DRAFT ROYAL DECREE APPROVED THE MINING SECURITY REGULATION.

I

The General Regulation of Basic Mining Safety Standards approved by Royal Decree 863/1985, of 2 April, established the minimum general rules to which the wide range of activities that constitute the mining or extractive industry would be subject, as well as those other works with equivalent characteristics such as the use of explosives or underground work of all kinds, in order to guarantee the safety not only of workers, but also of the space that surrounded them in terms of the environment, the soil or third parties, all within the framework of a better use of geological resources.

Although the publication of different complementary technical instructions during the years of validity of this Regulation has made it possible to adapt the regulations to technical progress, several factors make it necessary to amend this Regulation, such as: the extraordinary evolution of machinery and equipment, the establishment of the acquis communautaire on the prevention of occupational risks, the significant changes in a sector with a staff structure and typology of workplaces very different from the one existing in 1985, and the more than consolidated competence of the Autonomous Communities in the field of *mines*.

Since the entry into force of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, and more specifically with Royal Decree 1389/1997, of 5 September, approving the minimum provisions aimed at protecting the safety and health of workers in mining activities, the 1985 Regulation began to require constant and excessive interpretation.

Aware of this situation, Royal Decree 1389/1997 of 5 September 1997 made it compulsory to adapt the 1985 Regulation and its accompanying technical instructions to the acquis communautaire on the safety and health of workers. The fulfillment of this obligation of normative adaptation, although having largely exceeded the established period, becomes effective through this royal decree.

This Royal Decree unifies in a single text the specific mining safety standards, both from the point of view of mining-industrial safety and the safety and health of workers. Thus, the regulation is articulated as a development of the Mining Law and the Law on the Prevention of Occupational Risks, establishing, on the one hand, limits, and at the same time, a close collaboration, between the Public Administrations competent in the prevention of occupational risks and, on the other hand, an adequate fit between the general regulations of occupational and industrial safety and health and the specific regulations of the mining sector.

II

The sole article of this Royal Decree, whose purpose is the approval of the new Mining Safety Regulation, is accompanied by a set of additional and final provisions that come to restructure in a timely manner the matters and regulations affected by it and, in particular, aspects related to profit establishments, drilling, waste management and rehabilitation of the extractive industries or the use of explosives. The Regulation is then inserted, consisting of five titles.

Title I is intended for the general provisions which make it possible to direct, order and apply all the rules which make up the Regulation. On the basis of articles 117.1 of the Mining Act and 7.2 of the Occupational Risk Prevention Act, the scope of application is limited, as a whole, to open-pit, underground and drilling extractive industries. In addition, any work that requires the execution of blasts with explosives or other technologies in non-extractive activities will be subject to certain aspects of this Regulation. Finally, it is clarified that the technical requirements applicable to

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underground works established in the Mining Safety Regulation will apply to the drilling or excavation of tunnels or galleries in construction works when they are more rigorous or specific, amending for this purpose Royal Decree 1627/1997, of 24 October, which establishes minimum safety and health requirements in construction works.

This set of activities and works is none other than the very definition, and introduction into our law, of the legal concept of mining technique in clear reference to the opinion of the Council of State of December 18, 1997, as the set of methods, processes and / or procedures characteristic and unique that make up the activities that are developed in any extractive industry, as well as the works that require the use of explosives. The very specific knowledge of the conditions of the land or of the use of explosives is what makes the specialized administrative inspection (mine inspection) necessary and obligatory from the very phase of the projects, in order to make the administrative action the appropriate one in order to protect the safety and health of the workers. This should include excavation and maintenance of tunnels or galleries in construction works that share nature with underground mining, as the technical requirements in mining safety matters that are more rigorous or specific should also apply to these works.

Although it is for the Mining Authority, the competent regional body in the field of mines, to ensure the proper development of these activities and works, the Regulation establishes the necessary instruments for cooperation with the Labour and Social Security Inspectorate, all under the principles of cooperation, collaboration and coordination between public administrations, so as to ensure the monitoring and enforcement of compliance with the rules on the prevention of occupational risks, both general and sector-specific, as well as the correct investigation of accidents at work and occupational diseases.

In particular, and in relation to the division of competence in terms of prevention of occupational risks in profit establishments, the Regulation uses to differentiate the profit establishments that are located next to the extractive activity from those that are not, forming these latter, together with offices and other similar dependencies and (industrial) processing activities, the group of matters that fall under the competence of the Labour and Social Security Inspectorate in this sector. The reason is that there is no justification for the need for a specialized administration in facilities such as drying, calcination, agglomeration, treatment of industrial or urban waste or coal gasification, etc. In them it is difficult to find specificities or procedures of a marked mining nature, or with typical mining occupational risks. The “category” or mining condition of these facilities does exist depending on the workplace where they are located, as there may be various operations along or around the facility, such as the use of explosives, underground work, circulation of vehicles and machinery of large tonnage, large slopes, pulvigenic environment, large earth movements, large volume and high speed of material in line of treatment, etc.; i.e. a workplace bringing together extraction operations of mineral substances or raw materials and treatment for the preparation of such extracted materials for sale.

Due to the special characteristics of the extractive industry where the working environment itself is modified as a result of the logical evolution of the activity, the relationship of safety and health of workers with the safety of work, equipment and facilities is inseparable. Therefore, Title II of the Regulation establishes the indispensable existence of an optional direction, internal safety provisions, certification and approval of products and actions in the event of an accident. The Regulation maintains, as a critical element in mining safety, the figure of the optional management, while reorganizing and giving a primary role to the existence and correct application of internal safety provisions in each workplace.

The recent regulation of optional management by means of Order TED/252/2020 of 6 March 2020, the content of which remains practically unchanged in the corresponding supplementary technical instruction to this Regulation, had yet to be transposed to the cross-cutting legislation on the coordination of business activities. To this end, this Royal Decree adds an additional provision to Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities, thus adequately incorporating the custom and specific regulations of the extractive industries in relation to the preventive information to be exchanged by competing entrepreneurs in the workplaces of the sector and the measures to be adopted by the different parties involved in the mining operations.

III

Title III lays down the minimum requirements for the protection of the safety and health of workers in the opencast, underground and borehole extractive industries covered by Royal Decrees of 1996 and 1997 transposing, within the framework of Directive 89/391/EEC of 12 June, Directives 92/91/EEC of 3 November (borehole extractive industries) and 92/104/EEC of 3 December (opencast or underground extractive industries).

It is included in this Title III, and already at a national level, as other specific safety and health provisions of the mining sector, the risk management for exposure to dust and silica, the minimum professional training in safety and health that workers in this sector must possess, as a complement to that provided for in article 19 of the Law on Prevention of Occupational Risks, and the environmental conditions of underground work.

Title IV sets out the mining and industrial safety provisions and requirements to which open pit, underground or drilling works are subject, as well as profit establishments, mining waste facilities, exclusive electrical mine installations and blasting operations. The supplementary technical instructions to the previous Regulation have been revised and updated, while maintaining a large number of existing requirements. However, some new developments have been introduced.

First, without prejudice to the administrative authorisations to which mining work is subject by the mine management regulations as a public domain, the prior administrative authorisation of facilities, such as profit establishments, has been replaced by the communication procedure. In order for this replacement to be accompanied by an improvement in the safety conditions of these facilities, and in particular in the production lines (conveyor belts, mills, sorters, etc.) given their accidents, a new mandatory periodic inspection of the profit establishments has been arranged by the Mining Control Bodies (MCOs).

Secondly, certain aspects have been modified, including the abolition of the mobile mining machinery operator card, but maintaining mandatory requirements for its management, the introduction of a minimum periodic inspection of opencast work by a CMO and of mining waste facilities in operation, as well as the homogenisation in the content of all specific mining safety projects.

Thirdly, Title IV sets out the specific mining and industrial safety requirements for conducting drilling, including hydrocarbon drilling. Surveys for very low and low enthalpy geothermal uses as well as for groundwater research and lighting have been excluded from the scope of the Regulation. In the particular case of what is known as *water mining* in the Canary Islands, the Regulation specifies, in an additional provision, that they will continue to be considered as an underground extractive industry for all purposes, given their particular conditions and the mining techniques used in that territory.

Fourthly and lastly, Royal Decree 975/2009 of 12 June 2009 on mining waste installations and abandonment of work and Royal Decree 130/2017 of 24 February 2017 on explosives have been brought into line with the Regulation. With regard to the execution of blasts, it has been decided to delete the concept of special blasting and the specific administrative authorization for any blasting project has been redefined, homogenizing the relationship of the different Functional Areas of Industry and Energy of the Government Delegations and Subdelegations, as authorizers of the consumption of explosives, with the Mining Authorities, in their condition of specialized inspection of these works. This simplification of the two categories of blasting for administrative purposes, "special" and "non-special", into one category, "flying", also makes it necessary to correct in a timely manner Royal Decree 1000/2010 of 5 August 2010 on compulsory collegiate visas, when referring to these projects.

Title V establishes the sanctioning regime in matters of mining safety, requiring prior investigation of the file, in accordance with current legislation and without prejudice to the competences and regulatory developments of the Autonomous Communities.

IV

This Royal Decree is approved in accordance with the principles of necessity, effectiveness, proportionality, legal certainty, transparency and efficiency set out in Article 129 of Law 39/2015 of 1 October 2015 on the Common Administrative Procedure of Public Administrations.

In this sense, this standard is necessary, effective and proportional because it is the precise instrument to adapt the mining safety regulations contained in Royal Decree 863/1985, of April 2, and in its complementary technical instructions, and thus comply with the obligation of regulatory adaptation provided for in Royal Decree 1389/1997, of September 5. In addition, the principle of legal certainty is guaranteed since it is consistent with both the Mining Law and the Law on the Prevention of Occupational Risks. In application of the principle of transparency, the scope and objective have been clearly defined, and, in particular, the standard has been drafted with special attention to responding to the main axes or aspects proposed by the Mining Safety Commission, the highest advisory body of the Directorate-General for Energy Policy and Mines in matters of mining safety and where all the agents of the sector are represented (University, business representation, trade union representation, Autonomous Communities and other bodies).

Finally, this Royal Decree complies with the principle of efficiency, since it entails a significant reduction in administrative burdens associated with the prior authorisation scheme provided for in the 1985 Regulation, contributing to the rational management of existing public resources and allowing greater flexibility to the Mining Authorities when designing the inspection of mines by their seconded official staff.

This provision has been subject to the procedure for the provision of information on technical regulatory standards and regulations on information society services provided for in Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on information society services and Royal Decree 1337/1999 of 31 July 1999 on the provision of information in the field of technical standards and regulations and regulations on information society services.

The Royal Decree that is approved has been informed by the Ministry of Territorial Policy. Likewise, for the preparation of this royal decree, the mandatory procedure of hearing the interested parties and public information has been carried out. Finally, the Mining Safety Commission has reported it favourably.

This Royal Decree is issued in accordance with the provisions of Article 149(1). 7ª, 25ª and 26ª of the Constitution, which attributes to the State exclusive competence over labour legislation, the bases of the mining and energy regime and the regime of production, trade, possession and use of weapons and explosives, respectively.

Accordingly, on the proposal of the Second Vice-President and Minister for Labour and the Social Economy, and the Third Vice-President of the Government and Minister for the Ecological Transition and the Demographic Challenge, with the prior approval of the Minister for Territorial Policy, in agreement with the Council of State and after deliberation by the Council of Ministers at its meeting on XX XXXXX 20XX,

DISPOSAL:

Single article. Approval of Mining Safety Regulations

The Mining Safety Regulation was adopted, the text of which is inserted below.

First additional provision. Technical guide.

A non-binding technical guide for the practical application of the Regulation and its supplementary technical instructions will be kept up to date by the relevant management centre of the Ministry with competence in the field of mining safety, which may provide clarifications on general concepts.

Second additional provision. Application of technical requirements to the execution of soundings for very low and low enthalpy geothermal uses, as well as for groundwater research and lighting.

The drilling operations for very low and low enthalpy geothermal uses, as well as for the investigation and delivery of groundwater subject to the Regulation of the Public Hydraulic Domain, approved by Royal Decree 849/1986, of April 11, will be subject to the technical prescriptions of the complementary technical instruction ITC SM-IND-21 adapted to their specific conditions.

Third additional provision. Water mining in the Canary Islands

The underground hydraulic works and installations of the Canary Archipelago will be considered underground extractive industries of the Mining Safety Regulation for all purposes, adapted to their specific conditions and without prejudice to the corresponding legislative development in the autonomous community.

Fourth additional provision. Collaboration on the prevention of occupational risks between the Mining Authorities and the Labour and Social Security Inspectorate.

The mining authorities and the State Labour and Social Security Inspection Agency shall sign collaboration instruments to give effect to the principles of cooperation, collaboration and coordination between public administrations in the prevention of occupational risks provided for in Article 4.

First transitional provision. Adaptation of mobile mining machinery operator licences or certificates of fitness

The licenses or certificates of aptitude of mobile mining machinery operator already issued before the entry into force of this Royal Decree will continue to be valid until its expiration date, at which time the requirements for the operation of said machinery established in the Mining Safety Regulation approved by this Royal Decree must be met.

In the case of operators of mobile mining machinery holding licences or certificates of fitness more than five years old, these requirements shall be automatically understood as satisfied.

Second transitional provision. Mining Control Body (formerly known as Collaborating Administration Entities - ECAs) previously authorized.

Within one year of the entry into force of this Royal Decree, the Collaborating Entities of the Administration (ECAs) previously authorized, in order to continue carrying out their activity as Mining Control Bodies, must submit the responsible declaration regulated in Article 22 of the Mining Safety Regulation, enabling it to act throughout the State and for an indefinite period, without prejudice to the powers of verification, control and inspection of the Mining Authority.

Third transitional provision. Periodic inspections of active opencast work.

Opencast works that are active (in operation, paralyzed or temporarily suspended) will have the following deadlines to receive the first periodic inspection provided for in Article 25 of the Mining Safety Regulation:

Eighteen months for opencast work in workplaces with an affected area of more than 15 hectares and/or a total height of 60 metres or more.

Thirty-six months for opencast work in workplaces with an affected area of less than 15 hectares and a total height of less than 60 metres.

Fourth transitional provision. Periodic inspections of profit establishments.

Benefit establishments shall have the following deadlines to receive, for the first time, the periodic inspection provided for in Article 36 of the Mining Safety Regulations:

a) One year for profit establishments with conveyor belts put into service before 31 December 2009 or that do not prove the date of putting into service.

Two years for profit establishments with conveyor belts put into service from 1 January 2010.

Fifth transitional provision. Projects in process

Those projects that were in process at the entry into force of this Royal Decree will be instructed in accordance with Royal Decree 863/1985, of 2 April, and other regulatory provisions.

Sixth transitional provision. Disappearance of the fourth category in underground mines.

Mines defined as fourth category prior to the entry into force of this Royal Decree shall be considered as heavily grey or third category for all purposes, having to comply with the requirements established for them within six months from the entry into force of this Royal Decree.

Single derogatory provision. Regulatory repeal.

Any provisions of equal or lower rank that are contrary to the provisions of this Royal Decree and specifically:

1. Mining and Metallurgical Police Regulations of 23 August 1934 (Decree 2540/1960 of 22 December; Decree 1466/1962 of 22 June; Decree 416/1964 of 6 February and Decree 2991/1967 of 14 December).

2. Chapter IV of Royal Decree 3255/1983 of 21 December 1983 approving the Mining Statute

3. Royal Decree 863/1985 of 2 April 1985 approving the General Regulations on Basic Mining Safety Standards.

4. Royal Decree 1389/1997 of 5 September 1997 approving minimum requirements to protect the safety and health of workers in mining activities.

5. Order of 13 September 1985 approving certain supplementary technical instructions to Chapters III and IV of the General Regulations on Basic Mining Safety Standards.

6. Order of 2 October 1985 approving supplementary technical instructions for Chapters V, VI and IX of the General Regulations on Basic Mining Safety Standards.

7. Order of 20 March 1986 approving certain additional technical instructions relating to Chapters IV, V, IX and X of the General Regulation on Basic Mining Safety Standards.

8. Order of 29 April 1987 amending Supplementary Technical Instruction 10.2-01 'Explosives-Use'.

9. Order of 22 March 1988 approving supplementary technical instructions to Chapters II, IV and XIII of the General Regulations on Basic Mining Safety Standards.

10. Order of 27 March 1990 approving Supplementary Technical Instruction 04.7.05 of Chapter IV of the Basic Mining Safety Standards Regulation.

11. Order of 16 April 1990 approving the supplementary technical instructions to Chapter VII of the General Regulations on Basic Mining Safety Standards.

12. Order of 19 April 1994 approving certain supplementary technical instructions relating to Chapters IV and V of the General Regulations on Basic Mining Safety Standards.

13. Order of 29 July 1994 amending Additional Technical Instruction 10.3.01 'Special Blast Explosives' of Chapter X 'Explosives' of the General Regulation on Basic Mining Safety Standards.

14. Order of 2 February 1998 amending ITC 04.4.01, 'Underground Works. Cables", approved by Order of 13 September 1985.

15. Order ITC/101/2006 of 23 January 2006 regulating the minimum content and structure of the document on safety and health for the extractive industry.

16. Order ITC/1683/2007 of 29 May 2007 amending supplementary technical instructions 09.0.02, 12.0.01 and 12.0.02 and repealing supplementary technical instruction 12.0.04 of the General Regulation on Basic Mining Safety Standards.

17. Order ITC/1316/2008 of 7 May 2008 approving supplementary technical instruction 02.1.02 'Preventive training for the performance of the job' of the General Regulations on Basic Mining Safety Standards.

18. Order ITC/1607/2009, of 9 June, approving Supplementary Technical Instruction 02.2.01 "Entry into service, maintenance, repair and inspection of work equipment" of the General Regulation on basic mining safety standards.

19. Order ITC/2107/2009 of 28 July 2009 amending Order ITC/1683/2007 of 29 May 2007 amending supplementary technical instructions 09.0.02, 12.0.01 and 12.0.02 and repealing supplementary technical instruction 12.0.04 of the general regulation on basic mining safety standards.

20. Order ITC/2060/2010, of 21 July, amending Supplementary Technical Instruction 02.2.01 "putting into service, maintenance, repair and inspection of work equipment" of the General Regulation of Basic Mining Safety Standards, approved by Order ITC/1607/2009, of 9 June.

21. Order ITC/2699/2011 of 4 October 2011 amending supplementary technical instruction 02.1.02 "Preventive training for the performance of the job" of the General Regulations on Basic Mining Safety Standards, approved by Order ITC/1316/2008 of 7 May 2008.

22. Order ETU/995/2017 of 6 October 2017 approving supplementary technical instructions to Chapter IX "Electricity" of the General Regulations on Basic Mining Safety Standards.

23. Order TEC/1146/2018 of 22 October 2018 approving additional technical instruction 04.7.06 "Control of toxic gases in the atmosphere of underground activities" and amending additional technical instruction 05.0.02 "Specifications for underground coal mines and work at risk of explosion. Limit contents of methane in the air stream", of the General Regulations of Basic Standards of Mining Safety.

24. Order TED/252/2020 of 6 March 2020 amending Supplementary Technical Instructions 02.0.01 "Optional Directors" and 02.1.01 "Document on Safety and Health" and repealing Supplementary Technical Instruction 09.0.10 "assembly, operation and maintenance personnel" of the General Regulation on Basic Mining Safety Standards.

25. Order TED/723/2021 of 1 July 2021 approving Supplementary Technical Instruction 02.0.02 ‘Protection of workers against the risk of inhalation of respirable crystalline silica and dust’ of the General Regulation on Basic Mining Safety Standards.

26. Resolution of 9 June 2008 of the Directorate-General for Energy Policy and Mines approving technical specification number 2000-1-08 ‘Preventive training for the performance of the position of operator of transport, truck and dump machinery in outdoor extractive activities’ of supplementary technical instruction 02.1.02 ‘Preventive training for the performance of the job’ of the General Regulation on Basic Mining Safety Standards.

27. Resolution of 9 June 2008 of the Directorate-General for Energy Policy and Mines approving technical specification N.° 2001-1-08 ‘Preventive training for the performance of the position of operator of starter/loader/railway machinery, loader and hydraulic excavator of chains, in outdoor extractive activities’ of Supplementary Technical Instruction 02.1.02 ‘Preventive training for the performance of the job’ of the General Regulation of Basic Mining Safety Standards.

28. Resolution of 7 October 2008 of the Directorate-General for Energy Policy and Mines approving technical specification n.° 2002-1-08 ‘Preventive training for the performance of starter/loader and drilling/flying operator positions; mincer, borer and mining assistant, in indoor extractive activities" of the Complementary Technical Instruction 02.1.02 "Preventive training for the performance of the job", of the General Regulation of Basic Standards of Mining Safety.

29. Resolution of 18 November 2010 of the Directorate-General for Energy Policy and Mines approving technical specification number 2003-1-10 "Preventive training for the performance of jobs falling within groups 5.1 (a), (b), (c) and 5.2 (a), (b), (d), (f) and (h) of Supplementary Technical Instruction 02.1.02 "Preventive training for the performance of the job", of the General Regulations on Basic Mining Safety Standards".

30. Resolution of 18 November 2010 of the Directorate-General for Energy Policy and Mines approving technical specification number 2004-1-10 "Preventive training for the performance of jobs falling within groups 5.4 (a), (b), (c), (d), (e), (f), (g), (h), (j), (k), (l), (m), and 5.5 (a), (b) and (d) of paragraph 5 of

Supplementary Technical Instruction 02.1.02 "Preventive training for the performance of the job", of the General Regulations on Basic Mining Safety Standards".

31. Resolution of 18 November 2010 of the Directorate-General for Energy Policy and Mines approving technical specification number 2010-1-01 'Inspection of wheel loaders' of additional technical instruction 02.2.01 'Entry into service, maintenance, repair and inspection of work equipment' of the General Regulation on Basic Mining Safety Standards, approved by Order ITC/1607/2009 of 9 June 2009.

32. Resolution of 16 October 2014 of the Directorate-General for Energy Policy and Mines approving Technical Specification No. 2005-1-11 "Worker's Personal Training Book and Record Book of Courses Received" of Supplementary Technical Instruction 02.1.02 "Preventive Training for the Performance of the Workplace" of the General Regulations on Basic Mining Safety Standards.

33. Resolution of 16 October 2014 of the Directorate-General for Energy Policy and Mines, amending technical specification number 2001-1-08 "Preventive training for the performance of the position of operator of starter/loader/rail machinery, loader and hydraulic excavator of chains, in outdoor extractive activities", of complementary technical instruction 02.1.02 "Preventive training for the performance of the work station", of the General Regulation of Basic Mining Safety Standards.

34. Resolution of 19 December 2014, of the Directorate-General for Energy Policy and Mines, amending that of 18 November 2010, approving technical specification 2010-1-01 "Inspection of wheel loaders", of additional technical instruction 02.2.01 "Entry into service, maintenance, repair and inspection of work equipment" of the General Regulation of Basic Mining Safety Standards, approved by Order ITC/1607/2009, of 9 June.

35. Resolution of 14 September 2017, of the Directorate-General for Energy Policy and Mines, approving technical specification 2011-01-17 "Inspection of rigid frame dumpers on wheels", of complementary technical instruction 02.2.01 "Entry into service, maintenance, repair and inspection of work equipment", approved by Order ITC/1607/2009, of 9 June, of the General Regulation of Basic Mining Safety Standards.

36. Resolution of 14 September 2017, of the Directorate-General for Energy Policy and Mines, approving technical specification 2012-01-17 "Inspection of articulated castor dumpers on wheels", of complementary technical instruction 02.2.01 "Entry into service, maintenance, repair and inspection of work equipment", approved by Order ITC/1607/2009, of 9 June, of the General Regulations on Basic Mining Safety Standards.

First final provision. Amendment of Royal Decree 2857/1978, of 25 August, approving the General Regulations for the Mining Regime.

Royal Decree 2857/1978, of 25 August, approving the General Regulations for the Mining Regime, is amended as follows:

One. Article 1(4) is amended to read as follows:

> "4. Occasional extraction of mineral resources of minor technical and economic importance, whatever their classification, provided that it is carried out by the owner of the land on which they are located, for their exclusive and private use, without the excavation surpluses being able to move outside the property or being placed on the market for the purpose of marketing the resources obtained or products incorporating them, is outside the scope of the Mining Law and this Regulation.'

Two. Article 112 is amended to read as follows:

"1. The competent mining authority shall not declare the expiry of an authorisation, permit or concession until the authorised restoration plan has been implemented in accordance with Article 5.7 of Royal Decree 975/2009 of 12 June 2009.

The holders of the mining rights who have proceeded to execute the restoration plan, and the closure of the mining waste facilities where appropriate, when definitively abandoning the works, are obliged to leave them in good safety conditions for people and things, and will proceed to the abandonment of work in accordance with the provisions of Article 15 of Royal Decree 975/2009, of 12 June.

2. Once an authorisation, permit or concession has expired, the provisions of Article 88 of the Law shall apply.

Once the financial guarantee provided for in Article 42 of Royal Decree 975/2009 of 12 June 2009 and, where applicable, Article 43 have been released, the holder may freely dispose of the machinery and installations owned by him. However, where the withdrawal of such licences would adversely affect the use of the hatchery in its own concession or in concessions held by others, the competent mining authority may prohibit them until such time as it issues a favourable report.

If the prohibition becomes definitive, the interested party will be entitled to compensation, justified in the manner indicated by the Law on Forced Expropriation. In this case, the appropriate file must be investigated, subject to all the formalities and guarantees, without exception, provided for in the Law and Regulation of Forced Expropriation, both as regards the period in which the temporary retention or occupation of the machinery and facilities proceeds or must subsist and in the case of expropriation if the suspension of the withdrawal of those must be definitive.

In the case of installations in the territorial sea or continental shelf, the requirements imposed by the competent bodies must also be complied with.

Holders of expired rights shall not be exonerated from liability for damages that may arise from non-compliance with the provisions of this Article."

Three. A new paragraph 5 is added to Article 138:

"5. The authorisation provided for in paragraph 1 is limited to the rational use of resources and the protection of the environment. The intervention and surveillance regime of the Administration on the construction, commissioning and operation of these facilities, for mining safety purposes, will follow the provisions of the Mining Safety Regulation."

Second final provision. Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

A new additional provision is added to Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

"Fourth additional provision. Implementation of the Royal Decree in the extractive industries.

The activities carried out in the extractive industries, which are regulated by the Mining Safety Regulation, will be governed by the provisions of the aforementioned Royal Decree. For the purposes of this Royal Decree, the following shall be taken into account:

a) The information that the owner must provide to the competing entrepreneurs of article 7, will be provided through the document on safety and health regulated by article 10.2 of the Mining Safety Regulation.

b) The means of coordination in the mining sector will be those established in the Mining Safety Regulations, as well as any other complementary that may be established by the concurrent companies in the mining exploitation. It is up to the optional management, provided for in Article 6 of the Mining Safety Regulation, to organise the means of coordination.'

Third final provision. Amendment of Royal Decree 975/2009 of 12 June 2009 on the management of waste from the extractive industries and the protection and rehabilitation of the area affected by mining activities.

Royal Decree 975/2009 of 12 June 2009 on the management of waste from the extractive industries and the protection and rehabilitation of the area affected by mining activities is amended as follows:

One. Article 15 is amended to read as follows:

"Article 15. Definitive abandonment of harvesting work.

"1. Within Part II of the restoration plan, and in close relationship with the rest of the rehabilitation work, the operator will present a preliminary project for the definitive abandonment of harvesting work.

2. At the end of the exploitation, when the operator must proceed to the definitive rehabilitation and abandonment of the exploitation, it shall present, before the competent authority in matters of mining safety, a project of definitive abandonment of work in which it will be justified, with the measures adopted and to be adopted to guarantee the safety of persons and property, how the final situation foreseen in the authorized restoration plan is reached.

3. The operator shall carry out the corresponding work and, once completed, shall apply for authorisation to permanently abandon the holding.

4. The definitive abandonment of the harvesting works can only be considered to have been carried out after the competent mining safety authority has, within one year, carried out a final on-site inspection, assessed all the reports submitted by the operator and communicated to the operator its authorisation for the abandonment, and provided that it has been certified through a control body that complies with the provisions of Annex III to this Royal Decree that the final situation of the land affected by the exploitation of mineral resources and its ancillary facilities and services does not pose any danger to the safety of persons.

5. The authorisation of the abandonment by the competent authority shall under no circumstances diminish the responsibilities of the operator in accordance with the conditions of the authorisation or other legal obligations.

6. If the operator abandons the operation and its ancillary facilities and services without having obtained the appropriate authorisation from the competent authority, the competent authority shall subsequently take the necessary security measures to safeguard the safety and interests of third parties, without prejudice to administrative penalties and liabilities."

Two. Article 44(2) is amended to read as follows:

"[…] 2. The competent authority may require the inspections referred to in the previous paragraph to be carried out by a control body which complies with Annex III. In any case, a control body complying with Annex III shall carry out an inspection every five years in order to verify compliance with the restoration plan."

Three. Annex III is amended to read as follows:

"**ANNEX III**

Control bodies

A control body shall be understood as any public or private entity that, meeting certain requirements, verifies compliance with the provisions of this Royal Decree through audits and inspections of the exploitation of mining resources and their related services and facilities.

In what is not specifically provided for in this Royal Decree, the control bodies shall be governed by the provisions of Article 22 of the Mining Safety Regulations.

Where an undertaking, at the request of the competent authority, requests the report of a control body, it may freely select the control body to be entrusted with the provisions of this Royal Decree from among all those authorised. The company may not limit access to the exploitation and its services and facilities annexed to the control body nor may it hinder the actions of the control body, and must collaborate.

Fourth final **provision. Amendment of Royal Decree 1000/2010 of 5 August 2010 on compulsory collegiate visas.**

Article 2(e) of Royal Decree 1000/2010 of 5 August 2010 on compulsory collegiate visas is amended as follows:

"(e) Project for blasting provided for in Article 42 of the Mining Safety Regulation."

Fifth final **provision. Amendment of Royal Decree 130/2017 of 24 February 2017 approving the Explosives Regulation.**

Royal Decree 130/2017 of 24 February 2017 approving the Explosives Regulation is amended as follows:

One. Article 119(4)(f) is amended to read as follows:

'(f) To comply with the application requirements laid down in these regulations and in the Mining Safety Regulations.'

Two. Paragraphs (d) and (f) of Article 119(5) are amended to read as follows:

"(d) Operational procedures to be used for work with explosives. […]

f) In the case of entities that perform blasts: Types of blasts for which authorisation is sought, in accordance with the Mining Safety Regulation.'

Three. Article 120(1)(c) and (e) are amended to read as follows:

"(c) The name and location of the work centre for which the explosive is intended, indicating the municipality where it is located, and a copy of the approval of the blasting project. [...]

e) Name, surname and D.N.I. or NIE of the person responsible for the work or blasting equipment and of the person designated for the delivery of the order."

Four. Article 124(1) is amended to read as follows:

"1. The personnel involved in the processes of handling and consumption of explosives, designated by the company consuming explosives, will be the one listed below and will have the functions indicated for each one:

a) The person in charge of the work team or blasting, which is the competent technician who, in addition to the functions entrusted to him by his position, and to meet the requirements for his appointment in the case that he handles or uses explosives, according to paragraph 2, must guard and guarantee the correct use of the explosive material. You must also sign the records of use of explosives and prove that the data contained in them are true.

b) The person in charge of keeping the Consumer Book-Registration.

Other persons handling or manipulating explosives (gunners and assistant gunners). They shall be responsible for the correct use of the explosives and, where appropriate, for any other obligations entrusted to them by the person responsible for the work or blasting equipment.

In the case of blasting in extractive activities, without prejudice to the provisions of Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, regarding the coordination of business activities, the above designations must be approved by the optional management of the workplace. The person responsible for the work equipment or blasting may be the optional management itself or a competent technician of the optional equipment."

Five. Article 125(1) is amended to read as follows:

"1. As regards the execution of blasts, the aforementioned Mining Safety Regulation shall apply to everything that does not conflict with the provisions of this Regulation.'

Sixth final provision. Jurisdictional title.

1. This royal decree has a basic character and is approved under the provisions of paragraph 25 of Article 149.1 of the Spanish Constitution, which attributes to the State the competence in basic matters of the mining and energy regime.

2. However, Titles I, II, III and V, as well as the additional technical instructions that develop them, constitute labour legislation under Article 149(1)(7) of the Spanish Constitution.

3. In addition, Article 9 and Chapter VIII of Title IV are issued under paragraph 26 of Article 149.1 of the Spanish Constitution, which reserves to the State exclusive competence over the regime of production, trade, possession and use of weapons and explosives.

Seventh final provision. Amendment of Royal Decree 1627/1997 of 24 October 1997 laying down minimum safety and health requirements at construction sites.

One. A new additional provision is added to Royal Decree 1627/1997 of 24 October 1997 laying down minimum safety and health requirements for construction works, which reads as follows:

'Second additional provision. Minimum provisions designed to protect the safety and health of workers in the drilling or excavation of tunnels or galleries on construction sites.

Work consisting of the drilling or excavation of tunnels or galleries in construction works shall be governed by the provisions contained in this Royal Decree. Notwithstanding the foregoing, and provided that they are more stringent or specific, the requirements established in Articles 8, 9, 17.3, 29.1 and 2, 30.2, 39.4 of the Mining Safety Regulation, approved by Royal Decree XX/XXXX, of XXXX of XXXX, shall apply.'

Two. The single additional provision on the presence of preventive resources in construction works becomes the first additional provision.

Eighth final provision. Mining Safety Commission.

Within one year, the Government will update, by means of a joint ministerial order of the persons in charge of the ministries for the Ecological Transition and the Demographic Challenge and for Labour and Social Economy as provided for in Article 22.2 of Law 40/2015, of 1 October, on the Legal Regime of the Public Sector, the functioning of the Mining Safety Commission, a collegiate advisory body of the corresponding management centre of the Ministry with competences in matters of mining safety. This ministerial order will replace Royal Decree 783/1984 of 22 February 1984 amending the Greyhound and Mining Safety Commission.

Ninth Final Provision. Enabling for regulatory update.

The holder of the Ministry with competence in mining safety is empowered to approve, in order, the complementary technical instructions for the development and implementation of the Mining Safety Regulations.

The creation, modification or updating of the supplementary technical instructions of Title III shall require the mandatory and binding report of the Ministry of Labour and Social Economy.

The relevant management centre of the Ministry with competence in mining safety is empowered to modify, by means of a resolution, the list of standards included in ITC SM-COM-05, when the year of edition of any of the standards varies, or subsequent amendments to them are edited.

Tenth final provision. Entry into force.

This Royal Decree shall enter into force on 2 January XXXX.

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TITLE I. GENERAL PROVISIONS.

Article 1. Subject matter

1. The purpose of this Regulation is to lay down the minimum safety and health requirements for workers, as well as the safety conditions for installations, equipment and products, in the activities and work referred to in Article 2.

2. The provisions of the implementing regulations of the Law on the Prevention of Occupational Risks and of the industrial regulations apply to the whole area referred to in Article 2, without prejudice to the coordination instruments and the specific provisions present in this Regulation.

Article 2. Scope.

1. This Regulation shall apply to work in the open-pit, underground and drilling extractive industries regulated by Law 22/1973 of 21 July 1973 on . Mines.

2. Likewise, any work not included in paragraph 1 that requires the execution of blasts shall comply with the requirements contained in Articles 4, 5, 6.7, 7.4, 8, 9 and from 42 to 46.

3. The following are excluded from the scope of this Regulation:

Even if they form part of the workplaces in which any of the activities referred to in paragraph 1 are carried out, auxiliary work or administrative premises such as offices, sanitary facilities or retail premises.

Benefit establishments not located in or adjacent to the places of work in which any of the activities referred to in paragraph 1 are carried out, and, in any event, the places where processing activities linked to such establishments take place.

Article 3. Definitions.

For the purposes of this Regulation, the following definitions shall apply:

a) Processing activities: activities aimed at the procurement, repair, maintenance, modification or reuse of industrial products, packaging and packaging, including melting operations, industrial thermal processes and metallurgical processes.
b) Mining Authority: competent body in the field of mines and which has the competences (i) in the prevention of occupational risks in the activities and works regulated by this regulation and (ii) of administrative control in matters of mine-industrial safety.
c) Work centre: sets of areas and workplaces in which extractive industries activities are carried out.
d) Optional address: Competent technician, appointed by the employer, who takes care of the safety aspects of the activity by supervising the functioning of the workplaces of a workplace.
e) Internal security provisions: a set of instructions that regulate the internal activity of the activity, specifically adapting the Mining Safety Regulation.
f) Safety and health document: documentation relating to the preventive action provided for in Law 31/1995 of 8 November 1995 on the prevention of occupational risks for the extractive industry sector. In particular, it is that document in which the process of elaboration, implementation and form of application of preventive planning in the company is reflected, in addition to referring to how the prevention of occupational risks has been integrated into its management.
g) Optional equipment: qualified and commissioned technicians, appointed by the employer, who, being under the supervision of the optional management, perform functions for the correct and safe development of the extractive activity.

h) Benefit establishment: installation where preparation, concentration and profit activities are carried out for the sale of the extracted materials.
i) Semi-mobile or transportable profit establishment: Set of self-propelled, hauled or towed mobile machinery and/or components on wheels or chains that can be moved from one workplace to another or from one place to another in the same workplace.
j) Mining rescue station: Location or facility to house the necessary personal and material means, including self-contained breathing equipment and means of transport, to deal with emergency situations in underground activities at risk of fire, gas detachment or explosive dust.
k) Mining operation: underground or surface sites where, in particular, mineral exploration activities involving soil alteration by mechanical means, mineral extraction, and preparation, including crushing, grinding, concentrating or washing, of extracted material are carried out, and all machinery, equipment, accessories, installations, buildings and civil engineering structures used in connection with such activities.
l) Extractive industries (opencast, underground or surveyed): all industries carrying out the activities regulated by Law 22/1973 of 21 July 1973, and specifically:
   - the actual extraction of mineral materials in the open air, underground or by drilling and/or,
   - prospecting for such extraction, and/or,
   - preparation, concentration and profit for the sale of the extracted materials, excluding processing activities of the extracted materials.
m) Mining waste facility: Article 3.7(g) of Royal Decree 975/2009 of 12 June 2009.
n) Electrical mine installation: all equipment and associated circuits intended for a particular purpose: production, conversion, processing, transmission, distribution or use of electrical energy in the work of extractive industries.
o) Mining-industrial facility: set of equipment, structures, pipelines, fixed machinery, and/or instruments, intended for the operation of the extractive industries. It includes the concept of profit establishment, fixed or semi-mobile, electrical mine installation, as well as any other installation of an assimilable industrial type (pressure equipment, oil, storage of chemicals, fire protection, etc.).
p) Production line (of a mining profit establishment): a set of sequential operations in which a process of preparation, concentration or profit of the extracted materials is organised in order to obtain a product for sale or subsequent use.
q) Auxiliary working premises: rest rooms, for on-call staff, services, canteens and first aid.
r) Premises for sale to the public: constructions or installations of a fixed and permanent nature intended for the regular exercise of commercial activities, in which customers are served in person, either to sell products or to provide them with some service.
s) Workplaces: all the places where jobs directly or indirectly related to extractive activities are to be established, including sterile deposits and other storage areas and, where appropriate, accommodation, to which workers have access by reason of their work.
t) Mobile mining machine: self-propelled work equipment for extraction, loading and transport operations in extractive activities.
u) Substantial change: any variation in a project, mining operation or mining-industrial installation, as well as in the characteristics and functioning of the activity, which may have an impact on the safety or health of persons, property or the environment.
   The following shall be expressly considered a substantial modification:
   - Any modification or expansion of a mining-industrial installation that involves an increase in installed capacity of more than 50%.
   - An increase of more than 50% in the production capacity of a mining-industrial facility.
   - The replacement or change of the method of exploitation.

- In an open pit mining operation, the increase of the affected area or the increase of more than 25 % of the total expected volume of earth, sterile and mineral movement.
- In an open pit mining operation, the increase in bank heights by more than 25%, compared to the initial project.
- In an underground mining operation, the modification of the applied support system that causes an increase in the unsupported free span by more than 50%.
- In blasting projects, the change in the type of explosive used, in the loading and firing schemes or in the protection distances.
- Any modification that is either considered substantial or important in accordance with the criteria defined in the applicable regulations in force, in the field of industrial safety and the environment.

v) Mining Control Bodies (MCOs): those natural or legal persons who, having the capacity to act and having the necessary technical, material and human resources and impartiality and independence, are constituted with the purpose of verifying compliance with the mining-industrial safety conditions and requirements established in this Regulation, in collaboration with the Mining Authority.

w) Geothermal resource: the concentration of heat that exists in the Earth's crust in such a form and quantity that its economic extraction is currently or potentially possible. Depending on the temperature level, its use is classified as:

i. Between 5° and 25°, very low enthalpy.
ii. Between 25° and 90°, low enthalpy.
iii. Between 90° and 150°, half enthalpy.
iv. More than 150°, high enthalpy.

x) Blasting: operation aimed at the fragmentation and desired displacement of the rocky massif or other materials, through the controlled use of explosives or other technologies (pyrotechnics, pressure gas).

y) Watcher: person in charge of the supervision of operations, who is assigned the status of preventive remedy to the extent that the conditions provided for in the Law on the Prevention of Occupational Risks and its subsequent regulatory developments are met.

Article 4. Public Administration competent in the prevention of occupational risks.

1. The Mining Authority is the competent Public Administration in matters of prevention of occupational risks in the activities and works regulated by this Regulation in accordance with the provisions of article 117.1 of the Mining Law and article 7.2 of the Law on Prevention of Occupational Risks, without prejudice to the competence of the Labour and Social Security Inspectorate in matters not affected by this Regulation.

2. The inspection function of the Mining Authority includes the tasks (i) to monitor and enforce compliance with this Regulation, (ii) to investigate accidents at work and occupational diseases and (iii) to provide technical assistance to companies, workers and public administrations.

3. The officials attached to the Mining Authority who carry out this inspection function have the character of a public authority and are authorized to enter freely and without prior notice in any work center and carry out any measure of investigation, examination, reconstruction or evidence, which will be endowed with presumption of certainty unless proven otherwise.

4. The Mining Authority and the Labour and Social Security Inspectorate shall relate to each other on the basis of the principles of cooperation, collaboration and coordination between public administrations, so as to ensure the monitoring and enforcement of compliance with the rules on the prevention of

occupational risks, both general and specific to this Regulation, and the proper investigation of accidents at work and occupational diseases.

The Mining Authority, without prejudice to the obligations of companies regarding the communication of accidents at work, will transmit to the Labour and Social Security Inspectorate those investigation reports in which the existence of corporate responsibility is concluded. These reports shall be provided with a presumption of certainty so that the Labour and Social Security Inspectorate may initiate, where appropriate, the corresponding procedure for proposing a benefit surcharge in accordance with Article 164 of Royal Legislative Decree 8/2015 of 30 October 2015 approving the recast text of the General Law on Social Security, as well as any other administrative penalty procedure for breach of obligations excluded from the scope of this Regulation.

In any case, if the Mining Authority has knowledge of facts that could be subject to inspection in labour and / or social security matters, it will transfer them to the Labour and Social Security Inspectorate. In the same way, if the Mining Authority has knowledge of facts that could constitute a criminal offence, it will transfer them to the Public Prosecutor's Office.

Article 5. Administrative Control of Mining-Industrial Safety

1. The Mining Authority may at any time verify compliance with mining-industrial safety provisions and requirements, ex officio or at the request of an interested party in cases of significant risk to persons, property or the environment.

2. In order to comply with the mining and industrial safety provisions and requirements provided for in Title IV, the Mining Authority may carry out this verification through Mining Control Bodies.

3. The Ministry with competence in mining safety may promote, in collaboration with the respective Autonomous Communities, plans and campaigns, of a national nature, to verify, by sampling, the mining-industrial safety conditions of mining activities, facilities, equipment and products, the Mining Authority being responsible for the execution of the same in its territory.

TITLE II. COMMON PROVISIONS.

Article 6. Optional team and management.

1. Every workplace must be under the direction and control of an optional management, which will be assisted, where appropriate, by an optional team, and with the assiduous assistance of as many vigilantes and preventive resources as determined by the document on safety and health.

2. The optional management, and the personnel of the optional team who perform functions that require it, in terms of skills and competence, shall follow the provisions of article 117 of the Mining Law.

3. The optional address will be designated by the entrepreneur and communicated by electronic means to the Mining Authority.

4. The designation procedure and minimum functions of the optional management and its optional team are set out in ITC SM-COM-02.

5. The Mining Authority, respecting the principles of necessity and proportionality, may require a specific dedication to the optional management, understanding as such their physical presence, when the circumstances of the case and the characteristics of the workplace so require.

6. The presence of preventive resources will be entrusted to the vigilantes to the extent that the conditions provided for in the Law on Prevention of Occupational Risks and its subsequent regulatory developments are met.

7. The person responsible for the execution of blasts with explosives or other technologies in non-extractive activities shall follow the provisions of article 117 of the Mining Act.

Article 7. Internal security provisions.

1. Every workplace will have internal safety provisions for the correct fulfillment of the requirements of this Regulation with the aim of guaranteeing the safety and health of workers, the correct development of the work and operation of the facilities, the safe use of work equipment and the prevention of serious accidents with consequences for human health or the environment.

2. Internal safety arrangements shall be approved by the optional management and included in the safety and health document.

3. The articles and the different technical instructions of the Regulation shall indicate the need to establish a specific internal safety provision, the minimum content of which shall include written instructions, working procedures and safe operating modes, work authorisations and periodic checks of safety measures and/or periodic reviews and maintenance of machinery and work equipment.

4. In the case of non-extractive activities, safe working procedures and operating modes shall be approved by the person responsible for the execution of blasts.

Article 8. Accidents, salvage.

1. The employer must inform, within twenty-four hours, the Mining Authority of all fatal and serious accidents that occur and of any situation of serious danger, without prejudice to any other obligation of communication or notification imposed by the labor legislation in force.

The employer shall review the safety and health document and, if necessary, update it, in any case recording such review and the measures taken.

2. The procedure for handling and reporting accidents and incidents is set out in ITC SM-COM-03.

3. The employer shall ensure that adequate means of evacuation and rescue are in place and maintained so that workers, in the event of danger, can evacuate workplaces without difficulty, quickly and in complete safety.

All underground work with the danger of fire, detachment of gases or explosive dusts, will have a rescue station equipped with the necessary material to deal with emergency situations. The personnel of the rescue station must be composed of persons with proven mining experience.

Article 9. Certifications and approvals.

1. To be placed on the market, the products, equipment, equipment and materials used in the activities and works subject to this Regulation must comply with the requirements established in the Spanish

legislation transposing the Community implementing Directives, which require the relevant CE marking and the corresponding EC or EU declaration of conformity, among other documents.

2. In addition to the above, there are products or equipment that do not fall within the scope of the Community Directives, in which case, for use in the activities and works regulated in this Regulation, they must comply with the requirements established in the ITC SM-COM-04, and must be duly certified and / or approved before use.

3. In addition, and irrespective of the existence of Community Directives for placing on the market and having the corresponding CE marking, these additional technical instructions may lay down, for certain products or equipment used in the activities covered by this Regulation, specific requirements for use, installation or maintenance.

TITLE III. MINIMUM PROVISIONS INTENDED TO PROTECT THE SAFETY AND HEALTH OF WORKERS.

Article 10. General obligations.

1. In order to ensure the safety and health of workers, the employer shall take the necessary measures to ensure that:

Workplaces are designed, constructed, equipped, put into service, used and maintained in such a way that workers can perform the tasks assigned to them without compromising their safety, health or those of other workers.

The operation of workplaces where there are workers is supervised by an optional management.

c) Work involving a specific risk is entrusted only to competent workers and such work is carried out in accordance with the instructions given.

d) All safety instructions are comprehensible to all affected workers.

e) There are adequate facilities for first aid.

f) The necessary safety practices are carried out at regular intervals.

2. The employer shall ensure that a document on safety and health, hereinafter referred to as a 'safety and health document', containing the relevant requirements referred to in Chapters III and V of Law 31/1995 of 8 November 1995 on the Prevention of Occupational Risks, is drawn up and kept up to date. The document on safety and health of workers shall demonstrate in particular:

a) That the risks to which workers are exposed in the workplace have been identified and evaluated.

That appropriate measures will be taken to achieve the objectives set out in this Title.

c) That the design, use and maintenance of the workplace and equipment are safe.

That document shall be available to the labour and health authorities, as well as prevention delegates and workers' representatives in the field of safety and health.

The safety and health document must be prepared before the start of work and must be revised in the event of major modifications, extensions or transformations in the workplace.

3. The preparation of this document will have the advice and support required by the entrepreneur as provided for in Chapter IV of Law 31/1995, of November 8, including, at least, a university technical person with sufficient competence and experience in the extractive industry sector.

4. Through the ITC SM-PRL-06, the minimum content and structure of the document on safety and health is developed, as well as the requirements for its preparation and revision.

5. Where workers from several undertakings are in the same place of work, each employer shall be responsible for all aspects under its control, except as provided for in the provisions in force in cases of subcontracting. The employer who is the head of the establishment shall coordinate the implementation of all measures relating to the safety and health of workers and shall specify in the document on safety and health the subject matter, measures and detailed rules for the implementation of such coordination and shall monitor compliance with them by other employers operating at the establishment. Coordination shall not affect the liability of individual employers and self-employed persons provided for by the legislation in force.

Article 11. Fire protection.

The employer must take the measures and precautions appropriate to the type of holding in order to:

Prevent, detect and combat the onset and spread of fires and explosions; and

b) Prevent the formation of explosive atmospheres or harmful to health.

Article 12. Open communication systems.

The employer shall take the necessary measures to provide the necessary alarm systems and other means of communication to enable, where necessary, the immediate start-up of relief, evacuation and rescue operations.

Article 13. Information to workers.

1. Without prejudice to Articles 18, 36 and 38 of the Law on the Prevention of Occupational Risks, workers or their representatives shall be informed of all measures to be taken concerning safety and health in the workplace, in particular those relating to the application of Articles 10 to 12 of this Regulation.

2. The information shall be comprehensible to the workers concerned.

Article 14. Health surveillance.

1. The employer shall ensure adequate surveillance of the health of workers according to the risks related to their safety and health at work, with the extension and conditions established in Article 22 of the Law on the Prevention of Occupational Risks, and in Royal Decree 39/1997, of 17 January, on the Regulation of Occupational Risk Prevention Services, and the Public Administrations shall establish the appropriate means for the evaluation and control of health actions carried out in companies, through the actions indicated in Chapter VI of Title IV of Law 33/2011, of 4 October, General of Public Health.

2. The measures referred to in the previous paragraph will allow each worker to benefit from or be subject to health surveillance, before being assigned to tasks related to the activities referred to in Article 2.1 and subsequently at regular intervals, in accordance with the provisions of current legislation, collective agreements and company agreements.

3. The health surveillance activities and services referred to in this article may maintain collaboration with the National Health System, in accordance with the provisions of Article 38 of the Regulation of Occupational Risk Prevention Services.

Article 15. Consultation and participation.

1. The consultation and participation of workers and their representatives on the conditions referred to in this Regulation shall take place in accordance with the provisions of Chapter V of Law 31/1995 of 8 November 1995 on the Prevention of Occupational Risks.

2. In addition to the provisions of the previous paragraph, in any underground mining operation, a security mining delegate will be appointed, who will be elected from among the prevention delegates by a majority of the operation's personnel by secret ballot. In addition, an alternate mine safety delegate shall be appointed who, elected by the same procedure, shall replace him during his temporary absences.

Both the security mining delegate and his or her deputy must have been in operation for at least five years. In exceptional cases where there is no worker with the necessary seniority, they must have proven experience in underground holdings.

Where the staff of the establishment in which he is elected exceeds 250 workers, the dedication to the position shall be full, being released during the time of his term of office from any activity of his professional category.

In addition to the functions defined for the prevention delegates in Chapter V of Law 31/1995, of November 8, the functions of the security mining delegate will be:

(i) Carry out the necessary studies and research to reach a permanent and updated knowledge of the risks existing in the workplace, derived from the work environment, raw materials, machinery and tools and work systems and processes

(ii) Prepare a quarterly report of activities in which it will detail its actions, visits and investigations carried out, the situation of the exploitation in terms of safety and health, anomalies found and prevention measures proposed and adopted. This is without prejudice to, and irrespective of, any extraordinary reports it issues on the occasion of a major or fatal accident, casualty or any other emergency situation; and

(iii) Carry out those missions that the Committee on Safety and Health, within its competences, delegates or entrusts to it.

The term of office of the security mining delegates shall be four years and shall end with the end of the term of office, as a result of dismissal from the staff of the holding, physical incapacity to hold office, revocation agreed upon by two thirds of the staff of the holding or resignation from office.

3. The security mining delegate, as well as his alternate, shall be part of the Committee on Safety and Health defined in Article 38 of Law 31/1995 of 8 November 1995.

Article 16. Minimum health and safety requirements.

Workplaces, as well as modifications, extensions or transformations to existing workplaces, shall comply with the minimum health and safety requirements set out in Annexes I and II to this Regulation.

Article 17. Other health and safety provisions.

1. The dust originated, as well as its content in respirable crystalline silica, will be the subject of special consideration for the purpose of prevention of pneumoconiosis and other respiratory diseases of occupational origin, caused by exposure to inorganic dust, with special attention to silicosis and lung

cancer. To this end, ITC SM-PRL-07 establishes the obligations, measures and information necessary for dust control.

2. Workers who carry out their usual work in the activities regulated by this Regulation must have minimum training in occupational safety and health and periodically retrained, in a manner complementary to that provided for in Article 19 of Law 31/1995 of 8 November 1995. To this end, ITC SM-PRL-08 establishes the scope, content and characteristics of this preventive training.

3. The environmental conditions of underground work shall be those which allow workers to be protected from health risks. To this end, ITC SM-PRL-09 establishes the obligations, measures and information necessary for the control of environmental conditions, which include the limitations of concentrations of chemical and carcinogenic agents, as well as of temperature.

TITLE IV. MINERAL-INDUSTRIAL SECURITY.

CHAPTER I. Common provisions.

Article 18. Projects.

1. The projects referred to in this Regulation shall describe the exploitation work and/or the execution works of the mining-industrial installation in sufficient detail so that they can be assessed and interpreted unequivocally during their execution and must be signed by a competent technician.

2. In particular, the projects shall define the works and/or projected works in detail appropriate to their characteristics, including, where appropriate, the margins of variation of the technical parameters, so that it can be verified that the proposed solutions comply with the basic requirements of this Regulation and other applicable regulations. This definition shall include at least a descriptive report, drawings and budget, including supporting calculations, on the effectiveness of measures to ensure compliance with this Regulation, its supplementary technical instructions and other applicable rules.

3. Standard projects, the implementation of which may be repetitive, shall be accepted provided that such projects establish the margins of variation of the technical parameters and the most adverse conditions under which the activity or work can be carried out safely. The standard projects shall be reviewed no more frequently than five years.

Article 19. Conditions in the development of the work.

1. The start, continuity and suspension of work in the extractive industries shall be subject to the authorization of the exploitation or research project, including its substantial modifications, and the work plan, in accordance with the sectoral regulations of mining management.

2. The development of the work in the extractive industries will be carried out subject to the exploitation project, developed in the successive work plans (including the restoration plan), the prescriptions issued by the Mining Authority and the instructions issued by the optional management, as well as the applicable legislation and good practices of mining work.

Article 20. Conditions for the construction, commissioning, extension and modification of a mining-industrial facility.

1. Mining-industrial facilities will require the presentation of a project carried out by a competent technician before the Mining Authority.

By way of derogation from the previous paragraph, the specific chapters for each type of installation and the additional technical instructions may provide for the replacement of the project by a simpler document in cases where the less hazardous nature and conditions of those installations so advise.

2. For the commissioning of the mining-industrial installations, once the works of execution of the installation have been completed and before the commissioning of the installation, the owner shall submit, to the Mining Authority, a responsible declaration issued by the construction manager stating that the installation meets the regulatory conditions, conforms to the project or document presented, its operation is correct and the corresponding tests have been carried out, required in the complementary technical instructions of this Regulation as well as those prescribed by the other legal provisions and / or industrial regulations that affect it.

3. The extensions and modifications of the mining-industrial facilities that do not substantially affect them will be communicated to the Mining Authority and may be carried out without the need to submit additional documentation if, within a period of one month, the Mining Authority does not determine otherwise. In another case, when the Mining Authority so determines, or when the modification of the facilities substantially affects them, it will be necessary to present a project or detailed documentation of the modifications to be made.

4. Mining-industrial facilities will be registered in the Integrated Industrial Register regulated in Title IV of Law 21/1992, of July 16, on Industry, and its regulatory regulations for development.

Article 21. Mobile mining machinery and other work equipment.

1. The provision of work equipment to workers, as well as its maintenance and repair, shall follow the general requirements and procedures set out in ITC SM-IND-10.

2. An internal safety provision will regulate the use and maintenance of mobile mining machinery (revisions, repair, use, traffic and parking).

3. People working with shovel loaders, dump trucks and excavators must meet the requirements developed in the ITC SM-IND-11.

Article 22. Mining Control Bodies (MCOs).

1. CMOs may verify compliance with the mining and industrial safety conditions and requirements set out in this Regulation at the request of the Mining Authority or on a mandatory basis if the specific provisions of this Title IV so provide.

In addition to the CMOs, Control Bodies may be used in the field of other industrial safety regulations, provided that the scope of their accreditation covers the requirements and specific scope subject to inspection established in this Regulation.

2. The requirements and obligations of the CMOs, their fields of action within the scope of this Regulation, the specific scope of the inspection activity for each field of action, their obligation and periodicity, are set out in JTI SM-IND-12.

3. The CMOs, when acting within the scope of this Regulation, shall be governed, in so far as is not specifically regulated in this Article, by the provisions for the Control Bodies in the Regulation on Infrastructure for Quality and Industrial Safety approved by Royal Decree 2200/1995 of 28 December 1995.

4. Those who, having obtained their accreditation, wish to exercise their activity as a CMO must previously submit a responsible declaration to the Mining Authority, through which they must state the activities they intend to carry out and that for this purpose they meet the relevant requirements required both in the Infrastructure Regulation for Quality and Industrial Safety, and in this Regulation, and have the documentation that proves it and the documentation proving that they have insurance, guarantee or another equivalent financial guarantee that covers their civil liability.

5. The responsible declaration entitles the CMO, from the moment of its presentation, to act throughout the State and for an indefinite period, without prejudice to the powers of verification, control and inspection of the Mining Authority.

The Mining Authority shall inform the relevant management centre of the Ministry responsible for mining safety of the CMOs which have submitted the relevant declaration of responsibility in accordance with the provisions of this Article.

CHAPTER II. Open-air work.

Article 23. Project for the exploitation of open-cast work.

1. The project for the operation of opencast works shall contain all the studies and data necessary to justify and define the operation, its characteristics, as well as the safety measures envisaged to prevent damage to persons, property and the environment, and shall justify compliance with the requirements laid down in this Regulation and its supplementary technical instructions, as well as any other applicable legal requirements.

2. Its content shall comply with ITC SM-IND-13.

3. The development of the opencast work exploitation project will be carried out in the annual work plans.

Article 24. Design and development of open pit work.

1. The design and development of open pit mining operations will follow the requirements and obligations set out in JTI SM-IND-14, which aims to prevent damage to people, property and the environment.

2. The development of the work will attend to the following aspects:

2.1 Maintain the design parameters projected, and specifically in:

Front and slopes.

Work benches and berms.

c) Tracks and accesses.

2.2 Comply with the requirements during the execution of production, conservation and maintenance tasks, and specifically in:

a) Start-up, loading and transport operations.

b) Sanitation of the front; control of banks and berms.

Control of the water table.

Traffic.

d) Signalling and/or encirclement of the holding.

3. Internal security provisions will regulate the measures to comply with these requirements during the execution of the tasks.

Article 25. Periodic inspections.

1. The work of the open pit extractive industries must be subject to at least one CMO inspection every three years, in order to verify compliance with mining and industrial safety requirements, as well as their adjustment to the exploitation project and its work plans.

2. This frequency may be reduced by the Mining Authority.

Article 26. Inspections of mobile mining machinery designed for open pit operations.

1. Mobile mining machinery designed for open pit operations shall be subject to a technical inspection by a CMO in order to verify the outcome of the repair and maintenance operations carried out.

2. The inspection deadlines according to the age of the equipment, as well as the inspection procedures, are included in the ITC SM-IND-10 and its technical development specifications.

CHAPTER III. Underground labor.

Article 27. Underground work exploitation project.

1. The underground work operation project shall contain all the studies and data necessary to justify and define the operation, its characteristics, as well as the safety measures envisaged to prevent damage to persons, property and the environment, and shall justify compliance with the requirements laid down in this Regulation and its supplementary technical instructions, as well as any other applicable legal requirements.

2. Its content shall comply with ITC SM-IND-15.

3. The development of the project will be carried out in the annual work plans.

Article 28. Authorizations of new works or resumption.

1. In addition to the provisions of article 19, the beginning, or the resumption after a prolonged stop of underground work, will require administrative authorization by the Mining Authority.

2. To this end, the Mining Authority will be presented with a project of underground work that shows compliance with the specifications required by the complementary technical instructions of this Regulation, as well as those prescribed by the other legal provisions that affect it.

However, as indicated in the previous paragraph, the supplementary technical instructions may provide for the replacement of the project by a simpler document in cases where the less dangerous nature and conditions of such work so advise.

3. Modifications to underground works that do not substantially affect them shall be communicated to the Mining Authority and may be made without the need to submit additional documentation if, within a

period not exceeding one month, the competent body does not determine otherwise. In another case, when the Mining Authority so determines, or when the modification of the work substantially affects them, it will be necessary to present a project or detailed documentation of the modifications to be made.

Article 29. Design and development of underground works.

1. The design and development of underground mining operations shall follow the requirements and obligations set out in the accompanying technical instructions listed below, which aim to prevent damage to persons, property and the environment:

- ITC SM-IND-16

- ITC SM-IND-17

- ITC SM-IND-18

- ITC SM-IND-19 e,

- ITC SM-IND-20

2. The development of the work will attend to the following aspects:

2.1 Maintain the parameters of projected design, and in particular:

a) Accesses, exits and signage.

b) Extraction. Wells. Machinery, winches, braking devices, cages or skips and cables.

c) Transport of people, machinery and/or minerals.

d) Support.

Method of exploitation.

Ventilation.

Drainage.

2.2 Comply with the requirements during the execution of production, conservation and maintenance tasks.

3. Internal security provisions will regulate the measures to comply with these requirements during the execution of the tasks.

Article 30. Underground work with potentially explosive atmospheres, with propensity to fires and with risk of gasodynamic phenomena.

1. Underground work, in whole or in part, shall be classified with regard to the presence of potentially explosive atmospheres (fuel gases and flammable dusts), as well as the risk of propensity to fire and gasodynamic phenomena.

2. The definition of the method of exploitation shall take into account, in addition to the general requirements for the underground work exploitation project, the risks, requirements and prevention and protection measures provided for in ITC SM-IND-20.

CHAPTER IV. Polls.

Article 31. Project for the execution of surveys.

1. The project for the implementation of surveys shall contain all the studies and data necessary to justify its implementation, its characteristics, as well as the security measures envisaged to prevent damage to persons, property and the environment, and shall justify compliance with the requirements laid down in this Regulation and its supplementary technical instructions, as well as any other legal requirements for its implementation.

2. In the case of dissolution and leaching operations and underground gasification, the project shall justify the periodic survey plan by means of appropriate techniques, in accordance with the rate of growth of the cavities, in order to control their evolution.

Article 32. Polls.

1. The specific mining and industrial safety requirements of the mining and quarrying industries shall be governed by the provisions of this chapter.

2. Surveys are classified as research, exploitation or technological for the purposes of this Regulation.

3. The design and implementation of the surveys will follow the requirements and obligations set out in ITC SM-IND-21, which aims to prevent harm to people, property and the environment.

4. In addition to the provisions of Article 19, the Mining Authority shall be notified at least three working days in advance of the start of the execution of the surveys.

Article 33. Medium and high enthalpy geothermal resources.

1. During the resource collection operations, the well will be equipped with the necessary equipment and materials to prevent eruptions. The aquifers crossed and the formation containing the geothermal resource shall be adequately protected.

2. If the exploited geothermal fluid is high-enthalpy vapour, or any other high-temperature fluid, appropriate complementary measures shall be taken.

3. Pressure and temperature surveys will be carried out at the bottom of the well, periodically reporting the results obtained to the Mining Authority.

Article 34. Hydrocarbons.

1. Hydrocarbon research and exploitation surveys shall be governed by their specific regulations, with minimum and supplementary application of the requirements and obligations established in ITC SM-IND-21.

2. In marine operations, Royal Decree 1339/2018 of 29 October 2018 implementing Royal Decree-Law 16/2017 of 17 November 2017 laying down safety provisions for the research and exploitation of hydrocarbons in the marine environment applies.

CHAPTER V. BENEFITS.

Article 35. It's a profit-making event.

1. Benefit establishments are subject to the requirements of the constructive and industrial technical regulations in what is not specifically regulated in this chapter.

2. The production lines of the profit establishments shall be designed in accordance with the requirements and obligations set out in ITC SM-IND-22, the objective of which is to prevent damage to persons, property and the environment.

3. An internal security provision shall regulate the use and maintenance of the benefit establishment.

4. Semi-mobile profit establishments shall be subject to the requirements of this Chapter, adapted to their specific conditions.

Article 36. Periodic inspections of profit establishments.

1. Beneficiary establishments must undergo at least one inspection of a CMO every two years in order to verify compliance with the mining and industrial safety requirements of the production line and, formally, with the other requirements of the industrial regulations that apply to them.

2. The inspection of the CMO, which will follow the provisions of ITC- SM- IND-22, will indicate:

a) Correspondence with the original project or its modifications.

b) That the production line meets the required requirements.

That the corresponding periodic reviews have been carried out, in accordance with the applicable industrial regulations.

CHAPTER VI. Mining waste facilities.

Article 37. Coordination with the management of waste from the extractive industries and protection and rehabilitation of the area affected by mining activities.

1. The requirements for the design, operation, maintenance and decommissioning of mining waste facilities, as part of the waste management plans of the restoration plan for the mining activity, are set out in Royal Decree 975/2009 of 12 June 2009 on the management of waste from the extractive industries and the protection and rehabilitation of the area affected by mining activities.

2. In addition, the development of the work in the mining waste facilities will follow the requirements established in this Regulation.

3. An internal safety provision shall regulate the operation or operation and monitoring of the mining waste facility.

Article 38. Periodic inspections.

The work of operating or operating mining waste facilities must be subject to at least one CMO inspection every five years in order to verify compliance with mining-industrial safety requirements, as well as their compliance with the construction project of the mining waste facility.

CHAPTER VII. Electricity.

Article 39. Electrical installations for exclusive use in mines.

1. Electrical installations on underground holdings are considered to be for exclusive use in mines. These facilities will be subject to the mining-industrial safety requirements set out in this chapter.

2. In addition, with regard to the technical requirements that are not established here referring to the aforementioned installations, those indicated in Royal Decree 842/2002, of 2 August, approving the electrotechnical regulation for low voltage, Royal Decree 223/2008, of 15 February, approving the Regulation on technical conditions and safety guarantees in high voltage power lines and Royal Decree 337/2014, of 9 May, approving the Regulation on technical conditions and safety guarantees in high voltage electrical installations will apply.

3. Electrical installations in profit establishments and opencast mines are not considered to be mine-exclusive and, in this case, the relevant industrial regulations must be followed.

4. ITC SM-IND-23 lays down the technical requirements for mine-exclusive electrical installations.

Article 40. Commissioning and maintenance.

1. The commissioning and use of mine-exclusive electrical installations shall follow the procedure laid down in Article 20 of the Regulation, with the following specificities:

a) The electrical mine installation must be reviewed by the person in charge of electrical maintenance in order to verify the correct execution and safe operation of the same.

Where so determined in ITC-SM-IND-12, the installation shall be subject to an initial inspection by a CMO.

c) Installation certificate duly completed by the Mining Authority or by the competent body of the Autonomous Community will be required for the purposes of supply.

2. Any exclusive mine electrical installation will have an electrical maintenance manager, whose appointment must be communicated to the Mining Authority.

3. An internal safety arrangement will regulate the use and maintenance of mine exclusive electrical installations.

Article 41. Periodic inspections.

Without prejudice to the power that, in accordance with Article 5 of this Regulation, the Mining Authority has to carry out, by itself, the inspection and control actions it deems necessary, compliance with the mining and industrial safety provisions and requirements established by this Regulation, its complementary technical instructions and, the electrotechnical regulations, must be verified, where appropriate, by a CMO accredited in this regulatory field.

To this end, ITC SM-IND-23 determines:

a) The content of the project or technical design report of the new facilities or modifications.

b) Installations and modifications, repairs or extensions of installations that must be subject to initial inspection, before being put into service.

Installations to be subject to periodic inspection.

Time limits for periodic inspections.

CHAPTER VIII. Blasts.

Article 42. Blasting project.

1. The blasting project shall contain the set of studies and data necessary to justify and define the basic parameters of the blasting, as well as the safety measures envisaged to prevent damage to persons, property and the environment, and shall justify compliance with the requirements laid down in this Regulation and its supplementary technical instructions, as well as any other applicable legal requirements.

2. Its minimum content shall be in accordance with ITC SM-COM-24.

3. In accordance with Article 18(3), standard projects may be accepted where the blasts constitute or are to constitute a repetitive activity, all of which comply with the technical parameters and measures provided for in the first blast. The entities carrying out blasts shall carry out the periodic review of the standard project, as provided for in Article 18.3.

4. The following modifications to a blasting project shall require approval by the Mining Authority:

Type of explosive used.

Loading and firing schemes, including the initiation system.

Protection distances to persons or property.

Article 43. Execution of blasts.

1. In addition to the provisions relating to the consumption of explosives laid down in Title VII 'Use of explosives' of Royal Decree 130/2017 of 24 February 2017 approving the Explosives Regulation, the execution of blasts shall be subject to the requirements of this Chapter.

2. The design, execution of blasts and requirements, both general and specific, shall follow the requirements and obligations set out in ITC SM-IND-25, the objective of which is to prevent damage to persons, property and the environment.

3. Entities performing blasting shall submit a specific blasting project, prepared by a competent technician, to the Mining Authority for prior approval.

4. The approval of the blasting project, by the Mining Authority, will include the amount of explosives to be used by individual blasting and the projected cumulative total or the term of the project.

As established by the Explosives Regulation in its article 120.1 c), a copy of this approval of the blasting project will be included in the documentation to be submitted to the Functional Area of Industry and Energy of the Subdelegation or Government Delegation, by the authorized explosives consumer company, for the request for the supply order.

The Functional Area of Industry and Energy of the Government Delegation or Subdelegation, in view of the aforementioned approval of the blasting project, will record the supply orders associated with each blasting project, for the purposes of carrying out the controls established in Article 44.1.

5. An internal security provision will regulate the use and handling of explosives.

6. In the case of demolitions or blasts underwater, as well as in those cases in which the Mining Authority prescribes it due to the distances of protection to people or goods, the company or entity consuming authorized explosives must communicate to the Mining Authority the date and time of the shooting, with a minimum of seven days in advance.

Article 44. Inspection of blasting.

1. In accordance with the provisions of Articles 4 and 5 of this Regulation, the Mining Authority shall exercise the inspection and sanctioning functions in relation to the execution of blasts, being the exclusive competence of the Functional Area of Industry and Energy of the Delegation or Subdelegation of the Government the control of the supply orders made by the consumers of explosives and the control of the consumption quantities, monthly and total, approved by the Mining Authority.

2. For these purposes, the Mining Authority and the Industry and Energy Functional Area of the Delegation or Sub-delegation of the corresponding Government will relate to each other based on the principles of cooperation, collaboration and coordination between Public Administrations, so as to ensure interoperability and safety in the procedures and in the execution of blasts.

TITLE V. PENALTY SCHEME.

Article 45. Penalty regime for mining safety.

1. Without prejudice to the development, where appropriate, of sanctioning legislation of the Autonomous Communities in the field of mining-industrial safety (Title IV), the sanctioning regime in the field of mining safety shall comply with the provisions of this Title.

2. Infringements may not be punished without prior investigation of the appropriate file, in accordance with the special administrative procedure in this matter, on a proposal from the Mining Authority, without prejudice to the responsibilities of another order that may occur.

3. For the determination of the prescription of the infractions, the amounts of the sanctions or the expiration of the same, the provisions of the current legislation will be complied with.

4. The exercise of the sanctioning power with respect to mining safety violations will be exercised by the organs and with the distribution limits determined by each Administration.

Article 46. Work stoppage

When the official staff of the Mining Authority finds that the non-observance of the obligations of this Regulation, in any activity or work subject to it, implies, in their opinion, a risk to the safety of persons, the integrity of the surface or the protection of the environment, they shall communicate this fact to the Mining Authority as a matter of utmost urgency for the suspension of the activity or work in accordance with the provisions of Article 116.2 of the Mining Law.

ANNEX I. Minimum health and safety requirements in the opencast or underground extractive industries.

Part A. Common minimum provisions applicable to open-pit or underground extractive industries and surface dependencies

1. Monitoring and organisation.

1° Organization of workplaces.

Workplaces must be designed in such a way as to ensure adequate protection against risks of any kind. They shall be maintained in good condition by removing or keeping under control any hazardous substances or deposits in such a way as not to compromise the safety and health of workers.

Workplaces shall be designed and constructed in an ergonomic manner, taking into account the need for workers to have an overview of the operations carried out on their jobs.

Where workstations are occupied by isolated workers, they must be adequately monitored or able to keep in touch by means of telecommunications.

2° Optional direction.

All workplaces occupied by workers must at all times be under the direction and control of an optional management which has the necessary skills and competences for this function in accordance with the legislation in force and which has been designated by the employer.

The employer himself may assume responsibility for the workplace referred to in the previous paragraph if he has the skills and competences necessary for this function in accordance with the legislation in force and if he habitually carries out his professional activity at the workplace.

3° Surveillance.

Surveillance shall be available in order to ensure the protection of the safety and health of workers during all operations carried out; such supervision must be exercised by persons with the skills and competences necessary for this function in accordance with the legislation in force, who have been designated by the employer and are acting on his behalf.

Where the safety and health document so requires, a guard must visit the workstations occupied at least once during each work shift.

The employer himself may assume the supervision referred to in the first and second subparagraphs if he has the skills and competence necessary for that purpose, in accordance with the law.

4° Competent workers.

In all workplaces occupied by workers, there must be a sufficient number of workers with the skills, experience and training necessary to perform the tasks assigned to them.

5° Information, instructions and training.

Workers shall receive the information, instructions, training and retraining necessary to preserve their safety and health.

The employer must ensure that workers are given comprehensible instructions so as not to jeopardise their safety and health or those of other workers.

Information on occupational risks will be made through prevention delegates wherever they are established, in accordance with the provisions of article 18.1 of the Law on Prevention of Occupational Risks.

6° Written instructions.

Written instructions defining the standards to be observed to ensure the safety and health of workers and the safe use of equipment and facilities shall be drawn up for each workplace.

Such instructions shall also include instructions concerning the use of emergency equipment and the measures to be taken in the event of an emergency at or near the workplace.

7° Safe operating modes.

Safe operating modes shall be applied for each workplace or for each activity.

8° Work Authorization.

A system of work authorization shall be established for the execution of dangerous work and for the execution of work normally without danger but which may cause serious risks by interfering with other operations.

The work authorization must be issued by a responsible person, before the start of the work, and must specify the conditions to be met and the precautions to be taken, before, during and after the work.

9° Periodic checks of safety and health measures.

The employer shall organise regular checks of the measures taken with regard to the safety and health of workers, including the health and safety management system, to ensure compliance with the requirements of this Royal Decree.

Periodic checks on safety and health measures and the safety and health document shall be made available to the competent authorities as well as to workers' representatives.

2. Mechanical and electrical equipment and installations.

1° General.

The choice, installation, commissioning, operation and maintenance of mechanical and electrical equipment must take into account the safety and health of workers, taking into account the provisions applicable to them.

If they are located in an area where there is or may be a risk of fire or explosion due to the ignition of gas, vapours, coal dust or volatile liquids, they shall be adapted to the use of that area.

Such equipment shall be equipped with the required protective features and fail-safe systems.

2º Specific provisions.

Mechanical equipment and installations shall be sufficiently robust, free from apparent defects and appropriate for their intended use.

Electrical equipment and installations shall have sufficient capacity and power for their intended use.

Mechanical and electrical equipment and installations shall be installed and protected in such a way as to prevent any danger.

3. Maintenance.

1º General maintenance.

An appropriate plan shall be established which shall provide for the systematic inspection, maintenance and, where appropriate, verification of mechanical and electrical equipment and installations.

The maintenance, inspection and verification of any part of the plant or equipment shall be carried out by competent personnel.

Inspection and verification sheets shall be properly drawn up and archived.

2º Maintenance of safety equipment.

Appropriate safety equipment in good working order must always be kept ready for use.

Maintenance shall be carried out taking into account the activities carried out.

4. Protection against the risks of explosion, fire and harmful atmospheres.

1º General.

Measures should be taken to assess the presence of harmful and potentially explosive substances in the atmosphere and to measure the concentration of such substances.

Where required by the safety and health document, monitoring equipment shall be installed which automatically and continuously records gas concentrations at specific points, an automatic alarm device, automatic disconnection systems for electrical installations and automatic shut-down systems for internal combustion engines.

Where automatic measurements are provided, the measured values shall be recorded and retained.

Smoking shall be prohibited in areas where there is a specific risk of fire or explosion.

It shall also be prohibited to use naked flames there or to carry out work likely to involve a risk of inflammation, unless sufficient precautions have been taken to prevent the occurrence of a fire or explosion.

2º Protection against explosion hazards.

All necessary measures shall be taken to prevent the formation and accumulation of explosive atmospheres.

In areas at risk of explosion, the necessary measures must be taken to prevent the ignition of explosive atmospheres.

An explosion prevention plan should be established indicating the equipment to be used and the necessary measures to be taken. All personnel should also be trained in the handling of emergency devices.

3º Protection against harmful atmospheres.

Where harmful substances accumulate or may accumulate in the atmosphere, the necessary measures shall be taken to: remove them at source or extract them at source or dispose of them or, where it is impossible to take the above measures, dilute the accumulations of those substances so that there is no risk to workers.

The system shall be able to disperse such harmful atmospheres in such a way that there is no risk to workers.

b) Without prejudice to the provisions of the Mining Safety Regulations, and in areas where workers may be exposed to atmospheres harmful to health, adequate breathing and resuscitation equipment must be available in sufficient numbers.

In such cases, the presence at the workplace of a sufficient number of workers who know how to handle such equipment shall be ensured.

Protective material shall be properly stored and maintained.

When toxic gases exist or may exist in the atmosphere, a protection plan must be available indicating the available equipment and the preventive measures to be taken.

4º Protection against fire hazards.

Wherever workplaces are designed, constructed, equipped, operated, used or maintained, appropriate measures shall be taken to prevent the onset and spread of fires from the points identified in the safety and health document.

Measures must be taken to ensure that any fire conate is controlled quickly and effectively.

Workplaces shall be equipped with appropriate fire-fighting devices and, as required, with fire detectors and alarm systems.

Non-automatic fire-fighting devices shall be easily accessible and tampered with and, if necessary, protected against the risk of deterioration.

A fire safety plan shall be maintained in the workplaces themselves, indicating the measures to be taken, in accordance with Articles 8, 10, 11, 12 and 13 of the Regulation, to prevent, detect and combat the onset and spread of fires.

e) Fire-fighting devices must be marked in accordance with the provisions of current legislation.

Such marking must be affixed in appropriate places and must be durable.

5. Explosives and blasting devices.

The storage, transport and use of explosives and blasting devices shall be carried out by duly authorised competent persons.

These operations shall be organised and executed in such a way as to avoid any risk to workers.

6. Circulation routes.

1° Workplaces must be safely accessible and evacuated quickly and safely in the event of an emergency.

2° Traffic routes, including stairways, fixed ladders and loading docks and ramps, shall be so calculated, sized and situated that they can be used easily, safely and in accordance with their intended use by the person on foot or by vehicles and that workers employed in the vicinity of these traffic routes are not at risk.

3° The calculation of the dimensions of the roads used for the movement of persons and/or goods will depend on the potential number of users and the type of activity.

Where means of transport are used on roads, provision must be made for a sufficient safety distance for persons on foot.

4° Roads intended for vehicles must pass at a sufficient distance from doors, gates, footsteps, corridors and stairs.

5° The route of the traffic and access routes must be clearly marked to ensure the protection of workers.

6° If vehicles or machines have access to workplaces, the necessary traffic rules shall be laid down.

7. Outdoor workplaces.

1° Workstations, roads and other outdoor sites and installations occupied or used by workers during their activities must be designed in such a way that the movement of persons and vehicles can be carried out safely.

2° Outdoor workplaces shall have sufficient artificial lighting when daylight is not and shall, as far as possible, be so conditioned that workers:

a) Be protected against inclement weather and, if necessary, against falling objects.

Are not exposed to harmful sound levels or to harmful external factors (e.g. gases, vapours, dust).

They are able to leave their workplace quickly in case of danger or are able to receive assistance quickly.

d) Are protected against slips or falls.

Where the fitting-out of workstations is not possible, personal protective equipment shall be used.

8. Hazard zones.

1° Hazard areas must be clearly marked.

2° If workplaces contain danger areas due to the nature of the work, with the risk of worker falls or objects, these places must be equipped and properly marked with devices that prevent, as far as possible, unauthorized workers from entering these areas.

3° Appropriate measures must be taken to protect workers who are authorized to enter danger zones.

9. Emergency routes and exits.

1° In case of danger, all workstations must be able to be evacuated quickly, in conditions of maximum safety for workers.

2° Emergency routes and exits must remain expedited and lead as far as possible to the outside or to a safe area, a meeting point or a safe evacuation station.

3° The number, distribution and dimensions of emergency routes and exits will depend on the use, equipment and dimensions of the workplaces, as well as the maximum number of people that may be present in them.

4° Emergency doors shall be closed, but shall be capable of being opened outwards and installed in such a way that any person who needs to use them in an emergency can easily and immediately open them.

Sliding or revolving emergency doors shall be prohibited.

5° Emergency doors must not be locked.

Emergency routes and exits, as well as traffic routes and doors giving access to them, must not be obstructed by any object, so that they can be used unimpeded at any time.

6° In the event of illumination failure, roads and emergency exits requiring illumination shall be equipped with safety lighting of sufficient intensity.

7° Specific emergency routes and exits must be marked in accordance with current legislation.

10. Means of evacuation and rescue.

1° Workers should be informed of appropriate measures to be taken in the event of an emergency.

2° Rescue equipment shall be available ready for use in easily accessible and conveniently located locations and shall be marked in accordance with the provisions of the legislation in force.

11. Safety and evacuation practices.

Safety and evacuation practices must be carried out at regular intervals in normally occupied workplaces.

These practices shall in particular be aimed at training and checking the suitability of workers responsible, in the event of danger, for specific tasks requiring the use, handling or operation of emergency equipment.

Where necessary, other workers must also be able to use, handle or operate such equipment.

12. First aid equipment.

1° First aid equipment adapted to the activity carried out shall be available in all places where working conditions so require.

Such equipment shall be properly signposted and easily accessible.

2° When the importance of workplaces, the type of activity that takes place in them and the frequency of accidents require it, one or more premises must be assigned to first aid.

Instructions on first aid to be given in the event of an accident shall be clearly displayed in such premises.

3° Premises for first aid shall be equipped with essential first aid facilities and equipment and shall be easily accessible for stretchers.

They must be marked in accordance with the provisions of current legislation.

4° First aid equipment must also be available in all places where working conditions require it.

5° The necessary training on the use of first aid equipment should be provided to a sufficient number of workers.

13. Natural and artificial lighting.

1° All workplaces must be equipped in their entirety with lighting capable of providing adequate lighting for the tasks performed in them.

2° Workplaces shall, as far as possible, have sufficient natural light and, taking into account climatic conditions, be equipped with devices enabling adequate artificial lighting to ensure the safety and health of workers.

3° The lighting installations of work rooms and communication routes shall be so arranged that the type of lighting envisaged does not present a risk of accident to workers.

4° Workplaces where workers are exposed to hazards in the event of failure of artificial lighting shall have safety lighting of sufficient intensity.

Where this is impossible, workers shall be provided with individual lighting.

5° In the review established in the first final provision of this Royal Decree, the minimum parameters of sufficient lighting will be determined.

14. Sanitary facilities.

1° Clothing and wardrobes for clothes.

Appropriate changing rooms must be available to workers when they are required to wear special work clothes and cannot be required, for reasons of health or propriety, to change into another unit.

The changing rooms must be easily accessible, have sufficient capacity and be equipped with seats.

b) These changing rooms must be of sufficient size and have the means to allow each worker to keep his clothes under lock and key during working time.

If circumstances so require (e.g. hazardous substances, moisture, dirt or odours), the work clothes cabinets should be separated from the street clothes cabinets.

The necessary means must be put in place so that each worker can dry his work clothes.

Separate changing rooms for men and women or separate use of them should be provided.

d) When the changing rooms are not necessary, each worker must have a space to place his clothes.

2° Showers and washbasins.

Sufficient and adequate showers shall be made available to workers when required by the type of activity or healthiness.

Men's and women's shower rooms must be separated or their use must be provided for separately by men and women.

Shower rooms must be of sufficient size to allow each worker to be undisturbed and in adequate hygienic conditions.

Showers should be equipped with hot and cold water as well as soap.

Sufficient and appropriate washbasins with hot and cold water should be installed in the vicinity of workstations and changing rooms.

Separate lavatories for men and women or separate use of such lavatories shall be provided where this is necessary for reasons of decorum

3° Toilets and washbasins.

Workers must have in the vicinity of their workstations, rest rooms, changing rooms and shower or sink rooms specially equipped with a sufficient number of toilets and sinks.

Provision should be made for separate lavatories for men and women or separate use of such lavatories.

In the case of underground extractive industries, the sanitary facilities provided for in this point may be installed on the surface.

15. Sterile tanks and other storage areas.

Sterile depots, heaps, landfills and other storage areas, as well as settling ponds, shall be designed, constructed, disposed of and maintained in such a way as to ensure their stability and the safety and health of workers.

16. Surface units (additional special provisions).

1° Stability and solidity.

Workplaces shall be designed, constructed, installed, operated, monitored and maintained in such a way as to withstand foreseeable external conditions.

They must have the structure and robustness appropriate to their type of use.

2° Floors, walls, ceilings and roofs of the premises.

The floors of the premises must be free from dangerous protrusions, holes or inclined planes; they must be fixed, stable and not slippery.

The workplaces in which the workstations are installed shall be sufficiently thermally insulated, taking into account the type of work and physical activity of the workers.

The surfaces of the floors, walls and ceilings of the premises must be such as to allow them to be cleaned and renovated in order to obtain adequate hygiene conditions.

Transparent or translucent partitions, in particular fully glazed partitions located on premises and in the vicinity of workstations and traffic routes, must be clearly marked and made of safety materials, or be separated from such partitions and traffic routes in such a way that workers cannot come into contact with such partitions or be injured in the event of breakage.

Access to roofs made of materials that do not offer sufficient strength may be authorized only if adequate equipment is provided for the work to be carried out safely.

3° Dimensions and volume of air in the premises. Space for freedom of movement in the workplace.

Work premises shall have a sufficient surface area, height and volume of air to enable workers to perform their tasks without risk to their safety, health or well-being.

b) The dimensions of the free surface of the workplace must be such that the worker has sufficient freedom of movement to carry out his activities and to be able to carry out his tasks safely.

4° Windows and skylights.

Windows, skylights and ventilation devices fitted with opening, adjusting and closing mechanisms shall be so designed as to operate in complete safety.

Their location must be chosen in such a way as to prevent them from posing a risk to workers, when these systems are open.

Windows and skylights shall be safe to clean.

5° Doors and gates.

The location, number, materials and dimensions of doors and gates shall be determined by the nature and use of the premises or enclosures.

Transparent doors shall be marked at eye level.

oscillating swing doors and gates shall be transparent or have transparent panels.

Where the transparent or translucent surfaces of doors and gates are not of safety material and where there is a danger that workers may be injured if a door or gate breaks, these surfaces shall be protected against breakage.

Sliding doors must be equipped with a safety system that prevents them from getting off the rails and falling accidentally.

Doors and gates that open upwards must be provided with a security system that prevents them from descending again in a fortuitous manner.

g) Doors located on the routes of emergency routes must be properly signposted.

They must be able to be opened at any time from the inside without special assistance.

When workplaces are occupied, doors must be able to be opened.

Doors for the movement of persons on foot must be in the immediate vicinity of gates intended primarily for the movement of vehicles, except where the passage of persons on foot is safe, and must be clearly marked and permanently expedited.

Mechanical doors and gates shall operate without risk of accident to workers.

They shall have easily identifiable and easily accessible emergency stop devices and shall also be capable of being opened manually, unless they are opened automatically when the power supply fails.

6° Ventilation of enclosed workplaces.

In enclosed workplaces, measures must be taken to ensure that workers have a sufficient volume of healthy air, taking into account the working methods and physical conditions to which they are subjected.

If a ventilation system is used, it shall be maintained in good working order.

There must be a control system that indicates any breakdown whenever this is necessary for the health of the workers.

If air conditioning or mechanical ventilation systems are used, they shall operate in such a way that workers are not exposed to disturbing drafts.

Any deposition and debris likely to contaminate the breathed air and thereby pose an immediate risk to the health of workers must be disposed of promptly.

7° Temperature of the premises.

a) The temperature of the working rooms must be adequate to the human organism during working time, taking into account the working methods applied and the physical conditions to which the workers are subjected.

The temperature of rest rooms, premises for on-call staff, services, canteens and first-aid rooms shall be appropriate to their specific use.

Windows, skylights and glazed partitions should avoid excessive solar radiation in workplaces, taking into account the type of work and the nature of the workplace.

8° Resting places.

Where the safety or health of workers, in particular by reason of the type of activity or the number of staff exceeding a certain number of persons, so requires, workers shall have an easily accessible resting place.

This provision shall not apply where staff work in offices or similar work premises offering equivalent rest opportunities during breaks.

Rest rooms must be of sufficient size and equipped with a number of tables and seats with backrests commensurate with the number of workers.

Appropriate measures must be taken in rest rooms to protect non-smokers from inconvenience caused by tobacco smoke.

When the working day is regularly and frequently interrupted and there are no resting places, other premises must be made available to the staff so that they can remain there during the interruption of work, in cases where the safety or health of the workers so requires.

Appropriate measures shall be taken to protect non-smokers from the nuisances and risks caused by tobacco smoke.

17. Pregnant women and nursing mothers.

Pregnant women and nursing mothers should be able to rest lying down in appropriate conditions.

18. Disabled workers.

Workplaces must be fitted out taking into account, where appropriate, disabled workers.

This provision shall apply in particular to doors, roads, stairs, showers, washbasins, toilets and workstations used or occupied directly by disabled workers.

Part B. Special minimum provisions for open-cast extractive industries

1. General.

1° Without prejudice to Article 10.2, an employer responsible for the workplace covered by this Part B shall ensure that the safety and health document demonstrates that all appropriate measures have been taken to protect the safety and health of workers in both normal and critical situations.

2° The safety and health document should be regularly updated and made available at the workplace.

Periodic checks on safety and health measures and the safety and health document shall be updated at least once a year and submitted to the Mining Authority with the Work Plan.

2. Exploitation.

1° Work should be planned taking into account the elements of the safety and health document, with regard to the risks of landslides or landslides.

Therefore, the height and inclination of the clearing and exploitation fronts shall be defined on a preventive basis, taking into account the nature and stability of the land, as well as the methods of exploitation.

2° Work benches and runways shall have adequate stability for the machinery and vehicles used therein.

They must be constructed and maintained in such a way that the movement of vehicles and machinery can be carried out safely.

3° Before commencing or resuming work, clearing and operating fronts on work areas and traffic tracks shall be inspected to ensure the absence of blocks or unstable rocks.

If necessary, the slopes should be cleaned.

4° Fronts or stacks of material shall not be exploited in such a way as to cause instability.

5° Measures limiting access to dangerous places will be enabled for all people, including workers of the company, outside the work that takes place there.

Part C. Special minimum provisions for underground extractive industries

1. Preliminary remarks.

1° Without prejudice to Article 10.2, an employer responsible for the workplace covered by this Part C shall ensure that the safety and health document demonstrates that all appropriate measures have been taken to protect the safety and health of workers in both normal and critical situations.

2° The safety and health document shall be regularly updated according to the criteria set out in Articles 4.2 and 6 of the Prevention Services Regulation and shall be available at the workplace for inspection and participation rights purposes set out in the Occupational Risk Prevention Act and its regulatory development.

Work should be carried out in accordance with the safety and health document.

Periodic checks on safety and health measures and the safety and health document shall be updated at least once a year and submitted to the Mining Authority with the Work Plan.

2. Plans of the interior work.

1° Plans of interior work shall be made on a scale appropriate for their clear representation.

In addition to the galleries and the work of exploitation, known elements that may have an influence on the exploitation and its safety must be represented.

The plans shall be easily accessible and kept for as long as necessary for safety.

2° Indoor plans should be regularly updated and made available at the workplace.

3. Departures.

Any underground exploitation must have access to the surface through at least two different outlets, solidly established, adequately signposted and easily accessible to workers in the interior.

Where movement through these outlets requires significant effort on the part of the workers, they must be equipped with mechanical means of transport for the personnel.

4. It's work.

The work in which work is carried out shall be carried out, used, equipped and maintained in such a way that workers can work and circulate through them with the minimum risk.

Galleries should be signposted to facilitate guidance for workers.

5. Transport.

1° Transport facilities shall be constructed, operated and maintained in such a way as to ensure the safety and health of workers who drive, use or are in the vicinity of them.

2° The transport of workers by mechanical means shall be subject to appropriate conditioning and particular written instructions.

6. Sustained and stable terrain.

Support shall be provided immediately after excavation, except where the stability of the ground does not make it necessary for the safety of the workers. This support will be carried out according to schemes and written instructions.

The stability of the land of the work accessible to workers shall be regularly inspected, and the maintenance of the support shall be carried out accordingly.

After each inspection, the person responsible for carrying out the inspection shall record in a document the date and the results obtained, which shall be communicated to the workers' representatives.

7. Ventilation.

1° All authorised access underground works shall be adequately ventilated.

Permanent ventilation shall be provided to maintain a sufficient safety margin: a healthy atmosphere; an atmosphere in which the risks of explosion and respirable dusts are controlled; an atmosphere in which working conditions are adequate during working time, taking into account the methods applied and the conditions to which workers are subject.

2° Where natural ventilation does not satisfy the conditions laid down in paragraph 7.1°, the main ventilation shall be secured by one or more mechanical fans.

Measures shall be taken to ensure the stability and continuity of ventilation.

The depression of the main fans shall be monitored on a permanent basis and an automatic alarm shall be installed to signal untimely stops.

3° Periodic measurement of ventilation parameters shall be recorded.

A ventilation plan shall be drawn up indicating the useful characteristics of the ventilation and shall be regularly updated and made available at the workplace.

8. Grayish mines.

1° A mine or underground quarry in which there is a possibility of detachment of grisu in such a quantity that the risk of the formation of an explosive atmosphere cannot be excluded is considered to be grey.

2° The main ventilation shall be ensured by means of one or more mechanical fans.

3° The exploitation must be carried out taking into account the detachment of grisu.

Arrangements shall be made to eliminate as far as possible the risks due to grisu.

4° Secondary ventilation shall be limited to preparation work and recovery work, as well as to premises which communicate directly with the main ventilation stream.

Operational work may be ventilated in secondary ventilation only if appropriate additional measures are taken in such a way as to maintain the safety and health of the workers.

5° The ventilation measurements referred to in paragraph 7.3.° shall be completed by means of grisumetric checks.

Where required by the safety and health document, the grisu content shall be continuously monitored in the ventilation returns of the machining start-up and subtraction operations, as well as in the areas of the fronts of advance machined on sack bottom.

6° Only explosives and blasting devices intended for this purpose may be used in grey mines.

7° The provisions of paragraph 4.1°(b) of Part A are replaced by the following:

a) It is forbidden to smoke, to be a carrier of smoking tobacco or any other object intended to obtain fire.

b) Torch, welding and other comparable activities may be carried out only exceptionally, taking specific measures to ensure the safety and health of workers.

9. Mines with flammable powders.

1° Coal mines shall be considered as flammable dust mines unless the safety and health document demonstrates that none of the mined layers produce dust capable of spreading an explosion.

2° The provisions of paragraphs 8.6° and 8.7° of this Part C shall apply mutatis mutandis to mines with flammable powders.

3° Measures shall be taken to reduce flammable dust deposits and to dispose of them and to neutralize or fix them.

4° The propagation of flammable dust and/or grisu explosions capable of triggering other flammable dust explosions shall be limited by a system of extinguishing barriers.

The location of the extinguishing barriers shall be specified in a document which shall be regularly updated and made available at the workplace.

10. Instantaneous gas detachments, landslides or waterways.

1° In areas at risk of instantaneous gas landslides with or without ore or rock projection, ground strikes or waterways, an exploitation programme shall be designed and developed in such a way as to ensure as far as possible a safe working system and the protection of workers.

2° Measures will be taken to recognize risk areas, protect workers on the move and control risks.

11. Fires, fires and autocombustions.

1° Appropriate measures should be taken to prevent and, where appropriate, detect self-combustions early.

2° The introduction of combustible materials into underground work must be limited to the quantity strictly necessary.

3° Where it is necessary to use hydraulic fluids (fluids for the transmission of hydrostatic and/or hydrokinetic mechanical energy), fluids which are difficult to flammable shall, as far as possible, be used to prevent the risk of fire and its spread.

These hydraulic fluids shall comply with the specifications and test conditions relating to fire resistance as well as hygiene criteria.

Where hydraulic fluids are used which do not comply with the specifications, conditions and criteria referred to in the second subparagraph, additional preventive measures shall be taken to prevent an increased risk of fire and its spread.

12. Precautionary measures concerning the evacuation of workers.

In order to be able to retire safely, workers must have at their disposal, depending on the risk, a self-sustaining respiratory protection apparatus, which they must constantly keep within their reach.

They must be instructed in the manner in which they are employed.

This apparatus shall remain deposited in the mine and its good condition shall be regularly monitored.

13. Lighting.

The provisions of paragraph 13 of Part A are replaced by the following:

a) The workers will have an individual lamp adapted to the use.

Workstations shall be equipped, as far as possible, with devices enabling adequate artificial lighting in order to protect the safety and health of workers.

The lighting installations must be placed in such a way that the type of lighting envisaged does not present an accident hazard to workers.

14. Presence control inside the mine.

An organisational system must be in place to meet at all times the people inside the mine.

15. Rescue organization.

In order to swiftly and effectively take appropriate action in the event of a major incident, provision should be made for an appropriate rescue organisation.

In order to be able to intervene in any place of exploitation or exploration of underground work, this rescue organisation must have at its disposal a sufficient number of trained brigades and adequate intervention equipment.

ANNEX II. Minimum health and safety requirements in the extractive industries by drilling.

Part A. Common minimum provisions applicable to land and sea sectors

1. Stability and solidity.

Workplaces shall be designed, constructed, installed, operated, monitored and maintained in such a way as to withstand foreseeable external conditions.

They must have the structures and robustness appropriate to their type of use.

2. Organisation and supervision.

1° Organization of workplaces.

Workplaces shall be designed in such a way as to provide adequate protection against risks. They shall be kept clean, removing or keeping under control any hazardous substances or deposits in such a way as not to compromise the safety and health of workers.

Workplaces shall be designed and constructed in an ergonomic manner, taking into account the need for workers to have an overview of the operations carried out on their jobs.

Areas with a particular risk shall be delimited and marked with warning signs.

2° Optional direction.

All workplaces occupied by workers must at all times be under the direction and control of an optional management which has the necessary skills and competences for this function in accordance with the legislation in force and which has been designated by the employer.

The employer himself may assume responsibility for the workplace referred to in the previous paragraph if he has the skills and competences necessary for this function in accordance with the legislation in force and if he habitually carries out his professional activity at the workplace.

3° Surveillance.

Surveillance shall be provided in order to ensure the protection of the safety and health of workers during all operations carried out; such supervision must be exercised by persons with the skills and competences necessary for this function in accordance with the legislation in force and/or the practices of the sector, and who have been designated by or on behalf of the employer and are acting on his behalf.

The employer himself may assume the supervision referred to in the first subparagraph if he has the skills and competences necessary for this purpose, in accordance with the legislation in force and/or the practices of the sector.

4° Competent workers.

In all workplaces with workers there must be a sufficient number of workers, with the skills, experience and training necessary to carry out the tasks assigned to them.

5° Information, training and training.

Workers must receive the information, training, training and retraining necessary to preserve their safety and health.

The employer must ensure that workers are given comprehensible instructions so as not to jeopardise their safety and health or that of other workers.

6° Written instructions.

Written instructions defining the standards to be observed to ensure the safety and health of workers and the safe use of the material shall be drawn up for each workplace.

Such instructions shall also include instructions concerning the use of emergency equipment and the measures to be taken in the event of an emergency at or near the workplace.

7° Safe operating modes.

Safe modes of operation shall be applied for each workplace or for each activity.

8° Work Authorization.

Where the safety and health document so requires, a system of work authorisation shall be established for the performance of hazardous work, and for the performance of work which normally does not cause danger, but which may produce serious risks by interfering with other operations.

The work authorization must be issued by a responsible person before the start of the work and must specify the conditions to be met and the precautions to be taken before, during and after the work.

9° Periodic checks of safety and health measures.

The employer shall organise regular checks of the measures taken with regard to the safety and health of workers, including the health and safety management system, to ensure compliance with the requirements of this Annex.

3. Mechanical and electrical equipment and installations.

1° General.

The choice, installation, commissioning, operation and maintenance of mechanical and electrical equipment shall take into account the safety and health of workers, taking into account other provisions of this Annex.

If they are located in an area where there is or may be a risk of fire or explosion due to gas, vapour or volatile liquid ignition, they shall be adapted for use in that area.

Such equipment shall, if necessary, be fitted with adequate protective devices and fail-safe systems.

2° Specific provisions.

Mechanical equipment and installations shall be sufficiently robust, free from apparent defects and appropriate for their intended use.

Electrical equipment and installations shall have sufficient capacity and power for their intended use.

4. Maintenance.

1° General maintenance.

An appropriate plan shall be established which shall provide for the systematic inspection, maintenance and, where appropriate, verification of mechanical and electrical equipment and installations.

Maintenance, inspection and verification of any part of the plant or equipment shall be carried out by a competent person.

Inspection and verification sheets must be properly drawn up and archived.

2° Maintenance of safety equipment.

Appropriate safety equipment in good working order must always be kept ready for use.

Maintenance shall be carried out taking into account the activities carried out.

5. Control of wells.

Appropriate well control devices should be provided for during drilling operations in order to prevent the risk of eruption.

The fitting-out of such devices shall take into account the characteristics of the wells and the operating conditions.

6. Protection against harmful atmospheres and explosion risks.

1° Measures should be taken to assess the presence of harmful and/or potentially explosive substances in the atmosphere and to measure the concentration of such substances.

Where required by the safety and health document, monitoring equipment shall be provided for the automatic and uninterrupted recording of gas concentrations at specific points, automatic alarm devices and automatic disconnection systems for electrical installations and automatic shut-down systems for internal combustion engines.

Where automatic measures are provided for, the measured values as set out in the safety and health document shall be recorded and retained.

2° Protection against harmful atmospheres.

Appropriate measures should be taken to extract at the point of origin and eliminate harmful substances that accumulate in the atmosphere or are likely to accumulate in the atmosphere.

The system shall be capable of diluting such harmful atmospheres so that there is no risk to workers.

In areas where workers may be exposed to atmospheres harmful to health, adequate breathing and resuscitation equipment in sufficient numbers shall be provided.

In such cases, the presence at the workplace of a sufficient number of workers who know how to handle such material should be ensured.

Protective material shall be properly stored and maintained.

Where hydrogen sulphide or other toxic gases exist or may exist in the atmosphere, a plan shall be made available to the competent authorities indicating the equipment available and the preventive measures taken.

3° Prevention against explosion hazards.

All necessary measures shall be taken to prevent the occurrence and formation of explosive atmospheres.

In areas at risk of explosion, the necessary measures must be taken to prevent the ignition of explosive atmospheres.

An explosion prevention plan should be established indicating the necessary equipment and measures.

7. Emergency routes and exits.

1° Emergency routes and exits must remain expedited and lead as far as possible to the outside or a safety zone, a meeting point or a safe evacuation station.

2° In case of danger, all workstations must be able to be evacuated quickly, in conditions of maximum safety.

3° The number, distribution and dimensions of emergency routes and exits will depend on the use, equipment and dimensions of the workplaces, as well as the maximum number of people that may be present in them.

Accommodation areas and living quarters shall have at least two separate emergency exits, located as far away from each other as possible, leading to a safe area, a meeting point or a safe evacuation station.

4° Emergency doors must be opened outwards, or, if this is impossible, they must be sliding.

Emergency doors shall be closed so that any person who needs to use them in an emergency can open them easily and immediately.

5° Specific emergency routes and exits must be marked in accordance with current legislation.

6° Emergency doors must not be locked.

Emergency routes and exits, as well as traffic routes and doors giving access to them, must not be obstructed by any object, so that they can be used unimpeded at any time.

7° In the event of illumination failure, roads and emergency exits requiring illumination shall be equipped with safety lighting of sufficient intensity.

8. Ventilation of enclosed workplaces.

1° In enclosed workplaces, measures must be taken to ensure that workers have a sufficient volume of healthy air, taking into account the working methods and physical conditions to which they are subjected.

If a ventilation system is used, it shall be maintained in good working order.

There must be a control system that indicates any breakdown whenever this is necessary for the health of the workers.

2° If air conditioning or mechanical ventilation systems are used, they must be operated in such a way that workers are not exposed to disturbing drafts.

Any deposition and debris likely to contaminate the breathed air and thereby pose an immediate risk to the health of workers shall be promptly removed.

9. Temperature of the premises.

1° The temperature of the working premises must be appropriate to the human organism during working time, taking into account the working methods applied and the physical conditions to which the workers are subjected.

2° The temperature of rest rooms, premises for on-call staff, services, canteens and first-aid rooms shall be appropriate to their specific use.

3° Windows, skylights and glazed partitions shall avoid excessive solar radiation in workplaces, taking into account the type of work and the nature of the workplace.

10. Floors, walls, ceilings and roofs of the premises.

1° The floors of the premises shall be free from dangerous protrusions, holes or inclined planes; they must be fixed, stable and not slippery.

The workplaces in which the workstations are installed shall be sufficiently thermally insulated, taking into account the type of work and physical activity of the workers.

2° The surfaces of the floors, walls and ceilings of the premises must be such as to allow them to be cleaned and renovated in order to obtain adequate hygiene conditions.

3° Transparent or translucent partitions, in particular fully glazed partitions located on premises and in the vicinity of workstations and traffic routes, must be clearly marked and made of safety materials, or be separated from such partitions and traffic routes in such a way that workers cannot come into contact with such partitions or be injured in the event of breakage.

4.° Access to roofs made of materials which do not offer sufficient strength may be permitted only if suitable equipment is provided for the work to be carried out safely.

11. Natural and artificial lighting.

1° All workplaces must be fully equipped with lighting capable of providing sufficient lighting to ensure the health and safety of workers.

2° Workplaces must, as far as possible, have sufficient natural light and be equipped, in the light of weather conditions, with devices enabling adequate artificial lighting to ensure the safety and health of workers.

3° The lighting installations of work rooms and communication routes shall be so arranged that the type of lighting envisaged does not present a risk of accident to workers.

4° Workplaces in which workers are particularly exposed to risks in the event of a breakdown of artificial lighting shall have safety lighting of sufficient intensity.

5° Lighting installations shall be designed in such a way that farm control rooms, emergency lanes, boarding areas and hazardous areas remain illuminated.

Where workplaces are occupied only occasionally, the obligation referred to in the first subparagraph shall be limited to the time during which the workers are present.

12. Windows and skylights.

1° Windows, skylights and ventilation devices fitted with opening, adjusting and closing mechanisms shall be so designed as to operate in complete safety.

Their location must be chosen in such a way as to prevent them from posing a risk to workers, when these systems are open.

2° Windows and skylights must be safe to clean.

13. Doors and gates.

1° The location, number, materials and dimensions of doors and gates shall be determined by the nature and use of the premises or enclosures.

2° Transparent doors shall be marked at eye level.

3° Swing doors and gates shall be transparent or have transparent panels.

4° Where the transparent or translucent surfaces of doors and gates are not of safety material and where there is a danger that workers may be injured in the event of a door or gate breaking, these surfaces shall be protected against breakage.

5° Sliding doors shall be fitted with a safety system to prevent them from getting off the rails and falling accidentally.

6° Doors and gates that open upwards shall be provided with a security system that prevents them from descending again in a fortuitous manner.

7° Doors on emergency routes must be properly marked.

They must be able to be opened at any time from the inside without special assistance.

When workplaces are occupied, doors must be able to be opened.

8° Doors for the movement of persons on foot must be in the immediate vicinity of gates intended primarily for the use of vehicles, except where the passage of persons on foot is safe, and must be clearly marked and permanently expedited.

9° Mechanical doors and gates shall operate without risk of accident to workers.

They shall have easily identifiable and easily accessible emergency stop devices and shall also be capable of being opened manually, unless they are opened automatically when the power supply fails.

10° If at any point access is prevented by chains or similar devices, chains or similar devices shall be clearly visible and indicated by appropriate prohibition or warning signs.

14. Circulation routes.

1° Workplaces must be safely accessible and evacuated quickly and safely in the event of an emergency.

2° Traffic routes, including stairways, stationary ladders and loading docks and ramps, shall be located and calculated in such a way that persons on foot or vehicles can use them easily, safely and in accordance with their intended use; workers employed in the vicinity of these traffic routes shall not be at risk.

3° The calculation of the dimensions of the roads used for the movement of persons and/or goods will depend on the potential number of users and the type of activity.

Where means of transport are used on roads, provision must be made for a sufficient safety distance for persons on foot.

4° Roads intended for vehicles must pass at a sufficient distance from doors, gates, footsteps, corridors and stairs.

5° The route of the traffic and access routes must be clearly marked to ensure the protection of workers.

15. Dangerous areas.

1° If workplaces contain hazardous areas due to the nature of the work, risk of worker falls or risk of falling objects, these places shall be equipped, as far as possible, with devices to prevent unauthorized workers from entering these areas.

2° Appropriate measures must be taken to protect workers who are authorized to enter danger zones.

3° Hazard areas must be clearly marked.

16. Dimensions and volume of air of the premises. Space for freedom of movement in the workplace.

1° Workplaces shall have a sufficient surface area, height and volume of air to enable workers to perform their tasks without risk to their safety, health or well-being.

2° The dimensions of the free surface of the workplace must be such that the worker has sufficient freedom of movement to carry out his activities and to be able to carry out his tasks safely.

17. Resting places.

1° Where the safety or health of workers, in particular by reason of the type of activity or the number of staff exceeding a certain number of persons, so requires, workers must have an easily accessible resting place.

This provision shall not apply where staff work in offices or similar workplaces offering equivalent rest opportunities during breaks.

2° Rest rooms must be of sufficient size and equipped with a number of tables and seats with backrests commensurate with the number of workers.

3° Appropriate measures must be taken in rest rooms to protect non-smokers from inconvenience caused by tobacco smoke.

4° When working hours are interrupted regularly and frequently and there are no resting places, other places must be made available to staff so that they can remain there during the interruption of work, in cases where the safety or health of workers so requires.

Appropriate measures shall be taken to protect non-smokers from the nuisance caused by tobacco smoke.

18. Outdoor workplaces.

1° Workstations, roads and other outdoor sites and installations occupied or used by workers during their activities must be designed in such a way that the movement of persons and vehicles can be carried out safely.

2° Outdoor workplaces shall have sufficient artificial lighting when daylight is not sufficient.

3° When workers occupy outdoor workstations, such workstations shall, as far as possible, be so conditioned that workers:

a) Be protected against inclement weather and, if necessary, against falling objects.

Are not exposed to harmful sound levels or to harmful external factors (e.g. gases, vapours, dust).

They are able to leave their workplace quickly in case of danger or are able to receive assistance quickly.

d) They cannot slip or fall.

19. Pregnant women and nursing mothers.

Pregnant women and nursing mothers should be able to rest lying down in appropriate conditions.

20. Disabled workers.

Workplaces must be fitted out taking into account, where appropriate, disabled workers.

This provision shall apply in particular to doors, roads, stairs, showers, washbasins, toilets and workstations used or occupied directly by disabled workers.

Part B. Special minimum provisions applicable to the 'ground' sector

1. Detection and firefighting.

1° Whenever workplaces are designed, constructed, equipped, operated, used or maintained, appropriate measures must be taken to prevent the onset and spread of fires from points identified in the safety and health document.

Measures must be taken to ensure that any fire conate is controlled quickly and effectively.

2° Workplaces shall be equipped with appropriate fire-fighting devices and, as required, with fire detectors and alarm systems.

3° Non-automatic fire-fighting devices shall be easily accessible and tampered with and, if necessary, protected against the risk of deterioration.

4° A fire safety plan shall be available at workplaces indicating the measures to be taken in accordance with Articles 8, 10, 11, 12 and 13 of the Regulation to prevent, detect and combat the onset and spread of fires.

5° Fire-fighting devices must be marked in accordance with current legislation.

Such marking must be affixed in appropriate places and must be durable.

2. Remote control systems in case of emergency.

Where required by the safety and health document, certain equipment must be able to be remotely controlled from an appropriate location in the event of an emergency.

Remote control equipment shall include isolation and drainage systems for wells, installations and pipelines.

3. Media in a normal situation and during emergencies.

1° Where required by the safety and health document, all workplaces occupied by workers shall be equipped with:

a) An acoustic and optical system capable of giving the alarm if necessary in any workplace occupied by workers.

An acoustic system that can be clearly heard in all parts of the facility frequently occupied by workers.

2° Devices shall be provided to provide the alarm at appropriate locations.

3° Where workers are present in workplaces that normally do not have workers, appropriate communication systems shall be available.

4. Meeting points and attendance lists.

Where required by the safety and health document, meeting points should be established and presence lists maintained and the necessary measures taken.

5. Means of evacuation and rescue.

1° Workers should be trained on the actions to be taken in the event of an emergency.

2° Rescue equipment shall be available ready for use in easily accessible and conveniently located locations.

3° When evacuation must be carried out according to a route that offers difficulty or where there is or may be an unbreathable atmosphere, workers must rely on self-catchers at their workplace for immediate use.

6. Safety exercises.

Safety exercises shall be carried out at regular intervals in normally occupied workplaces.

The purpose of these exercises shall be, in particular, to train and check the suitability of workers assigned, in the event of danger, to tasks where the use, handling or operation of emergency equipment is necessary, taking into account the criteria laid down in the safety and health document referred to in point 1.1°.

Where necessary, the workers thus affected must also be able to carry out exercises for the use, handling or commissioning of such equipment.

7. Sanitary facilities.

1° Clothing and wardrobes:

Appropriate changing rooms must be available to workers when they are required to wear special work clothes and cannot be required, for reasons of health or propriety, to change into another unit.

The changing rooms must be easily accessible, have sufficient capacity and be equipped with seats.

b) These changing rooms must be of sufficient size and have the means to allow each worker to keep his clothes under lock and key during working time.

If circumstances so require (e.g. hazardous substances, moisture, dirt), workwear cabinets should be separated from streetwear cabinets.

The necessary means must be put in place so that each worker can dry his work clothes.

They shall be provided for men and women in separate changing rooms or separate use thereof.

Where changing rooms are not required under paragraph 7.1 °, (a), each worker must be able to have a space to place his or her clothes.

2° Showers and washbasins.

Sufficient and adequate showers shall be made available to workers when required by the type of activity or healthiness.

Men's and women's shower rooms must be separated or men's and women's separate use of shower rooms must be provided.

Shower rooms must allow each worker to dress undisturbed and under appropriate hygienic conditions.

Showers must be equipped with running, hot and cold water.

Where showers are not required under the first subparagraph of paragraph 7.2°(a), adequate and appropriate washbasins with running, hot and cold water shall be installed in the vicinity of workstations and changing rooms.

Separate washbasins or separate use of washbasins shall be provided for men and women where this is necessary for reasons of propriety.

If shower rooms or washrooms are separated from changing rooms, these units must communicate directly with each other.

3° Toilets and washbasins.

Workers must have, in the vicinity of their workplaces, rest rooms, changing rooms and shower rooms or washbasins, special rooms equipped with a sufficient number of toilets and washbasins.

Separate toilets or separate use of toilets shall be provided for men and women.

8. Premises and equipment for first aid.

1° First aid equipment must be appropriate to the activities carried out.

There must be one or more premises for first aid.

Instructions on first aid to be given in the event of an accident shall be clearly displayed in such premises.

2° Premises for first aid shall be equipped with essential first aid equipment and facilities and shall be easily accessible for stretchers.

They must be marked in accordance with the legislation in force.

3° First aid equipment must also be available in all places where working conditions require it.

Such material shall be properly signposted and easily accessible.

4° The necessary training on the use of first aid equipment shall be provided to a sufficient number of workers.

9. Circulation routes.

If vehicles have access to the workplace, the necessary traffic rules shall apply.

Part C. Special minimum provisions applicable to the 'at sea' sector

1. Preliminary remark.

1° Without prejudice to Article 10.2, an employer who, in accordance with current legislation and/or industry practices, is responsible for the workplace covered by this Part C shall ensure that the safety and health document demonstrates that all appropriate measures have been taken to protect the safety and health of workers in both normal and emergency situations.

To this end, the document shall:

Identify the specific risks associated with the workplace, including any activities relating to the workplace, which could cause accidents likely to have serious consequences for the safety and health of the workers concerned.

Assess the risks arising from the specific sources of hazard referred to in paragraph (a).

Demonstrate that adequate precautions have been taken to prevent the accidents referred to in paragraph (a), to limit the spread of accidents and to enable effective and controlled evacuation from the workplace in emergency situations.

Demonstrate that the management system complies with the requirements of this annex in both normal and emergency situations.

2° In the planning and implementation of all relevant phases covered by this Instruction, the employer shall observe the procedures and modalities provided for in the Safety and Health Document.

3° The various employers responsible for the various places of work shall cooperate, where appropriate, with regard to the preparation of documents on the safety and health of workers.

2. Detection and firefighting.

1° Appropriate precautions, as defined in the safety and health document referred to in paragraph 1.1°, shall be taken to prevent, detect and combat fires and to prevent their spread.

Fire barriers shall be installed where necessary to isolate areas where there is a risk of fire.

2° All workplaces shall be equipped with adequate fire detection and protection systems, fire-fighting and alarm systems, in accordance with the risks identified in the safety and health document referred to in 1.1°.

Such systems may include in particular:

Fire detection systems.

Fire alarms.

Fire water distribution network.

d) Fire hydrants and hoses.

Artificial rain systems and water curtains.

f) Automatic spraying system.

Gas flares extinguishing systems.

h) Foam extinguishing systems.

Portable fire extinguishers.

Firefighter's equipment.

3° Non-automatic fire-fighting devices shall be easily accessible and tampered with and, if necessary, protected against the risk of deterioration.

4° A fire safety plan shall be available at the workplace indicating the measures to be taken to prevent, detect and combat the onset and spread of fires.

5° Safety systems shall be kept isolated and protected against accidents in such a way that safety functions remain operational if necessary.

These systems shall be duplicated, if necessary.

6° These equipment must be marked in accordance with current legislation.

Such marking must be affixed in appropriate places and must be durable.

3. Remote control systems in case of emergency.

1° Where required by the safety and health document referred to in paragraph 1.1°, a remote control system shall be established in the event of an emergency.

That system shall have control posts in appropriate locations which can be used in the event of an emergency, including, where necessary, control posts at secure assembly points and evacuation stations.

2° Equipment which can be controlled remotely, as referred to in point 3.1°, must include at least ventilation systems, emergency stops for equipment liable to cause inflammation, a system for preventing leakage of flammable liquids and gases, as well as fire protection and well control systems.

4. Media in a normal situation and during emergencies.

1° Where required by the safety and health document referred to in 1.1°, all workplaces occupied by workers shall be equipped with:

a) An acoustic and optical system capable of giving the alarm if necessary in any workplace occupied by workers.

An acoustic system capable of being heard clearly in all parts of the installation frequently occupied by workers.

A system capable of maintaining communication with land and relief services.

2° Such systems should be able to remain operational in the event of an emergency.

The acoustic system shall be reinforced with communication systems that are not based on vulnerable electrical energy sources.

3° When workers are present in workplaces that normally do not have workers, appropriate communication systems should be made available to them.

5. Meeting points and attendance lists.

1° Appropriate measures shall be taken to protect evacuation stations and safety assembly points from heat, smoke and, as far as possible, the effects of explosions and to ensure that removal routes leading to or from evacuation stations and assembly points remain practicable.

Such measures shall be capable of affording workers protection of a sufficient duration to permit, where necessary, the organisation and execution of a safe evacuation and rescue operation.

2° Where required by the safety and health document referred to in paragraph 1.1°, one of the protected sites referred to in paragraph 5.5.° shall be provided with adequate facilities to allow remote monitoring of the equipment referred to in paragraph 3 of this Part C and to communicate with the coastline and relief services.

3° Safety assembly points and evacuation stations shall be easily accessible from accommodation and work areas.

4° It will be mandatory to update and display in a visible place at each safety meeting point a list of the workers assigned to that meeting point.

5° A list of workers assigned special tasks in an emergency shall be drawn up and displayed at appropriate places in the workplace.

Your name must appear in the written instructions referred to in Section 2.6° of Part A.

6. Means of evacuation and rescue.

1° Workers should be trained on how to act correctly in an emergency.

In addition to training on emergency measures in general, workers should receive training on the specific characteristics of the workplace which should be indicated in the document on safety and health referred to in point 1.1.° on the workplace.

2° Workers must receive appropriate training in survival techniques, taking into account the criteria set out in the safety and health document referred to in 1.1°

3° All workplaces shall be provided with a sufficient number of suitable means to enable evacuation and direct escape to the sea in case of emergency.

4° An emergency plan shall be drawn up for rescue at sea and evacuation from the workplace.

The plan, which shall be based on the safety and health document referred to in 1.1.°, shall provide for the use of relief craft and helicopters and shall include criteria relating to the capacity and reaction time of relief craft and helicopters.

The required reaction time shall be indicated in the safety and health document for all installations.

Relief craft shall be suitably designed and equipped to meet evacuation and rescue needs.

5° Lifeboats, lifeboats, life-jackets and life-jackets available to workers shall meet the following minimum requirements:

Be adequate and, if necessary, equipped to ensure survival for a sufficient period of time.

Be available in sufficient numbers to all workers who may have to use them.

c) Be of a type appropriate to the workplace.

be constructed of reliable materials, taking into account their life-saving function and the circumstances in which they are to be used or kept ready for use.

e) Be of a color that makes them clearly visible when they are being used and be equipped with devices that can be used to attract the attention of rescue teams.

6° The appropriate life-saving equipment shall be ready for immediate use.

7. Safety exercises.

Safety exercises shall be carried out at regular intervals in all normally occupied workplaces, where:

a) The training and verification of the suitability for the performance of their tasks of workers in charge, in case of danger, of specific functions involving the use, handling or operation of emergency equipment, taking into account the criteria set out in the document on safety and health referred to in paragraph 1.1.°

Where necessary, workers shall also be able to carry out exercises in the use, handling or operation of such equipment.

All relief equipment used in the exercises shall be examined, cleaned and, if necessary, reloaded or replaced: all portable equipment shall be placed back in the place where it is normally stored.

The operation of life-saving craft shall be verified.

8. Sanitary facilities.

1° Clothing and wardrobes for clothes.

Appropriate changing rooms must be available to workers when they are required to wear special work clothes and cannot be required, for reasons of health or propriety, to change into another unit.

The changing rooms must be easily accessible, have sufficient capacity and be equipped with seats.

b) These changing rooms must be of sufficient size and have the means to allow each worker to keep his clothes under lock and key during working time.

If circumstances so require (e.g. hazardous substances, moisture, dirt), workwear cabinets should be separated from streetwear cabinets.

The necessary means must be put in place so that each worker can dry his work clothes.

They shall be provided for men and women in separate changing rooms or separate use thereof.

Where changing rooms are not required under paragraph 8.1 ° (a), each worker must be able to have a space to place his or her clothes.

2° Showers and washbasins.

In addition to the facilities provided in the accommodation areas, showers and sinks shall be installed in the vicinity of the workplaces if necessary.

3° Toilets and washbasins.

In addition to the facilities provided in the accommodation areas, toilets and washbasins shall, if necessary, be installed in the vicinity of the workstations.

Lavatories must be separate, or separate use of lavatories for men and women must be provided.

9. Premises and equipment for first aid.

1° There must be one or more premises intended for first aid, according to the size of the facilities and the type of activity carried out.

2° Premises for first aid shall be equipped with equipment, facilities, medicines and a sufficient number of specialised workers, in so far as circumstances so require, in order to be able to provide first aid or, where appropriate, to carry out the necessary assistance under the direction of a doctor (who may not be present).

These premises must be marked in accordance with the legislation in force.

3° First aid equipment must also be available in all places where working conditions require it.

Such material shall be properly signposted and easily accessible.

10. Accommodation.

1° If the nature, importance or duration of the operations so require, the employer must provide the workers with accommodation which must be:

a) Properly protected against the effects of an explosion, against the influx of fumes and gases and against the onset and spread of fires, as defined in the document on safety and health referred to in 1.1°.

b) Equipped with adequate ventilation, heating and lighting facilities.

Provided at each level with at least two independent exits leading to emergency routes.

d) Protected against noise, odors and smoke that may be harmful to health, from other areas, and against inclement weather.

Separated from workstations and located at a distance from hazardous areas.

2° Accommodation must have a sufficient number of beds or bunk beds for people sleeping on the premises.

The rooms intended for bedroom must have enough space for the occupants to place the clothes.

Separate dormitories for men and women should be available.

3° Accommodation must include a sufficient number of showers and sinks equipped with running, hot and cold water.

Men's and women's shower rooms must be separated or men's and women's separate use of shower rooms must be provided.

Showers must be of sufficient size to allow any worker to wash undisturbed and in adequate hygiene conditions.

4° Accommodation must be equipped with a sufficient number of toilets and washbasins.

Separate toilets or separate use of toilets shall be provided for men and women.

5° Accommodation and equipment must be maintained at appropriate hygiene levels.

11. Helicopter operations.

1° Helicopter landing platforms at workplaces shall be of sufficient size and positioned in such a way as to allow for an unobstructed approach and to allow the largest helicopter using the platform to manoeuvre under the worst conditions for such operations.

The helicopter landing platform shall be properly designed and constructed for the service to be provided.

2° In the vicinity of the helicopter landing area, the equipment necessary for use in the event of an accident involving transport by helicopter shall be arranged and stored.

3° In facilities where workers are accommodated, a team with a sufficient number of emergency responders, with appropriate training, shall be present on the helicopter landing platform during aircraft manoeuvres.

12. Location of the facilities at sea. Security and stability.

1° All necessary measures shall be taken to ensure the safety and health of workers in the extractive industries by drilling during offshore plant siting operations.

2° Preparatory operations for the siting of installations at sea shall be carried out in such a way as to ensure their safety and stability.

3° Equipment and procedures for the activities referred to in paragraph 12.1° shall be such as to reduce the risks to workers in the extractive industries from drilling, taking into account both normal and emergency conditions.

ITC SM-COM-01 TERMINOLOGY

1. OBJECT

The purpose of this Supplementary Technical Instruction is to set out the definitions of terms common to several supplementary technical instructions of the Mining Safety Regulation.

2. DEFINITIONS

1) **Access:** road intended for the use of vehicles and/or personnel of a temporary nature for the service of an operating front; in underground mining, any mining work that serves as a permanent communication between interior and surface.
2) **Mooring:** elements located on the roofs of the cages or skips to facilitate the union of these with the suspension cables that allow their elevation and descent along the shaft.
3) **Start-up:** fragmentation of the rocky massif or separation of ore from the rest of the massif of which it is part, by hand tools, machines or other means depending on whether it is manual removal, machining, explosives, etc.
4) **Drag:** a series of operations aimed at removing the grubbed-up products from the holding and driving them to their storage in the general transport system.
5) **Potentially explosive atmosphere :** Environmental condition with a concentration level of flammable gases between 0 % Vol. and the Lower Explosivity Limit (LIE), or between the Upper Explosivity Limit (LSE) and 100 % Vol.
   The values for the LIE and LSE of flammable gases and vapours are those given in UNE - EN ISO/IEC 80079-20-1. For methane (grey) these values are: LIE = 4,4 % Vol. and LSE = 17 % Vol.
6) **Explosive atmosphere**: mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts, in which, after ignition, combustion spreads to the entire unburned mixture. Environmental condition in a concentration range of flammable gases between the LIE and the LSE.
7) **Progress:** distance that advances a task in a certain time.
8) **Barreno: Cylindrical** hollow practiced in the rock to house explosive.
9) **Block:** in ornamental rock mining operations, a piece from the primary independence of the rock massif, of a more or less parallelepipedical form and of variable dimensions.
10) **Bulon:** element, normally metallic, which aims to reinforce and withstand fractured or incompetent rocks to prevent their breakage.
11) **Winch:** machine for lifting and lowering loads by means of traction of metal cable wound on a drum.
12) **Boiler**: lower part of a well, flat or ramp below the lower working level, where accidentally fallen water or products accumulate.
13) **Camera:** excavation in ore for the purpose of grubbing-up of dimensions predetermined by the operating system used.
14) **Chambers and pillars**: method of exploitation in which the stability of the hole created by the grubbing-up is ensured, at least temporarily, by massifs of ore remaining as support.
15) **Layer:** vein or stratiform reef of sedimentary origin.
16) **Castillete**: external structure, usually metallic, located on a vertical well, at the upper end of which are the pulleys that allow the lifting of cages for the vertical transport of materials and people by means of metal cables.
17) **Convergence:** reduction of the distance between the walls of an excavation as a result of the pressures of the ground.
18) **Stockbreeding:** term used when referring to the genesis of the site.

19) **Barracks:** subdivision of an area, comprising one or more neighbouring holdings, with secondary transports and common ventilations.
20) **Gas release :** outlet to the mining atmosphere of a gas from the places where it is occluded or stored.
21) **Instantaneous or sudden detachment of gas or grisu**: when the detachment is very rapid and frequently with mechanical dragging of significant amounts of minerals or rocks.
22) **Daily exposure (ED):** It is the mean concentration of the chemical agent in the worker's breathing zone measured or calculated in a time-weighted manner, for the actual working day and referring to a standard working day of eight hours per day.
23) **Boarding**: part of an immediate gallery to a well, plane or scale from which the manoeuvres of entry and exit of people, ore or materials to the mechanical extraction or transport facilities are carried out.
24) Sterile: material with no economic value extracted to allow the exploitation of the useful ore.
25) **Failure:** bankruptcy or discontinuity that a geological movement has produced in the continuity of a deposit.
26) **Gasodynamic phenomenon:** Sudden emission of gas caused by the variation of the tensional state of the rock massif and which may be accompanied by material detachments.
27) **Sack bottom :** access or work that, because it has a single access as entrance and exit, is not covered by the main ventilation.
28) **Front:** area of a pit in the normal direction to that of the advance or progression line of a holding.
29) **Gallery:** any horizontal or very slight slope access to an underground mine that allows the movement of persons and/or vehicles, the installation of mechanical transport elements and ventilation.
30) **Ganga:** unusable part of an ore.
31) **Shocks from the ground**: violent and sudden breakage of rocks surrounding an excavation.
32) **Grey :** gas consisting mainly of methane which is released in certain mines, especially coal, and which can form explosive or irrespirable mixtures with the mining atmosphere.
33) **Hastial:** rock in contact with the vein or reef.
34) **Sinking :** any work that collapses due to the fall of the fractured terrain located on the operating hole or on the cavity.
35) **Cage:** means of vertical transport of persons or materials within a mine; at the bottom usually has a container drawer (skip) to raise the extracted material.
36) **Locomotive:** mobile towing machine moving on wheels and rails for the trawling of wagons hooked to and from each other.
37) **sludge:** product in the form of a cake, paste or hydromix with a specific solid/liquid ratio for each case and with a grain size generally between sand and silt.
38) **Massif:** block of ore delimited for further exploitation or other purposes.
39) **Mena:** rock with sufficient content of usable substances that make it economically exploitable.
40) **Operating method :** procedure used for the orderly development of the grubbing-up work.
41) **Mobile:** This qualifier applies to any material, device or machine that can be moved under voltage during operation.
42) **Mining:** part of a mine, barracks or exploited layer.
43) **Mineral:** usable part of an ore
44) **Wall:** hastial located below the layer.
45) **Pillar:** volume of ore not grubbed up, which contributes to the maintenance of a holding.
46) **Inclined plane**: access consisting of an inclined gallery, with a slope of more than ten percent, which establishes communication between various plants of a mine and/or with the exterior.
47) **Plant:** a set of galleries located at the same level and connecting the holdings with the main

access to the outside.

48) Flammable **powder: Solid** particles suspended in the mining atmosphere from the minerals or rocks of the mine and produced in its exploitation, which are susceptible to combustion or explosion.
49) **Well:** access consisting of a vertical or steeply inclined duct that establishes communication between the plants of a mine and the outside or only between plants.
50) **Ramp:** communication between the exterior and/or the various levels of a mine that, due to its slope and section, allows the circulation of motor vehicles and that, normally, is not provided with any other means of transport.
51) **Return (ventilation):** access through which the air flow flows outwards after having travelled through the work and operations of a mine.
52) **Sanitation:** task aimed at removing those rocks or unstable minerals that could be fortuitously detached from a slope, starting front, roof or gallery hulls, etc.
53) **Skip:** vessel for the transport of ore or materials in vertical transport systems (wells).
54) **Semi-fixed:** qualifier applicable to any material, device or machine that can only move without voltage, but remains eventually connected to the network
55) **Semi-mobile**: qualifier applicable to any material, device or machine capable of being moved, occasionally, during its operation.
56) **Socavón**: general gallery that, in a mountain mine, establishes direct communication with the surface without the need for a well or plan.
57) **Tabique:** total or partial closing element, fixed or moveable, established in an access, work or operation, on a permanent or occasional basis and whose mission is to suppress, reduce, distribute or direct the ventilation current.
58) **Tagus:** grubbing-up area on a holding or preparation work.
59) **Ceiling :** hastial located on the layer.
60) **All-one**: ore as it is extracted from a holding. It is usually a mixture of mineral, bargain and sterile.
61) **Daily Environmental Exposure Limit Value (VLA-ED®)**: Limit value of the average concentration, measured or calculated in a time-weighted manner for the actual working day and referring to a standard working day of eight hours per day.
62) **Forced ventilation**: Ventilation driven by some artificial element.
63) **Natural ventilation**: Ventilation that is not driven by any artificial element and whose movement is due to pressure and temperature differences between the different locations of a mine.
64) **Main ventilation**: Continuous ventilation, natural or forced, that enters the mine by one or several fixed accesses, runs through a network of accesses and works of all kinds and returns to the outside by one or several also fixed accesses.
65) **Secondary ventilation**: forced ventilation, continuous or discontinuous, which is introduced into a sack bottom work. The flow is taken by deriving it from the main ventilation and returning it to it once the work that ventilates has been covered.
66) **Site:** geological structure where, in a natural way, a rock or a certain mineral is found.
67) **Breathing area**: The space around the worker's face from which he takes the air he breathes. For technical purposes, a more precise definition is as follows: A semi-sphere of 0,3 m radius extending in front of the worker’s face, the centre of which is located at the midpoint of the imaginary segment linking the two ears and the base of which consists of the plane containing that segment, the highest part of the head and the larynx (standard UNE –EN 1540 ‘Exposure at the workplace. Terminology)

ITC SM-COM-02 FACULTATIVE ADDRESS

1. OBJECT

The purpose of this Supplementary Technical Instruction (hereinafter "ITC") is to regulate the figure of the optional management of the extractive industries in the open pit, underground or by drilling, in accordance with the provisions of Article 6 of the Mining Safety Regulation.

2. REGULATION OF THE OPTIONAL DIRECTORATE

2.1 General

Every workplace must be under the direction and control of an optional directorate, assisted, where appropriate, by an optional team, and with the assiduous assistance of as many vigilantes and preventive resources as determined by the document on safety and health (hereinafter referred to as the "DSS").

2.2 Skills and competence

The optional management and the staff of the optional team who perform functions that require it, in terms of skills and competence, will follow the provisions of article 117 of Law 22/1973, of July 21, on Mines.

2.3 Functions of the optional directorate

2.3.1 Exclusive functions of the optional management

1. Approve the documentation of the DSS that allows to plan and implement the preventive measures, as well as the resources and concrete methods of work.

2. Coordinate periodic controls of working conditions and collaborate in the adoption of safety and health measures, as well as in their implementation and control.

3. Approve the internal security provisions (hereinafter "ISD"), establish the work instructions and issue the authorizations provided for in the DSS.

4. Participate in the investigation of accidents and occupational diseases.

5. Organise the coordination of business activities provided for in Article 24 of Law 31/1995 of 8 November 1995 on the Prevention of Occupational Risks.

6. Implement all necessary measures to comply with all those requirements established by the Mining Authority.

2.3.2 Functions that can be carried out by the staff of the optional team

7. Take the necessary measures so that only authorized persons can access the workplace.

8. Direct and control the execution of work in the workplace to ensure the safety of people and property.

9. Participate in the development and implementation of DISs.

10. Collaborate in the development, implementation, maintenance and updating of the DSS.

11. Direct and control the construction, operation or operation of mining waste facilities.

12. Intervene in the operations of use and consumption of explosives, in the terms established in the Explosives Regulation.

13. Propose as many measures as are necessary to comply with all those requirements established by the Mining Authority.

14. Any other function designated in the Mining Safety Regulations and in the supplementary technical instructions, which is not specific to the optional management, and in general, assist the employer in its duty to protect workers from occupational risks.

2.4 Work stoppage

Without prejudice to the provisions of paragraphs 2 and 3 of Article 21 of Law 31/1995 of 8 November 1995 and Article 116(2) of Law 22/1973 of 21 July 1973, when the optional management finds non-compliance with safety and health measures, it shall warn the employer thereof, being entitled, in circumstances of serious and imminent risk to the safety and health of workers, to provide for the cessation of work or, as the case may be, of the entire activity.

In the case provided for in the previous paragraph, the optional management must report to the Mining Authority, to the competing companies, as well as to the representatives of their employees.

2.5 Dedication of optional management

The dedication of the optional management in the workplace must be one that guarantees an effective fulfillment of the functions assigned to it, which will at least be those defined in section 3.3.

The Mining Authority, respecting the principles of necessity and proportionality, may require a specific dedication, understanding as such its physical presence, to the optional management when the circumstances of the case and the characteristics of the workplace so require.

3. DESIGNATION AND COMMUNICATION OF THE OPTIONAL DIRECTORATE

3.1 General

The optional address shall be designated by the employer.

The failure of the employer to designate and notify the Mining Authority of the optional management constitutes an infringement provided for in Article 121 of Law 22/1973 of 21 July 1973.

The designation of the optional directorate shall not relieve the employer of his responsibilities for the prevention of occupational risks. The employer is obliged to provide the necessary means so that the optional management can carry out its work, in accordance with the provisions of the Mining Safety Regulations and this technical instruction.

3.2 Designation and communication to the Mining Authority

The employer has the obligation to notify the Mining Authority of the designation of the optional address of the workplace. This communication, which shall be made by electronic means, shall be accompanied by the acceptance of the position by the optional management and shall have the minimum content provided for in Annexes I and II to this Technical Instruction.

The communication allows the exercise of the optional direction in the work center from the day of its presentation, without prejudice to the powers of verification, control and inspection of the Mining Authority.

The Mining Authority will register the optional management in a regional register, which will collect, for each Optional Director, the identification of the workplaces where he/she carries out the optional management and date of discharge. The Mining Authority shall forward this register to the Directorate-General for Energy Policy and Mines in order to complete a State register.

The documentation of the designation and communication of the optional address constitutes the documentation provided for in section "4.3 Optional address" of the DSS.

3.3 Resignation and termination due to force majeure

The waiver of an optional address must be communicated in writing, ten working days in advance, to the Mining Authority by electronic means and to the employer of the workplace. Within this period, the entrepreneur must notify the Mining Authority of the appointment of a new optional address.

In the event of termination of an optional address due to force majeure, the employer shall have 10 days from the event giving rise to such termination to notify the Mining Authority of the appointment of a new optional address.

4. REGULATION OF THE VIGILANT

4.1 General

The employer must define the boundaries of each area, set of workplaces, work or part of a mine entrusted to a guard, in order to ensure the protection of the safety and health of workers during all operations carried out, assisting the optional management of the workplace.

The presence of preventive resources will be entrusted to the vigilantes to the extent that the conditions provided for in the Law on Prevention of Occupational Risks and its subsequent regulatory developments are met.

The guard must write a daily report on the work carried out, where they record the news and incidents that they know and that concern the work under their charge and the mine in general, especially those that affect the safety or hygiene of people. These parts shall be kept at the disposal of the Mining Authority for a period of six months.

4.2 Template of guards

The employer must designate and have at his disposal the appropriate number of guards required by each type of work, in order to ensure the protection of the safety and health of workers during all operations carried out.

The employer's designation of the watchman will be reflected in section "4.5 Watchmen and preventive resources" of the DSS.

4.3 Recognition in underground work

In addition to what is indicated in the previous sections, in the case of underground farms, the guard or other persons of the optional team will not allow the entry into the front of the work until they have verified that the ventilation is adequate and that there are no concentrations of dangerous gases.

In coal mines or at risk of dangerous gases, these persons shall be equipped with detectors suitable for these surveys.

These previous surveys will be especially careful in the days following a stop of the work cycles (festives, etc.).

At the beginning of the relay, the tasks in which detachments of roofs or roofs may occur must also be carefully recognized.

Such prior examinations shall not be required in relay work where the replacement of staff is carried out at the place of work and the outgoing watchman has carried out the checks at the end of his or her relay and reports them to the incoming watchman.

4.4 Periodic inspections

The guard must visit the posts occupied on a daily basis.

In its inspections it must ensure compliance with all safety standards, and in particular:

a) For all kinds of work:

The condition of the equipment and facilities, prohibiting the use of them if it detects a danger, and preventing them from being used again as long as the danger persists.

Take appropriate measures, in accordance with the instructions of the optional directorate, in times of emergency, in defence of the safety of persons, including those not directly under its command.

Staff who remain alone in their workplace.

Ensure that all abandoned work remains properly signposted at all entrances, so that it cannot be inadvertently penetrated.

Monitor the transport and storage of explosives, and in case of firing in their relay, take care of the correct use of explosives and compliance with all the rules of this operation.

In addition, for underground work:

The adequate conservation and installation of the fortifications according to the support project, with special attention to the state of the roof and roofs in the galleries and fronts in progress, and the sanitation of the dangerous areas. In tasks where particular difficulties or risks arise, it should intensify its vigilance.

Control of general ventilation and the proper condition and use of ventilation doors and secondary ventilation facilities. The review of sites where dangerous gases may detach or accumulate shall be a primary concern of the watcher.

Ensure that all tabic work keeps its closures in proper condition.

Ensure the provision of fortification and filling elements and the good use of them.

4.5 Personnel control

The watchman shall keep a record of the names of the personnel assigned to the tasks under his supervision during his or her relay and shall monitor their situation and performance in relation to safety at work, giving such instructions as he or she deems appropriate. It should preferably deal with staff who, because of their short experience or the hazardous nature of their work, are most exposed to risk.

ANNEX I

Minimum content of the designation and communication of the optional address.

a) Details of the employer holding the establishment

- Name and surname of the business owner.
- NIF/NIE of the owner employer.
- Name, registered office and CIF of the company.
- Company contact details: telephone, contact person and email.
- Name of the workplace.
- Location of the workplace (place and municipality).
- Workplace UTM-DATUM ETRS89 coordinates.

b) Details of the competent qualified technician appointed to the position of optional director

- Name and surname of the optional address.
- NIF/NIE of the optional address.

c) Declaration by the employer that:

- The optional management is assigned at least the minimum functions set out in ITC SM-COM-02 of the Mining Safety Regulations.
- The necessary means are available for the optional management to carry out its work in accordance with the provisions of the Mining Safety Regulations and the ITC SM-COM-02.
- The optional management and the employer have assessed and established the necessary dedication of the optional management in the workplace, which guarantees an effective fulfillment of these minimum assigned functions.

d) Identification list of the members of the initial optional team at the workplace

e) Electronic signature of the employer holding the workplace

ANNEX II

Minimum content of the acceptance of the position of the optional management.

a) Details of the assigned optional address

- Name and surname of the optional address.
- NIF/NIE of the optional address.
- Contact details of the optional address: address, telephone and e-mail.
- Title, Official College and number of collegiate of the optional direction.

b) Details of the workplace for which he/she accepts the position of optional director

- Name of the workplace.
- Location of the workplace (place and municipality).
- Workplace UTM-DATUM ETRS89 coordinates.

c) Statement by the optional director that:

- The designated optional address complies with the requirements set out in ITC SM-COM-02 of Mining Safety Regulations.
- The optional management is assigned at least the minimum functions set out in the ITC SM-COM-02 of the Mining Safety Regulations.
- The optional management and the employer have assessed and established the necessary dedication of the optional management in the workplace, which guarantees an effective fulfillment of these minimum assigned functions.

d) Comprehensive list of the optional addresses held by the assigned optional address throughout the national territory, including the one requested

- Name (and if applicable, n.° mining cadastre).
- Municipal term.
- Province.
- Location with coordinates UTM-DATUM ETRS89.

e) Electronic signature of the assigned optional address

ITC SM-COM-03 COMMUNICATION OF ACCIDENTS. SAFEGUARD MEASURES

1. OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims to establish the requirements and obligations with regard to accident reporting and rescue, in development of the provisions of Article 8 of the Mining Safety Regulation.

2. SERIOUS ACCIDENTS AND INCIDENTS

2.1 Notification

The employer must inform, within twenty-four hours, the Mining Authority, of all fatal and serious accidents that occur and of any situation of serious danger or serious incident, without prejudice to any other obligation of communication or notification imposed by the labor legislation in force.

A serious hazard or serious incident is one that compromises the safety of workers, and in particular those related to:

- Sudden debris and sinking of workshops or galleries.
- Untimely detachments of large blocks on quarry fronts.
- Explosions of flammable gases or dusts, fires and self-combustions.
- Untimely explosions of prepared sticks, and remains of failed holes.
- Serious failures in extraction systems or maneuvers in vertical and inclined wells.
- Gas-dynamic phenomena.
- Unique incidents due to their exceptionality in the exploitation in question.
- Floods or sudden influxes of water.
- Track exits with overturning or drops by slopes of mobile mining machinery.

2.2 Research

Where the Mining Authority becomes aware of accidents or serious incidents, it shall arrange for its seconded official staff to be transferred to the site of the event.

Subsequently, official personnel attached to the Mining Authority will investigate the event and draw up an investigation report stating the description and manner of its occurrence, indicating its true or probable causes and the regulatory precepts infringed if any. For the issuance of this report, the opinion of the specialists in the field and the expert reports that it deems necessary may be obtained. Annex I to this JTI sets out the reference index of the accident investigation report which, in addition, shall contain the summary statement of accidents at work for statistical purposes and the model of which is incorporated in Annex II.

In the event of an accident, and in the event that there may be a criminal offence, the Mining Authority shall send a copy of that investigation report to the competent judicial body, adding any additional information it deems appropriate.

2.3 Communication to the Ministry responsible for *mines*

The mining authorities shall communicate, within 72 hours and by electronic means, to the Directorate-General for Energy Policy and Mines, serious and fatal accidents and serious incidents notified to it, in accordance with the model set out in Annex III.

Subsequently, the Mining Authority will send the Directorate-General for Energy Policy and Mines a copy of the investigation report as specified in section 2.2 of this JTI.

3. SAFEGUARD MEASURES

3.1 Means of evacuation and rescue

Any underground work endangered by fire, detachment of explosive gases or dust shall be provided with a rescue station equipped with self-contained breathing apparatus and with the necessary materials and tools to deal with emergency situations, as well as with means of transport.

In addition to the self-contained breathing apparatus referred to in the previous paragraph, the rescue stations shall be equipped with harmful gas detectors, devices for artificial respiration and oxygen supply to injured persons, and portable lighting equipment.

The total number of autonomous breathing apparatus of each rescue station shall be established to allow continuous action, depending on their autonomy and the number of persons constituting the rescue relief.

3.2 Organization of rescue brigades

Rescue-trained personnel shall not serve in isolation when using autonomous breathing equipment, but shall be grouped into teams of not less than three, one of them acting as the chief of the rescue brigade.

The rescue brigade shall have the necessary personnel to ensure its work on a continuous basis, taking into account the autonomy of the breathing apparatus and the recovery times of the personnel after each relay.

Personnel trained in the operation of autonomous breathing apparatus shall carry out periodic practices which shall be duly recorded in section 10 “Training” of the document on safety and health.

ANNEX I: ACCIDENT RESEARCH REPORT REFERENCE INDEX

A) PART OF ACCIDENT (Codification of the most relevant data of the accident for statistical purposes, its model is incorporated in Annex 2)

B) DESCRIPTION AND FORM OF PRODUCING THE ACCIDENT

B.1 Descriptive data

- Data of the injured party: job (job and category), age, seniority in the job and in the company, type of contract, nationality, training, type and severity of injury.

- Company details: Management, owner, operator, optional management, substance exploited, CNAE, n° of workers, installed power and production.

- Details of the contracted company (if any)

- Accident data: Date, time, place, existence of witnesses.

B.2 Description of the accident site

B.3 Photo report

- Situation and status of the accident site

- Status and status of related work teams (if any)

B.4 Statements (handwritten interviews and testimonies)

- Witnesses (Short and clear description of how the accident happened)

- Other persons on the holding

B.5 Objective description of the facts

B.6 Results of the reconstruction of the facts (if any)

B.7 Approaching the different scenarios on how the accident occurred

B.8 Descriptive sketches

C) CERTAIN OR LIKELY CAUSES

C.1 Causal analysis of the different hypotheses. Study of the possible existence/incidence of possible causal factors.

Causal factors relating to the material conditions of work.

- Causal factors relating to the workplace environment.

Individual causal factors.

Causal factors relating to the organisation of work and prevention management.

C.2 Tree of causes of the different hypotheses (immediate causes in its absence)

D) INFRINGEED REGULATIONAL PRECEPTS

D.1 Specific references to the regulation infringed.

D.2 Grounds for each of the infringements.

E) ANNEXES

1. Notification of the accident

2. Deregistration of the mutual

3. Photographic annex

4. Inspection report

5. Manuscript testimonies of witnesses

6. Research report of the company's prevention service

7. Existing risk assessment in the DSS

8. Supporting documentation concerning the training received by the injured party (if any)

9. Expert reports (if necessary)

10. Technical documentation of related work teams (if any)

11. Summary sheet for accidents at work

AUTONOMOUS COMMUNITY
LOGO

ANNEX II: MODEL WORKING ACCIDENT SUMMARY SHEET

AUTONOMOUS			
N° ACCIDENT:		**YEAR:**	

1.- COMPETENT MINING SERVICE DATA	
Department responsible for the investigation of the accident:	
Date of accident:	
Date of farm visit:	

2.- DATA OF THE ACCIDENT WORKER										
Age:		**Nationality:**	**Spanish:**		**Other:**		**Gender:**	**V**		**M**
Date of entry into the company:			**Age at the workplace:**							
Occupation according to CNO [1]:	*Code*									
Mining workstation [2]:	*Code*									
Type of contract [3]:	*Code*									
ITC SM-PRL-08 training:	**YES**		**NO**							

3.- DATA OF THE COMPANY IN WHICH THE WORKER IS HIGH IN SOCIAL SECURITY	
Name or company name of the company:	
Municipality and province:	
Main economic activity CNAE-09 (4 digits) [4]:	*Code*
Template:	
At the time of the accident the company was acting as [5]:	*Code*
Modality of preventive organization adopted in the company [6]	*Code*

4.- DATA OF THE WORKING CENTER IN THE SMR SCOPE WHERE THE ACCIDENT HAS OCCURRED	
Municipality and province:	
Name of holding:	
Operator:	
CNAE-09 (4 digits) of the operating company:	*Code*
Mining subsector [7]:	*Code*
Product exploited [8]:	*Code*
Type of workplace [9]:	*Code*
Type of operation and/or industrial installation [10]:	*Code*
Template of the operator:	
Workplace template:	

5.- ASSISTANCE DATA				
Gravity:	**Serious accident:**		**Mortal accident:**	

6.- ACCIDENT DATA						
Day of the week of the accident:	**Time of the day of the accident:**	**Hour of work of the accident:**	**Regular work:**			
			YES		**NO**	
Has a risk assessment been carried out on the workplace where the accident occurred?:			**YES**		**NO**	
If yes, is the main risk related to the accident covered in this assessment?:			**YES**		**NO**	
Brief description of the accident [11]:						
Where in the workplace was the injured person at the time of the accident? (Place) [12]:						
Code						
The worker carried out mining work or was in maintenance work:						
Mining work:		**Maintenance:**				
In case of mining work, what kind of mining work were you doing when the accident occurred? (Mining work) [13]:						
Code						
In case of maintenance, what kind of maintenance did the worker perform?[14]:						
Code						
Is the accident related to the use of work equipment?:						
YES		**NO**				
If yes, with which work equipment is the accident related?						
Type of equipment [15]	*Code*					
Working equipment [16]	*Code*					
How did the accident occur?(Deviation + Contact form)						
Deviation [17]:	*Code*					
Form of Contact [18]:	*Code*					
In case the accident has affected more than one worker, how many were affected in total?						

INSTRUCTIONS FOR COMPLETING ANNEX II.

(1) OCCUPATION ACCORDING TO CNO-2011

The codes for the national classification of occupations (corresponding to ISCO-08, International Standard Classification of Occupations) are available on the website of the National Statistical Institute:

http://www.ine.es/daco/daco42/clasificaciones/cno11_estructura.xls

(2) JOB IN MINING

The mining workstation corresponding to the classification established in ITC SM-PRL-08 "Preventive training for the performance of the workstation", which is reproduced below, shall be included:

1 RESEARCH.	**4 BENEFIT ESTABLISHMENT.**
A) TECHNIQUES HELD.	A) TECHNIQUES HELD.
B) GEOPHYSICAL OPERATORS.	B) CARRIERS AND/OR SURVEILLANTS.
C) GEOCHEMICAL OPERATORS.	C) CUTTING/CLASSIFICATION OPERATORS.
D) OTHER STAFF.	D) MILLING OPERATORS.
2 EXTERNAL ACTIVITIES.	E) STRUCTURE OPERATORS.
A) TECHNIQUES HELD.	F) SEPARATION AND CONCENTRATION OPERATORS.
B) CARRIERS AND/OR SURVEILLANTS.	G) OVEN OPERATORS.
C) OPERATORS OF STARTING/LOADING/VIAL MACHINERY.	H) MIXING OPERATORS.
D) PERFORATION/COURT/VOLADURA.	I) MOLDEO AND/OR SINTERIZATION OPERATORS.
E) TRANSPORT MACHINERY OPERATORS.	J) OPERATORS OF PLANTS OF MATERIALS FOR CONSTRUCTION.
F) WATER AND/OR RESEARCH SOUND OPERATORS.	K) ORNAMENTAL ROCK PLANTS OPERATORS.
G) OIL OR GAS PRODUCTION OPERATORS.	L) LABORATORY OPERATORS.
H) MECHANICAL AND/OR ELECTRIC MAINTENANCE OPERATORS.	M) MECHANICAL AND/OR ELECTRIC MAINTENANCE OPERATORS.
3 INTERIOR ACTIVITIES.	**5 COMMON POSTS.**
A) TECHNIQUES HELD.	A) ADDRESS.
B) CARRIERS AND/OR SURVEILLANTS.	B) TECHNIQUES WHO DO NOT PARTICIPATE IN THE PRODUCTIVE PROCESS.
C) OPERATORS START/LOAD.	C) HEALTH STAFF.
D) PERFORATION/VOLADURA.	D) MANAGEMENT AND STAFF OF SERVICES OTHER THAN MAINTENANCE.
E) TRANSPORT OPERATORS.	E) VARIOUS.
F) PREPARATION OPERATORS.	
G) MECHANICAL AND/OR ELECTRIC MAINTENANCE OPERATORS.	
H) OPERATORS OF GENERAL SERVICES.	

(3) TYPE OF CONTRACT

One of the following types of contract shall be included:

1	INDEFINITED CONTRACT
2	TEMPORARY CONTRACT
3	LEARNING OR PRACTICE CONTRACT
4	AUTONOMOUS WORKER

(4) MAIN ECONOMIC ACTIVITY CNAE-09

The codes corresponding to the national classification of economic activities (corresponding to the EU classification of economic activities NACE) are available on the website of the National Institute of Statistics:

http://www.ine.es/daco/daco42/clasificaciones/cnae09/int_cnae_2009.pdf

(5) AT THE TIME OF THE ACCIDENT THE COMPANY ACTED AS

One of the following codes shall be included:

1	MAIN COMPANY
2	CONTRACT OR SUBCONTRACT
3	TEMPORARY WORKING COMPANY

(6) MODALITY OF PREVENTIVE ORGANIZATION ADOPTED IN THE COMPANY

One of the following codes shall be included:

1	EMPLOYER'S PERSONAL ASSISTANCE
2	DESIGNED WORKER
3	OWN PREVENTION SERVICE
4	PREVENTION SERVICE
5	MANCOMMONED PREVENTION SERVICE
6	NONE

(7) MINING SUBSECTOR

One of the following codes shall be included:

1	COAL
2	CANTERA PRODUCTS
3	ORNAMENTAL ROCK
4	INDUSTRIAL MINERALS
5	METAL MINERALS

(8) PRODUCT EXPLODED

One of the following codes shall be included:

COAL		**INDUSTRIAL MINERALS**	
1	ANTRACITA	30	SPECIAL ARRANGEMENTS
2	HULLA	31	BARITINE
3	SUBSTITUMINOUS HULLA	32	BAUXITA
4	LITTLE PARLIAMENT	33	CAOLÍN
CANTERA PRODUCTS		34	Quartz
5	ANPHIBOLITE	35	FLUOR SPATO
6	ARCILLA	36	ESTEATITE
7	ARENA SILICEA	37	STRONGY
8	ARENA AND GRAVA	38	FELDESPATO
9	ARENISCA	39	GLAUBERITA
10	BASALTO	40	MAGNESITA CRUDA
11	CALIZA	41	IRON OXIDES
12	Quartzite	42	POMEZ STONE
13	DOLOMY	43	GEMA SALT
14	GRANITO	44	MANANTIAL SALT
15	GRAUVACA	45	MARINE SALT
16	MARGAS	46	POTASICAL SALTS

17	MILONITE	47	THENARDITA
18	OFITA	48	TRIPOLI
19	PRODUCTS	49	OTHER INDUSTRIAL MINERALS
20	SERPENTINA AND DUNITA	**METAL MINERALS**	
21	TRAQUITA	50	TIN
22	YESO	51	NIQUEL
ORNAMENTAL ROCK		52	IRON
23	ALABASTRO	53	GOLD-PLATE
24	ORNAMENTAL ARENISCA		
25	ORNAMENTAL CALIZA		
26	ORNAMENTAL QUARCITE		
27	ORNAMENTAL GRANITE		
28	MARMOL		
29	PIZARRA		

(9) TYPE OF WORK CENTER

One of the following codes shall be included:

1	UNDERGROUND HOLDING WITH ASSOCIATED BENEFIT ESTABLISHMENT
2	SUBTERRANEAN HOLDING WITHOUT ASSOCIATED BENEFIT ESTABLISHMENT
3	OPEN SKY HOLDING WITH ASSOCIATED BENEFIT ESTABLISHMENT
4	OPEN SKY HOLDING WITHOUT ASSOCIATED BENEFIT ESTABLISHMENT
5	INDEPENDENT ASSOCIATED BENEFIT ESTABLISHMENT OF THE HOLDING
6	SPECIAL WORKS, PROSPECTIONS AND SOUNDS
7	VOLADURA IN NON-EXTRACTIVE ACTIVITY

(10) TYPE OF HOLDING AND/OR ESTABLISHMENT OF BENEFITS

One of the following codes shall be included:

SUBTERRANEAN HOLDING	
1	SUBNIVES STARTING WITH EXPLOSIVES
2	SUB LEVELS STARTING MACHINED
3	LARGER FRONTS PICKING START
4	MECHANIZED LARGER START FRONTS
5	CAMERAS AND PILLARS
OPEN SKY HOLDING	
6	CANTERA STARTING WITH FIXED OR SEMIFIXED MACHINERY
7	MOBILE MACHINERY STARTING CANTERA
8	CANTERA EXPLOSIVE START
9	EXPLOSIVE-MECHANIZED MIXED START CANTERA
10	SHORT
11	GRAVERA
12	SALINA
13	DISOLUTION MINING
BENEFIT ESTABLISHMENT	
14	MANUFACTURING VESSEL
15	CUTTING WORKSHOP
16	OTHERS: SPECIFY
17	WASHING MACHINE
18	CEMENTERA/FABRICA DE CAL OR YESO
19	ASFALTIC FLOOR
20	MINERALURGIC CONCENTRATION PLANT

(11) BRIEF DESCRIPTION OF THE ACCIDENT

A paragraph shall be drafted as follows: “where the injured worker was, what he was doing, what happened to him and what consequences it had”.

(12) PLACE OF ACCIDENT

One of the following codes shall be included:

PLACES OF INTERIOR		**EXTERNAL PLACES**	
1	STARTING FRONTS	7	STARTING FRONTS
2	MAIN GALLERIES	8	CANTERA PLACE
3	SECONDARY GALLERIES	9	OPEN SKY EXPLOITATION TALUDES
4	INCLINATED POWERS	10	MOVEMENT TRACKS
5	VERTICAL POWERS	11	WORKSHOP OR CUTTING WORKSHOP INTERIOR
6	OTHER PLACES OF INTERIOR	12	MAINTENANCE WORKSHOP
		13	SHOPPING

(13) TYPE OF MINING WORK

One of the following codes shall be included:

1	START
2	LOAD AND DOWNLOAD
3	TRANSPORT
4	VOLADURA
5	PREPARATION
6	SUSTAINABILITY
7	OTHER OPERATIONS

(14) TYPE OF MAINTENANCE

One of the following codes shall be included:

1	REPAIR OF WORKING EQUIPMENT OR FACILITIES
2	REPLACEMENT OF ELEMENTS IN WORKING EQUIPMENT OR FACILITIES
3	CLEANING OF WORKING EQUIPMENT, FACILITIES OR PLACES
4	ELIMINATION OF MATERIAL ATTACKS
5	OTHER MAINTENANCE LABORES

(15) TYPE OF WORKING EQUIPMENT

One of the following codes shall be included:

1	MOBILE MACHINERY	3	FACILITIES
2	FIXED MACHINERY	4	TOOLS

(16) WORKING TEAM

One of the following codes shall be included:

MOBILE MACHINERY		**FIXED OR SEMIFIXED MACHINERY**	
1	CHARGING PALA	21	CINTA TRANSPORTADORA
2	VOLQUETE	22	CABRESTANT
3	CHARGING ROAD	23	MOLINO
4	VAGON OF MINA	24	TOLVA
5	LOCOMOTORA	25	BARRENOS PERFORATOR
6	ELEVATORY ROAD	26	PANCER
7	BULLDOZER	27	SIERRA DE CORTE
8	JUMBO	28	MACHINE CUT WITH YARN
9	TRACTOR	29	SONDEOS MACHINE
10	EXCAVATOR	30	CRIBA
11	MOTONIVELADORA	31	GRUA BRIDGE
12	ROZADORA	32	SILO
13	CEPILLO	33	ROLL TRANSPORTER
14	MINADOR	34	SIERRA DE BRAZO
15	OTHER MOBILE MACHINERY	35	OTHER FIXED OR SEMIFIXED MACHINERY
FACILITIES		**TOOLS**	
16	COMPRESSED AIR INSTALLATION	36	MARTILLO PICADOR
17	ELECTRIC INSTALLATION	37	RADIAL
18	INSTALLATION OF WATER	38	WELDER
19	SUSTAINABILITY	39	AMOLADORA
20	OTHER FACILITIES	40	HYDRAULIC CAT
		41	BARRENA
		42	OTHER TOOLS

(17) DEVIATION

Deviation means the abnormal event that caused the accident. One of the following codes shall be included:

1	Deviation due to electrical problem, explosion, fire – unspecified
2	Electrical problem leading to electric shock – no physical contact
3	Electrical problem that results in contact with an abnormally stressed element
4	Explosion
5	Fire, fire
6	Overflow deviation, overturning, escape, spillage, emanation – unspecified
7	In solid state - overflow, overturn
8	In liquid state - exhaust, soaking, spilling, splashing, sprinkling
9	In gaseous state - vaporization, aerosol formation, gas formation
10	Powdery material, fume emission, dust emission, particulate matter
11	Breaking, bursting, sliding, falling, collapsing Material agent – unspecified
12	Breakage of material, joints, connections
13	Breaking, bursting, in fragments (wood, glass, metal, stone, others)
14	Sliding, falling, collapsing Material agent – falling from above on the worker
15	Fall, collapse of Material Agent – on which the falling worker is
16	Sliding, falling, falling, collapsing Material agent – overturning on the worker
17	Loss of total or partial control of work equipment or materials – unspecified
18	Loss (full or partial) of control - of the machine, including untimely starting, and of the material on which the machine is worked
19	Loss (full or partial) of control – of means of transport, or of loading equipment, with or without engine
20	Loss (full or partial) of control - of manual tool with or without motor, and of the material on which the tool is worked
21	Loss (full or partial) of control – of the object or material (transported, moved, handled, etc.)
22	Loss (full or partial) of control – of the animal
23	Fall of persons – Slip or trip with fall – unspecified
24	Fall of a person - from a height
25	Fall of a person - at the same level
26	Body movement without added physical effort – unspecified
27	Stepping on a sharp or sharp object
28	Kneeling, sitting, leaning against
29	Being trapped, being dragged, by some element or by the impulse of this
30	Uncoordinated movements, untimely gestures, inopportune
31	Body movement as a result of or with physical exertion – unspecified

32	Lift, transport, get up
33	Push, pull
34	Depositing a load, an object, bending down
35	When rotating or manipulating, in twisting of a load, an object
36	Walking with difficulty, tripping, tripping without falling, slipping without falling
37	Surprise, fear, violence, aggression, threat, presence – unspecified
38	Surprise, fear
39	Violence, aggression, threat - between members of the company
40	Violence, aggression, threat - exercised by people outside the company
41	Aggression, push - by animals
42	Presence of the victim or a third person representing a danger
99	Other Deviation not encoded in this classification

(18) CONTACT FORM

One of the following codes shall be included:

Contact with electric current, fire, or dangerous substances	
1	Contact with electric current, fire, temperature or hazardous substances - Not specified
2	Indirect contact with an electric arc, beam (passive)
3	Direct contact with electricity, receive an electric shock on the body
4	Contact with direct flames or objects or environments - with high temperature or on fire
5	Contact with object or environment - cold or ice cream
6	Contact with dangerous substances - through the nose, mouth, by inhalation
7	Contact with dangerous substances - on or through the skin and eyes
8	Contact with dangerous substances - through the digestive system: swallowing or eating
9	Other type of contact
Drowning, getting buried, getting wrapped	
10	Drowning, being buried, being wrapped - Not specified
11	Drowning in a liquid
12	To be buried under a solid
13	Wrapped by, surrounded by gases or suspended particles
14	Another type of drowning
Crushing on or against an immobile object	
15	Crushing on or against an immobile object (worker is in vertical or horizontal motion) - Unspecified
16	Crushing on or against, resulting from a fall
17	Crushing on or against, resulting from a trip or collision with an immobile object
18	Another type of crushing
Shock or blow to a moving object	
19	Shock or blow to a moving object, collision with –Unspecified
20	Shock or blow against an object - projected
21	Shock or knock against an object - falling
22	Shock or blow against an object - in swing
23	Shock or blow to an object (including vehicles) - moving
24	Collision with an object (including vehicles) - collision with a person (victim is on the move)
25	Another type of shock against moving object
Contact with "material agent" cutting, punching, etc.	
26	Contact with "material agent" cutting, sharp, hard, rough, - Unspecified
27	Contact with a cutting "material agent" (knife or blade)
28	Contact with a sharp "material agent" (key or sharp tool)
29	Contact with a "material agent" that scratches (scratcher, sanding, unbrushed board, etc.)
30	Another type of contact with "material agent" cutting, punching, etc.
Getting caught, being crushed, suffering an amputation	
31	Getting caught, being crushed, suffering an amputation - Not specified
32	Get caught, get crushed - in
33	Getting caught, getting crushed - low
34	Getting caught, getting crushed - between
35	Amputation, sectioning of a limb, hand or finger
36	Another type of entrapment
Physical overexertion, psychic trauma, radiation exposure, light, noise or pressure	
37	Physical overexertion, psychic trauma, radiation exposure, noise, light or pressure - Not specified
38	Physical overexertion - about the musculoskeletal system
39	Exposure to radiation, noise, light or pressure
40	Psychic trauma
41	Another type of overexertion
Bites, kicks, etc. (of animals or people)	
42	Bites, kicks, etc. (of animals or people) - Not specified.
43	Bite
44	Biting of an insect, a fish
45	Knocks, kicks, heads, strangulation
46	Another type of bite, kick, etc.

Infarctions, strokes and other non-traumatic pathologies	
47	Infarctions, strokes and other non-traumatic pathologies
Other forms of accident	
99	Other forms of accident

ANNEX III: MODEL COMMUNICATION SHEET FOR ACCIDENT TO THE DIRECTORATE-GENERAL FOR ENERGY POLICY AND MINES

REFERRED BY:	
RECIPIENT:	
DATE OF ACCIDENT:	
COMMUNICATION DATE:	

1.- DATA OF THE WORK CENTER WHERE THE ACCIDENT HAS OCCURRED	
Municipality and province:	
Holder:	
Name of the workplace:	
Place of work:	

2.- DATA OF THE COMPANY IN WHICH THE WORKER IS HIGH IN SOCIAL SECURITY	
Name or company name of the company:	
Municipality and province:	

3.- DATA OF THE ACCIDENT WORKER	
Name and surname:	
Workplace:	

4.- ASSISTANCE DATA					
Gravity:	**Serious accident:**		**Mortal accident:**		
Description of the accident:					

ITC SM-COM-04 CERTIFICATION AND APPROVAL

1. OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims to develop the content of Article 9 of the Mining Safety Regulation, specifying the conformity assessment procedure for products for use in mining.

The essential safety requirements for most products, equipment, equipment and materials used in mining, as well as the procedures for accrediting their compliance when placed on the market, are regulated by the Spanish legislation transposing the Community Directives, and must have the relevant CE marking. Only a small number of products, equipment, appliances and materials for use in mining do not fall within the scope of the provisions of European Community law.

This JTI sets out the essential safety requirements for these products and the procedures for accrediting their compliance. In some cases, requirements are laid down for proper use, installation or maintenance, both for CE marked products and for those subject to national requirements for placing on the market.

2. DEFINITIONS

For the purposes of this JTI, the following definitions apply:

2.1 Certification: Procedure by which a third party guarantees in writing that a product, process or service meets the established requirements.

2.2 Compulsory certification: Certification that, due to the requirement of a provision of Spanish or Community law, must be carried out before marketing a product, process or service.

2.3 Marketing: Temporary or indefinite supply, for consideration or free of charge, of equipment, products or materials for distribution or use in the national territory, including rentals in any of its modalities.

The assembly of equipment, machinery or apparatus, or the manufacture of a product, including when intended for own use, is considered to be placing on the market.

The following cases shall not be considered as marketing:

a) Transfer of the product from the manufacturer of a third country to the agent established in the European Union, which is responsible for carrying out the necessary procedures so that the product complies with the directive and can be marketed in the European Union.

Import to the Community market for re-export.

c) Transfer of a product manufactured in the territory of the Community for export to a third country.

d) Exhibition of the product at fairs and exhibitions, in which case it must be shown that the equipment is not yet suitable for use.

2.4 Technical criterion: Document approved as a matter of urgency by the Directorate-General for Energy Policy and Mines, after hearing the Mining Safety Commission, which includes an interpretation for the application of an existing standard or technical specification.

2.5 Declaration of Conformity: Declaration by a manufacturer or authorised representative expressing, under his sole responsibility, the conformity of a product, process or service with certain regulatory constructive and functional requirements.

2.6 EC declaration of conformity: This is the documented declaration by which the manufacturer declares that his product concerned complies with the essential safety requirements laid down in the relevant provision(s) of European Community law.

2.7 New work team: Work equipment that is first placed on the market after manufacture is considered to be new. Also considered new equipment whose first commercialization did not take place in the European Economic Area (hereinafter, EEA), including, therefore:

second-marketing work teams from non-EEA countries and

second-marketing work teams from countries which are currently members of the EEA but which were not members of the EEA at the time of their first placing on the market and putting into service.

2.8 Technical specification (hereinafter ET): Resolution of the Directorate General of Energy Policy and Mines that develops specific aspects of technical instructions complementary to the Mining Safety Regulation.

2.9 Conformity assessment: Systematic procedure for verifying that a product, process or service complies with the established requirements.

2.10 Compulsory conformity assessment: Assessment of compliance with the requirements established in the Spanish regulations or in the provisions of European Community law and that must be respected before placing a product, process or service on the market.

2.11 EC type-examination: It is the procedure whereby a notified body checks and testifies that a product or service satisfies the provisions and requirements laid down in the provision(s) of European Community law which concern it.

In the global approach or approach to certification and testing and within the modular scheme of conformity assessment, it is known as module B, EC type-examination.

2.12 Manufacturer: The one who assumes responsibility for the design and manufacture of a product that must meet the safety requirements established in this regulation. This definition does not affect the manufacturer's liability regime.

The manufacturer may subcontract some or all of those operations, including design, if he materially manufactures the product, or manufacture, if he is responsible for the design, provided that he maintains the direction and responsibility of the whole.

A fortiori, the manufacturer can use elements or components already manufactured for the elaboration of the product, without losing the status of manufacturer.

Whoever changes the use, modifies the function, the features or the characteristics of the same, becomes a manufacturer of a new product.

2.13 Importer or person responsible for placing on the market: A person who places a product subject to safety requirements on the market from a third country. Unlike the agent, the importer does not have a privileged relationship with the (third-country) manufacturer. Therefore, it can only be responsible for compliance with certain obligations listed in the implementing legislation.

In that case, the importer is responsible for placing the imported product on the market and, as such, he must be able to ensure that he can make available to the surveillance authorities both the

manufacturer's declaration of conformity and the technical file, in the case of products subject to provisions of European Community law, and the documentation attesting compliance with the requirements of the Mining Safety Regulation, in all other cases.

2.14. Standard: A document established by consensus and approved by a recognised standardisation body, providing rules, guidelines or characteristics for certain activities or their results, in order to achieve an optimal degree of order in a given context.

2.15. Harmonised standard: Standard adopted by a European standardisation body, based on general guidelines agreed by the European standardisation bodies and the Commission, and resulting from a mandate from the Commission. The list of harmonised standards and their references are published in the Official Journal of the European Union.

2.16. Notified body: Third party competent to carry out the conformity assessment tasks laid down in Community provisions, designated by a Member State among the bodies under its jurisdiction, notified to the Commission and the other Member States, and meeting the criteria for competence and the requirements laid down in Community provisions.

2.17 Transitional period: Period in which manufacturers may voluntarily choose to have their products already evaluated in accordance with the provisions of European Community law, or continue to be evaluated in accordance with the provisions of Spanish regulations.

This transitional period shall end on the deadline set by the relevant provision of European Community law for the start of its mandatory application.

2.18 Presumption of conformity: The conformity with national rules transposing harmonised standards, the references of which have been published by the Commission in the Official Journal of the European Union, gives rise to the presumption of conformity with the essential requirements referred to in the harmonised standards.

2.19 Product: "Product" means any object which has, directly or indirectly, an effect on safety and which may bring together terms such as product, equipment, apparatus, device, instrument, materials, units, components, etc.

Products which have undergone major modifications may be considered as new products which must comply with the provisions for a new product which are applicable when they are placed on the Community market and entered into service. This should be assessed on a case-by-case basis, unless otherwise stated.

Products that have been repaired (e.g. after a breakdown) without altering their original performance, purpose or type characteristics are not subject to conformity assessment.

2.20 Regulated product: Any product whose characteristics are regulated by one or more state technical regulations or provisions of European Community law.

2.21 Draft Standard: Document in preparation within a recognised standardisation body, identifiable by an official code and a date of publication, which is in a state of processing of at least public information.

2.22 Commissioning: First use in the Community territory of a product falling within the scope of this JTI by an end-user.

2.23. Essential requirements: The essential requirements refer to aspects of safety, health, environmental protection and any other aspect of collective interest. They are generally referred to as ‘essential safety requirements’ in the provisions of European Community law (in particular in the

'New Approach Directives'), and represent the minimum requirements to be met so that the product in question can be placed on the market and move freely within the European Union.

2.24 Authorised representative or authorised representative: He who, expressly designated by the manufacturer, acts in the name and on behalf of the latter with regard to the obligations laid down in the regulations.

If the manufacturer designates an agent, he must be established in the European Union for CE marked products, or in Spain for the rest of the products, in order to act on behalf of the manufacturer. The express delegation of the manufacturer to the agent is contained in a written mandate, which details the obligations that correspond to the manufacturer in relation to the regulations in force, whose fulfillment the manufacturer entrusts to the agent. Acting on behalf of the manufacturer without exceeding his powers, the agent does not commit himself personally, but commits the manufacturer.

3. ASSESSMENT OF THE NATIONAL CONFORMITY OF PRODUCTS

3.1 Affected products

The marketer of new products or work equipment which:

they do not require a CE marking either because they are not covered by a provision of European Community law or because the manufacturer does not opt for the CE marking where a transitional period is provided for, under the terms set out in paragraph 2.17.

b) or have the corresponding CE marking, but are subject to particular national requirements for use and/or installation.

It shall subject them, prior to their placing on the national market, to the appropriate conformity assessment procedure set out below, in accordance with the technical documents set out in ITC SM-COM-5.

3.1.1 Products that need to be evaluated according to 3.3.1

a) Electric cables and their accessories for open pit mines

b) Plastic studs for closing holes in work with grisu

c) Omega tubes in work with grisu

d) Indoor non-metallic ventilation ducts

e) Indoor compressed air hoses and hoses

Flexible cables for submerged pumps

Explosive traceability code-reading equipment

Radio-frequency location systems in underground locations

3.1.2 Products that need to be evaluated according to 3.3.2

3.1.2.1 Products to be used in any location

Specific protections for flexible cables

b) Anchor bolts

c) Dust meters and collectors

3.1.2.2 Products for indoor use

Protections against indirect contacts (insulation control devices, differentials, and other systems fulfilling this function)

b) Tajo chests

Transformers

Emergency stop switches

e) Mobile machines powered by a power grid

Control circuits associated with pit chests

g) Luminaires of fronts of advance and slits of starting

h) Gallery luminaires

Helmet lamp

Moorings and suspensions for the transport of personnel

Capstans and extraction machines for the transport of personnel

l) Friction stemples

m) Manual Pump Hydraulic Stemples

Racks

o) Pneumatic mattresses for support

Gas detection and measurement apparatus

Anemometers

Resins and organic products

s) Flexible pipes for hydraulic circuits

3.1.3 Products that need to be evaluated according to 3.3.2 and 3.3.3

3.1.3.1 Products to be used in any location

a) Mechanical cables for personnel transport.

3.1.3.2 Products for indoor use

Belts for conveyor belts

Hydraulic fluids

c) Electrical cables and their accessories (splices, extension boxes, etc.)

d) High strength chains

e) Steel sliding metal frames for support

3.1.3.3. Products for use in underground coal mines

a) Non-metallic ventilation ducts.

b) Compressed air hoses.

3.1.4. Products that need to be approved

After obtaining the type certificate by an Authorized Official Laboratory, approval will be requested, following a report from the Mining Safety Committee, by the Directorate-General for Energy Policy and Mines, accompanying the application, in addition to:

a) Name of the manufacturer, with the data of its industrial identification.

b) Identification of the factory or workshop where the product is manufactured.

c) Name of the product.

From the following documentation:

a) Plan or plans of the manufacturer that clearly define the product, with date and signature.

b) Manufacturer's descriptive document.

Type Examination Certificate according to Procedure 2 as defined in point 3.3.2.

d) For 3.1.4.2 products, factory audit certificate.

3.1.4.1 Products to be used in any location

Explosors for electric and non-electric detonators.

Explosors for electronic detonators.

c) Ohms and line testers for explosives.

Explosives loaders.

Explosive loading hoses.

f) Cables and accessories for glue line.

g) Electric initiators for non-electric glues.

Mobile Explosive Manufacturing Units (MEMUS).

i) Pumping equipment of emulsions, suspensions or gels, in bulk of interior, with the possibility of sensitization of the explosive.

3.1.4.2 Products for use in underground coal mines

Safety explosives.

Electrical safety detonators.

Safety detonating cords.

3.2 Declaration of conformity

In all cases, the manufacturer, his agent or the importer of the product, having legal personality in Spain, shall accompany each supply of the product with a declaration of conformity certifying that, under his sole responsibility, the product in question he supplies, identified by its serial number or failing that by the batch or date of manufacture, is in conformity with the applicable safety requirements. The signatory shall provide evidence of the power to commit the liability of the manufacturer or his representative.

The declaration of conformity shall contain the following elements:

a) The name or identification mark and the address of the manufacturer or his representative established in Spain.

b) The name of the product.

c) Where appropriate, the name of the Authorised Official Laboratory carrying out procedure 3 of conformity assessment.

d) Where applicable, the type or unit certificate number.

Reference to the standards and technical specifications used.

Identification of the signatory.

g) Date of declaration (must be post-manufacture).

The manufacturer shall first draw up a technical file containing all the documents and records required in accordance with the conformity assessment procedure to be carried out.

For a period of 10 years from the last date of manufacture of the product, the marketer must be able to ensure that the manufacturer keeps the technical file at the disposal of the national authorities which require it for justified reasons.

3.3 Conformity Assessment Procedures

3.3.1 Procedure 1: Internal manufacturing control

It is the procedure by which the manufacturer guarantees and declares that the products in question meet the requirements applicable to them. The manufacturer shall draw up a written declaration of conformity.

The manufacturer shall draw up a technical file enabling conformity assessment of the product covering its design, manufacture and operation, including:

a) A general description of the product.

b) Design and manufacturing plans.

c) The descriptions and explanations necessary for the understanding of these plans and diagrams and the operation.

A list of standards that have been applied, in whole or in part.

e) The results of the design calculations carried out and the controls carried out.

Test reports.

The manufacturer shall take all necessary measures to ensure that the manufacturing process ensures conformity of the manufactured products with the technical documentation referred to above.

3.3.2 Procedure 2: Examination of types or units

It is the procedure by which an Authorized Official Laboratory examines the design and the necessary tests are carried out to verify compliance with the requirements that are applicable to a particular product. Depending on the nature of the applicable requirements, one of the following documents will be issued as a result of the examination:

a) A certificate of control, which certifies compliance with the safety requirements established in technical specifications, technical criteria or technical instructions.

A Certificate of Conformity, attesting compliance with the requirements of a standard or draft standard.

For the examination application, the manufacturer, or his legal representative (mandatory) in Spain, will address his application to an Official Authorized Laboratory for certification. It shall accompany the request for:

a) Sample, unit, type or prototype of product to be certified.

b) Descriptive report that completely defines the product, justifying the security measures implemented, and that will include the plans and schemes to put into service, preserve, inspect, check the proper functioning, and if necessary, repair the product.

c) Installation, use and maintenance manual in Spanish language.

3.3.3 Procedure 3: Control of the manufacture of products

It is the procedure by which, through audits and inspections, the control of the manufacture of the products is examined in order to verify their conformity with the approved prototypes. Audits and inspections shall be carried out by an Authorised Official Laboratory.

The manufacturer shall implement an approved production or product quality system as well as carry out an inspection and testing of the finished products as specified in point 3.3.3.1. In addition, it shall be subject to the surveillance referred to in point 3.3.3.2.

3.3.3.1 Quality system

The manufacturer shall submit, for the products concerned, an application for assessment of his quality system to an authorised official laboratory. This application shall include:

All relevant information according to the category of products concerned.

Documentation relating to the quality system.

Technical documentation of the approved type.

The quality system shall ensure that the equipment conforms to the type described in the certificate of inspection and to the requirements of the technical standards applicable to it.

All elements, requirements and provisions adopted by the manufacturer shall be contained in a documentation carried out in a systematic and orderly manner in the form of measures, procedures and written instructions. Such quality system documentation shall allow for a uniform interpretation of quality programmes, plans, manuals and records.

In particular, it shall include an adequate description of:

Quality objectives, organizational structure and responsibilities of management personnel and their powers with regard to the quality of explosives.

b) The manufacturing procedures, control techniques and quality assurance, as well as the techniques and systematic actions that are applied.

c) The controls and tests that are carried out before, during or after manufacture, with indication of the frequency with which they are carried out.

Quality records, such as inspection reports, test and calibration data, qualification reports for the personnel concerned, etc.

e) The means of surveillance that allow to control the obtaining of the necessary quality of the products and the effective operation of the quality system.

The authorised official laboratory shall evaluate the quality system to determine whether it meets the requirements specified above and shall assume compliance with those requirements in the case

of quality systems applying the relevant harmonised standard. The audit team shall have at least one member who has experience in evaluating the technology of the product concerned. The assessment procedure shall include an inspection visit to the manufacturer's premises.

The manufacturer shall undertake to comply with the obligations arising from the quality system as approved and to maintain it in such a way that it remains adequate and effective.

The manufacturer or his authorised representative shall inform the authorised official laboratory which has approved the quality system of any plans to adapt to it, which shall evaluate the proposed amendments and decide whether the modified quality system still meets the requirements or whether a new assessment is necessary.

The Authorised Official Laboratory shall communicate the results of its evaluations to the manufacturer by means of audit reports and/or inspection reports. The approval of the quality system shall be notified to the manufacturer by means of a Manufacturer Accreditation.

3.3.3.2. Monitoring of the manufacturing system

The purpose of surveillance is to verify that the manufacturer duly fulfils his obligations under the approved quality system.

The manufacturer shall allow the authorised official laboratory to enter the factories, warehouses and inspection and testing facilities for inspection purposes and shall provide it with all necessary information, in particular:

Documentation on the quality system.

Quality records, such as inspection reports, test and calibration data, or reports on the qualification of the personnel concerned.

The Authorised Official Laboratory shall regularly carry out audits to ensure that the manufacturer maintains and implements the quality system and shall provide an audit report to the manufacturer.

The Authorised Official Laboratory may carry out unannounced inspection visits to the manufacturer. In the course of such visits, it may carry out or have carried out tests in order to verify, if deemed necessary, the proper functioning of the quality system. It shall subsequently submit to the manufacturer an inspection report and, if any tests have been carried out, a test report.

3.4 Control of products on the market

The Directorate-General for Energy Policy and Mines shall take the necessary measures to ensure that the products concerned by this JTI can only be placed on the national market when they meet all the requirements applicable to them, and have been subject to a conformity assessment in accordance with the requirements and procedures detailed in section 3.3 or in the corresponding provisions of European Community law that are applicable.

4. CHANGE OF TITLE OF CERTIFICATES AND APPROVAL

4.1 Products subject to the provisions of European Community law

Change of ownership means changes affecting the manufacturer, agent or representative in the European Union.

The change of ownership of a manufacturer or representative in the European Union of a product with a CE marking shall be regulated in accordance with the relevant Community legislation.

4.2 Products not subject to the provisions of European Community law

The change of ownership of a certificate of conformity to a national standard of a product not subject to provisions of European Community law shall be communicated to the Authorised Official Laboratory which issued the certification in order to proceed with the recertification of the product.

The change of ownership of an approval shall be communicated to the Directorate-General for Energy Policy and Mines.

The change of ownership (name and corporate address) will be reflected both in the documentation that is part of the file of the Official Authorised Laboratory and in the marking of the newly placed on the market product, which is the subject of the change of ownership.

5. OBLIGATIONS OF THE MARKETING RESPONSIBLE

5.1 Products subject to the provisions of European Community law

The person responsible for placing the product on the market or making it available on the market shall:

a) It must ensure and be able to guarantee that the necessary product conformity assessment procedure has been carried out, as well as the requirements corresponding to the current legislation that apply to it.

b) It must be ensured and must be able to guarantee that the documentation that is part of the technical construction file will be available, for the purposes of a possible con- trol by a request from the Competent Authority, for at least ten years from the last date of manufacture of the product, the last specimen manufactured if it is a series manufacture, or the last placed on the Spanish market.

The supply of the equipment must be accompanied by technical documentation to assess whether the product is suitable for its intended use, allowing for proper and safe installation, use and maintenance. It shall at least consist of:

the declaration of conformity and its original version, if applicable; and

b) of the instruction and maintenance manual.

5.2 Products not subject to the provisions of European Community law

By placing it on the market, the manufacturer is responsible for ensuring that the manufactured product complies with the regulatory requirements and has satisfactorily passed the individual verifications and tests required, or the manufacturing controls prescribed in each case, being obligatory on his part:

ensure compliance with all the manufacturing conditions laid down in the descriptive documents supplied, as well as those laid down in the certificates of conformity or control issued by the authorised official laboratory, by means of a declaration of conformity; and

b) inform the Directorate General of Energy Policy and Mines, of any accident or incident that could compromise the safety of people, property, domestic animals or the environment of which it has been aware and that is attributable to the product.

The supply of the equipment must be accompanied by technical documentation to assess whether the product is suitable for its intended use, allowing for proper and safe installation, use and maintenance. It shall at least consist of:

the declaration of conformity and its original version, if applicable; and

b) of the instruction and maintenance manual.

6. CHECKS, CHECKS, CALIBRATIONS AND PERIODIC CONTRACTS

For the installation of detection and measurement equipment on the proper functioning of which the safety of workers depends, the necessary measures shall be taken to carry out an initial check and start-up for the first time. After each assembly in a new place or location, a new check will be carried out in order to ensure its correct installation and proper functioning.

Detection and measurement equipment subject to influences liable to cause deterioration that may lead to dangerous situations shall be subject to checks or, where appropriate, to periodic tests or controls, in order to ensure compliance with safety and health provisions and to remedy such deterioration in a timely manner. The checks shall be carried out by competent and specialised personnel, and the results of the regular checks and controls shall be documented and made available to the Mining Authority, and shall be kept for the entire lifetime of the products.

The requirements and conditions for periodic checks or controls on products shall be in accordance with the specific rules applicable to them.

All sensing and measuring equipment, the accuracy of which depends on the safety of workers, shall be periodically calibrated according to the certification conditions and the manufacturer's instructions, for example:

anemometers;

gas detectors;

tellurometers;

vibration detectors and

e) sonometers.

7. ACTIVITIES IN EXCEPTIONAL SITUATIONS

7.1 Prior authorisation

Where exceptional situations arise requiring the use of equipment whose certification or CE marking presents particular difficulties, assessed as such by the Mining Authority, the Mining Authority may issue authorisations on a trial basis to use such equipment and shall inform the Mining Safety Commission. The applicant shall include in the application a detailed project.

The Mining Authority may require an inspection report from a Mining Control Agency and will resolve incorporating the requirements it deems necessary.

7.2 Performance of the actions

The entity carrying out the actions shall train staff on the above instructions.

In the course of the actions, a continuous control of the complementary security measures will be carried out, interrupting them when these conditions are breached.

8. OFFICIAL LABORATORY AUTHORISED BY THE ADMINISTRATION

The verifications set out in Chapter 3 of this JTI will be carried out by an Authorised Official Laboratory, which is understood to be a body authorised by the Directorate-General for Energy Policy and Mines to verify compliance with the mandatory safety conditions of products placed on the market. For the authorization, the criteria defined in Law 21/1992, of July 16, on Industry and in Royal Decree 2200/1995, of December 28, approving the Regulation of the Infrastructure for Quality and Industrial Safety, for the control bodies will be followed. In application of the principle of proportionality and necessity and exceptionally, the authorisation of the Directorate-General for Energy Policy and Mines may provide for a procedure for the exclusion of such criteria for products determined in view of the uniqueness of their use in the extractive industry.

On the basis of mutual recognition, the Authorised Official Laboratory may accept certificates and test reports carried out by a notified body in a Member State of the European Union or of the European Economic Area, in accordance with the relevant regulations referred to in ET 12.1, or another recognised standard ensuring equivalent safety. In any case, it will always be necessary to have the certificate issued by the Official Authorized Laboratory.

The Official Authorised Laboratory shall periodically send a register of all the products it has certified and/or evaluated, including the relevant information associated with each of them, for publication on the website of the Ministry responsible for mines.

ITC SM-COM-05 RELATIONSHIP OF TECHNICAL STANDARDS OF COMPLIANCE

1. OBJECT

This Supplementary Technical Instruction (hereinafter referred to as 'ITC') is intended to contain the list of equipment and products used in mining that require national conformity assessment, as well as the corresponding applicable procedures described in paragraph 3 of ITC-SM-COM-4, together with their implementing regulations.

Likewise, the list of standards and technical specifications, identified by their titles and numbering, is included.

2. PRODUCTS REQUIRING CONFORMITY ASSESSMENT AND CERTIFICATION

The following table includes the products that require conformity assessment, and where appropriate certification by an Authorised Official Laboratory, prior to their use in Spanish mining, as established in section 3.3 of ITC-SM-COM-4.

Product	Conformity assessment procedure		
	1	2	3
Electric cables for open pit mines	UNE 22585-2		
	UNE 22586		
	UNE 22587		
Plastic studs for closing holes in work with grisu	EN 1127-2		
Omega tubes in work with grisu	EN 1127-2		
Indoor non-metallic ventilation ducts	UNE 22315		
Indoor compressed air hoses	UNE 22070		
Flexible cables for submerged pumps	UNE 21166		
Transformers	UNE-EN IEC 60076-11		
Emergency stop switches	UNE-EN 60947		
Forward-facing luminaires and starting slits	UNE 22531		
Luminaires for galleries	UNE 22532		
Case lamps		ET 05.08	
Electrical cable accessories (splices, extension boxes, etc.)	UNE-EN 50393		
	UNE-HD 629.1 S3		
Explosive Traceability Code Reader Equipment	ET 05.13		
Radiofrequency locating systems in underground locations	ET 05.13		
Anchor bolts		UNE 22781	
		UNE 22782	
		ET 05.15	
Steel sliding metal frames for support		UNE 22725	ET 05.06
Friction stemples		UNE 22700	
Manual Pump Hydraulic Stemples		UNE 22710	
		UNE 22711	

Product	Conformity assessment procedure		
	1	2	3
		UNE 22713	
Racks		UNE 22740	
Pneumatic mattresses		UNE 22730	
Non-metallic ventilation ducts for coal mines		UNE 22315	ET 05.06
Compressed air hoses for coal mines		UNE 22070	ET 05.06
Dust meters and collectors		UNE EN ISO 13137	ET 05.06
		ET 05.14	ET 05.06
Gas detection and measurement apparatus		UNE EN 60079-29-1	
Mechanical cables for the transport of personnel		UNE-EN 12385	ET 05.06
		UNE 36741	
		UNE 22002	
		ET 5.01	
		ET 5.09	
High Strength Chains for Indoor		UNE 22260	ET 05.06
Moorings and suspensions for the transport of personnel		UNE 22006-1	
		ET 05.10	
Capstans and extraction machines for the transport of personnel		UNE 22010	
High strength chains		UNE 22260	
Resins and organic products		ET 05.04	
Hydraulic fluids for indoor use		UNE 22910	ET 05.06
Belts for conveyor belts		UNE EN 14973	ET 05.06
Indoor electric cables		UNE 20431	ET 05.06
		UNE 22510	ET 05.06
		UNE 22511	ET 05.06
		UNE 22512	ET 05.06
		UNE 22513	ET 05.06
		UNE 22560	ET 05.06
		UNE 22561	ET 05.06
		ET 05.02	ET 05.06
		ET 05.03	ET 05.06
		ET 05.11	ET 05.06
		ET 05.14	ET 05.06
Tajo chests		UNE 22520	
		UNE 22522	
		UNE 22527	
		ET 05.07	
Control circuits associated with pit chests		UNE 22522	
Indirect contact protection (insulation control devices, differentials, and other systems fulfilling this function)		UNE EN 61557-8	
		ET 05.05	
Specific protections for flexible cables		UNE 22521	
Mobile machines powered by a power grid		UNE 22548	

3. PRODUCTS REQUIRING CERTIFICATION AND APPROVAL

The following table includes the products that, in addition to requiring the intervention and certification of an Authorized Official Laboratory, require approval by the Directorate-General for Energy Policy and Mines, as established in section 3.1.4 of ITC-SM-COM-4.

Product	Conformity assessment procedure	
	2	3
Safety explosives	UNE 31310	ET 05.06
Electrical safety detonators	UNE 31361	ET 05.06
Safety detonating cords	UNE 31315	ET 05.06
Explosors for electric and non-electric detonators	UNE-EN 13763-26	
Explosors for electronic detonators	UNE-CEN/TS 13763-27	
Ohms and line testers for explosives	UNE-EN 13763-26	
Hoses for loading explosives	UNE 22071	
Cables and accessories for glue line	UNE-EN 13763-26	
Electric initiators for non-electric glues	UNE-EN 13763-26	
Explosives loaders	UNE 22351	
	ET 05.12	
Mobile Units for the Manufacture of Explosives (MEMUS)	ET 05.12	
Pumping equipment for emulsions, suspensions or gels, in bulk, with the possibility of explosive sensitisation	ET 05.12	

4. RELATIONSHIP OF RULES

Number	Name
UNE 20431	Characteristics of fire-resistant electrical cables.
UNE 21166	Cables for powering submerged pumps.
UNE 22002	Cables for mining installations. Impregnation compounds and lubricants used in the manufacturing process and in the service of cables. Characteristics and tests.
UNE 22006-1	Moorings and cable suspensions for mining installations in vertical mine shafts. Part I. Construction and Testing Rules.
UNE 22010	Capstans up to 60 kN in force.
UNE 22070	Compressed air hoses. Measurement of electrical resistance. Test method and specifications.
UNE 22071	Hoses for pneumatic loading of explosives. Measurement of electrical resistance. Test method and specifications.
UNE 22260	High tensile steel chains (round link) for chain conveyors and carbon brushes.
UNE 22315	Ventilation ducts and pipes. Electrical conductivity. Test method. Specifications.
UNE 22351	Granular explosives loaders using pressure vessels. Safety rules.
UNE 22510	Electric cables for mine interiors. General requirements.
UNE 22511	Electric cables for mine interiors. Rigid cables armed with insulation and PVC cover, rated voltage 0,6/1 kV to 3,6/6 kV.
UNE 22512	Electric cables for mine interiors. Flexible cables armed insulated with EPR. Rated voltage 0,6/1 kV at 3,6/6 kV. Type 2M2N.
UNE 22513-1	Electric cables for mine interiors. Flexible cables armed insulated with EPR. Rated voltage 0,6/1 kV, 1,8/3 kV and 3,6/6 kV. Part I (symmetrical).
UNE 22513-2	Electric cables for mine interiors. Flexible cables armed insulated with EPR. Rated voltage 0,6/1 kV, 1,8/3 kV and 3,6/6 kV. Part 2. Type DN/3E.
UNE 22513-3	Electric cables for mine interiors. Flexible cables armed insulated with EPR. Rated voltage 0.6/1 kV, 1,8/3 kV and 3,6/6 kV. Part 3. DSIN type (asymmetric).
UNE 22520	Electrical material for mines. Cut-out chest.
UNE 22522	Electrical material for mine interiors. Tajo chests. Control circuits.

Number	Name
UNE 22527	Electrical material for mines. Tajo chests. Requirements for chests used in the supply of secondary fans.
UNE 22521	Electrical material for mines. Tajo chests. Flexible cable protection.
UNE 22531	Electrical material for mines. Tajo luminaires.
UNE 22532	Electrical material for mines. Luminaires for galleries
UNE-EN IEC 60076-11	Power transformers. Part 11: Dry type transformers.
UNE-EN 50393	Test methods and requirements for rated voltage distribution cable accessories 0,6/1,0 (1,2) kV.
UNE-HD 629.1 S3	Test requirements for accessories for use in cables with rated voltage energy from 3,6/6(7,2) kV to 20,8/36(42) kV. Part 1: Accessories for cables with extruded insulation.
UNE EN 61557-8	Electrical safety in low voltage distribution networks up to 1 000 V a.c. and 1 500 V a.c. Equipment for testing, measuring or monitoring protective measures. Part 8: Isolation detection devices for IT schemes.
UNE 22548	Mobile machines for indoor mines. Safety rules for mobile machines powered by a three-phase power grid.
UNE 22560	Electric cables for mine interiors. Telecommunication cables.
UNE 22561	Electric cables for mine interiors. Signalling and control cables 300/500 V.
UNE 22585-2	Electric cables for open pit mines. Flexible cables insulated with EPR. Part 2. Rated voltage cables 1,8/3 kV up to 18/30 kV.
UNE 22586	Electric cables for open pit mines. EPR-insulated armed cables for semi-mobile and semi-fixed services of nominal voltage 6/10 kV up to 18/30 kV.
UNE 22587	Electric cables for open pit mines. Lightweight cables for hauling in mobile services. Rated voltage 1,8/3 kV and 3,6/6 kV.
UNE 22700	Friction stemples. Specifications and tests.
UNE 22710	Hydraulic stemples. Specifications and tests.
UNE 22711	Hydraulic stemples. Calculations.
UNE 22713	Hydraulic stemples. Characteristics and tests of pressure relief safety valves.
UNE 22725	Steel sliding metal frames for support.
UNE 22730	Pneumatic support mattresses.
UNE 22740	Racks. Rehearsals.
UNE 22781	Blown up. Point anchor bolts.
UNE 22782	Anchor bolts distributed for use in mining.
UNE 22910	Hardly flammable fluids for hydraulic circuits. Flammability and flame propagation tests.
UNE 31310	Safety explosives. Test methods and criteria.
UNE 31315	Safety detonating cords. Test methods and criteria. Applications.
UNE 31361	Electrical safety detonators. Test methods and criteria.
UNE 36741	Steel Cables. Textile souls. Specifications.
UNE EN ISO 13137	Atmospheres in the workplace. Pumps for personal sampling of chemical and biological agents. Requirements and test methods.
UNE EN 60079-29-1	Explosive atmospheres. Part 29-1: Gas detectors. Operating requirements for flammable gas detectors.
UNE-EN 12385-1	Steel cables. Security. Part 1: General requirements.
UNE-EN 12385-2	Steel cables. Security. Part 2: Definitions, designation and classification.
UNE-EN 12385-4	Steel cables. Security. Part 4: Braided cables for general lifting applications.
UNE-EN 12385-6	Steel cables. Security. Part 6: Cord cables for mine shafts.
UNE-EN 12385-7	Steel cables. Security. Part 7: Closed extraction cables for mining wells.
UNE-EN 13763-26	Explosives for civil uses. Detonators and relays. Part 26: definitions, methods and requirements for appliances and accessories for the reliable and safe operation of detonators and relays.
UNE-CEN/TS 13763-27	Explosives for civil use. Detonators and relays. Part 27: Definitions, methods and requirements of electronic initiation systems.
UNE-EN 1127-2	Explosive atmospheres. Prevention and protection against explosion. Part 2: Basic concepts and methodology for mining.
UNE-EN 60947	Low voltage switchgear.
UNE-EN 14973	Conveyor belts for use in underground facilities. Electrical safety requirements and flammability protection.

5. RELATIONSHIP OF TECHNICAL SPECIFICATIONS

Number	Name
ET 05.01	Flat cables for mining installations.
ET 05.02	Unipolar reinforced rigid cable.
ET 05.03	Cables with polyurethane cover.
ET 05.04	Resins and organic products used for consolidation and sealing.
ET 05.05	Insulation control for voltage networks with insulated neutral.
ET 05.06	Implementation of European standards for quality management and assurance.
ET 05.07	Tajo chests.
ET 05.08	Helmet lamps.
ET 05.09	Moorings and suspensions.
ET 05.19	Design of flexible asymmetric cables.
ET 05.11	Devices for loading explosives. Safety rules.
ET 05.12	Radio frequency in the presence of explosives.
ET 05.13	Electric cables type DM2N.
ET 05.14	Equipment for taking samples of respirable crystalline silica and dust.
ET 05.15	Anchor bolts distributed for use in mining. Anchor bolts with resin.

ET 05.01 FLAT CABLES FOR MINING EXTRACTION FACILITIES

1. OBJECT AND SCOPE

The purpose of this Technical Specification is to specify the characteristics of the flat cables used in mine-mining facilities, as well as to establish the technical conditions of supply and inspection.

It is applicable to flat extraction and balancing cables.

2. CONSULTATION RULES

- UNE 7468. Metallic materials. Wires. Simple torsion test.
- UNE 7469. Metallic materials. Wires. Alternative folding test.
- UNE 22002. Cables for mining installations. Impregnation compounds and lubricants used in the manufacturing process and in the service of cables. Characteristics and test methods.
- UNE 36741. Steel cables. Textile souls. Specifications.
- UNE EN ISO 7.500-1. Metallic materials. Calibration and verification of static uniaxial testing machines. Part 1: Tensile/compression testing machines. Calibration and verification of the force measurement system.
- UNE-EN 10021. General technical supply conditions for steel products.
- UNE-EN ISO 6892-1. Metallic materials. Tensile test. Part 1: Ambient temperature test method.
- UNE 7326. Tensile test of steel cables and cords.
- UNE-EN 12385-2. Steel cables. Security. Part 2: Definitions, designation and classification.
- UNE-EN 12385-6. Steel cables. Security. Part 6: Cord cables for mine shafts.
- ISO 3154. Braided cables for mining installations. Technical supply requirements.
- UNE-EN 10257-1. Wires of non-alloy steel coated with zinc or zinc alloys for the assembly of cables for the transport of energy or cables for telecommunications. Part 1: Ground cables.

3. MATERIALS

3.1 Wires

The wires used shall comply with ISO 3154.

3.2 Textile and lubricating components

Textile souls of steel cables shall meet the requirements laid down in UNE 36741. Lubricants shall comply with the conditions prescribed in UNE 22002.

3.3 Cable construction

The cords and cables shall be constructed in accordance with the requirements of UNE-EN 12385-6.

3.3.1 Sewing of cables

The seam must be made so that all the wires that compose it are parallel to each other and are located in the same plane. Wires assembled in a cord, or a single thick weft, should not be used.

3.4 Standard compositions

3.4.1 Extraction cables

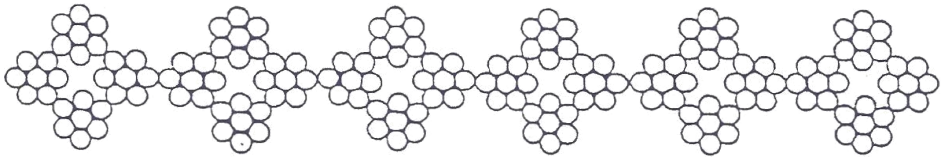


Figure: 1 Flat cable 6 (6 x7 + 1)

TABLE1: Flat cable 6 (4 x 7 +1)

1	2	3	4	5	6	7	8	9	10
Width x thickness (at x e) a ± 5% e ± 10%	Mass Approx.	Wire Diameter	Metal section	Breaking load minimum. Class of resistance			Breaking load nominal total. Class Resistance		
				(*) A 1570*	(*) To 1770*	To 1960	(*) A 1570*	(*) A 1170*	To 1960
a x and e mm	m ± 5% kg/m	d mm	s mm	F_{or} kN			F_b kN		
56 x 11	2,2	1,30	223	315	355	393	350	394	437
60 x 12	2,6	1,40	259	366	413	457	407	459	508
65 x 14	3,0	1,50	297	420	4473	524	467	526	582
70 x 15	3,4	1,60	338	478	538	596	531	598	662
78 x 17	4,3	1,80	427	603	680	753	670	756	837
87 x 19	5,3	2,00	528	746	841	931	829	934	1.035
95 x 21	6,4	2,20	638	901	1.016	1.025	1.001	1.129	1.250

* These resistance classes are considered preferred

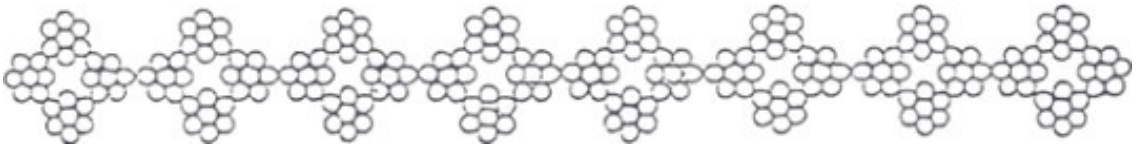


Figure: 2 Flat cable 8 (4 x 7 +1)

TABLE2: Flat cable 8 (4 x 7 +1)

1	2	3	4	5	6	7	8	9	10

Width x thickness (at x e) a ± 5% e ± 10%	Mass Approx.	Wire Diameter	Metal section	Breaking load minimum. Class of resistance			Breaking load nominal total. Class Resistance		
				(*) A 1570*	(*) To 1770*	To 1960	(*) A 1570*	(*) A 1170*	To 1960
a x and e mm	m ± 5% kg/m	d mm	s mm	F_{or} kN			F_b kN		
70 x 10	2,5	1,20	253	357	403	446	397	448	496
75 x 11	3,0	1,30	298	421	475	526	468	527	584
80 x 12	3,5	1,40	345	487	550	609	542	611	676
86 x 14	4,0	1,50	396	560	631	699	622	701	776
92 x 15	4,5	1,60	450	636	717	794	707	796	882
104 x 17	5,7	1,80	569	804	906	1.004	893	1.007	1.115
116 x 19	7,0	2,00	703	993	1.120	1.240	1.103	1.244	1.378
128 x 21	8,5	2,20	851	1.202	1.356	1.501	1.336	1.506	1.668

3.4.2. Balance cables

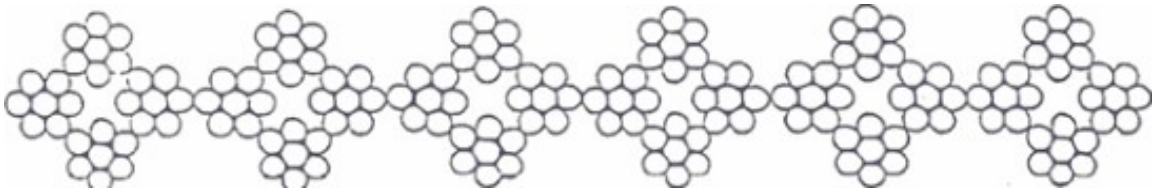


Figure: 3 Flat cable 6 (4 x 7 + 1)

TABLE3: Flat cable 6 (4 x 7 +1)

1	2	3	4	5	6	7	8
Width x thickness (at x e)		Mass approximate		Wire Diameter	Metal section I	Breaking load	Nominal breaking load
a ± 5% Simple sewing	e ± 10% Simple sewing	Simple sewing	Double sewing			Resistance class A 1570 N/mm²	Resistance class A 1570 N/mm²

(at x e)		m ± 5%		d	S_0	F_0	F_1
mm		kg/m		mm	mm^2	kN	kN
70 x 15	70 x 17	3,4	3,5	1,60	338	480	530
74 x 16	74 x 18	3,8	4,0	1,70	381	540	600
78 x 17	78 x 19	4,3	4,5	1,80	427	600	670
82 x 18	82 x 20	4,8	5,0	1,90	476	675	750
87 x 19	87 x 21	5,3	5,5	2,00	529	750	830
87 x 20	91 x 22	5,8	6,1	2,10	582	822	915
95 x 21	95 x 23	6,4	6,7	2,20	638	900	1.000

Figure: 4 Flat cable 8 (4 x 7 +1)

TABLE4: Flat cable 8 (4 x 7 +1)

1	2	3	4	5	6	7	8
Width x thickness (at x e)		Mass approximate		Wire Diameter	Metal section I	Breaking load	Nominal breaking load
a ± 5% Simple sewing	e ± 10% Simple sewing	Simple sewing	Double sewing			Resistance class A 1570 N/mm^2	Resistance class A 1570 N/mm^2
(at x e)		m ± 5%		d	S_0	F_0	F_1
mm		kg/m		mm	mm^2	kN	kN
110 x 18	110 x 20	6,4	6,7	1,90	635	900	1.000
116 x 19	116 x 21	7,0	7,4	2,00	704	995	1.105
122 x 20	122 x 22	7,8	8,1	2,10	776	1.100	1.220
128 x 21	128 x 23	8,5	9,9	2,20	851	1.200	1.340

Figure: 5 Flat cable 6 (4 x 12 -1)

TABLE5: Flat cable 6 (4 x 12 +1)

1	2	3	4	5	6	7	8
Width x thickness (at x e)		Mass approximate		Wire Diameter	Metal section	Breaking load	Nominal breaking load
a ± 5% Simple sewing	e ± 10% Simple sewing	Simple sewing	Double sewing			Resistance class A 1570 N/mm^2	Resistance class A 1570 N/mm^2
(at x e)		m ± 5%		d	S_0	F_0	F_1
mm		kg/m		mm	mm^2	kN	kN
112 x 23	112 x 26	8,2	8,6	1,90	816	1.155	1.280
118 x 24	118 x 27	9,0	9,5	2,00	905	1.280	1.420
124 x 25	124 x 28	10,0	10,5	2,10	997	1.410	1.565
130 x 26	130 x 29	10,9	11,5	2,20	1.095	1.550	1.720

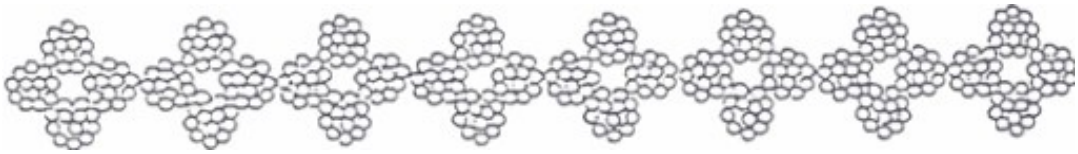


Figure: 6 Flat cable 8 (4 x12 +1)

TABLE6: Flat cable 8 (4 x 12 +1)

1	2	3	4	5	6	7	8
Width x thickness (at x e)		Mass approximate		Wire Diameter	Metal section	Breaking load	Nominal breaking load
a ± 5% Simple sewing	e ± 10% Simple sewing	Simple sewing	Double sewing			Resistance class A 1570 N/mm^2	Resistance class A 1570 N/mm^2
(at x e)		m ± 5%		d	S_0	F_0	F_1
mm		kg/m		mm	mm^2	kN	kN
146 x 23	146 x 26	10,9	11,5	1,90	1.089	1.540	1.710
154 x 24	154 x 27	12,1	12,7	2,00	1.206	1.705	1.895

160 x 25	160 x 28	13,3	14,0	2,10	1.330	1.880	2.100
168 x 26	168 x 29	14,6	15,3	2,20	1.460	2.065	2.295

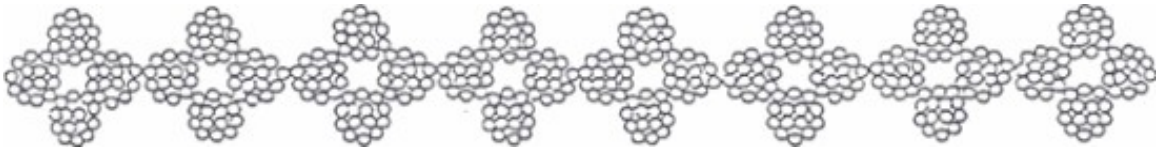


Figure: 7 Flat cable 8 (4 x 14 + 1)

TABLE7: Flat cable 8 (4 x 14 +1)

1	2	3	4	5	6	7	8
Width x thickness (at x e)		Mass approximate		Wire Diameter	Metal section	Breaking load	Nominal breaking load
a ± 5% Simple sewing	e ± 10% Simple sewing	Simple sewing	Double sewing			Resistance class A 1570 N/mm^2	Resistance class A 1570 N/mm^2
(at x e)		m ± 5%		d	S_0	F_0	F_1
mm		kg/m		mm	mm^2	kN	kN
172 x 26	172 x 29	14,8	15,5	2,05	1.478	2.090	2.320
180 x 27	180 x 30	16,3	17,1	2,15	1.626	2.300	2.555

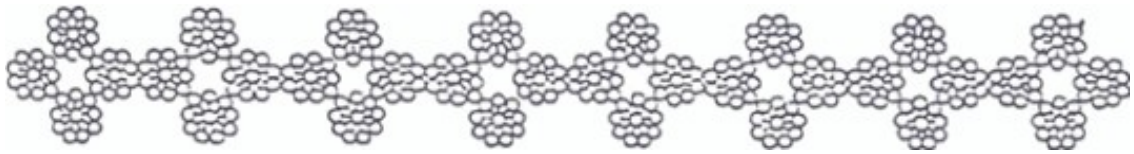


Figure: 8 Flat cable 8 (4 x 19 + 1)

TABLE8: Flat cable 8 (4 x 19 +1)

1	2	3	4	5	6	7	8
Width x thickness (at x e)		Mass approximate		Wire Diameter	Metal section	Breaking load	Nominal breaking load
a ± 5% Simple sewing	e ± 10% Simple sewing	Simple sewing	Double sewing			Resistance class A 1570 N/mm^2	Resistance class A 1570 N/mm^2
(at x e)		m ± 5%		d	S_0	F_0	F_1
mm		kg/m		mm	mm^2	kN	kN
186 x 28	186 x 31	17,3	18,1	1,09	1.724	2.435	2.710

190 x 29	190 x 32	18,2	19,1	1,95	1.815	2.565	2.850
194 x 30	194 x 33	19,1	20,1	2,00	1.910	2.700	3.000

The ratio of the seam section to that of the outer wire assembly of a cord shall be between 1,3 and 2,1. If a higher ratio is necessary, it will be specified in the order.

4. CABLE INSPECTION

4.1 General

Inspection of the cable shall entail visual inspection of the cable and verification of the following characteristics of the cable:

Cable dimensions (width x thickness).

Mass per meter of cable.

Coating quality (if wires are galvanized).

Breaking load.

Diameter of wires.

Resistance of wires to alternative bending.

Resistance of wires to simple torsion.

4.2 Inspection methods

The cable shall be inspected according to the methods of standard UNE 22013 “Inspection procedures for steel cables in service for mining installations”.

5. TEST METHODS

5.1 Determination of cable dimensions (width x thickness)

The measurement of the dimensions of the cable shall be carried out on a straight, non-tensioned part and at two points at a distance of at least 1 m. As real dimensions, the arithmetic mean of the two measurements obtained will be taken.

King's foot gauge with legs long enough to cover the full width of the cable shall be used.

In case of dispute or contrast, the cable shall be measured by subjecting it to a voltage not exceeding 5% of the minimum guaranteed breaking load.

5.2 Determination of mass per metre

The mass shall be determined by weighing, with uncertainty less than 1%, a minimum length of m measured with uncertainty less than 1%.

The unit mass shall be determined by the formula:

$$m = M/L$$

where:

m = Unit mass.

M = Mass of the test piece expressed in kilograms

L = Length expressed in metres.

5.3 Coating

The control of the coating shall be carried out by determining the actual mass of the coating as indicated in standard UNE-EN 10257-1.

5.4 Determination of wire diameter

The diameter of the wires shall be determined as the arithmetic mean of two measurements obtained on two perpendicular diameters of the same cross-section.

5.5 Determination of breaking load

5.5.1. Method I. Measured full burst load

The measured total breaking load is the sum of the breaking loads of all wires, taken from a cable sample and tested separately.

If inspection method 1 has been agreed, UNE-EN ISO 6892-1 shall be applied for the testing of all wires extracted from the cable.

For the determination of tensile strength, the nominal section of each wire shall be used as the divider of the total load.

5.5.2. Method II. Measured breaking load

The measured breaking load of a cable is the value of the maximum load needed to break a cable sample.

If inspection method II has been agreed, the method described in UNE 7326 shall be applied with the following details:

A traction machine of at least type 1 (UNE EN ISO 7500-1) shall be used. Such machinery shall be regularly calibrated by an officially recognised Control Body.

The useful test length (distance between anchorages) shall be at least 8a (a = cable width), provided that it is not less than 700 mm.

5.5.3. Ratio rupture load/total rupture load measured

The values of the characteristics defined in 6.5.1.1 and 6.5.2.2 are related to each other by the formula:

Measured breakage load=k x Measured total breakage load

Being

k = Coefficient of wiring losses.

The wiring loss coefficient takes the value 0.9.

Determination of elongation. If the elongation determination has been agreed, it shall be measured over a test length of 500 mm. The determinations shall be made from a load of 2% of the minimum breaking load F_0, and for the values 0,1 F_0, 0,2 F_0, 0,3 F_0, 0,5 F_0 and 0,6 F_0. It can also be determined by continuous recording.

When discontinuous determinations are made, the remaining elongation shall be measured by discharging the specimen up to 2% of the minimum breaking load with an uncertainty of 0,1 mm.

5.5.4. Alternative bending resistance

The provisions of UNE 7469 shall apply.

5.5.5. Simple torque resistance

The provisions of standard UNE 7468 shall be applied, carrying out the test until breakage.

6. ACCEPTANCE CRITERIA

The same criteria as specified in ISO 3154 are followed.

7. RECEPTION

In relation to the place of reception, presentation to reception and rights and duties of the receiving agent, the provisions of standard UNE-EN 10021 apply.

8. CERTIFICATION

The user must indicate the type of document, according to one of the models indicated in Annexes A and B that must be provided with each supply.

9. CONDITIONS OF SUPPLY

The same as specified in ISO 3154.

10. DATA TO BE INCLUDED IN THE ORDER

When placing an order (request for an offer) with the manufacturer, the buyer must include at least the following information:

a) Cable Type:
   - Composition and form.

b) Nominal cable measurements:
   - Width.
   - Thickness.
   - Length.
   - Mass per metre (if applicable).

c) Resistance class of wires.

d) Minimum breaking load.

e) Nature of the surface (grey, or type of galvanized).

f) Inspection method.

g) Reception (if applicable).

h) Type of certificate.

i) Type of presentation and packaging.

ANNEX A

Conformity Testing Model for Cables

(Conformity testing)

Manufacturer: .....

Buyer: .....

Buyer's order number: .....

Delivery date: .....

Nominal width: .....
.....
.....

Nominal thickness: .....
.....
.....

Length: .....m

Composition: .....

Resistance class of wires: .....
.....

Nature of the surface of the wires: .....

Nominal total breaking load, or minimum breaking load: .....

N Mass per linear metre: .....kg/m

Total cable mass: .....kg

Coil/roll n.0: .....

Comments: .....

This document certifies that the cable supplied, the nominal characteristics of which are detailed, conforms to ET 05.01.

Date and place

Signature and stamp

ANNEX B

Model of control certificate for cables

(Certificate of control)

Manufacturer: .....

Buyer: .....

Buyer's order number: .....

Delivery date: .....

CHARACTERISTICS OF CABLE:

Conditions of supply: .....

Cable Width: .....

Nominal: .....mm.....Measure: .....mm

Cable Thickness:

Nominal: .....mm.....Measure: .....mm

Cable Length:

Requested: .....Measure: .....m

Total cable mass: .....kg

Mass per linear meter:

Nominal: .....kg/m ....Measure: .....kg/m

Composition: .....

Nature of the surface of the wires: .....

Cable: .....

Preformed: IF ☐ NO ☐ Post-forming: IF ☐ NO ☐

Nominal tensile strength of wires: .....N/mm ^{2}

Minimum breaking load: .....N

Cable breakage load:

Total load measured: ..... Measured breaking load: .....

Nature of the soul: .....

Type of lace lubricant: .....

Type of impregnation compound of interleaved fibres: .....

Percentage of the impregnation compound of the interleaved fibres and of the souls, relative to the mass of the dry fibre: ……

Number of coil or reel: ……

Coil dimensions (diameter x length): ……

Total mass of cable-support-packing assembly: ……kg

Place and date

Stamp and signature

ET 05.02 UNIPOLAR ARMED RIGID CABLE

1. OBJECT AND SCOPE

The purpose of this Technical Specification is to regulate a type of construction cable not currently covered by the current regulations, UNE 22511 'Electric cables for mine interiors. Rigid cables armed with insulation and PVC cover. Rated voltage 0,6/1 kV at 3,6/6 kV.", which refers only to tripolar cables.

The need to use these cables is technologically justified by the high sections of the unipolars.

It is applicable to unipolar reinforced rigid cable insulated with polyvinyl chloride (PVC) for use in indoor mines.

2. REQUIREMENTS

All unipolar cables meeting the following requirements shall be considered eligible for certification for use in indoor mines.

Its section is higher than the maximum established in UNE 22511.

Except in the grouping, the cable complies with all the requirements established by UNE 22511; For those aspects that exceed the scope of this standard and that need to be taken into account, the criteria of standard UNE 21123-1 "Electric cables for industrial use of rated voltage 0,6/1 kV. Part 1: Insulated cables with polyvinyl chloride cover', UNE 21123-2 'Electric cables for industrial use with rated voltage 0,6/1 kV. Part 2: Cables with cross-linked polyethylene insulation and polyvinyl chloride cover" and UNE 211435-2 "Guide to the choice of electrical cables for electrical power distribution circuits. Part 2: Cables with a rated voltage exceeding 0,6/1 Kv', as applicable.

The unipolar cable armour shall ensure the conductivity required of the protective conductor as set out in UNE 22511.

ET 05.03 CABLES WITH POLYURETHANE COVER

1. OBJECT AND SCOPE

The purpose of this Technical Specification is to extend the scope of UNE 22513 to cables with polyruethane cover (PUR), a material used in mining as a substitute for polychloroprene (EPR), which binds to its mechanical properties a lower density than polychloroprene, allowing the use of lighter cables.

The additives used to ignite polyurethane covers cause the loss of some mechanical properties, although the additive polyurethane still has mechanical characteristics, in particular against tearing, much higher than those of polychloroprene admitted in the UNE 22513 standard. Therefore, a cable with an ignited polyurethane cover has mechanical characteristics at least equal to those of polychloroprene.

It is applicable to electrical cables for mine interiors and flexible cables insulated with polyurethane cover.

2. REQUIREMENTS

The cable shall comply with the requirement of UNE 22513, except in the requirements relating to the cover.

Polyurethane shall have a tear strength greater than or equal to that required for the cover material standardised in UNE 22513.

The cable shall be “non-fire propagator” according to UNE-EN 60332, corresponding to its characteristics.

ET 05.04 ORGANIC RESINS AND PRODUCTS, USED FOR CONSOLIDATION AND SEALING

1. OBJECT AND SCOPE

This Technical Specification aims to establish the certification requirements for resins and organic products used in consolidation and sealing work in underground mining.

2. REQUIREMENTS

2.1 Resins for use in underground work

2.1.1 Toxicity

The manufacturer's documentation shall include the safety data sheets for both the reagents used to obtain the resin and the final product, as laid down in Royal Decree 1802/2008 of 3 November 2008 amending the Regulation on the notification of new substances and the classification, packaging and labelling of dangerous substances, approved by Royal Decree 363/1995 of 10 March 1995, in order to adapt its provisions to Regulation (EC) No ° 1907/2006 of the European Parliament and of the Council (REACH Regulation).

2.1.2 Fire risk

Six test pieces measuring approximately 50x50x250 mm shall be subjected to the test defined in UNE-EN ISO 340. The acceptance criterion shall be the non-appearance of flame after the lighter has been removed.

2.2 Resins intended for use in underground work at risk of explosive atmospheres

In addition to the requirements set out in 2.1.1 and 2.1.2, the following shall apply.

2.2.1 Antistatic characteristics

The surface strength of the final product shall be determined in accordance with UNE 22315. For this purpose, 3 square specimens of 300x300 mm with a minimum thickness of 20 mm shall be provided. The acceptance criterion shall be the electrical resistance measure with a value of less than 1 Giga ohm in each of the test pieces. These measurements shall be made at a voltage between 200 V and 1000 V, at 22 ± 2° C and 40 ± 10% relative humidity.

ET 05.05 INSULATION CONTROL FOR TENSION NETWORKS WITH INSULATED NEUTER

1. OBJECT AND SCOPE

This Technical Specification aims to establish the certification requirements for insulation controls with non-continuous current injection, as well as for defect locating devices used in mining.

It is applicable to permanent insulation control devices and associated fault locating devices, for low voltage networks, (up to 1100 V), and medium voltage, (up to 11 kV), with neutral isolated.

2. REQUIREMENTS

2.1 PERMANENT INSULATION CONTROL DEVICES

2.1.1 Constitution

All insulation controls must be equipped with the following elements:

A built-in optical signage: this signalling shall determine a pre-set failure resistance threshold.

A remotely operated output circuit consisting of potential-free contacts (relay) with closing and cutting power of at least 2 A to 220 V a.c. with a power factor of 0,7 or 0,5 A to 110 V c.c.

- The device must have positive security, so that the interruption of the power current means the disconnection of the network it protects.

A test pushbutton, not maintained, for the verification of the proper functioning of the device. This pushbutton can be installed on the device itself or it will have the appropriate connections for the connection of an external pushbutton.

A manual rearmament device after the defect has disappeared.

The measuring current with the short-circuited terminals shall not exceed 5 mA (effective value).

They may have an adjustment of the insulation resistance threshold or be set by the manufacturer, but in no case may the minimum or minimum adjustable threshold be less than 200 Ohms.

They may have an indicator (analog or digital) for the continuous measurement of the insulation resistance. If supplied with this device, the reading error shall not exceed 15% in the measurement range from 2 Ohm/Volt to 10 Ohm/Volt (Ohm/Volt of the network to be controlled, e.g. 1000 to 5000 Ohm on a 500 V network).

2.1.2. Constructive features

All the masses of the devices shall be connected to the earth terminal.

2.1.3. Test at full voltage on the current injection circuit

Between the earth terminal and the current injection terminal (or test voltage application terminal) apply a voltage equal to 110% of the composite voltage of the network to be controlled and maintained for 24 hours.

2.1.4 Direct test

The device will be wrapped in a sheet of metal (e.g. aluminum foil), coating the insulating parts, attaching is to the earth and current injection terminals.

The test shall verify the dielectric strength of the independent electrical circuits taken from two to two.

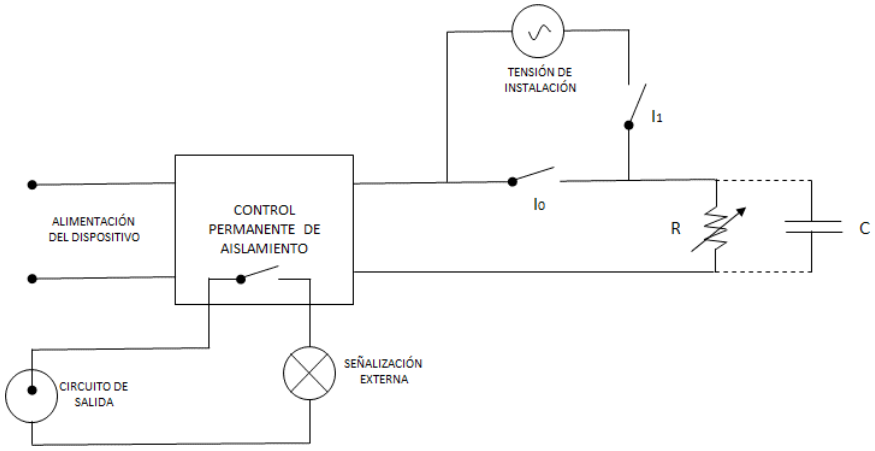
With the non-powered device, the dielectric abilities of each of the independent electrical circuits shall be verified by applying the test voltage. The test voltage shall be 2U+ 1000V, with a minimum of 1500 V, U being the composite voltage of the network to be controlled. This voltage shall be applied gradually from 0 V to that test voltage with a gradient of 500±100 V/s and shall be maintained at the test voltage for 1 minute.

The device shall conform if no dielectric rupture occurs.

2.1.5 Verification of the operating field

This test consists of ensuring the field of operation of the values provided for the measurement of the insulation resistance.

The test circuit is shown in the following figure.



The test circuit shall verify:

If the insulation resistance threshold is factory preset, the resistance value that the device discriminates.

If the threshold is adjustable, three checks shall be carried out: one at the adjustable minimum resistance end, one at the maximum level and one third halfway through the logarithmic scale adjustment (if continuous).

The tests will be performed (see figure above) according to the guidelines:

a) With installation voltage present (I_0 closed, I_1 open) and device powered at its nominal voltage.

b) No installation voltage present (I_0 open, I_1 closed) and device powered at its rated voltage.

c) With installation voltage present (I_0 closed, I_1 open) and device powered at its nominal voltage increased by 10%.

d) With installation voltage present (I_0 closed, I_1 open) and device fed at its nominal voltage decreased by 15%.

For each of the guidelines will be verified:

Starting from a test resistance (R) equal to or greater than 500 kilo ohms (a resistance value of at least twice that expected as the defect threshold can be assumed) its value shall be progressively decreased until the device detects the failure (incorporated luminous signal and external signalling indication). Once the defect has been detected, the value of the resistance R shall be determined or measured; as an acceptance criterion, this value shall not exceed 15% of the adjustment value of the device.

The test shall be repeated with a capacity of 10 µF in parallel with the resistance. The placement of this capability shall not change the response threshold by more than 10%.

2.1.6. Test function verification

With the device powered at rated voltage it shall be verified that the actuation of the test device (pusher) causes the light indication and external signalling of the isolation controller.

2.2. DEFECTS LOCATION DEVICES

2.2.1 Constitution

Any defect locating device must be equipped with the following elements:

A generator that injects a low-frequency alternating voltage into the voltage grid; this generator can be associated with a permanent insulation control.

A current detector placed on the branch to be controlled adjusted to the frequency of the generator.

Generator and detector can be combined into a single device. The voltage of the generator must be of small safety voltage in low voltage networks (up to 1100 V).

Built-in optical signage; this signal shall indicate a pre-set failure resistance threshold. If the detector is multiple (monitoring of several branches) the indication shall be made for each branch.

It must have a test pushbutton and an output circuit and may have a continuous indication of the insulation resistance, all with the same requirements as those referred to for permanent insulation controls.

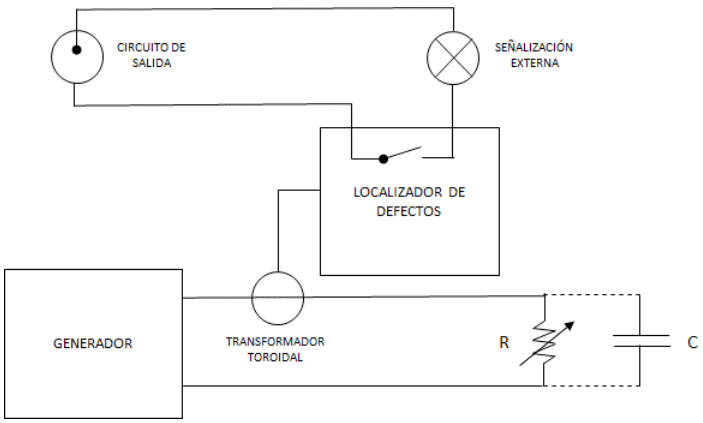
2.2.2. Device Generators

If the generator is included in a permanent insulation control, it shall be subjected to the tests prescribed in paragraph 3.1. Otherwise, the generator shall be subjected to the tests specified in paragraphs 3.2.3. and 3.2.4.

2.2.3. Verification of the operating field

This test consists of ensuring the field of operation of the values provided for the measurement of the insulation resistance.

The test circuit is shown in the following figure.



The test circuit shall verify:

If the insulation resistance threshold is factory preset in resistance value that the device discriminates.

If the threshold is adjustable, three checks will be carried out: one at the adjustable minimum resistance end, one at the maximum and one third at the halfway point of the logarithmic scale adjustment (if continuous).

The tests will be performed (see figure above) according to the guidelines:

Powered at its nominal voltage.

Powered at its rated voltage increased by 10%.

Powered at its nominal voltage decreased by 15%.

For each of the guidelines will be verified:

Starting from a test resistance (R) equal to or greater than 500 kilo ohms (a resistance value of at least twice the expected resistance value as the defect threshold can be assumed), the value of the test resistance (R) shall be progressively decreased until the device detects the failure (incorporated luminous signal and external signalling indication). Once the defect has been detected, the value of the resistance R shall be determined or measured; as an acceptance criterion, this value shall not exceed 15% of the adjustment value of the device.

The test shall be repeated with a capacity of 10 µF in parallel with the resistance. The placement of this capability shall not change the response threshold by more than 10%.

2.2.4. Test function verification

With the device powered at rated voltage it shall be verified that the actuation of the test device (pusher) causes the light indication and external signalling of the isolation controller.

2.3. Marking

The marking must be legible and durable and must include the following particulars:

The name of the manufacturer.

The type designation.

Nominal values of electrical quantities.

Certificate reference.

ET 05.06 MINIMUM CRITERIA FOR QUALITY MANAGEMENT AND ASSURANCE

1. OBJECT

This Technical Specification aims to establish the minimum control requirements in the manufacture of products for use in mining in whose certification process Procedure 3 regulated in ITC-SM-COM 04 is included.

2. EVALUATION CRITERIA

2.1 Manufacturers must have and demonstrate evidence of the application of a Quality System based on the following general principles contained in the European Standard for Quality Management.

a) Availability of a Quality Manual and / or written Procedures, or similar documents, where the arbitrage means for compliance with all the aspects developed in the following points are clearly collected.

b) Clear definition of responsibilities, authority and means of communication of all personnel who direct, carry out or verify tasks that have an impact on quality control.

c) Establishment of a clear system of control, approval and review, or modification, of all documents having an impact on quality control (in particular Quality Manual and/or procedures, or similar documents; records and records of test results, verifications and measurements, and calibration of equipment) which shall include the minimum archiving period of those documents for at least 10 years from the last date of manufacture of the product.

d) Establishment of the necessary procedures for the identification and traceability of manufactured products, including in the intermediate stages of manufacture.

e) Concise definition of the controls and tests to be carried out on raw materials, intermediate products and final products and the criteria to be applied, which should be based in general on existing national or international standards. Any variation to the test or verification model, proposed in a standard, shall be collected concisely.

f) An inventory of all available measuring and testing equipment shall be kept up to date, indicating, when applicable, the dates of the last and next calibration and whether it is internal or external. If it is internal, the procedure followed will be indicated.

g) Appropriate documentary means must be arbitrated to ensure that inspections and tests are carried out with calibrated instruments and with the necessary uncertainty.

h) A procedure shall be clearly established to ensure knowledge of the inspection and/or testing status of products, raw materials or intermediate products.

i) Clear formulae for the treatment of non-compliant products in any state of manufacture, normally detected during inspection and/or testing, shall be established. Likewise, the examinations, studies and evaluations to be carried out on the causes of the non-conformities and their possible corrections will be defined.

j) Where special means of storage of raw materials or finished products are required, the areas and/or means for this purpose shall be clearly defined.

k) A regular system of internal controls will be established for compliance with all aspects included in the Quality Manual and/or Procedures. The results of the control will be

documented and archived together with the corrective actions taken and their subsequent solution.

l) In case of subcontracting of tests, the manufacturer must ensure that the subcontractor complies with the applicable aspects of this criterion, maintaining as its own the corresponding documentary record.

m) All quality records shall be easily identifiable with the product being checked and must be quickly traceable to the manufacturer's own premises.

n) Where appropriate, the need for training and coaching of personnel performing specific tasks shall be documented, keeping records of the records attesting to the necessary training.

2.2 The control of manufacturing processes must be defined taking into account both the nature of the product and the type of manufacturing used, and must be applied at least in the reception of raw materials, intermediate products or components, and in the final product.

2.3 If the manufacturer has a Quality Management System certified according to standards harmonized by an entity accredited by the National Accreditation Entity (ENAC), the Official Authorized Laboratory may limit the audit to verifying the adequacy of the manufacturing procedures and controls established, to ensure the conformity of the products, examining at least:

a) Manufacturing procedures and control techniques.

b) Checks and tests that are carried out before, during and after manufacture, and the frequency with which they are carried out.

c) Means of surveillance to obtain the necessary quality of the products.

2.4 The Authorised Official Laboratory shall communicate to the manufacturer, by means of audit reports and/or inspection reports, the results of the verifications carried out on the production control. The approval of the quality system shall be notified to the manufacturer by means of a Manufacturer Accreditation.

ET 05.07 TAJO COFFRES

1. OBJECT AND SCOPE

This Technical Specification aims to establish the national certification requirements for pit chests for use in underground mining.

2. REQUIREMENTS

2.1 Locations without risk of presence of grisu

a) EU Declaration of Conformity including:

- Declaration on the Low Voltage (LV) Directive 2014/35/EU
- Declaration on Electromagnetic Compatibility (EMC) Directive 2014/30/EU

b) Certificate of Conformity with standard UNE 22520 “Electric material for mines. Tajo chests’

2.2 Locations at risk for the presence of grisu

a) EU Declaration of Conformity including:

- Declaration on Explosive Atmospheres Directive 2014/34/EU (ATEX)
  - To cover the requirements of point 1.2.7 of Directive 2014/34/EU on risks other than explosion, the manufacturer must include in the EU Declaration of Conformity the reference to the technical standards harmonised under the BT Directive used, in this case EN 61439-1 and EN 61439-4.
- Declaration on Electromagnetic Compatibility (EMC) Directive 2014/30/EU

b) Certificate of Conformity with the UNE 22520 standard.

2.3 Certificate of Conformity with the UNE 22520 standard

The requirements of paragraph 8 of standard UNE 22520 referring to standard UNE 20098 (cancelled) shall be covered by the manufacturer's declaration in respect of technical standards EN 61439-1 and EN 61439-4 included in the EU Declaration of Conformity. The Official Authorised Laboratory (LOA) shall verify the requirements of UNE 222520 as set out in Table 1.

In addition, the LOA will verify that the manufacturer has applied the harmonised standards, verifications and tests, contained in standards EN 61439-1 and EN 61439-4, equivalent to those contained in UNE 20098, according to Table 2.

Table 1. Verifications UNE 22520

Requirements UNE 22520	
Classification	4
Nominal employment voltage	5.1
Nominal insulation voltage	5.2
Nominal currents	5.3
Degrees of protection	6.1
Closures and warnings	6.2.1
Quick opening door	6.2.2
Grounding of cables	6.2.3

Dimensions of the muddy	6.3.1
Separator/Inverter	6.3.2
Switch/Switch	6.3.2.1
Main contactor	6.3.3
Protection modes	6.4.1 to 5
Walls, entrances and sockets	6.4.6.1
Flexible cable protection and control relay	6.4.6.2
UNE 20098 Factory mounted low voltage switchgear assemblies (cancelled)	8

Table 2. Equivalences for UNE 20098 verifications

UNE 20098 requirements. Type Tests		**UNE-EN 61439-1**	**UNE-EN 61439-4**
Heating limits	8.2.1	10.10	
Dielectric properties	8.2.2	10.9	
Short-circuit resistance	8.2.3	10.11	
Continuity of protection circuit	8.2.4	10.5	
Insulation distances and leakage lines	8.2.5	10.4	
Mechanical operation	8.2.6	10.2.8	
Degree of protection	8.2.7	10.3	
Impact	8.2.8.2		10.2.6
Shock	8.2.8.3	10.2.5	
Corrosion (temperature and humidity)	8.2.9	10.2.2	
UNE 20098 requirements. Individual tests		**UNE-EN 61439-1**	**UNE-EN 61439-4**
Overall inspection	8.3.1	11.5-11.8 and	
Isolation	8.3.2	11.9	
Protection measures	8.3.3	11.4	

ET 05.08 CASCO LAMPS

1. OBJECT

This Technical Specification aims to establish the certification requirements for helmet lamps for use in areas at risk of grisu.

2. REFERENCE RULES

a) UNE-EN 62013-1. Helmet lamps for use in areas at risk of grisu. Part 1: General requirements. Construction and testing.

b) UNE-EN 62013-2. Helmet lamps for use in areas at risk of grisu. Part 2: Operation and other safety related issues.

c) UNE-EN 50303. Material of Group I, category M1 intended to remain in operation in atmospheres with danger of grisu and/or coal dust.

d) UNE-EN 50033. Electrical material for potentially explosive atmospheres. Helmet lamps for mines at risk of grisu.

3. REQUIREMENTS

A) Lamps of categories M1 or M2 shall comply with UNE-EN 62013-1 and UNE- EN 62013- 2. In order to assess conformity with functional safety requirements, the manufacturer shall:

- Include reference to these standards in the ATEX Declaration of Conformity for compliance with Essential Safety Requirement 1.2.7; or
- Submit it to the Certification according to these standards by an Official Authorized Laboratory.

B) Lamps of categories M1 must additionally comply with Standard UNE-EN 50303, the reference of which must also be included in the ATEX Declaration of Conformity.

ET 05.09 LOVES AND SUSPENSIONS

1. OBJECT AND SCOPE

This Technical Specification (hereinafter referred to as 'TS') is intended to define the characteristics, construction requirements and type and individual tests of the tie-down cables and balance cable suspensions used in mining installations in vertical mine shafts.

2. CONSULTATION STANDARD

UNE-EN ISO 7500-1 Metallic materials. Calibration and verification of static uniaxial testing machines. Part 1: Tensile/compression testing machines. Calibration and verification of the force measurement system.

UNE-EN ISO 898-1 Mechanical characteristics of carbon steel and alloy steel fasteners. Part 1: Bolts, screws and bolts with specified quality classes. Thick-pass thread and fine-pass thread.

UNE 22260 High tensile steel chains (round link) for chain conveyors and carbon brushes.

UNE-EN 10204 Metal products. Types of inspection documents.

3. DEFINITIONS

For the purposes of this TS, the following definitions apply:

a) Mooring: Mooring of an extraction cable (see Figures 1 and 2) means the assembly of parts used to attach the cable to the charging apparatus (cage, skip or vat) or to the counterweight.

b) Suspension: Suspension of a balancing cable (see Figures 2 and 3) means the assembly of parts used to attach the cable to the charging apparatus (cage or skip) or to the counterweight.

c) Maximum static lifting load: It is the load that results from adding to the weight of the loader itself, the maximum load to be carried, the weight of the mooring, the extraction cables and the weights of the suspension and the balancing cable between the bottom of the well and the highest position of the load in it.

d) Type test: This is the name given to tests carried out on the model prior to the placing on the market of a type of mooring or suspension in order to establish that the service characteristics are satisfactory and appropriate to the intended use.

e) Individual tests: These are carried out by the manufacturer on the parts of each lashing or suspension.

f) Rated rated load (Cn): Loading capacity of the mooring or suspension assigned by the manufacturer.

4. CONSTRUCTIVE REQUIREMENTS

4.1 Materials

Steels used for the construction of mooring parts and suspensions shall be of standard UNE-EN types.

The manufacturer must accredit by means of a type 3.1 inspection certificate according to UNE-EN 10204, the properties of the materials used in the manufacture.

4.2 Unions

4.2.1. Welded joints

Welded joints may be used only if they do not participate in the absorption of load-induced stresses.

4.2.2. Bolted joints

The screws used in the manufacture must be at least class 8.8 according to UNE- EN ISO 898- 1.

4.3 Chains

When chains are used, they must be in accordance with the provisions of UNE 22260. In moorings with more than two chains, these will be sized assuming that the maximum static lifting load is supported only by two of them, taking into account the angle they form with their line of application.

4.4 Special elements

4.4.1 Elongation compensation and cable tensile strength measurement devices

In multi-wire extraction installations, the berths of each of the cables must be fitted with mechanical or hydraulic devices to compensate for the relative lengthening between the cables. They shall also be equipped with devices for measuring the tensile force on each of the cables. Both devices shall be considered as components of the lashing.

4.4.2 Rotating elements

Suspensions for round balance cables and lashings for vat-extraction cables shall be fitted with rotating stumps. The rotation torque shall not exceed:

$$0{,}006\ r \times S\ (m \cdot kN),$$

where:

S is the rated load, kN;

r is the radius of the raceway of the axial bearing, m.

5. TESTING

Tests on test piece of material

Before the prototype or each part is manufactured for delivery, the test pieces shall be prepared for testing the materials. The items for which the materials are tested are specified in Table 1.

Chemical Composition Analysis (CQ)

The concentration of Carbon (C), Silicon (Si), Manganese (Mn), Phosphorus (P) and Sulphur (S) shall be determined. These may be replaced by the manufacturer's material certificate.

Concentrations shall be within the limits set by the steel-specific standard.

Metallographic study (MS)

The structure and size of grain will be studied.

The structure and size of the grain will be within the limits established by the specific steel standard.

The steel structure and grain size shall be within the specifications set out in the steel standard.

Tests on manufactured equipment

The following tests shall be carried out on the Type and on each piece of equipment or part manufactured:

Tensile test

Each end-assembly of the sample, i.e. the lashing or suspension mounted with the permissible largest and smallest diameter cables, shall be subjected to a tensile test on a machine of at least Class 1 according to UNE-EN ISO 7500-1 at a minimum load equal to 3 times the maximum static load specified by the manufacturer. During the test, there should be no permanent deformations, appreciable slippage of the cable, or mechanical failures in any of its parts. For the measurement of direct deformations on the mooring parts, the initial laying or loading load shall be 1/l0 (10%) of the maximum static load.

Ultrasonic analysis (US)

Its purpose is to detect internal defects in the elements indicated in Table 1, depending on the type of element.

No discontinuities shall be detected for classes S2 and E2.

Determination of hardness (DD)

On the elements and parts indicated in Table 1, depending on the type of element, the hardness of the steel in its final state will be determined.

The maximum hardness value or range thereof shall be that defined by the steel type standard.

Resuscitation test (ER)

The structure and grain size of the steel shall be checked.

Magnetic particle (PM) test

Its purpose is to determine the lack of cracks in the elements indicated in Table 1, depending on the type of element.

No surface discontinuities shall be detected.

6. TYPE TEST

All Type lashings and suspensions shall be subjected to the tests specified in paragraphs 5.1 and 5.2.

6.1 Documentation

The manufacturer shall provide the Laboratory with a technical report containing the following information:

- Technical description of the mooring or suspension, indicating the Assigned Nominal Load
- The maximum and minimum diameters of the cables that can be used.
- Calculations justifying the sizing of its different parts and joints.
- Plans of assembly and detail of the pieces, with clear indication of the dimensions, materials and treatments applied.
- Assembly and maintenance instructions, indicating in particular the parts that must be subject to special revisions, the purpose of such revisions and the periods of time with which they must be carried out.

6.2 Samples for testing

Prior to the manufacture of the Test Type, the manufacturer shall deliver to the Laboratory the specimens necessary for the tests in paragraph 5.1. that apply to him.

After passing the test requirements of paragraph 5.1, the manufacturer shall provide the Laboratory with a complete assembly (sample) of the lashing or suspension, together with two cable sections, of larger and smaller permissible diameters, for inspection and testing. In order to carry out the tensile test, the length of the free cable, once all the mooring elements including staples have been assembled, must be at least one metre.

7. INDIVIDUAL TESTS

Prior to the issuance of the Declaration of Conformity to this Specification, and which must accompany each supply, the manufacturer shall carry out or have carried out, with each unit manufactured, the individual tests carried out on each component of the lashing or suspension supplied.

The individual tests shall be as follows:

		Essays on			Essays on			
		CQ	**CQ(C)**	**MS**	**US**	**DD**	**ER**	**PM**
Figure 1	A							
	B	X		X	X			
	C					X	X	X
	D		X		X	X		
	E	X		X	X			
	F	X		X	X			
	G				X	X		
Figure 2	A							
	B	X		X	X			
	C	X			X			
	D					X		
	E							
Figure 3	A							
	B	X		X	X			
	C	X		X	X			
	D	X			X			
	E	X		X	X			
	F	X		X	X			
	G	X		X	X			
	A				X	X		
	B							

Figure 4	C	X		X	X			
	D	X		X	X			
	E	X		X	X			

In the case of designs that do not strictly conform to the models listed in Figures 1 to 4, the Authorized Official Laboratory shall establish the tests by analogy.

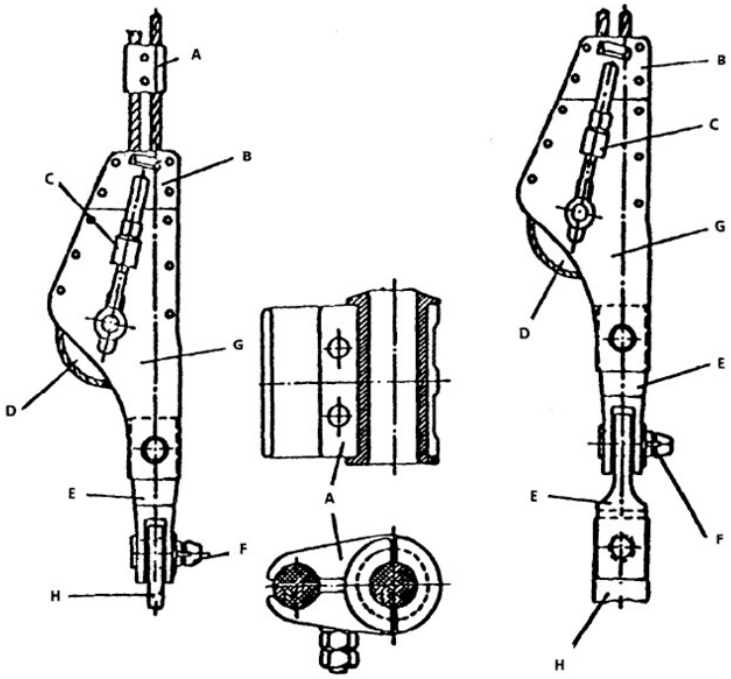
8. MARKING

The manufacturer shall, after individual tests, mark all the parts of the lashings and suspensions which at least include the reference of the Declaration of Conformity issued by the manufacturer for the part in question.

The ranger must bear a marking plate, visibly positioned, with the following indications:

- Manufacturer's name.
- Date of manufacture.
- Manufacturing number.
- Rated load assigned.
- Maximum and minimum cable diameters.
- Reference to the Declaration of Conformity.
- Type Certificate Number.

9. EXAMPLES OF CONFIGURATIONS



To: Cable End Fixing Staple

B: Detachable plate to inspect the cable

C: Locking screw

D: Wedge

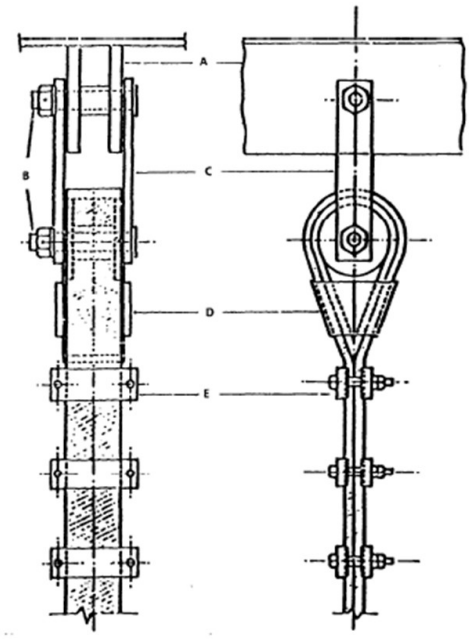
E: Fork

F: Fool with chaveta

G: Headguard body

H: Masterbar

Fig. 1 — Example of wedge lashing with locking screw



To: Suspension beam

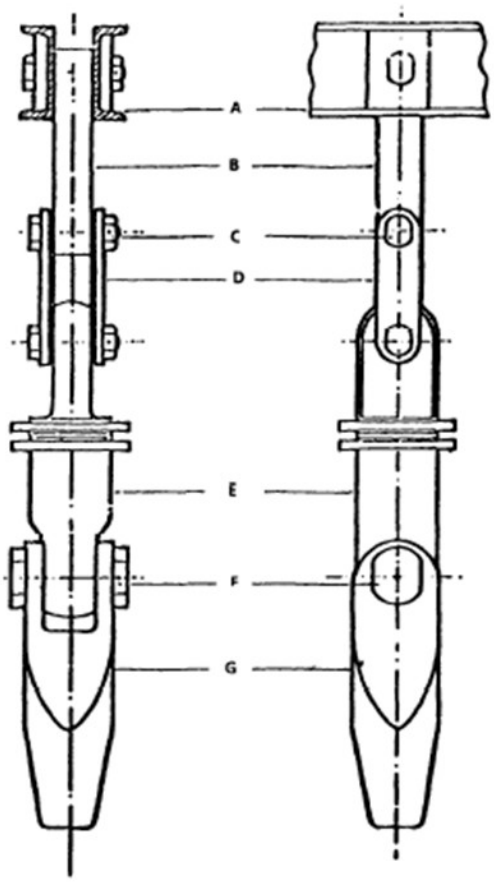
B: Bulons

C: Flange

D: Guardacabos

E: Staples

Fig. 2— Example of suspension for flat cable



To: Suspension beams

B: Inner flange

C: Bulon

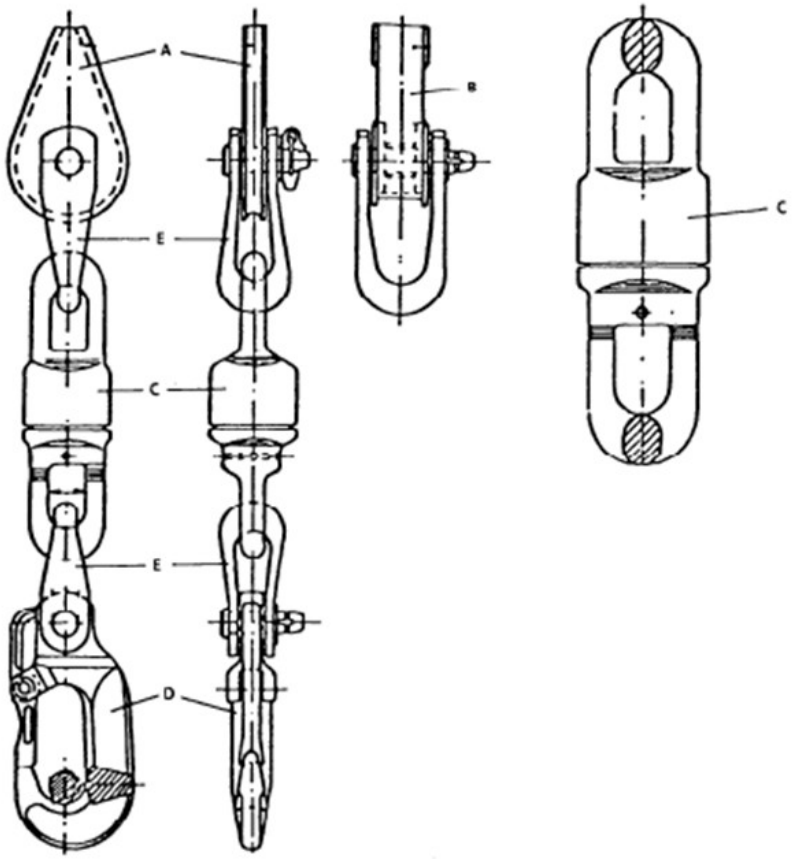
D: Outer flange

E: Rotating sprocket

F: Bulon

G: Mazarota cap

Fig. 3— Sample hull suspension for round cable



To: Caps for round cable

B: Caps for flat cable

C: Muñón

D: Hook with locking carabiner

E: Shackle

Fig. 4— Example of vat mooring

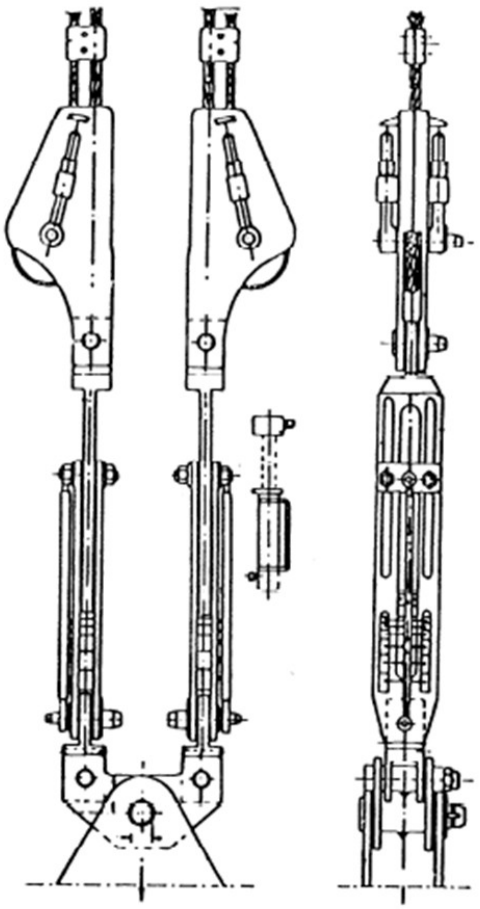


Fig. 5— Example of mooring for multi-cable Koeppe pulley installations with cable extension compensation device

10. PROCEDURE FOR THE EXTENSION OF LIFE IN SERVICE OF BEARING PARTS

The Mining Authority may authorize the extension of the life in service of the mooring parts up to a maximum of 50%, following a report from the Official Authorized Laboratory regarding the execution of the following checks:

1. Verification of the life in service of the device, based on records and reliable documentation provided by the applicant.
2. Results of the verifications carried out by the applicant in application of the provisions of section 4.5.5 of ITC SM-IND-17.
3. Assessment of wear and corrosion on the parts.
4. Inspection and pressure testing of hydraulic components where they exist.

The assessment of wear and corrosion shall be carried out on the basis that the resulting loss of metal section in the parts does not decrease. Their safety coefficient below the lower of the following values:

- 90% of the value of the design safety coefficient.
- The regulatory safety coefficient set out in point 4.4.2 of ITC SM-IND-17 of the Mining Safety Regulation.

ET 05.10 DESIGN OF ASYMETRIC FLEXIBLE CABLES

1. OBJECT AND SCOPE

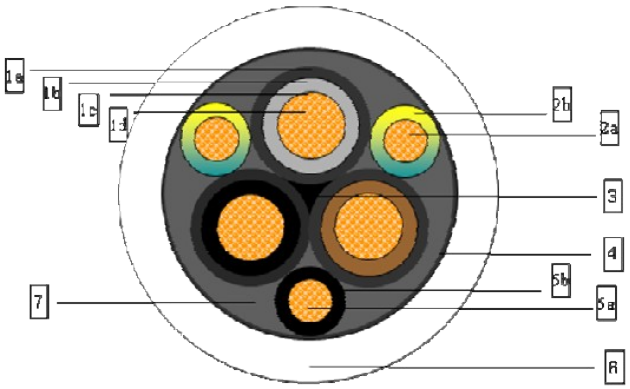
This Technical Specification ('TS') aims to establish the certification requirements for certain types of flexible cables for use in underground mining.

This ET extends the scope of UNE 22513- 3: 'Electric cables for mine interiors. Flexible insulated cables with EP rated voltage 0,6/1 kV, 1,8/ 3kV and 3,6/6 kV. Part 3: Type DS1N (asymmetrical)", to an asymmetrical flexible cable design, with a formation not covered by the standard. This design meets the characteristics of materials and maintains the performance, by practical experience in the mine, despite having a constructive configuration not exactly defined in the standard itself.

2. REQUIREMENTS

As an alternative design to those established in UNE 22513-3, the scheme shown in Figure 1 is accepted for use in underground holdings without potentially explosive atmospheres.

This asymmetrical design allows to have a set of active conductors and drainage conductor in contact, all of them coated with an extruded semiconductor material for the shielding function close to the cover, since any defect in the cover leaves the cable out of service. In addition, it allows the use of earth conductors isolated from the screen and drainage for use as land in the equipment currently used in mining.



1a.- Pantalla semiconductora extrudida del conductor de fase.
1b.- Aislamiento.
1c.- Encintado.
1d.- Conductor de fase.
2a.- Conductor de tierra (1 ó 2 según secciones).
2b.- Aislamiento del conductor de tierra.
3.- Relleno central semiconductor.
4.- Cinta semiconductora en hélice.
5a.- Conductor de drenaje.
5b.- Pantalla semiconductora extrudida del conductor de drenaje.
6.- Cubierta externa.
7.- Relleno hidrófugo.

Figure 1. Outline of straight section of asymmetrical flexible cable alternative to those set out in UNE 22513- 3

With regard to ensuring disconnection from external penetrations, all semiconductor screens forming part of the design (central filling (3), semiconductors on insulation (1a), semiconductor drainage (5b) and semiconductor tape on assembly elements (4)) are in close contact with each other. This allows the electronic device to act when it detects a variation in the current circulating permanently in the drain, in case of penetrating external aggression. The screens between deck and each of the active phases are indicated as (1a) and the equivalents of this in the other two phases.

ET 05.11 DEVICES FOR THE LOADING OF EXPLOSIVES. SECURITY RULES

1. OBJECT AND SCOPE

This Technical Specification ('TS') aims to establish the safety rules to be complied with in the use of bulk explosives loading devices, ANFO type and water-based emulsions and hydrogels, by means of pressure vessels or mechanical elements.

Similarly, this ET applies to mobile bulk device manufacturing units (MEMUS) and pumping equipment for emulsions, suspensions or gels, in bulk indoors, with the possibility of explosive sensitisation.

These rules are independent of the requirements to which vehicles carrying explosives loading devices may be subject if, in addition, they carry the explosive.

2. PRINCIPLES ON WHICH OPERATIONAL SECURITY IS BASIS

The equipment must comply with all the construction requirements included in the European Directives applicable to it, in particular in the European Directive 2006/42/EC of 17 May 2006 on machinery, and have the corresponding EC Declaration of Conformity.

This Statement should include a reference to the standards or specifications that have been used to cover the required safety requirements.

The equipment must be accompanied by instructions for assembly, use and maintenance, including the hazards to which it may be subjected or cause during use, which have been taken into account in its design. Where appropriate, the measures to be taken by the user to comply with the requirements for the use of such equipment, as well as to eliminate residual risks, should also be included.

2.1. Requirements to avoid risks caused by mechanical equipment

2.1.1. Materials

The pressure tank shall be constructed of materials which are not affected by the corrosive effects of the explosive; e.g. stainless steel. Parts that cannot be constructed with materials that meet the above requirement shall be coated with an anti-corrosive paint. Copper alloys are not allowed.

2.1.2. Pressure equipment

The tank and/or pressure equipment shall be capable of withstanding a minimum pressure of 8 bar and, in any case, 1.5 times the maximum expected working pressure.

As a safety element, the system shall have a safety valve which shall be weighed at a pressure lower than the test pressure of the pressure vessel(s).

2.1.3. Mechanical equipment

2.1.3.1. Risks related to the use of mechanical equipment

The main risks of mechanical equipment related to pumping explosives are:

- High temperatures due to dry operation of the pump.
- High temperatures due to lack of product feed to the pump.
- High temperatures due to overpressure.
- Sparks or high temperatures due to friction and/or impact.

Explosive pumping systems must be designed in such a way that pumping is interrupted if:

- There is an obstruction in the hose or at the pump outlet.
- Do not pump product due to lack of it in the pump feed.
- The maximum operating temperature of the pump or pumping of the explosive is exceeded.
- The maximum operating pressure of the pump or pumping of the explosive is exceeded.

2.1.3.2. Requirements related to the use of mechanical equipment

Only diaphragm, peristaltic, progressive cavity, piston and lobe pumps, the use of any other type of pumps, will be allowed, provided that the applicant provides proven documents that lower the equivalent safety of the proposed pump.

Measures shall be taken to prevent the entry of foreign materials into the product pumping system.

Pumping systems must be designed in such a way as not to intentionally create areas or volumes in which the product can accumulate and in which it is subjected to pressure that could lead to overheating or degradation of the product.

The discharge pressures of the product must not exceed those indicated by the explosive manufacturer and those indicated by the pump manufacturer.

The rotor or stator of progressive cavity pumps shall be covered by an elastomer or non-metallic material that prevents friction and/or impact between internal metal parts of the pump.

For pumps with moving parts that may be subject to friction, e.g. lobe pumps. These elements must be covered by an elastomer or non-metallic material, or they must be made of non-metallic material.

Where mechanical conveying systems of the product, e.g. endless screws, are used, the bearings shall be external in such a way that they do not come into contact with the product. If this cannot be avoided, the bearings must be of the sealed type, or they must be monitored by temperature sensors so that the entire pumping system stops if the temperature exceeds the limit value. Bearings shall be sized so that the loads applied are not more than 50% of the nominal value given by the bearing manufacturer. Where mechanical seals are used, they shall be monitored by temperature sensors.

2.1.3.3. Protective devices

Explosive loading systems shall have the following protective devices according to their risk analysis:

- Minimum product level sensor in the tank.
- Flow sensor that detects situations of low pump flow and/or lack of supply to the pump and stops the explosive loading device in case the minimum pump flow is not reached in a given time.
- Low pressure sensor designed to detect that the minimum working pressure is reached in a given time. This type of sensor can also be used to detect the condition of low pumping flow. If the minimum pressure is not reached within a specified time, the explosive loading device shall be stopped.
- High pressure sensor located at the pump outlet that detects clogging situations of the product in the discharge hose and stops the explosive loading device.
- Breaking disc located at the pump discharge.

- Temperature sensors that measure the temperature of the pumped product and stop the explosive loading device when the maximum operating temperature of the pump or the minimum flash temperature of the explosive is exceeded. These sensors, when they cannot be placed inside the pump to ensure the mechanical integrity of the pump, may be located at the pump discharge. In addition, when the risk analysis so determines, sensors may be placed at other points of the pump such as the outer surface, bearings or product input to the pump. Temperature sensors shall be set to a maximum of 10ºC above the pump's maximum operating temperature and below 100ºC.

In the case of progressive cavity and lobe pumps, the pump shall be sized so that the maximum pump speed does not exceed 200 rpm.

These devices shall not be required in the case of pumping systems where the mechanical drive element has no moving parts that may be subject to impact or friction, e.g. diaphragm pumps where the outlet lock causes the pump to stop and the product is subjected only to the pump feed pressure.

The explosive loading device shall be designed in such a way as to limit the supply energies (pressure limiters, regulating valves, torque limiters, ... speed limiters) so that the intended operating conditions of the pump are not exceeded.

2.2. Requirements to avoid risks caused by electrical equipment

Any electrical equipment located in the enclosure of the machinery which may be subjected to contact with the explosive shall have an IP6X and a maximum surface temperature lower than the explosive flash temperature determined in accordance with UNE 31011 “Nitrocellulose, gunpowder and explosives flash temperature.” or other equivalent standard. Where the above requirement cannot be met, mechanical barriers may be used to prevent the explosive from coming into contact with such elements or another equivalent system.

2.3. Requirements to avoid risks arising from the accumulation of electrostatic charges

2.3.1. Grounding Borna

The charging device shall be fitted in the vat with a terminal so that it can be connected to a grounding outlet and good electrical contact between the metal parts of the pneumatic/mechanical system and the tank shall be ensured.

2.3.2. Discharge hose

For devices for the pneumatic loading of explosives, the discharge hose shall comply with UNE 22071 ‘Pneumatic loading hoses for explosives. Measurement of electrical resistance. Test method and specifications.”, or to another standard whose compliance provides equivalent safety. If in these devices the discharge nozzle of the hose is metallic, it shall be galvanically attached to the mass of the loader by means of a copper conductor having a section of at least 2,5 mm2.

The loading of emulsions shall ensure the presence of water inside the hose and in the discharge nozzle by means of a flow meter at the outlet of the water pump which shall stop the pumping in the event that it is detected under flow.

2.3.3. Equipmenttentiality of the facility

Any metal element of the installation must be attached to a mass equipment that is grounded by the grounding terminal, with a maximum connection resistance of 1 MΩ.

2.3.4. Discharge operation

The unloading operation shall always be carried out with due precautions and following the indications to be supplied by the manufacturer. The ground terminal shall be connected to an independent grounding outlet in a secure manner, ensuring that the connections are not loosened during working periods.

The grounding shall be suitable only if it turns out that the total resistance from the outlet end of the hose to the grounding (including ground electrode) is less than or equal to 1 MΩ.

All metal parts shall be grounded with a resistance of less than 1 MΩ (grounding resistance values below this value may be prescribed by other standards or specifications of electrical equipment).

Non-conductive materials other than hoses in contact with the explosive shall have a surface resistance of less than 10^{9}Ω, measured according to UNE 21306 "Electrical insulating materials. Determination of insulation resistance of solid insulators.". If this condition cannot be met, its maximum projected surface area shall be limited according to the characteristics of the explosive.

In the case of non-metallic materials covering the rotor (moving part) or stator (fixed part) of the pumps to avoid the risk of friction of the internal elements, any of the following conditions shall be met:

- They shall have a surface resistance of less than 10^{9}Ω, measured according to UNE 21306. If this condition cannot be met, its maximum projected surface area shall be limited according to the characteristics of the explosive.
- The grounding of the fixed part and moving part with which the non-metallic material may come into contact must be ensured.

2.4. Radio frequencies

Remote control equipment shall comply with the requirements of ET 5.12 "RADIOFRECUENCE *IN THE PRESENCE OF EXPLOSIVES*".

3. ADDITIONAL REQUIREMENTS FOR GREAT INSIDE EMULSION, SUSPENSION OR GELE MEMUS AND PUMP EQUIPMENT

3.1 Removal of explosive remnants

Once the explosive has been unloaded and manufactured in situ, it is necessary to carry out an adequate cleaning of the explosive discharge equipment and hoses to ensure and guarantee that the explosive remains are disposed of, and prior to subsequent transport in the case of MEMUs. To this end, the relevant procedure shall be developed and applied in sufficient detail to ensure previous compliance.

4. CERTIFICATION

The manufacturer shall submit to the Authorised Official Laboratory a technical report of the explosive loading device containing:

- Name and address of the manufacturer.
- Designation of the type of device.
- General description, including operating principles.
- Design plans.
- Documents justifying compliance with European Directives or
- National regulations affecting the device, including this TS.

- Instructions for use and maintenance written in one of the official languages in Spain.
- Model of the EC Declaration of Conformity in relation to Directive 2006/42/EC of 17 May 2006 on machinery.

ET 05.12 RADIOFRECUENCE IN THE PRESENCE OF EXPLOSIVES

1. OBJECT AND SCOPE

The purpose of this Technical Specification is to establish the requirements for electromagnetic compatibility to be provided by equipment reading explosive traceability codes, all remote control devices in the presence of detonators, as well as radiofrequency tracking systems in underground mining, in order to avoid risks of accidental ignition of electric detonators.

2. REQUIREMENTS

2.1 General requirements

Explosive traceability code-reading equipment, as well as radio frequency tracking systems in underground mining, must ensure an electric field of less than 120 V/m.

This requirement shall be deemed to have been met if the equipment complies with the provisions of Standard UNE EN 55032:2016 'Electromagnetic compatibility of multimedia equipment. Emission requirements' and/or ETSI EN-301 489-1 'Electromagnetic and Radio Spectrum Compatibility (ERM); Electromagnetic Compatibility (EMC) Standard for radio equipment and services; Part 1: Common technical requirements".

Such equipment should also be CE marked in compliance with Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

2.2. Specific requirements for the operation of traceability code readers

The operation of reading the explosives traceability codes must be carried out in the absence of wireless connection type WiFi, Bluetooh or similar, in order to avoid possible interference with explosive objects, for which the reading equipment must operate in "aeroplane mode".

ET 05.13 ELECTRIC CABLES TYPE DM2N

1. OBJECT AND SCOPE

The purpose of this Technical Specification is to establish certification requirements for certain types of electrical cables for use in underground mining, namely armed flexible cables insulated with EPR and rated voltage 1,8/3 kV type DM2N, referred to in standard UNE 22512 'Electric cables for mine interiors. Flexible cables armed insulated with EPR. Rated voltage 0,6/1 kV at 3,6/6 kV. Type DM2N.".

2. REQUIREMENTS

The nominal conductor section 150 mm^2 is included in the list of nominal conductor sections of 1,8/3 kV voltage cables referred to in UNE 22512.

The construction and testing requirements for this new 150 mm^2 driver section shall be the same as for the nominal 120 mm^2 driver section.

ET 05.14 SAMPLING EQUIPMENT FOR RESPIRABLE POWDER AND SILCE CRYSTALINE SAMPLES

1. OBJECT AND SCOPE

The purpose of this Technical Specification is to establish and update the standards and requirements for use that apply to the equipment necessary to carry out personal sampling to assess exposure to respirable dust and crystalline silica in the workplace (dust meters and collectors), as indicated in ITC SM-PRL-07.

In addition, and in accordance with the provisions of ITC-SM-COM-04, the application requirements are established for sampling pumps and dust samplers, which must be certified by an Official Authorized Laboratory (LOA), before being put into service.

2. SAMPLING EQUIPMENT

The equipment required for sampling consists of a personal sampling pump, connected by means of a flexible plastic tube to a sampler of the breathable fraction (usually a cyclone), inside which is the retaining element or membrane filter that collects the particles for later analysis in the laboratory.

a) Personal sampling pump. Type P suction pump for airborne particulate sampling, able to maintain continuous operation during the sampling time and at the recommended sampler flow rate.

b) Breathable fraction sampler. Element whose function is to classify the particles according to the convention of the respirable fraction described in standard UNE EN 481. There are mainly two types: cyclones and impactors.

c) Retention element. Medium where the particles of the respirable fraction are collected for later analysis in the laboratory. It depends on the sampler selected, although most samplers use 5 µm pore size PVC (polyvinyl chloride) membrane filters.

Retention elements or membrane filters are usually inserted into plastic filter holders or cassettes that must be adapted to the sampler used.

d) Connecting tube. Flexible plastic tube that allows to join sampling pump and sampler, of a material that minimizes electrostatic effects.

e) Flow meter. Equipment enabling the sampling set (sample pump) to be checked. According to its principle of operation it can be (ordered from lower to higher uncertainty of flow reading according to the standard UNE-EN 482) of bubble, dry piston, mass and rotameter. The equipment must be calibrated periodically according to the certification conditions and instructions of the manufacturer or at least biennially. Such calibration should be performed by an accredited laboratory, the certificate of which should be attached to the risk assessment and reassessment reports.

3. SAMPLING EQUIPMENT REQUIREMENTS

3.1 Sampling pumps

Personal sampling pumps may be used in the terms indicated in ITC SM-PRL-07 if they comply with the requirements set out in UNE-EN ISO 13137, taking into account the following specifications with regard to the assessment of exposure to respirable dust and crystalline silica:

- Automatic and constant flow compensation

- Have a system (locking, protection, specific use of a tool, etc.) that prevents accidental or intentional manipulation of the pump controls during sampling.

- Include a pump malfunction indicator due to a reduction or interruption of air flow during sampling, or a disconnection device in case the flow deviates by more than 5% or is interrupted. The pump may attempt to start automatically in the event of an airflow interruption, unless it exceeds 120 ± 10 seconds, in which case it shall not start or activate the malfunction indicator until it is restored to its initial state.

- Have a filter that prevents the entry of particles into the pump, easily accessible by the user for replacement.

- Have a clamping system that allows the pump to be fixed to the person and does not exceed 1.2 kg of weight for pumps with a flow rate equal to or less than 5 l/min, since it is a personal equipment. Where sampling requirements require the use of pumps operating at higher flow rates, the weight shall not exceed 2,5 kg.

- Ensure an operating range greater than 8 hours, for sampling flows between 1 and 3 l/min, at the load losses specified in UNE-EN ISO 13137 for these flows, during which time the flow rate shall not deviate by more than 5% of the initial value, regardless of the working temperature .

- The pump should comply with Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

Where wireless communication with other devices is available, the pump shall comply with Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

- If used in areas classified as explosive atmospheres, the pump should comply with Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

3.2 Samplers

Samplers of the respirable fraction may be used in the terms indicated in ITC SM-PRL-07 if they make the selection of particles in accordance with the convention for the respirable fraction defined in standard UNE-EN 481, as well as with the performance requirements defined in standard UNE-EN 482. Taking into account that the UNE-EN 13205 series of standards lays down the procedures for the assessment of such compliance, samplers of the respirable fraction shall:

- Be included or comply with the criteria established in the technical report CEN/TR 15230 (2004). Other samplers available on the market and not included in this report must demonstrate compliance with the criteria specified therein. Annex C (Table C.1) to UNE 81550 includes a series of samplers of the respirable fraction, included in the aforementioned technical report, which potentially meet the requirements of the standard. This table can also be consulted on the website of the National Institute of Silicosis (INS), where it is kept conveniently updated.

- Have a certificate in accordance with the breathable agreement defined in UNE-EN 481, following the evaluation procedures specified in UNE-EN 13205. That certificate shall contain information enabling the following to be known:
    - Version of the standard used for the evaluation.
    - Identification and number of samplers tested.
    - Sampling flow rate.
    - Particle size corresponding to D50 obtained in the test.
    - Graphical representation of the penetration percentage according to the aerodynamic diameter obtained in the test and its comparison with UNE-EN 481.
    - Comparison bias with standard UNE-EN 481.
    - Date of issue of the certificate.
    - Responsible (signatory) for the conformity assessment or responsible for the entity that endorses the results.
- Non-original filter holders or cassettes must be compatible with the sampler, requesting the corresponding certification from the LOA.

4. SAMPLING PROCEDURE

Standards UNE 81550 and UNE 81599 describe the procedure to be followed and the equipment necessary for the determination, in the working environment, of the content of dust and crystalline silica in the respirable fraction of the particles. Below, among the steps included in the aforementioned standards, the most relevant for personal sampling are detailed. The instruction manual for the suction pump shall refer to the sampling procedure included in the technical criterion.

1. Before starting, it will be verified that all the elements (cyclone, tube and pump) are in good condition, without apparent damage.

2. The pre-heavy retainer (membrane filter) is placed on the selected sampler and the assembly shall remain closed until sampling begins. If the filter is housed in a removable cassette, it is very important to check its compatibility with the selected sampler, depending on the manufacturer's requirements

3. The pump flow rate has to be adjusted by a calibrated flow meter (preferably primary meter) to the required flow rate for the selected sampler. Preferably the adjustment shall be made at the workplace where the samples are to be taken, or if this is not possible in a nearby location, and in a clean environment, to avoid possible contamination and deviations of the flow. For this purpose, a sampler and a retention element of the same characteristics as the one used in the sampling, which cannot be used for sampling or as a field target, shall be used.

4. The pre-adjusted pump is connected to the sampler by a flexible tube.

5. The sampler is placed in the worker's breathing zone (defined in UNE 81550) respecting the position indicated by the manufacturer to achieve an appropriate classification. The sampling pump is located in the worker's belt avoiding interference with their movements, as well as possible strangulation of the flexible tube.

6. The sampling is started by starting the pump and blocking the screen with menus or other device, so that it can not be manipulated.

7. Throughout the working day, the correct functioning of the equipment must be monitored periodically, as well as paying attention to all those incidents or anomalies that may affect the final result. The permanence of the technician during the sampling will also allow greater control of the tasks, detect possible interference with other positions, document the use of preventive measures, PPE, work organization, etc., which will facilitate the subsequent validation and interpretation of the results.

8. Once the samples have been taken, the worker's equipment is removed and the time elapsed and the volume aspirated are recorded, as well as the other data related to the sampling that are considered necessary.

9. The pump flow rate should be checked after sampling has been completed to ensure that during operation the pump has remained within ±5% of the initial flow rate recorded. Otherwise the sample will be considered invalid. This operation must be carried out with the same flow meter, sampler and retaining element with which the initial flow adjustment was made.

10.The retaining elements, usually housed in cassettes, shall be placed in appropriate packaging for subsequent shipment to the laboratory of analysis, avoiding shocks or sudden movements that may cause a detachment of the sample. For each batch of samples taken under the same conditions, at least one field blank (retention element subjected to exactly the same handling as the samples, except for the passage of air through it) shall be attached. It is recommended to provide a field target for every 10 samples taken.

5. CERTIFICATION

The ITC-SM-COM-04 indicates the documentation that the manufacturer or his legal representative in Spain must provide to apply for certification to the LOA. In addition, it should include:

- A certificate of compliance with the respirable fraction defined in UNE EN 481 for the sampler, following the assessment procedures specified in UNE-EN 13205.
- EU Declaration of Conformity with the Implementing Directives.

In the event of any change in the pump or sampler (including modifications in the nominal flow rate to comply with the respirable fraction according to UNE-EN 481), the manufacturer or his legal representative in Spain must apply again to the LOA for certification.

Similarly, the use of non-original filter holders or cassettes different from the one included in the certified equipment, will require prior evaluation and recertification by the LOA.

6. STANDARDS

NUMBER	NAME	APPLICATION
UNE-EN ISO 13137	Atmospheres in the workplace. Pumps for personal sampling of chemical and biological agents. Requirements and test methods	Sampling pumps
UNE-EN 13205	Exposure in the workplace. Evaluation of the operation of samplers for the measurement of concentrations of suspended particulate matter in air.	Samplers

UNE-EN 481	Atmospheres in the workplace. Definition of fractions by particle size for aerosol measurement.	Samplers
UNE 81550	Exposure in the workplace. Determination of crystalline silica (breathable fraction) in the air. Infrared spectrophotometry method	Procedure of sampling
UNE 81599	Exposure in the workplace. Determination of airborne particles (inhalable, thoracic and breathable fractions). Gravimetric method.	Procedure of sampling
UNE-EN 482	Exposure in the workplace. Procedures for determining the concentration of chemical agents. General performance requirements.	Procedure of sampling

ET 05.15 BULONES DE ANCLAJE REPARTIDO DE USO EN MINERÍA. ANCHORAGE BULONES WITH RESIN

1. OBJECT AND SCOPE

This Technical Specification aims to establish the requirements for resin-split anchor bolts used in mining for the support of rock structures.

2. CONSULTATION RULES

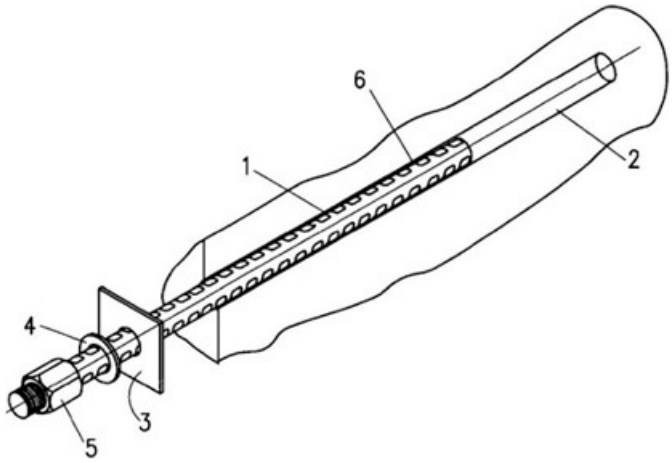
UNE-EN 10020. Definition and classification of types of steels.

UNE-EN ISO 4034. Normal hexagon nuts, type 1. Class C product (ISO 4034).

UNE-EN ISO 6892-1. Metallic materials. Tensile test. Part 1: Ambient temperature test method. (ISO 6892-1).

3. DESCRIPTION OF THE BULONATE SYSTEM

The resin-split anchor bolting system consists of the following elements, as specified in Figure 1.



1- Corrugated or threaded presence steel bar.
2- Anchoring the bolt by resin or cement
3- Outer distribution plate
4- Washer or pressure joint.
5- Nut
6- Area of contact with the rock

Figure 1. Anchor bolt distributed with resins. Components.

The steel bar shall be solid with corrugated or threaded surface presence (helical type).

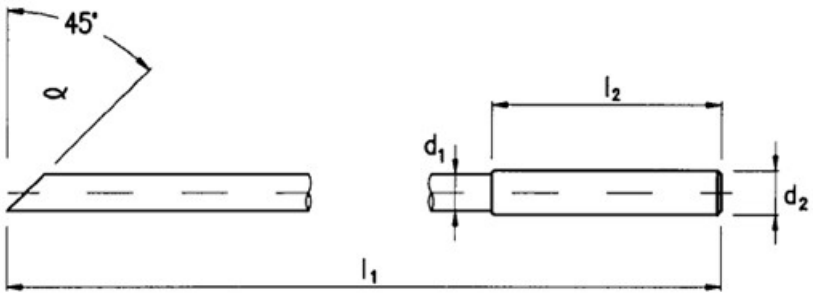
The bolt shall be anchored by means of resin or cement grout.

The bolt-to-rock delivery plate may include a washer or pressure seal. The partition plate may be flat or have a domed shape in its central part and with a spherical seat compatible with the rest of the bolt elements.

The nut, depending on the type of distribution plate used may be of flat hexagonal type or with a spherical seat.

4. STANDARDISED DIMENSIONS IN THE BULON

The following standard dimensions are considered:



l_1 bolt length

l_2 threaded length for nut

d_1 bolt diameter

d_2 thread diameter

Bezel α Ανγλε

Figure 2. Anchor bolt distributed with resins. Dimensions.

The standard values are those given in Table 1:

Length of the bolt (l_1) (mm)	Bolt diameter (d_1) (mm)	Length minimum threaded (l_2) (mm)
Between 1500 and	20	150
Between 1500 and	22	150
Between 1500 and	25	150
Between 3000 and	32	150
Between 3000 and	40	150

Table 1. Dimensions.

For bolts of threaded termination in which the diameter below the threaded part is not equal to or greater than the diameter of the rest of the bolt, a tensile test shall be carried out in accordance with paragraph 6.4 of that threaded part.

The completion of the bolt can also be implemented by forged head made from the conformation of the bolt bar itself.

Welded joints on any part or element of the bolt are not permitted.

5. MATERIALS

The steels to be used in the manufacture of bolt bars shall have a homogeneous structure and a chemical composition of:

- 0.65% maximum carbon
- 1.65% maximum manganese
- 0.05% maximum sulphur
- 0.05% maximum phosphorus

The tensile strength (Rm) shall be at least 20 % higher than the upper elastic limit (ReH) or, if this is not applicable, the elasticity limit (Rp0.2). In the case of bolts intended for land with high convergences, the above ratio shall be at least 40 %.

The elongation after breakage (A) shall be at least 18 %.

Nuts shall be of hexagonal type with at least quality class 8 according to UNE-EN ISO 4034 or equivalent, unless their height exceeds 26mm.

The delivery plate shall be constructed of steel.

6. TYPE TESTS

6.1. Chemical composition analysis and metallographic analysis

The concentration of carbon, silicon, manganese, phosphorus and sulphur in the bolt rod and delivery plate and nut shall be determined.

The steel structure of the bolt rod shall be determined by means of a metallographic study.

6.2 Test to determine the mechanical characteristics of bolt steel

The mechanical properties of steel bars shall be determined by testing in accordance with UNE - EN ISO 6892- 1. The elastic limit for this test shall be the upper elastic limit (ReH) or, if this is not applicable, the elasticity limit (Rp0.2).

Additionally, a tensile test will be carried out on the bolt rod to determine the breaking load of the bolt.

6.3 Flatness test of the partition plate

The vaulted partition plates shall be subjected to a tensile test so that the plate shall be flattened when subjected to a load between 50 per cent and 70 per cent of the bolt breaking load.

Three assemblies will be tested.

6.4 Threaded termination test of bolt or forged head

The breaking load of the bolt threaded termination assembly, consisting of the bolt threaded part, delivery plate and nut, as well as the forged head, shall be determined by a tensile test.

Three assemblies will be tested.

The load shall be applied progressively until it breaks.

Additionally, for threaded termination bolts, a tensile test of a threaded bar with the same characteristics as the threaded termination of the bolt shall be carried out. For bolts in which the

part below the threaded area has the same diameter or is greater than the rest of the bolt, this test need not be carried out.

For each test, the maximum load at the time of failure shall be recorded.

The breaking load shall be the lowest value of those tested.

6.5. Adhesion force test between resin and bolt

Several bolt tensile tests shall be carried out to measure the functionality of the resin steel bolt system. For this purpose, a series of holes with different depths will be drilled on rock or concrete block and bolts of the required length will be installed with a small resin capsule forming an encapsulated bolt length of no more than 300 mm. An axial load shall be applied at the end of the bolt and the length of the bolt measured. The load is applied up to the maximum load borne by the system.

For each bolt diameter at least three tests shall be carried out for different bolt lengths. Additional tests may be carried out to determine the influence of the bolt length, if any, on the joining force.

A hole shall be drilled, with the diameter defined by the manufacturer for the diameter of the bolt to be tested and in such a way that the length of the bolt is sufficient to allow the connection with the jaw of the traction element. The hole will then be re-drilled to a larger diameter leaving 300 mm of the initial hole. This process will ensure that the length of the encapsulation is accurately known.

Once the bolt has been prepared according to the manufacturer's instructions, the tensile test must be carried out not earlier than 1h and not later than 24h after installation to ensure that the resin has had time to cure and to ensure that the roof or ground mechanically withstands the bolt regardless of the time.

The load shall be applied to the bolt progressively and continuously and the displacement of the bolt shall be noted at regular intervals of the load, resulting in a resin bond force/displacement graph. The adhesion force shall be that maximum force for which the slope of the graph falls below 20 kN/mm.

7. DOCUMENTATION

The manufacturer shall draw up a technical file containing at least the following information:

- Description of the bolt and the different elements.
- Dimensional plans of the different elements of the bolt.
- Complete identification (chemical composition and mechanical characteristics) of the materials used, metallic materials and resins.

Safety instructions, preparation, use

ITC SM-PRL-06 SAFETY AND HEALTH DOCUMENT

1. OBJECT

The purpose of this Supplementary Technical Instruction is to establish the minimum content and structure of the documentation relating to preventive action, as well as the requirements for its preparation and review, in accordance with Article 10.2 of the Mining Safety Regulations.

This documentation is contained in the so-called 'Safety and Health Document'.

2. SAFETY AND HEALTH DOCUMENT

The document on safety and health is the one in which the process of elaboration, implementation and form of application of the planning of preventive action in the company is reflected, in addition to referring to how the prevention of occupational risks has been integrated into its management system.

When drawing up the safety and health document and when planning preventive action, the employer must consult the workers' safety and health representatives.

The safety and health document shall show:

a) That the prevention of occupational risks has been integrated into the general management system of the company, both in all its activities and at all hierarchical levels of the company.

That hazards have been identified and the risks to which workers are exposed in the workplace have been assessed, both in relation to work equipment and the workplace environment.

c) That the design and use of equipment and workplaces are safe, in accordance with the principles of preventive action.

Adequate maintenance management of work equipment is envisaged to ensure that safety is not degraded.

Appropriate measures have been envisaged to eliminate hazards and minimize risks, in order to achieve the objectives set by labour legislation.

That the structure, dedication of personnel, means of prevention bodies and financial means are adequate and sufficient for preventive activity.

Emergency measures and health monitoring have been integrated into preventive action.

The conditions, organization, working methods and state of health of workers are regularly monitored.

That adequate training, information, consultation and participation of staff in the area of safety and health has been planned and programmed.

That the necessary measures have been envisaged to ensure the coordination of business activities in the workplace.

That arrangements have been made for the monitoring of jobs and the presence of preventive resources.

The minimum qualification of the persons or entities that collaborate in the realization of said document.

2.1 Initial document

In the case of new workplaces, and before the start of the activity, the employer must plan the preventive action by documenting its preparation, form of application and implementation in the document on safety and health.

The safety and health document shall be presented separately to the project referred to in Article 19 of the Mining Safety Regulation.

2.2 Approval

With the aim of planning and implementing preventive measures, as well as specific resources and working methods, the voluntary management shall approve the documentation provided for this purpose in the document on safety and health, taking into account in any case the updates provided for in section 2.3.

2.3 Updates to the safety and health document

The safety and health document should evolve over time and be adapted to the changing circumstances of the workplace and its places of work. To that end, it shall be updated at least once a year. Thus, the amendments to the document on safety and health will be presented as a separate document, together with the Work Plan.

The document must also be revised in the event of major modifications, extensions or transformations in the workplace, adaptations to technical progress, the incorporation or change of contracts in the workplace, or when fatal or serious accidents have occurred, or any situation of serious risk to the safety and health of workers.

In any case, the document must record all the incidents on safety and health that occur in the life of the company, as well as the periodic checks of the working conditions and the activity of the workers, the safety and health measures, and the results of the evaluations or audits of the occupational risk prevention management system.

3. MINIMUM CONTENT AND STRUCTURE OF THE SAFETY AND HEALTH DOCUMENT

In order to facilitate the preparation of the safety and health document in accordance with its minimum content and the structure of the mandatory documentation to be drawn up by the employer, the following benchmark is established:

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ITC SM-PRL-07 PROTECTION OF WORKERS AGAINST RISK FROM INHALIATION OF POWDER OR RESPIRABLE CRYSTALINE

1. OBJECT

This Supplementary Technical Instruction (hereinafter "CTI") aims at the prevention of pneumoconiosis and other respiratory diseases of occupational origin, caused by exposure to inorganic dust, with special attention to silicosis and lung cancer by exposure to respirable dust with respirable crystalline silica content generated in a work process, in development of Article 17.2 of the Mining Safety Regulation.

The provisions of Royal Decree 665/1997 of 12 May 1997 on the protection of workers from the risks related to exposure to carcinogens at work and Royal Decree 374/2001 of 6 April 2001 on the protection of the health and safety of workers from the risks related to chemical agents at work shall be fully implemented, without prejudice to the more stringent or specific provisions laid down in this JTI.

2. DEFINITIONS

For the purposes of this JTI:

a) Breathable dust fraction: Mass fraction of inhaled particles entering the non-ciliated airways set out in clause 5.3 of UNE-EN-481 'Atmospheres at workstations. Definition of particle size fractions for aerosol measurement'.

Working day: Period of time that, daily, corresponds to the full working day.

c) Sampler: A device for separating chemical and/or biological agents from the surrounding air, consisting of a classification system and/or restraint element.

d) Powder: Suspension of solid matter, particulate and dispersed in the atmosphere, produced by mechanical processes and / or by the movement of air.

Crystalline silica: Silicon dioxide, usually crystallized in the form of quartz or cristobalite.

3. RISK IDENTIFICATION AND ASSESSMENT

3.1 Risk assessment

Where the risk assessment shows that exposure to respirable dust may occur, the degree and duration of exposure of workers shall be assessed.

The occupational risk assessment must be reviewed when the circumstances referred to in Article 6 of Royal Decree 39/1997 of 17 January 1997 approving the Regulation on Prevention Services occur and, in any case, every three years.

3.2 Determination of risk from exposure to dust and environmental limit values (VLA-ED)

For the determination of the risk from exposure to respirable dust, the parameters and limit values for daily exposure (DAV-ED) to be taken into account at the same time shall be:

a) Powder (breathable fraction): 3 mg/m^3.

Breathable crystalline silica powder: 0,05 mg/m ^{3}. See Annex III to Royal Decree 665/1997 of 12 May 1997, as amended by Royal Decree 1154/2020 of 22 December 2020.

3.3 Type of equipment used

The sampling equipment used shall consist of a sampler and a sampling pump to ensure the proper functioning of the assembly.

These devices are products affected by the conformity assessment procedure for products for use in mining set out in ITC SM-COM-04.

3.4 Sampling

The measurement of the environmental concentration shall be representative of the exposure to inhalation dust to which workers are exposed.

The strategy and sampling must be carried out by competent personnel in accordance with the provisions of Chapter VI of Royal Decree 39/1997 of 17 January 1997. Sampling personnel shall be present for the duration of sampling.

The measurement of dust concentration in the air shall be carried out by means of personal measurements, so that the sampler is placed in its breathing area and in accordance with the conditions of equipment review, sampling and sampling procedure laid down in standard UNE 81550 'Workplace exposure. Determination of crystalline silica (breathable fraction) in air. Infrared spectrophotometry method';

3.5 Duration of sampling

Dust sampling shall be extended to the entire working day.

Exceptionally, and subject to the requirements of the analytical method, the duration of sampling may be reduced where there is a risk of saturation of the membrane filters as a result of excessive dust concentration.

The documentation relating to the taking of samples must state the particularities or, where appropriate, the incidents which led to the derogation referred to above. In any case, the sample must be sufficient and representative of the activity carried out during the entire working day.

3.6 Analysis of samples

The analyses of the samples shall be carried out by the National Silicosis Institute or by specialised laboratories whose suitability for that purpose is formally recognised by the Mining Authority in accordance with the procedure described in Annex I.

3.7 Frequency of sampling

Samples shall be taken at least once every four months of the calendar year at workstations where there is a risk of exposure to dust.

4. PREVENTION AND REDUCTION OF EXHIBITION

The daily exposure shall not exceed the limit values set out in paragraph 3.2. In any case, the employer shall ensure that the level of exposure of workers is reduced to as low a value as technically possible.

Whenever work is carried out that is likely to create a risk to the safety or health of workers due to exposure to respirable crystalline silica dust, or workers may be exposed to it, the employer shall

apply all the measures provided for in Article 5 of Royal Decree 665/1997 of 12 May 1997. Likewise, the criteria and good practices recommended by the National Institute of Silicosis will apply.

5. PERSONAL HYGIENE AND INDIVIDUAL PROTECTION MEASURES

In any activity where there is a risk of exposure to respirable crystalline silica dust, the employer must take the necessary measures provided for in Article 6 of Royal Decree 665/1997 of 12 May 1997.

The use of personal protective equipment shall never replace the technical and organisational preventive measures that may remove and evacuate or, failing that, dilute or settle the dust allowing its controlled disposal. Its use will be necessary when the previous preventive measures are insufficient, exposure cannot be avoided or reduced by other means and for the time necessary to implement other more efficient measures.

Its use shall always be in accordance with the provisions of Royal Decree 773/1997 of 30 May 1997 on minimum health and safety requirements for the use by workers of personal protective equipment and the UNE-EN 529 standard 'Respiratory protective equipment. Recommendations on selection, use, care and maintenance. Guide' referring to airway protectors and, specifically, to the suitability to the user taking into account their anatomical characteristics. Filtering equipment based on facial adjustment shall ensure tightness on the face of the wearer.

6. ACCIDENTAL EXPOSURES AND NON-REGULAR EXPOSURES

In the event of accidental and non-regular exposures of respirable crystalline silica dust, the provisions of Article 7 of Royal Decree 665/1997 of 12 May 1997 shall apply.

Special attention should be paid to non-regular activities such as repairs, maintenance operations or other actions of inspection of facilities or cleaning thereof.

7. HEALTH SURVEILLANCE: HEALTH REVIEW AND REVIEW OF ASSESSMENT AND PREVENTION AND PROTECTION MEASURES

In accordance with the provisions of Article 8 of Royal Decree 665/1997 of 12 May 1997 and Article 6 of Royal Decree 374/2001 of 6 April 2001, the employer shall ensure adequate and specific surveillance of the health of workers, carried out by competent health personnel, as determined by the health authorities in the guidelines and protocols drawn up, in accordance with Article 22 of Law 31/1995 of 8 November 1995 on the prevention of occupational risks, point 37.3 of Royal Decree 39/1997 of 17 January 1997 and Royal Decree 843/2011 of 17 June 2011 establishing the basic criteria on the organisation of resources to develop the health activity of prevention services, and shall carry out the review of the assessment and of the collective and individual prevention and protection measures adopted, in accordance with Article 8.4 of Royal Decree 665/1997 of 12 May 1997.

The exposure values to which workers are subject shall be recorded periodically in individual fiches for each worker in order to know the cumulative risk to which they have been exposed. These sheets will be attached to your medical file.

8. DOCUMENTATION

The employer is obliged to have at his disposal the documentation provided for in Article 9 of Royal Decree 665/1997 of 12 May 1997, which will be included in the relevant sections of the document on safety and health, provided that work is likely to create a risk due to exposure to respirable crystalline silica dust.

The documentation shall include the criteria followed during the sampling and treatment of the results obtained. The results of sampling shall be recorded by means of individual sheets in accordance with the model available in Annex II.

9. INFORMATION TO MINING AUTHORITIES AND THE NATIONAL INSTITUTE OF SILICOSIS

Without prejudice to the obligations laid down in the labour legislation on information to the authorities, the employer shall send, at least quarterly and by electronic means, the statistical data sheets including the results of the sampling to the National Institute of Silicosis and annually, together with the submission of the amendments to the document on safety and health, to the Mining Authority. In addition, the National Silicosis Institute will send an annual summary of these statistical data to the Mining Authority.

Any case of pneumoconiosis, silicosis and lung cancer recognized as resulting from exposure to respirable crystalline silica or dust during work shall be reported to the Mining Authority and the National Silicosis Institute. Annually, the National Institute of Silicosis will publish a memoir detailing newly diagnosed cases of pneumoconiosis, silicosis and cancer.

10. INFORMATION AND TRAINING OF WORKERS

Within the framework of the requirements laid down in Article 11 of Royal Decree 665/1997 of 12 May 1997 and Article 9 of Royal Decree 374/2001 of 6 April 2001, the employer shall take appropriate measures to ensure that workers and workers' representatives are trained and informed, with regard to their protection and prevention against the risk of exposure to respirable dust and crystalline silica, and in particular:

It shall ensure that each worker receives accurate information and training, theoretical and practical, sufficient and adequate, on the prevention of exposure to respirable dust and crystalline silica at the workplace.

In accordance with the third subparagraph of paragraph 5, ensure practical training through quantitative adjustment tests of respiratory protective equipment, using methods such as those set out in standard UNE-EN 529.

The training must be repeated at least once a year and in particular when the worker changes functions, position or workplace, or new technologies or changes in work equipment are introduced, adapting to new knowledge regarding the risks or the appearance of new ones.

ANNEX I

Recognition of the technical capacity of specialised laboratories

The recognition of the technical capacity of the specialized laboratories will be carried out by means of a responsible declaration to the Mining Authority where the specialized laboratories start their activity or locate their facilities.

In this responsible declaration, which shall be accompanied by the accreditation certificate of the National Accreditation Entity (ENAC) in accordance with standard UNE-EN-ISO/IEC 17025, the specialised laboratory shall undertake to maintain the conditions that were decisive for the recognition of this accreditation, as well as to comply with the requirements established in this technical instruction for the development of its activity.

Once communicated to the Mining Authority, the specialized laboratory will send this same documentation, together with the justification of its presentation before the Mining Authority, to the Directorate General of Energy Policy and Mines, so that it maintains a list available of specialized laboratories on the website of the Ministry for the Ecological Transition and the Demographic Challenge.

In January of each calendar year, the specialized laboratories, guaranteeing the confidentiality of the information, shall send the results of the analysis of samples to the National Institute of Silicosis for statistical purposes, indicating at least:

- Company code.
- Workplace activity.
- Job code.
- Prevention and protection measures.
- Filter code.
- Sampling date.
- Sampling pump and sampler.
- Sampling rate and sampled volume.
- Breathable fraction of dust and respirable crystalline silica.

ANNEX II. Statistical data sheet

Instituto Nacional de Silicosis	ANNEX II: STATISTICAL DATA SHEET (Sampling)

Company	Work centre/location	Province	Company code (1)

Analysis laboratory	Prevention service	Health surveillance service	N° of new diagnostics on the job		
			Silicosis	Neumoconiosis	Lung cancer

Raw material	Activity			
	1 Open ☐ sky	2 ☐ Tunnel	3 Underground ☐ mining	
	4 ☐ Production vessel	5 ☐ Benefit states	6 ☐ Other (please specify):	

SAMPLING

Name of worker	

Workplace	Job Code	Work team	N° Workers in the Job	N° Total workers in the center

Prevention and protection measures				Incidences of sampling and observations:
1	Localized ☐ extraction	6	☐ Enclosure	
2	☐ Nebulization	7	☐ Watering of tracks	
3	☐ Spraying	8	Forced ☐ ventilation	
4	Water ☐ injection	9	Respiratory ☐ protective equipment	
5	☐ Cabin with air conditioning and filtering	10	☐ Other (please specify):	

Filter code	Filter type	Sampling date	Weather conditions	
				1 ☐ Sunny
				2 ☐ Rainy
Sampling pump	Sampler (cyclone, cassette ...)	Flow rate		3 ☐ Cloudy
		l/min		4 ☐ Wind

Sampled volume	Sampling time	Total duration of the day
m^3	minutes	hours

Breathable Dust Fraction (2)	Respirable crystalline silica fraction (2)	Breathable/inhalable fraction other agents (2)(specify)
mg/m^3	mg/m^3	mg/m^3

(1) The company code will apply to the National Institute of Silicosis

(2) Completing with the results of the laboratory of analysis

ITC SM-PRL-08 PREVENTIVE TRAINING FOR WORKPLACE PERFORMANCE

1 OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims to regulate the minimum professional training in occupational safety and health that workers in extractive activities must possess, in development of Article 17.1 of the Mining Safety Regulation.

2 SCOPE OF THE PROVISIONS

2.1 The preventive training established in this ITC is considered as an enabler for the performance of the job, so it is mandatory for the company to carry it out. Likewise, preventive training must be carried out for the performance of the updating and recycling job.

2.2 The technical specifications establishing the basic content of the different training paths must necessarily be included in the planning of preventive training for the performance of the initial or host job for newly recruited staff.

2.3 At least half of the hours of the training regulated in this JTI must be given in person.

2.4 Initial training courses shall be suitable for a minimum of 20 teaching hours.

2.5 Training courses for retraining or updating knowledge, the periodicity of which shall not exceed four years, shall be adapted to a minimum of five teaching hours.

3 DEFINITION OF DIFFERENT TRAINING ITINERARY

3.1 The training route is the programme of contents which, as basic guidelines, provide support for training in the prevention of occupational risks specific to each job.

3.2 The technical specifications developed by the different training pathways should include at least the training programme and its minimum duration, the staff concerned (jobs performing similar tasks in the different sub-sectors) and the mandatory maximum frequency for receiving training courses.

As a result of the grouping of jobs, the technical specifications cannot be exhaustive, so they must be developed by adapting them to the specific preventive aspects that are important to highlight in the company and specific job.

3.3 The minimum content of preventive training is set out in the following technical specifications:

- ET 08.01 Operator of transport machinery, lorry and dump, in outdoor extractive activities.

- ET 08.02 Operator of starter/loader/railway machinery, loader and hydraulic chain excavator, in outdoor activities.

- ET 08.03 Starting/loading operator and drilling/flying operator; mincer, borenista and mining assistant, in extractive activities of interior.

- ET 08.04 Qualified technicians, geophysics and/or geochemistry operators, managers and/or watchmen, drilling/cutting/external blasting, drilling or mechanical and/or electrical maintenance operators, in outdoor activities.

- ET 08.05 Jobs in profit establishments and other common jobs.

4 CONTENT AND STRUCTURE OF TRAINING ITINERARY

The contents of the different training paths must be adapted to the specific way in which the employer responds to preventive needs and adapt to the following structure:

1º Definition of the work: main and specific jobs and tasks that are usually performed by the workers occupying that position, from a basically preventive perspective.

2º Specific preventive and protective techniques: a set of work practices, provisions and habits whose knowledge and mastery is of the utmost interest for the performance of the work in the appropriate conditions of safety and health by the workers occupying that specific position. They should be based on the risk assessment of the workplace, and on the overall risk assessment where it is also necessary, as well as on the planning of preventive activity.

3º Auxiliary equipment, tools or means: type of notions in which it would be necessary to deepen the knowledge of the machinery and work equipment employed (both main and auxiliary) by the workers in that position; the best guidelines for carrying out maintenance tasks on them; and broadening the understanding of the principles on which the safety features present in each case are based.

4º Control and surveillance of the workplace and its environment: name that includes contents referring to the necessary inspections and controls to be carried out by the worker, and how this should be adapted to the provisions of the internal safety provisions of the workplace.

5º Interferences with other activities: reference to the training to be designed in the case of possible interference that may occur between tasks that are carried out simultaneously by different workers, occupying the same or different jobs and on the possible procedures to be followed in these cases in which the personnel concerned will have to be instructed.

6º Regulations and legislation: a set of existing rights and obligations in labour matters that most directly affect the functions of the post analysed, set out both in the legislation in force and in the more specific legislation, of a complementary nature, including the internal safety provisions of the workplace.

5 ORGANIZATION OF PREVENTIVE STAFF TRAINING

The employer shall organise the provision of the corresponding training to workers who so require, either because of their recent incorporation, or as a retraining or updating of knowledge. For this, it must have the appropriate means, both material and human, being able to be own or external, ensuring in a timely manner the effectiveness of one or the other for the achievement of the objectives set.

When organising this training, you must take into account in a very special way the specificities of your workplace, both in terms of the activities carried out, as well as the work teams you have, the characteristics of the workplaces, the conditions in which the tasks are carried out, etc. All this with the fundamental objective of ensuring that the preventive training provided is adapted to the specific situation of the job and the workplace.

6 CHARACTERISTICS OF THE TRAINING TEAM

The team in charge of teaching the contents of the different training itineraries per job must meet the following requirements:

a) Include any member who is accredited for the performance of the functions of higher level in Occupational Risk Prevention, in accordance with the provisions of Article 37 and Annex VI of Royal Decree 39/1997, of 17 January, approving the Regulation of Prevention Services, which will perform the functions of coordinator.

b) Some of its members must have specific academic or professional training in mining.

c) Have work experience in the sector of activity.

The training team may consist of only one person, if it meets the requirements set out in this JTI.

7 CERTIFICATION OF TRAINING

7.1 Workers who have been adequately trained in accordance with the provisions of this JTI, exceeding the levels of knowledge established by the teaching staff, will receive a documentary proof of this, issued by the company if it had used its own means for the delivery of the training, or by the entity entrusted by it to do so, in case of having resorted to external means. This training shall be recorded and certified on each worker's own vocational training record book.

7.2 The model of the worker's personal training booklet and record book of courses received is set out in technical specification ET 08.06.

7.3 The list of training activities of this nature carried out, both by own means and by other means, together with the most relevant information relating to them, such as data on assistants, jobs held by them, teaching materials used, data on teachers, etc., must be incorporated into the document on safety and health.

ET 08.01 PREVENTIVE TRAINING FOR THE PERFORMANCE OF THE OPERATING OF TRANSPORT MACHINERY, ROAD AND VOLQUET, IN EXTRACTIVE EXTERNAL ACTIVITIES

1. OBJECT AND FIELD OF APPLICATION

This Technical Specification ('TS') aims to develop the minimum content of the specific preventive training for the performance of the transport machinery operator position in open pit mining activities, in particular the dump operator and truck driver positions, as set out in paragraphs 3 and 4 of ITC SM-PRL-08 'Preventive Training for the Performance of the Workplace' of the Mining Safety Regulation.

This minimum content will also be taken into account for the training of workers belonging to subcontracted companies that perform these jobs in open pit mining activities, in accordance with the provisions of Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

2. DEFINITIONS

2.1 Truck. – Self-propelled vehicle on wheels, with an open box, which carries out the transport of material in those areas of the holding intended for use, and, where appropriate, external road transport to distribute the products to end-users. The vehicle is loaded by external means.

2.2 Dump. – Self-propelled machine, on wheels or chains, with an open box, carrying and overturning or extending materials. The loading of the machine is carried out by external means.

3. MINIMUM CONTENT OF PREVENTIVE TRAINING

3.1 Duration and frequency – The duration of the training courses for the position of transport machinery operator in outdoor activities according to the programme set out in 3.2 will be 20 hours.

The maximum compulsory frequency with which the worker will receive the training courses will be two years. Since this training has the character of updating and retraining knowledge with a minimum duration of 5 hours, its program will be distributed in proportion to the duration of the initial program.

3.2 Programme.

1° Job definition (one hour). Definition of all the tasks developed in the workplace of each particular machine.

2° Preventive and protective techniques specific to the workplace of each particular machine (11 hours). Hazards associated with the following tasks:

Before starting the work:

Review of the machine before commissioning, including safety-impacting systems.

Basic maintenance operations. Towed.

Access to the tipper operator position or maintenance points.

During work:

Engine start.

Preparation of the machine for the execution of the works.

Loading of material.

Transport of material (runway circulation).

Discharge of material in hoppers.

Parking lot.

Loading material in dump trucks located in the front.

Dumping dumps on heaps and slopes.

Circulation of dumps in accesses to work platforms.

Residual hazards associated with each particular machine, specified in the machine instruction manual.

Preventive measures commensurate with the hazards associated with the above tasks.

Prevention and protection measures indicated by the manufacturers of the equipment for the performance of maintenance.

Possible prescriptions or limitations imposed by the repair and/or maintenance workshops on each particular machine.

Measures incorporated into the machine in particular in case of compliance with the provisions set out in Annex I to Royal Decree 1215/1997.

Collective and individual protective equipment. First aid.

Emergency and evacuation plan.

3° Equipment, tools or auxiliary means of each particular machine (three hours):

General knowledge of the machine.

Technical limitations on the intended use of the machine, according to the manufacturer's specifications.

Safety elements and systems associated with the machine:

Security locks; Mechanical locking of the swingarm controls.

Transmission locks.

Pressure and temperature controls of the main systems. Strap guards and fans.

Warning and hazard indicators. Acoustic reversing warning device. Safety belt and anchors.

Emergency brake.

Lighting and indication devices. Rearview mirrors.

Existing additional security locks on dumps; mechanical locking of the case, mechanical locking of the chassis joint and locking of the transmission in unloading operations.

Emergency address on dumps.

ROPS/FOPS protection structures in dumps.

Box heating system in dumps.

Safety mirrors in dumpers.

Instruction manual.

4º Control and surveillance of the workplace and its environment (two hours).

Knowledge of safety devices for the control and monitoring of the operation of the machine:

Pressure gauges.

Thermometers.

Level indicators.

Acoustic and luminous alarm panel.

Load indicator.

Control of the swingarm.

Control and monitoring of the workplace according to internal procedures.

5º Interferences with other activities (two hours). Protocols/procedures established when performing work simultaneously, in particular:

Loading in the vicinity of other vehicles, machinery or personnel.

Secure procedures for communicating with people abroad (receiving work orders).

Repairs, revisions and maintenance.

Circulation along runways, accesses and exploitation fronts.

6.º Regulations and legislation (one hour).

Law 31/1995 of 8 November 1995 on the prevention of occupational risks: rights and obligations.

Working instructions.

Internal security provisions.

ET 08.02 PREVENTIVE TRAINING FOR THE PERFORMANCE OF THE OPERATING OF STARTING/LOADING/VIAL MACHINERY, LOADING PALA AND HYDRAULIC CHAIN EXCAVATOR, IN EXTRACTIVE EXTRACTIVE ACTIVITIES

1. OBJECT AND FIELD OF APPLICATION

This Technical Specification (hereinafter "TS") aims to develop the minimum content of the specific preventive training for the performance of the position of operator of starter/loading/traveller machinery in outdoor extractive activities, in particular the positions of operator of loader shovel, operator of hydraulic excavator of chains and operator of tractor of chains or bulldozer, as established in paragraphs 3 and 4 of the ITC SM-PRL-08 "Preventive training for the performance of the work station", of the Mining Safety Regulation.

This minimum content will also apply to the training of workers belonging to subcontracted companies that perform these jobs in extractive activities abroad, in accordance with the provisions of Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

2. DEFINITIONS

2.1 Accessory: Detachable device (working tool) fixed directly to the machine or by means of a quick coupling device to perform the main function of the machine or for other specific use.

2.2 Quick coupling device: Device that facilitates a quick change of accessories.

2.3 Equipment: Set of components mounted on the base machine to fulfill the primary function for which it has been designed.

2.4 Hydraulic Chain Excavator: Self-propelled excavator on chains, with a superior structure capable, normally, of making a 360° turn, whose main function is to excavate by means of a spoon, without the load-bearing structure moving during a work cycle of the machine and that uses a hydraulic system to operate the equipment mounted on the base machine.

2.5 Base machine: Machine without equipment as described in the manufacturer's specifications.

2.6 Loader shovel: Self-propelled machine on wheels or chains, with a work equipment mounted on the front whose main function are loading operations (use of spoon), with which it loads or excavates by moving the machine forward.

2.7 Chain tractor or bulldozer: Self-propelled machine on chains equipped, either with a blade that cuts, displaces and levels the material by moving the machine forward or with equipment to exert a pushing or pulling force.

3. MINIMUM CONTENT OF PREVENTIVE TRAINING

3.1 Duration. – The duration of the training courses for the operator of start-up/loading/travel machinery in outdoor extractive activities according to the programme set out in 3.2 shall be 20 hours.

The maximum compulsory frequency with which the worker will receive the training courses will be two years. Since this training has the character of updating and retraining knowledge with a minimum duration of 5 hours, its program will be distributed in proportion to the duration of the initial program.

3.2 Programme.

1° Job definition (one hour). Definition of all the tasks developed in the workplace of each particular machine.

2° Preventive and protective techniques specific to the workplace of each particular machine (11 hours). Hazards associated with the following tasks:

a) Before starting the work:

- Review of the machine before commissioning, including safety-impacting systems.
- Access to the operator's station or maintenance points. Basic maintenance operations.
- Boarding on gondola for transport.
- Towed.
- Change of accessories.

b) During work:

- Engine start.
- Preparation of the machine for the execution of the works.
- Material loading (only for loader shovel operators and hydraulic chain excavators).
- Discharge of material onto other machines (only for operators of loaders and hydraulic excavators of chains).
- Starting material.
- Work in the vicinity of slopes or on the slope itself (only for operators of loaders and chain tractors).
- Machine recovery and towing (only for chain tractor operators).
- Parking of the machine.
- Residual hazards associated with each particular machine, as specified in the machine instruction manual.
- Preventive measures commensurate with the hazards associated with previous activities.
- Prevention and protection measures indicated by the manufacturers of the equipment for the performance of maintenance.
- Possible prescriptions or limitations imposed by the repair and/or maintenance workshops on each particular machine.
- Measures incorporated into the machine in particular in case of compliance with the provisions set out in Annex I to Royal Decree 1215/1997.
- Collective and individual protective equipment.
- First aid.
- Emergency and evacuation plan.

3° Equipment, tools or auxiliary means of each particular machine (three hours):

- General knowledge of the machine and its accessories.

- Technical limitations on the intended use of the machine, according to the manufacturer's specifications.
- Safety elements and systems associated with the machine:
  - Security locks; Mechanical locking of work equipment (only for operators of loaders and hydraulic excavators of chains).
  - Mechanical locking of the articulated frame and mechanical locking of the controls of the work equipment of loaders and chain tractors (only for operators of loaders and chain tractors).
  - Mechanical blockage of the superstructure, blockage of the hydraulic system of hydraulic chain excavators.
  - Transmission locks.
  - Pressure and temperature controls of the main systems.
  - Strap guards and fans.
  - Warning and hazard indicators.
  - Acoustic reversing warning device for loader shovels and chain tractors (only for loader shovel operators and chain tractors).
  - Safety belt and anchors.
  - Emergency brake of loader blades.
  - Rotary brake of hydraulic chain excavators.
  - Emergency direction of loader blades.
  - Lighting devices.
  - Devices for the indication of loader blades.
  - ROPS/FOPS protective structures.
  - Rearview mirrors and safety mirrors.
  - Quick coupling device of accessories (only for operators of loaders and hydraulic excavators of chains).
  - Straightener (only for chain tractor operators).
  - Instruction manual.

4º Control and surveillance of the workplace and its environment (two hours).

a) Knowledge of safety devices for the control and monitoring of the operation of the machine:
   - Pressure gauges.
   - Thermometers.
   - Level indicators.
   - Acoustic and luminous alarm panel.
   - Load indicator.

b) Control and monitoring of the workplace according to internal procedures.

5º Interferences with other activities (two hours).

a) Protocols/procedures established when performing work simultaneously, in particular:

- Loading and unloading in the vicinity of other vehicles, machinery or personnel (only for loader shovel operators and hydraulic chain excavators).
- Co-start operations with other machines (only for chain tractor operators).
- Secure procedures for communicating with people abroad (receiving work orders).
- Repairs, revisions and maintenance.
- Circulation by tracks, accesses and fronts of operation of loader blades.

6.º Regulations and legislation (one hour).

- Law 31/1995 of 8 November 1995 on the prevention of occupational risks: rights and obligations.
- Working instructions.
- Internal security provisions.

ET 08.03 PREVENTIVE TRAINING FOR THE PERFORMANCE OF LAUNCH/LOAD OPERATOR AND PERFORATION/VOLADURA OPERATOR POSTS; PICADOR, BARRENIST AND MINING AID, IN INTERIOR EXTRACTIVE ACTIVITIES

1. OBJECT AND FIELD OF APPLICATION

This Technical Specification (hereinafter referred to as 'TS') aims to develop the minimum content of the specific preventive training for the performance of the starter/load operator and drill/fly operator workstations in underground extractive activities, in particular the mincer, borer and mining assistant workstations, as set out in paragraphs 3 and 4 of ITC SM-PRL-08 'Preventive training for the performance of the workstation' of the Mining Safety Regulation.

This minimum content will also apply to the training of workers belonging to subcontracted companies that perform these jobs in indoor extractive activities, in accordance with the provisions of Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

2. MINIMUM CONTENT OF PREVENTIVE TRAINING

2.1 Duration and frequency.

The duration of the training courses for the jobs covered by this TS shall be 20 hours according to the programme set out in 2.2.

The maximum compulsory frequency with which the worker will receive the technical training courses will be two years. Since this training has the character of updating and retraining knowledge with a minimum duration of 5 hours, its program will be distributed in proportion to the duration of the initial program.

2.2 Programme.

1º Job definition (one hour). Definition of all the tasks developed in the workplace of each particular machine.

2º Preventive and protective techniques specific to the workplace of each particular machine (11 hours). Hazards associated with the following tasks:

a) Before starting the work:
   - Review of the machine before commissioning, including safety-impacting systems.
   - Access to the operator's station or maintenance points. Basic maintenance operations.
   - Boarding on gondola for transport.
   - Towed.
   - Change of accessories.

b) During work:
   - Engine start.
   - Preparation of the machine for the execution of the works.
   - Material loading (only for loader shovel operators and hydraulic chain excavators).
   - Discharge of material onto other machines (only for operators of loaders and hydraulic excavators of chains).

- Starting material.
- Work in the vicinity of slopes or on the slope itself (only for operators of loaders and chain tractors).
- Machine recovery and towing (only for chain tractor operators).
- Lifting of unpalletized loads.
- Parking of the machine.
- Residual hazards associated with each particular machine, as specified in the machine instruction manual.
- Preventive measures commensurate with the hazards associated with previous activities.
- Prevention and protection measures indicated by the manufacturers of the equipment for the performance of maintenance.
- Possible prescriptions or limitations imposed by the repair and/or maintenance workshops on each particular machine.
- Measures incorporated into the machine in particular in case of compliance with the provisions set out in Annex I to Royal Decree 1215/1997.
- Collective and individual protective equipment.
- First aid.
- Emergency and evacuation plan.

3º Equipment, tools or auxiliary means of each particular machine (three hours):

- General knowledge of the machine and its accessories.
- Technical limitations on the intended use of the machine, according to the manufacturer's specifications.
- Safety elements and systems associated with the machine:
    - Security locks; Mechanical locking of work equipment (only for operators of loaders and hydraulic excavators of chains).
    - Mechanical locking of the articulated frame and mechanical locking of the controls of the work equipment of loaders and chain tractors (only for operators of loaders and chain tractors).
    - Mechanical blockage of the superstructure, blockage of the hydraulic system of hydraulic chain excavators.
    - Transmission locks.
    - Pressure and temperature controls of the main systems.
    - Strap guards and fans.
    - Warning and hazard indicators.
    - Acoustic reversing warning device for loader shovels and chain tractors (only for loader shovel operators and chain tractors).
    - Safety belt and anchors.

- Emergency brake of loader blades.
- Rotary brake of hydraulic chain excavators.
- Emergency direction of loader blades.
- Lighting devices.
- Devices for the indication of loader blades.
- ROPS/FOPS protective structures.
- Rearview mirrors and safety mirrors.
- Quick coupling device of accessories (only for operators of loaders and hydraulic excavators of chains).
- Straightener (only for chain tractor operators).
- Instruction manual.

4° Control and surveillance of the workplace and its environment (two hours).

c) Knowledge of safety devices for the control and monitoring of the operation of the machine:

- Pressure gauges.
- Thermometers.
- Level indicators.
- Acoustic and luminous alarm panel.
- Load indicator.

d) Control and monitoring of the workplace according to internal procedures.

5° Interferences with other activities (two hours).

b) Protocols/procedures established when performing work simultaneously, in particular:

- Loading and unloading in the vicinity of other vehicles, machinery or personnel (only for loader shovel operators and hydraulic chain excavators).
- Co-start operations with other machines (only for chain tractor operators).
- Secure procedures for communicating with people abroad (receiving work orders).
- Repairs, revisions and maintenance.
- Circulation by tracks, accesses and fronts of operation of loader blades.

6.° Regulations and legislation (one hour).

- Law 31/1995 of 8 November 1995 on the prevention of occupational risks: rights and obligations.
- Working instructions.
- Internal security provisions.

ET 08.04 PREVENTIVE TRAINING FOR THE PERFORMANCE OF POSTS OF TECHNIQUES, GEOPHYSICS AND/OR GEOCHEMICS OPERATORS, INSTRUCTORS AND/OR SURVEILLANTS, EXTERNAL PERFORATION/COURT/VOLADURA OPERATORS, OF SONDEOS OR OF MECHANICAL AND/OR ELECTRICAL MAINTENANCE, IN EXTERNAL ACTIVITIES

1. OBJECT AND FIELD OF APPLICATION

This Technical Specification (hereinafter "TS") aims to develop the minimum content of the specific preventive training for the performance of the jobs of qualified technicians, geophysics and/or geochemistry operators, managers and/or watchmen, drilling/cutting/external blasting, drilling or mechanical and/or electrical maintenance operators, in open pit extractive industries, as established in paragraphs 3 and 4 of the ITC SM-PRL-08 "Preventive training for the performance of the job", of the Mining Safety Regulation.

This minimum content will also apply to the training of workers belonging to subcontracted companies that perform these jobs in extractive activities abroad, in accordance with the provisions of Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

2. DEFINITIONS

2.1 Rock Cutting Machinery: Machines that in their intended use contemplate the execution of cuts in the rock (diamond thread cutters, arm scrapers, disc cutters, pressurized water cutters, thermal lances, chopper hammers, etc.).

2.2 Drilling machinery: Machines that in their intended use contemplate the execution of drilling (bankers, hammers, trolleys and drilling wagons, etc.).

2.3 Probing machinery: Machines that in their intended use contemplate the execution of soundings.

2.4 Cutting Operator: Workstation that groups all the tasks destined to the execution of cuts in the rock in order to remove it from the rocky massif for the obtaining of primary blocks, as well as to divide it into secondary blocks by means of the use of diverse machinery of cutting of rock in extractive industries to open sky.

2.5 Driller: Workstation that groups all the tasks destined to the execution of drillings in order to carry out the starting of the material or to fractionate the material already torn by means of the use of diverse drilling machinery in extractive industries in open pit.

2.6 Sondista: Workstation that groups all the tasks destined to the execution of soundings by means of the use of diverse machinery of sounding.

2.7 Taqueo: Mining task consisting of the secondary fragmentation of large blocks of rock produced in the blasts (bolos) by drilling holes or by placing surface loads.

3. MINIMUM CONTENT OF PREVENTIVE TRAINING

3.1 Duration and frequency.

The duration of the training courses for the jobs covered by this TS, according to the programme set out in 3.2, shall be 20 hours.

The maximum compulsory frequency with which the worker will receive the training courses as a retraining or updating of knowledge, will be adapted, according to the job to a minimum of five teaching hours, will be:

a) Four years for the jobs of qualified technicians, managers and / or vigilantes, survey operators, geophysics and / or geochemistry operators.

b) Two years for the jobs of drill/cut/fly operators and mechanical and/or electrical maintenance operators.

As this training has the character of updating and retraining knowledge with a minimum duration of five hours, your program will be distributed in proportion to the duration of the contents of the initial program.

3.2 Programme.

1° Job definition (one hour). Definition of all the tasks developed in the workplace of each particular machine.

2° Preventive and protective techniques specific to each particular job (seven hours).

2.1 Hazards associated with the tasks defined in section 1°, and in particular with the following:

a) Before starting the work:

- Workplace review. Reconnaissance of the land.
- Installation of machinery in the area of operation.
- Review of equipment, machines, accessories and instruments before commissioning, including systems that affect their safety.
- Basic maintenance operations.
- Access to the workstation or maintenance points.
- Verification of electrical, hydraulic and pneumatic installations.

b) During work:

- Common to the jobs of qualified technicians, geophysics and/or geochemistry operators
  - Preparation of the teams for the execution of the works.
  - Start-up of the teams.
  - Operation of the equipment. Supervision.
  - Completion of work. Teams stop.
  - Problem solving.
- Specific for drilling/cutting/exterior blasting operator workstations
  - Execution of perforations or cuts in the upper platform of the bank.
  - Execution of perforations or cuts on a bench basis.
  - Execution of perforations for taqueo for perforators.
  - Block footwear during the execution of cuts for cutting operators.
  - Separation of primary blocks.
  - Defeat of primary blocks.
  - Handling of pressure fluid circuits.
  - Sanitation operations.

- Treatment of drilling sterile for drillers.

• Specific for the jobs of survey operators and qualified technicians, geophysics and/or geochemistry operators

- Collection and control of sounding products (water, sludge, etc.).
- Inspection of safety valves against eruptions.
- Change of drilling tool.
- Execution of surveys at sea.

• Specific for the workstations of mechanical and/or electrical maintenance operators

- Maintenance and overhaul of mobile machinery.
- Assembly, commissioning, maintenance and overhaul of equipment or facilities (electric, hydraulic and pneumatic).
- Special work (Procedures).

2.2 Preventive measures commensurate with the hazards associated with previous activities.

2.3 First aid.

2.4 Emergency and evacuation plan.

2.5 Safe working procedures.

3° Work equipment, personal protective equipment or auxiliary equipment used on the job (seven hours).

3.1 General knowledge of each particular work team used in the workplace.

3.2 Technical limitations on the intended use of work equipment as specified by the manufacturer.

3.3 Safety elements and systems associated with work equipment. Examples:

- Security locks.
- Pressure and temperature controls of the main systems.
- Warning and hazard indicators.
- Lighting and indication devices.
- Safety devices for the control and monitoring of the operation of equipment and its accessories.
- Instruction manuals.

3.4 Residual hazards associated with each particular work equipment, as specified in the equipment instruction manual.

3.5 Prevention and protection measures indicated by the manufacturers of equipment, instruments and substances, where appropriate.

3.6 Possible prescriptions or limitations imposed by the repair and/or maintenance workshops on each particular piece of equipment.

3.7 Measures incorporated into the particular equipment and accessories in the event of compliance with the provisions laid down in Annex I to Royal Decree 1215/1997.

4° Control and surveillance of the workplace and its environment (two hours).

4.1 Knowledge of safety devices for the control and monitoring of the operation of equipment or facilities.

4.2 Control and surveillance of the workplace according to internal procedures.

5° Interferences with other activities (two hours).

c) Protocols/procedures established when performing work simultaneously, in particular:

– Coordination with the work of the gunners. Blasts.

– Works with possible presence of failed sweeps.

– Secure communication procedures.

– Work in the vicinity of mobile machinery.

– Repairs, revisions and maintenance.

6.° Regulations and legislation (one hour).

- Law 31/1995 of 8 November 1995 on the prevention of occupational risks: rights and obligations.
- Working instructions.
- Internal security provisions.

ET 08.05 PREVENTIVE TRAINING FOR THE PERFORMANCE OF WORKING POSTS IN BENEFIT ESTABLISHMENTS AND OTHER COMMON POSTS

1. OBJECT AND FIELD OF APPLICATION

This Technical Specification (hereinafter "TS") aims to develop the minimum content of specific preventive training for the performance of jobs in benefit establishments and other common positions, as established in paragraphs 3 and 4 of the ITC SM-PRL-08 "Preventive training for the performance of the job", of the Mining Safety Regulation.

This minimum content will also apply to the training of workers belonging to subcontracted companies that perform these jobs in open pit, underground or drilled extractive industries, in accordance with the provisions of Royal Decree 171/2004, of 30 January, implementing Article 24 of Law 31/1995, of 8 November, on the Prevention of Occupational Risks, on the coordination of business activities.

2. DEFINITIONS

2.1 Accessory: Detachable device attached or coupled to the equipment to perform the main function of the equipment or for other specific use.

2.2 Equipment: any machinery, apparatus, instrument or installation used in the work.

2.3 Electrical installation: A set of materials and equipment in a workplace that generates, converts, transforms, transports, distributes, uses or stores electrical energy.

3. MINIMUM CONTENT OF PREVENTIVE TRAINING

3.1 Duration and frequency.

The duration of the training courses for the jobs covered by this TS, according to the programme set out in 3.2, shall be 20 hours.

The maximum compulsory frequency with which the worker will receive training courses in the form of retraining or updating of knowledge, which will be adapted, depending on the job, to a minimum of five teaching hours, will be:

- Four years for common jobs.
- Two years for jobs in profit establishments.

Since this training has the character of updating and retraining knowledge with a minimum duration of five hours, its program will be distributed in proportion to the duration of the initial program.

3.2 Programme.

1.° Job definition (one hour). Definition of all the tasks developed in the workplace.

2.° Preventive and protective techniques specific to each particular job (seven hours).

2.1 Hazards associated with the tasks defined in section 1°, and in particular with the following:

a) Before starting the work:

– Review of the workplace.

– Review of equipment, machines, accessories and instruments before commissioning, including systems that affect their safety.

– Basic maintenance operations.

– Access to the workstation or maintenance points.

– Verification of electrical, hydraulic and pneumatic installations.

During work:

• Common to all groups covered by this technical specification:

– Preparation of the teams for the execution of the work.

– Start-up of equipment.

– Feeding material to equipment.

– Operation of equipment. Supervision.

– Discharge of equipment material.

– Completion of the work. Teams stop.

– Problem solving.

• Specific for mechanical and electrical maintenance operators in profit establishments:

– Assembly, commissioning, maintenance and overhaul of equipment or installations (electrical, hydraulic and pneumatic).

– Special work (Procedures).

• Specific for laboratory operators:

– Sampling.

– Carrying out analyses and tests taking into account any requirements or limitations imposed by the manufacturers of each particular equipment, instrumentation or substance.

2.2 Preventive measures commensurate with the hazards associated with previous activities.

2.3 First aid.

2.4 Emergency and evacuation plan.

2.5 Safe working procedures.

3º Work equipment, personal protective equipment or auxiliary equipment used on the job (seven hours).

3.1 Knowledge of equipment, accessories, machines or installations.

3.2 Technical limitations on the intended use of machines or installations, as specified by the manufacturer.

3.3 Safety elements and systems associated with machines or installations. Examples:

- Security locks.
- Pressure and temperature controls of the main systems.
- Warning and hazard indicators.
- Lighting and indication devices.
- Safety devices for the control and monitoring of the operation of equipment and its accessories.

- Instruction manuals.

3.4 Residual hazards associated with each particular work equipment, as specified in the equipment instruction manual.

3.5 Prevention and protection measures indicated by the manufacturers of equipment, instruments and substances, where appropriate.

3.6 Possible prescriptions or limitations imposed by the repair and/or maintenance workshops on each particular piece of equipment.

3.7 Measures incorporated into the particular equipment and accessories in the event of compliance with the provisions laid down in Annex I to Royal Decree 1215/1997.

4° Control and surveillance of the workplace and its environment (two hours).

4.1 Knowledge of safety devices for the control and monitoring of the operation of equipment or facilities. Examples:

– Gauges

– Thermometers

– Level indicators

– Acoustic and luminous alarm panel

4.2 Control and surveillance of the workplace according to internal procedures.

5° Interferences with other activities (two hours).

5.1 Protocols/procedures established when performing work simultaneously, in particular:

– Secure communication procedures.

– Work in the vicinity of mobile machinery or other personnel.

– Repairs, revisions and maintenance.

6.° Regulations and legislation (one hour).

- Law 31/1995 of 8 November 1995 on the prevention of occupational risks: rights and obligations.
- Working instructions.
- Internal security provisions.

distribute in proportion to the duration of the programme

ET 08.06 WORKER'S PERSONAL TRAINING CARTLE AND RECEIPT COURSE REGISTRATION BOOK

1. OBJECT AND SCOPE

This Technical Specification (hereinafter 'TS') aims to develop the format of the personal training booklet for workers and the register book of courses received referred to in paragraph 7 of ITC SM-PRL-08 of the Mining Safety Regulation.

2. TRAINING CARTLE FOR THE WORKER

The personal training card will belong to the worker, will be delivered by the employer to the latter and will record the preventive training received throughout his working life.

2.1 Training courses in the field of ITC SM-PRL-08 and its technical development specifications.

The booklet shall consist of as many sheets as the training courses received by the worker in the field and in accordance with the provisions of JTI SM-PRL-08 and technical specifications for its development, each of these sheets conforming to the model set out in Annex I to this TS.

At the end of each training course in the field of JTI SM-PRL-08, the entity providing the course, either the company itself or an external training entity, will request from each worker his/her training booklet in order to complete the data relating to the training provided. In addition, both the company to which the worker belongs and the entity that teaches the course, must certify its completion by stamp and signature of the head of each entity in the space enabled for this purpose in the model included in Annex I of this TS. If the training is provided by the company itself, this certification will be carried out in duplicate in each of the spaces authorized for this purpose.

2.2 Other training courses on the prevention of occupational risks.

Optionally, the worker may include in the personal training card specified in the previous section, other courses received in the field of occupational risk prevention other than those regulated by the ITC SM-PRL-08, in order to unify in a single document all the preventive training certificates available. To this end, the worker must complete the sheet corresponding to other training courses on the prevention of occupational risks included in Annex I to this TS and incorporate it into his personal training card.

The information related to other preventive training courses included must be supported by the corresponding certificates issued by the companies that delivered the courses, so that the worker can demonstrate the information he has reflected.

The sheets corresponding to other courses received will be sorted in the personal training booklet in a single separate block of the training courses received in the scope of the ITC SM-PRL-08.

3. BOOK REGISTRATION OF COURSES RECEIVED

The register of courses received to be maintained by the employer shall consist of as many sheets as there are workers in the company, each of them conforming to the model set out in Annex II to this TS.

Only courses received by the worker in accordance with ITC SM-PRL-08 and the technical specifications that develop it shall be included in the course record book received.

The record book of courses received may be maintained by computer means.

The entrepreneur must keep up to date the record book that will be available to the Mining Authority.

ANNEX I

Worker's training card on the prevention of occupational risks

Name of worker:
DNI:
Nationality:
Date and place of birth:

Sheet number 1

NOTE: Cover model for personal training booklet.

Training course of the worker in the field of the ITC SM-PRL-08 and technical specifications of development

(Its inclusion in the worker's training card is mandatory)

Name of worker:
Workplace:
Age in the company:
Age at the workplace:

Company:
CIF:
Work centre:
Address of the workplace:
Responsible Person/Optional Address:
Telephone: Fax:
Email:

Entidad que imparte e curso:

Nombre de curso:

Tipo de curso: Nueva incorporación □ Actualización o recic aje □

Fechas de impartición de curso:

Lugar de impartición del curso:

Horas de formación:

Stamp and signature of the person in charge of the company to which the worker belongs:	Stamp and signature of the person in charge of the training entity or trainer who has

Name and surname:	taught the course Name and surname:

Sheet number:

NOTE: Model sheet to include the courses in the scope of the ITC SM-PRL-08 in the personal training booklet.

Training course on the prevention of occupational risks

(Its inclusion in the worker's training card is optional)

Name of worker:

Entity providing the course:
Course name:
Course delivery dates:
Place of delivery of the course:
Training hours:

Sheet number:

NOTE: Model sheet to include other training courses on the prevention of occupational risks in the personal training booklet.

ANNEX II

Book record of training received by the worker in the field of JTI SM-PRL-08 and technical specifications for development

Name of worker:
Nationality:
Date and place of birth:
Age in the company:

COURSES RECEIVED EXCLUSIVELY IN THE FIELD OF ITC-SM-PRL-8 AND TECHNICAL DEVELOPMENT SPECIFICATIONS.				
Date	Name	Type (Incorporation, upgrade or recycling)	N.º hours	Entity

Sheet number:

NOTE: Model sheet to include training in the field of ITC SM-PRL-08 received by a worker in the record book of courses received.

ITC SM-PRL-09 ENVIRONMENTAL CONDITIONS FOR SUBTERRANEAN LABORES

1. OBJECT AND SCOPE.

This Supplementary Technical Instruction (hereinafter referred to as 'ITC'), pursuant to Article 17(3) of the Mining Safety Regulation, is intended to lay down requirements and certain limits on the environmental conditions of underground work in order to protect workers from health risks and, in particular, to:

- The following toxic gases: CO; CO_2; NO; NO_2; SH_2; and SO_2.

- Emissions from diesel engines.

- The temperature.

In any event, the provisions of Royal Decree 665/1997 of 12 May 1997 on the protection of workers from the risks related to exposure to carcinogens at work and Royal Decree 374/2001 of 6 April 2001 on the protection of the health and safety of workers from the risks related to chemical agents at work shall be fully implemented, without prejudice to the more stringent or specific provisions laid down in this JTI.

2. DEFINITIONS.

For the purposes of this JTI, the following definitions apply:

a) Chemical agent or gas: chemical element or compound, which alone or mixed, irrespective of its origin, is likely to be present in the atmosphere of workplaces. Usually considering the gaseous form of chemical agents, and their exposure by respiratory route (inhalation).

b) Environmental concentration: chemical agent content per unit volume of air.

c) Short-term exposure (SPE): mean concentration of the chemical agent in the worker's breathing area, measured or calculated for any period of 15 minutes throughout the working day.

d) Breathable fraction: mass fraction of inhaled particles entering the non-ciliated airways set out in paragraph 5.3 of UNE-EN-481 'Atmospheres at workstations. Definition of particle size fractions for aerosol measurement'.

e) Equivalent temperature: climatic value in ºC, determined on the basis of the dry temperature, the wet temperature and the speed of the air flow, in accordance with the established formulae or with the abacus in Annex III.

f) Wet temperature: temperature of the air stream indicated by the wet thermometer, expressed in ºC.

g) Dry temperature: temperature of the air stream indicated by the dry thermometer, expressed in ºC.

h) Emergency work: interventions by life-saving equipment or equipment intended to save persons, to prevent a risk to the life or health of persons, or to prevent significant damage to important installations on the holding in the event of an unforeseen event.

i) Workplace: a set of activities that are entrusted to a specific worker, as well as the physical space in which he carries out his work.

j) Environmental limit value (ELV): reference limit values for concentrations of chemical agents in a worker's breathing zone.

k) Environmental limit value for short-term exposures (VLA-EC): limit value for short-term exposure (SEL).

3. TOXIC GAS IN THE ATMOSPHERE OF SUBTERRANEAN ACTIVITIES.

3.1 Environmental limit values (ELVs).

The limit values for daily exposure (VLA-ED) and the limit values for short-term exposure (VLA-EC) of the toxic gases listed above are given in Table 1. These values constitute a reference value and represent conditions under which it is considered, based on current knowledge, that most workers can be exposed on a daily basis, throughout their working life, without suffering adverse effects on their health. They are not intended to be used for any other purpose or, in particular, as levels to alert to the risk of fire.

Table 1. Environmental limit values

	VLA-ED (ppm)	VLA-EC (ppm)
C	20	100
CO_2	5.000	12.500
SO_2	0,5	1
SH_2	5	10
NO	2	10
NO_2	0,5	1

In addition, the proportion of oxygen will not be less than 19% by volume, in any position and workplace.

The above values will be modified, where necessary, by the relevant corrections (pressure and temperature).

3.2 Obligations of the employer.

The employer must assess the risks to the health and safety of workers caused by possible exposure to the toxic gases mentioned in this TCI, in accordance with the provisions of Article 3 of Royal Decree 374/2001 of 6 April, and specifically must take into account:

a) The organization of work in underground activities, which will be decisive to predict the maximum accumulations of toxic gases due, among others, to the use of explosives, accumulation of machinery driven by internal combustion engine, phenomena of self-combustion, oxidations or detachments of gases. In addition, the layout of the galleries should be considered.

b) Ventilation and its ability to dilute gases and ensure a clean atmosphere.

c) The company's existing historical data on environmental concentrations, provided that they have been measured using technically appropriate and comparable equipment and measurement criteria as set out in this JTI.

d) The measurements to be carried out, following the criteria indicated in this JTI.

e) The conclusions of the results of the health surveillance that have been carried out.

The emission of toxic gases shall always comply with the limit values previously established, in accordance with the requirements of this JTI.

The employer shall set out in the safety and health document the measures put in place to ensure the control of the atmosphere at workstations, including at least:

a) The initial assessment (both initial and revisions) of workplace hazards due to exposure to the toxic gases covered by this JTI.

b) Frequency and methodology of measurement of the environmental concentration of gases in the workstations, as well as of the oxygen concentration in them, leaving a documentary record of the results obtained in the measurement register (see Annex I).

c) Exhaust gas measurement procedure and related maintenance system.

d) The methodology of measurement (and guarantee of proper functioning) of the ventilation, being able to refer to the existing measurement system of capacity, or, where appropriate, of the dilution of gases when there is no forced ventilation.

e) Likewise, the objective criteria that condition the frequency or methodology of measurement, regarding the temporal evolution of the dilution of gases after a blast, when there are variations in the use of machinery with smoke emissions, etc. An internal safety provision will set these conditions.

f) Mixed compositions of toxic gases and, if necessary, other chemical agents should be considered.

The employer will carry out the actions detailed below, depending on the different types of measurements (initial, periodic and control) established in section 3.3.

a) When the initial risk assessment and the corresponding initial measurements exceed the VLA-EC or VLA-ED, the provisions of the document on safety and health in terms of task relocation shall apply to workers. A detailed study of the origin of the problem will be carried out, preventing access to the workplace as long as it is not solved and taking preventive measures to prevent its recurrence. The risk assessment shall be repeated when working conditions are changed and in any case every 3 years.

b) Where the initial risk assessment presents acceptable results, periodic measurements shall be carried out in accordance with the periodicity indicated in paragraph 3.3. In these measurements, when the VLA-ED is exceeded, the origin of the problem must be studied, making the necessary complementary measurements, and analyzing the causes that motivated this exceedance, establishing a specific plan that solves the situation produced and prevents its reproduction. The same action will be taken when it is found that the VLA-EC has been exceeded, although in this case the worker will be removed from the contaminated atmosphere until the situation has normalized.

c) Control measurements shall be planned in order to avoid exceeding the VLA-EC. The entrepreneur, taking the provisions of Table 2, will define the methodology and frequency of the measurements, duly motivating it in the safety and health document.

Depending on the concentration (c) obtained in the control measurement, the employer will carry out the following actions:

1. If ≥ VLA-EC the task will be halted, the affected workers will be withdrawn to the areas foreseen in the document on safety and health.

2. If c is equal to the action threshold (AU), as defined in section 2.4, the safety and health

document shall set out the actions to be taken.

3.3 Measurement of concentrations.

Measurements shall not replace the obligation to achieve, by technical or organisational means, the minimum risk to workers' health.

Measurements shall be carried out using a methodology reflected in the safety and health document, including an appropriate measurement strategy and method, in order to comply with the requirements of this JTI.

The employer must make the following measurements:

a) Initial measurement (for initial risk assessment)

b) Periodic measurements.

c) Control measurement, in order to avoid exceeding the VLA-EC.

The action threshold (AU) used as the action threshold value for the measured concentration is defined by the expression:

$$UA = N \times VLA\text{-}EC$$

where,

N = takes the value 0,7 in continuous measurement system and the value 0,5 in discontinuous measurement.

The personnel carrying out these measurements must have specific, theoretical and practical training for this purpose, and an adequate level of qualification in accordance with the provisions of Chapter VI of Royal Decree 39/1997 of 17 January 1997 approving the Regulations on Prevention Services.

3.3.1 Initial and periodic measurement.

These measurements will be carried out from an industrial hygiene perspective, with which the worker's exposure must be measured by means of a properly located sampler (in practice, which allows the concentrations in the breathing area to be captured). The criterion of environmental measurement in the worker's environment, as a substitute for the previous one, must be adequately justified and reflected in the measurement methodology and therefore in the document on safety and health.

The measurements must make it possible to make a decision on the risk to which the workers are subject, in accordance with the established VLA-ED and VLA-EC. For this purpose, in each job at risk, it will be necessary to:

a) Determine the concentration of daily exposure (ED). That is, the concentration to toxic gas during the entire working day, referred to eight hours.

$$ED = \frac{\sum_{i=1}^{n} \left(c_i \cdot t_i \right)}{8}$$

where,

c_i = concentration of the toxic obtained in each homogeneous and representative period i (being 0 for periods without exposure).

t_i = duration of each period i ($\sum t_i$= 8h; for different periods of work, the extrapolated value at eight hours shall be obtained).

b) Obtain the exposure rate of the substance (I), as a result of the quotient:

$$I = \frac{ED}{VLA - ED}$$

c) Make a decision, establishing the decision criteria in accordance with Table 2.

Table 2. Measurements to be made based on the Exposure Index (I) obtained

I obtained (initial measurement)	Control measurement	Periodic measurement
I ≤ 0,1 at least three different days.	It's not necessary.	Six months.
I ≤ 0.25, at least three different days.	Monthly.	Six months.
I < 1, at least three different days, and the arithmetic mean ≤ 0.5.	Weekly.	Six months.
I < 1, at least three different days, and the arithmetic mean > 0.5.	Daily.	Six months.
	A study and implementation of specific prevention measures according to the origin of the gas will be carried out.	
I ≥ 1.	Unacceptable exposure. The situation must be rectified.	

If any concentration suggests that the VLA-EC can be reached, a detailed study of the origin of the problem will be carried out, preventing access to the workplace as long as it is not solved.

Likewise, if the set of initial measurements (usually three) cannot be considered representative for any day, the precise measurements will be carried out until this representativeness is reached.

In any case, the risk assessment will be reviewed when the operating conditions in a workplace are modified or when the circumstances referred to in Article 6 of Royal Decree 39/1997, of 17 January, approving the Regulation of Prevention Services, and in any case, every 3 years.

3.3.2 Control measurements.

In addition to those whose periodicity is set out in Table 2, the necessary control measurements will be carried out to avoid exceeding the EC-LAVs.

The frequency of measurements shall be established, in a reasoned manner in the safety and health document, taking into account the actual risk of the activity (which in turn shall be established taking into account existing prevention measures and their guarantee of operation).

The control measurements shall be carried out for a period of 15 minutes, in the most unfavourable situation(s) of the working day. Control measurements will also be considered those carried out during periodic measurements, in the most unfavorable situation or situations of the working day.

Irrespective of the scheduled control measurements, the optional management, prevention services staff and safety mining delegates may carry out control measurements of a workstation at any time

they deem appropriate. These measurements will be integrated into the measurement register, recording the reasons why the decision to make the measurement was made.

3.3.3 Measurement methodology.

The strategy and methodology of the initial measurements (or reassessment) may be carried out:

a) In accordance with Annex II of this JTI.

b) Exceptionally, based on a strategy and methodology designed specifically for the activity, which must be approved by the Mining Authority, after hearing the National Institute of Silicosis.

This strategy shall take into account the various factors involved in the generation of harmful atmospheres: explosive firing cycles, use and maintenance of machinery, gas dilution and ventilation. Measurement criteria must be established that, taking into account these factors, guarantee that it is carried out in the most unfavourable scenario, understanding that the rest of the working day the atmosphere is less polluted.

3.3.4 Reduction of the number of measurements.

When the statistical evidence of results, supported by the relevant information on the preventive criteria established in the company, allows to guarantee that the exposure rate is in one of the first two cases of Table 2, the periodic measurement can be carried out biennially, and the control measurement quarterly.

When the company has historical data that make it possible to conclude, unequivocally, that the job is in one of the first two cases of Table 2, the initial risk assessment may be carried out by incorporating the criterion for reducing the number of measurements previously foreseen, starting with a control measurement. Both reductions must be approved by the Mining Authority, after hearing the National Institute of Silicosis, and will cease to be in force when any measurement exceeds the VLA-EC or VLA-ED.

3.3.5 Measuring equipment.

Measuring equipment shall be accredited for conformity in accordance with the procedures set out in ITC SM-COM-04. Likewise, the corresponding checks, controls, calibrations and periodic checks will be carried out, in accordance with the provisions of the aforementioned JTI.

It is recommended to carry out the measurements with equipment that allows point or continuous sampling and data storage. In the case of exhaust gases, appropriate specific equipment shall be used.

Personnel taking samples must be properly trained in their handling.

For those holdings where there is a risk of explosive atmospheres forming, the measuring equipment shall comply with the regulatory safety requirements.

4. DIESEL ENGINE EMISSIONS.

Work involving exposure to diesel engine emissions is considered a carcinogenic agent, with an environmental limit value of 0.05 mg/m3 measured as elemental carbon in the respirable fraction. See Annex III to Royal Decree 665/1997 of 12 May 1997, as amended by Royal Decree 427/2021 of 15 June 2021.

The daily exposure shall not exceed that limit value. In any case, the employer shall ensure that the level of exposure of workers is reduced to as low a value as technically possible.

Whenever work is carried out that is likely to create a risk to the safety or health of workers due to exposure to diesel engine emissions, or workers may be exposed to them, the employer shall apply all the measures provided for in Article 5 and 6 of Royal Decree 665/1997 of 12 May 1997.

In addition, the actions to control fumes and exhaust gases must include at least the following actions:

a) Equipment purchased and put into service must meet the requirements of the directives controlling the emission of gaseous and particulate pollutants, or of any legal provision that, in this sense, is applicable.

b) Where the chemical agent or agents are produced by work equipment, the risk assessment shall under no circumstances consider acceptable the operation of equipment the emissions of which do not comply with the provisions in force or, failing that, those laid down by the manufacturer for proper operation.

c) The proper maintenance of the engines must be ensured, in accordance with the manufacturer's instructions, in such a way as to minimise the content of toxic gases and particulate matter in the exhaust.

d) The maintenance guidelines, in terms of exhaust emission control, as well as compliance with them, will be properly documented and will be part of the company's safety and health document.

e) Special attention will be paid to the technical progress of the control of diesel exhaust pollutants, in order to apply the preventive criteria derived from them.

f) The following preventive actions will be carried out:

    1. In the maintenance of the equipment, special care must be taken to use and renew the elements designed to minimise the emission of pollutants.

    2. The machinery user shall be specifically trained in order to minimise their exposure to exhaust gases and fumes.

    3. Wherever possible, working machinery should be equipped with pressurized air and HEPA (High Efficiency Air Filters) filters, properly maintained.

5. TEMPERATURE CONTROL IN SUBTERRANEAN ACTIVITIES.

5.1 General.

The ventilation current established in underground activities, in addition to reducing the presence of dust and gases in suspension by drag and dilution, must be able to supply breathable air and prevent the rise of the temperature of the work.

The equivalent temperature shall be calculated using the abacus listed in Annex III for all underground mining operations with the exception of salt farms, which shall be calculated using the following formula:

$$t_e = 0.9\, t_h + 0.1\, t_s$$

where:

t_e= equivalent temperature in ºC.

t_h= wet temperature in ºC.

t_s= dry temperature in ºC.

All measures taken for the control of the equivalent temperature shall be included in the safety and health document.

5.2 Maximum equivalent temperature limit.

The temperature at work shall not exceed 33 ºC of equivalent temperature in any place where staff regularly work.

Where the equivalent temperature is greater than or equal to 30 ºC, the provisions of paragraph 5.3. shall apply. In special cases it may be worked at an equivalent temperature above 33 ºC in accordance with paragraph 5.4.

5.3 Work on work with an equivalent temperature of 30 ºC or more.

In workplaces with an equivalent temperature equal to or greater than 30 ºC, the risk of thermal stress shall be evaluated, with the application of UNE-EN ISO 7933 «*Ergonomics of the thermal environment. Analytical determination and interpretation of thermal stress by calculating the estimated thermal overload*».

In order to take the necessary measures to minimize the risk, the following actions will be carried out:

a) Temperatures will be taken daily, noting them in a record book. In addition, the air temperature at the general inlet and outlet shall be measured. These risk assessments shall be carried out under the most unfavourable conditions to which workers may be exposed, such as due to the presence of machinery and the type of workplace. Preferably, evaluation methods will be used to better understand the sources of thermal stress and assess the benefits of the proposed actions.

b) To obtain these measurements, manual or automatic temperature control may be implemented; the relevant checks, checks, calibrations and periodic checks of the control equipment shall be carried out in accordance with paragraph 6 of JTI SM-COM-04.

c) An internal safety provision shall regulate the conditions under which work is to be carried out on these tasks with an equivalent temperature between 30 and 33 ºC. This provision shall specifically concern the duration of uninterrupted working time, the duration and frequency of breaks, the temperature zone in which these breaks are to be carried out, etc.

5.4 Work in work with an equivalent temperature exceeding 33 ºC.

In special cases it may be worked at an equivalent temperature above 33 ºC. The criteria and procedures for action in this case will be agreed with the workers' representation and supervised and approved by the competent Mining Authority, and the following conditions must also be met:

a) The technical impossibility of lowering the temperature to lower values should be justified.

b) These will be specific work of a fixed duration.

c) The necessary measures and controls should be taken, as set out in section 5.3. In particular, and in agreement with the medical services of the undertaking, the duration of uninterrupted working time, the duration and frequency of breaks, the temperature zone in which these breaks are to be carried out and any other measures deemed necessary to ensure the safety and health of workers shall be fixed.

d) Workers must be subject to prior medical check-up.

e) Prior to the completion of the work, express authorization will be required from the Mining Authority, which may establish any prescription it deems necessary.

f) The start and end of the work must be communicated to the Mining Authority.

It can also be worked at equivalent temperatures above 33 ° C in emergency work, which will be carried out with due precautions and under the constant control of technical personnel.

6. HEALTH SURVEILLANCE.

In accordance with the provisions of Article 8 of Royal Decree 665/1997 of 12 May 1997 and Article 6 of Royal Decree 374/2001 of 6 April 2001, the employer shall ensure adequate and specific surveillance of the health of workers, carried out by competent health personnel, as determined by the health authorities in the guidelines and protocols drawn up, in accordance with Article 22 of Law 31/1995 of 8 November 1995 on the prevention of occupational risks, point 37.3 of Royal Decree 39/1997 of 17 January 1997 and Royal Decree 843/2011 of 17 June 2011 establishing the basic criteria on the organisation of resources to develop the health activity of prevention services, and shall carry out the review of the assessment and of the collective and individual prevention and protection measures adopted, in accordance with Article 8.4 of Royal Decree 665/1997 of 12 May 1997.

The exposure values to which workers are subject shall be recorded periodically in individual fiches for each worker in order to know the cumulative risk to which they have been exposed. These sheets will be attached to your medical file.

In addition, in the case of high temperatures, the workers involved must have been judged fit by means of a medical examination referring especially to the heart and circulatory system. Such recognition shall be repeated at least annually.

7. TRAINING AND INFORMATION TO WORKERS.

In accordance with Articles 18 and 19 of the Law on the Prevention of Occupational Risks, the employer must ensure that workers and workers' representatives receive adequate training and information on the risks arising from the presence of hazardous chemical agents in the workplace and in particular, without prejudice to the provisions of Royal Decree 374/2001 of 6 April 2001 and Royal Decree 665/1997 of 12 May 1997 on:

a) The nature of such risks and related health surveillance aspects.

b) Exposure limit values.

c) Measures taken pursuant to this JTI.

d) The results of the evaluations and measurements carried out.

e) The correct use and maintenance of personal protective equipment, and technical prevention elements.

f) The correct use and maintenance of machinery.

ANNEX I: MINIMUM CONTENT OF THE TOXIC GAS MEASUREMENT REGISTER

The measurement and result record obtained, which shall be part of the safety and health document, shall contain at least the following information:

a) Measured toxic gas (or oxygen).

b) Equipment used.

c) Reason for measurement and, if necessary, integration into measurement scheduling.

d) Location, date, time of start and end of sampling and result obtained.

e) Name of the sampler performing the measurement.

ANNEX II: METHOD FOR EVALUATION OF TOXIC GAS EXPOSURE

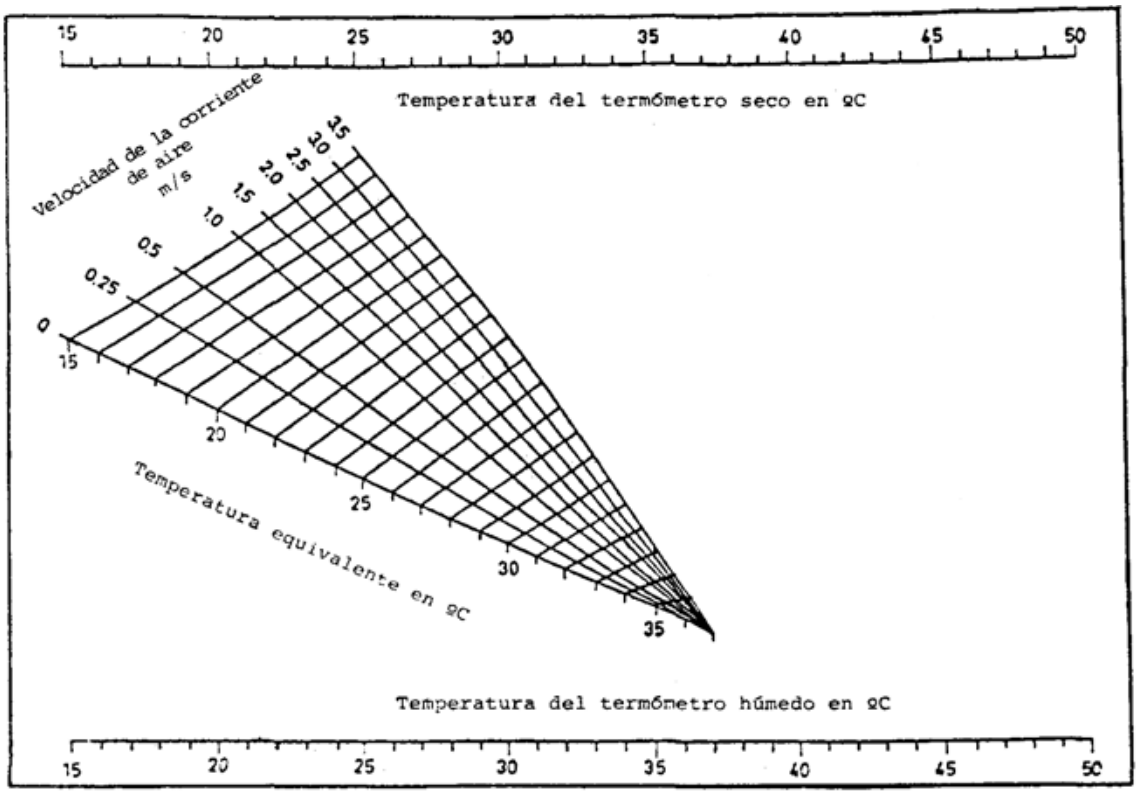
This procedure is intended to determine the exposure of workers to toxic gases, throughout the working day, in order to compare it with the VLA-ED and obtain a decision criterion on the existence or non-existence of acceptable risk in the exposure to toxic gases, as well as to establish the periodicity of control measurements, in accordance with the provisions of this JTI.

It will begin by defining the days and periods of the day (representative of the different significant exposures) in which the measurements will be carried out. For this, criteria such as those recommended in Standard UNE-EN 689 may be followed other criteria based on objective knowledge of the particular circumstances of underground activity, with regard to the generation of toxic gases, which guarantee an adequate degree of protection of the health of workers.

Due to the variability of the concentration of pollutants throughout the working day, the duration of sampling should be as close as possible to the totality of the sample although, in any case, it is recommended that it exceeds 80%. Depending on the measurement method selected (direct reading equipment, aerosol sampling filters, adsorbent tubes, etc.), as many samples as necessary will be taken to cover this duration.

Based on the above measurements, the daily exposure (DA) shall be calculated for a reference period of eight hours as indicated in paragraph 3.3.1.

ANNEX III: ABACO FOR THE DETERMINATION OF EQUIVALENT TEMPERATURE



ITC SM-IND-10 SERVICE, MAINTENANCE, REPAIR AND INSPECTION OF WORK EQUIPMENT

1. OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims at the development of Article 20.1 of the Mining Safety Regulation, in relation to work equipment used in extractive activities.

This ITC is applicable to work equipment that is new, used, rented, or belonging to subcontracted companies, and that is also:

a) Assessed or placed in conformity with the safety and health requirements provided for in the regulations transposing the rules of European Community law in the field of industrial safety and which provide for the CE marking.

b) Certificates and approved in accordance with the provisions of Article 9 of the Mining Safety Regulation and the ITC SM-COM-04.

c) Assessed or placed in accordance with Article 3.1.b) and with the provisions of Annex I of Royal Decree 1215/1997, of 18 July, establishing the minimum safety and health requirements for the use of work equipment by workers.

This TCI does not apply to vehicles approved and registered for use on the State road network used for the exclusive carriage of persons or goods by road.

2. PLACEMENT OF WORKING EQUIPMENT

2.1 General requirements

In order to make work equipment available to workers, and before putting it into service, the employer must ensure that it acquires and uses only equipment that satisfies all the requirements and legal provisions applicable to it and, in particular, the minimum safety and health requirements for the use of work equipment used by workers at work set out in Royal Decree 1215/1997 of 18 July 1997.

For this, it is necessary to have the technical documentation that allows a correct and safe installation, use and maintenance, at least in Spanish.

2.2 Procedure for equipment when first made available to workers

In the case of new equipment or equipment assessed as new, the employer must have at his disposal the following documents:

a) The name or identification mark and address of the supplier or representative.

b) The name and identification of the work team.

c) The EC declaration of conformity in Spanish (and its original version if applicable), the national declaration of conformity, or the approval decision in accordance with the procedures defined in ITC SM-COM-04.

d) Documents to prove that the provisions of Royal Decree 1215/1997 of 18 July 1997 have been complied with.

2.3 Special procedures for equipment previously made available to workers

For the purposes of this JTI, work equipment that has previously been made available to workers (used equipment) includes the following:

1) Used equipment whose date of first placing on the market was after the entry into force of the European directives on placing on the market in the field of industrial safety and, therefore, subject to the CE marking.

2) Used equipment subject to usage requirements set out in ITC SM-COM-04 of the Mining Safety Regulations.

3) Used equipment whose date of first placing on the market was before the entry into force of the European directives on placing on the market in the field of industrial safety and, therefore, not subject to the CE marking.

2.3.1 Equipment that is in conformity with existing requirements for placing on the market

In addition to the documents referred to in paragraph 2.2 above, where the declaration of conformity or the approval decision in paragraph c) are those required at the time of first placing on the market, the employer must have at his disposal the following documents for making available to workers the work equipment referred to in paragraphs 2.3 (1) and (2):

Evidence of the availability of the history of repair and maintenance interventions; and

Supplier's statement ensuring that:

the equipment has been maintained at least under the conditions laid down by the original manufacturer; and

that no changes or reforms have been made to it.

In the event that these two documents are not available, the employer shall submit the equipment to a detailed inspection by one of the entities listed in section 3.3 of this JTI or, in the case of mobile mining machinery, by a mining control body (hereinafter referred to as CMO) for technical inspection in accordance with the provisions of section 5 of this JTI, issuing, together with the inspection report, a declaration ensuring that the equipment has been maintained at least under the conditions established by the manufacturer, and that no alterations or modifications have been made to it.

2.3.2 Equipment not in conformity with existing requirements for placing on the market

They may only be made available to workers if they meet the following requirements:

its first placing on the market took place in a Member State of the European Economic Area before the end of the transitional period for the Directives applicable to it;

When first placed on the market, the equipment complied with the national marketing requirements of the Member State of the European Union; and

It has not been subject to compulsory withdrawal from service by the competent authority of the Member State of the European Union from which it originates.

In order to make these work equipment available to workers, in addition to the documents referred to in section 2.3.1 above, with the exception of those provided for in section 2.2.c), the employer must have the following:

i) Documents setting out the intrinsic limitations of use that condition their subsequent making available to workers (e.g. protection provided by the cab, IP of electrical equipment, safety of internal combustion engines, conformity category for equipment for explosive atmospheres, etc.).

ii) Proof of compliance with the circumstances set out in subparagraphs (a), (b) and (c) above.

3. MAINTENANCE AND REPAIR OF EQUIPMENT IN SERVICE

3.1 General requirements

Maintenance and/or repair operations must be duly documented and may only be carried out by qualified personnel.

3.2 Maintenance requirements for in-service equipment

The employer shall take the necessary measures to ensure that all equipment is properly maintained so that it is kept for the entire duration of use under conditions which satisfy all safety and use requirements.

This maintenance may be carried out by own means provided that the manufacturer's instructions and the conditions of use are followed, and taking into account any other normal or exceptional circumstances that may influence its deterioration or mismatch.

The technical documentation for the correct execution of maintenance is that which accompanies the supply of the material, whether it is equipment placed on the market following the national certification or approval rules, or equipment placed on the market following the rules established in the European Directives that are applicable to CE marked work equipment, or its components.

The application of new safety features on in-service equipment is considered an improvement and will therefore be documented as a maintenance operation.

Where the operator does not have the instruction manual, he shall take steps to ask the manufacturer of the equipment or his distributor or authorised technical service for a copy of it, at least in Spanish. In the absence of the manufacturer's indications, the employer may adopt a maintenance plan specifically drawn up by an entity as defined in paragraph 4 of this JTI, which shall assume responsibility as a manufacturer.

3.3 Repair of equipment security elements

The repair of items which fulfil a safety function and which the manufacturer has incorporated into a work equipment without informing the user of its repair procedure may be carried out only:

by the manufacturer's own repair services, or by authorised technical services under the control and responsibility of the original manufacturer,

b) By a workshop authorized for the repair of the security elements, as detailed in section 4 of this ITC.

These are repairs of security elements, among others, the following:

a) Repair by mechanization of anti-flaming joints.

b) Closing by welding a crack in an anti-flagrant enclosure.

c) Rewinding of electric motors.

d) Total or partial change of elements of hydraulic/tyre steering systems or braking of mobile equipment, by others not indicated by the manufacturer.

Repair of roll-over and fall protection structures.

f) Repair of safety obstacles of electrical, hydraulic and pneumatic systems.

Repair of structural elements.

3.4 Equipment refurbishment or modification

It is the intervention on a work equipment whose result is the modification of the expected conditions of use defined by the manufacturer.

Reform interventions include, but are not limited to, the following:

a) Miner to which the cutting head or the anchoring system is modified to work in galleries of greater section or slope.

b) Self-displacement support to which the hydraulic control and control components are changed for remote actions.

c) Change of winding type of an electric motor.

d) Change of the pressure relief valve from one support element to another with different hydraulic characteristics.

e) Machining of the coupling of a cable inlet in an anti-flare envelope.

Modification of the internal components of a pit box.

Change of the tensioning system of a conveyor belt.

The reform of any work team will be considered as a newly designed team.

The provisions of the previous paragraph apply even when the reform is carried out by the user of the equipment.

4. ENABLED SAFETY ELEMENT REPAIR WORKSHOPS

4.1 General

The repair shops of safety elements referred to in section 3.3.b) of this ITC must submit, prior to the start of the activity, to the Mining Authority, ~~a~~ responsible declaration in which the owner of the workshop or his legal representative states that they meet the requirements required by this ITC, that they have the documentation that accredits it and that they undertake to maintain them during the duration of the activity. The responsible declaration may be submitted using the minimum content set out in Annex I to this JTI.

The presentation of the declaration enables the repair shop to carry out the activity from the moment of its presentation, throughout the national territory and during the period of three years, and may be carried out by electronic means.

The Mining Authority will communicate to the Directorate General of Energy Policy and Mines, the responsible declarations received, in order to maintain a general register of authorized repairers.

4.2 Requirements for repair shops for safety features

Repair shops shall:

a) Have subscribed an insurance policy that covers the risks of its liability for a minimum amount of 350,000 euros, without the amount of the policy limiting such liability. That amount shall be updated annually on the basis of the consumer price index.

Implement a management system, which may be carried out by electronic means, that ensures the issuance and archiving for five years of all repair records, including at least the following:

i) Diagnostics (inspection at reception) and definition of the scope of the necessary repair.

Identification of the repairs carried out and their nature.

The list of spare parts used.

Records of final checks and tests.

Copy of repair certificates

The marking plates issued.

c) Have the documents such as certificates of conformity, control, approval or approval decisions, the declaration of conformity, and/or the EC type-examination certificate. It is also recommended that you have the descriptive documents linked to the official document (prospect, diagrams, official plans, technical characteristics, operation, adjustments, etc.). Otherwise, the necessary technical and human resources must be available to replicate the applicable basic requirements and to assess compliance with the reference standards in force. The history of the repairs must be consulted with the user.

d) Have descriptive documentation specifying at least the following:

The scope of repair activities.

Its resources and work and testing equipment.

Training of staff.

Occupational safety and technical operating standards, applicable to repairs of each material; and

The availability of the original documentation (repair books, certificates, test reports, etc.) of the same, which may be carried out by electronic means.

e) Have a Quality System based on the following general principles contained in the series of European standards for quality management and quality assurance:

i) Availability of a Quality Manual and / or written procedures or similar documents, which clearly reflect the means arbitrated for compliance with all aspects developed in the following points.

Clear definition of responsibilities, authority and channels of communication for all personnel who direct, perform or verify tasks that have an impact on quality control.

Establishment of a clear system of control, approval and review, or modification, of all documents having an impact on quality control (in particular Quality Manual and/or similar procedures or documents; records and records of test results, verifications and measurements, and calibration of equipment). In addition, the minimum archiving period for those documents shall be defined.

Establishing the necessary procedures for the identification and traceability of repaired products, including in the intermediate stages of repair.

v) Concise definition of the controls and tests to be carried out on the repaired security elements, as well as the criteria to be applied.

An inventory of all available measuring and testing equipment shall be kept up to date, indicating, when applicable, the dates of the last and next calibration and whether it is internal or external. This inventory shall be managed by electronic means. If it is internal, the procedure followed will be indicated.

Appropriate documentary means must be arbitrated to ensure that controls (inspections and/or tests) are carried out with calibrated instruments and with the necessary uncertainty.

A procedure shall be clearly established to ensure knowledge of the state of repair of the security element.

Procedures should be established on the treatment of non-conformities in relation to the repair carried out, taking into account the causes of the non-conformities and their possible corrections.

A periodic system of internal controls shall be established for the observance of all aspects included in the Quality Manual and/or Procedures.
The results of the control will be documented and archived together with the corrective actions taken and their subsequent solution. This documentation and archive must be managed by electronic means.
(xi) In the case of subcontracting tests, the repair shop must ensure that the subcontractor complies with the applicable aspects of this JTI, maintaining the corresponding documentary record as its own.

All records relating to the quality control of repaired safety features shall be kept for a period of at least five years and shall be available to the approved official laboratory. This register shall be managed by electronic means.

(xii) Where appropriate, the need for training and coaching of personnel performing specific tasks shall be documented, keeping records of the records attesting to the necessary training.

d) In the case of subcontracting work, these must be clearly specified. In any case, the authorized workshop must always carry out all the controls and tests and prepare the repair file, always retaining the responsibility of the repaired equipment.

4.4 Marking of repaired equipment

The relevant information of the repair carried out on the safety features shall be indicated on the repaired equipment, either by means of a glued, riveted or welded repair plate, or in the form of a high-strength self-adhesive label.

The marking must be legible and indelible and must include at least:

a) the identification of the repair shop.

the date of repair or overhaul; and

c) the repair reference (intervention code, file, work order, etc.).

Repaired equipment shall maintain the manufacturer's original marking and the marking of the last repair performed.

4.5 Repair certificates

The workshop shall issue with each repaired unit a repair certificate containing at least the following information:

Certificate number (encoded chronologically, e.g.: intervention order/year).

b) Name of the repair shop.

c) Address of the repairer.

Designation of repaired equipment.

e) Name of the manufacturer.

f) Identification number/series of the unit (original information plate).

Reference of the work file/repair order.

h) Date of receipt of the equipment.

Completion date of the work.

Brief description of the repairs carried out.

Declaration of conformity of repair.

4.6 Freedom to provide services

1. Repair shops for safety features, legally established in any other Member State, wishing to carry out the activity in Spanish territory, under the freedom to provide services, must submit, prior to the start of the activity, a single responsible declaration to the Mining Authority where they start the activity, in which the owner of the company or his legal representative declares that he meets the requirements for the exercise of the activity set out in section 4.2.a) of this ITC, the data identifying that they are legally established in a Member State of the European Union to exercise that activity and declaration of the absence of any prohibition, at the time of the declaration, that prevents him from exercising the activity in the Member State of origin.

2. For this purpose, where the repairer of safety features is already covered by professional indemnity insurance or another guarantee equivalent or essentially comparable in terms of its purpose and the coverage it offers in terms of insured risk, insured sum or guarantee limit in another Member State where it is already established, the requirement set out in point 4.2(a) shall be deemed to be fulfilled. If the equivalence with the requirements is only partial, the extension of the insurance or other guarantee may be required until the required conditions are fulfilled.

3. The presentation of this responsible declaration enables the exercise of the activity throughout the national territory, and must be carried out by electronic means.

5. TECHNICAL INSPECTION OF MOBILE MINING MACHINERY

5.1 Periodic inspections

Loader blades on wheels, rigid frame dumpers on wheels and articulated frame dumpers on wheels must be subjected to a technical inspection of machinery by a CMO in order to verify the result of the repair and maintenance operations carried out.

The following technical specifications shall be followed for the performance of such inspections:

- ET 10.01 Inspection of wheel loaders
- ET 10.02 Inspection of rigid frame dumpers on wheels
- ET 10.03 Inspection of articulated frame dumpers on wheels

The certificate of conformity issued by the CMO carrying out the inspection shall be kept by the operator at the disposal of the Mining Authority.

This is without prejudice to mandatory inspections of equipment according to its category as a self-propelled vehicle for use on public roads.

5.2 Inspection deadlines

The first technical inspection of the mobile mining machinery referred to in the previous section will be carried out three years after its entry into service. In addition, they will be inspected periodically with the deadlines indicated below:

a) Machines up to six years old: Every three years.

b) Machines more than six and up to ten years old: Every two years.

c) Machines more than 10 years old or not attesting to their age: Every year.

To determine the age of a machine, the date of its first use must be taken, which must be documented and, failing that, the date of manufacture.

Periodic inspections shall verify the concepts contained in the relevant technical specification.

Any machinery complying with the requirements laid down in its technical specification shall affix to an easily visible part of the cab, under the responsibility of the inspecting CMO, a blue adhesive plate, modelled on Annex II, with characters engraved in white, 105 × 75 mm, containing the following information:

ITMM.

b) Reference of the mining control body and number of the inspection certificate.

Serial number (or, where applicable, the frame).

Date of next inspection: (before: XXXX-XX – year and month).

5.3 Result of periodic inspections

The following results shall be established for periodic inspections:

a) Favourable: The machine has no deficiencies or only deficiencies that have no significant impact on the safety and health of workers. The machine can be made available to workers.

Favourable with deficiencies: The machine has only minor deficiencies, but the evolution of which may lead to deficiencies that compromise the safety and / or health of workers. The machine can be made available to workers, although these deficiencies must be remedied before the usual deadline for the next inspection is met.

c) Disadvantaged with deficiencies: The machine has deficiencies that compromise the safety and / or health of workers. The machine cannot be made available to the workers until the deficiencies are remedied through the corresponding maintenance and / or repair interventions, in accordance with the provisions of sections 3.1 and 3.2 of this JTI. A re-inspection with a favourable or favourable result with deficiencies shall be required for re-entry into service.

Negative: The machine has deficiencies that affect the main systems or safety elements. The machine cannot be made available to the workers until the deficiencies have been remedied by means of the corresponding repair, in accordance with the provisions of section 3.3 of this JTI. A re-inspection with a favourable or favourable result with deficiencies shall be required for re-entry into service.

5.4 Record of periodic inspections

The employer must have a register of the machinery in service included in the documents specified in paragraph 2 of this I.

ANNEX I

Minimum content of the responsible statement concerning compliance with the requirements laid down for repairers of safety features

1) Applicant details:

a) Name and surname

b) DNI or NIF

c) Company you represent

d) Address, postcode, town, province and country

e) Telephone and e-mail

f) Data for notification purposes (Domicile, telephone, e-mail, address, postal code, population, province and country)

2) Declaration specifically including:

a) Compliance and commitment to maintain all the requirements established in section 4 of the ITC SM-IND-10 during the duration of the activity.

b) Documentation that proves it.

3) Place, date and authorized electronic signature.

ANNEX II

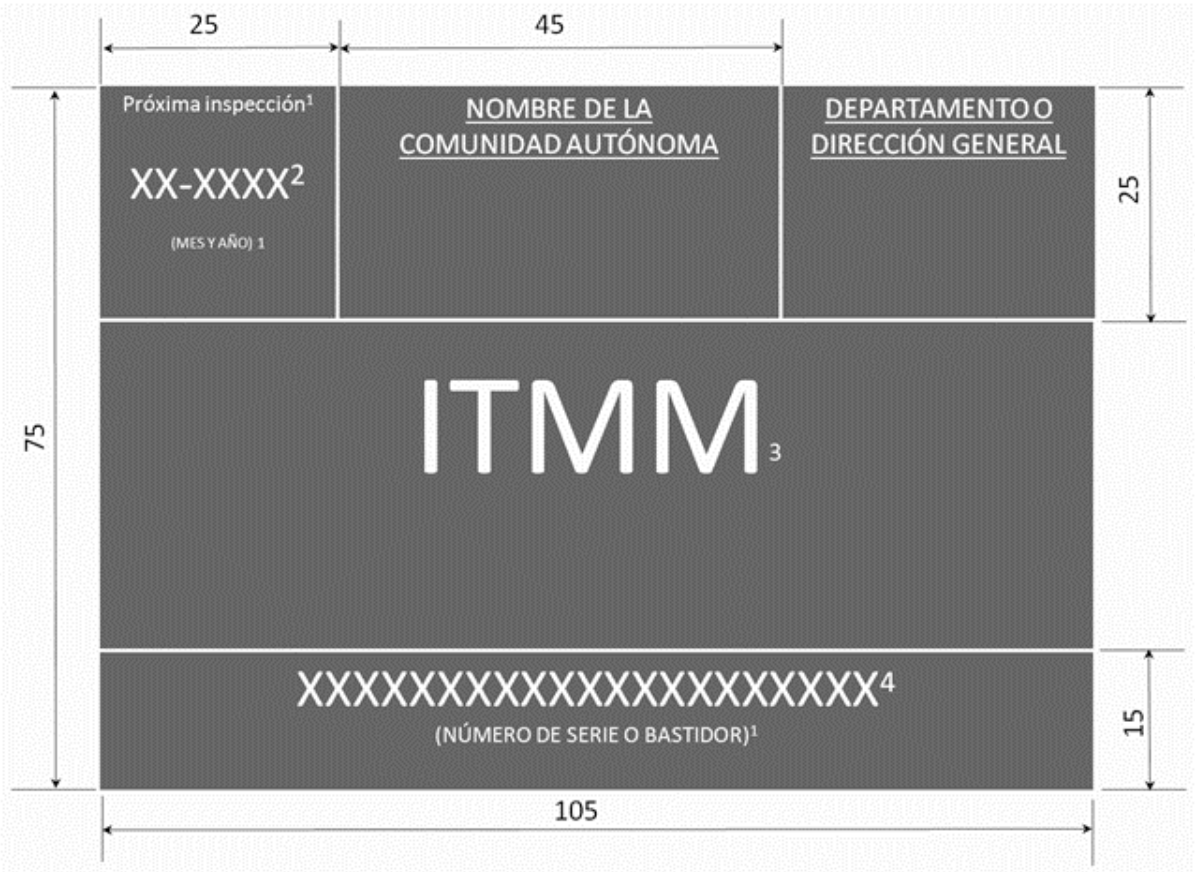
Adhesive plate model

1. Dimensions of the plate: 105 x 75 mm

2. Letter size:

Call		Height (mm)
1	.....	2
2	.....	4
3	.....	10
4	.....	

3. Board Configuration:



ET 10.01 INSPECTION OF LOADERS ON WHEELS

1. OBJECT AND FIELD OF APPLICATION

This Technical Specification ('TS') aims to establish the procedure for periodic inspections of wheel loaders.

Wheel loaders expressly designed for use inside tunnels or galleries are excluded.

Retrochargers and mini-loaders are also excluded.

2. DEFINITIONS

2.1 Accessory: Detachable device (working tool) fixed directly to the machine or by means of a quick coupling device to perform the main function of the machine or for other specific use.

2.2 Loader on wheels: Self-propelled machine on wheels, with front-mounted work equipment whose main function [1] is loading operations (use of spoon), with which it loads or excavates by moving the machine forward.

2.3 Nominal load: Maximum permissible load specified by the manufacturer.

2.4 Conservation: Set of operations that the manufacturer, user or others must perform to protect the machines against the corrosive action of the environment and against minor damage that may occur during handling, transport and storage.

2.5 Quick coupling device: Device that facilitates a quick change of accessories.

2.6 Steering control element: Manual control medium by which the operator transmits muscle strength to the steering system in order to steer the machine. It comprises the typical steering wheel or any other means of manual control.

2.7 Element or system in good, safe or adequate condition: For the purposes of this TS, an element or system of the machine is considered to be in good condition, safe or suitable, provided that it performs the function for which it is designed, in terms of safety.

2.8 Loader Equipments: Set of components mounted on the base machine to fulfill the primary function for which it has been designed.

2.9 Steering effort: Necessary force exerted by the operator on the steering control element to drive the machine.

2.10 Power source for normal direction: Means to provide power for driving in power steering or servo steering systems, e.g. hydraulic pump, air compressor, electric generator.

2.11 Base machine: Loader without equipment as described in the manufacturer's specifications.

3. REQUIREMENTS

The machinery to which this TS refers shall comply with the provisions specified below (for further details, see Annex IV, the points to be inspected in Annex VIII and the reference standards in Annex XIII), and which affect the use, maintenance and maintenance of all components and mechanisms which are directly related to the safety and health of persons. Its classification, for this purpose, shall be carried out in accordance with Standard UNE-ISO 7131.

3.1 Documentation

The manufacturer's instruction manual, written in Spanish or in another official language in the Autonomous Community in which the machine is located, must be in the possession of the user.

3.2 Access

[1] is loading operations (use of spoon), with which it loads or excavates by moving the machine forward. Other functions of the machine are not excluded: wheel loaders with lifting equipment, drilling, hydraulic hammer, etc., are within the scope of this ET.

Access to the operator's station and maintenance areas shall be maintained in accordance with the conditions laid down by the manufacturer. In particular, accesses must:

Prevent anyone accessing these areas from coming into contact with dangerous parts of the machine (hot surfaces, moving parts, etc.).

Maintain a minimum safety space on the access road to the operator's station, the machine being in the position of maximum articulation, and the locking devices of the frame articulation in good condition (refer to Standard UNE 115241), which must be installed on all machines.

Allow three secure support points, for access to the operator's position, and at least two, for access to maintenance points (see UNE-EN ISO 2867).

3.3 Operator's position

The cab shall be maintained under the conditions laid down by the manufacturer. In particular, it shall comply with the following:

Have a minimum enclosure space that ensures the complete operation of the machine in a safe and ergonomic manner (see UNE-EN ISO 6682 on earthmoving machinery). Comfort zones and accessibility to the controls).

Prevent any accidental contact with the wheels and work equipment.

There shall be no sharp edges at the operator's station.

If pressure and/or high temperature tubes and hoses exist, they must be adequately protected.

The emergency exit(s) provided for by the manufacturer shall be operational and, if necessary, marked.

Doors and windows must have anchoring devices.

All glazing must be of safety glass or equivalent strength.

Indoor fixed lighting should make it possible to read the User's Manual when there is no outside light.

It shall be equipped with a heating and ventilation system providing the operator with adequate climatic conditions.

3.4 Operator protection structures

Machines must be equipped with rollover protection structure (ROPS) and falling object protection structure (FOPS), if used in applications where there is a risk of rollover or falling material, respectively. No manipulations (drills, welds, etc.) that have not been authorized by the manufacturer's Technical Services are allowed. These structures must be maintained under the conditions provided for by the manufacturer and must not present any structural deficiencies.

3.5 Seats

The operator's seat and seat belt must be maintained in the conditions prescribed by the manufacturer. In particular, they must:

Keep settings operational.

Keep all its elements in good condition.

Keep the operator in a stable position that allows control of the machine and adequate comfort.

In the case of a seat belt, it must be replaced on the date marked by the manufacturer and after the machine has suffered a serious accident.

If the machine has an additional seat, it must also be in good condition, as well as its seat belt.

If the machine does not equip ROPS, the installation, maintenance and use of seat belts is at the discretion of the machine user.

3.6 Commands and indicators

The controls and indicators must be kept in good condition so as to enable:

Its easy access. Objects that may prevent proper operation should not be placed.

Your I.D. Their identification symbols must be kept legible.

If the signals of the controls are transmitted electrically, the parasitic currents must not, under any circumstances, cause dangerous foreseeable action; To this end, any electrical or electronic equipment installed in the cab must comply with the applicable electromagnetic compatibility (EMC) requirements.

Preserve the sense of the movement made, according to the manufacturer's design.

Be operated without excessive effort, in normal operations.

The separation between pedals, their original dimensions and their surfaces, which will be non-slip, must be correctly preserved. Changes to the original functions of the pedals are not allowed, except in cases where the manufacturer has considered the possibility of programming them by the operator.

The protections in those controls whose involuntary operation may mean a danger, must be kept in good condition.

There must be no dangerous movements of the machine and work equipment (or accessories) after starting, interrupting the power supply or stopping the engine.

All symbols identifying the controls and indicators must consist of pictograms, or be written in Spanish or in another official language of the Autonomous Community in which the machine is located.

3.7 Steering systems

The components of these systems must be kept under the conditions laid down by the manufacturer. In particular, they must comply with the following:

To endure an abnormal effort on the part of the operator in a hypothetical panic situation.

Having characteristics of sensitivity, action and response that allow the operator to constantly keep the machine in the intended path for each of the functions for which the machine has been designed.

The movement of the steering control element to produce a result should not vary excessively between right and left turns.

The warning device (sound or visual) indicating any failure of the power source in the normal direction must be kept in good condition.

They must allow safe manoeuvring with the machine (see UNE-EN ISO 5010 on tests of steering systems).

3.8 Braking systems

Braking systems equipped on the machine must be efficient under all conditions of service, load, speed, terrain and slope foreseeable by the manufacturer and in line with normal working situations (refer *to Standard UNE-EN ISO 3450 on braking tests*).

The capacity of each braking system must be identical on each wheel of at least one axle on which it is applied.

3.8.1. Service brake

The operator must be able to safely decelerate and stop the machine using this system. If energy accumulators are used as the main application force for the service brake, the service brake must be equipped with a warning device (continuous alarm visible and/or audible) that is activated before the value of the accumulated energy falls below the values specified by the manufacturer. In addition, the service brake must maintain its resilience.

3.8.2. Emergency brake

In the event of a service brake failure, this system must allow the operator to safely decelerate and stop the machine.

3.8.3. Parking brake

Once powered, it cannot depend on an exhaustible energy source. The parking brake must maintain its immobilization capacity, even on a slope and with nominal load.

3.9. Visibility

3.9.1. Operator field of view

The operator must at all times have sufficient visibility in relation to the working and driving area of the machine. In particular:

The glazing of the cab and rear-view mirrors must be kept in good condition; the latter must be sufficient in number.

If the machine is equipped with additional devices (ultrasound, television, etc.) these should be kept in good condition.

There must be no added objects in the cabin that prevent proper vision.

Windscreen wipers/washers and the front and rear window anti-fog system should be kept operational.

3.9.2. Lighting, light-signalling and retro-reflective devices

All necessary systems and devices installed by the manufacturer must be kept in good condition. In particular, wheel loaders must equip at least:

All machines:

Rotating headlamp, if required in the Autonomous Community where the machine is located.

Working lights.

Rear retro-reflectors.

Machines with a translation speed exceeding 40 km/h:

Front and rear intermittents.

Rear position lights.

Brake lights.

Reversing lights.

Dipped-beam headlamps.

Machines with a translation speed exceeding 40 km/h and bearing the CE marking:

Emergency lights.

Front-lateral intermittents.

Their function, location, number, grouping, reciprocity, intensity, orientation, colorimetric characteristics and flashing frequency (in the case of flashing lights and rotating headlamps) shall be those laid down in Standard UNE-ISO 12509 on lighting systems.

3.10. Warning and signalling devices

The following devices shall retain their functionality and sound level according to the manufacturer's specifications:

The audible warning device (speaker),

The reverse warning device; and

The start-up audible warning device (if installed by the manufacturer).

3.11. Sound emissions

The machine must be kept in a state of conservation that allows it to comply with the limits that apply to it, both for noise emissions and[1] for the sound level at the operator's station.

3.12. Protective devices

All guards, guards and screens that prevent accidental contact with any hot surface or moving parts by the machine operator or during maintenance operations must be kept in good condition. Any hot surface or movable part accessible to persons must be protected.

3.13. Engagement and transport

The anchorage points and attachment devices of the machine must be kept in good condition.

3.14. Electrical components

The electrical installation of the machine (batteries, cables, pipes, fuses and other overload protection systems, etc.) must be kept in good condition, avoiding mechanical deterioration or environmental conditions.

3.15. Pipes and hoses

All pipe and hose protections with high pressure or high temperature fluids should be kept in good condition.

[1] Noise emission measurement is outside the scope of this ET.

3.16. Pressure vessels, fuel and hydraulic tanks

They shall be maintained under the conditions laid down by the manufacturer. In particular, they shall comply with the following:

Loading nozzles must be easily accessible, fitted with a lid that can be immobilised and located outside the operator's cab.

The means provided to remove the internal pressure shall be operational.

Pressure vessels must keep their information plate legible.

3.17. Fire protection

The fire protection system (fire extinguishers or automatic system) must comply with the required regulations, in relation to its periodic reviews, maintenance and conservation.

3.18. Use with spoon and accessories

Only spoons or accessories covered by the manufacturer of the machinery may be used, or those for which the manufacturer of the machinery has taken into account for their design the following parameters:

The rollover load of the machine.

The nominal operating load.

Nominal capacity.

Hydraulic capacity.

The manufacturer of the spoon or accessories must provide this information to the user, together with the information on assembly and use.

3.19. Quick coupling device

3.19.1. Interlocking

The coupling and restraint system shall be maintained under the conditions laid down by the manufacturer, under all conditions of use. From the operator's position or from where the interlock control is activated, it must be possible to verify the interlock position of the quick coupling.

3.19.2. Instructions

The user must have in his possession the instructions regarding the assembly, interlocking, revision procedure and influence of the nominal load in operation, provided by the manufacturer.

3.20. Tyres and rims

The machine must be equipped with the tyres and rims covered by the manufacturer (of the machine and of the tyres). They must have a state of preservation within the limits specified by the manufacturer, and the same for the same axle.

3.21. Marking

The machine must keep legibly and in a visible place its characteristic plate and the adhesive plate corresponding to the last inspection carried out. The warning signs necessary for the safe operation of the machinery must also be in the same condition.

Both the plates and the warning signs must be in Spanish or in another official language in the Autonomous Community in which the machine is located.

ANNEX I

Verification of requirements and/or security measures

In order to verify compliance with the requirements set out in this TS, one or more of the following possibilities should apply:

Measurement, in those inspection points for which the use of specific instrumentation is needed to obtain the results.

Visual examination, at those inspection points for which it is not necessary to use any instrument or equipment outside the machine itself.

Evaluation of the documentation, related to the documents provided by the manufacturer, and the records, dossiers and accreditations of the machine.

Test, where applicable, if there is a method prescribed for any particular requirement in the standard cited as reference , or in the manufacturer's instruction manual. With exceptions, all tests require some type of measurement.

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or in the manufacturer's instruction manual. With exceptions, all tests require some type of measurement. Taking into account the objectives and scope of this TS, the methods prescribed in the reference standards, such as those relating to braking systems, must be adapted to each machine and to the conditions of the tracks where these tests are carried out, and must ensure that they are as appropriate as possible to the type of

Measurements shall be made at those points for which, in the opinion of the inspector, the visual examination has not clearly determined their condition.

The use of specific instrumentation is mandatory for the testing of certain systems (braking systems and exhaust gas system), to measure cabin noise and full body vibrations transmitted to the operator.

ANNEX II

Inspection phases

The inspection procedure shall consist of several phases or stages, which are classified taking into account the state of operation of the engine and the machinery.

There are basically two ways to perform the tests or trials: statically and dynamically.

Static tests must be carried out when the points to be inspected do not require, for their correct evaluation, any movement of the machine, its elements (except for the moving elements of the engine, such as belts and fans) or its work equipment. In turn, two types of static tests are distinguished:

With the engine stopped, or,

With the engine running.

Dynamic tests must be carried out when the points to be inspected require, for their correct evaluation, specific movements of the machine, its elements or its work equipment. In turn, three types of dynamic tests are distinguished:

With machine elements in motion, but without machine translation movement (examples: checking for slacks in the directional elements or for symmetry in the direction).

test to be carried out. In the above-mentioned case of braking systems, the highest speed allowed by the conditions of the machine and the test track shall always be chosen.

With the work equipment in motion, but without moving the machine, or,

With the machine moving.

Dynamic tests should also be considered as those that, although the movement of the machine, its components or its work equipment is not required or expected, may give rise to involuntary movements of these, due to malfunction of one of the systems (for example, parking brake retention test with the machine stopped on slope).

ANNEX III

Classification of deficiencies

Each of the inspected points, because they have a direct relationship with the safety of the machine, may present a degree of deviation (wear, mismatches, malfunctions, damage, lack of parts, etc.) that distances it from what should be considered its normal situation (in minimum conditions that can guarantee safety). This degree of deviation results in classifying the deficiencies found in these points as follows:

Level 1 deficiency, in which it must be understood that the observed deviation of the element from the minimum safety conditions does not immediately affect it, but that, if its evolution were not controlled, it would lead to a less desirable situation and that it would not guarantee safety.

Level 2 deficiency, in which it must be understood that the observed deviation of the element from the minimum safety conditions can immediately affect it, not making sense in this case to control its evolution, since it should not be allowed.

Level 3 deficiency, in which the observed deviation of the element from the minimum safety conditions must be understood to clearly affect the minimum safety condition.

On the other hand, the deficiencies found in each of the systems and subsystems inspected will be classified according to the risks generated by each of them, from the point of view of safety, assessing together the probability of damage occurring and the severity of it.

Deficiencies in systems and subsystems shall therefore be classified as:

Minor deficiencies: When they do not affect the safety and health of people immediately and, if the damage occurs, it has minimal consequences.

Moderate deficiencies: When they affect the safety and health of persons, but do not pose an imminent or serious risk.

Major deficiencies: When they involve an imminent or serious risk to the safety and health of persons.

ANNEX IV

Assessment of inspection points

This Annex sets out, in general terms, the criteria to be used, and the classification of defects may be changed in exceptional cases, at the discretion of the inspector.

The symbol (X) indicates that the defect at the inspected point can be classified in several ways, depending on its state.

The order of appearance of the different inspection points, as shown in the inspection sheet in Annex VIII, does not necessarily imply a temporary pattern to be followed during the inspection, nor is it necessary to inspect all points belonging to the same system consecutively. It should be up to the inspectors to decide which points to check at each stage of the inspection, depending on the circumstances and their experience.

Where appropriate, the machine hardware shall be checked by visual examination, without the use of tools to check the tightening.

At each stage of the inspection, the points shall be assessed in accordance with one of the methods set out in Annex I. The results of each of these points shall be classified in accordance with the criteria set out in Annex III. To this end, the following must be taken into account in order to comply with the requirements specified in paragraph 3 of this TS:

1. Instruction manual

For the classification of deficiencies, the following aspects shall be taken into account:

Content and conservation status of the instruction manual.

The language in which the documents are written.

The correct identification of the machine.

	Rating[2]		
	DN1	DN2	DN3
a) Content and conservation status:			
Absence of unreadable sheets or paragraphs	X		
Absence of unreadable sheets or paragraphs in the security section		X	
Does not exist			X
Language and identification:			
It is not in Spanish or any of the other official languages		X	
Does not belong to the machine (n° series outside the interval)		X	(X)
User-produced manual that does not take into account important safety aspects		X	(X)

2. Chassis

For the classification of the deficiencies of the constituent elements, the following aspects shall be taken into account:

The existence and size of areas with corrosion, shocks, cracks, remnants of weld cords, areas with lack of material, etc.

Screws of the different worn, loose or non-existent anchors.

The structural importance of the elements concerned.

The proportion of affected area.

The proximity of the affected areas and the deficiencies.

The number and location of missing or deficient screws.

	Rating		
	DN1	DN2	DN3
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones with thickness loss up to 10%	X		
With thickness loss up to 20%		X	
With thickness loss of more than 20%			X

[2] For the whole Annex: DN1 = Level 1 deficiency, DN2 = Level 2 deficiency and DN3 = Level 3 deficiency.

	Rating		
	DN1	DN2	DN3
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)

3. Tyres[3]

For the classification of deficiencies, the following aspects shall be taken into account:

The types of tires mounted on each side and their condition.

The number, location and depth of tacos plucked.

The number, location, length and depth of the cuts on the flanks.

The wear condition of the tread.

The pressures they're working on.

Joint influence of deficiencies in the same bending area, on the tyre and between tyres on the same axle.

Worn, loose or non-existent anchor screws.

The number and location of missing or deficient screws.

3.1. Types of tyres (per axle)

	Rating		
	DN1	DN2	DN3
Different dimensions	X	(X)	
At least one of them has features not allowed by the manufacturer			X
Different condition of each tyre	X	(X)	

[3] Machines equipped with chains may be inspected with them (See *Annex XII*).

3.2. Tacos plucked – In relation to the loss of tacos[4], the following classification shall be taken:

	Rating		
	DN1	DN2	DN3
Less than 5% of the studs are missing, in non-contiguous positions, without showing the casing	X		
In contiguous positions		X	
Missing between 5% and 10% of the studs, in non-contiguous positions, without showing the casing		X	
In contiguous positions			X
More than 10% of tacos are missing			X
Missing some taco that lets you see the casing			X

3.3 Cuts on the flanks:

	Rating		
	DN1	DN2	DN3
a) Isolated cutting of large dimensions that does not reach protection mesh:	X		
Reaching the protective mesh, without affecting it		X	
Affecting the protective mesh			X
Small cuts in the same bending area that do not reach the protective mesh:	X		
Large cuts in the same bending area that do not reach the protective mesh		X	
Reaching the protective mesh			X
c) Formation of air chambers between tarpaulins without leaks:			
Small in size, not located in the same bending area	X		
In the same bending area		X	
Medium in size, not located in the same bending area		X	
In the same bending area			X
Large			X
With leaks to the outside			X
Loss of material:			
Small in size in the same bending area	X		
Medium size		X	

[4] Tacos shall be classified as defective if part of them has a certain defect, and the total absence of such defect is therefore not necessary.

	Rating		
	DN1	DN2	DN3
Reaching the protective mesh, without affecting it		X	
Large or affecting protective mesh			X

3.4 Irregular wear (difference between average and lower heel height), with reference to average heel height:

	Rating		
	DN1	DN2	DN3
Not more than 5	X		
Not more than 10		X	
Exceeds 10			X

3.5 Regular wear – In relation to uniform tread wear, if the tyres have final wear controls, these shall be taken as a reference, otherwise the following shall be taken as a reference: (difference between average and lower taco height), with reference to average taco height:

	Rating		
	DN1	DN2	DN3
a) End wear witnesses:			
0.5 cm to reach it	X		
Wear witness has been reached		X	
Wear witness overrun			X
b) Less difference between the sculpture and the background of the sculpture:			
Between 2 and 2.5 cm	X		
Between 1 and 2 cm		X	
Difference less than 1 cm			X

3.6 Anchor screws:

	Rating		
	DN1	DN2	DN3
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)

3.7 Tire Status:

	Rating		
	DN1	DN2	DN3
Structural damage (permanent tire deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		

4. Steering systems

For the classification of deficiencies, the following aspects shall be taken into account:

The operation and condition of the steering wheel (or joystick) and steering column.

The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the elements of the direction.

The proportion of affected area.

The proximity of the affected areas and the deficiencies.

Symmetry in the performance of the steering wheel and the steering joint of the frame (central articulation).

The amount of oil lost from leaks in the cylinders.

The existence of bites on the plungers.

Excessive slacks between elements.

The state and effectiveness of the joint turning stops.

Effective operation of both the main and emergency management.

The speed of translation of the machine.

4.1 Steering elements (Flying/joystick, steering column, turning stops and cylinders), structural condition:

	Rating		
	DN1	DN2	DN3
Structural damage (permanent deformations in the elements, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Leaks in cylinders:			
Leaks without continuous drip	X		
Continuous drip leaks		X	
Leaks in the form of a jet			X

4.2 Steering wheel/joystick, operation:

	Rating		
	DN1	DN2	DN3
Moderate effort is required for its operation, but it does not make it inoperative	X		
It shows the need to apply sudden movements for control or dead spots in its route		X	
Difficult drive			X

4.3 Slacks in the elements of the address:

	Rating		
	DN1	DN2	DN3
axial slacks in bolts, relative to their nominal length			
Machines with a translation speed exceeding 30 km/h:			

	Rating		
	DN1	DN2	DN3
Up to 10%	X		
Between 11% and 15%		X	
Over 15%			X
Machines with a translation speed less than or equal to 30 km/h:			
Up to 15%	X		
Between 16% and 20%		X	
Over 20%			X
Radial slacks in bolts, relative to their nominal diameter			
Machines with a translation speed exceeding 30 km/h:			
Up to 5%	X		
Between 6% and 10%		X	
Greater than 10%			X
Machines with a translation speed less than or equal to 30 km/h:			
Up to 10%	X		
Between 11% and 15%		X	
Over 20%			X

4.4 Steering wheel slacks or steering joystick:

	Rating		
	DN1	DN2	DN3
Free ride of the steering wheel in either direction			
Machines with a translation speed less than or equal to 30 km/h:			
It's between 15 and 20 degrees.	X		
It's between 21 and 25 degrees.		X	
Is greater than 25 degrees			X
Machines with a translation speed exceeding 30 km/h and machines with joystick:			
It's between 10 and 15 degrees	X		
It's between 16 and 20 degrees.		X	
It is greater than 20 degrees			X

4.5 Symmetry:

	Rating		
	DN1	DN2	DN3
The maximum articulation position of the frame varies in the right and left turns:			
Between 20% and 25%	X		
Between 26% and 30%		X	
More than 30%			X

4.6 Emergency address:

	Rating		
	DN1	DN2	DN3
a) Control over the steering wheel or joystick:			
Excessive effort is required for its operation, but it does not make it inoperative	X		
It shows the need to apply sudden movements for control or dead spots in its route		X	
Direction of very difficult actuation		X	
Maneuverability:			
Low manoeuvrability (short operating time, only allows initial movement in one direction, with the possibility of a change of direction	X		
Insufficient manoeuvrability (short operating time, only allows initial movement in one direction, without the possibility of a change of direction)		X	
Inability to maintain control		X	
Operation:			
Intermittent (it does not work in some cases or you have to press the switch two or three times for its activation)	X		
The switch must be pressed more than three times for activation		X	
Does not work		X	
d) Non-existent or partially or totally disassembled			X

5. Braking systems

For the classification of deficiencies, the state of each of the systems forming it shall be taken into account together. For each braking system, the following aspects shall be taken into account: [5]

The efficiency in braking, stopping the machine in safe conditions.

Excessive deviation from the rectilinear path during braking.

Retention capacity.

The general state of the system.

How to apply the system by the operator (expected operation of the controls or pedals of the system).

The amount of oil lost from leaks in packages.

The effort that the operator must make to apply the system.

For the verification of each braking system, several methods have been established, with dynamic or static tests, as the case may be, taking precedence over engine torque tests: therefore, as a general rule, dynamic or static tests should be applied, leaving torque tests to be carried out only in cases where it is not possible to apply the above mentioned tests. If engine torque testing is to be used, the inspector shall reflect in the inspection report the reasons why he was unable to perform the other tests. The following table summarizes these trials, which are detailed below.

Summary table for braking systems

Braking system	Test			Parameters to check	Other checks	Comments
	Static	Dynamics	Against engine torque			
Service		X	X	E_e or E_2 - μ or β	Oil leaks in packages	2 tests of one type

[5] The machine must be tested without load.

Emergency (no blockage by power cut)		X	X	E_e or E_2 n° Drives	• Warning device • Automatic drive	1 test of a type
Emergency (with power cut-off)		X	X	E_e or E_2 – t_r - E_b		
Parking	X		X	P_e or E_2	Disc status, drum, etc.	1 test of a type

Requirements for runways and slopes used for checking braking systems:

a) The test tracks for dynamic tests of service and emergency braking systems may have a maximum inclination of 5%, both longitudinally and transversely, in relation to the direction of travel of the machinery.

b) For the static test of the parking braking system, the slope where the machine is located shall allow the free movement of both undercarriages; this slope must be verified on the machine itself.

5.1 Service brake

5.1.1 Dynamic test

	Rating		
	DN1	DN2	DN3
a) Effectiveness of the service brake			
$E > E_e \geq 0.9\ E$	X		
$0.9\ E > E_e \geq 0.8\ E$		X	
$0.8\ E > E_e$			X
Deviation of the rectilinear path during braking:			
$30\% \geq \mu > 25\%$	X		
$35\% \geq \mu > 30\%$		X	
$\mu > 35\%$			X

E (%) being the efficiency of the minimum mean braking deceleration required for this type of test in UNE-EN ISO 3450, $E_{(\%)}$ being the braking efficiency obtained in each of the two tests to be performed and μ (%) being the ratio between the maximum frontal and lateral decelerations of the machine obtained during the test.

5.1.2 Engine torque retention test[6]:

	Rating		
	DN1	DN2	DN3
Brake efficiency:			
95% > E_2 ≥ 85%	X		
85% > E_2 ≥ 75%		X	
75% > E_2			X
Brake distribution:			
30% > β ≥ 25%	X		
35% > β ≥ 30%		X	
β ≥ 35%			X

The efficiency of the E_2 system (%) being the ratio between the revolutions per minute of the engine at which the system stops retaining the machine and 70% of the number of maximum engine revolutions, and β (%) the distribution of braking, calculated as the complementary ratio of the difference between the number of maximum engine revolutions and the revolutions per minute of the engine at which the system stops retaining the machine, and the difference between the number of maximum engine revolutions and the revolutions per minute of the engine at which some of the wheels begin to move.

5.2 Oil leaks in packages.

	Rating		
	DN1	DN2	DN3
Leaks without continuous drip	X		
Continuous drip leaks		X	

[6] The machine must be tested without load.

	Rating		
	DN1	DN2	DN3
Leaks in the form of a jet			X

5.3 Parking brake.

5.3.1 Static test. Slope retention test:

	Rating		
	DN1	DN2	DN3
Brake efficiency:			
P_{min}- 6% ≤ P_e < P_{min}- 3%	X		
P_{min}- 9% ≤ P_e < P_{min}- 6%		X	
P_e < P_{min}- 9%			X

P_e (%) being the minimum slope at which the machine is retained and P_{min} (%) the minimum required slope, according to the UNE-EN ISO 3450 standard.

5.3.2 Engine torque retention test:

	Rating		
	DN1	DN2	DN3
Brake efficiency:			
85% > E_2 ≥ 75%	X		
75% > E_2 ≥ 65%		X	
65% > E_2			X

5.4 Emergency brake.

5.4.1 Dynamic test:

	Rating		
	DN1	DN2	DN3
Emergency Brake Effectiveness			
0,95 E > E_e ≥ 0,9 E	X		
0.9 E > E_e ≥ 0.85 E		X	

	Rating		
	DN1	DN2	DN3
$0.85\ E > E_e$			X

5.4.2 Engine torque retention test:

	Rating		
	DN1	DN2	DN3
Brake efficiency:			
$85\% > E_2 \geq 75\%$	X		
$75\% > E_2 \geq 65\%$		X	
$65\% > E_2$			X

5.4.3 Capacity test of the energy storage system for unladen machine braking:

This test must be performed if the energy accumulated in the service brake calderines is also used to operate the emergency brake, and the model does not have an automatic power cut-off locking system. It shall also be performed on machines with oil accumulator for the service brake system. The number of full actuations of the service brake of the machine, with the engine stopped, shall be checked on a slope of 16% (±1%), starting with the machine stopped and with an interval of 5 seconds between actuations, so as to allow free movement between braking.

	Rating		
	DN1	DN2	DN3
Number of effective full brake actuations:			
You get four	X		
You get between two and three		X	
You get one or none			X
Less than five are achieved, leaving the machine locked	X		

In addition to the above, the service brake energy shall be reduced by any appropriate means (e.g. purging of the calderines). The warning device shall be activated before the automatic application of the emergency brake.

5.4.4 Warning device:

	Rating		
	DN1	DN2	DN3
The alarm is not continuous, audible and / or visible, but acts long enough to attract the attention of the operator	X		
If it doesn't attract your attention		X	
With the engine running and the doors and windows closed, its sound is not properly perceived	X		
The warning device is not a visible and/or audible continuous alarm		X	
The warning device is activated below 50% of the value of the accumulated energy	X		
If not activated		X	

5.4.5 Automatic drive:

	Rating		
	DN1	DN2	DN3
The automatic drive is activated when the value of the accumulated energy is:			
Below 45% of the maximum operating value specified by the manufacturer	X		
Below 40%		X	
Below 35%			X

5.4.6 Machines with automatic locking system by power cut:

5.4.7 It shall be checked whether this system operates within the safety margins. The test shall be carried out at a speed of 4 ± 1 km/h on a slopeless surface, measuring the time elapsed from the power cut-off to the start of the system operation (response time t_r) and the braking efficiency of the automatic locking (E_b).

	Rating		
	DN1	DN2	DN3
a) The response time of automatic locking to power cut:			
3 s < tr ≤ 4 s	X		
4 s < tr ≤ 5 s		X	
tr > 5 s			X
Brake efficiency:			

	Rating		
	DN1	DN2	DN3
21% > Eb ≥ 19%	X		
19% > Eb ≥ 17%		X	
Eb < 17%			X

Note: If dynamic braking tests are to be carried out under adverse climatic conditions,[7] the following correction factors shall be taken into account:

Wet runway (with formation of water and/or mud bags)	Machines weighing less than 32,000 kg	Machines weighing 32,000 kg or more
Of earth or similar	0,8	0,6
Of asphalt or similar	0,9	0,6
Concrete or similar	1	1

On the other hand, if the conditions of the track cause the tyres to sink,[8] the aquaplaning or hydroplaning[9] or the skidding[10] of the machine, the track must be conditioned before the tests in order to avoid these phenomena. If this conditioning is not possible, engine torque tests shall be carried out.

6. Engine

For the classification of deficiencies, the following aspects shall be taken into account:

The existence of leaks and corrosion phenomena in the fuel and coolant tanks of the engine, and the amount of fluid loss.

The existence of shocks, breaks, cracks, fissures or leaks of fuel or coolant.

The condition and operation of the filling cap of the fuel tanks and coolant.

[7] In these circumstances, any deviation from the rectilinear path during braking shall not be taken into account.

[8] Waterlogged tracks with little compaction (sand, slate or marble limestone powder, etc.).

[9] Waterlogged tracks with good compaction (asphalt, concrete, etc.).

[10] Tracks with good compaction, with ice formation or snow accumulation.

The existence of bites, cuts, loose flanges or leaks (and amount of fluid loss) in the ducts of the fuel system or engine cooling system.

The operation of the rapid fuel filling system and its strainer system.

The structural state of the fan blades and their operation.

The general condition of the engine compartment.

The amount of oil lost from engine leaks.

The proportion of fumes and gases leaking into exhaust manifolds.

6.1 Fuel system.

	Rating		
	DN1	DN2	DN3
a) Structural status of tanks and pipelines:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of capacity	X		
Dents in tanks with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Fuel leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
c) Filling plug			
Deficient state or performance	X	(X)	
Absence of cap			X

6.2 Cooling system

	Rating		
	DN1	DN2	DN3
Operation:			

	Rating		
	DN1	DN2	DN3
The system does not maintain the temperature within the limits set by the manufacturer		X	(X)
Structural status of elements:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks or radiator without appreciable loss of capacity	X		
Dents in tanks or radiator with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Coolant leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Filling plug:			
Deficient state or performance	X	(X)	
Absence of cap			X
e) Fans:			
Poor condition or absence of blades	X	(X)	
Levels:			
Below the manufacturer's requirements	X	(X)	

6.3 Motor compartment.

	Rating		
	DN1	DN2	DN3
Exhaust circuit status:			
Structural damage (cracks, breakages, etc.)		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Flue gas leakage:			
Sporadic or intermittent	X	(X)	
Continuing		X	(X)

	Rating		
	DN1	DN2	DN3
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Levels:			
Below the manufacturer's requirements	X	(X)	
Straps:			
Worn or cracked, with sufficient tension	X		
Other defects		X	(X)

7. Drive train

For the classification of deficiencies in transmission shafts, differential groups, final controls and junctions between transmission elements, the following aspects shall be taken into account:

The existence and size of areas with corrosion, shocks, cracks, areas with lack of material, etc.

Screws worn, loose or non-existent.

The structural importance of the elements concerned.

The proportion of affected area.

The proximity of the affected areas and the deficiencies.

The amount of oil lost due to leaks in the differential groups or in the final controls.

	Rating		
	DN1	DN2	DN3
Status of transmission trees, differential groups and final controls:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)

	Rating		
	DN1	DN2	DN3
b) Oil leaks in differential groups and final controls:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X

8. Hydraulic system

For the classification of deficiencies, the following aspects shall be taken into account:

The existence of cracks, fissures, dents, etc., in tanks and conduits (rigid and flexible).

The loss of tank and system capacity due to dents or oil leaks.

	Rating		
	DN1	DN2	DN3
Structural status of rigid and flexible tanks and conduits:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of capacity	X		
Dents in tanks with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
c) Scaffolding system			
Deficient state or performance	X		
Absence of a strainer system		X	
Levels:			
Below the manufacturer's requirements:			
If it does not affect the steering hydraulic system	X	(X)	
Affecting the hydraulic steering system		X	(X)

9. Pneumatic system

For the classification of deficiencies, the following aspects shall be taken into account:

The existence of cracks, fissures, dents, etc., in tanks and conduits.

The loss of capacity of the boilers and the system, due to dents and / or air leaks.

	Rating		
	DN1	DN2	DN3
a) Structural status of boilers and pipelines:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of volume	X		
Dents in tanks with appreciable loss of volume		X	(X)
Corrosion zones	X	(X)	
Loosening of some anchorage	X		
Absence or poor condition of anchor screws		X	(X)
Air leakage:			
That cause the pressure drop of the system gradually	X	(X)	
That cause the pressure drop of the system immediately		X	(X)
c) Purged of calderines. Accumulation of water or other substances:			
Expulsion of substances intermittently	X		
Continuously expelling substances		X	(X)
Pressure:			
Below the manufacturer's requirements:			
If it does not affect the brake system	X	(X)	
Affecting the brake system		X	(X)

10. Protection structures

For the classification of deficiencies, the following aspects shall be taken into account:

The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the cabin (ROPS / FOPS) and in other protective structures (installed in windscreens and / or spoon).

Screws of the different worn, loose or non-existent anchors.

The structural importance of the elements concerned.

The proportion of affected area.

The proximity of the affected areas and the deficiencies.

The number and location of missing or deficient screws.

The existence of non-permitted operations, such as drills, cuts or welds (ROPS/FOPS cab).

	Rating		
	DN1	DN2	DN3
Structural condition of the ROPS/FOPS cab:			
Structural damage (deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones with thickness loss up to 5%	X	(X)	
With thickness loss greater than 5%		X	(X)
Status defects in anchors	X	(X)	
Structural status of zenith FOPS in machines without ROPS/FOPS cab:			
Structural damage (deformations, cracks, breakages, etc.)	X	(X)	
Corrosion zones	X	(X)	
Status defects in anchors	X	(X)	
d) Structural status of the FOPS front or accessory:			
Any type of defect	X	(X)	
d) Restrictions on use:			
Unauthorised manipulations, before the entry into force of this TS	X		

11. Access elements

For the classification of deficiencies, the following aspects should be taken into account:

When accessing the machine or the cab, the access elements (stairs, steps, railings, etc.) must at all times provide three secure support points.

The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the access elements and in the passage and permanence platforms.

Screws of the different anchors of elements to the worn, loose or non-existent chassis.

The proportion of affected area.

The proximity of the affected areas and the deficiencies (on the platforms).

The number and location of missing or deficient screws.

The effective footprint and pass distance of the anti-slip surfaces of the machine.

	Rating		
	DN1	DN2	DN3
State of the elements:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Non-slip surfaces: effective footprint and pass distance:			
Loss of adhesion or non-slip surface	X	(X)	
Absence of non-slip surfaces		X	(X)

12. Operator's position

For the classification of deficiencies, the state of each of the systems forming it shall be taken into account together.

12.1 Cabin security.

For the classification of deficiencies, the following aspects should be taken into account:

The cabin must have adequate means for closing doors and windows.

The existence and size of cracks in crystals, and if any part of them is missing.

The number of cracks, their location and their impact on mechanical strength.

The number, orientation and existence of cracks in the rearview mirrors.

The field of view that allows the crystals and mirrors to the operator.

The state of screws and anchors of the rear-view mirrors.

The effort that must be made to open doors and windows.

The existence, readability and status of the emergency exit signal.

The existence, adequacy and state of the means of opening the emergency exit.

The elements that can prevent a safe abandonment of the cabin by the emergency exit.

The condition of the shock absorbers and anchorages of the cab supports.

The effectiveness of door anchors and their condition.

	Rating		
	DN1	DN2	DN3
State of the elements:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Crystals:			
Cracks affecting the operator's field of vision or the mechanical strength of the glass	X	(X)	
Absence of crystals		X	(X)
Rear-view mirrors.[11] Loss of total field of vision:			
Up to 25%	X		
Up to 50%		X	
More than 50%			X
Safety mirrors. Loss of field of vision at hazardous points:			
Up to 50%	X		
More than 50%		X	
Emergency exit:			
Signaling illegible or absent	X		
Difficulties in opening		X	(X)
Presence of objects that prevent their use		X	(X)
Lock and key:			
Status defects	X		
Key malfunction		X	
No key, lock or other means to securely close the machine			X

12.2 Operator seat.

For the classification of deficiencies, the following aspects should be taken into account:

The state of the seat.

The effectiveness of adjustments and suspensions.

[11] To establish the field of vision, the provisions of Standard UNE-ISO 14401-2 shall be used.

The existence and condition of the seat belt and its anchorages, and its adaptation to the machine.

The existence of cuts or loose fibers in the seat belt.

The date of installation of the seat belt.

The operation of the seat belt.

	Rating		
	DN1	DN2	DN3
Status of the seat and its components:			
Damage (corrosion zones, cracks, breaks, wear, etc.):			
Interfering or may interfere with driving	X	(X)	
Interfering or likely to interfere with fire resistance properties	X		
Other damage	X		
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Seat with characteristics other than those specified by the manufacturer		X	(X)
Adjustments:			
Non-operational major adjustments	X	(X)	
Non-operational secondary adjustments	X		
Suspensions:			
Damages to the seat suspension, to the adjusting scale display or to the adjusting control:			
Causing appreciable loss of suspension capacity	X	(X)	
Causing total loss of suspension capacity		X	(X)
Safety belt[12]:			
d.1) Impairment of the belt or its anchorages:			
They show signs of deterioration that may decrease their effectiveness	X		
Decreasing their effectiveness		X	
That render it useless			X
d.2) Operational:			
Not properly restraining the operator		X	
Blockage does not work sometimes		X	
On almost no or no occasion			X

[12] The provisions of Standard UNE-EN ISO 6683 shall be used.

	Rating		
	DN1	DN2	DN3
d.3) Replacement:			
In good condition, but not replaced on the date marked by the manufacturer	X		
In good condition, but not installed by the manufacturer's technical service or by an authorized workshop		X	
d.4) Absence of belt or any of its anchorages			X

12.3 Environmental conditions and ergonomics.

For the classification of deficiencies, the following aspects should be taken into account:

The existence and effectiveness of the heating/anti-vaho system in the front and rear windows.

The existence, condition and efficiency of the acoustic and thermal insulation of the cabin.

The readability, suitability and language of the symbols of the controls.

The state of the controls and their operation.

The effort required for their performance.

The existence of objects that can fall or move, causing unintended movements by the operator.

The existence of objects that can limit the operator's movements or significantly reduce his cabin space.

The status of the dust filter.

The existence of living edges.

	Rating		
	DN1	DN2	DN3
a) Door and window cabinets:			
Deterioration that reduces its function	X	(X)	
Absence of burletes		X	(X)
Control symbols:			
Unreadable or absent, not belonging to braking or steering controls	X	(X)	
Unreadable or absent, belonging to braking or steering controls		X	(X)
In a foreign language, without pictograms accompanying it	X		
Commands.			

	Rating		
	DN1	DN2	DN3
Damages:			
Impairment that affects or may affect its functionality	X	(X)	
Drive:			
It is necessary to apply a moderate force.	X	(X)	
It is necessary to apply excessive force		X	(X)
Your response is not immediate (when required)	X	(X)	
Does not respond or performs a different function than expected		X	(X)
Air-conditioning system:			
Intermittent malfunction or operation	X	(X)	
Does not work			X
Cleaning of the cabin (indoor):			
Excessive dirtyness in cabin	X	(X)	
Loose or poorly fixed elements that can move uncontrollably	X	(X)	
Loose or poorly fixed elements that may fall or affect driving		X	(X)
f) Interior lighting:			
Damages that do not prevent its use immediately	X		
Low luminous intensity	X	(X)	
Does not work			X
g) Dust filter:			
Excessive accumulation of dust in the filter	X	(X)	
Absence of filter			X
h) Enveloping space of the operator:			
Installation of objects or modifications to the seat that partially reduce the surrounding space	X	(X)	
Installation of objects or modifications to the seat that excessively reduce the surrounding space		X	(X)
Existence of live edges with low probability of contact with the operator	X		
Existence of live edges with high probability of contact with the operator		X	(X)

12.4 Cabin safety information

For the classification of deficiencies, the following aspects should be taken into account:

The warning level displayed by the panel alarm.

The number and importance of those alarms.

The number and importance of alarms or indicators that do not work.

	Rating		
	DN1	DN2	DN3
Indicators and alarm lights. Malfunction, absence or illegibility of:			
Information indicators	X		
Warning indicators		X	
Hazard indicators			X
b) Test of operation of the alarm panel. Malfunction, absence or illegibility of:			
Information indicators	X		
Warning indicators		X	
Hazard indicators			X

12.5 Starting and stopping devices of the machine.

For the classification of deficiencies, the following aspects should be taken into account:

Your signage.

Its operation (ability to cause a dangerous situation due to a malfunction of the device).

The way in which the start-up or stop of the machine is performed (expected operation of the devices).

	Rating		
	DN1	DN2	DN3
a) Key:			
Irregular operation	X	(X)	
On and off positions are not identified	X	(X)	
Means not included in its design are used for starting the machine		X	(X)
Start-up:			
Anomalies in the start-up	X	(X)	
Means not included in its design are used for commissioning		X	(X)
Stop:			
Anomalies at the stop	X	(X)	

	Rating		
	DN1	DN2	DN3
Means not included in its design are used for the stop		X	(X)

13. Safety barriers

For the classification of deficiencies, the following aspects shall be taken into account:

Your signage.

Its existence and effectiveness.

The structural state of its elements.

How the lock is performed (expected application of the lock devices).

	Rating		
	DN1	DN2	DN3
a) Common defects for all types of security obstacles:			
The device does not perform the function for which it was designed		X	(X)
Difficulties in its use	X	(X)	
The lock does not work or is not installed			X
Manipulations: device partially or completely disassembled, so that it cannot be used (e.g. lack of safety pin)		X	(X)
Signaling Unreadable or Absent	X		
Status of elements in mechanical locks:			
Structural damage (permanent deformations, cracks, breakages, etc.)	X	(X)	
Corrosion zones	X	(X)	
Other deformations	X		
Absence, loosening or poor condition of anchor screws	X	(X)	

14. Work team

For the classification of deficiencies, the following aspects shall be taken into account:

The general condition of the work team.

The existence and size of areas with corrosion, blows, cracks, remains of weld cords, areas with lack of material, etc., in the lifting and turning arms, in the cylinders and their anchors.

The structural importance of the elements concerned.

The proportion of affected area.

The proximity of the affected areas and the deficiencies.

The possibility of neutralizing the controls of the work team, directly or indirectly.

The operation of the cylinders.

The amount of oil lost from leaks in the cylinders.

The condition and operation of the quick coupling device.

	Rating		
	DN1	DN2	DN3
a) Appropriateness to the machine:			
It is not possible to identify the accessory	X	(X)	
Accessory not covered by the manufacturer	X	(X)	
b) Quick coupling:			
Anomalies in the coupling operation	X	(X)	
The accessory is not properly interlocked	X	(X)	
Difficulties in checking the operation	X	(X)	
c) Structural status of swivel and lifting arms, bolts, bucket (or other accessory) and cylinders:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones with thickness loss up to 10%	X		
With thickness loss up to 20%		X	
With thickness loss of more than 20%			X
Other deformations	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
d) Oil leaks in cylinders:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Operation:			

	Rating		
	DN1	DN2	DN3
Equipment or machine instability observed during operations	X	(X)	
Neutralization of controls:[13]			
The work equipment does not go down entirely, but allows a safe towing of the machine	X		
If you do not allow safe towing		X	
Neutralization is not done from a safe area		X	
Does not work		X	
Machine for lifting loads with direct neutralization acting on the controls, without safety valves to prevent the fall of the load	X	(X)	

15. Safeguards

For the classification of deficiencies, the following aspects shall be taken into account:

The existence, suitability and condition of the gates at all access points to dangerous parts of the machine.

The possibility of closing, opening and anchoring the different gates.

The need to open the guards or gates with a key or tool.

The state of the screws and anchors.

The existence and condition of fenders and skirts.

Welded anchors or fender screws and skirts to the racks.

	Rating		
	DN1	DN2	DN3
Structural status of guards and fenders:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		

[13] If the procedure requires the disassembly of parts with tools or the partial or total emptying of oil, the device shall be checked for signs of proper operation.

	Rating		
	DN1	DN2	DN3
Excessive movement between elements		X	(X)
Safeguard effectiveness:			
Defects that do not allow opening or closing	X	(X)	
Partial loss of protection characteristics	X	(X)	
Significant loss of protection characteristics		X	(X)
Absence of protection (if required)			X

16. Warning and Hazard Indicators

For the classification of deficiencies, the following aspects shall be taken into account:

Location, readability and conservation status of indicators and towing points.

The language in which they are written (if they are not pictograms).

The existence of all the necessary indicators.

	Rating		
	DN1	DN2	DN3
a) Location:			
It's not in the warning danger zone.	X	(X)	
There is no link between the warning and the actual danger		X	(X)
b) Legibility and conservation status:			
Unreadable or absent	X	(X)	
Absence of indicators in highly hazardous areas		X	(X)
In a foreign language, without pictograms accompanying it	X		

17. Fire protection

For the classification of deficiencies, the following aspects shall be taken into account:

The need for the machine to be equipped with means of extinguishing.

Location, loading, adaptation to the machine and state of conservation of the extinguishers.

The general state of preservation of the machine.

The condition of the flame retardant materials provided for by the manufacturer.

The condition of the engine and fire protections.

The consequences that can result from a fire in the machine.

	Rating		
	DN1	DN2	DN3
Fire retardant material:			
Partial loss of flame retardant	X	(X)	
If there is appreciable loss of flammable fluids in the machine		X	(X)
Extinction system.			
Automatic:			
Impairment in the system that may prevent its proper functioning	X	(X)	
Manual:			
Insufficient load	X	(X)	
Inadequate location or lack of signage	X	(X)	
Absence of system, with appreciable loss of flammable fluids in the machine		X	(X)

18. Electrical system

For the classification of deficiencies, the following aspects shall be taken into account:

The state of the battery anchors to the battery chest, and from the battery chest to the chassis.

The amount of electrolyte poured into the chest.

The state and operation of the batteries.

The state of the battery casket.

Excessive accumulation of dirt.

Protection of battery terminals.

The state of terminal connections and wiring.

The operation of the power cutter, or similar device.

The existence of loose or unprotected fittings.

The existence of aging or cuts in the protection of electrical cables.

The existence of loose electrical cables.

The function of the cables with deficiencies and their possibility of contact, between them and with metal parts.

The status and protections of contactors.

Excessive accumulation of dirt in the electrical system.

	Rating		
	DN1	DN2	DN3
a) Batteries.			
Structural damage (permanent deformations, cracks, breakages, etc.) to battery chests	X	(X)	
Corrosion zones	X	(X)	
Other deformations	X		
Absence, loosening or poor condition of anchor screws	X	(X)	
Movements (slacks) between elements	X	(X)	
Accumulation of clay, electrolyte or other substances	X	(X)	
Connections in poor condition	X	(X)	
Unprotected positive (or negative, as applicable) terminals		X	(X)
b) Electrical installation:			
Excessive accumulation of mud or other substances	X	(X)	
Damage to cable attachments	X	(X)	
Aging or presence of cuts in insulating protections	X	(X)	
Connections in poor condition	X	(X)	
Electrical protections in poor condition		X	(X)
Current cutting device (or equivalent system)			
Anomalous operation	X	(X)	
Absence of signalling of the acting positions (if necessary)	X		
Damage to the key or control	X	(X)	
There is no equivalent device or system			X

19. Acoustic warning devices

For the classification of deficiencies, the following aspects shall be taken into account:

The operation of the horn, the reverse warning device and, where applicable, the start-up warning device.

The automatic operation of the reversing audible warning device and, where applicable, the start-up warning device.

Sound level.

	Rating		
	DN1	DN2	DN3
a) Performance of acoustic warning devices:			
Does not have a normal cadence, but is identifiable	X		
If there is a large interval between sounds		X	
Does not work		X	
Does not exist or has been completely or partially dismantled			X
Sound level of horn and reverse warning device:			
Sounds like the accelerated motor or fans hide it	X		
If they are less intense sounds (engine idling, etc.)		X	

20. Lighting and indication devices

For the classification of deficiencies, the following aspects shall be taken into account:

The function performed by each device (illumination or indication).

The impact that its malfunction has on the safety of people.

The impact that its malfunction has on the safety in the circulation of other machines.

The location on the machine and whether or not the device performs a redundant function (double optics, for example).

Its optical properties (intensity, orientation, colorimetry, reciprocity, combination with other lights, etc.).

The state of the parable (illumination) and the protective screen.

The flashing frequency (intermittents and rotating beacon).

Its operation (automatic or manual).

20.1 Long, working and position lights.

	Rating		
	DN1	DN2	DN3
a) Defects in its elements or in the means of attachment (for each type of device)			
Affecting any of the lights	X	(X)	
Affecting all lights			X
Operation:			
Abnormal operation or means of on/off not provided for by the manufacturer	X	(X)	
Some don't work	X	(X)	
None of them work			X
c) Colour:			
Different from the one that its function is required	X	(X)	
Luminance:			
Below nominal values	X	(X)	
e) Other properties:			
Combined with other lights	X		
Misaligned	X		

20.2 Retro-reflectors.

	Rating		
	DN1	DN2	DN3
Defects on the reflective surface.	X	(X)	
Color different from the one its function is required.	X	(X)	

20.3 Rotating headlamp.

	Rating		
	DN1	DN2	DN3
a) Defects in its elements or in the means of attachment	X	(X)	

	Rating		
	DN1	DN2	DN3
Operation:			
Does not work	X	(X)	
Flash frequency:			
Outside the frequency range specified by the manufacturer	X	(X)	
d) Colour:			
Different from the one that its function is required	X		
e) Other properties:			
Combined with other (non-rotating) lights	X		
Misaligned	X		

20.4 Dipped-beam headlamps.

	Rating		
	DN1	DN2	DN3
Operation:			
They are switched on by means other than the switch installed for that purpose	X		
Sometimes they turn off involuntarily	X		
If it happens frequently		X	
Half of the dipped-beam headlamps do not work, do not exist or have been fully or partially disassembled		X	
All dipped-beam headlamps do not operate, do not exist or have been totally or partially disassembled			X
b) Luminance:			
Loss up to 25%	X		
Up to 50%		X	
More than 50%			X
c) The fixations of the optics, housings or protective screens have defects (corrosion, blows, absence of screws or welding cords), which are necessary to repair:			
Short-term	X		
If all dipped-beam headlamps are affected		X	
Immediately		X	
If all dipped-beam headlamps are affected			X
Parables			

	Rating		
	DN1	DN2	DN3
Isolated and small blackened parts that prevent proper reflection of light:			
If all or most of the dipped-beam headlamps	X		
If concentrated or large		X	
Absence of parables			X
Colour of lights:			
Other than white	X	(X)	
Red		X	(X)
Other:			
Miscombined	X		
Misaligned	X		

20.5 Intermittent.

	Rating		
	DN1	DN2	DN3
Operation:			
Signaling of any of the directional changes does not work		X	
If there are lateral intermittents in that direction	X		
Signaling of any of the changes of direction does not exist or has been completely or partially disassembled		X	
If there are lateral intermittents in that direction	X		
Signaling none of the directional changes works			X
If there are side intermittents in one direction		X	
If there are lateral intermittents in both directions	X		
Flash frequency:			
Flashes in different phases	X		
Between 45 and 60 flashes per minute	X		
If lower		X	
More than 120 flashes per minute	X		
c) The fixations of the optics, housings or protective screens have defects (corrosion, blows, absence of screws or welding cords), which are necessary to repair:			
Short-term	X		
Immediately		X	

	Rating		
	DN1	DN2	DN3
d) Colour of lights:			
Are not amber/yellow	X		
Other:			
Miscombined	X		

20.6 Brake lights.

	Rating		
	DN1	DN2	DN3
Operation:			
Do not turn on automatically when stepping on the service brake pedal		X	
Sometimes they turn off involuntarily	X		
Not working or half of the brake lights have been completely or partially disassembled	X		
None of them work		X	
All brake lamps have been completely or partially disassembled			X
b) Luminance:			
Loss between 25 and 50%	X		
More than 50%.		X	
c) The fixations of the optics, housings or protective screens have defects (corrosion, blows, absence of screws or welding cords), which are necessary to repair:			
Short-term	X		
Immediately		X	
d) Colour of lights:			
Other than red		X	
Other:			
Miscombined	X		
Alternative action with lights not allowed	X		

20.7 Reversing lights.

Rating		
DN1	DN2	DN3

	Rating		
	DN1	DN2	DN3
Operation:			
Do not turn on automatically when reversing		X	
Sometimes they turn off involuntarily	X		
Not working or half of the brake lights have been completely or partially disassembled	X		
None of them work		X	
All brake lamps have been completely or partially disassembled			X
b) Luminance:			
Loss between 25 and 50%	X		
More than 50%			
c) The fixations of the optics, housings or protective screens have defects (corrosion, blows, absence of screws or welding cords), which are necessary to repair:			
Short-term	X		
Immediately		X	
d) Colour of lights:			
Different from white.		X	
Other:			
Miscombined	X		
Alternative action with lights not allowed	X		

21. Noise in the cabin.

The following test shall be carried out only on machines fitted with cabs:

Machine Location: The machinery must be located on a flat surface and as far as possible away from external sources of noise (benefits, other machinery, etc.).

Preparation of the machine: The machine must be equipped with the equipment and accessories specified by the manufacturer. The engine and hydraulic system must be at the temperature corresponding to the normal operating conditions specified by the machine manufacturer. All fluid systems must have levels within the range specified by the manufacturer. The machine must be located in the test area with the accessory located at a height of 300 mm ± 50 mm above ground level, or at the maximum possible height if this is less than 250 mm. The plane formed by the edges of the accessory must be approximately parallel to the ground (transport position).

Operating conditions: The machine must be static with the brakes actuated. The engine must run unladen, rotating at the revolutions per minute corresponding to the net power specified by the manufacturer. The transmission must be in neutral and neither the main accessories nor the auxiliaries must be in operation.

The engine must be initially idled and then driven to the revolutions per minute corresponding to the net power specified by the manufacturer. Before each data logging series, the engine must reach its steady idle speed.

Operator position: During the test, the operator must remain in his position and the observers must not be in the cabin.

Seat position: The seat should be positioned in the midpoint of its horizontal and vertical settings, or as close to it as possible. Any suspension of the seat must be adjusted to the operator's weight.

Microphone position: The microphone must be oriented horizontally, directed in the usual direction of the gaze of a person occupying the operator's position, and located 200 mm ± 20 mm from the middle plane of the operator's head, at eye level.

Measurements: The total measurement time for each reading carried out under stable conditions must be at least 30 s. 6 readings (not more than 3 dB apart) shall be made.

Measurements should be made with doors and windows closed and air conditioning and/or ventilation systems functioning. The protections and access gates to the components of the machinery must also be closed. If more than one operating speed is available, air conditioning and/or pressurized ventilation systems must operate at the second speed for systems up to four speeds.

For systems with more than four operating speeds, the third and, for systems with infinite continuous variation speeds, the average value of the speed should be used. If the air conditioning and / or ventilation systems have a control with the position for recirculation and air intake from the outside, it must be in the latter position.

Once the 6 readings have been obtained, those of lower and higher value will be discarded, and the arithmetic mean of the remaining ones will be taken.

The result shall be classified as follows:

	Rating		
	DN1	DN2	DN3
The equivalent daily exposure level (LAeq,d):			
It is greater than or equal to 80 dB(A) and less than 85 dB(A)	X		

	Rating		
	DN1	DN2	DN3
It is greater than or equal to 85 dB(A) and less than 87 dB(A)		X	
Is greater than or equal to 87 dB(A)			X

22. Vibrations.

Full body vibrations in a wheel loader respond to the profile of short and well-defined exposures, since the magnitudes of the different vibrations can be associated with each of the individual operations (loading and displacement).

This test aims to obtain a measurement of the full-body vibrations to which the operator is subjected through the seat due exclusively to factors specific to the machine, therefore the calculation of the vibrations associated with the displacement will be dispensed with.

Therefore, for the calculation of the full body vibration level, the following sequence shall be considered as the individual operating cycle:

Elevation of the accessory.

Movement of the accessory (turning/picking of the spoon or the one that corresponds, depending on the accessory).

Descent of the accessory to the transport position.

Machine Location: The machine shall be located on a flat surface.

Preparation of the machine: The machine must be equipped with the equipment and accessories specified by the manufacturer. The engine and hydraulic system must be at the temperature corresponding to the normal operating conditions specified by the machine manufacturer. All systems provided with fluids must have the levels within the range specified by the manufacturer. The plane formed by the edges of the accessory must be approximately parallel to the ground (transport position).

Operating conditions: The machine must be static with the brakes actuated. The engine must run unladen, at the speed corresponding to the net power specified by the manufacturer. The transmission must be deadlocked.

Operator position: During the test, the operator must remain in place with the seat belt fastened and observers must not be in the cab or in its immediate vicinity.

Measurements: Ten individual operating cycles shall be carried out consecutively, with an interval of 10 s between them, measuring continuously from the beginning of the first cycle until the end of the last of them. The result shall be classified as follows:

	Rating		
	DN1	DN2	DN3
The standard daily exposure value for a reference period of eight hours, measured during the test:			

	Rating		
	DN1	DN2	DN3
It is greater than or equal to 0.5 ms^{-2} and less than 0.7 ms^{-2}	X		
It is greater than or equal to 0.7 ms^{-2} and less than 1.15 ms^{-2}		X	
Is greater than or equal to 1.15 ms^{-2}			X

23. Opacity and exhaust gases.

For gaseous emission levels of the engine, the following limits, measured at maximum engine revolutions, shall be taken:[14] idle, in the case of opacity, and idling for exhaust gases (on the measurement method, see Annex XIII):

Emissions	Level 1 Defect
Opacity K(m^{-1})	≥ 4.5
NOX (ppm)	≥ 210
CO (%)	≥ 0.4
CO2 (%)	≥ 5.0
HC (ppm)	≥ 15

ANNEX V

Actions to be taken

Once the inspection of the machine has been carried out, a series of measures must be established depending on the result obtained. These measures are classified as:

Urgent measures: are those which are intended to remedy those deficiencies which have resulted in a *negative* or *unfavourable* report .

Necessary measures: are those that are aimed at addressing those deficiencies that have resulted in a *favourable report with deficiencies*.

[14] The engine temperature shall be at least 60°C for gas measurement and 80°C for smoke opacity measurement.

"Measures to be observed"[15]*:* are those aimed at addressing deficiencies that involve tolerable risks and result in a *favourable report*. Correcting them is a priority over the other deficiencies observed that also involve tolerable risks.

From the above, it is concluded that several types of measurements can be established on a machine, as shown below:

*Table**9**. Measures to be taken depending on the outcome of the verification.*

Types of measures	Outcome		
	Negative or Unfavorable	*Favourable with deficiencies*	*Favorable*
Urgent	X	--	--
Necessary	Depending on the case	X	--
To observe	Depending on the case		

The inspection report shall reflect the systems, subsystems and elements concerned, as well as the type of measures to be taken in each case.

In addition to the above, and without prejudice to Article 5(3) of Royal Decree 1215/1997 of 18 July 1997 laying down the minimum health and safety requirements for the use of work equipment by workers and Article 18 of Law 31/1995 of 8 November 1995 on the Prevention of Occupational Risks, the personnel responsible for carrying out the inspection shall inform the operator of the machinery inspected, during or at the end of the inspection of the measures to be taken and/or any restrictions on use (see *Annex XII)*.

[15] Any deficiencies reflected in the report must entail some type of measure on the part of the user; to specify this aspect, it will be understood that there is a measure to be observed when any of these circumstances occur:

If there are Level 3 deficiencies in non-determining points (weight 1 or 2) and the system as a whole is not deficient, or

If there are Level 3 deficiencies at non-determining points (weight 1 or 2) and the system as a whole is deficient due exclusively to the defect found at a determining point.

ANNEX VI

Personnel responsible for carrying out inspections

For a correct inspection, it will be necessary an inspector with adequate training and technical knowledge on:

Machine mechanics.

Elasticity and strength of materials.

Hydraulic and pneumatic systems.

Internal combustion engines.

Electricity.

The machine to be evaluated (knowledge *of the systems installed and their operation)*,

In addition, they should also have knowledge of:

Safety and Health (Law *on the Prevention of Occupational Risks*, *Workplaces*, *Signalling*, *etc.)*.

Regulations and implementing legal provisions (Machinery *Directive*, *Mining Safety Regulation*, *Royal Decree 1215/1997*, *etc.)*.

Specific technical regulations applicable to this type of machinery (Standards *of the series UNE-EN 474*).

In order to improve the safety conditions during the inspection and to speed up the procedure (which results in a shorter machine downtime), the inspector may be assisted by a qualified mechanic or electromechanic, who will support him during the inspection.

ANNEX VII

Security (Informative)

1. Preliminary considerations

This Annex refers to certain aspects related to safety during inspections, which can serve as a reference for carrying out the corresponding risk assessment.

The user of the machinery shall take appropriate measures to ensure that:

It is in a reasonable state of cleanliness that allows access to all the elements to be inspected without the risk of falls or slips, as well as for its correct evaluation.

Machine fluid levels and tire pressure are within the limits specified by the manufacturer.

The fuel level is sufficient to be able to carry out the inspection without the need to refuel the unit and without the machine being able to stop unintentionally due to lack of fuel.

If the machinery is equipped with emergency steering,[16] the operator's manual shall refer to whether any limitations of this system have been established and to the on-site test procedure to verify its operability.

2. Personal protective equipment

Personnel carrying out the inspection shall use the following personal protective equipment:

Tight workwear and high visibility.

Helmet and safety boots.

Protective gloves against mechanical and thermal hazards, and safety glasses, during checks of hydraulic systems, engine compartment and protections of hot surfaces and pressure fluids.

Hearing protectors, mask and safety glasses, in the measurements of exhaust gases.

3. Safety standards

It is essential to establish, on the part of the inspection team, procedural rules that will be explained to the operator and any person who may be present in the environment of the machine, before starting the inspection, and respected during the inspection. Similarly, the inspection team must ensure that the operator is aware of the safety systems of the machinery. Where particular circumstances require changes to be made, they should be known and agreed upon by all staff. These rules of procedure shall include, inter alia, the following:

Steps to follow in the inspection.

Person who will give instructions to the operator at all times.

Location of inspectors at each step.

Communication protocol between inspectors, and between inspectors and machine operator.

In addition to the safety considerations mentioned here, all applicable safety provisions must be taken into account, in accordance with current regulations.

In particular, the rules of movement laid down on the holding must be respected; if conditions that are incompatible with these rules (e.g. set speed limits) are required for certain verifications, the operator must be informed and a site where they can be carried out under safe conditions (runways without traffic or with restricted traffic during testing) must be sought. Otherwise, you should choose to use other types of tests (static tests).

Inspectors shall at all times have full field of view of the area of influence of the machinery.

3.1 Operator

[16] Machines with a translation speed equal to or greater than 20 km/h.

Before starting you will be explained the process that will be followed for the inspection, paying special attention to the operations with the engine running and with the machine in motion.

The instructions shall be clear and shall not give rise to misinterpretations by the operator of the machinery. All necessary explanations shall be given to enable the operator to understand how operations are to be carried out with the machinery in motion, in particular braking, steering and operating tests with the work equipment.

The inspection staff must verify that the operator has understood the operations to be carried out, and that they know, at all times, the location of the inspectors.

3.2 Machine

Before commencing any operation, the existence and operation of all mechanical safety devices shall be checked and the location of the machinery shall be in accordance with paragraph 3.3 of this Annex. Wherever possible, these devices shall be in a locked position and shall only be unlocked when all persons in the area of influence of the machinery are notified of this fact. Particular care will be taken in the event that any of these devices is not operational, stopping the inspection if necessary and not resuming it until it is verified that minimum safety conditions are guaranteed.

Machine fluid levels (engine oil, hydraulic oil and coolant) will also be checked. These checks shall be carried out by the operator or by maintenance personnel, taking into account the precautions set out in section 3.4 of this Annex.

3.3 Places to carry out the inspection

Only persons directly connected with the inspection may remain in the area of influence of the machinery: the operator of the machinery, the inspector and the person assisting the machinery, the person responsible for maintenance and the operator of the inspected machinery may also be present.

3.3.1 Inspection with Stopping Machine

The location to check the stopped machine must meet the following requirements, to proceed with this phase of the inspection:

Away from the area of influence and work of other machines and people.

Conveniently signposted.

It shall be as flat as possible and shall have no inclinations which can set the machine in motion by failure or ineffectiveness of the parking brake.

It shall have a surface area large enough to permit the safe movement of persons present during the inspection.

It will have adequate lighting.

If fully or partially covered, ventilation must be ensured for engine start-up or exhaust gas analysis. It shall also be of sufficient height to ensure the safe lifting operation of the work equipment.

3.3.2 Inspection with moving machine

The track used to check the moving machine must meet the following requirements, in order to proceed with this phase of the inspection:

Departure from the area of influence and work of other machines.

Conveniently signposted.

It will have adequate lighting.

It will be as flat as possible and free of obstacles, allowing the machine to circulate safely.

It is essential that the track has means of escape for a hypothetical situation of failure in the brakes or in the direction.

If the performance of any of the brakes must be checked on a slope, it must have similar characteristics.

3.4 Inspection with Stopping Machine

Prior to any verification, the effectiveness of the stationary parking brake, the mechanical locking of the controls and the mechanical locking of the frame joint shall be checked and shall be operational throughout this phase of the inspection. Special care will also be taken with hot surfaces, if the machine was previously working, and with pressure vessels.

If it is necessary to lift the work equipment to carry out checks, the mechanical locking devices provided for by the manufacturer, or other elements provided for this purpose, shall be placed to prevent its unintentional descent. In no case can any of the areas of influence of the work team be accessed if it is not properly blocked.

The operator or the person responsible for maintenance shall open and fix the gates giving access to the engine compartment and the batteries, leaving the machinery until it is closed.

No person shall enter and remain in the position of the operator except the inspector or the person assisting him.

If tyre pressure needs to be measured, a pyrometer shall be used to check the tyre temperature in advance to ensure that it is within normal operating limits. Once this check has been carried out, a pressure gauge shall be fitted with a hose length allowing reading to be made from one side of the tyre (perpendicular to the tread, as far away as possible from the tread and, above all, from the sidewalls of the tyre). Pressure should never be measured if the temperature exceeds these limits and, even less, the inflation of a hot tire will be allowed, due to the risk of explosion that exists.

No plug of the hydraulic system or cooling circuit of the engine shall be opened without taking the necessary precautions, checking that the pressure and temperature of the fluids allow the opening to be carried out safely.

3.5 Inspection with machine stopped and engine running

Before starting the engine, it shall be checked that the transmission is disconnected and that the parking brake is still applied. Once the engine is started, it is essential to verify that the communications carried out are intelligible to all the people involved, due to the noise generated by the engine; the operator must leave the cabin until his presence is again required.

Particular care shall be taken in the accesses to the engine, with hot surfaces and moving elements (belts, fans, etc.).

Oversized machines: Once this stage of the inspection has been completed, the operator and one of the inspectors shall be placed in the cabin to check the elements of the main direction. The inspection staff below must communicate to their colleague the different movements to be made on the direction in a clear way, being the inspector located in the cabin who transmits these orders to the operator. A safety distance must be maintained in such a way that contact with either rack is impossible and sufficiently far from the machine's articulation area.

At this stage, any change in position, whether seen directly by the operator or not (via the established gestures or the broadcaster), must be permanently communicated by the downstream inspection staff.

Although the reversing movement of the machine is not presumed, when checking the operation of the lamps and the acoustic reversing warning device, a sufficient safety distance must be maintained, occupying a lateral position with respect to the possible movement of the machine.

If it is necessary to measure the luminous intensity of some of the lighting and signalling devices, the machine shall be stopped and the inspector or person who assists him must be in the cab with the operator, informing him of the position of his partner, being warned through the station.

3.6 Inspection of working equipment in operation

During operations with the work team, no person shall be near or on the machine, except the operator and one of the members of the inspection team, who shall be in the cab. Nor can it remain in the front of the machine, because there is a risk of falling materials that would have been adhered to the work equipment.

3.7 Inspection with moving machine

Before starting the machine, the operation of the service brake must be checked; for this purpose, a static braking test may be carried out.

No further tests shall be carried out if the service brake is not of adequate performance, or if the main steering is deficient.

If the emergency steering is electrically operated, its static operation shall be checked before further braking tests are carried out.

Once the above is done, the following steps are:

1. If the machine has a pneumatic braking support system, it shall be checked that the machine is retained by lowering the pressure of the pneumatic circuit, under the prescribed conditions.

2. Once the results of the above tests have been found to be favourable, the parking brake slope retention test shall be carried out on a track with the conditions referred to in paragraph 3.3.2 of this annex. Subsequently, the dynamic test of the service brake will be carried out, ending with the stalled engine slope retention test and the emergency brake test.

3. If the machine has emergency steering to support the main steering, after verifying that the machine has sufficient braking performance, the test shall be carried out on the slope of emergency steering, with the machine in motion and the engine stopped (or following the procedure set out in the instruction manual).

The slopes to be used in all cases must be in accordance with the most unfavourable situation expected, being necessary to adapt to the conditions of the test track and the machine.

ANNEX VIII

Periodic inspection form

MACHINE

TYPE:	BRAND:	MODEL:	N° SERIES:		WORKING HOURS:
CHARGING PALA ON WHEELS					
YEAR OF MANUFACTURING:	DATE OF PLACEMENT IN SERVICE	CE MARKING	PREVIOUS INSPECTION CERTIFICATE	DATE OF INSPECTION:	COMING DATE. INSPECTION:

USER

COMPANY:	
ACTIVITY:	
CIF:	
DIRECTORATE:	
PHONE:	
FAX:	
E-MAIL:	
CONTACT PERSON:	

ENGINE

BRAND AND MODEL	NOMINAL POWER (kW)	Maximum rpm

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
DOCUMENTATION	1									
Instruction Manual	3					D		X		
CHASIS	3									
Front frame	3					V	M	X		
Rear frame	3					V	M	X		
Motor block anchors	2					V	M	X		
Spoon Lift Arm Anchors	3					V	M	X		
Spoon Slewing Arm Anchors	3					V	M	X		
Spinning axles	2					V	M	X		
Train anchorages	3					V	M	X		
Counterweight	3					V	M	X		
Towing points	1					V	M	X		
Bumper	1					V	M	X		
Pneumatics	3									
NEUMATICS FRONT	3									
Same condition between tyres	1					V	M	X		
Tacos plucked	3					V		X		
Irregular tread wear	2					V	M	X		
Regular tread wear	2					V	M	X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Cuts on the flanks	3					V		X		
Screws	1					V		X		
Tire Status	2					V		X		
TREATMENT Pneumatics	3									
Same condition between tyres	1					V	M	X		
Tacos plucked	3					V		X		
Irregular tread wear	2					V	M	X		
Regular tread wear	2					V	M	X		
Cuts on the flanks	3					V		X		
Screws	1					V		X		
Tire Status	2					V		X		
ADDRESS SYSTEMS	3									
MAIN ADDRESS	3									
Steering wheel/Joystick	1					V	M	X	X	
Steering column	2					V		X		
Slacks on cylinders	3					V	M	X	X	
Slacks on the steering wheel	3					V	M	X	X	
Turning stops	1					V		X	X	

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Symmetry	3					V	M	X	X	
Cylinders	2					V		X		
EMERGENCY ADDRESS	3									
Operation	3						Test	X	X	
FRYING SYSTEMS	3									
Service brake	3						Test	X	X	
Oil leaks in packages	2					V		X		
Parking brake	2						Test	X		
Emergency brake	3						Test	X	X	
ENGINE	1									
FUEL SYSTEM	1									
Deposits	2					V		X		
Conductions	2					V		X		
Fast filling system	1					V		X		
REFRIGERATION SYSTEM	2									
Radiator	3					V		X		
Deposits	3					V		X		
Fan	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
Conductions	2					V		X		
Filling plug	2					V		X		
Level	1					V		X		
COMPARTIMENT ENGINE	2									
Oil leaks	1					V		X		
Oil level	2					V	M	X		
Straps	2					V		X		
Exhaust circuit	1					V		X		
IMPULSION TRAIN	2									
TRANSMISSION	1									
Transmission trees	1					V		X		
Differentials	1					V		X		
FINAL COMMANDS	2									
Leakage	3					V		X		
Damages	1					V		X		
HYDRAULIC SYSTEM	3									
Deposits	2					V		X		
Conductions	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
Scaffolding system	1					V		X		
Level	1					V		X		
Pneumatic system	2									
Calderines	1					V		X		
Conductions	2					V		X		
Purged	2					V		X		
Pressure	2					V		X		
PROTECTION STRUCTURES	3									
Fall protection structure of objects on windshield/spoon	2					V	M	X		
ROPS/FOPS cabin	3					V	M	X		
ACCESS ELEMENTS	2									
ACCESS TO THE CABINE	2									
Stairs	2					V		X		
stirrups	2					V		X		
Asideros	2					V		X		
Railings	2					V		X		
Non-slip surfaces	3					V		X		
Passage and permanence platforms	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
ACCESS TO MAINTENANCE POINTS	2									
Stairs	2					V		X		
stirrups	2					V		X		
Asideros	2					V		X		
Railings	2					V		X		
Non-slip surfaces	3					V		X		
Passage and permanence platforms	2					V		X		
OPERATOR'S POSITION	3									
SECURITY IN CABINA	3									
Lock and key	1					V		X		
Window and windshield windows	2					V		X		
Cabin brackets	2					V	M	X		
Door and window opening mechanisms	2					V		X		
Rear-view mirrors	3					V	M	X		
Emergency exit	2					V		X		
Door opening anchors	1					V		X		
OPERATOR'S SEAT	3									
Impairment of the operator's seat	2					V		X		
Rules	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
Suspensions	2					V		X		
Safety belt	3					V		X		
ENVIRONMENTAL CONDITIONS AND ERGONOMY	2									
Door and Window Burletes	1					V		X		
Symbols of the controls	2					V		X		
Commands	3					V		X		
HVAC system	2					V		X		
Cleaning the cabin	1					V		X		
Dust filter	1					V		X		
Interior lighting	1					V		X		
Operator Envelope Space	3					V	M	X		
SAFETY INFORMATION IN CABINA	1									
Indicators and alarm lights	2					V		X		
Performance test	2					V		X		
POWERING AND STOP DEVICES	2									
Key	2					V		X		
Start-up	2					V		X	X	
Stop	3					V		X	X	

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
SECURITY WORKS	3									
Mechanical work equipment locks (if required)	2					V	M	X	X	
Mechanical locking of the swivel joint	2					V	M	X	X	
Work team controls locks	3					V		X	X	
Other obstacles	2					V		X		
WORKING EQUIPMENT (OTHER IMPLEMENTS)	3									
Adaptation to the machine	3					V		X		
Quick coupling	2					V		X	X	
Slewing arms	3					V	M	X		
Lifting arms	3					V	M	X		
Spoon	2					V	M	X		
Spoon Slewing Bulbs	1					V	M	X		
Slewing arm bolts	1					V	M	X		
Lift arm bolts	2					V	M	X		
Neutralisation of controls	3					V	Test	X	X	
Operation	2					V	M	X	X	
Slewing cylinders	1					V	M	X		
Lifting cylinders	2					V	M	X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
SAFEGUARDS	3									
Compartment doors	1					V		X		
Fan guards and belts	3					V		X		
Guards for moving power transmission parts	2					V		X		
Mudguards	2					V		X		
High temperature parts guards	2					V		X		
WARNING AND DANGER INDICATORS	2									
Cabin indicators	2					V		X		
Machine indicators	2					V		X		
Towing point indicators	1					V		X		
FIRE PROTECTION	1									
Fire retardant material in engine compartment	2					V		X		
Extinction system	2					V		X		
ELECTRICAL SYSTEM	1									
Batteries	2					V		X		
Installation	2					V		X		
Current cutting device	3					V		X		
ACUSTIC NOTICES	3									

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
Reversing warning device	2					V		X	X	
Horn	2					V		X		
Start-up warning device (if installed by the manufacturer)	1					V		X		
LIGHTING AND INDICATION DEVICES	3									
FRONT PART	2									
Crossing	2					V	M	X		
Long	1					V	M	X		
Work	1					V	M	X		
Intermittent	3					V	M	X		
Rotating headlamp	2					V		X		
Position	1					V	M	X		
Retro-reflectors	1					V		X		
REAR PART	2									
Work	1					V	M	X		
Braking	3					V	M	X		
Back march	3					V	M	X	X	
Intermittent	3					V	M	X		
Position	1					V	M	X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Retro-reflectors	1					V		X		
NOISE IN CABINA	1									
Cabin noise	2						Test		X	
VIBRATIONS IN THE OPERATOR'S SEAT	1									
Vibrations in the operator's seat	2						Test		X	
OPACITY AND GAS OF ESCAPE	1									
Opacity of fumes	3						Test	X		
CO	2						Test	X		
HC	2						Test	X		
NO_x	3						Test	X		
CO_2	1						Test	X		

RESULT INSPECTION	ENTERED USER	O.C.M (SEAL AND SIGNATURE)
Favourable		
FAVOURABLE WITH [ ] DEFICIENCIES		
DISFAVORABLE WITH [ ] DEFICIENCIES		
NEGATIVE		

(Legend of the inspection sheet)

F = Favourable

DN1 = Level 1 deficiency

DN2 = Level 2 deficiency

DN3 = Level 3 deficiency

(Last page)

ANNEX IX

Report template

(Logo of the Department or Directorate-General of the Autonomous Community)	Technical Inspection of Mining Machinery n° Inspection Report:	(Logo of the O.C.M.)

MACHINE

TYPE:	BRAND:	MODEL:	N° SERIES:		WORKING HOURS:
CHARGING PALA ON WHEELS					
YEAR OF MANUFACTURING:	DATE OF PLACEMENT IN SERVICE	CE MARKING	PREVIOUS INSPECTION CERTIFICATE	DATE OF INSPECTION:	COMING DATE. INSPECTION:
		□	□		

USER

COMPANY:	
ACTIVITY:	
CIF:	
DIRECTORATE:	
PHONE:	
FAX:	
E-MAIL:	
CONTACT PERSON:	

ENGINE

BRAND AND MODEL	NOMINAL POWER (kW)	Maximum rpm

(Page 1)

(O.C.M. data)

(Page footer)

In the following columns appear those systems of the machine in which deficiencies of some kind were found, detailing the elements involved and the severity of the defect.

System concerned

Subsystem

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

System concerned

Subsystem 1

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

Subsystem 2

Inspection points	Deficiency	Description
Point 1		
Point 2		

...		

...

(Next pages)

Braking tests:

	E (%)	Lateral deviation (%)	Results	Test	Speed (km/h)
Service					
Emergency					
Parking					

GASEOUS EMISSIONS:

K :	m^{-1}
NO_x:	ppm
CO:	(%)
HC:	ppm
CO2:	(%)

CABIN NOISE:

LAeq,d:	dB(A)

FULL BODY VIBRATIONS:

A(8):	ms^{-2}

Legend:

F = Favourable DN1 = Level 1 Deficiency DN2 = Level 2 Deficiency DN3 = Level 3 Deficiency

Equipment used:

Gaseous emissions	Opacity of fumes	Cabin noise	Vibrations	Team	Team	Team
Brand/Model	Brand/Model	Brand/Model	Brand/Model	Brand/Model	Brand/Model	Brand/Model
N° Series	N° Series	N° Series	N° Series	N° Series	N° Series	N° Series
Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date

RESULT INSPECTION		ENTERED USER	OC.M. (SEAL AND SIGNATURE)
Favourable	□		
FAVOURABLE WITH [ ] DEFICIENCIES	□		
DISFAVORABLE WITH [ ] DEFICIENCIES	□		
NEGATIVE	□		

Comments:

Any defect not covered by the inspection procedure but likely to impair the safety of the machine must be included in this table, describing the element concerned, the system to which it belongs and the type of defect.

Type of measures to be taken (Mark with “X” where appropriate and the number of measures to be observed in each system)

System	Urgent	Necessary	To observe
Documentation			
Chassis			
Tyres			
Steering systems			
Braking systems			
Engine			
Drive train			
Hydraulic system			
Pneumatic system			
Protection structures			
Access elements			
Operator's position			
Safety barriers			

Work team			
Safeguards			
Warning and Hazard Indicators			
Fire protection			
Electrical system			
Acoustic warning devices			
Lighting and indication devices			
Cabin noise			
Vibrations in the operator's seat			
Opacity and exhaust gases			
Total			

Information note on the results: (Explanatory note to be included in the report)

Negative: The machine can NOT be made available to workers, until the deficiencies found in the affected systems indicated in the report are remedied.

Unfavorable with [ ] deficiencies: Urgent action should be taken to address the deficiencies found in the affected systems identified in the report. The machine can NOT be made available to workers, until the deficiencies found in the affected systems indicated in the report are remedied.

Favourable with [ ] deficiencies: Necessary measures should be taken to address the deficiencies found in the affected systems identified in the report.

Favourable: The machine has no deficiencies or only deficiencies that have no significant impact on safety. The machinery may be made available to workers, but the deficiencies indicated in the report must be remedied.

(Last page)

ANNEX X

Valuation method

1. Assessment of deficiencies

Each of the *deficiencies* of the inspection points, subsystems and systems of the machine are assigned the following value:

For inspection points

- No defects: You = 0.
- Level 1 deficiencies: Vd = 3.
- Level 2 deficiencies: Vd = 6.
- Level 3 deficiencies: Vd = 9.

For subsystems and systems

- No defects: You = 0.
- Minor deficiencies: Vd = 3.
- Moderate deficiencies: Vd = 6.
- Major deficiencies: Vd = 9.

Each inspection point, subsystem and system of the machine is assigned a *weight* (from 1 to 3) depending on the impact it has on the safety of the machine (Pp, Pss and Ps, respectively).

2. Assessment of inspection points

An inspection point may have one or more deficiencies, the highest level being the one that must be used to assign its defect.

The result (or contribution) of each inspection point Rp shall be equal to the product of its weight by the value of the deficiency it presents:

$$Rp = Pp \times Vd$$

3. Assessment of subsystems

If n inspection points belong to a subsystem, once their individual results have been obtained, the result of the subsystem to which they belong is calculated as follows:

$$Resultado\ de\ la\ inspección\ del\ subsistema\ (Rss) = \sum_{i=1}^{n} Rpi = \sum_{i=1}^{n} Ppi\ x\ Vdi$$

Rpi being the result of the i-th inspection point of the subsystem and Vdi the deficiency it presents.

The following limits shall be taken into account when classifying the state of the subsystem:[17]

*Table**10**. Assessment of machine subsystems.*

No defect	$Rss < \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 3$	Or,	--
Mild deficiency	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6 > Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 3$		Some inspection point with weight 3 has deficiency Level 1
Moderate deficiency	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9 > Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6$		Some Inspection Point with Weight 3 Has Level 2 Deficiency
Major deficiency	$Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9$		Some Inspection Point with Weight 3 Presents Level 3 Deficiency

4. Assessment of systems

If the system consists exclusively of inspection points (it does not have subsystems), it proceeds in the same way as in the previous case.

If the system consists of subsystems, the subsystems are first evaluated in the manner indicated in point 3. Then, if m subsystems belong to a system, once their individual results are obtained, the result of the system to which they belong is calculated as follows:

[17] For the whole Annex: the most unfavourable result will always be taken. In cases where all points belonging to a subsystem have weight 3, the numerical limits shall not be taken into account.

$$Resultado\ de\ la\ inspección\ del\ sistema\ (Rs) = \sum_{j=1}^{m} Rssj\ x\ Pssj$$

Rssj being the result of the *j-th subsystem* and *Pssj* its weight.

The following limits shall be taken into account when classifying the state of the system:

*Table**11**. Assessment of machine systems.*

Mild deficiency	$\sum_{j=1}^{m}\left(6\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right) > Rs \geq \sum_{j=1}^{m}\left(3\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n}$		Some subsystem with weight 3 has mild deficiency
Moderate deficiency	$\sum_{j=1}^{m}\left(9\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right) > Rs \geq \sum_{j=1}^{m}\left(6\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n}$	Or,	Some subsystem with weight 3 is moderately deficient
Major deficiency	$Rs \geq \sum_{j=1}^{m}\left(9\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right)$		Some subsystem with weight 3 has major deficiency

Ppij being the weight of point i-th belonging to subsystem j-th.

5. Assessment of the general condition of the machine

With n being the number of systems verified on the machine, and once the individual results of these are obtained, the overall result of the Rg machine is calculated as follows:

$$Resultado\ global\ de\ la\ máquina\ (Rg) = \sum_{k=1}^{n} Psk\ x\ Vdk$$

Psk being the weight of the k-th system and Vdk the deficiency it presents.

The following limits shall be taken into account when classifying the condition of the machinery:

*Table**12**. Classification of the result according to the score obtained.*

No defect	$Rg < \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$		
Favourable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$		Some system with weight 3 has mild deficiency
Unfavorable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 9 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6$	Or,	Some system with weight 3 has moderate deficiency
Negative	$Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 9$		Some system with weight 3 has major deficiency

ANNEX XI

Procedure for the evaluation of elements that may require disassembly

There are certain elements that, for evaluation or measurement, may require disassembly. This annex sets out the guidelines for verification:

Elements that require visual inspection.

Elements located in compartments closed by padlocks, screws, keys, etc., such as low maintenance batteries: the user of the machinery shall provide for this and shall keep such compartments open to facilitate inspection.

Elements that require measurement.

Moving parts that may be worn or loose: for the verification of certain parameters, such as clearances on bolts or bearings of steering elements, their disassembly and measurement must be carried out only if the person acting on behalf of the user (who will sign the inspection report) and the inspectors do not agree with the classification of the observed defect.

ANNEX XII

Restrictions on use

This annex details some special circumstances that may lead to a favourable report, but with restriction of use of the inspected unit. In such cases, the inspection report shall reflect those restrictions and the reasons for them. In particular, the following shall be taken into account:

1. Tyres with protective chains:

   The parameters to be verified in relation to the tyres (wear, cuts, lack of material, etc.) in those machines that are inspected with protective chains mounted on them, will be evaluated with a level immediately lower, in relation to the interpretation of defects established for machines without chains, provided that these chains are in good condition. If it is necessary to use this new interpretation, this should be noted in the inspection report, limiting the validity of the inspection certificate to the use of chains.

2. Manipulations not permitted by the manufacturer, in ROPS/FOPS structures, which do not involve plastic deformations caused by impact, overturning, etc., such as welds, cuts, drills, or the like, for the installation of elements such as emitters, antennas, extinguishers, air conditioning equipment, etc.

   If there are no other additional deficiencies, these will be treated as Level 1 deficiencies, with restrictions on the use of the machine to places and operations where there is no danger of overturning the machine or falling objects on it, limiting the validity of the certificate of inspection to this type of application.

3. Uninstallation of cabin by the user:

It may be classified as a Level 1 deficiency and proceed as in the previous point provided that it can be demonstrated that other factors, such as environmental conditions, state of the engine smoke exhaust system, etc., do not affect the safety and health of the operator.

4. Machines put into service before 1995:

   a) Not equipped with an emergency steering system by the manufacturer:

      If there are no additional deficiencies that lead the machine to an unfavourable or negative assessment and its installation is not possible for technical and/or economic reasons, these will be treated as Level 1 deficiencies, with a technical speed limitation[18] of the machine to 20 km/h, making the validity of the inspection certificate conditional on this maximum speed limit.

   b) With a braking system equipped by the manufacturer which does not meet the positive safety requirements:

      If there are no other additional deficiencies that lead the machine to an unfavourable or negative assessment and its installation is not possible for technical and/or economic reasons, these will be treated as Level 1 deficiencies, with restrictions on the use of the machine to places and tracks with maximum slopes of 10% and technical limitation[19] of the speed of the machine to 20 km/h, making the validity of the inspection certificate subject to these limits.

Points 2 and 3 will be treated as discussed, provided that they were made prior to the entry into force of this TS.

[18] The installation of a speed limiter is required if the machine can reach higher speeds.

[19] The installation of a speed limiter is required if the machine can reach higher speeds.

ET 10.02 INSPECTION OF RIGID BASTIDER VOLQUETS ON WHEELS

1. OBJECT AND FIELD OF APPLICATION

The purpose of this Technical Specification ('TS') is to establish the procedure for periodic inspections of rigid-frame dumpers on wheels, in service at mining sites.

Rigid-frame dump trucks on wheels expressly designed for use inside tunnels or galleries, rigid-frame dump trucks expressly designed for use on public roads and mini rigid-frame dump trucks are excluded.

2. DEFINITIONS

2.1. Nominal load: Maximum permissible load specified by the manufacturer.

2.2. Conservation: Set of operations that the manufacturer, user or others must perform to protect the machines against the corrosive action of the environment and against minor damage that may occur during handling, transport and storage.

2.3. Steering control element: Manual control medium by which the operator transmits muscle strength to the steering system in order to steer the machine. It comprises the typical steering wheel or any other means of manual control.

2.4. Element or system in good, safe or adequate condition: For the purposes of this TS, an element or system of the machine is considered to be in good condition, safe or suitable, provided that it performs the function for which it is designed, in terms of safety.

2.5. Steering effort: Necessary force exerted by the operator on the steering control element to drive the machine.

2.6. Power source for normal direction: Means to provide power for driving in power steering or servo steering systems, e.g. hydraulic pump, air compressor, electric generator.

2.7. Dumping: Self-propelled machine, on wheels or chains, with an open box,[20] which transports and overturns or extends materials. The loading of the machine is carried out by external means.

2.8. Rigid frame tipper on wheels: Tipper with a rigid frame whose steering system is by means of the front wheels.

3. REQUIREMENTS

The machinery to which this TS refers shall comply with the provisions specified below (for further details, see Annex IV, the points to be inspected in Annex VIII and the reference standards in Annex XIII), and which affect the use, maintenance and maintenance of all components and mechanisms which are directly related to the safety and health of persons. Its classification, for this purpose, will be carried out in accordance with Standard UNE 115408.

Note: the general classification of earthmoving machinery, including those included in this TS, is covered by Standard UNE-EN ISO 6165.

3.1. Documentation

The original or a copy of the manufacturer's instruction manual, written in Spanish or in the official language of the Autonomous Community in which the machinery is located or, at least, in a language which is understandable to the operator, shall be found in an appropriate place within the operator's cabin.

3.2. Access

[20] Other functions or modifications of the machine are not excluded: Rigid frame dumpers on wheels without box for the transport of blocks, with water tank for irrigation operations, etc., are within the scope of this ET.

Access to the operator's station and maintenance areas shall be maintained in accordance with the conditions laid down by the manufacturer. Anyone entering these areas should be prevented from coming into contact with dangerous parts of the machine (hot surfaces, moving parts, etc.). The systems for access to the operator's post must allow for three secure support points, and those for access to maintenance points for at least two (see *UNE-EN ISO 2867*).

3.3. Operator's position

Machines must be equipped with operator's cab and have a minimum enclosure space that ensures the complete operation of the machine in a safe and ergonomic manner (see *UNE-EN ISO 6682*).

From the operator's station any accidental contact with the wheels and the box must be impossible. The exhaust system of the engine must direct the gases in such a way that they do not affect the operator. There shall be no sharp edges at the operator's station. If pressure and/or high temperature tubes and hoses exist, they must be adequately protected.

The emergency exit(s) shall be in good condition, operational and properly marked. Doors and windows must have adequate anchoring devices, both when they are open and closed. All glazing must be safety glass. Indoor fixed lighting should make it possible to read the User's Manual when there is no outside light.

The machine must be equipped with a heating and ventilation system that provides the operator with adequate weather conditions and allows effective defogging of the front and rear windows of the cab.

3.4. Operator protection structures

Machines must be equipped with rollover protection structure (ROPS) and object drop protection structure (FOPS). Manipulations (drills, welds, etc.) that have not been authorized by the manufacturer's Technical Services or by an authorized workshop for the repair of safety elements, according to section 4 of the ITC SM-IND-10, are not allowed. These structures should be kept in good condition and should not be structurally deficient.

3.5. Seats

The operator's seat must retain all its operational settings. It will also keep your upholstery in good condition and must keep the operator in a stable position that allows control of the machine and adequate comfort. Armrests, if they exist, should provide firm support during machine operation.

The seat belt and its anchorages must be kept in good condition and must be replaced on the dates marked by the manufacturer or after the machine has suffered a serious accident.

If the machine has an additional seat, it must also be in good condition, as well as its seat belt.

3.6. Commands and indicators

The controls and indicators must be kept in good condition so as to enable:

a) Its easy access. Objects that may prevent proper operation should not be placed.

b) Your I.D. Their identification symbols must be kept legible.

c) If the signals of the controls are transmitted electrically, the parasitic currents must not, under any circumstances, cause dangerous foreseeable action; for this purpose, any

electrical or electronic equipment installed in the cab must comply with the applicable electromagnetic compatibility (EMC) requirements.

d) Preserve the sense of the movement made, according to the manufacturer's design.

e) Be operated without excessive effort, in normal operations.

The separation between pedals, their original dimensions and their surfaces, which will be non-slip, must be correctly preserved. Changes to the original functions of the pedals are not allowed, except in cases where the manufacturer has considered the possibility of programming them by the operator.

The protections in those controls whose involuntary operation may mean a danger, must be kept in good condition.

There must be no dangerous movement of the machine and the box after starting, interrupting the power supply or stopping the engine.

All symbols identifying the controls and indicators must consist of pictograms, or be written in Spanish or in the official language of the Autonomous Community in which the machinery is located or, at least, in a language which is understandable to the operator.

3.7. Steering systems

The normal steering control element for the operator intended by the manufacturer (flyer) must be retained; the operator must endure an abnormal effort on the part of the operator in a hypothetical panic situation.

The sensitivity, actuation and response of the normal steering system should be adequate in order to allow the qualified operator to constantly keep the machine on the intended path for each of the functions for which the machine is designed.

All machines must be equipped with an emergency steering system, and their manual must include the following:

a) The mention that the machine is equipped with this system.

b) The limitations of this.

c) The on-site test procedure to verify its operability.

Driving effort must be adequate, although somewhat greater efforts are allowed in the case of the emergency steering system.

The movement of the steering control element to produce a result should not vary excessively between right and left turns.

The warning device (sound or visual) indicating any failure of the power source in the normal direction must be kept in good condition.

Steering systems must allow safe manoeuvring with the machine (see *UNE EN ISO 5010 on tests of steering systems*).

3.8. Braking systems

Braking systems equipped on the machine must be efficient under all conditions of service, load, speed, terrain and slope foreseeable by the manufacturer and in line with normal working situations (refer *to Standard UNE-EN ISO 3450 on braking tests*).

The capacity of each braking system must be identical on each wheel of at least one axle on which it is applied.

3.8.1. Service brake

The operator must be able to safely decelerate and stop the machine using this system. If energy accumulators are used as the main application force for the service brake, the service brake must be equipped with a warning device (continuous alarm visible and/or audible) that is activated before the value of the accumulated energy falls below the values specified by the manufacturer. In addition, the service brake must maintain adequate recovery capacity.

3.8.2. Emergency brake

In the event of a service brake failure, this system must allow the operator to safely decelerate and stop the machine. In addition, the emergency brake must maintain adequate recovery capacity.

3.8.3. Parking brake

Once powered, it cannot depend on an exhaustible energy source. The parking brake must maintain an adequate immobilisation capacity, even on a slope and at nominal load.

3.8.4 Delayed r

It must retain the retardation capacity established by the manufacturer. In the cabin the diagrams of the retardation characteristics of the machine must be in good condition.

3.9 Visibility

3.9.1 Operator field of view

The operator must at all times have sufficient visibility in relation to the working and driving area of the machine. The glazing of the cab and rear-view mirrors must be kept in good condition; The latter should be sufficient in number and appropriately targeted. If the machine is equipped with additional devices (ultrasound, television, etc.) these should be kept in good condition. There must be no added objects in the cabin that prevent proper vision. Windscreen wipers/washers and the front and rear window anti-fog system should be kept operational.

3.9.2 Lighting, light-signalling and retro-reflective devices

All systems and devices installed by the manufacturer must be kept in good condition. In particular, rigid-frame dumpers on wheels must equip at least:

a) Emergency lights.

b) Front-lateral intermittents.

At the front:

a) Position lights.

b) Dipped-beam headlamps (front working lamps, if any, shall be considered for the purposes of this ET as complementary to dipped-beam headlamps).

c) Road lights.

d) Intermittent.

On the back:

a) Position lights.

b) Intermittent.

c) Brake lights.

d) Reversing lights.

e) Retro-reflectors.

Their function, location, number, grouping, reciprocity, intensity, orientation, colorimetric characteristics and flashing frequency (in the case of flashing lights and rotating headlamps) *shall be appropriate (see UNE-ISO 12509 on lighting systems).*

3.10. Warning and signalling devices

The following devices shall retain their functionality and an appropriate sound level:

a) The audible warning device (speaker),

b) The start-up audible warning device (if fitted by the manufacturer); and

c) The acoustic recoil warning device.

3.11. Sound emissions

The machine must be kept in a state of conservation that allows it to comply with the limits that apply to it, both for noise emissions and[21] for the sound level at the operator's station.

3.12. Protective devices

All guards, guards and screens that prevent accidental contact with any hot surface or moving parts by the machine operator or during maintenance operations must be kept in good condition. Any hot surface or movable part accessible to persons must be adequately protected.

3.13. Engagement and transport

The anchorage points and attachment devices of the machine must be kept in good condition.

3.14. Electrical components

The electrical installation of the machine (batteries, cables, pipes, fuses and other overload protection systems, etc.) must be kept in good condition, avoiding mechanical deterioration or environmental conditions.

3.15. Pipes and hoses

All pipe and hose protections with high pressure or high temperature fluids should be kept in good condition.

3.16. Pressure vessels, fuel and hydraulic tanks

[21] Noise emission measurement is outside the scope of this ET.

Loading nozzles must be easily accessible, fitted with a lid that can be immobilised and located outside the operator's cab. The means provided to remove the internal pressure shall be operational. Pressure vessels must keep their information plate legible.

3.17. Fire protection

The fire protection system (fire extinguishers or automatic system) must comply with the required regulations, in relation to its periodic reviews, maintenance and conservation.

3.18. Tipper Box

3.18.1 Descent of the box

With the engine stationary it should be possible to lower the case to its transport position (chassis) and remove any residual pressure in the hydraulic and pneumatic systems. The way to perform this operation must be explained in the operator's position or in the Instruction Manual. The control that facilitates the descent of the box may be located outside the cabin, but always in a safe place and so that the person performing the operation has direct vision of the box.

3.18.2 Box indicator in transport position

The indicator that warns that the box is not in its transport position must be operational.

3.18.3 Box locking device

The mechanical elements (shafts, pins, etc.) of the safety lock of the box, which allows it to be secured in its highest position, must be kept in good and operational condition.

3.18.4 Unloading safety device

If installed by the manufacturer, this safety device must be kept in good condition.

3.18.5 Adhered load

The heating system of the housing shall be kept in good condition.

3.19. Tyres and rims

The machine must be equipped with the tyres and rims covered by the manufacturer (of the machine and of the tyres). Its state of conservation (pressures, wear, etc.) will be adequate and equal for the same axis, within the specified limits.

3.20. Marking

The machine must keep legibly and in a visible place its characteristic plate and the adhesive plate corresponding to the last inspection carried out. The warning signs necessary for the safe operation of the machine must also be in the same condition.

Both the plates and the warning signs must be in Spanish or in the official language of the Autonomous Community in which the machine is located.

ANNEX I

Verification of requirements and/or security measures

In order to verify compliance with the requirements set out in this TS, one or more of the following possibilities should apply:

a) Measurement, in those inspection points for which the use of specific instrumentation is needed to obtain the results.

b) Visual examination, at those inspection points for which it is not necessary to use any instrument or equipment outside the machine itself.

c) Evaluation of the documentation, related to the documents provided by the manufacturer, and the records, dossiers and accreditations of the machine.

d) Test, where applicable, if there is a method prescribed for any particular requirement in the standard cited as reference , [or in the manufacturer's instruction manual. With exceptions, all tests require some type of measurement.]

Measurements shall be made at those points for which, in the opinion of the inspector, the visual examination has not clearly determined their condition.

The use of specific instrumentation is mandatory for the testing of certain systems (braking systems and exhaust gas system), to measure cabin noise and full body vibrations transmitted to the operator.

[or in the manufacturer's instruction manual. With exceptions, all tests require some type of measurement.] Taking into account the objectives and scope of this TS, the methods prescribed in the reference standards, such as those relating to braking systems, must be adapted to each machine and to the conditions of the tracks where these tests are carried out, and must ensure that they are as appropriate as possible to the type of test to be carried out. In the above-mentioned case of braking systems, the highest speed allowed by the conditions of the machine and the test track shall always be chosen.

ANNEX II

Inspection phases

The inspection procedure shall consist of several phases or stages, which are classified taking into account the state of operation of the engine and the machinery.

There are basically two ways to perform the tests or trials: statically and dynamically.

Static tests must be carried out when the points to be inspected do not require, for their correct evaluation, any movement of the machine, its elements (except for the moving elements of the engine, such as belts and fans) or its case. In turn, two types of static tests are distinguished:

a) With the engine stopped, or

b) With the engine running.

The dynamic tests must be carried out when the points to be inspected require, for their correct evaluation, specific movements of the machine, its elements or its box. In turn, three types of dynamic tests are distinguished:

a) With machine elements in motion, but without machine translation movement (examples: checking for slacks in the directional elements or for symmetry in the direction).

b) With the box in motion, but without moving the machine, or

c) With the machine moving.

Dynamic tests should also be considered as those that, although the movement of the machine, its elements or its box is not required or expected, may give rise to involuntary movements of these, due to malfunction of one of the systems (for example, parking brake retention test with the machine stopped on slope).

ANNEX III

Classification of deficiencies

Each of the inspected points, because they have a direct relationship with the safety of the machine, may present a degree of deviation (wear, mismatches, malfunctions, damage, lack of parts, etc.) that distances it from what should be considered its normal situation (in minimum conditions that can guarantee safety). This degree of deviation results in classifying the deficiencies found in these points as follows:

a) Level 1 deficiency (DN1), in which it must be understood that the observed deviation of the element from the minimum safety conditions does not immediately affect it, but that, if its evolution were not controlled, it would lead to a less desirable situation and would not guarantee safety.

b) Level 2 deficiency (DN2), in which it must be understood that the observed deviation of the element from the minimum safety conditions can immediately affect it, not making sense in this case to control its evolution, since it should not be allowed.

c) Level 3 deficiency (DN3), in which the observed deviation of the element from the minimum safety conditions must be understood to clearly affect it.

On the other hand, the deficiencies found in each of the systems and subsystems inspected will be classified according to the risks generated by each of them, from the point of view of safety, assessing together the probability of damage occurring and the severity of it. Deficiencies in systems and subsystems shall therefore be classified as:

a) Minor deficiencies: When they do not affect the safety and health of people immediately and, if the damage occurs, it has minimal consequences.

b) Moderate deficiencies: When they affect the safety and health of persons, but do not pose an imminent or serious risk.

c) Major deficiencies: When they involve an imminent or serious risk to the safety and health of persons.

ANNEX IV

Assessment of inspection points

This Annex sets out, in general terms, the criteria to be used, and the classification of defects may be changed in exceptional cases, at the discretion of the inspector.

The symbol (X) indicates that the defect at the inspected point can be classified in several ways, depending on its state.

The order of appearance of the different inspection points, as shown in the inspection sheet in Annex VIII, does not necessarily imply a temporary pattern to be followed during the inspection, nor is it necessary to inspect all points belonging to the same system consecutively. It should be up to the inspectors to decide which points to check at each stage of the inspection, depending on the circumstances and their experience.

Where appropriate, the machine hardware shall be checked by visual examination, without the use of tools to check the tightening torque.

At each stage of the inspection, the points shall be evaluated in accordance with one of the methods set out in Annex I. The results of each of these points shall be classified in accordance with the criteria laid down in Annex III. To this end, the following must be taken into account in order to comply with the requirements specified in paragraph 3 of this TS:

1. Instruction manual

For the classification of deficiencies, the following aspects shall be taken into account:

a) Location, content and conservation status of the documentation to be submitted.

b) The language in which the documents are written.

c) The correct identification of the machine.

Instruction manual	Classification		
	DN1	DN2	DN3
Content and conservation status:			
Absence of unreadable sheets or paragraphs	X		

Instruction manual	Classification		
	DN1	DN2	DN3
Absence of unreadable sheets or paragraphs in the security section		X	
Does not exist			X
Language and identification:			
It is not in Spanish or any of the other official languages		X	
Does not belong to the machine (n° series outside the interval)		X	(X)
User-produced manual that does not take into account important safety aspects		X	(X)

2. Chassis

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, remnants of weld cords, areas with lack of material, etc.

b) Screws of the different worn, loose or non-existent anchors.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

Chassis	Classification		
	DN1	DN2	DN3
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones with thickness loss up to 10%	X		
With thickness loss up to 20%		X	
With thickness loss of more than 20%			X
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)

Chassis	Classification		
	DN1	DN2	DN3
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)

3. Tyres[22]

For the classification of deficiencies, the following aspects shall be taken into account:

a) The types of tires mounted on each side and their condition.

b) The condition of the tyres that are mounted on the steered wheels.

c) The condition of the tyres mounted on the twin wheels.

d) The number, location and depth of tacos plucked[23].

e) The number, location, length and depth of the cuts on the flanks.

f) The wear condition of the tread.

g) Joint influence of deficiencies in the same bending area, on the tyre and between tyres on the same axle.

h) Worn, loose or non-existent anchor screws.

i) The number and location of missing or deficient screws.

j) The structural state and efficiency of stone extraction bars.

Tyres	Classification		
	DN1	DN2	DN3
Types of tyres (for each axle and/or twin wheel):			
Different dimensions	X	(X)	
At least one of them has features not allowed by the manufacturer			X
Different condition of each tyre	X	(X)	

[22] Machines equipped with chains may be inspected with them (See *Annex XII*).

[23] Tacos will be classified as defective if some of them have a certain defect, and therefore the total absence of these is not necessary.

Tyres	Classification		
	DN1	DN2	DN3
Irregular wear (difference between average and lower heel height), with reference to average heel height:			
Not more than 5%	X		
Not more than 10%		X	
Exceeds 10%			X
Regular wear.- In relation to the uniform wear of the tread, if the tyres have final wear controls, these will be taken as a reference; otherwise, the following shall be taken as a reference:			
End wear witnesses:			
0.5 cm to reach it	X		
Wear witness has been reached		X	
Wear witness overrun			X
Less difference between the sculpture and the background of the sculpture:			
Between 2.5 and 3 cm	X		
Between 2 and 2.4 cm		X	
Difference less than 2 cm			X
Small tyres (e.g. old machines with a nominal capacity of 25 tonnes)			
Between 1.5 and 2 cm	X		
Between 1 and 1.4 cm		X	
Difference less than 1 cm			X
Existence of cuts on the flanks:			
Large insulated cut that does not reach protection mesh	X		
Reaching the protective mesh, without affecting it		X	
Affecting the protective mesh			X
Small cuts in the same bending area that do not reach the protective mesh	X		
Large cuts in the same bending area that do not reach the protective mesh		X	
Reaching the protective mesh			X
Formation of air chambers between tarpaulins without leakage:			
Small in size, not located in the same bending area	X		
In the same bending area		X	
Medium in size, not located in the same bending area		X	

Tyres	Classification		
	DN1	DN2	DN3
In the same bending area			X
Large			X
Formation of air chambers between tarpaulins with leaks to the outside			X
Loss of material:			
Small in size in the same bending area	X		
Medium size		X	
Reaching the protective mesh, without affecting it		X	
Large or affecting protective mesh			X
Tacos plucked:			
Less than 5% of the studs are missing, in non-contiguous positions, without showing the casing	X		
In contiguous positions		X	
Missing between 5% and 10% of the studs, in non-contiguous positions, without showing the casing		X	
In contiguous positions			X
More than 10% of tacos are missing			X
Missing some taco that lets you see the casing			X
Anchor screws:			
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Tire Status:			
Structural damage (permanent tire deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		
Status of stone strips:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		
Absence of any of the bars			X

4. Damping system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, remnants of weld cords, areas with lack of material, etc.

b) Screws of the different worn, loose or non-existent anchors.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

g) The amount of oil lost from leaks in the cylinders.

h) The existence of bites on the plungers.

i) The damping efficiency, both under vacuum and under load[24].

Damping systems	Classification		
	DN1	DN2	DN3
Free space in vacuum:			
Outside the manufacturer's specifications		X	(X)
Nominal load clearance:			
Outside the manufacturer's specifications	X	(X)	
Anchorage:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Condition of the damping system:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		

[24] Testing with the loaded machine is not mandatory, although it is recommended. In the case of loading the machine, this operation will be carried out as a usual loading operation, it being not necessary to carry out the weighing of the load to verify if the machine has its nominal maximum load; this verification shall be carried out by estimation.

5. Steering systems

For the classification of deficiencies, the following aspects shall be taken into account:

a) Operation and condition of the steering wheel and steering column.

b) The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the elements of the direction.

c) The proportion of affected area.

d) The proximity of the affected areas and the deficiencies.

e) Symmetry in steering wheel and helmsmanship performance.

f) The amount of oil lost from leaks in the cylinders.

g) The existence of bites on the plungers.

h) Excessive slacks between elements.

i) Effective operation of both the main and secondary management.

Steering systems	Classification		
	DN1	DN2	DN3
Steering elements (Flying, steering column, turning stops, pins and cylinders), structural condition:			
Structural damage (permanent deformations in the elements, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Steering wheel, operation:			

Steering systems	Classification		
	DN1	DN2	DN3
Moderate effort is required for its operation, but it does not make it inoperative	X		
It shows the need to apply sudden movements for control or dead spots in its route		X	
Difficult drive			X
Slacks in the elements of the address:			
Axial slacks on pins or bolts, relative to their nominal length:			
Up to 10%	X		
Between 11% and 15%		X	
Over 15%			X
Radial slats on pins or bolts, relative to their nominal diameter:			
Up to 5%	X		
Between 6% and 10%		X	
Greater than 10%			X
Slacks on the steering wheel. Free ride of the steering wheel in either direction:			
It's between 10 and 15 degrees	X		
It's between 16 and 20 degrees.		X	
It is greater than 20 degrees			X
Symmetry. The movement of the elements of the steering control, to produce a given result varies, between the turns to the right and to the left:			
Between 20% and 25%	X		
Between 26% and 30%		X	
More than 30%			X
Emergency address:			
Steering wheel control:			
Excessive effort is required for its operation, but it does not make it inoperative	X		
It shows the need to apply sudden movements for control or dead spots in its route		X	
Direction of very difficult actuation		X	

Steering systems	Classification		
	DN1	DN2	DN3
Maneuverability:			
Low manoeuvrability (short operating time, only allows initial movement in one direction, with the possibility of a change)	X		
Insufficient maneuverability (short operating time, only allows initial movement in one direction, without the possibility of a change)		X	
Inability to maintain control		X	
Operation:			
Intermittent (it does not work in some cases or you have to press the switch two or three times for its activation)	X		
The switch must be pressed more than three times for activation		X	
Does not work		X	
Non-existent or partially or completely disassembled			X

6. Braking systems

For the classification of deficiencies, the state of each of the systems forming it shall be taken into account together. For each braking system, the following aspects shall be taken into account:[25]

a) The efficiency in braking, stopping the machine in safe conditions.

b) Excessive deviation from the rectilinear path during braking.

c) Retention capacity.

d) The general state of the system.

e) How to apply the system by the operator (expected operation of the controls or pedals of the system).

f) The amount of oil lost from leaks in packages.

g) The effort that the operator must make to apply the system.

For the verification of each braking system, several methods have been established, with dynamic or static tests, as the case may be, taking precedence over engine torque tests: therefore, as a general rule, dynamic or static tests should be applied, leaving torque tests to be carried out only in cases where it is not possible to apply the above mentioned tests. If engine torque testing is to be

[25] The machine should be tested without load, where possible.

used, the inspector shall reflect in the inspection report the reasons why he was unable to perform the other tests. The following table summarises these tests, which are detailed below.

Braking system	Test			Parameters to check	Other checks	Comments
	Static	Dynamics	Against engine torque			
Service		X	X	E_e or E_2 - μ or β	Oil leaks in packages	2 tests of one type
Emergency (no blockage by power cut)		X	X	E_e or E_2 n° Drives	• Warning device • Automatic drive	1 test of a type
Emergency (with power cut-off)		X	X	E_e or E_2 – t_r - E_b		
Parking	X		X	P_e or E_2	Disc status, drum, etc.	1 test of a type
Delayer		X			Loss of capacity	1 test

Requirements for runways and slopes used for checking braking systems:

a) The test tracks for dynamic tests of service and emergency braking systems may have a maximum inclination of 5%, both longitudinally and transversely, in relation to the direction of travel of the machinery.

b) For the static test of the parking braking system, the slope where the machine is located shall allow the free movement of both undercarriages; this slope must be verified on the machine itself.

In the case of the retarder, it is sufficient to check that it performs its function according to the specifications given by the manufacturer (in the cabin diagrams or in the instruction manual), preventing the machine from acquiring speed by descending slopes, when this is applied.

Braking systems	Classification		
	DN1	DN2	DN3
System effectiveness			
Service brake			
Dynamic test without load:			
0.9 E > Ee ≥ 0.8 E	X		
0.8 E > Ee ≥ 0.7 E		X	
0,7 E > Ee			X
Dynamic test with load:			
0.9 E > Ee ≥ 0.8 E	X		
0.8 E > Ee ≥ 0.7 E		X	
0,7 E > Ee			X
Emergency brake			
Dynamic test without load:			
0.95 E > Ee ≥ 0.9 E	X		
0.9 E > Ee ≥ 0.85 E		X	
0.85 E > Ee			X
Dynamic test with load:			
0.9 E > Ee ≥ 0.8 E	X		
0.8 E > Ee ≥ 0.7 E		X	
0,7 E > Ee			X
Parking brake, slope retention:			
Min- 6% ≤ Pe < Min- 3%	X		
Min- 9% ≤ Pe < Min- 6%		X	
Pe < Min- 9%			X
Deviation of rectilinear path during braking, service brake:			
30% ≥ μ > 25%	X		
35% ≥ μ > 30%		X	
μ > 35%			X
Retention tests against engine torque[26]			
Service brake			
Brake efficiency:			
95% > E2 ≥ 85%	X		
85% > E2 ≥ 75%		X	
75% > E2			X
Breakdown distribution:			
30% > β ≥ 25%	X		

[26] During these tests, braking systems will normally hold the machine. In this situation, the draught of the converter is caused, which results in excessive heating of the transmission oil, so this check cannot be maintained for a long time (less *than one minute)*. Therefore, you should always opt for dynamic testing, resorting to static testing in exceptional cases.

Braking systems	Classification		
	DN1	DN2	DN3
35% > β ≥ 30%		X	
β ≥ 35%			X
Emergency brake			
Brake efficiency:			
85% > E2 ≥ 75%	X		
75% > E2 ≥ 65%		X	
65% > E2			X
Parking brake			
Brake efficiency:			
85% > E2 ≥ 75%	X		
75% > E2 ≥ 65%		X	
65% > E2			X
Retarder capacity			
The system has lost its retaining capacity considerably (insignificant contribution to machine retention)	X		
The system has totally lost its retention capacity		X	
Fully or partially uninstalled			X
Energy Accumulation System Capacity Test for Unladen Machine Braking[27]			
Number of fully effective service brake actuations required by UNE-EN ISO 3450:			
You get four	X		
You get between two and three		X	
You get one or none			X
Less than five are achieved, leaving the machine locked	X		
Warning device[28]:			
The alarm is not continuous, audible and / or visible, but acts long enough to attract the attention of the operator	X		
Alarm does not attract operator's attention		X	
With the engine running and the doors and windows closed, its sound is not properly perceived	X		

[27] These tests shall be taken as requirements for the emergency braking system. This test must be performed if the energy accumulated in the service brake calderines is also used to operate the emergency brake, and the model does not have an automatic power cut-off locking system. It shall also be performed on machines with oil accumulator for the service brake system. The number of full actuations of the service brake of the machine, with the engine stopped, shall be checked on a slope of 12% (±1%), starting with the machine stopped and with an interval of 5 seconds between actuations, so as to allow free movement between braking.

[28] In addition to the above, the service brake energy shall be reduced by any appropriate means (e.g. purging of the calderines). The warning device shall be activated before the cumulative energy value is less than 50% of the maximum operating value specified by the manufacturer. The warning device shall be activated before the automatic application of the emergency brake.

Braking systems	Classification		
	DN1	DN2	DN3
The warning device is not a visible and/or audible continuous alarm		X	
The warning device is activated below 50% of the value of the accumulated energy	X		
Warning device is not activated		X	
Automatic operation of the emergency brake			
The automatic drive is activated when the value of the accumulated energy is:			
Below 45% of the maximum operating value specified by the manufacturer	X		
Below 40% of the maximum operating value specified by the manufacturer		X	
Below 35% of the maximum operating value specified by the manufacturer			X
Machines with automatic locking system by power cut[29]			
Response time:			
5 s < tr ≤ 6 s	X		
6 s < tr ≤ 8 s		X	
tr > 8 s			X
Brake efficiency:			
19% > Eb ≥ 17%	X		
17% > Eb ≥ 15%		X	
Eb < 15%			X
Oil leaks in packages:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X

Being:

P_e (%) the minimum slope at which the machine is retained

P_{min} (%) the minimum required slope, according to UNE-EN ISO 3450

E (%) braking efficiency required by UNE-EN ISO 3450

E_e (%) the braking efficiency obtained in each of the tests

μ (%) the ratio between the maximum frontal and lateral decelerations of the machine, obtained during the test

[29] It shall be checked whether this system operates within the safety margins. The test shall be carried out at a speed of 4 ± 1 km/h on a slopeless surface, measuring the time elapsed from the power cut-off to the start of the system operation (response time t_r) and the

E_2 (%) the ratio of engine revolutions per minute at which the system stops holding the machine to 70% of the maximum engine revolutions

β (%) the brake distribution, calculated as the complementary to the ratio of the difference between the number of maximum engine revolutions and the revolutions per minute of the engine at which some of the wheels begin to move, and the difference between the number of maximum engine revolutions and the revolutions per minute of the engine at which the system ceases to retain the machine

NOTE.- If dynamic braking tests are to be carried out under adverse weather conditions,[30] the following correction factors shall be taken into account:

Wet runway (with formation of water and/or mud bags)	Machines weighing less than 32,000 kg	Machines weighing 32,000 kg or more
Of earth or similar	0,7	0,6
Of asphalt or similar	0,8	0,7
Concrete or similar	0,9	0,8

On the other hand, if the conditions of the track cause the tyres to sink,[31] the aquaplaning or hydroplaning[32] or the skidding[33] of the machine, the track must be conditioned before the tests in order to avoid these phenomena. If this conditioning is not possible, static or torque tests shall be carried out, as appropriate.

7. Engine

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence of leaks and corrosion phenomena in the fuel and coolant tanks of the engine, and the amount of fluid loss.

b) The existence of shocks, breaks, cracks, fissures or leaks of fuel or coolant.

c) The condition and operation of the filling cap of the fuel tanks and coolant.

d) The existence of bites, cuts, loose flanges or leaks (and *amount of fluid loss)* in the fuel system or engine cooling system ducts.

[30] In these circumstances, any deviation from the rectilinear path during braking shall not be taken into account.

[31] Waterlogged tracks with little compaction (sand, slate or marble limestone powder, etc.)

[32] Waterlogged tracks with good compaction (asphalt, concrete, etc.)

[33] Tracks with good compaction, with ice formation or snow accumulation.

e) The operation of the rapid fuel filling system and its strainer system.

f) The structural state of the fan blades and their operation.

g) The general condition of the engine compartment.

h) The amount of oil lost from engine leaks.

i) The proportion of fumes and gases leaking into exhaust manifolds.

Engine	Classification		
	DN1	DN2	DN3
Fuel system			
Structural status of tanks and pipelines:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of capacity	X		
Dents in tanks with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Fuel leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Filling plug:			
Deficient state or performance	X	(X)	
Absence of cap			X
Fast filling system			
Deficient state or performance	X	(X)	
Cooling system			
Operation:			
The system does not maintain the temperature within the limits set by the manufacturer		X	(X)
Structural status of elements:			
Structural damage (cracks, breakages, etc.)		X	(X)

Engine	Classification		
	DN1	DN2	DN3
Dents in tanks or radiator without appreciable loss of capacity	X		
Dents in tanks or radiator with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Coolant leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Filling plug:			
Deficient state or performance	X	(X)	
Absence of cap			X
Fans:			
Poor condition or absence of blades	X	(X)	
Levels:			
Below the manufacturer's requirements	X	(X)	
Engine compartment			
Exhaust circuit status:			
Structural damage (cracks, breakages, etc.)		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Flue gas leakage:			
Sporadic or intermittent	X	(X)	
Continuing		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Levels:			
Below the manufacturer's requirements	X	(X)	

Engine	Classification		
	DN1	DN2	DN3
Straps:			
Worn or cracked, with sufficient tension	X		
Other defects		X	(X)

8. Drive train

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, areas with lack of material, etc. on the tree, differentials, final controls or other elements of the transmission.

b) Screws of the differentials, final controls or of the joints between elements of the transmission, worn, loose or non-existent.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

g) The amount of oil lost due to leaks in the differential groups or in the final controls.

Drive train	Classification		
	DN1	DN2	DN3
Status of transmission shafts, differential groups and final controls:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Oil leaks in differential groups and final controls:			

Drive train	Classification		
	DN1	DN2	DN3
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X

9. Hydraulic system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence of cracks, fissures, dents, etc., in tanks and ducts (rigid *and flexible)*.

b) The loss of tank and system capacity due to dents or oil leaks.

c) Operation (flow *and pressure suitable for the steering and lifting system of the housing*).

d) References shall be the design pressures and flow rates of the machine.

Hydraulic system	Classification		
	DN1	DN2	DN3
Structural condition of rigid and flexible tanks and pipes:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of capacity	X		
Dents in tanks with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Scaffolding system:			
Deficient state or performance	X		
Absence of a strainer system		X	
Levels:			

Hydraulic system	Classification		
	DN1	DN2	DN3
Below what is established by the manufacturer, not affecting the hydraulic system of the steering	X	(X)	
Below what is established by the manufacturer, affecting the hydraulic system of the steering		X	(X)

10. Pneumatic system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence of cracks, fissures, dents, etc., in tanks and conduits.

b) The loss of capacity of the boilers and the system, due to dents and / or air leaks.

c) Operation (appropriate *pressure for braking systems*).

d) References will be machine design pressures.

Pneumatic system	Classification		
	DN1	DN2	DN3
Structural status of boilers and pipelines:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of volume	X		
Dents in tanks with appreciable loss of volume		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Air leakage:			
That cause the pressure drop of the system gradually	X	(X)	
That cause the pressure drop of the system immediately		X	(X)
Purged of calderines. Accumulation of water or other substances:			
Expulsion of substances intermittently	X		
Continuously expelling substances		X	(X)
Pressure:			

Pneumatic system	Classification		
	DN1	DN2	DN3
Below what is established by the manufacturer, not affecting any braking system	X	(X)	
Below what is established by the manufacturer, affecting any of the braking systems		X	(X)

11. Protection structures

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, remnants of weld cords, areas with lack of material, etc., in the cabin (ROPS/FOPS) and in the visor of the box.

b) Screws of the different worn, loose or non-existent anchors.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

g) The existence of non-permissible operations, such as drills, cuts or welds (ROPS/FOPS *cab and case visor)*.

Protection structures	Classification		
	DN1	DN2	DN3
ROPS/FOPS cab structural status:			
Structural damage (deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones with thickness loss up to 5%	X	(X)	
Corrosion zones with thickness loss greater than 5%		X	(X)
Status defects in anchors	X	(X)	
FOPS structural status (box view):			
Any type of defect	X	(X)	
Restrictions on use:			
Unauthorised manipulations, before the entry into force of this TS	X		

12. Access elements

For the classification of deficiencies, the following aspects should be taken into account:

a) When accessing the machine or the cab, the access elements (stands, *steps*, *railings*, *etc.)* must at all times provide three secure support points.

b) The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the access elements and in the passage and permanence platforms.

c) Screws of the different anchors of elements to the worn, loose or non-existent chassis.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies (on *the platforms*).

f) The number and location of missing or deficient screws.

g) The effective footprint and pass distance of the anti-slip surfaces of the machine.

Access elements	Classification		
	DN1	DN2	DN3
Status of items:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Non-slip surfaces. Effective Footprint and Passing Distance:			
Loss of adhesion or non-slip surface	X	(X)	
Absence of non-slip surfaces		X	(X)

13. Operator's position

For the classification of deficiencies, the state of each of the systems forming it shall be taken into account together.

Cabin safety

For the classification of deficiencies, the following aspects should be taken into account:

a) The cabin must have adequate means for closing doors and windows.

b) The existence and size of cracks in crystals, and if any part of them is missing.

c) The number of cracks, their location and their impact on mechanical strength.

d) The number, orientation and existence of cracks in the rearview mirrors.

e) The field of view that allows the crystals and mirrors to the operator.

f) The state of screws and anchors of the rear-view mirrors.

g) The effort that must be made to open doors and windows.

h) The existence, readability and status of the emergency exit signal.

i) The existence, adequacy and state of the means of opening the emergency exit.

j) The elements that can prevent a safe abandonment of the cabin by the emergency exit.

k) The condition of the shock absorbers and anchorages of the cab supports.

l) The effectiveness of door anchors and their condition.

Operator's position: Cabin Safety	Classification		
	DN1	DN2	DN3
Status of items:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Crystals:			
Cracks affecting the operator's field of vision or the mechanical strength of the glass	X	(X)	
Absence of non-safety crystals or crystals		X	(X)
Rear-view mirrors. Loss of total field of vision:			
Up to 25%	X		
Up to 50%		X	

. Loss of total field of vision: To establish the field of vision, the provisions of Standard UNE-ISO 14401-2 shall be used.

Operator's position: Cabin Safety	Classification		
	DN1	DN2	DN3
More than 50%			X
Safety mirrors. Loss of field of vision at hazardous points:			
Up to 50%	X		
More than 50%		X	
Emergency exit:			
Signaling illegible or absent	X		
Difficulties in opening		X	(X)
Presence of objects that prevent their use		X	(X)
Lock and key:			
Status defects	X		
Key malfunction		X	
No key, lock or other means to securely close the machine			X

Operator seat

For the classification of deficiencies, the following aspects should be taken into account:

a) The condition of the seat upholstery.

b) The state of armrests and headrests, and their attachments.

c) The state of the seat anchorages to the cabin floor.

d) The effectiveness of adjustments and suspensions.

e) The existence and condition of the seat belt and its anchorages, and its adaptation to the machine.

f) The existence of cuts or loose fibers in the seat belts.

g) The date of installation of the safety belts.

h) The operation of seat belts.

Operator's position: Operator's seat	Classification		
	DN1	DN2	DN3
Status of the seat and its components: Damage (corrosion zones, cracks, breaks, wear, etc.) that interferes or may interfere with driving	X	(X)	

Operator's position: Operator's seat	Classification		
	DN1	DN2	DN3
Damage (corrosion zones, cracks, breakages, wear, etc.) that interferes or may interfere with fire resistance properties	X		
Other damage	X		
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Seat with characteristics other than those specified by the manufacturer		X	(X)
Adjustments:			
Non-operational major adjustments	X	(X)	
Non-operational secondary adjustments	X		
Suspensions:			
Damage to the seat suspension, adjusting scale viewfinder or adjusting control causing appreciable loss of suspension capacity	X	(X)	
Damage to the seat suspension, adjusting scale viewfinder or adjusting control, resulting in total loss of suspension capacity		X	(X)
Safety belt[34]			
Impairment of the belt or its anchorages:			
They show signs of deterioration that may decrease their effectiveness	X		
They show signs of deterioration that decrease their effectiveness		X	
They show signs of deterioration that render it useless			X
Operational:			
Not properly restraining the operator		X	
Blockage does not work sometimes		X	
The blockage does not act on almost no occasion or no occasion			X
Replacement:			
In good condition, but not replaced on the date marked by the manufacturer	X		
In good condition, but not installed by the manufacturer's technical service or by an authorized workshop		X	
Absence of belt or any of its anchorages			X
Accompanying seat/instructor			
Any defect in the condition of the seat or its elements	X	(X)	

[34] The provisions of Standard UNE-EN ISO 6683 shall be used.

Operator's position: Operator's seat	Classification		
	DN1	DN2	DN3
Impairment or absence of the belt or any of its anchorages		X	(X)
In good condition, but not installed by the manufacturer's technical service or by an authorized workshop	X	(X)	

Environmental conditions and ergonomics

For the classification of deficiencies, the following aspects should be taken into account:

a) The existence and effectiveness of the heating/anti-vaho system in the front and rear windows.

b) The existence, condition and efficiency of the acoustic and thermal insulation of the cabin.

c) The readability, suitability and language of the symbols of the controls.

d) The state of the controls and their operation.

e) The effort required for their performance.

f) The existence of objects that can fall or move, causing unintended movements by the operator.

g) The existence of objects that can limit the operator's movements or significantly reduce his cabin space.

h) The status and effectiveness of the dust filter.

i) The existence of living edges.

Operator's position: environmental conditions and ergonomics	Classification		
	DN1	DN2	DN3
Door and window cabinets:			
Deterioration that reduces its function	X	(X)	
Absence of burletes		X	(X)
Symbols of the controls:			
Unreadable or absent, not belonging to braking or steering controls	X	(X)	
Unreadable or absent, belonging to braking or steering controls		X	(X)

Operator's position: environmental conditions and ergonomics	Classification		
	DN1	DN2	DN3
In a foreign language, without pictograms accompanying it	X		
Commands			
Damages:			
Impairment that affects or may affect its functionality	X	(X)	
Drive:			
It is necessary to apply a moderate force	X	(X)	
It is necessary to apply excessive force		X	(X)
Your response is not immediate (when required)	X	(X)	
Does not respond or performs a different function than expected		X	(X)
Air conditioning system:			
Intermittent malfunction or operation	X	(X)	
Does not work			X
Cleaning the cabin (indoor):			
Excessive dirtyness in cabin	X	(X)	
Loose or poorly fixed elements that can move uncontrollably	X	(X)	
Loose or poorly fixed elements that may fall or affect driving		X	(X)
Interior lighting:			
Damages that do not prevent its use immediately	X		
Low luminous intensity	X	(X)	
Does not work			X
Dust filter:			
Excessive accumulation of dust in the filter	X	(X)	
Absence of filter			X
Operator Envelope Space:			
Installation of objects or modifications to the seat that partially reduce the surrounding space	X	(X)	
Installation of objects or modifications to the seat that excessively reduce the surrounding space		X	(X)
Existence of live edges with low probability of contact with the operator	X		
Existence of live edges with high probability of contact with the operator		X	(X)

Cabin safety information

For the classification of deficiencies, the following aspects should be taken into account:

a) The warning level displayed by the panel alarm.

b) The number and importance of those alarms.

c) The number and importance of alarms or indicators that do not work.

Operator's position: cabin safety information	Classification		
	DN1	DN2	DN3
Indicators and alarm lights. Malfunction, absence or illegibility of:			
Information indicators	X		
Warning indicators		X	
Hazard indicators			X
Alarm panel performance test. Malfunction, absence or illegibility of:			
Information indicators	X		
Warning indicators		X	
Hazard indicators			X

Machine start-up and shut-down devices

For the classification of deficiencies, the following aspects should be taken into account:

a) Your signage.

b) Its operation (ability *to cause a dangerous situation due to a malfunction of the device*).

c) The way in which the start-up or shut-down of the machine is carried out (expected *operation of the devices*).

Operator's position: start-up and shut-down devices of the machine	Classification		
	DN1	DN2	DN3
Key:			
Irregular operation	X	(X)	
On and off positions are not identified	X	(X)	

Operator's position: start-up and shut-down devices of the machine	Classification		
	DN1	DN2	DN3
Means not included in its design are used for starting the machine		X	(X)
Start-up:			
Anomalies in the start-up	X	(X)	
Means not included in its design are used for commissioning		X	(X)
Stop:			
Anomalies at the stop	X	(X)	
Means not included in its design are used for the stop		X	(X)

14. Safety barriers

For the classification of deficiencies, the following aspects shall be taken into account:

a) Your signage.

b) Its existence and effectiveness.

c) The structural state of its elements.

d) How the lock is performed (expected *application of the lock devices*).

Safety barriers	Classification		
Common defects for all types of safety barriers:			
The device does not perform the function for which it was designed			
Difficulties in its use			
The lock does not work or is not installed			
Manipulations: device partially or completely disassembled, so that it cannot be used (e.g. lack of safety pin)			
Signaling Unreadable or Absent			
Status of elements in mechanical locks:			
Structural damage (permanent deformations, cracks, breakages, etc.)			
Corrosion zones			
Other deformations			
Absence, loosening or poor condition of anchor screws			

15. Tipper Box

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence, suitability and condition of the lateral supplements of the box.

b) The general condition of the box.

c) The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the box and in the cylinders and their anchors.

d) The structural importance of the elements concerned.

e) The proportion of affected area.

f) The proximity of the affected areas and the deficiencies.

g) The existence and condition of the support stops of the box to the chassis.

h) The number of support caps in poor condition, or nonexistent, and their location.

i) The existence and condition of turning bolts and their means of attachment.

j) Instability caused by malfunction of the lifting system in the tilting operation, or by excessive slack of elements.

k) The possibility of neutralizing the control of the swingarm, directly or indirectly.

l) The operation of the cylinders.

m) The amount of oil lost from leaks in the cylinders.

n) The existence of bites on the plungers.

o) The existence, condition and operation of the warning device with the box raised.

Tipper Box	Classification		
	DN1	DN2	DN3
Adaptation to the machine:			
Box or other accessory not covered by the manufacturer		X	(X)
Box supplements:			
They are used to increase the volume, but not the nominal load of the machine	X		
They are used to increase the volume and nominal load of the machine		X	(X)

Tipper Box	Classification		
	DN1	DN2	DN3
Structural condition of the box (or other accessory), support stops, bolts, supplements and cylinders:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones with thickness loss up to 10%	X		
Corrosion zones with thickness loss up to 20%		X	
Corrosion zones with thickness loss greater than 20%			X
Other deformations	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Oil leaks in cylinders:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Operation:			
Instability of the box (or other accessory) or machine is observed during operations		X	(X)
Neutralisation of controls[:]			
The work equipment does not go down entirely, but allows a safe towing of the machine	X		
The work equipment does not go down in its entirety, not allowing a safe towing of the machine		X	
Neutralization is not done from a safe area		X	(X)
Does not work		X	(X)

16. Safeguards

For the classification of deficiencies, the following aspects shall be taken into account:

[:] If the procedure requires the disassembly of parts with tools or the partial or total emptying of oil, the device shall simply be checked for signs of proper operation.

a) The existence, suitability and condition of the gates at all access points to dangerous parts of the machine.

b) The possibility of closing, opening and anchoring the different gates.

c) The need to open the guards or gates with a key or tool.

d) The state of the screws and anchors.

e) The existence and state of fenders and skirts.

f) Welded anchors or fender screws and skirts to the chassis or case.

Safeguards	Classification		
	DN1	DN2	DN3
State of guards and fenders:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Efficacy of safeguards:			
Defects that do not allow opening or closing	X	(X)	
Partial loss of protection characteristics	X	(X)	
Significant loss of protection characteristics		X	(X)
Absence of protection (if required)			X
Mudguard effectiveness:			
Partial loss of protection characteristics	X	(X)	
Significant loss of protection characteristics		X	(X)
Absence of fenders (if required)			X

17. Warning and Hazard Indicators

For the classification of deficiencies, the following aspects shall be taken into account:

a) Location, readability and conservation status of indicators and towing points.

b) The language in which they are written (if *they are not pictograms*).

c) The existence of all the necessary indicators.

Warning and Hazard Indicators	Classification		
	DN1	DN2	DN3
Location:			
It's not in the warning danger zone.	X	(X)	
There is no link between the warning and the actual danger		X	(X)
Legibility and conservation status:			
Unreadable or absent	X	(X)	
Absence of indicators in highly hazardous areas		X	(X)
In a foreign language, without pictograms accompanying it	X		

18. Fire protection

For the classification of deficiencies, the following aspects shall be taken into account:

a) The need for the machine to be equipped with means of extinguishing.

b) Location, loading, adaptation to the machine and state of conservation of the extinguishers.

c) The general state of preservation of the machine.

d) The condition of the flame retardant materials provided for by the manufacturer.

e) The condition of the engine and fire protections.

f) The consequences that can result from a fire in the machine.

Fire protection	Classification		
	DN1	DN2	DN3
Fire retardant material:			
Partial loss of flame retardant	X	(X)	
Loss of flammable fluids in the machine		X	(X)
Extinction system			
Automatic:			
Impairment in the system that may prevent its proper functioning	X	(X)	

Fire protection	Classification		
	DN1	DN2	DN3
Manual:			
Insufficient load	X	(X)	
Inadequate location or lack of signage	X	(X)	
Absence of system, with loss of flammable fluids in the machine		X	(X)

19. Electrical system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The state of the battery anchors to the battery chest, and from the battery chest to the chassis.

b) The amount of electrolyte poured into the chest.

c) The state and operation of the batteries.

d) The state of the battery casket.

e) Excessive accumulation of dirt.

f) Protection of battery terminals.

g) The state of terminal connections and wiring.

h) The operation of power cutters, or similar devices.

i) The existence of loose or unprotected fittings.

j) The existence of aging or cuts in the protection of electrical cables.

k) The existence of loose electrical cables.

l) The function of the cables with deficiencies and their possibility of contact, between them and with metal parts.

m) The status and protections of the connectors.

n) Excessive accumulation of dirt in the electrical system.

Electrical system	Classification		
	DN1	DN2	DN3
Batteries:			

Electrical system	Classification		
	DN1	DN2	DN3
Structural damage (permanent deformations, cracks, breakages, etc.) to battery chests	X	(X)	
Corrosion zones	X	(X)	
Other deformations	X		
Absence, loosening or poor condition of anchor screws	X	(X)	
Movements (slacks) between elements	X	(X)	
Accumulation of clay, electrolyte or other substances	X	(X)	
Connections in poor condition	X	(X)	
Unprotected positive (or negative, as applicable) terminals		X	(X)
Electrical installation:			
Excessive accumulation of mud or other substances	X	(X)	
Damage to cable attachments	X	(X)	
Connections in poor condition	X	(X)	
Electrical protections in poor condition	X	(X)	
Current cutting device (or equivalent system)			
Anomalous operation	X	(X)	
Absence of signalling of the acting positions (if necessary)	X		
Damage to the key or control	X	(X)	
There is no equivalent device or system			X

20. Acoustic warning devices

For the classification of deficiencies, the following aspects shall be taken into account:

a) The operation of the horn, the start-up warning device (if fitted by the manufacturer) and the acoustic recoil warning device.

b) Automatic operation (except horn).

c) Sound level.

Acoustic warning devices	Classification		
	DN1	DN2	DN3
Operation:			

Acoustic warning devices	Classification		
	DN1	DN2	DN3
Does not have a normal cadence, but is identifiable	X		
There is a large interval between sounds		X	
Does not work		X	
Does not exist or has been completely or partially dismantled			X
Sound level of horn and recoil warning:			
Sounds like the accelerated engine or fans mask your performance	X		
Lower-intensity sounds (idle motor, etc.) mask your performance		X	
Sound level of the start-up warning device:			
Not audible to the operator	X	(X)	

21. Lighting and indication devices

For the classification of deficiencies, the following aspects shall be taken into account:

a) The function performed by each device (illumination or indication).

b) The impact that its malfunction has on the safety of people.

c) The impact that its malfunction has on the safety in the circulation of other machines.

d) The location on the machine and whether or not the device performs a redundant function (double optics, for example).

e) Its optical properties (intensity, orientation, colorimetry, reciprocity, combination with other lights, etc.).

f) The state of the parable (illumination) and the protective screen.

g) The flashing frequency (intermittents and rotating beacon).

h) Its operation (automatic or manual).

i) Reference values (recorded on the maximum intensity surface of the light beam, vertically above the optical display, and in such a way as to prevent other external sources from affecting the measurement):

Device type	Value (klx)
Long lights	30
Dipped-beam headlamps	30
Working lights	40
Braking lamps	5
Reversing lamps	20
Position lights	1

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Long lights/Rear working lights			
Defects in its elements or in the means of attachment			
Affecting any of the devices	X	(X)	
Affecting all devices			X
Operation:			
Abnormal operation or means of on/off not provided for by the manufacturer	X	(X)	
Some device doesn't work	X	(X)	
No device works			X
Colorimetry: Different from the one that its function is required	X	(X)	
Lighting: Below reference values	X	(X)	
Other properties:			
Combined with other devices	X		
Incorrect alignment	X		
Position lights			
Defects in its elements or in the means of attachment			
Affecting any of the devices	X	(X)	
Affecting all devices			X
Operation:			

: Below reference values A photometer shall be used to measure illuminance, the unit of which is lux (lx).

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Abnormal operation or means of on/off not provided for by the manufacturer	X	(X)	
Some device doesn't work	X	(X)	
No device works			X
Colorimetry: Different from the one that its function is required	X	(X)	
Lighting: Below reference values	X	(X)	
Other properties:			
Combined with other devices	X		
Incorrect alignment	X		
Dipped-beam headlamps			
Operation:			
They are switched on by means other than the switch installed for that purpose	X		
Sometimes they turn off involuntarily	X		
They shut down unintentionally often		X	
They do not work, they do not exist or half of the devices have been totally or partially dismantled		X	
They do not work, they do not exist or all the devices have been totally or partially dismantled			X
Lighting:			
Less than 90% compared to baselines	X		
Less than 75% compared to baselines		X	
Less than 50% compared to baselines			X
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
If all devices are affected		X	
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	

Lighting and indication devices	Classification		
	DN1	DN2	DN3
If all devices are affected			X
Colorimetry:			
Other than white	X	(X)	
Red		X	(X)
Other properties:			
Incorrect combination	X		
Incorrect alignment	X		
Intermittents and emergency lights			
Operation:			
Signaling of any of the directional changes does not work		X	
If there are lateral intermittents in that direction	X		
Signaling of any of the changes of direction does not exist or has been completely or partially disassembled		X	
If there are lateral intermittents in that direction	X		
Signaling none of the directional changes works			X
If there are side intermittents in one direction		X	
If there are lateral intermittents in both directions	X		
Flash frequency:			
Flashes in different phases	X		
Between 45 and 60 flashes per minute	X		
Less than 45 flashes per minute		X	
More than 120 flashes per minute	X		
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
Colorimetry: Are not amber/yellow	X		
Other properties: Incorrect combination	X		

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Brake lights			
Operation:			
Do not turn on automatically when stepping on the service brake pedal			X
Sometimes they turn off involuntarily	X		
Not working or half of the devices have been fully or partially disassembled	X		
No device works		X	
All devices have been completely or partially disassembled			X
Lighting:			
Less than 75% compared to baselines	X		
Less than 50% compared to baselines		X	
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
Colorimetry: They are not red	X	(X)	
Other properties:			
Incorrect combination	X		
Alternative action with lights not allowed	X		
Reversing lamps			
Operation:			
Do not turn on automatically when reversing		X	(X)
Sometimes they turn off involuntarily	X	(X)	
Not working or half of the devices have been fully or partially disassembled	X	(X)	
No device works		X	(X)
All devices have been completely or partially disassembled			X
Lighting:			
Less than 75% compared to baselines	X		
Less than 50% compared to baselines		X	

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
Colorimetry: They are not white	X	(X)	
Other properties:			
Incorrect combination	X		
Alternative action with lights not allowed	X		
Retro-reflectors:			
Defects on the reflective surface	X	(X)	
Different color than your function is required	X	(X)	
Rotating headlamp			
Defects in its elements or in the means of attachment	X	(X)	
Does not work	X	(X)	
Flash frequency outside the frequency range specified by the manufacturer	X	(X)	
Different color than your function is required	X		
Other properties:			
Combination with other (non-rotating) lamps	X		
Incorrect alignment	X		

22. Cabin noise

The following test shall be carried out only on machines fitted with cabs:

Machine Location: The machinery must be located on a flat surface and as far as possible away from external sources of noise (benefits, other machinery, etc.).

Preparation of the machine: The machine must be equipped with the equipment and accessories specified by the manufacturer. The engine and hydraulic system must be at the temperature corresponding to the normal operating conditions specified by the machine manufacturer. All fluid systems must have levels within the range specified by the manufacturer. The machine must be located in the test area with the case fully supported on the chassis (carrying position).

Operating conditions: The machine must be static with the brakes actuated. The engine must run unladen, rotating at the revolutions per minute corresponding to the net power specified by the manufacturer. The transmission must be in neutral and the case lifting system must not be in operation.

The engine must be initially idled and then driven to the revolutions per minute corresponding to the net power specified by the manufacturer. Before each data logging series, the engine must reach its steady idle speed.

Operator position: During the test, the operator must remain in his position and the observers must not be in the cabin, unless there is a passenger/instructor seat in safe conditions of use.

Seat position: The seat should be positioned in the midpoint of its horizontal and vertical settings, or as close to it as possible. Any suspension of the seat must be adjusted to the operator's weight.

Microphone position: The microphone must be oriented horizontally, directed in the usual direction of the gaze of a person occupying the operator's position, and located 200 mm ± 20 mm from the middle plane of the operator's head, at eye level.

Measurements: The total measurement time for each reading carried out under stable conditions must be at least 30 s. 6 readings (not more than 3 dB apart) shall be made.

Measurements should be made with doors and windows closed and air conditioning and/or ventilation systems functioning. If observers are present in the cab during measurements, they must remain silent or not raise the tone of voice too much to give instructions, so that they do not significantly affect the results. The protections and access gates to the components of the machinery must also be closed. If more than one operating speed is available, air conditioning and/or pressurized ventilation systems must operate at the second speed for systems up to four speeds.

For systems with more than four operating speeds, the third and, for systems with infinite continuous variation speeds, the average value of the speed should be used. If the air conditioning and / or ventilation systems have a control with the position for recirculation and air intake from the outside, it must be in the latter position.

Once the 6 readings have been obtained, those of lower and higher value will be discarded, and the arithmetic mean of the remaining ones will be taken.

The result shall be classified as follows:

Cabin noise	Classification		
	DN1	DN2	DN3
The equivalent daily exposure level (LAeq,d):			
It is greater than or equal to 80 dB(A) and less than 85 dB(A)	X		
It is greater than or equal to 85 dB(A) and less than 87 dB(A)		X	
Is greater than or equal to 87 dB(A)			X

23. Vibrations

The full body vibrations in a rigid frame tipper on wheels respond to the profile of short and well-defined exposures, since the magnitudes of the different vibrations can be associated with each of the individual operations (loading, displacement and unloading). Normally the operator is subjected to a higher level of full body vibrations when the machine is moving in a vacuum and when the machine is being loaded.

This test aims to obtain a measure of the full body vibrations to which the operator is subjected through the seat due exclusively to factors specific to the machine, so the calculation of the vibrations associated with displacement (which depend mainly on the conditions of the tracks) and load (which depend mainly on the characteristics of the material to be loaded and the type of loading machine used, as well as the expertise of the operator who handles it) will be dispensed with.

Therefore, for the calculation of the level of full-body vibrations, the following sequence shall be considered as the operating individual cycle, starting with the direction at its neutral point:

a) Elevation of the box.

b) Full turn of the direction to the left (or right).

c) Full turn of the direction to the right (or left).

d) Turn the direction to place it back at its neutral point.

e) Descent of the box to the transport position.

Machine Location: The machine shall be located on a flat surface.

Preparation of the machine: The machine must be equipped with the equipment and accessories specified by the manufacturer. The engine and hydraulic system must be at the temperature corresponding to the normal operating conditions specified by the manufacturer. All fluid-powered systems must have levels within the range specified by the manufacturer and with the enclosure fully supported on the chassis (carrying position).

Operating conditions: The machine must be static with the parking brake actuated. The engine must run unladen, at the speed corresponding to the net power specified by the manufacturer, during the lifting phases of the body and steering turns, and at idle during the lowering phase of the body. The transmission must be deadlocked.

Operator position: During the test, the operator must remain in place with the seat belt fastened and observers must not be in the cab unless there is a passenger/instructor seat in safe conditions of use. The seat cushioning system must be maintained under normal conditions of use.

Measurements: Ten individual operating cycles shall be carried out consecutively, with an interval of 10 s between them, measuring continuously from the beginning of the first cycle until the end of the last of them. The result shall be classified as follows:

Vibrations	Classification		
	DN1	DN2	DN3
The standard daily exposure value for a reference period of eight hours, measured during the test:			
It is greater than or equal to 0.5 ms^{-2} and less than 0.7 ms^{-2}	X		
It is greater than or equal to 0.7 ms^{-2} and less than 1.15 ms^{-2}		X	
Is greater than or equal to 1.15 ms^{-2}			X

24. Opacity and exhaust gases

For gaseous emission levels of the engine, the following limits shall be taken, measured at maximum engine idle[35] speeds in the case of opacity and at idle speed for exhaust gases (on the method of measurement, see Annex XIII):

Opacity and exhaust gases	Classification		
	DN1	DN2	DN3
Opacity (K) ≥ 4.5 m-1	X		
NOx ≥ 210 ppm	X		
CO ≥ 0,4 %	X		
CO2 ≥ 5.0%	X		
HC ≥ 15 ppm	X		

35 The engine temperature shall be at least 60°C for gas measurement and 80°C for smoke opacity measurement.

ANNEX V

Actions to be taken

Once the inspection of the machine has been carried out, a series of measures must be established depending on the result obtained. These measures are classified as:

a) *Urgent measures:* are those which are intended to remedy those deficiencies which have resulted in a *negative* or *unfavourable* report .

b) *Necessary measures:* are those that are aimed at addressing those deficiencies that have resulted in a *favourable report with deficiencies*.

c) *"Measures to be observed":* are those that are aimed at addressing deficiencies that involve tolerable risks, and result in a *favourable report*. Correction and/or follow-up should be recommended for information purposes only.[36]

From the above, it is concluded that several types of measurements can be established on a machine, as shown below:

*Table**13**. Measures to be taken depending on the outcome of the verification.*

Types of measures	Outcome		
	Negative or Unfavorable	*Favourable with deficiencies*	*Favorable*
Urgent	X	--	--
Necessary	Depending on the case	X	--
To observe	Depending on the case		

The inspection report shall reflect the systems, subsystems and elements concerned, as well as the type of measures to be taken in each case.

In addition to the above, and without prejudice to Article 5(3) of Royal Decree 1215/1997 of 18 July 1997 laying down the minimum safety and health requirements for the use of work equipment by workers and Article 18 of Law 31/1995 of 8 November 1995 on the Prevention of Occupational Risks, the personnel responsible for carrying out the inspection shall inform the operator of the machinery inspected, during the inspection or at the end of the inspection, of the measures to be taken and/or any restrictions on use (see *Annex XII)*.

[36] Any deficiencies reflected in the report must entail some type of measure on the part of the user; to specify this aspect, it will be understood that there is a measure to be observed when any of these circumstances occur:

- If there are Level 3 deficiencies in non-determining points (weight 1 or 2) and the system as a whole is not deficient, or
- If there are Level 3 deficiencies at non-determining points (weight 1 or 2) and the system as a whole is deficient due exclusively to the defect found at a determining point.

ANNEX VI

Personnel responsible for carrying out inspections

For a correct inspection, it will be necessary an inspector with adequate training and technical knowledge on:

a) Machine mechanics.

b) Elasticity and strength of materials.

c) Hydraulic and pneumatic systems.

d) Internal combustion engines.

e) Electricity.

f) The machine to be evaluated (knowledge *of the systems installed and their operation)*,

In addition, they should also have knowledge of:

a) Safety and Health (Law *on the Prevention of Occupational Risks*, *Workplaces*, *Signalling*, *etc.)*.

b) Regulations and implementing legal provisions (Machinery *Directive*, *Mining Safety Regulation*, *Royal Decree 1215/1997*, *etc.)*.

c) Specific technical regulations applicable to this type of machinery (Standards *of the series UNE-EN 474*).

In order to improve the safety conditions during the inspection and to speed up the procedure (which results in a shorter machine downtime), the inspector may be assisted by a qualified mechanic or electromechanic, who will support him during the inspection.

ANNEX VII

Security (Informative)

1. Preliminary considerations

This Annex refers to certain aspects related to safety during inspections, which can serve as a reference for carrying out the corresponding risk assessment.

The user of the machinery shall take appropriate measures to ensure that:

a) It is in a reasonable state of cleanliness that allows access to all the elements to be inspected without the risk of falls or slips, as well as for its correct evaluation.

b) Machine fluid levels and tire pressure are within the limits specified by the manufacturer.

c) The fuel level is sufficient to be able to carry out the inspection without the need to refuel the unit and without the machine being able to stop unintentionally due to lack of fuel.

d) Possible limitations of the emergency steering as well as the on-site test procedure to verify its operability have been set out in the operator's manual.

2. Personal protective equipment

Personnel carrying out the inspection shall use the following personal protective equipment:

a) Tight workwear and high visibility.

b) Helmet and safety boots.

c) Protective gloves against mechanical and thermal hazards, and safety glasses, during checks of hydraulic systems, engine compartment and protections of hot surfaces and pressure fluids.

d) Hearing protectors, mask and safety glasses, in the measurements of exhaust gases.

3. Safety standards

It is essential to establish, on the part of the inspection team, procedural rules that will be explained to the operator and any person who may be present in the environment of the machine, before starting the inspection, and respected during the inspection. Similarly, the inspection team must ensure that the operator is aware of the safety systems of the machinery. Where particular circumstances require changes to be made, they should be known and agreed upon by all staff. These rules of procedure shall include, inter alia, the following:

a) Steps to follow in the inspection.

b) Person who will give instructions to the operator at all times.

c) Location of inspectors at each step.

d) Communication protocol between inspectors, and between inspectors and machine operator.

In addition to the safety considerations mentioned here, all applicable safety provisions must be taken into account, in accordance with current regulations.

In particular, the rules of movement laid down on the holding must be respected; if conditions that are incompatible with these rules (e.g. set speed limits) are required for certain verifications, the operator must be informed and a site where they can be carried out under safe conditions (runways without traffic or with restricted traffic during testing) must be sought. Otherwise, you should choose to use other types of tests (static tests).

Inspectors shall at all times have full field of view of the area of influence of the machinery.

3.1 Operator

Before starting you will be explained the process that will be followed for the inspection, paying special attention to the operations with the engine running and with the machine in motion.

The instructions shall be clear and shall not give rise to misinterpretations by the operator of the machinery. All necessary explanations shall be given to enable the operator to understand how

operations are to be carried out with the machinery in motion, in particular braking, steering and box operation tests.

The inspection staff must verify that the operator has understood the operations to be carried out, and that they know, at all times, the location of the inspectors.

3.2 Machine

Before commencing any operation, the existence and operation of all mechanical safety devices shall be checked and the location of the machinery shall be in accordance with paragraph 3.3 of this Annex. Wherever possible, these devices shall be in a locked position and shall only be unlocked when all persons in the area of influence of the machinery are notified of this fact. Particular care will be taken in the event that any of these devices is not operational, stopping the inspection if necessary and not resuming it until it is verified that minimum safety conditions are guaranteed.

Machine fluid levels (engine oil, hydraulic oil and coolant) will also be checked. These checks shall be carried out by the operator or by maintenance personnel, taking into account the precautions set out in section 3.4 of this Annex.

3.3 Places to carry out the inspection

Only persons directly connected with the inspection may remain in the area of influence of the machinery: the operator of the machinery, the inspector and the person assisting the machinery, the person responsible for maintenance and the operator of the inspected machinery may also be present.

3.3.1 Inspection with machine stopped.

The location to check the stopped machine must meet the following requirements, to proceed with this phase of the inspection:

a) Away from the area of influence and work of other machines and people.

b) Conveniently signposted.

c) It shall be as flat as possible and shall have no inclinations which can set the machine in motion by failure or ineffectiveness of the parking brake.

d) It shall have a surface area large enough to permit the safe movement of persons present during the inspection.

e) It will have adequate lighting.

f) If fully or partially covered, ventilation must be ensured for engine start-up or exhaust gas analysis. It shall also be of sufficient height to ensure the safe lifting operation of the housing.

3.3.2 Inspection with moving machine.

The track used to check the moving machine must meet the following requirements, in order to proceed with this phase of the inspection:

a) Departure from the area of influence and work of other machines.

b) Conveniently signposted.

c) It will have adequate lighting.

d) It will be as flat as possible and free of obstacles, allowing the machine to circulate safely.

e) It is essential that the track has means of escape for a hypothetical situation of failure in the brakes or in the direction.

If the performance of one or more of the braking systems is to be checked on a gradient, the gradient shall have similar characteristics.

3.4 Inspection with machine stopped.

Prior to any verification, the effectiveness of the stationary parking brake and the mechanical locking of the controls shall be checked and shall be operational throughout this phase of the inspection. Special care will also be taken with hot surfaces, if the machine was previously working, and with pressure vessels.

If the box is raised, the safety pins, or elements intended for it, shall be placed to avoid its unintentional descent. In no case may any of the areas of influence of the box be accessed by inspecting it from the bottom of the machine or from the front access of the machine.

The operator or the person responsible for maintenance shall open and fix the gates giving access to the engine compartment and the batteries, leaving the machinery until it is closed.

No person shall enter and remain in the position of the operator except the inspector or the person assisting him.

If tyre pressure needs to be measured, a pyrometer shall be used to check the tyre temperature in advance to ensure that it is within normal operating limits. Once this check has been carried out, a pressure gauge shall be fitted with a hose length allowing reading to be made from one side of the tyre (perpendicular to the tread, as far away as possible from the tread and, above all, from the sidewalls of the tyre). Pressure should never be measured if the temperature exceeds these limits and, even less, the inflation of a hot tire will be allowed, due to the risk of explosion that exists.

No plug of the hydraulic system or cooling circuit of the engine shall be opened without taking the necessary precautions, checking that the pressure and temperature of the fluids allow the opening to be carried out safely.

3.5 Inspection with machine stopped and engine running.

Before starting the engine, it shall be checked that the transmission is disconnected and that the parking brake is still applied. Once the engine is started, it is essential to verify that the communications carried out are intelligible to all the people involved, due to the noise generated by the engine; the operator must leave the cabin until his presence is again required.

Particular care shall be taken in the accesses to the engine, with hot surfaces and moving elements (belts, fans, etc.).

Once this stage of the inspection has been completed, the operator and one of the inspectors shall be placed in the cabin to check the elements of the main direction. The inspector below must communicate to his companion the different movements to be made on the direction in a clear way, being the inspector located in the cabin who transmits these orders to the operator. A safety

distance must be maintained in such a way that it is impossible to contact any of the lower steering elements (tyres, cylinders, etc.) and the wheels.

At this stage, the inspection staff below must permanently communicate any change in their position, whether seen directly by the operator or not (through the established gestures or the broadcaster).

Although the reversing movement of the machine is not presumed, when checking the operation of the reversing lamps and the acoustic reversing warning device, a sufficient safety distance must be maintained, occupying a lateral position with respect to the possible movement of the machine.

If it is necessary to measure the illuminance of some of the lighting and signalling devices, the machine will be stopped and the inspector or person who assists him must be in the cabin with the operator, informing him of the position of his partner, being warned through the station.

3.6 Inspection of the operating box.

During lifting or lowering operations, no person shall be near or on the machinery except the operator and one of the members of the inspection team, who shall be in the cab. Nor can it remain on the front and rear of the machine, because there is a risk of falling materials that may have been adhered to the box or on its visor.

3.7 Inspection with moving machine.

At this stage of the inspection, only the operator and the inspector will be in the machine, leaving the rest of the people away from it. Both the operator and the inspector shall adjust the safety belts.[37]

Before starting the machine, the operation of the service brake must be checked; for this purpose, a static braking test may be carried out.

No further tests shall be carried out if the service brake is not of adequate performance, or if the main steering is deficient.

If the emergency steering is electrically operated, its static operation shall be checked before further braking tests are carried out.

Once the above is done, the following steps are:

a) If the machine has a pneumatic braking support system, it shall be checked that the machine is retained by lowering the pressure of the pneumatic circuit, under the prescribed conditions.

b) Once the results of the above tests have been found to be favourable, the parking brake slope retention test shall be carried out on a track with the conditions referred to in paragraph 3.3.2 of this annex. Subsequently, the dynamic test of the service brake will be carried out, ending with the stalled engine slope retention test and the emergency brake test.

[37] If there is no seat or seat belt for the instructor or passenger, only the operator may remain in the cabin.

c) If the machine has emergency steering to support the main steering, after verifying that the machine has sufficient braking performance, the test shall be carried out on the slope of emergency steering, with the machine in motion and the engine stopped (or following the procedure set out in the instruction manual).

d) Check the operation of the retarder.

The slopes to be used in all cases must be in accordance with the most unfavourable situation expected, being necessary to adapt to the conditions of the test track and the machine.

ANNEX VIII

Periodic inspection form

MACHINE

TYPE:	BRAND:	MODEL:	N° SERIES:		WORKING HOURS:
RIGID BASTIDER VOTE ON WHEELS					
YEAR OF MANUFACTURING:	DATE OF PLACEMENT IN SERVICE	CE MARKING	PREVIOUS INSPECTION CERTIFICATE	DATE OF INSPECTION:	COMING DATE. INSPECTION:

USER

COMPANY:	
ACTIVITY:	
CIF:	
DIRECTORATE:	
PHONE:	
FAX:	
E-MAIL:	
CONTACT PERSON:	

ENGINE

BRAND AND MODEL	NOMINAL POWER (kW)	Maximum rpm

(page 1)

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
DOCUMENTATION	1									
Instruction Manual	3					D		X		
CHASIS	3									
Rack	3					V	M	X		
Motor block anchors	2					V	M	X		
Box anchors	3					V	M	X		
Box supports	2					V	M	X		
Towing points	1					V	M	X		
Bumper	1					V	M	X		
Pneumatics	3									
NEUMATICS FRONT	3									
Same condition between tyres	1					V	M	X		
Tacos plucked	3					V		X		
Irregular tread wear	2					V	M	X		
Regular tread wear	2					V	M	X		
Cuts on the flanks	3					V		X		
Screws	1					V		X		
Tires	1					V		X		
TREATMENT Pneumatics	3									
Same condition between tyres	1					V	M	X		
Tacos plucked	3					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Irregular tread wear	2					V	M	X		
Regular tread wear	2					V	M	X		
Cuts on the flanks	3					V		X		
Screws	1					V		X		
Tires	1					V		X		
Stone extractor bars	2					V		X		
SUSPENSION SYSTEMS[38]	3									
FOR FRIENDS: FRONT PART	3									
Free space in vacuum	2						E/M	X		
Free space with nominal load	2						E/M	X		
Anchorage	3					V	M	X		
Status of front shock absorbers	3					V		X		
Oil leaks	1					V		X		
BALLESTS OR SILENTBLOCKS: FRONT PART	3									
Anchorage	3					V	M	X		
Status of crossbows or silentblocks	3					V		X		
FOR FRIENDS: REAR PART	3									
Free space in vacuum	2						E/M	X		
Free space with nominal load	2						E/M	X		
Anchorage	3					V	M	X		
Condition of rear shock absorbers	3					V		X		
Oil leaks	1					V		X		

[38] The types of suspensions are exclusive for both axles and depend on the model.

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
BALLESTS OR SILENTBLOCKS: REAR PART	3									
Anchorage	3					V	M	X		
Status of crossbows or silentblocks	3					V		X		
ADDRESS SYSTEMS	3									
MAIN ADDRESS	3									
Steering wheel	1					V	M	X	X	
Steering column	2					V		X		
Slacks in the elements of the direction	3					V	M	X	X	
Slacks on the steering wheel	3					V	M	X	X	
Elements of management	3					V		X		
Symmetry	3					V	M	X	X	
Cylinders	2					V		X		
SECONDARY ADDRESS	3									
Operation	3					V	E	X	X	
FRYING SYSTEMS	3									
Service brake	3						E	X	X	
Oil leaks in packages	2					V		X		
Parking brake	2						E	X		
Emergency brake	3						E	X	X	
Delayer	1					V	E	X	X	
ENGINE	1									
FUEL SYSTEM	1									
Deposits	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Conductions	2					V		X		
Fast filling system	1					V		X		
REFRIGERATION SYSTEM	2									
Radiator	3					V		X		
Deposits	3					V		X		
Fan	2					V		X		
Conductions	2					V		X		
Filling plug	2					V		X		
Level	1					V		X		
COMPARTIMENT ENGINE	2									
Oil leaks	1					V		X		
Oil level	2					V	M	X		
Straps	2					V		X		
Exhaust circuit	1					V		X		
IMPULSION TRAIN	2									
TRANSMISSION	1									
Transmission trees	1					V		X		
Differentials	1					V		X		
FINAL COMMANDS	2									
Leakage	3					V		X		
Damages	1					V		X		
HYDRAULIC SYSTEM	3									
Deposits	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Conductions	2					V		X		
Scaffolding system	1					V		X		
Level	1					V		X		
Pneumatic system	2									
Calderines	1					V		X		
Conductions	2					V		X		
Purged	2					V		X		
Pressure	2					V		X		
PROTECTION STRUCTURES	3									
Fall protection structure of objects in box	3					V	M	X		
ROPS/FOPS cabin	3					V	M	X		
ACCESS ELEMENTS	2									
ACCESS TO THE CABINE	3									
Stairs	2					V		X		
stirrups	2					V		X		
Asideros	2					V		X		
Railings	2					V		X		
Non-slip surfaces	3					V		X		
Passage and permanence platforms	2					V		X		
ACCESS TO MAINTENANCE POINTS	2									
Stairs	2					V		X		
stirrups	2					V		X		
Asideros	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Railings	2					V		X		
Non-slip surfaces	3					V		X		
Passage and permanence platforms	2					V		X		
OPERATOR'S POSITION	3									
SECURITY IN CABINA	3									
Lock and key	1					V		X		
Window and windshield windows	2					V		X		
Cabin brackets	2					V	M	X		
Door and window opening mechanisms	2					V		X		
Rear-view mirrors	3					V	M	X		
Emergency exit	2					V		X		
Door opening anchors	1					V		X		
OPERATOR'S SEAT	3									
Impairment of the operator's seat	2					V		X		
Rules	2					V		X		
Suspensions	2					V		X		
Safety belt	3					V		X		
Accompanying seat/instructor	1					V		X		
ENVIRONMENTAL CONDITIONS AND ERGONOMY	2									
Door and Window Burletes	1					V		X		
Symbols of the controls	2					V		X		
Commands	3					V		X		
HVAC system	2					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Cleaning the cabin	1					V		X		
Dust filter	1					V		X		
Interior lighting	1					V		X		
Operator Envelope Space	3					V	M	X		
SAFETY INFORMATION IN CABINA	1									
Indicators and alarm lights	2					V		X		
Performance test	2					V		X		
POWERING AND STOP DEVICES	2									
Key	2					V		X		
Start-up	2					V		X	X	
Stop	3					V		X	X	
SECURITY WORKS	3									
Mechanical enclosure locks	2					V	M	X	X	
Safety lock on unloading	3					V		X	X	
Other obstacles	2					V		X		
VOLQUETE BOX	3									
Adaptation to the machine	3					D/V		X		
Side supplements	2					V		X		
Status of the box	3					V	M	X		
Turning bolts	2					V	M	X		
Neutralisation of controls	3					V	E	X	X	
Operation	2					V		X	X	
Lifting cylinders	2					V		X	X	

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Case-to-chassis support stops	2					V		X		
SAFEGUARDS	3									
Compartment doors	1					V		X		
Fan guards and belts	3					V		X		
Guards for moving power transmission parts	2					V		X		
Mudguards	2					V		X		
High temperature parts guards	2					V		X		
WARNING AND DANGER INDICATORS	2									
Cabin indicators	2					V		X		
Machine indicators	2					V		X		
Towing point indicators	1					V		X		
FIRE PROTECTION	1									
Fire retardant material in engine compartment	2					V		X		
Extinction system	2					V		X		
ELECTRICAL SYSTEM	1									
Batteries	2					V		X		
Installation	2					V		X		
Current cutting device	3					V		X		
ACUSTIC NOTICES	3									
Reverse warning device	3					V		X	X	
Horn	2					V		X		
Start-up warning device	1					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
LIGHTING AND INDICATION DEVICES	3									
FRONT PART	3									
Crossing	2					V	M	X		
Long	1					V	M	X		
Intermittent	3					V	M	X		
Emergency lights	1					V	M	X		
Rotating headlamp	2					V	M	X		
Position	1					V	M	X		
Retro-reflectors	1					V		X		
REAR PART	3									
Work	2					V	M	X		
Braking	2					V	M	X		
Back march	3					V	M	X	X	
Intermittent	2					V	M	X		
Emergency lights	1					V	M	X		
Position	1					V	M	X		
Retro-reflectors	1					V		X		
NOISE IN CABINA	1									
Cabin noise	3						E		X	
VIBRATIONS IN THE OPERATOR'S SEAT	1									
Vibrations in the operator's seat	3						E		X	
OPACITY AND GAS OF ESCAPE	1									

Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Type of test		Comments
						Documentary/ Visual	Test/ Measurement	Static	Dynamics	
Opacity of fumes	3						E	X		
CO	2						E	X		
HC	2						E	X		
NOX	3						E	X		
CO2	1						E	X		

RESULT INSPECTION	ENTERED USER	O.C.M (SEAL AND SIGNATURE)
Favourable		
FAVOURABLE WITH [ ] DEFICIENCIES		
DISFAVORABLE WITH [ ] DEFICIENCIES		
NEGATIVE		

(Legend of the inspection sheet)

F = Favourable

DN1 = Level 1 deficiency

DN2 = Level 2 deficiency

DN3 = Level 3 deficiency

(Last page)

ANNEX IX

Report template

(Logo of the Department or Directorate-General of the Autonomous Community)	Technical Inspection of Mining Machinery n° Inspection Report:	(Logo of the O.C.M)

MACHINE

TYPE:	BRAND:	MODEL:	N° SERIES:		WORKING HOURS:
RIGID BASTIDER VOTE ON WHEELS					
YEAR OF MANUFACTURING:	DATE OF PLACEMENT IN SERVICE	CE MARKING	PREVIOUS INSPECTION CERTIFICATE	DATE OF INSPECTION:	COMING DATE. INSPECTION:

USER

COMPANY:	
ACTIVITY:	
CIF:	
DIRECTORATE:	
PHONE:	
FAX:	
E-MAIL:	
CONTACT	

PERSON:	

ENGINE

BRAND AND MODEL	NOMINAL POWER (kW)	Maximum rpm

(Page 1)

(O.C.M. data)

(Page footer)

In the following columns appear those systems of the machine in which deficiencies of some kind were found, detailing the elements involved and the severity of the defect.

ACLARATORY NOTE: The measurements made of cabin noise and full body vibrations transmitted to the operator during the inspection, as well as the results obtained, may not be used for the risk assessment indicated in Law 31/1995, of 8 November, on the Prevention of Occupational Risks and subsequent amendments.

System concerned

Subsystem

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

System concerned

Subsystem 1

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

Subsystem 2

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

Braking tests:

	E (%)	Lateral deviation (%)	Results	Test	Speed (km/h)
Service					
Emergency					
Parking					

Delayer					

GASEOUS EMISSIONS:

K :	m^{-1}
NO_x:	ppm
CO:	(%)
HC:	ppm
CO2:	(%)

CABIN NOISE:

LAeq,d:	dB(A)

FULL BODY VIBRATIONS:

A(8):	ms^{-2}

Legend:

F = Favourable DN1 = Level 1 Deficiency DN2 = Level 2 Deficiency DN3 = Level 3 Deficiency

Equipment used:

Gaseous emissions	Opacity of fumes	Cabin noise	Vibrations	Team	Team	Team
Make/ Model	Make/ Model	Make/ Model	Make/ Model	Make/ Model	Make/ Model	Make/ Model
N° Series	N° Series	N° Series	N° Series	N° Series	N° Series	N° Series
Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date

RESULT INSPECTION		ENTERED USER	E.C.A. (SEAL AND SIGNATURE)
Favourable	□		
FAVOURABLE WITH [ ] DEFICIENCIES	□		
DISFAVORABLE WITH [ ] DEFICIENCIES	□		
NEGATIVE	□		

Comments:

Any defect not covered by the inspection procedure but likely to impair the safety of the machine must be included in this table, describing the element concerned, the system to which it belongs and the type of defect.

Type of measures to be taken (Mark with “X” where appropriate and the number of measures to be observed in each system)

System	Urgent	Necessary	To observe
Documentation			
Chassis			
Tyres			
Suspension systems			
Steering systems			
Braking systems			
Engine			
Drive train			
Hydraulic system			
Pneumatic system			

Protection structures			
Access elements			
Operator's position			
Safety barriers			
Tipper Box			
Safeguards			
Warning and Hazard Indicators			
Fire protection			
Electrical system			
Acoustic warning devices			
Lighting and indication devices			
Cabin noise			
Vibrations in the operator's seat			
Opacity and exhaust gases			
Total			

Information note on the results: (Explanatory note to be included in the report)

Negative: The machine can NOT be made available to workers, until the deficiencies found in the affected systems indicated in the report are remedied.

Unfavorable with [ ] deficiencies: Urgent action should be taken to address the deficiencies found in the affected systems identified in the report. The machine can NOT be made available to workers, until the deficiencies found in the affected systems indicated in the report are remedied.

Favourable with [ ] deficiencies: Necessary measures should be taken to address the deficiencies found in the affected systems identified in the report.

Favourable: The machine has no deficiencies or only deficiencies that have no significant impact on safety. The machinery may be made available to workers, but the deficiencies indicated in the report must be remedied.

ANNEX X

Valuation method

1. Assessment of deficiencies

Each of the *deficiencies* of the inspection points, subsystems and systems of the machine are assigned the following value:

For inspection points

- No defects: You = 0.
- Level 1 deficiencies: Vd = 3.
- Level 2 deficiencies: Vd = 6.
- Level 3 deficiencies: Vd = 9.

For subsystems and systems

- No defects: You = 0.
- Minor deficiencies: Vd = 3.
- Moderate deficiencies: Vd = 6.
- Major deficiencies: Vd = 9.

Each inspection point, subsystem and system of the machine is assigned a *weight* (from 1 to 3) depending on the impact it has on the safety of the machine (Pp, Pss and Ps, respectively).

2. Assessment of inspection points

An inspection point may have one or more deficiencies, the highest level being the one that must be taken into account to assign its defect. The result (or contribution) of each inspection point Rp shall be equal to the product of its weight by the value of the deficiency it presents:

Rp = Pp x Vd

3. Assessment of subsystems

If n inspection points belong to a subsystem, once their individual results have been obtained, the result of the subsystem to which they belong is calculated as follows:

$$Resultado\ de\ la\ inspección\ del\ subsistema\left(Rss\right)=\sum_{i=1}^{n} Rpi=\sum_{i=1}^{n} Ppi\ x\ Vdi$$

Rpi being the result of the i-th inspection point of the subsystem and Vdi the deficiency it presents. The following limits shall be taken into account when classifying the state of the subsystem:[39]

*Table **14**. Assessment of machine subsystems.*

No defect	$Rss < \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 3$	Or,	--

[39] For the whole Annex: the most unfavourable result will always be taken. In cases where all points belonging to a subsystem have weight 3, the numerical limits shall not be taken into account.

Mild deficiency	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6 > Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 3$		Some inspection point with weight 3 has mild deficiency
Moderate deficiency	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9 > Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6$		Some inspection point with weight 3 is moderately deficient
Major deficiency	$Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9$		Some inspection point with weight 3 has major deficiency

4. Assessment of systems

If the system consists exclusively of inspection points (it does not have subsystems), it proceeds in the same way as in the previous case.

If the system consists of subsystems, the subsystems are first evaluated in the manner indicated in point 3. Then, if m subsystems belong to a system, once their individual results are obtained, the result of the system to which they belong is calculated as follows:

$$Resultado\ de\ la\ inspección\ del\ sistema\ (Rs) = \sum_{j=1}^{m} Rssj\ x\ Pssj$$

Rssj being the result of the *j-th subsystem* and *Pssj* its weight. The following limits shall be taken into account when classifying the state of the system:

*Table**15**. Assessment of machine systems.*

Mild deficiency	$\sum_{j=1}^{m}\left(6\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right) > Rs \geq \sum_{j=1}^{m}\left(3\ x\ Pssj\ x\ \sum_{i=1\ y\ P}^{n}\right.$		Some subsystem with weight 3 has mild deficiency
Moderate deficiency	$\sum_{j=1}^{m}\left(9\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right) > Rs \geq \sum_{j=1}^{m}\left(6\ x\ Pssj\ x\ \sum_{i=1\ y\ P}^{n}\right.$	Or,	Some subsystem with weight 3 is moderately deficient
Major deficiency	$Rs \geq \sum_{j=1}^{m}\left(9\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right)$		Some subsystem with weight 3 has major deficiency

Ppij being the weight of point i-th belonging to subsystem j-th.

5. Assessment of the general condition of the machine

With n being the number of systems verified on the machine, and once the individual results of these are obtained, the overall result of the Rg machine is calculated as follows:

$$Resultado\ global\ de\ la\ máquina\ (Rg) = \sum_{k=1}^{n} Psk\ x\ Vdk$$

Psk being the weight of the k-th system and Vdk the deficiency it presents. The following limits shall be taken into account when classifying the condition of the machinery:

*Table**16**. Classification of the result according to the score obtained.*

No defect	$Rg < \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$		

Favourable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$	Or,	Some system with weight 3 has mild deficiency
Unfavorable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 9 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6$		Some system with weight 3 has moderate deficiency
Negative	$Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 9$		Some system with weight 3 has major deficiency

6. Exclusions

For the calculation of the limits indicated in Tables 2, 3 and 4, those inspection points, subsystems and systems which are not susceptible to inspection shall not be taken into account in each unit inspected.

ANNEX XI

Procedure for the evaluation of elements that may require disassembly

There are certain elements that, for evaluation or measurement, may require disassembly. This annex sets out the guidelines for verification:

a) Elements that require visual inspection.

Elements located in compartments closed by padlocks, screws, keys, etc., such as low maintenance batteries: the user of the machinery shall provide for this and shall keep such compartments open to facilitate inspection.

b) Elements that require measurement.

Moving parts that may be worn or loose: for the verification of certain parameters, such as gaps in the steering elements, their disassembly and measurement must be

carried out only if the person acting on behalf of the user (who will sign the inspection report) and the inspectors do not agree with the classification of the observed defect.

ANNEX XII

Restrictions on use

This annex details some special circumstances that may lead to a favourable report, but with restriction of use of the inspected unit. In such cases, the inspection report shall reflect those restrictions and the reasons for them. In particular, the following shall be taken into account:

1. Information available in a language other than Spanish:

   This should be noted in the inspection report, limiting the validity of the certificate of inspection to the use of the machine in the Autonomous Community where the machine was inspected, or to its use by operators who understand the language in which the information is written.

2. Tyres with protective chains:

   The parameters to be verified in relation to the tyres (wear, cuts, lack of material, etc.) in those machines that are inspected with protective chains mounted on them, will be evaluated with a level immediately lower, in relation to the interpretation of defects established for machines without chains, provided that these chains are in good condition. If it is necessary to use this new interpretation, this should be noted in the inspection report, limiting the validity of the inspection certificate to the use of chains.

3. Manipulations not permitted by the manufacturer or by an authorized workshop, in ROPS/FOPS structures, which do not involve plastic deformations caused by impact, overturning, etc., such as welding, cutting, drilling, or the like, for the installation of elements such as emitters, antennas, extinguishers, air conditioning equipment, etc.

   If there are no other additional deficiencies, these will be treated as Level 1 deficiencies, with restrictions on the use of the machine to places and operations where there is no danger of overturning the machine or falling objects[40] on it, limiting the validity of the certificate of inspection to this type of application.

4. Machines put into service before 1995

[40] One way to prevent falling objects is to provide a safety zone to the operator during the loading operation outside the cab.

a) Not equipped with an emergency steering system by the manufacturer:

   If there are no additional deficiencies that lead the machine to an unfavourable or negative assessment and its installation is not possible for technical and/or economic reasons, these will be treated as Level 1 deficiencies, with a technical speed limitation[41] of the machine to 20 km/h, making the validity of the inspection certificate conditional on this maximum speed limit.

b) With a braking system equipped by the manufacturer which does not meet the positive safety requirements:

   If there are no other additional deficiencies that lead the machine to an unfavourable or negative assessment and its installation is not possible for technical and/or economic reasons, these will be treated as Level 1 deficiencies, with restrictions on the use of the machine to places and tracks with maximum slopes of 10% and technical limitation[47] of the speed of the machine to 20 km/h, making the validity of the inspection certificate subject to these limits.

Point 3 will be treated as discussed, provided that the manipulations have been carried out prior to the entry into force of this TS.

[41] The installation of a speed limiter is required if the machine can reach higher speeds.

ET 10.03 INSPECTION OF ARTICULATED BASTIDER VOLQUETS ON WHEELS

1. OBJECT AND FIELD OF APPLICATION

The purpose of this Technical Specification ('TS') is to establish the procedure for periodic inspections of wheeled articulated frame dumpers in service at mining sites.

Articulated castor dump trucks expressly designed for use inside tunnels or galleries, articulated dump trucks expressly designed for use on public roads and articulated mini dump trucks are excluded.

2. DEFINITIONS

2.1 Nominal load: Maximum permissible load specified by the manufacturer.
2.2 Conservation: Set of operations that the manufacturer, user or others must perform to protect the machines against the corrosive action of the environment and against minor damage that may occur during handling, transport and storage.
2.3 Steering control element: Manual control medium by which the operator transmits muscle strength to the steering system in order to steer the machine. It comprises the typical steering wheel or any other means of manual control.
2.4 Steering effort: Necessary force exerted by the operator on the steering control element to drive the machine.
2.5 Element or system in good, safe or adequate condition: For the purposes of this TS, an element or system of the machine is considered to be in good condition, safe or suitable, provided that it performs the function for which it is designed, in terms of safety.
2.6 Power source for normal direction: Means to provide power for driving in power steering or servo steering systems, e.g. hydraulic pump, air compressor, electric generator.
2.7 Dumping: Self-propelled machine, on wheels or chains, with an open box,[42] which transports and overturns or extends materials. The loading of the machine is carried out by external means.
2.8 Articulated frame tipper on wheels: Tipper on wheels with an articulated frame that ensures the function of steering by articulation.

3. REQUIREMENTS

The machinery to which this TS refers shall comply with the provisions specified below (for further details, see Annex IV, the points to be inspected in Annex VIII and the reference standards in Annex XIII), and which affect the use, maintenance and maintenance of all components and mechanisms which are directly related to the safety and health of persons. Its classification, for this purpose, will be carried out in accordance with Standard UNE 115408.

Note: the general classification of earthmoving machinery, including those included in this TS, is covered by Standard UNE-EN ISO 6165.

3.1. Documentation

[42] Other functions or modifications of the machine are not excluded: Articulated frame dumpers on wheels without box for the transport of blocks, with water tank for irrigation operations, etc., are within the scope of this ET.

The original or a copy of the manufacturer's instruction manual, written in Spanish or in the official language of the Autonomous Community in which the machinery is located or, at least, in a language which is understandable to the operator, shall be found in an appropriate place within the operator's cabin.

3.2. Access

Access to the operator's station and maintenance areas shall be adequate and safe. Anyone entering these areas should be prevented from coming into contact with dangerous parts of the machine (hot surfaces, moving parts, etc.).

A minimum safety space must be maintained on the access road to the operator's *station, the machine being in the position of maximum articulation, and the locking devices of the frame articulation in good condition (refer to UNE 115241*).

The systems for access to the operator's post must allow for three secure support points, and those for access to maintenance points for at least two (see *UNE-EN ISO 2867*).

3.3. Operator's position

Machines must be equipped with operator's cab and have a minimum enclosure space that ensures the complete operation of the machine in a safe and ergonomic manner (see *UNE-EN ISO 6682*).

From the operator's station any accidental contact with the wheels and the box must be impossible. The exhaust system of the engine must direct the gases in such a way that they do not affect the operator. There shall be no sharp edges at the operator's station. If pressure and/or high temperature tubes and hoses exist, they must be adequately protected.

The emergency exit must be in good condition, operational and properly signposted. Doors and windows must have adequate anchoring devices, both when they are open and closed. All glazing must be safety glass. Indoor fixed lighting should make it possible to read the User's Manual when there is no outside light.

The machine must be equipped with a heating and ventilation system that provides the operator with adequate weather conditions, and allows effective defogging of the front and rear windows of the cab.

3.4. Operator protection structures

Machines must be equipped with rollover protection structure (ROPS) and object drop protection structure (FOPS). Manipulations (drills, welds, etc.) that have not been authorized by the manufacturer's Technical Services or by an authorized workshop for the repair of safety elements, according to section 4 of the ITC SM-IND-10, are not allowed. These structures should be kept in good condition and should not be structurally deficient.

3.5. Seats

The operator's seat must retain all its operational settings. It will also keep your upholstery in good condition and must keep the operator in a stable position that allows control of the machine and adequate comfort. Armrests should provide firm support during machine operation.

The seat belt and its anchorages must be in good condition and must be replaced on the dates marked by the manufacturer or after the machine has suffered a serious accident.

If the machine has an additional seat, it must also be in good condition, as well as its seat belt.

3.6. Commands and indicators

The controls and indicators must be kept in good condition so as to enable:

a) Its easy access. Objects that may prevent proper operation should not be placed.

b) Your I.D. Their identification symbols must be kept legible.

c) If the signals of the controls are transmitted electrically, the parasitic currents must not, under any circumstances, cause dangerous foreseeable action; To this end, any electrical or electronic equipment installed in the cab must comply with the applicable electromagnetic compatibility (EMC) requirements.

d) Preserve the sense of the movement made, according to the manufacturer's design.

e) Be operated without excessive effort, in normal operations.

The separation between pedals, their original dimensions and their surfaces, which will be non-slip, must be correctly preserved. Changes to the original functions of the pedals are not allowed, except in cases where the manufacturer has considered the possibility of programming them by the operator.

The protections in those controls whose involuntary operation may mean a danger, must be kept in good condition.

There must be no dangerous movement of the machine and the box after starting, interrupting the power supply or stopping the engine.

All symbols identifying the controls and indicators must consist of pictograms, or be written in Spanish or in the official language of the Autonomous Community in which the machinery is located or, at least, in a language which is understandable to the operator.

3.7. Steering systems

The normal steering control element for the operator intended by the manufacturer (flyer) must be retained; the operator must endure an abnormal effort on the part of the operator in a hypothetical panic situation.

The sensitivity, actuation and response of the normal steering system should be adequate in order to allow the qualified operator to constantly keep the machine on the intended path for each of the functions for which the machine is designed.

All machines must be equipped with an emergency steering system, and their manual must include the following:

a) The mention that the machine is equipped with this system.

b) The limitations of this.

c) The on-site test procedure to verify its operability.

Driving effort must be adequate, although somewhat greater efforts are allowed in the case of the emergency steering system.

The movement of the steering control element to produce a result should not vary excessively between right and left turns.

The warning device (sound or visual) indicating any failure of the power source in the normal direction must be kept in good condition.

Steering systems must make it possible to manoeuvre safely with the machine (see *UNE-EN ISO 5010 on tests of steering systems*).

3.8. Braking systems

Braking systems equipped on the machine must be efficient under all conditions of service, load, speed, terrain and slope foreseeable by the manufacturer and in line with normal working situations (refer *to Standard UNE-EN ISO 3450 on braking tests*).

The capacity of each braking system must be identical on each wheel of at least one axle on which it is applied.

3.8.1. Service brake

The operator must be able to safely decelerate and stop the machine using this system. If energy accumulators are used as the main application force for the service brake, the service brake must be equipped with a warning device (continuous alarm visible and/or audible) that is activated before the value of the accumulated energy falls below the values specified by the manufacturer. In addition, the service brake must maintain adequate recovery capacity.

3.8.2. Emergency brake

In the event of a service brake failure, this system must allow the operator to safely decelerate and stop the machine. In addition, the emergency brake must maintain adequate recovery capacity.

3.8.3. Parking brake

Once powered, it cannot depend on an exhaustible energy source. The parking brake must maintain an adequate immobilisation capacity, even on a slope and at nominal load.

3.8.4. Delayer

It must retain the retardation capacity established by the manufacturer. In the cabin the diagrams of the retardation characteristics of the machine must be in good condition.

3.9. Visibility

3.9.1. Operator field of view

The operator must at all times have sufficient visibility in relation to the working and driving area of the machine. The glazing of the cab and rear-view mirrors must be kept in good condition; The latter should be sufficient in number and appropriately targeted. If the machine is equipped with additional devices (ultrasound, television, etc.) these should be kept in good condition. There must be no added objects in the cabin that prevent proper vision. Windscreen wipers/washers and the front and rear window anti-fog system should be kept operational.

3.9.2. Lighting, light-signalling and retro-reflective devices

All systems and devices *installed by the manufacturer must be kept in* good condition. In particular, wheeled articulated frame dumpers must equip at least:

a) Emergency lights.

b) Front-lateral intermittents.

At the front:

a) Position lights.

b) Dipped-beam headlamps (front working lamps, if any, shall be considered for the purposes of this ET as complementary to dipped-beam headlamps).

c) Road lights.

d) Intermittent.

On the back:

a) Position lights.

b) Intermittent.

c) Brake lights.

d) Reversing lights.

e) Retro-reflectors.

Their function, location, number, grouping, reciprocity, intensity, orientation, colorimetric characteristics and flashing frequency (in the case of flashing lights and rotating headlamps) *shall be appropriate (see UNE-ISO 12509 on lighting systems)*.

3.10. Warning and signalling devices

The following devices shall retain their functionality and an appropriate sound level:

a) The audible warning device (speaker),

b) The start-up audible warning device (if fitted by the manufacturer); and

c) The recoil warning device.

3.11. Sound emissions

The machine must be kept in a state of conservation that allows it to comply with the limits that apply to it, both for noise emissions and[43] for the sound level at the operator's station.

[43] Noise emission measurement is outside the scope of this ET.

3.12. Protective devices

All guards, guards and screens that prevent accidental contact with any hot surface or moving parts by the machine operator or during maintenance operations must be kept in good condition. Any hot surface or movable part accessible to persons must be adequately protected.

3.13. Engagement and transport

The anchorage points and attachment devices of the machine must be kept in good condition.

3.14. Electrical components

The electrical installation of the machine (batteries, cables, pipes, fuses and other overload protection systems, etc.) must be kept in good condition, avoiding mechanical deterioration or environmental conditions.

3.15. Pipes and hoses

All pipe and hose protections with high pressure or high temperature fluids should be kept in good condition.

3.16. Pressure vessels, fuel and hydraulic tanks

Loading nozzles must be easily accessible, fitted with a lid that can be immobilised and located outside the operator's cab. The means provided to remove the internal pressure shall be operational. Pressure vessels must keep their information plate legible.

3.17. Fire protection

The fire protection system (fire extinguishers or automatic system) must comply with the required regulations, in relation to its periodic reviews, maintenance and conservation.

3.18. Tipper Box

3.18.1. Descent of the box

With the engine stationary it should be possible to lower the case to its transport position (chassis) and remove any residual pressure in the hydraulic and pneumatic systems. The way to perform this operation must be explained in the operator's position or in the Instruction Manual. The control that facilitates the descent of the box may be located outside the cabin, but always in a safe place and so that the person performing the operation has direct vision of the box.

3.18.2. Box indicator in transport position

The indicator that warns that the box is not in its transport position must be operational.

3.18.3. Box locking device

The mechanical elements (shafts, pins, etc.) of the safety lock of the box, which allows it to be secured in its highest position, must be kept in good and operational condition.

3.19. Tyres and rims

The machine must be equipped with the tyres and rims covered by the manufacturer (of the machine and of the tyres). Its state of conservation (pressures, wear, etc.) will be adequate and equal for the same axis, within the specified limits.

3.20. Marking

The machine must keep legibly and in a visible place its characteristic plate and the adhesive plate corresponding to the last inspection carried out. The warning signs necessary for the safe operation of the machinery must also be in the same condition.

Both the plates and the warning signs must be in Spanish or in the official language of the Autonomous Community in which the machine is located.

ANNEX I

Verification of requirements and/or security measures

In order to verify compliance with the requirements set out in this TS, one or more of the following possibilities should apply:

a) Measurement, in those inspection points for which the use of specific instrumentation is needed to obtain the results.

b) Visual examination, at those inspection points for which it is not necessary to use any instrument or equipment outside the machine itself.

c) Evaluation of the documentation, related to the documents provided by the manufacturer, and the records, dossiers and accreditations of the machine.

d) Test, where applicable, if there is a method prescribed for any particular requirement in the standard cited as reference , [or in the manufacturer's instruction manual. With exceptions, all tests require some type of measurement.]

[or in the manufacturer's instruction manual. With exceptions, all tests require some type of measurement.] Taking into account the objectives and scope of this TS, the methods prescribed in the reference standards, such as those relating to braking systems, must be adapted to each machine and to the conditions of the tracks where these tests are carried out, and must ensure that they are as appropriate as possible to the type of test to be carried out. In the above-mentioned case of braking systems, the highest speed allowed by the conditions of the machine and the test track shall always be chosen.

Measurements shall be made at those points for which, in the opinion of the inspector, the visual examination has not clearly determined their condition.

The use of specific instrumentation is mandatory for the testing of certain systems (braking systems and exhaust gas system), to measure cabin noise and full body vibrations transmitted to the operator.

ANNEX II

Inspection phases

The inspection procedure shall consist of several phases or stages, which are classified taking into account the state of operation of the engine and the machinery.

There are basically two ways to perform the tests or trials: statically and dynamically.

Static tests must be carried out when the points to be inspected do not require, for their correct evaluation, any movement of the machine, its elements (except for the moving elements of the engine, such as belts and fans) or its case. In turn, two types of static tests are distinguished:

a) With the engine stopped, or

b) With the engine running.

The dynamic tests must be carried out when the points to be inspected require, for their correct evaluation, specific movements of the machine, its elements or its box. In turn, three types of dynamic tests are distinguished:

a) With machine elements in motion, but without machine translation movement (examples: checking for slacks in the directional elements or for symmetry in the direction).

b) With the box in motion, but without moving the machine, or

c) With the machine moving.

Dynamic tests should also be considered as those that, although the movement of the machine, its elements or its box is not required or expected, may give rise to involuntary movements of these, due to malfunction of one of the systems (for example, parking brake retention test with the machine stopped on slope).

ANNEX III

Classification of deficiencies

Each of the inspected points, because they have a direct relationship with the safety of the machine, may present a degree of deviation (wear, mismatches, malfunctions, damage, lack of parts, etc.) that distances it from what should be considered its normal situation (in minimum conditions that can guarantee safety). This degree of deviation results in classifying the deficiencies found in these points as follows:

a) Level 1 deficiency (DN1), in which it must be understood that the observed deviation of the element from the minimum safety conditions does not immediately affect it, but that, if its evolution were not controlled, it would lead to a less desirable situation and would not guarantee safety.

b) Level 2 deficiency (DN2), in which it must be understood that the observed deviation of the element from the minimum safety conditions can immediately affect it, not making sense in this case to control its evolution, since it should not be allowed.

c) Level 3 deficiency (DN3), in which the observed deviation of the element from the minimum safety conditions must be understood to clearly affect it.

On the other hand, the deficiencies found in each of the systems and subsystems inspected will be classified according to the risks generated by each of them, from the point of view of safety, assessing together the probability of damage occurring and the severity of it. Deficiencies in systems and subsystems shall therefore be classified as:

a) Minor deficiencies: When they do not affect the safety and health of people immediately and, if the damage occurs, it has minimal consequences.

b) Moderate deficiencies: When they affect the safety and health of persons, but do not pose an imminent or serious risk.

c) Major deficiencies: When they involve an imminent or serious risk to the safety and health of persons.

ANNEX IV

Assessment of inspection points

This Annex sets out, in general terms, the criteria to be used, and the classification of defects may be changed in exceptional cases, at the discretion of the inspector.

The symbol (X) indicates that the defect at the inspected point can be classified in several ways, depending on its state.

The order of appearance of the different inspection points, as shown in the inspection sheet in Annex VIII, does not necessarily imply a temporary pattern to be followed during the inspection, nor is it necessary to inspect all points belonging to the same system consecutively. It should be up to the inspectors to decide which points to check at each stage of the inspection, depending on the circumstances and their experience.

Where appropriate, the machine hardware shall be checked by visual examination, without the use of tools to check the tightening torque.

At each stage of the inspection, the points shall be evaluated in accordance with one of the methods set out in Annex I. The results of each of these points shall be classified in accordance with the criteria laid down in Annex III. To this end, the following must be taken into account in order to comply with the requirements specified in paragraph 3 of this TS:

1. Instruction manual

For the classification of deficiencies, the following aspects shall be taken into account:

a) Location, content and conservation status of the documentation to be submitted.

b) The language in which the documents are written.

c) The correct identification of the machine.

Instruction Manual	Classification		
	DN1	DN2	DN3
Content and conservation status:			
Absence of unreadable sheets or paragraphs	X		
Absence of unreadable sheets or paragraphs in the security section		X	
Does not exist			X
Language and identification:			
It is not in Spanish or any of the other official languages		X	
Does not belong to the machine (n° series outside the interval)		X	(X)
User-produced manual that does not take into account important safety aspects		X	(X)

2. Chassis

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, remnants of weld cords, areas with lack of material, etc.

b) Screws of the different worn, loose or non-existent anchors.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

Chassis	Classification		
	DN1	DN2	DN3
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones with thickness loss up to 10%	X		
With thickness loss up to 20%		X	
With thickness loss of more than 20%			X

Chassis	Classification		
	DN1	DN2	DN3
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)

3. Tyres[44]

For the classification of deficiencies, the following aspects shall be taken into account:

a) The types of tires mounted on each side and their condition.

b) The condition of the tyres that are mounted on the steered wheels.

c) The condition of tyres mounted on the same axle.

d) The number, location and depth of tacos plucked[45].

e) The number, location, length and depth of the cuts on the flanks.

f) The wear condition of the tread.

g) The pressures he's working on.

h) Joint influence of deficiencies in the same bending area, on the tyre and between tyres on the same axle.

i) Worn, loose or non-existent anchor screws.

j) The number and location of missing or deficient screws.

Tyres	Classification		
	DN1	DN2	DN3
Types of tyres (per axle):			

[44] Machines equipped with chains may be inspected with them (See *Annex XII*).

[45] Tacos will be classified as defective if some of them have a certain defect, and therefore the total absence of these is not necessary.

Tyres	Classification		
	DN1	DN2	DN3
Different dimensions	X	(X)	
At least one of them has features not allowed by the manufacturer		X	(X)
Different condition of each tyre	X	(X)	
Irregular wear (difference between average and lower heel height), with reference to average heel height:			
Not more than 5%	X		
Not more than 10%		X	
Exceeds 10%			X
Regular wear.- In relation to the uniform wear of the tread, if the tyres have final wear controls, these will be taken as a reference; otherwise, the following shall be taken as a reference:			
End wear witnesses:			
0.5 cm to reach it	X		
Wear witness has been reached		X	
Wear witness overrun			X
Less difference between the sculpture and the background of the sculpture:			
Between 2.5 and 3 cm	X		
Between 2 and 2.4 cm		X	
Difference less than 2 cm			X
Small tyres (e.g. old machines with a nominal capacity of 25 tonnes)			
Between 1.5 and 2 cm	X		
Between 1 and 1.4 cm		X	
Difference less than 1 cm			X
Existence of cuts on the flanks:			
Large insulated cut that does not reach protection mesh	X		
Reaching the protective mesh, without affecting it		X	
Affecting the protective mesh			X
Small cuts in the same bending area that do not reach the protective mesh	X		

Tyres	Classification		
	DN1	DN2	DN3
Large cuts in the same bending area that do not reach the protective mesh		X	
Reaching the protective mesh			X
Formation of air chambers between tarpaulins without leakage:			
Small in size, not located in the same bending area	X		
In the same bending area		X	
Medium in size, not located in the same bending area		X	
In the same bending area			X
Large			X
Formation of air chambers between tarpaulins with leaks to the outside			X
Loss of material:			
Small in size in the same bending area	X		
Medium size		X	
Reaching the protective mesh, without affecting it		X	
Large or affecting protective mesh			X
Tacos plucked:			
Less than 5% of the studs are missing, in non-contiguous positions, without showing the casing	X		
In contiguous positions		X	
Missing between 5% and 10% of the studs, in non-contiguous positions, without showing the casing		X	
In contiguous positions			X
More than 10% of tacos are missing			X
Missing some taco that lets you see the casing			X
Anchor screws:			
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Tire Status:			
Structural damage (permanent tire deformations, cracks, breakages, etc.)		X	(X)

Tyres	Classification		
	DN1	DN2	DN3
Other deformations	X		

4. Damping system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, remnants of weld cords, areas with lack of material, etc.

b) Screws of the different worn, loose or non-existent anchors.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

g) The amount of oil lost from leaks in the cylinders.

h) The existence of bites on the plungers.

i) The existence of bites, lack of material or metal parts of silentblocks.

Damping systems	Classification		
	DN1	DN2	DN3
Anchorage:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X

Damping systems	Classification		
	DN1	DN2	DN3
Condition of the damping system:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Other deformations	X		

5. Steering systems

For the classification of deficiencies, the following aspects shall be taken into account:

a) Operation and condition of the steering wheel and steering column.

b) The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the elements of the direction.

c) The proportion of affected area.

d) The proximity of the affected areas and the deficiencies.

e) Symmetry in the performance of the steering wheel and the steering joint of the frame (central *joint).*

f) The amount of oil lost from leaks in the cylinders.

g) The existence of bites on the plungers.

h) Excessive slacks between elements.

i) Effective operation of both the main and secondary management.

Steering systems	Classification		
	DN1	DN2	DN3
Steering elements (Flying, steering column, turning stops, pins and cylinders), structural condition:			
Structural damage (permanent deformations in the elements, cracks, breaks, etc.)		X	(X)

Steering systems	Classification		
	DN1	DN2	DN3
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Steering wheel, operation:			
Moderate effort is required for its operation but does not make it inoperative	X		
It shows the need to apply sudden movements for control or dead spots in its route		X	
Difficult drive			X
Slacks in the elements of the address:			
Axial slacks on pins or bolts, relative to their nominal length:			
Up to 10%	X		
Between 11% and 15%		X	
Over 15%			X
Radial slats on pins or bolts, relative to their nominal diameter:			
Up to 5%	X		
Between 6% and 10%		X	
Greater than 10%			X
Slacks on the steering wheel. Free ride of the steering wheel in either direction:			
It's between 10 and 15 degrees	X		
It's between 16 and 20 degrees.		X	
It is greater than 20 degrees			X

Steering systems	Classification		
	DN1	DN2	DN3
Symmetry. The movement of the elements of the steering control, to produce a given result varies, between the turns to the right and to the left:			
Between 20% and 25%	X		
Between 26% and 30%		X	
More than 30%			X
Emergency address:			
Steering wheel control:			
Excessive effort is required for its operation but does not make it inoperative	X		
It shows the need to apply sudden movements for control or dead spots in its route		X	
Direction of very difficult actuation		X	
Maneuverability:			
Low manoeuvrability (short operating time, only allows initial movement in one direction, with the possibility of a change)	X		
Insufficient maneuverability (short operating time, only allows initial movement in one direction, without the possibility of a change)		X	
Inability to maintain control		X	
Operation:			
Intermittent (it does not work in some cases or you have to press the switch two or three times for its activation)	X		
The switch must be pressed more than three times for activation		X	
Does not work		X	
Non-existent or partially or completely disassembled			X

6. Braking systems

For the classification of deficiencies, the state of each of the systems forming it shall be taken into account together. For each braking system, the following aspects shall be taken into account:[46]

a) The efficiency in braking, stopping the machine in safe conditions.

b) Excessive deviation from the rectilinear path during braking.

c) Retention capacity.

d) The general state of the system.

e) How to apply the system by the operator (expected operation of the controls or pedals of the system).

f) The amount of oil lost from leaks in packages.

g) The effort that the operator must make to apply the system.

For the verification of each braking system, several methods have been established, with dynamic or static tests, as the case may be, taking precedence over engine torque tests: therefore, as a general rule, dynamic or static tests should be applied, leaving torque tests to be carried out only in cases where it is not possible to apply the above mentioned tests. If engine torque testing is to be used, the inspector shall reflect in the inspection report the reasons why he was unable to perform the other tests. The following table summarises these tests, which are detailed below.

Braking system	Test			Parameters to check	Other checks	Comments
	Static	Dynamics	Against engine torque			
Service		X	X	E_e or E_2 - μ or β	Oil leaks in packages	2 tests of one type
Emergency (no blockage		X	X	E_e or E_2	• Warning device	1 test of a

[46] The machine should be tested without load, where possible.

by power cut)				n° Drives	• Automatic drive	type
Emergency (with power cut-off)		X	X	E_e or $E_2 – t_r$ - E_b		
Parking	X		X	P_e or E_2	Disc status, drum, etc.	1 test of a type
Delayer		X			Loss of capacity	1 test

Requirements for runways and slopes used for checking braking systems:

a) The test tracks for dynamic tests of service and emergency braking systems may have a maximum inclination of 5%, both longitudinally and transversely, in relation to the direction of travel of the machinery.

b) For the static test of the parking braking system, the slope where the machine is located shall allow the free movement of both undercarriages; this slope must be verified on the machine itself.

In the case of the retarder, it is sufficient to check that it performs its function according to the specifications given by the manufacturer (in the cabin diagrams or in the instruction manual), preventing the machine from acquiring speed by descending slopes, when this is applied.

Braking systems	Classification		
	DN1	DN2	DN3
System effectiveness			
Service brake			
Dynamic test without load:			
$0.9\ E > E_e \geq 0.8\ E$	X		
$0.8\ E > E_e \geq 0.7\ E$		X	
$0,7\ E > E_e$			X
Dynamic test with load:			
$0.9\ E > E_e \geq 0.8\ E$	X		
$0.8\ E > E_e \geq 0.7\ E$		X	
$0,7\ E > E_e$			X
Emergency brake			
Dynamic test without load:			

Braking systems	Classification		
	DN1	DN2	DN3
0,95 E > E_e ≥ 0,9 E	X		
0.9 E > E_e ≥ 0.85 E		X	
0.85 E > E_e			X
Dynamic test with load:			
0.9 E > E_e ≥ 0.8 E	X		
0.8 E > E_e ≥ 0.7 E		X	
0,7 E > E_e			X
Parking brake, slope retention:			
P_{min} -6% ≤ P_e < P_{min} -3%	X		
P_{min} -9% ≤ P_e < P_{min} -6%		X	
P_e < P_{min} -9%			X
Deviation of rectilinear path during braking, service brake:			
30% ≥ μ > 25%	X		
35% ≥ μ > 30%		X	
μ > 35%			X
Retention tests against engine torque[47]			
Service brake			
Brake efficiency:			
95% > E_2 ≥ 85%	X		
85% > E_2 ≥ 75%		X	
75% > E_2			X
Breakdown distribution:			
30% > β ≥ 25%	X		
35% > β ≥ 30%		X	
β ≥ 35%			X
Emergency brake			
Brake efficiency:			
85% > E_2 ≥ 75%	X		
75% > E_2 ≥ 65%		X	
65% > E_2			X
Parking brake			
Brake efficiency:			
85% > E_2 ≥ 75%	X		

[47] During these tests, braking systems will normally hold the machine. In this situation, the draught of the converter is caused, which results in excessive heating of the transmission oil, so this check cannot be maintained for a long time (less *than one minute)*. Therefore, you should always opt for dynamic testing, resorting to static testing in exceptional cases.

Braking systems	Classification		
	DN1	DN2	DN3
75% > E_2 ≥ 65%		X	
65% > E_2			X
Retarder capacity			
The system has lost its retaining capacity considerably (insignificant contribution to machine retention)	X		
The system has totally lost its retention capacity		X	
Fully or partially uninstalled			X
Energy Accumulation System Capacity Test for Unladen Machine Braking[48]			
Number of fully effective service brake actuations required by UNE-EN ISO 3450:			
You get four	X		
You get between two and three		X	
You get one or none			X
Less than five are achieved, leaving the machine locked	X		
Warning device[49]:			
The alarm is not continuous, audible and / or visible, but acts long enough to attract the attention of the operator	X		
Alarm does not attract operator's attention		X	
With the engine running and the doors and windows closed, its sound is not properly perceived	X		
The warning device is not a visible and/or audible continuous alarm		X	
The warning device is activated below 50% of the value of the accumulated energy	X		
Warning device is not activated		X	
Automatic operation of the emergency brake			
The automatic drive is activated when the value of the accumulated energy is:			
Below 45% of the maximum operating value specified by the manufacturer	X		
Below 40% of the maximum operating value specified by the manufacturer		X	
Below 35% of the maximum operating value specified by the manufacturer			X
Machines with automatic locking system by power cut[50]			

[48] These tests shall be taken as requirements for the emergency braking system. This test must be performed if the energy accumulated in the service brake calderines is also used to operate the emergency brake, and the model does not have an automatic power cut-off locking system. It shall also be performed on machines with oil accumulator for the service brake system. The number of full actuations of the service brake of the machine, with the engine stopped, shall be checked on a slope of 12% (±1%), starting with the machine stopped and with an interval of 5 seconds between actuations, so as to allow free movement between braking.

[49] In addition to the above, the service brake energy shall be reduced by any appropriate means (e.g. purging of the calderines). The warning device shall be activated before the cumulative energy value is less than 50% of the maximum operating value specified by the manufacturer. The warning device shall be activated before the automatic application of the emergency brake.

Braking systems	Classification		
	DN1	DN2	DN3
Response time:			
4 s < t_r ≤ 5 s	X		
5 s < t_r ≤ 7 s		X	
t_r > 7 s			X
Brake efficiency:			
19% > E_b ≥ 17%	X		
17% > E_b ≥ 15%		X	
E_b < 15%			X
Oil leaks in packages:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X

Being:

P_e (%) the minimum slope at which the machine is retained

P_{min} (%) the minimum required slope, according to UNE-EN ISO 3450

E (%) braking efficiency required by UNE-EN ISO 3450

E_e (%) the braking efficiency obtained in each of the tests

μ (%) the ratio between the maximum frontal and lateral decelerations of the machine, obtained during the test

E_2 (%) the ratio of engine revolutions per minute at which the system stops holding the machine to 70% of the maximum engine revolutions

β (%) the brake distribution, calculated as the complementary to the ratio of the difference between the number of maximum engine revolutions and the revolutions per minute of the engine at which some of the wheels begin to move, and the difference between the number of maximum engine revolutions and the revolutions per minute of the engine at which the system ceases to retain the machine

[50] It shall be checked whether this system operates within the safety margins. The test shall be carried out at a speed of 4 ± 1 km/h on a slopeless surface, measuring the time elapsed from the power cut-off to the start of the system operation (response time t_r) and the braking efficiency of the automatic locking (E_b).

NOTE.- If dynamic braking tests are to be carried out under adverse weather conditions,[51] the following correction factors shall be taken into account:

Wet runway (with formation of water and/or mud bags)	Correction factor
Of earth or similar	0,8
Of asphalt or similar	0,9
Concrete or similar	1

On the other hand, if the conditions of the track cause the tyres to sink,[52] the aquaplaning or hydroplaning[53] or the skidding[54] of the machine, the track must be conditioned before the tests in order to avoid these phenomena. If this conditioning is not possible, static or torque tests shall be carried out, as appropriate.

7. Engine

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence of leaks and corrosion phenomena in the fuel and coolant tanks of the engine, and the amount of fluid loss.

b) The existence of shocks, breaks, cracks, fissures or leaks of fuel or coolant.

c) The condition and operation of the filling cap of the fuel tanks and coolant.

d) The existence of bites, cuts, loose flanges or leaks (and *amount of fluid loss)* in the fuel system or engine cooling system ducts.

e) The operation of the rapid fuel filling system and its strainer system.

f) The structural state of the fan blades and their operation.

g) The general condition of the engine compartment.

h) The amount of oil lost from engine leaks.

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[51] In these circumstances, any deviation from the rectilinear path during braking shall not be taken into account.

[52] Waterlogged tracks with little compaction (sand, slate or marble limestone powder, etc.)

[53] Waterlogged tracks with good compaction (asphalt, concrete, etc.)

[54] Tracks with good compaction, with ice formation or snow accumulation.

i) The proportion of fumes and gases leaking into exhaust manifolds.

Engine	Classification		
	DN1	DN2	DN3
Fuel system			
Structural status of tanks and pipelines:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of capacity	X		
Dents in tanks with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Fuel leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Filling plug:			
Deficient state or performance	X	(X)	
Absence of cap			X
Fast filling system			
Deficient state or performance	X	(X)	
Cooling system			
Operation:			
The system does not maintain the temperature within the limits set by the manufacturer		X	(X)
Structural status of elements:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks or radiator without appreciable loss of capacity	X		
Dents in tanks or radiator with appreciable loss of capacity		X	(X)

Engine	Classification		
	DN1	DN2	DN3
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Coolant leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Filling plug:			
Deficient state or performance	X	(X)	
Absence of cap			X
Fans:			
Poor condition or absence of blades	X	(X)	
Levels:			
Below the manufacturer's requirements	X	(X)	
Engine compartment			
Exhaust circuit status:			
Structural damage (cracks, breakages, etc.)		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Flue gas leakage:			
Sporadic or intermittent	X	(X)	
Continuing		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Levels:			
Below the manufacturer's requirements	X	(X)	
Straps:			

Engine	Classification		
	DN1	DN2	DN3
Worn or cracked, with sufficient tension	X		
Other defects		X	(X)

8. Drive train

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, shocks, cracks, areas with lack of material, etc. on the tree, differentials, final controls or other elements of the transmission.

b) Screws of the differentials, final controls or of the joints between elements of the transmission, worn, loose or non-existent.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

g) The amount of oil lost due to leaks in the differential groups or in the final controls.

Drive train	Classification		
	DN1	DN2	DN3
Status of transmission shafts, differential groups and final controls:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		

Drive train	Classification		
	DN1	DN2	DN3
Excessive movement between elements		X	(X)
Oil leaks in differential groups and final controls:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X

9. Hydraulic system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence of cracks, fissures, dents, etc., in tanks and ducts (rigid *and flexible)*.

b) The loss of tank and system capacity due to dents or oil leaks.

c) Operation (flow *and pressure suitable for the steering and lifting system of the housing*).

d) References shall be the design pressures and flow rates of the machine.

Hydraulic system	Classification		
	DN1	DN2	DN3
Structural condition of rigid and flexible tanks and pipes:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of capacity	X		
Dents in tanks with appreciable loss of capacity		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Oil leakage:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Scaffolding system:			

Hydraulic system	Classification		
	DN1	DN2	DN3
Deficient state or performance	X		
Absence of a strainer system		X	
Levels:			
Below what is established by the manufacturer, not affecting the hydraulic system of the steering	X	(X)	
Below what is established by the manufacturer, affecting the hydraulic system of the steering		X	(X)

10. Pneumatic system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence of cracks, fissures, dents, etc., in tanks and conduits.

b) The loss of capacity of the boilers and the system, due to dents and / or air leaks.

c) Operation (appropriate *pressure for braking systems*).

d) References will be machine design pressures.

Pneumatic system	Classification		
	DN1	DN2	DN3
Structural status of boilers and pipelines:			
Structural damage (cracks, breakages, etc.)		X	(X)
Dents in tanks without appreciable loss of volume	X		
Dents in tanks with appreciable loss of volume		X	(X)
Corrosion zones	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Air leakage:			
That cause the pressure drop of the system gradually	X	(X)	
That cause the pressure drop of the system immediately		X	(X)

Pneumatic system	Classification		
	DN1	DN2	DN3
Purged of calderines. Accumulation of water or other substances:			
Expulsion of substances intermittently	X		
Continuously expelling substances		X	(X)
Pressure:			
Below what is established by the manufacturer, not affecting any braking system	X	(X)	
Below what is established by the manufacturer, affecting any of the braking systems		X	(X)

11. Protection structures

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence and size of areas with corrosion, bumps, cracks, remnants of weld cords, areas with lack of material, etc., in the cabin (ROPS/FOPS), in the back window protection mesh.

b) Screws of the different worn, loose or non-existent anchors.

c) The structural importance of the elements concerned.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies.

f) The number and location of missing or deficient screws.

g) The existence of non-permitted operations, such as drilling, cutting or welding (ROPS/FOPS *cab).*

Protection structures	Classification		
	DN1	DN2	DN3
ROPS/FOPS cab structural status:			

Protection structures	Classification		
	DN1	DN2	DN3
Structural damage (deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones with thickness loss up to 5%	X	(X)	
Corrosion zones with thickness loss greater than 5%		X	(X)
Status defects in anchors	X	(X)	
Fall protection structure of objects in rear window:			
Any type of defect	X	(X)	
Restrictions on use:			
Unauthorised handling in the ROPS/FOPS cab, prior to the entry into force of this ET	X		

12. Access elements

For the classification of deficiencies, the following aspects should be taken into account:

a) When accessing the machine or the cab, the access elements (stands, *steps*, *railings*, *etc.)* must at all times provide three secure support points.

b) The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the access elements and in the passage and permanence platforms.

c) Screws of the different anchors of elements to the worn, loose or non-existent chassis.

d) The proportion of affected area.

e) The proximity of the affected areas and the deficiencies (on *the platforms*).

f) The number and location of missing or deficient screws.

g) The effective footprint and pass distance of the anti-slip surfaces of the machine.

Access elements	Classification		
	DN1	DN2	DN3
Status of items:			

Access elements	Classification		
	DN1	DN2	DN3
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Non-slip surfaces. Effective Footprint and Passing Distance:			
Loss of adhesion or non-slip surface	X	(X)	
Absence of non-slip surfaces		X	(X)

13. Operator's position

For the classification of deficiencies, the state of each of the systems forming it shall be taken into account together.

Cabin safety

For the classification of deficiencies, the following aspects should be taken into account:

a) The cabin must have adequate means for closing doors and windows.

b) The existence and size of cracks in crystals, and if any part of them is missing.

c) The number of cracks, their location and their impact on mechanical strength.

d) The number, orientation and existence of cracks in the rearview mirrors.

e) The field of view that allows the crystals and mirrors to the operator.

f) The state of screws and anchors of the rear-view mirrors.

g) The effort that must be made to open doors and windows.

h) The existence, readability and status of the emergency exit signal.

i) The existence, adequacy and state of the means of opening the emergency exit.

j) The elements that can prevent a safe abandonment of the cabin by the emergency exit.

k) The condition of the shock absorbers and anchorages of the cab supports.

l) The effectiveness of door anchors and their condition.

Operator's position: Cabin Safety	Classification		
	DN1	DN2	DN3
Status of items:			
Structural damage (permanent deformations in the structure, cracks, breaks, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X		
Absence or poor condition of anchor screws		X	(X)
Crystals:			
Cracks affecting the operator's field of vision or the mechanical strength of the glass	X	(X)	
Absence of non-safety crystals or crystals		X	(X)
Rear-view mirrors. Loss of total field of vision:			
Up to 25%	X		
Up to 50%		X	
More than 50%			X
Safety mirrors. Loss of field of vision at hazardous points:			
Up to 50%	X		
More than 50%		X	
Emergency exit:			
Signaling illegible or absent	X		

. Loss of total field of vision: To establish the field of vision, the provisions of Standard UNE-ISO 14401-2 shall be used.

Operator's position: Cabin Safety	Classification		
	DN1	DN2	DN3
Difficulties in opening		X	(X)
Presence of objects that prevent their use		X	(X)
Lock and key:			
Status defects	X		
Key malfunction		X	
No key, lock or other means to securely close the machine			X

Operator seat

For the classification of deficiencies, the following aspects should be taken into account:

a) The condition of the seat upholstery.

b) The state of armrests and headrests, and their attachments.

c) The state of the seat anchorages to the cabin floor.

d) The effectiveness of adjustments and suspensions.

e) The existence and condition of the seat belt and its anchorages, and its adaptation to the machine.

f) The existence of cuts or loose fibers in the seat belts.

g) The date of installation of the safety belts.

h) The operation of seat belts.

Operator's position: Operator's seat	Classification		
	DN1	DN2	DN3
Status of the seat and its components:			
Damage (corrosion zones, cracks, breaks, wear, etc.) that interferes or may interfere with driving	X	(X)	

Operator's position: Operator's seat	Classification		
	DN1	DN2	DN3
Damage (corrosion zones, cracks, breakages, wear, etc.) that interferes or may interfere with fire resistance properties	X		
Other damage	X		
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Seat with characteristics other than those specified by the manufacturer		X	(X)
Adjustments:			
Non-operational major adjustments	X	(X)	
Non-operational secondary adjustments	X		
Suspensions:			
Damage to the seat suspension, adjusting scale viewfinder or adjusting control causing appreciable loss of suspension capacity	X	(X)	
Damage to the seat suspension, adjusting scale viewfinder or adjusting control, resulting in total loss of suspension capacity		X	(X)
Safety belt[55]			
Impairment of the belt or its anchorages:			
They show signs of deterioration that may decrease their effectiveness	X		
They show signs of deterioration that decrease their effectiveness		X	
They show signs of deterioration that render it useless			X
Operational:			
Not properly restraining the operator		X	
Blockage does not work sometimes		X	
The blockage does not act on almost no occasion or no occasion			X
Replacement:			
In good condition, but not replaced on the date marked by the manufacturer	X		
In good condition, but not installed by the manufacturer's technical service or by an authorized workshop		X	
Absence of belt or any of its anchorages			X
Accompanying seat/instructor			
Any defect in the condition of the seat or its elements	X	(X)	

[55] The provisions of Standard UNE-EN ISO 6683 shall be used.

Operator's position: Operator's seat	Classification		
	DN1	DN2	DN3
Impairment or absence of the belt or any of its anchorages		X	(X)
In good condition, but not installed by the manufacturer's technical service or by an authorized workshop	X	(X)	

Environmental conditions and ergonomics

For the classification of deficiencies, the following aspects should be taken into account:

a) The existence and effectiveness of the heating/anti-vaho system in the front and rear windows.

b) The existence, condition and efficiency of the acoustic and thermal insulation of the cabin.

c) The readability, suitability and language of the symbols of the controls.

d) The state of the controls and their operation.

e) The effort required for their performance.

f) The existence of objects that can fall or move, causing unintended movements by the operator.

g) The existence of objects that can limit the operator's movements or significantly reduce his cabin space.

h) The status and effectiveness of the dust filter.

i) The existence of living edges.

Operator's position: environmental conditions and ergonomics	Classification		
	DN1	DN2	DN3
Door and window cabinets:			
Deterioration that reduces its function	X	(X)	
Absence of burletes		X	(X)
Symbols of the controls:			

Operator's position: environmental conditions and ergonomics	Classification		
	DN1	DN2	DN3
Unreadable or absent, not belonging to braking or steering controls	X	(X)	
Unreadable or absent, belonging to braking or steering controls		X	(X)
In a foreign language, without pictograms accompanying it	X		
Commands			
Damages:			
Impairment that affects or may affect its functionality	X	(X)	
Drive:			
It is necessary to apply a moderate force	X	(X)	
It is necessary to apply excessive force		X	(X)
Your response is not immediate (when required)	X	(X)	
Does not respond or performs a different function than expected		X	(X)
Air conditioning system:			
Intermittent malfunction or operation	X	(X)	
Does not work			X
Cleaning the cabin (indoor):			
Excessive dirtyness in cabin	X	(X)	
Loose or poorly fixed elements that can move uncontrollably	X	(X)	
Loose or poorly fixed elements that may fall or affect driving		X	(X)
Interior lighting:			
Damages that do not prevent its use immediately	X		
Low luminous intensity	X	(X)	
Does not work			X
Dust filter:			
Excessive accumulation of dust in the filter	X	(X)	
Absence of filter			X
Operator Envelope Space:			
Installation of objects or modifications to the seat that partially reduce the surrounding space	X	(X)	
Installation of objects or modifications to the seat that excessively reduce the surrounding space		X	(X)
Existence of live edges with low probability of contact with the operator	X		

Operator's position: environmental conditions and ergonomics	Classification		
	DN1	DN2	DN3
Existence of live edges with high probability of contact with the operator		X	(X)

Cabin safety information

For the classification of deficiencies, the following aspects should be taken into account:

a) The warning level displayed by the panel alarm.

b) The number and importance of those alarms.

c) The number and importance of alarms or indicators that do not work.

Operator's position: cabin safety information	Classification		
	DN1	DN2	DN3
Indicators and alarm lights. Malfunction, absence or illegibility of:			
Information indicators	X		
Warning indicators		X	
Hazard indicators			X
Alarm panel performance test. Malfunction, absence or illegibility of:			
Information indicators	X		
Warning indicators		X	
Hazard indicators			X

Machine start-up and shut-down devices

For the classification of deficiencies, the following aspects should be taken into account:

a) Your signage.

b) Its operation (ability *to cause a dangerous situation due to a malfunction of the device*).

c) The way in which the start-up or shut-down of the machine is carried out (expected *operation of the devices*).

Operator's position: start-up and shut-down devices of the machine	Classification		
	DN1	DN2	DN3
Key:			

Operator's position: start-up and shut-down devices of the machine	Classification		
	DN1	DN2	DN3
Irregular operation	X	(X)	
On and off positions are not identified	X	(X)	
Means not included in its design are used for starting the machine		X	(X)
Start-up:			
Anomalies in the start-up	X	(X)	
Means not included in its design are used for commissioning		X	(X)
Stop:			
Anomalies at the stop	X	(X)	
Means not included in its design are used for the stop		X	(X)

14. Safety barriers

For the classification of deficiencies, the following aspects shall be taken into account:

a) Your signage.

b) Its existence and effectiveness.

c) The structural state of its elements.

d) How the lock is performed (expected *application of the lock devices*).

For safety barriers, the following classification shall be used:

Safety barriers	Classification		
	DN1	DN2	DN3
Common defects for all types of safety barriers:			
The device does not perform the function for which it was designed		X	(X)
Difficulties in its use	X	(X)	
The lock does not work or is not installed			X
Manipulations: device partially or completely disassembled, so that it cannot be used (e.g. lack of safety pin)		X	(X)
Signaling Unreadable or Absent	X		
Status of elements in mechanical locks:			
Structural damage (permanent deformations, cracks, breakages, etc.)	X	(X)	
Corrosion zones	X	(X)	

Safety barriers	Classification		
	DN1	DN2	DN3
Other deformations	X		
Absence, loosening or poor condition of anchor screws	X	(X)	

15. Tipper Box

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence, suitability and condition of the lateral supplements of the box.

b) The general condition of the box.

c) The existence and size of areas with corrosion, shocks, cracks, remains of weld cords, areas with lack of material, etc., in the box and in the cylinders and their anchors.

d) The structural importance of the elements concerned.

e) The proportion of affected area.

f) The proximity of the affected areas and the deficiencies.

g) The existence and condition of the support stops of the box to the chassis.

h) The number of support caps in poor condition, or nonexistent, and their location.

i) The existence and condition of turning bolts and their means of attachment.

j) Instability caused by malfunction of the lifting system in the tilting operation, or by excessive slack of elements.

k) The possibility of neutralizing the control of the swingarm, directly or indirectly.

l) The operation of the cylinders.

m) The amount of oil lost from leaks in the cylinders.

n) The existence of bites on the plungers.

o) The existence, condition and operation of the warning device with the box raised.

Dump box	Classification		
	DN1	DN2	DN3
Adaptation to the machine: Box or other accessory not covered by the manufacturer		X	(X)

Dump box	Classification		
	DN1	DN2	DN3
Box supplements:			
They are used to increase the volume but not the nominal load of the machine	X		
They are used to increase the volume and nominal load of the machine		X	(X)
Structural condition of the box (or other accessory), support stops, bolts, supplements and cylinders:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones with thickness loss up to 10%	X		
Corrosion zones with thickness loss up to 20%		X	
Corrosion zones with thickness loss greater than 20%			X
Other deformations	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Oil leaks in cylinders:			
No continuous drip	X		
With continuous drip		X	
In the form of a jet			X
Operation:			
Instability of the box (or other accessory) or machine is observed during operations	X	(X)	
Neutralisation of controls[56]:			
The work equipment does not go down entirely, but allows a safe towing of the machine	X		
The work equipment does not go down in its entirety, not allowing a safe towing of the machine		X	
Neutralization is not done from a safe area		X	(X)
Does not work		X	(X)

16. Safeguards

For the classification of deficiencies, the following aspects shall be taken into account:

a) The existence, suitability and condition of the gates at all access points to dangerous parts of the machine.

b) The possibility of closing, opening and anchoring the different gates.

c) The need to open the guards or gates with a key or tool.

[56] If the procedure requires the disassembly of parts with tools or the partial or total emptying of oil, the device shall simply be checked for signs of proper operation.

d) The state of the screws and anchors.

e) The existence and state of fenders and skirts.

f) Welded anchors or fender screws and skirts to the chassis or case.

Safeguards	Classification		
	DN1	DN2	DN3
State of guards and fenders:			
Structural damage (permanent deformations, cracks, breakages, etc.)		X	(X)
Corrosion zones	X	(X)	
Other deformations	X	(X)	
Loosening of anchor screws	X	(X)	
Absence or poor condition of anchor screws		X	(X)
Small shifts (slacks) between elements	X		
Excessive movement between elements		X	(X)
Efficacy of safeguards:			
Defects that do not allow opening or closing	X	(X)	
Partial loss of protection characteristics	X	(X)	
Significant loss of protection characteristics		X	(X)
Absence of protection (if required)			X
Mudguard effectiveness:			
Partial loss of protection characteristics	X	(X)	
Significant loss of protection characteristics		X	(X)
Absence of fenders			X

17. Warning and Hazard Indicators

For the classification of deficiencies, the following aspects shall be taken into account:

a) Location, readability and conservation status of indicators and towing points.

b) The language in which they are written (if *they are not pictograms*).

c) The existence of all the necessary indicators.

Warning and Hazard Indicators	Classification		
	DN1	DN2	DN3
Location:			
It's not in the warning danger zone.	X	(X)	
There is no link between the warning and the actual danger		X	(X)
Legibility and conservation status:			
Unreadable or absent	X	(X)	
Absence of indicators in highly hazardous areas		X	(X)
In a foreign language, without pictograms accompanying it	X		

18. Fire protection

For the classification of deficiencies, the following aspects shall be taken into account:

a) The need for the machine to be equipped with means of extinguishing.

b) Location, loading, adaptation to the machine and state of conservation of the extinguishers.

c) The general state of preservation of the machine.

d) The condition of the flame retardant materials provided for by the manufacturer.

e) The condition of the engine and fire protections.

f) The consequences that can result from a fire in the machine.

Fire protection	Classification		
	DN1	DN2	DN3
Fire retardant material:			
Partial loss of flame retardant	X	(X)	
Loss of flammable fluids in the machine		X	(X)
Extinction system			
Automatic:			
Impairment in the system that may prevent its proper functioning	X	(X)	
Manual:			
Insufficient load	X	(X)	
Inadequate location or lack of signage	X	(X)	
Absence of system, with loss of flammable fluids in the machine		X	(X)

19. Electrical system

For the classification of deficiencies, the following aspects shall be taken into account:

a) The state of the battery anchors to the battery chest, and from the battery chest to the chassis.

b) The amount of electrolyte poured into the chest.

c) The state and operation of the batteries.

d) The state of the battery casket.

e) Excessive accumulation of dirt.

f) Protection of battery terminals.

g) The state of terminal connections and wiring.

h) The operation of power cutters, or similar devices.

i) The existence of loose or unprotected fittings.

j) The existence of aging or cuts in the protection of electrical cables.

k) The existence of loose electrical cables.

l) The function of the cables with deficiencies and their possibility of contact, between them and with metal parts.

m) The status and protections of the connectors.

n) Excessive accumulation of dirt in the electrical system.

Electrical system	Classification		
	DN1	DN2	DN3
Batteries:			
Structural damage (permanent deformations, cracks, breakages, etc.) to battery chests	X	(X)	
Corrosion zones	X	(X)	
Other deformations	X		
Absence, loosening or poor condition of anchor screws	X	(X)	
Movements (slacks) between elements	X	(X)	
Accumulation of clay, electrolyte or other substances	X	(X)	
Connections in poor condition	X	(X)	
Unprotected positive (or negative, as applicable) terminals		X	(X)
Electrical installation:			
Excessive accumulation of mud or other substances	X	(X)	

Electrical system	Classification		
	DN1	DN2	DN3
Damage to cable attachments	X	(X)	
Connections in poor condition	X	(X)	
Electrical protections in poor condition	X	(X)	
Current cutting device (or equivalent system)			
Anomalous operation	X	(X)	
Absence of signalling of the acting positions (if necessary)	X		
Damage to the key or control	X	(X)	
There is no equivalent device or system			X

20. Acoustic warning devices

For the classification of deficiencies, the following aspects shall be taken into account:

a) The operation of the horn, the start-up warning device (if fitted by the manufacturer) and the acoustic recoil warning device.

b) Automatic operation (except horn).

c) Sound level.

Acoustic warning devices	Classification		
	DN1	DN2	DN3
Operation:			
Does not have a normal cadence, but is identifiable	X		
There is a large interval between sounds		X	
Does not work		X	
Does not exist or has been completely or partially dismantled			X
Sound level of horn and recoil warning:			
Sounds like the accelerated engine or fans mask your performance	X		
Lower-intensity sounds (idle motor, etc.) mask your performance		X	
Sound level of the start-up warning device:			
Not audible to the operator	X	(X)	

21. Lighting and indication devices

For the classification of deficiencies, the following aspects shall be taken into account:

a) The function performed by each device (illumination or indication).

b) The impact that its malfunction has on the safety of people.

c) The impact that its malfunction has on the safety in the circulation of other machines.

d) The location on the machine and whether or not the device performs a redundant function (double optics, for example).

e) Its optical properties (intensity, orientation, colorimetry, reciprocity, combination with other lights, etc.).

f) The state of the parable (illumination) and the protective screen.

g) The flashing frequency (intermittents and rotating beacon).

h) Its operation (automatic or manual).

i) Reference values (recorded on the maximum intensity surface of the light beam, vertically above the optical display, and in such a way as to prevent other external sources from affecting the measurement):

Device type	Value (klx)
Long lights	30
Dipped-beam headlamps	30
Working lights	40
Braking lamps	5
Reversing lamps	20
Position lights	1

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Long lights/Rear working lights			
Defects in its elements or in the means of attachment			
Affecting any of the devices	X	(X)	
Affecting all devices			X
Operation:			
Abnormal operation or means of on/off not provided for by the manufacturer	X	(X)	
Some device doesn't work	X	(X)	
No device works			X
Colorimetry: Different from the one that its function is required	X	(X)	
Lighting[57]: Below reference values	X	(X)	
Other properties:			
Combined with other devices	X		
Incorrect alignment	X		
Position lights			
Defects in its elements or in the means of attachment			
Affecting any of the devices	X	(X)	
Affecting all devices			X
Operation:			
Abnormal operation or means of on/off not provided for by the manufacturer	X	(X)	
Some device doesn't work	X	(X)	
No device works			X
Colorimetry: Different from the one that its function is required	X	(X)	
Lighting: Below reference values	X	(X)	
Other properties:			
Combined with other devices	X		
Incorrect alignment	X		
Dipped-beam headlamps			
Operation:			
They are switched on by means other than the switch installed for that purpose	X		
Sometimes they turn off involuntarily	X		
They shut down unintentionally often		X	
They do not work, they do not exist or half of the devices have been totally or partially dismantled		X	
They do not work, they do not exist or all the devices have been totally or partially dismantled			X
Lighting:			
Less than 90% compared to baselines	X		
Less than 75% compared to baselines		X	
Less than 50% compared to baselines			X

[57] A photometer shall be used to measure illuminance, the unit of which is lux (lx).

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
If all devices are affected		X	
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
If all devices are affected			X
Colorimetry:			
Other than white	X	(X)	
Red		X	(X)
Other properties:			
Incorrect combination	X		
Incorrect alignment	X		
Intermittents and emergency lights			
Operation:			
Signaling of any of the directional changes does not work		X	
If there are lateral intermittents in that direction	X		
Signaling of any of the changes of direction does not exist or has been completely or partially disassembled		X	
If there are lateral intermittents in that direction	X		
Signaling none of the directional changes works			X
If there are side intermittents in one direction		X	
If there are lateral intermittents in both directions	X		
Flash frequency:			
Flashes in different phases	X		
Between 45 and 60 flashes per minute	X		
Less than 45 flashes per minute		X	
More than 120 flashes per minute	X		
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
Colorimetry: Are not amber/yellow	X		
Other properties: Incorrect combination	X		
Brake lights			
Operation:			
Do not turn on automatically when stepping on the service brake pedal			X
Sometimes they turn off involuntarily	X		

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Not working or half of the devices have been fully or partially disassembled	X		
No device works		X	
All devices have been completely or partially disassembled			X
Lighting:			
Less than 75% compared to baselines	X		
Less than 50% compared to baselines		X	
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
Colorimetry: They are not red	X	(X)	
Other properties:			
Incorrect combination	X		
Alternative action with lights not allowed	X		
Reversing lamps			
Operation:			
Do not turn on automatically when reversing		X	(X)
Sometimes they turn off involuntarily	X	(X)	
Not working or half of the devices have been fully or partially disassembled	X	(X)	
No device works		X	(X)
All devices have been completely or partially disassembled			X
Lighting:			
Less than 75% compared to baselines	X		
Less than 50% compared to baselines		X	
Defects in its elements or in the means of attachment:			
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair in the short term	X		
Fixations of the optics, housings or protective screens are damaged (corrosion, blows, absence of screws or welding cords), which are necessary to repair immediately		X	
Colorimetry: They are not white	X	(X)	
Other properties:			
Incorrect combination	X		
Alternative action with lights not allowed	X		
Retro-reflectors:			
Defects on the reflective surface	X	(X)	
Different color than your function is required	X	(X)	

Lighting and indication devices	Classification		
	DN1	DN2	DN3
Rotating headlamp			
Defects in its elements or in the means of attachment	X	(X)	
Does not work	X	(X)	
Flash frequency outside the frequency range specified by the manufacturer	X	(X)	
Different color than your function is required	X		
Other properties:			
Combination with other (non-rotating) lamps	X		
Incorrect alignment	X		

22. Cabin noise

The following test shall be carried out only on machines fitted with cabs:

Machine Location: The machinery must be located on a flat surface and as far as possible away from external sources of noise (benefits, other machinery, etc.).

Preparation of the machine: The machine must be equipped with the equipment and accessories specified by the manufacturer. The engine and hydraulic system must be at the temperature corresponding to the normal operating conditions specified by the machine manufacturer. All systems provided with fluids must have the levels within the range specified by the manufacturer. The machine must be located in the test area with the case fully supported on the chassis (carrying position).

Operating conditions: The machine must be static with the brakes actuated. The engine must run unladen, rotating at the revolutions per minute corresponding to the net power specified by the manufacturer. The transmission must be in neutral and the case lifting system must not be in operation.

The engine must be initially idled and then driven to the revolutions per minute corresponding to the net power specified by the manufacturer. Before each data logging series, the engine must reach its steady idle speed.

Operator position: During the test, the operator must remain in his position and the observers must not be in the cabin, unless there is a passenger/instructor seat in safe conditions of use.

Seat position: The seat should be positioned in the midpoint of its horizontal and vertical settings, or as close to it as possible. Any suspension of the seat must be adjusted to the operator's weight.

Microphone position: The microphone must be oriented horizontally, directed in the usual direction of the gaze of a person occupying the operator's position, and located 200 mm ± 20 mm from the middle plane of the operator's head, at eye level.

Measurements: The total measurement time for each reading carried out under stable conditions must be at least 30 s. 6 readings (not more than 3 dB apart) shall be made.

Measurements should be made with doors and windows closed and air conditioning and/or ventilation systems functioning. If observers are present in the cab during measurements, they

must remain silent or not raise the tone of voice too much to give instructions, so that they do not significantly affect the results. The protections and access gates to the components of the machinery must also be closed. If more than one operating speed is available, air conditioning and/or pressurized ventilation systems must operate at the second speed for systems up to four speeds.

For systems with more than four operating speeds, the third and, for systems with infinite continuous variation speeds, the average value of the speed should be used. If the air conditioning and / or ventilation systems have a control with the position for recirculation and air intake from the outside, it must be in the latter position.

Once the 6 readings have been obtained, those of lower and higher value will be discarded, and the arithmetic mean of the remaining ones will be taken.

The result shall be classified as follows:

Cabin noise	Classification		
	DN1	DN2	DN3
The equivalent daily exposure level (LAeq,d):			
It is greater than or equal to 80 dB(A) and less than 85 dB(A)	X		
It is greater than or equal to 85 dB(A) and less than 87 dB(A)		X	
Is greater than or equal to 87 dB(A)			X

23. Vibrations

The full-body vibrations in a castor tipper articulated on wheels respond to the profile of short and well-defined exposures, since the magnitudes of the different vibrations can be associated with each of the individual operations (loading, displacement and unloading). Normally the operator is subjected to a higher level of full body vibrations when the machine is moved in a vacuum.

This test aims to obtain a measure of the full body vibrations to which the operator is subjected through the seat due exclusively to factors specific to the machine, so the calculation of the vibrations associated with displacement (which depend mainly on the conditions of the tracks) and load (which depend mainly on the characteristics of the material to be loaded and the type of loading machine used, as well as the expertise of the operator who handles it) will be dispensed with.

Therefore, for the calculation of the level of full-body vibrations, the following sequence shall be considered as the operating individual cycle, starting with the direction at its neutral point:

a) Elevation of the box.

b) Full turn of the direction to the left (or right).

c) Full turn of the direction to the right (or left).

d) Turn the direction to place it back at its neutral point.

e) Descent of the box to the transport position.

f) Full turn of the direction to the left (or right).

g) Full turn of the direction to the right (or left).

h) Turn the direction to place it back at its neutral point.

Machine Location: The machine shall be located on a flat surface.

Preparation of the machine: The machine must be equipped with the equipment and accessories specified by the manufacturer. The engine and hydraulic system must be at the temperature corresponding to the normal operating conditions specified by the manufacturer. All systems provided with fluids must have the levels within the range specified by the manufacturer and with the box fully supported on the chassis (transport position).

Operating conditions: The machine must be static with the parking brake actuated. The engine must run unladen, at the speed corresponding to the net power specified by the manufacturer, during the lifting phases of the body and steering turns, and at idle during the lowering phase of the body. The transmission must be deadlocked.

Operator position: During the test, the operator must remain in place with the seat belt fastened and observers must not be in the cab unless there is a passenger/instructor seat in safe conditions of use. The seat cushioning system must be maintained under normal conditions of use.

Measurements: Eight individual operating cycles shall be carried out consecutively, with an interval of 10 s between them, measuring continuously from the beginning of the first cycle until the end of the last of them. The result shall be classified as follows:

Vibrations	Classification		
	DN1	DN2	DN3
The standard daily exposure value for a reference period of eight hours, measured during the test:			
It is greater than or equal to 0.5 ms^{-2} and less than 0.7 ms^{-2}	X		
It is greater than or equal to 0.7 ms^{-2} and less than 1.15 ms^{-2}		X	
Is greater than or equal to 1.15 ms^{-2}			X

24. Opacity and exhaust gases

For gaseous emission levels of the engine, the following limits shall be taken, measured at maximum engine idle[58] speeds in the case of opacity and at idle speed for exhaust gases (on the method of measurement, see Annex XIII):

Opacity and exhaust gases	Classification		
	DN1	DN2	DN3
Opacity (K) ≥ 4.5 m^{-1}	X		
NO_x ≥ 210 ppm	X		
CO ≥ 0,4 %	X		
CO_2 ≥ 5.0 %	X		
HC ≥ 15 ppm	X		

58 The engine temperature shall be at least 60°C for gas measurement and 80°C for smoke opacity measurement.

ANNEX V

Actions to be taken

Once the inspection of the machine has been carried out, a series of measures must be established depending on the result obtained. These measures are classified as:

a) *Urgent measures:* are those which are intended to remedy those deficiencies which have resulted in a *negative* or *unfavourable* report .

b) *Necessary measures:* are those that are aimed at addressing those deficiencies that have resulted in a *favourable report with deficiencies*.

c) *"Measures to be observed":* are those that are aimed at addressing deficiencies that involve tolerable risks, and result in a *favourable report*. Correction and/or follow-up should be recommended for information purposes only.[59]

From the above, it is concluded that several types of measurements can be established on a machine, as shown below:

*Table**17**. Measures to be taken depending on the outcome of the verification.*

Types of measures	Outcome		
	Negative or Unfavorable	*Favourable with deficiencies*	*Favorable*
Urgent	X	--	--
Necessary	Depending on the case	X	--
To observe	Depending on the case		

The inspection report shall reflect the systems, subsystems and elements concerned, as well as the type of measures to be taken in each case.

In addition to the above, and without prejudice to Article 5(3) of Royal Decree 1215/1997 of 18 July 1997 laying down the minimum safety and health requirements for the use of work equipment by workers and Article 18 of Law 31/1995 of 8 November 1995 on the Prevention of Occupational Risks, the personnel responsible for carrying out the inspection shall inform

[59] Any deficiencies reflected in the report must entail some type of measure on the part of the user; to specify this aspect, it will be understood that there is a measure to be observed when any of these circumstances occur:

- If there are Level 3 deficiencies in non-determining points (weight 1 or 2) and the system as a whole is not deficient, or
- If there are Level 3 deficiencies at non-determining points (weight 1 or 2) and the system as a whole is deficient due exclusively to the defect found at a determining point.

the operator of the machinery inspected, during the inspection or at the end of the inspection, of the measures to be taken and/or any restrictions on use (see *Annex XII)*.

ANNEX VI

Personnel responsible for carrying out inspections

For a correct inspection, it will be necessary an inspector with adequate training and technical knowledge on:

—

a) Machine mechanics.

b) Elasticity and strength of materials.

c) Hydraulic and pneumatic systems.

d) Internal combustion engines.

e) Electricity.

f) The machine to be evaluated (knowledge *of the systems installed and their operation)*,

In addition, they should also have knowledge of:

a) Safety and Health (Law *on the Prevention of Occupational Risks*, *Workplaces*, *Signalling*, *etc.)*.

b) Regulations and implementing legal provisions (Machinery *Directive*, *Mining Safety Regulation*, *Royal Decree 1215/1997*, *etc.)*.

c) Specific technical regulations applicable to this type of machinery (Standards *of the series UNE-EN 474*).

In order to improve the safety conditions during the inspection and to speed up the procedure (which results in a shorter machine downtime), the inspector may be assisted by a qualified mechanic or electromechanic, who will support him during the inspection.

ANNEX VII

Security (Informative)

1. Preliminary considerations

This Annex refers to certain aspects related to safety during inspections, which can serve as a reference for carrying out the corresponding risk assessment.

The user of the machinery shall take appropriate measures to ensure that:

a) It is in a reasonable state of cleanliness that allows access to all the elements to be inspected without the risk of falls or slips, as well as for its correct evaluation.

b) Machine fluid levels and tire pressure are within the limits specified by the manufacturer.

c) The fuel level is sufficient to be able to carry out the inspection without the need to refuel the unit and without the machine being able to stop unintentionally due to lack of fuel.

d) Possible limitations of the emergency steering as well as the on-site test procedure to verify its operability have been set out in the operator's manual.

2. Personal protective equipment

Personnel carrying out the inspection shall use the following personal protective equipment:

a) Tight workwear and high visibility.

b) Helmet and safety boots.

c) Protective gloves against mechanical and thermal hazards, and safety glasses, during checks of hydraulic systems, engine compartment and protections of hot surfaces and pressure fluids.

d) Hearing protectors, mask and safety glasses, in the measurements of exhaust gases.

3. Safety standards

It is essential to establish, prior to the visit, procedural rules that will be respected during the inspection. Where particular circumstances require changes to be made, they should be known and agreed upon by all staff. These rules of procedure shall include, inter alia, the following:

a) Steps to follow in the inspection.

b) Person who will give instructions to the operator at all times.

c) Location of inspectors at each step.

d) Communication protocol between inspectors, and between inspectors and machine operator.

In addition to the safety considerations mentioned here, all applicable safety provisions must be taken into account, in accordance with current regulations.

In particular, the rules of movement laid down on the holding must be respected; if conditions that are incompatible with these rules (e.g. set speed limits) are required for certain verifications, the operator must be informed and a site where they can be carried out under safe conditions (runways without traffic or with restricted traffic during testing) must be sought. Otherwise, you should choose to use other types of tests (static tests).

Inspectors shall at all times have full field of view of the area of influence of the machinery.

3.1 Operator

Before starting you will be explained the process that will be followed for the inspection, paying special attention to the operations with the engine running and with the machine in motion.

The instructions shall be clear and shall not give rise to misinterpretations by the operator of the machinery. All necessary explanations shall be given to enable the operator to understand how operations are to be carried out with the machinery in motion, in particular braking, steering and box operation tests.

The inspection staff must verify that the operator has understood the operations to be carried out, and that they know, at all times, the location of the inspectors.

3.2 Machine

Before commencing any operation, the existence and operation of all mechanical safety devices shall be checked and the location of the machinery shall be in accordance with paragraph 3.3 of this Annex. Wherever possible, these devices shall be in a locked position and shall only be unlocked when all persons in the area of influence of the machinery are notified of this fact. Particular care will be taken in the event that any of these devices is not operational, stopping the inspection if necessary and not resuming it until it is verified that minimum safety conditions are guaranteed.

Machine fluid levels (engine oil, hydraulic oil and coolant) will also be checked. These checks shall be carried out by the operator or by maintenance personnel, taking into account the precautions set out in section 3.4 of this Annex.

3.3 Places to carry out the inspection

Only persons directly connected with the inspection may remain in the area of influence of the machinery: the operator of the machinery, the inspector and the person assisting the machinery, the person responsible for maintenance and the operator of the inspected machinery may also be present.

3.3.1 Inspection with machine stopped.

The location to check the stopped machine must meet the following requirements, to proceed with this phase of the inspection:

a) Away from the area of influence and work of other machines and people.

b) Conveniently signposted.

c) It shall be as flat as possible and shall have no inclinations which can set the machine in motion by failure or ineffectiveness of the parking brake.

d) It shall have a surface area large enough to permit the safe movement of persons present during the inspection.

e) It will have adequate lighting.

f) If fully or partially covered, ventilation must be ensured for engine start-up or exhaust gas analysis. It shall also be of sufficient height to ensure the safe lifting operation of the housing.

3.3.2 Inspection with moving machine.

The track used to check the moving machine must meet the following requirements, in order to proceed with this phase of the inspection:

a) Departure from the area of influence and work of other machines.

b) Conveniently signposted.

c) It will have adequate lighting.

d) It will be as flat as possible and free of obstacles, allowing the machine to circulate safely.

e) It is essential that the track has means of escape for a hypothetical situation of failure in the brakes or in the direction.

If the performance of one or more of the braking systems is to be checked on a gradient, the gradient shall have similar characteristics.

3.4 Inspection with machine stopped.

Prior to any verification, the effectiveness of the stationary parking brake and the mechanical locking of the controls shall be checked and shall be operational throughout this phase of the inspection. Special care will also be taken with hot surfaces, if the machine was previously working, and with pressure vessels.

If the box is raised, the safety pins, or elements intended for it, shall be placed to avoid its unintentional descent. In no case may any of the areas of influence of the box be accessed by inspecting it from the bottom of the machine or from the front access of the machine.

The operator or the person responsible for maintenance shall open and fix the gates giving access to the engine compartment and the batteries, leaving the machinery until it is closed.

No person shall enter and remain in the position of the operator except the inspector or the person assisting him.

If tyre pressure needs to be measured, a pyrometer shall be used to check the tyre temperature in advance to ensure that it is within normal operating limits. Once this check has been carried out, a pressure gauge shall be fitted with a hose length enabling readings to be made from one side of the tyre (perpendicular *to the tread*, *as far away as possible from the tread and*, *above all*, *from the tyre flanks)*. Pressure should never be measured if the temperature exceeds these limits and, even less, the inflation of a hot tire will be allowed, due to the risk of explosion that exists.

No plug of the hydraulic system or cooling circuit of the engine shall be opened without taking the necessary precautions, checking that the pressure and temperature of the fluids allow the opening to be carried out safely.

3.5 Inspection with machine stopped and engine running.

Before starting the engine, it shall be checked that the transmission is disconnected and that the parking brake is still applied. Once the engine is started, it is essential to verify that the communications carried out are intelligible to all the people involved, due to the noise generated by the engine; the operator must leave the cabin until his presence is again required.

Particular care shall be taken in the accesses to the engine, with hot surfaces and moving elements (belts, fans, etc.).

Once this stage of the inspection has been completed, the operator and one of the inspectors shall be placed in the cabin to check the elements of the main direction. The inspector below must communicate to his companion the different movements to be made on the direction in a clear way, being the inspector located in the cabin who transmits these orders to the operator. A safety distance must be maintained in such a way that contact with either rack is impossible and sufficiently far from the machine's articulation area.

At this stage, any change in position, whether seen directly by the operator or not (via the established gestures or the broadcaster), must be permanently communicated by the downstream inspection staff.

Although the reversing movement of the machine is not presumed, when checking the operation of the reversing lamps and the acoustic reversing warning device, a sufficient safety distance must be maintained, occupying a lateral position with respect to the possible movement of the machine.

If it is necessary to measure the luminous intensity of some of the lighting and signalling devices, the machine shall be stopped and the inspector or person who assists him must be in the cab with the operator, informing him of the position of his partner, being warned through the station.

3.6 Inspection of the operating box.

During lifting or lowering operations, no person shall be near or on the machinery except the operator and one of the members of the inspection team, who shall be in the cab. Nor can it remain on the front and back of the machine, because there is a risk of falling materials that may have been adhered to the box.

3.7 Inspection with moving machine.

At this stage of the inspection, only the operator and the inspector will be in the machine, leaving the rest of the people away from it. Both the operator and the inspector shall adjust the safety belts.[60]

Before starting the machine, the operation of the service brake must be checked; for this purpose, a static braking test may be carried out.

No further tests shall be carried out if the service brake is not of adequate performance, or if the main steering is deficient.

If the emergency steering is electrically operated, its static operation shall be checked before further braking tests are carried out.

Once the above is done, the following steps are:

a) If the machine has a pneumatic braking support system, it shall be checked that the machine is retained by lowering the pressure of the pneumatic circuit, under the prescribed conditions.

b) Once the results of the above tests have been found to be favourable, the parking brake slope retention test shall be carried out on a track with the conditions referred to in paragraph 3.3.2 of this annex. Subsequently, the dynamic test of the service brake will be carried out, ending with the stalled engine slope retention test and the emergency brake test.

c) If the machine has emergency steering to support the main steering, after verifying that the machine has sufficient braking performance, the test shall be carried out on the slope of emergency steering, with the machine in motion and the engine stopped (or following the procedure set out in the instruction manual).

d) Check the operation of the retarder.

The slopes to be used in all cases must be in accordance with the most unfavourable situation expected, being necessary to adapt to the conditions of the test track and the machine.

[60] If there is no seat or seat belt for the instructor or passenger, only the operator may remain in the cabin.

ANNEX VIII

Periodic inspection form

MACHINE

TYPE:	BRAND:	MODEL:	N° SERIES:		WORKING HOURS:
ARTICULATED BASTIDER VOLKET ON WHEELS					
YEAR OF MANUFACTURING:	DATE OF PLACEMENT IN SERVICE	CE MARKING	PREVIOUS INSPECTION CERTIFICATE	DATE OF INSPECTION:	COMING DATE. INSPECTION:

USER

COMPANY:	
ACTIVITY:	
CIF:	
DIRECTORATE:	
PHONE:	
FAX:	
E-MAIL:	
CONTACT PERSON:	

ENGINE

BRAND AND MODEL	NOMINAL POWER (kW)	Maximum rpm

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
DOCUMENTATION	1									
Instruction Manual	3					D		X		
CHASIS	3									
Front frame	3					V	M	X		
Rear frame	3					V	M	X		
Motor block anchors	2					V	M	X		
Box anchors	3					V	M	X		
Spinning axles	2					V	M	X		
Box supports	2					V	M	X		
Towing points	1					V	M	X		
Bumper	1					V	M	X		
Pneumatics	3									
NEUMATICS FRONT	3									
Same condition between tyres	1					V	M	X		
Tacos plucked	3					V		X		
Irregular tread wear	2					V	M	X		
Regular tread wear	2					V	M	X		
Cuts on the flanks	3					V		X		
Screws	1					V		X		
Tires	1					V		X		
TREATMENT Pneumatics	2									
Same condition between tyres	1					V	M	X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
Tacos plucked	3					V		X		
Irregular tread wear	2					V	M	X		
Regular tread wear	2					V	M	X		
Cuts on the flanks	3					V		X		
Screws	1					V		X		
Tires	1					V		X		
AMORTIGUATION SYSTEM[61]	3									
FRONT WARMERS	3									
Oil leaks	1					V		X		
Anchorage	3					V	M	X		
Status	3					V		X		
TRANSFER WARMERS	3									
Oil leaks	1					V		X		
Anchorage	3					V	M	X		
Status	2					V		X		
FRONT AMORTIGUATION BY BALLESTAS OR SILENTBLOCKS	3									
Anchorage	3					V	M	X		
Status	3					V		X		
REAR AMORTIGUATION BY BALLESTAS OR SILENTBLOCKS	3									
Anchorage	3					V	M	X		

[61] The types of suspensions are exclusive and depend on the model.

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Status	2					V		X		
ADDRESS SYSTEMS	3									
MAIN ADDRESS	3									
Steering wheel	1					V	M	X	X	
Steering column	2					V		X		
Loops in central articulation	3					V	M	X	X	
Slacks on cylinders	3					V	M	X	X	
Slacks on the steering wheel	3					V	M	X	X	
Turning stops	1					V		X	X	
Symmetry	3					V	M	X	X	
Cylinders	2					V		X		
SECONDARY ADDRESS	3									
Operation	3						E	X	X	
FRYING SYSTEMS	3									
Service brake	3						E	X	X	
Oil leaks in packages	2					V		X		
Parking brake	2						E	X		
Emergency brake	3						E	X	X	
Delayer	1					V	E	X	X	
ENGINE	1									
FUEL SYSTEM	1									
Deposits	2					V		X		
Conductions	2					V		X		
Fast filling system	1					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
REFRIGERATION SYSTEM	2									
Radiator	3					V		X		
Deposits	3					V		X		
Fan	2					V		X		
Conductions	2					V		X		
Filling plug	2					V		X		
Level	1					V		X		
COMPARTIMENT ENGINE	2									
Oil leaks	1					V		X		
Oil level	2					V	M	X		
Straps	2					V	M	X		
Exhaust circuit	2					V		X		
IMPULSION TRAIN	2									
TRANSMISSION	1									
Transmission trees	1					V		X		
Differentials	1					V		X		
FINAL COMMANDS	2									
Leakage	3					V		X		
Damages	1					V		X		
HYDRAULIC SYSTEM	3									
Deposits	2					V		X		
Conductions	2					V		X		
Scaffolding system	1					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Level	1					V		X		
Pneumatic system	2									
Calderines	1					V		X		
Conductions	2					V		X		
Purged	2					V		X		
Pressure	2					V	M	X		
PROTECTION STRUCTURES	3									
Fall protection structure of objects in rear window	2					V		X		
ROPS/FOPS cabin	3					V	M	X		
ACCESS ELEMENTS	2									
ACCESS TO THE CABINE	2									
Stairs	2					V		X		
stirrups	2					V		X		
Asideros	2					V		X		
Railings	2					V		X		
Non-slip surfaces	3					V		X		
Passage and permanence platforms	2					V		X		
ACCESS TO MAINTENANCE POINTS	2									
Stairs	2					V		X		
stirrups	2					V		X		
Asideros	2					V		X		
Railings	2					V		X		
Non-slip surfaces	3					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
Passage and permanence platforms	2					V		X		
OPERATOR'S POSITION	3									
SECURITY IN CABINA	3									
Lock and key	1					V		X		
Window and windshield windows	3					V		X		
Cabin brackets	2					V	M	X		
Door and window opening mechanisms	2					V		X		
Rear-view mirrors	3					V	M	X		
Emergency exit	2					V		X		
Door opening anchors	1					V		X		
OPERATOR'S SEAT	3									
Impairment of the operator's seat	3					V		X		
Rules	2					V		X		
Suspensions	2					V		X		
Safety belt	3					V		X		
Accompanying seat/instructor	1					V		X		
ENVIRONMENTAL CONDITIONS AND ERGONOMY	2									
Door and Window Burletes	1					V		X		
Symbols of the controls	2					V		X		
Commands	3					V	M	X		
HVAC system	2					V		X		
Cleaning the cabin	1					V		X		
Dust filter	1					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Interior lighting	1					V		X		
Operator Envelope Space	3					V	M	X		
SAFETY INFORMATION IN CABINA	1									
Indicators and alarm lights	2					V		X		
Performance test	2					V		X		
POWERING AND STOP DEVICES	2									
Key	2					V		X		
Start-up	2					V		X	X	
Stop	3					V		X	X	
SECURITY WORKS	3									
Mechanical enclosure locks	2					V	M	X	X	
Turning joint safety lock	2					V	M	X	X	
Hydraulic system safety lock	3					V		X		
Other obstacles	2					V		X		
VOLQUETE BOX	3									
Adaptation to the machine	3					D/V		X		
Side supplements	2					V		X		
Status of the box	3					V	M	X		
Turning bolts	2					V	M	X		
Neutralisation of controls	3					V	E	X	X	
Operation	2					V		X	X	
Lifting cylinders	2					V		X	X	
Case-to-chassis support stops	1					V		X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamics*	
SAFEGUARDS	3									
Compartment doors	1					V		X		
Fan guards and belts	3					V		X		
Guards for moving power transmission parts	2					V		X		
Mudguards	2					V		X		
High temperature parts guards	2					V		X		
WARNING AND DANGER INDICATORS	2									
Cabin indicators	2					V		X		
Machine indicators	2					V		X		
Towing point indicators	1					V		X		
FIRE PROTECTION	1									
Fire retardant material in engine compartment	2					V		X		
Extinction system	2					V		X		
ELECTRICAL SYSTEM	1									
Batteries	2					V		X		
Installation	2					V	M	X		
Current cutting device	3					V		X		
ACUSTIC NOTICES	3									
Reverse warning device	3					V	M	X	X	
Horn	2					V	M	X		
Start-up warning device	1					V	M	X		
LIGHTING AND INDICATION DEVICES	3									
FRONT PART	3									

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
Crossing	2					V	M	X		
Long	1					V	M	X		
Intermittent	2					V	M	X		
Emergency lights	1					V	M	X		
Rotating headlamp	2					V	M	X		
Position	1					V	M	X		
Retro-reflectors	1					V		X		
REAR PART	2									
Work	1					V	M	X		
Braking	2					V	M	X		
Back march	3					V	M	X	X	
Intermittent	2					V	M	X		
Emergency lights	1					V	M	X		
Position	1					V	M	X		
Retro-reflectors	1					V		X		
NOISE IN CABINA	1									
Cabin noise	3						E		X	
VIBRATIONS IN THE OPERATOR'S SEAT	1									
Vibrations in the operator's seat	3						E		X	
OPACITY AND GAS OF ESCAPE	1									
Opacity of fumes	3						E	X		
CO	2						E	X		
HC	2						E	X		
NO_x	3						E	X		

Inspection point	Weight	F	DN1	DN2	DN3	*Inspection*		*Type of test*		Comments
						D *ocumental/V isual*	E *nsayo/M edition*	*Static*	*Dynamic s*	
CO_2	1						E	X		

RESULT INSPECTION	ENTERED USER	O.C.M (SEAL AND SIGNATURE)
Favourable		
FAVOURABLE WITH [ ] DEFICIENCIES		
DISFAVORABLE WITH [ ] DEFICIENCIES		
NEGATIVE		

(Legend of the inspection sheet)

F = Favourable

DN1 = Level 1 deficiency

DN2 = Level 2 deficiency

DN3 = Level 3 deficiency

(Last page)

ANNEX IX

Report template

(Logo of the Department or Directorate-General of the Autonomous Community)	Technical Inspection of Mining Machinery n° Inspection Report:	(Logo of the O.C.M)

MACHINE

TYPE:	BRAND:	MODEL:	N° SERIES:		WORKING HOURS:
ARTICULATED BASTIDER VOLKET ON WHEELS					
YEAR OF MANUFACTURING:	DATE OF PLACEMENT IN SERVICE	CE MARKING	PREVIOUS INSPECTION CERTIFICATE	DATE OF INSPECTION:	COMING DATE. INSPECTION:

USER

COMPANY:	
ACTIVITY:	
CIF:	
DIRECTORATE:	
PHONE:	
FAX:	
E-MAIL:	
CONTACT PERSON:	

ENGINE

BRAND AND MODEL	NOMINAL POWER (kW)	Maximum rpm

(Page 1)

(O.C.M. data)

(Page footer)

In the following columns appear those systems of the machine in which deficiencies of some kind were found, detailing the elements involved and the severity of the defect.

ACLARATORY NOTE: The measurements made of cabin noise and full body vibrations transmitted to the operator during the inspection, as well as the results obtained, may not be used for the risk assessment indicated in Law 31/1995, of 8 November, on the Prevention of Occupational Risks and subsequent amendments.

System concerned

Subsystem

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

System concerned

Subsystem 1

Inspection points	Deficiency	Description

Point 1		
Point 2		
…		

Subsystem 2

Inspection points	Deficiency	Description
Point 1		
Point 2		
…		

…

(Next pages)

Braking tests:

	E (%)	Lateral deviation (%)	Results	Test	Speed (km/h)
Service					
Emergency					
Parking					
Delayer					

GASEOUS EMISSIONS:

K :	m^{-1}
NO_x:	ppm
CO:	(%)
HC:	ppm
CO2:	(%)

CABIN NOISE:

LAeq,d:	dB(A)

FULL BODY VIBRATIONS:

A(8):	ms^{-2}

Legend:

F = Favourable DN1 = Level 1 Deficiency DN2 = Level 2 Deficiency DN3 = Level 3 Deficiency

Equipment used:

Gaseous emissions	Opacity of fumes	Cabin noise	Vibrations	Team	Team	Team
Make/ Model	Make/ Model	Make/ Model	Make/ Model	Make/ Model	Make/ Model	Make/ Model
N° Series	N° Series	N° Series	N° Series	N° Series	N° Series	N° Series
Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date	Certificate and calibration date

RESULT INSPECTION		ENTERED USER	E.C.A. (SEAL AND SIGNATURE)
Favourable	□		
FAVOURABLE WITH [ ] DEFICIENCIES	□		
DISFAVORABLE WITH [ ] DEFICIENCIES	□		
NEGATIVE	□		

Comments:

Any defect not covered by the inspection procedure but likely to impair the safety of the machine must be included in this table, describing the element concerned, the system to which it belongs and the type of defect.

Type of measures to be taken (Mark with “X” where appropriate and the number of measures to be observed in each system)

System	Urgent	Necessary	To observe
Documentation			
Chassis			
Tyres			
Suspension systems			
Steering systems			
Braking systems			
Engine			
Drive train			
Hydraulic system			
Pneumatic system			
Protection structures			
Access elements			
Operator's position			
Safety barriers			
Tipper Box			
Safeguards			
Warning and Hazard Indicators			
Fire protection			
Electrical system			
Acoustic warning devices			
Lighting and indication devices			
Cabin noise			
Vibrations in the operator's seat			
Opacity and exhaust gases			
Total			

Information note on the results: (Explanatory note to be included in the report)

Negative: The machine can NOT be made available to workers, until the deficiencies found in the affected systems indicated in the report are remedied.

Unfavorable with [ ] deficiencies: Urgent action should be taken to address the deficiencies found in the affected systems identified in the report. The machine can NOT be made available to workers, until the deficiencies found in the affected systems indicated in the report are remedied.

Favourable with [ ] deficiencies: Necessary measures should be taken to address the deficiencies found in the affected systems identified in the report.

Favourable: The machine has no deficiencies or only deficiencies that have no significant impact on safety. The machinery may be made available to workers, but the deficiencies indicated in the report must be remedied.

(Last page)

ANNEX X

Valuation method

1. Assessment of deficiencies

Each of the *deficiencies* of the inspection points, subsystems and systems of the machine are assigned the following value:

For inspection points

- No defects: You = 0.
- Level 1 deficiencies: Vd = 3.
- Level 2 deficiencies: Vd = 6.
- Level 3 deficiencies: Vd = 9.

For subsystems and systems

- No defects: You = 0.
- Minor deficiencies: Vd = 3.
- Moderate deficiencies: Vd = 6.
- Major deficiencies: Vd = 9.

Each inspection point, subsystem and system of the machine is assigned a *weight* (from 1 to 3) depending on the impact it has on the safety of the machine (Pp, Pss and Ps, respectively).

2. Assessment of inspection points

An inspection point may have one or more deficiencies, the highest level being the one that must be taken into account to assign its defect. The result (or contribution) of each inspection point Rp shall be equal to the product of its weight by the value of the deficiency it presents:

Rp = Pp x Vd

3. Assessment of subsystems

If n inspection points belong to a subsystem, once their individual results have been obtained, the result of the subsystem to which they belong is calculated as follows:

$$Resultado\,de\,la\,inspección\,del\,subsistema\left(Rss\right)=\sum_{i=1}^{n} Rpi=\sum_{i=1}^{n} Ppi\,x\,Vdi$$

Rpi being the result of the i-th inspection point of the subsystem and Vdi the deficiency it presents. The following limits shall be taken into account when classifying the state of the subsystem:[62]

[62] For the whole Annex: the most unfavourable result will always be taken. In cases where all points belonging to a subsystem have weight 3, the numerical limits shall not be taken into account.

*Table**18**. Assessment of machine subsystems.*

No defect	$Rss < \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 3$	Or,	--
Mild deficiency	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6 > Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 3$		Some inspection point with weight 3 has mild deficiency
Moderate deficiency	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9 > Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6$		Some inspection point with weight 3 is moderately deficient
Major deficiency	$Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9$		Some inspection point with weight 3 has major deficiency

4. Assessment of systems

If the system consists exclusively of inspection points (it does not have subsystems), it proceeds in the same way as in the previous case.

If the system consists of subsystems, the subsystems are first evaluated in the manner indicated in point 3. Then, if m subsystems belong to a system, once their individual results are obtained, the result of the system to which they belong is calculated as follows:

$$Resultado\ de\ la\ inspección\ del\ sistema\ (Rs) = \sum_{j=1}^{m} Rssj\ x\ Pssj$$

Rssj being the result of the *j-th subsystem* and *Pssj* its weight. The following limits shall be taken into account when classifying the state of the system:

*Table**19**. Assessment of machine systems.*

Mild deficiency	$\sum_{j=1}^{m}\left(6\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right) > Rs \geq \sum_{j=1}^{m}\left(3\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n}\right.$		Some subsystem with weight 3 has mild deficiency
Moderate deficiency	$\sum_{j=1}^{m}\left(9\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right) > Rs \geq \sum_{j=1}^{m}\left(6\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n}\right.$	Or,	Some subsystem with weight 3 is moderately deficient
Major deficiency	$Rs \geq \sum_{j=1}^{m}\left(9\ x\ Pssj\ x\ \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij\right)$		Some subsystem with weight 3 has major deficiency

Ppij being the weight of point i-th belonging to subsystem j-th.

5. Assessment of the general condition of the machine

With n being the number of systems verified on the machine, and once the individual results of these are obtained, the overall result of the Rg machine is calculated as follows:

$$Resultado\ global\ de\ la\ máquina\ (Rg) = \sum_{k=1}^{n} Psk\ x\ Vdk$$

Psk being the weight of the k-th system and Vdk the deficiency it presents. The following limits shall be taken into account when classifying the condition of the machinery:

*Table**20**. Classification of the result according to the score obtained.*

No defect	$Rg < \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$		
Favourable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$		Some system with weight 3 has mild deficiency
Unfavorable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 9 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6$	Or,	Some system with weight 3 has moderate deficiency
Negative	$Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 9$		Some system with weight 3 has major deficiency

No defect	$Rg < \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$	Or,	
Favourable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 6 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\ x\ 3$		Some subsystem with weight 3 has mild deficiency

Unfavorable with [ ] deficiencies	$\sum_{k=1\ y\ Psk\neq 3}^{n} Psk\,x\,9 > Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\,x\,6$		Some subsystem with weight 3 is moderately deficient
Negative	$Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{n} Psk\,x\,9$		Some subsystem with weight 3 has major deficiency

6. Exclusions

For the calculation of the limits indicated in Tables 2, 3 and 4, those inspection points, subsystems and systems which are not susceptible to inspection shall not be taken into account in each unit inspected.

ANNEX XI

Procedure for the evaluation of elements that may require disassembly

There are certain elements that, for evaluation or measurement, may require disassembly. This annex sets out the guidelines for verification:

a) Elements that require visual inspection.

Elements located in compartments closed by padlocks, screws, keys, etc., such as low maintenance batteries: the user of the machinery shall provide for this and shall keep such compartments open to facilitate inspection.

b) Elements that require measurement.

Moving parts that may be worn or loose: for the verification of certain parameters, such as gaps in the steering elements, their disassembly and measurement must be carried out only if the person acting on behalf of the user (who will sign the inspection report) and the inspectors do not agree with the classification of the observed defect.

ANNEX XII

Restrictions on use

This annex details some special circumstances that may lead to a favourable report, but with restriction of use of the inspected unit. In such cases, the inspection report shall reflect those restrictions and the reasons for them. In particular, the following shall be taken into account:

1. Information available in a language other than Spanish:

   This should be noted in the inspection report, limiting the validity of the certificate of inspection to the use of the machine in the Autonomous Community where the machine was inspected, or to its use by operators who understand the language in which the information is written.

2. Tyres with protective chains:

   The parameters to be verified in relation to the tyres (wear, cuts, lack of material, etc.) in those machines that are inspected with protective chains mounted on them, will be evaluated with a level immediately lower, in relation to the interpretation of defects established for machines without chains, provided that these chains are in good condition. If it is necessary to use this new interpretation, this should be noted in the inspection report, limiting the validity of the inspection certificate to the use of chains.

3. Manipulations not permitted by the manufacturer or by an authorized workshop, in ROPS/FOPS structures, which do not involve plastic deformations caused by impact, overturning, etc., such as welding, cutting, drilling, or the like, for the installation of elements such as emitters, antennas, extinguishers, air conditioning equipment, etc.

If there are no other additional deficiencies, these will be treated as Level 1 deficiencies, with restrictions on the use of the machine to places and operations where there is no danger of overturning the machine or falling objects[63] on it, limiting the validity of the certificate of inspection to this type of application.

4. Machines put into service before 1995

   a) Not equipped with an emergency steering system by the manufacturer:

      If there are no additional deficiencies that lead the machine to an unfavourable or negative assessment and its installation is not possible for technical and/or economic reasons, these will be treated as Level 1 deficiencies, with a technical speed limitation[64] of the machine to 20 km/h, making the validity of the inspection certificate conditional on this maximum speed limit.

   b) With a braking system equipped by the manufacturer which does not meet the positive safety requirements:

      If there are no other additional deficiencies that lead the machine to an unfavourable or negative assessment and its installation is not possible for technical and/or economic reasons, these will be treated as Level 1 deficiencies, with restrictions on the use of the machine to places and tracks with maximum slopes of 10% and technical limitation of the speed of the machine to 20 km/h, making the validity of the inspection certificate subject to these limits.

Point 3 will be treated as discussed, provided that the manipulations have been carried out prior to the entry into force of this TS.

ITC SM-IND-11 REQUIREMENTS FOR MOBILE MINING MACHINERY MANAGEMENT

1. OBJECT

This Supplementary Technical Instruction (hereinafter, "ITC") aims to regulate the requirements that must have the operator or operator of mobile mining machinery, in development of Article 21.3 of the Mining Safety Regulation, of the following work equipment: shovel loader, tipper and excavator.

2. SPECIFIC REQUIREMENTS FOR MOBILE MINING MACHINERY OPERATOR

Persons working with loaders, dumpers and excavators shall meet the following requirements:

1. Be of legal age.

[63] One way to prevent falling objects is to provide a safety zone to the operator during the loading operation outside the cab.

[64] The installation of a speed limiter is required if the machine can reach higher speeds.

2. Be in psychophysical conditions for the activity of operation of mobile machinery, accredited by medical certificate. To this end, a medical examination on visual acuity, sense of orientation, balance and auditory acuity and psychological abilities must be passed.

3. Have the necessary knowledge for the operation of mobile mining machinery, which can be accredited by any of the following ways:

a) Have a certificate of professional training or a certificate of professionalism included in the National Directory of Professional Certificates, whose scope of competence includes the subjects developed in the technical specifications ET 11.01, ET 11.02 and ET 11.03.

b) Complete a theoretical and practical course taught by an accredited entity for the certification of persons by ENAC or any other National Accreditation Body designated in accordance with Regulation (EC) No ° 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No ° 339/93, in accordance with standard UNE- EN ISO 17024.

   All entities accredited for the certification of people who want to grant these certifications must include in their certification scheme an evaluation system that includes the minimum contents detailed in the technical specifications ET 11.01, ET 11.02 and ET 11.03.

ET 11.01 PROFESSIONAL KNOWLEDGE FOR VOLQUETE OPERATORS

1. OBJECT

This Technical Specification aims to establish the minimum professional knowledge for the performance of the work position of tipper operator, as established in the ITC SM-IND-11 "Requirements for the handling of mobile mining machinery", of the Mining Safety Regulation.

2. MINIMUM PROFESSIONAL KNOWLEDGE

2.1 General knowledge

Carry out the own work of the tipper (both articulated and rigid), as well as carry out the tuning and maintenance of it.

2.2 Knowledge (C)

C 1. Carrying out tillage operations

C 2. Perform set-up and maintenance

2.3 Performance of tasks (L) and main phases (F)

2.3.1 Knowledge 1: Carry out the tilling operations with tipper

L 1.1. Carry out loading operation on fronts.

F 1.1.1. Placing the vehicle in the most appropriate position with respect to the operating front and the loading equipment, facilitating the minimum of manoeuvres and the shortest possible cycle duration.

F 1.1.2. Checking that the equipment is placed in a loading area that guarantees the appropriate leveling and stability in the operation.

F 1.1.3. Verifying the permanence in the driving position during the whole process of the operation.

F 1.1.4. Verifying the correct functioning of the safety and signalling systems of the vehicle, both optical and acoustic, involved in the operation, prior to the development of it.

L 1.2. Carry out transport operation.

F 1.2.1. Verifying that driving is done at the speed most appropriate to the state and design of the track or access, maintaining the safety limitations imposed on mining and attention to the rest of machinery / vehicles and personnel on foot.

F 1.2.2. Verifying that the driving is carried out maintaining the appropriate safety distance with any other type of vehicle according to the conjunctural circumstances of the operation.

F 1.2.3. Verifying that the operation is carried out taking into account the possible limitations existing on the farm: overtaking, crossing, etc.

F 1.2.4. Verifying the correct functioning of the safety and signalling systems of the vehicle, both optical and acoustic, involved in the operation, prior to the development of it.

L 1.3. Perform unloading operation (housing, hopper, heap)

F 1.3.1. Verifying that the access, place and form of discharge conform to what is specified in the internal provisions of the mining operation.

F 1.3.2. Verifying that the stability of the vehicle at the point of discharge is adequate, maintaining a safe distance from the slope of discharge, the vehicle being in neutral or in neutral with the parking brake actuated.

F 1.3.3. Verifying the correct functioning of the safety and signalling systems of the vehicle, both optical and acoustic, involved in the operation, prior to the development of it.

F 1.3.4. Noting that, after unloading, the box or tipper resumes its working position, without starting the vehicle starting movement.

L 1.4. Carry out parking operation.

F 1.4.1. Noting that the operation is carried out in a firm, horizontal area, without hindering existing traffic, with the box lowered, the gear change in neutral and with the parking brake actuated; verifying that after a variable time the machine is stopped, the starter key is removed and the equipment cutter is operated.

F 1.4.2. Verifying that, if the operation is carried out on sloping terrain, the wheels will remain on the road.

F 1.4.3. Verifying that, if the fault operation occurs, the corresponding signaling established in the internal provisions is carried out.

F 1.4.4. If an area is assigned to this operation, observing that there is no personnel or other type of vehicle within the parking area, to prevent accidents. Noting that other transport vehicles or machines located to the right and left of the tipper, maintain an adequate separation to avoid accidents.

2.3.2 Knowledge 2: Perform set-up and maintenance

L 2.1 Carry out the cleaning and lubrication of the machines using the techniques, frequencies and materials indicated in the maintenance manual, for the perfect state of operation and safety of the units.

F 2.1.1. Cleaning inside and outside all the components of the machine, before proceeding to its grease.

F 2.1.2. Replacing damaged greasers with new ones, when it is observed that the fat does not enter the points to be greased.

F 2.1.3. Using the type of lubricant recommended by the manufacturer of the machine, in the amount indicated in the maintenance manual.

F 2.1.4. Performing the daily greasing of the points of the machines, indicated by the maintenance manual of the same. If automatic grease is available, checking the level of grease in the tank.

F 2.1.5. Performing the general grease of the machine, using the "grease plane" of the unit and observing the periods of time indicated in the maintenance manual. If automatic grease is available, checking the level of grease in the tank.

F 2.1.6. Disassembling, cleaning and reassembling, those components where the grease does not enter so that the mechanisms work correctly again.

F 2.1.7. Check the condition of the air filters, observing their condition in case it requires replacement.

F 2.1.8. Performing the drainage of the fuel tank in the form and periods of time, indicated by the manufacturer, and performing at the same time the cleaning of the respirator of said tank.

L 2.2. Verify fluid levels by means of peepholes and level probes, to detect deficiencies of these fluids and replenish them, if necessary, before starting the engine of the machine.

F 2.2.1. Checking that the machine is located on horizontal ground, with the equipment supported on the ground, braked and with the engine stopped.

F 2.2.2. Verifying that the engine crankcase oil level is between the maximum and minimum marks, of the level rod.

F 2.2.3. Checking the oil level of the servo transmission by means of the peephole, being between the *maximum* and *minimum* marks .

F 2.2.5. Noting that the coolant level of the engine radiator reaches the *maximum* level marked in the filling mouth of said radiator.

F 2.2.6. Checking through the control panel of the equipment, that the fuel tank is full or has enough for the working day.

F 2.2.7. Noting that the oil level of the hydraulic system tank is between the *maximum* and *minimum* markings when the equipment is in the position indicated in the machine maintenance manual and refilling if necessary.

F 2.2.8. Checking by means of the control devices, that all the components of the machine work correctly with the engine running.

L 2.3. Perform the maintenance of the undercarriage of the machines, checking the condition of the same and replacing defective elements, so that the units are in the best condition to move safely.

F 2.3.1. Checking daily before starting the working day that the tyres, especially those on the guide axle:

- There are no cuts or deformations.
- That tread wear is within the allowed limits.
- It has no solid materials between the twin wheels.

F 2.3.2. Checking previously that, when disassembling a wheel of the machine, the fixing nuts have been loosened and it has been raised and footwear, safely.

F 2.3.3. Noting that, when installing wheels on the machine, the tread pattern is in the sense indicated by the machine manual.

F 2.3.4. Performing the final tightening of the fixing nuts in the order recommended by the manufacturer and when the wheel is resting on the ground.

F 2.3.5. Checking that the inflation pressure of the tire is indicated in the pressure table established by the manufacturer and according to the measurements of the installed tire.

L 2.4. Maintain the electrical system of the tipper, checking all circuits and replacing defective elements, for proper operation of the unit.

F 2.4.1. Noting that, when changing the alternator strap, it is replaced by another of the same characteristics and tensioned according to the instructions of the maintenance manual.

F 2.4.2. Verifying when starting the engine, that the alternator works as indicated in the operations manual.

F 2.4.3. Checking when replacing lamps and fuses, which are well installed and are of the same voltage and intensity as those indicated by the manufacturer.

F 2.4.4. Performing the change of batteries, according to the instructions of the maintenance manual, either to replace or recharge them.

F 2.4.5. Checking that the batteries are well installed, starting and stopping the engine.

F 2.4.6. Checking that the electrolyte level covers the plates, adding distilled water if necessary, without exceeding that level.

F 2.4.7. Checking that the holes in the plugs of the battery cups are not clogged, to prevent it from bursting.

F 2.4.8. Verifying that after the completion of the works the cutting *current of* the equipment is activated.

L 2.5. Perform the maintenance of the power train and the various fluid circuits of the machine, following the instructions of the maintenance manual, in order to avoid breakdowns and obtain the maximum performance of the unit.

F 2.5.1. Noting that the machine is located on horizontal ground, with the equipment resting on the ground, the brake applied and the engine stopped.

F 2.5.2. Checking the change of oil and engine filters when it is hot, by others of the same characteristics, checking its level after starting and stopping the engine.

F 2.5.3. Checking the oil change and servo transmission filter, with oil of the same type, checking its level before and after starting the engine.

F 2.5.4. Checking the oil change of the differential group and final controls when it is hot, for another of the same type, checking that its level is correct.

F 2.5.5. Checking the oil change of the steering system, for another of the same type, checking that its level is correct.

F2.5.6. Checking that the change of hydraulic oil and its corresponding filter is made, following the instructions of the maintenance manual, as to the type of oil to be replaced and how to perform.

F 2.5.7. Replacing the primary and secondary filters of the fuel circuit, then purging to remove air from the circuit and checking that there are no failures in the operation of the engine.

F 2.5.8. Cleaning inside and outside the engine cooling circuit, using the materials, frequencies and techniques recommended by the manufacturer and replacing damaged sleeves, if necessary.

F 2.5.9. Replacing the fan strap, following the manufacturer's instructions regarding the type, measurement and adjustment of the fan strap.

F 2.5.10. Changing the damaged hydraulic hoses, for new ones of the same characteristics, after eliminating the internal pressure of the hydraulic circuit.

F 2.5.11. Checking that the cylinders and pipes of the hydraulic system, do not present shocks, friction, or loss of hydraulic fluid.

3 FORMATIVE MODULES

3.1 MF1 Working operations

Associated with knowledge C 1. “Perform dump-loading operations”.

3.1.1 Practical training unit (UFP1.1)

- Start the machine, heat it and put it in service order.
- Perform the characteristic movements of the unit.
- Position the machine on different working fronts.
- Carry out the loading operation on fronts.
- Perform complete cycles of each of the characteristic works:
    - Transport of light materials.
    - Transport of heavy materials.
    - Transport of loose semi-fluid materials.
- Simulate complete characteristic cycles in vacuum with the tipper.
- Download in bulk, hopper and heap.
- Carry out stop operations and definitive parking.
- Check the safety measures of the machine.

3.1.2 Theoretical training unit (UFT1.2)

- Controls and operating levers of the basic unit and the box. Operation.
- Pilots and indicators.
- Starting, commissioning and stopping system.
- Ceiling lights. Electric panel and driving pilot lights.
- Positions of the march.
- Dimensions and load capacity.
- Internal security provisions.
- Markings on holdings.

- Soil mechanics: sponge, hardness, cohesion and compactness.
- Densities and specific weights.
- Study and interpretation of sketches and drawings.
- Ground movements. Production cycles and quality levels.
- Loading operation techniques.
- Material Discharge Operation Techniques: I collect, hopper and heap.
- Parking operation techniques.
- Poor operational practices.
- Vehicle stop due to breakdown: signage, communication.
- Usual procedures when running jobs simultaneously.
- Optimization of consumption.
- Basic notions of costs.
- Completion of work parts, maintenance, breakdowns and repair.

3.1.3 Vocational skills training unit (UFC1.3)

- Responsibility and autonomy in their work.
- Respect the internal procedures and rules of the company.
- Integration into the system of technical-professional relations.
- Compliance with Safety and Hygiene standards.
- Methods to verify the quality of the work.
- Rationalization of work.

3.2 MF2 Tuning and maintenance

Associated with knowledge C2 “Performing set-up and maintenance”.

3.2.1 Practical training unit (UFP2.1)

- Perform complete eye inspections of different dumps.
- Become familiar with electronic diagnostic control systems and dashboards.
- Control oil levels in motor, servo-transmission, hydraulic system and final controls.
- Check the oil change in crankcase, servo-transmission, hydraulic system and final controls.
- Distinguish and select types of oils appropriate to each case (lubrication / grease).
- Control brake fluid level.
- Control the water level of the cooling system.
- Check the fuel tank level.

- Examine the condition of the undercarriage.
- Grease the joints of the lifting/descending system.
- Grease the machine or refill the grease tank in case of centralized automatic grease.
- Cleaning and changing filters.
- Adjust slacks on hooks and joints.
- Change spark plugs and heaters.
- Correct leaks and leaks of air, water or oil.
- Fill the gas tank.
- Purge the fuel system.
- Make the change of sleeves.
- Change tires and adjust your inflation pressure.
- Replace elementary assemblies (belts and hoses).
- Purge air boiler from pneumatic system.
- Check the state of the battery, state of charge and level of the electrolyte by supplying it if necessary until it reaches its level.
- Perform small basic maintenance operations of the electrical installation. Disassembly and assembly of:
    - Lighthouses and pilots.
    - Lamps and fuses.
    - Windshield wiper horns and motors.
    - Windshield wipers.
    - Conventional switches and switches.

3.2.2 Theoretical training unit (UFT2.2)

- Thermal motors: components and operation.
- Mechanical and hydraulic transmissions.
- Cooling of engines.
- Fuels and fuel circuits.
- Technical characteristics of the machines. Capacity, weight, dimensions and power. Capabilities and limitations. Basic principles of operation. Applications.
- Basic industrial technology: systems, mechanisms and cuttings.
- Instruction manuals, Interpretation.
- Main tools, tools, accessories, materials used in maintenance work.
- Corrective, preventive and predictive maintenance.
- Types of dumpers: rigid and articulated.
- Components of dumpers. General and design features.

- Rack.
- Power train: engine and transmission (servotransmission).
- Address.
- Brakes: standard service, parking and retarder.
- Suspension.
- Box and tilt system.
- Cabin.
  - Control instruments.
  - Alarm panels.
  - Security elements.
  - Start-up and commissioning system.
- Undercarriage: tyres.
- Electrical and lighting system.

- Equipment protection and safety systems.
- Oils, greases and lubricants. Types and characteristics.
- Fungible elements. Typology and characteristics.
- Environmental risks and waste.

3.2.3 Training unit professional skills (UFC2.3)

- Responsibility and autonomy in their work.
- Compliance with Safety and Hygiene standards.
- Rationalization of work.
- Analysis of procedures for solving technical problems.
- Control the development and quality of the work.
- Preservation, cleaning and maintenance of tools, tools and machines used.

ET 11.02 PROFESSIONAL KNOWLEDGE FOR LOADING PALA OPERATORS

1. OBJECT

This Technical Specification aims to establish the minimum professional knowledge for the performance of the work position of loader shovel operator, as established in the ITC SM-IND-11 "Requirements for the handling of mobile mining machinery", of the Mining Safety Regulation.

2. MINIMUM PROFESSIONAL KNOWLEDGE

2.1 General knowledge

Carry out the loader's own work with the front shovel equipment and the scarifier, as well as carry out the set-up and maintenance of it.

2.2 Knowledge (C)

C 1. Carry out tillage operations with loader blade

C 2. Carry out the set-up and maintenance of the loader

2.3 Performance of tasks (L) and main phases (F)

2.3.1 Knowledge 1: Carry out the tillage operations with shovel loader.

L 1.1. Carry out clearings and spreading of materials in order to prepare land for subsequent work.

F 1.1.1. Placing the machine in the highest place on the ground, to facilitate the movement of materials.

F 1.1.2. Checking that it places the equipment with the appropriate angle of attack and height before starting work.

F 1.1.3. Verifying that the machine advances at the shortest speed, ensuring that the bucket is not keyed in the ground and no ripples are made.

F 1.1.4. Noting that the collection of the brushed material, is carried out in the predetermined place for this purpose.

F 1.1.5. Establishing a work plan, prior to a study of the land to be conditioned.

F 1.1.6. Filling the areas of the land that require it, depositing in them the amount of necessary material.

F 1.1.7. Extending and equalizing the material with the shovel, so that it remains a smooth surface.

L 1.2. Dig a front using the loader blade with front thrust equipment, in order to extract material or perform a disassembly.

F 1.2.1. Performing the cleaning and preparation of the pit, with the loader shovel with front equipment, before starting the excavation of the pit.

F 1.2.2. Placing the shovel preferably perpendicular to the front, or collection, and aligned to perform the operation of pushing and loading the material, verifying that the bucket is fully loaded.

F 1.2.3. Excavating and loading the material, preventing the wheels from skating or lifting the back of the loader.

F 1.2.4. Checking that the transport vehicles are placed at approximately 35°/45° in relation to the front and close to it, and that there are no people in the work area.

F 1.2.5. Carrying out the excavation and loading of the material in the transport vehicles, ensuring that the material falls gently on the vehicle box.

F 1.2.6. Taking advantage of the downtime in selecting the excavated material if necessary and keeping the excavation front healthy and clean, preventing serious accidents from occurring.

L 1.3. Build a half-slope track for vehicle access, using the loader shovel with front thrust equipment.

F 1.3.1. Verifying on the spot the type of material to be excavated and the measurements and dimensions specified in the work order for the construction of the track.

F 1.3.2. Performing preliminary work before starting the construction of the track.

F 1.3.3. Placing the machine on the axis and starting point of the track trace and on a horizontal plane.

F 1.3.4. Carrying out the excavation from the axis of the track outwards, always and firstly dismantling the material from the top of the excavation front, then following the excavation to the plane of the track.

F 1.3.5. Discharging the excavated material, on the edge of the outer embankment of the track or collection prefixed for this purpose.

F 1.3.6. Checking that the width, the unevenness, the slope inside and flat of the track, conform to the specifications indicated in the work order.

F 1.3.7. Advancing the machine to continue the excavation of the track, observing at all times the current safety standards.

L 1.4. Load disaggregated materials with the loader in vehicles, for transport.

F 1.4.1. Noting that the transport vehicles are located to the right or left of the machine, at an angle of 35°/45° approx. with respect to the cargo front and close to it.

F 1.4.2. Carrying out the load of disaggregated material in the transport vehicle gently and completely inside the vehicle box taking care not to damage it, not having in any case to pass over the cabin of the transport vehicle, being carried out in the smallest possible space, to shorten the duration of the cycle, but being sufficient to raise the load above the side of the transport vehicle box.

F 1.4.3. Distributing the material well in the box of the transport vehicle, preventing the material from falling down the hauling road.

F 1.4.4. Observing that there are no personnel inside the work area of the machine, to prevent accidents.

L 1.5. Load large blocks and tonnage in transport vehicles.

F 1.5.1. Taking the rocks of great volume and tonnage, inside the bucket of the loader shovel with frontal equipment, observing previously that said rock can be loaded well in the box of the transport vehicle.

F 1.5.2. Placing the machine so that the transport vehicle can approach the machine bucket in reverse and in front of it when large blocks and tonnage are loaded.

F 1.5.3. Facilitating the loading of the rock.

F 1.5.4. Placing the rock in the back of the box, gently pushing it with the bucket, until the rock is loaded into the vehicle.

F 1.5.5. Checking that the rock is well loaded in the vehicle and can not fall when moving it.

F 1.5.6. Ensuring that the driver of the transport vehicle leaves the cab of the vehicle and is located at a safe distance from the loading operation.

L 1.6. Perform emptying with shovel loader, for later use.

F 1.6.1 Performing its work plan, depending on the characteristics of the terrain to be excavated and the specifications given in the work order.

F 1.6.2. Placing the machine in the chosen place beforehand to start work, stably.

F 1.6.3. Excavating and conditioning the accesses to the bottom of the emptying and wide spaces to facilitate the maneuvers of the machine and transport vehicles in accordance with the specifications of the work order.

F 1.6.4. Continuously checking that the bottom of the excavation is smooth and clean and emptying with the geometries and dimensions specified in the work order.

F 1.6.5. Keeping the front of the excavation at all times clean, vertical or with the inclination indicated in the work order, avoiding dangerous collapses.

L 1.7. Perform hopper feeding.

F 1.7.1. Placing the loader blade aligned and perpendicular to the hopper to perform the discharge, in the area enabled for this purpose, verifying the stability of the equipment.

F 1.7.2. Performing the discharge in neutral, with service brake or parking brake activated, smoothly, at intervals if necessary, and fully within hopper avoiding spills and projections of material.

F 1.7.3. Observing that there are no personnel inside the work area of the machine, to prevent accidents.

F 1.7.4. Observing at all times the security provisions.

L 1.8. Carry out parking operation.

F 1.8.1. Noting that the operation is carried out in a firm, horizontal area, without hindering existing traffic, with a bucket in the correct position, gear change in neutral and with

actuated parking brake; verifying that after a variable time the machine is stopped, the starter key is removed and the equipment cutter is operated.

F 1.8.2. Verifying that, if the operation is carried out on sloping terrain, the wheels will remain on the road.

F 1.8.3. Verifying that, if the fault operation occurs, the corresponding signaling established in the internal safety provisions is carried out.

F 1.8.4. If an area is assigned to this operation, noting that there is no personnel or other type of vehicle within the parking area, to prevent accidents. Noting that other transport vehicles or machines located to the right and left of the equipment, maintain an adequate separation to avoid accidents.

2.3.2 Knowledge 2: Carry out the set-up and maintenance of excavation machines.

L 2.1 Carry out the cleaning and lubrication of the machines using the techniques, frequencies and materials indicated in the maintenance manual, for the perfect state of operation and safety of the units.

F 2.1.1. Cleaning inside and outside all the components of the machine, before proceeding to its grease and to avoid accidents.

F 2.1.2. Replacing damaged greasers with new ones, when it is observed that the fat does not enter the points to be greased.

F 2.1.3. Using the type of lubricant recommended by the manufacturer of the machine, in the amount indicated in the maintenance manual.

F 2.1.4. Performing the daily greasing of the points of the machines, indicated by the maintenance manual of the same. If automatic grease is available, checking the level of grease in the tank.

F 2.1.5. Performing the general grease of the machine, using the "grease plane" of the unit and observing the periods of time indicated in the maintenance manual. If automatic grease is available, checking the level of grease in the tank.

F 2.1.6. Disassembling, cleaning and reassembling, those components where the grease does not enter so that the mechanisms work correctly again.

F 2.1.7. Check the condition of the air filters, observing their condition in case it requires replacement.

F 2.1.8. Performing the drainage of the fuel tank in the form and periods of time, indicated by the manufacturer, and performing at the same time the cleaning of the respirator of said tank.

L 2.2. Verify fluid levels by means of peepholes and level probes, to detect deficiencies of these fluids and replenish them, if necessary, before starting the engine of the machine.

F 2.2.1. Checking that the machine is located on horizontal ground, with the equipment resting on the ground, braking and the engine stopped.

F 2.2.2. Verifying that the oil level of the engine crankcase, is between the marks of maximum and minimum, of the level rod.

F 2.2.3. Checking the oil level of the servo-transmission by means of the peephole, being between the *maximum* and *minimum* marks .

F 2.2.4. Observing that the level of the coolant of the engine radiator, reaches the *maximum* level marked in the filling mouth of said radiator.

F 2.2.5. Checking through the control panel of the equipment, that the fuel tank is full or has enough for the working day.

F 2.2.6. Noting that the oil level of the reservoir of the hydraulic system is between the *maximum and minimum* marks, when the equipment is located in the position indicated in the manual of, maintenance of the machine and refilling if necessary.

F 2.2.7. Checking by means of the control devices, that all the components of the machine work correctly with the engine running.

L 2.3. Perform the maintenance of the undercarriage of the machines, checking the condition of the same and replacing defective elements, so that the units are in the best condition to move safely.

F 2.3.1. Verifying that the tensioning of the tracks is correct in the different circumstances of the dry or wet terrain and conforms to the indications of the machine maintenance manual.

F 2.3.2. Checking previously that, when disassembling a wheel of the machine, the fixing nuts have been loosened and it has been raised and footwear, safely.

F 2.3.3. Noting that, when installing a wheel on the machine, the tread pattern is in the sense indicated by the machine manual.

F 2.3.4. Performing the final tightening of the fixing nuts in the order recommended by the manufacturer and when the wheel is resting on the ground.

F 2.3.5. Checking that the inflation pressure of the tire is indicated in the pressure table established by the manufacturer and according to the measurements of the installed tire.

F 2.3.6. Checking daily before starting the working day, that the tires:

- There are no cuts or deformations.
- That tread wear is within the allowed limits.

L 2.4. Replace blades, teeth and tips, of the different equipment of the loader, with the spare parts and techniques recommended by the manufacturer, to maintain the machine, in the best conditions of profitability and safety.

F 2.4.1. Placing the bucket of the equipment in a way that facilitates the replacement of tips, teeth and blades with maximum security.

F 2.4.2. Replacing the worn tooth tips with others of the same characteristics and measures, checking that they are well attached to their respective tooth holders.

F 2.4.3. Verifying that the change of teeth (or any other type of cutting tool) of the bucket has been made in accordance with the standards established by the manufacturer, in terms of type, measurements and anchorage.

F 2.4.4. Cleaning the seat of the blades well, before installing the new ones.

F 2.4.5. Noting that the screws for fixing the blades to the equipment, are perfectly coupled to the corresponding cajeo that these blades have for coupling.

F 2.4.6. Verifying that the tightening torque of the fixing screws of the blades is done according to the manufacturer's instructions.

L 2.5. Maintain the electric system of the loader, checking all circuits and replacing defective elements, for proper operation of the unit.

F 2.5.1. Noting that, when changing the alternator strap, it is replaced by another of the same characteristics and tensioned according to the instructions of the maintenance manual.

F 2.5.2. Verifying when starting the engine, that the alternator of current, works as indicated in the operations manual.

F 2.5.3. Checking when replacing lamps and fuses, which are well installed and are of the same voltage and intensity as those indicated by the manufacturer.

F 2.5.4. Performing the change of batteries, according to the instructions of the maintenance manual, either to replace or recharge them.

F 2.5.5. Checking that the batteries are well installed, starting and stopping the engine.

F 2.5.6. Checking that the electrolyte level covers the plates, adding distilled water if necessary, without exceeding that level.

F 2.5.7. Verifying that the holes in the plugs of the battery vessels are not clogged, to prevent it from bursting.

F 2.5.8. Verifying that after the completion of the works the cutting *current of* the equipment is activated.

L 2.6. Perform the maintenance of the power train and the various fluid circuits of the machine, following the instructions of the maintenance manual, in order to avoid breakdowns and obtain the maximum performance of the unit.

F 2.6.1. Noting that the machine is located on horizontal ground, with the equipment supported on the ground, the brake applied and the engine stopped.

F 2.6.2. Checking the oil and filter change of the engine when it is hot, by others of the same characteristics, checking its level after starting and stopping the engine.

F 2.6.3. Checking the oil change and servo-transmission filter, with oil of the same type, checking its level before and after starting the engine.

F 2.6.4. Checking the change of the oil of the differential groups when it is hot, for another of the same type, checking that its level is correct.

F 2.6.5. Checking that the change of hydraulic oil and its corresponding filter is made, following the instructions of the maintenance manual, as to the type of oil to be replaced and how to perform.

F 2.6.6. Replacing the primary and secondary filters of the fuel circuit, then purging to remove air from the circuit and checking that there are no failures in the operation of the engine.

F 2.6.7. Cleaning inside and outside the engine cooling circuit, using the materials, frequencies and techniques recommended by the manufacturer and replacing damaged sleeves, if necessary.

F 2.6.8. Replacing the fan strap, following the manufacturer's instructions regarding the type, measurement and adjustment of the fan strap.

F 2.6.9. Changing the damaged hydraulic hoses, for new ones of the same characteristics, after eliminating the internal pressure of the hydraulic circuit.

F 2.6.10. Checking that the cylinders and pipes of the hydraulic system, do not present shocks, friction, or loss of hydraulic fluid.

3. FORMATIVE MODULES

3.1 MF1 Working operations

Associated with knowledge C 1. “Performing tillage operations with shovel loader”.

3.1.1 Practical training unit (UFP1.1)

- Previous work in the cabin.
- Start the engine, interpretation of the control devices and commissioning.
- Become familiar with electronic monitoring systems.
- Check levels.
- Drive the machine.
- Perform movements with the machine and equipment in vacuum.
- Execute work of clearing and cleaning of land.
- Dig ditches.
- Dig in front of different kinds of materials.
- Build ramps and slopes on half a hillside.
- Feed hoppers.
- Collect materials.
- Lifting loads.
- Loading fragmented materials and blocks in transport vehicles.
- Perform other auxiliary work.
- Carry out stop operations and definitive parking.
- Check the safety measures of the machine.

3.1.2 Theoretical training unit (UFT1.2)

- Loading machines. Types: of wheels, of tracks.
- Equipment instruction manual. Operational procedure.
- Start-up and commissioning systems.

- Pilots and indicators. Lighting, alarm and signalling system.
- Functions of the controls and controls. Possibilities of unit movements.
- Service, parking and emergency brakes.
- Application of excavation machinery in the extractive industry.
- Techniques for carrying out excavation work and loading materials.
- Land movements.
- Densities and specific weights.
- Internal security provisions.
- Markings on holdings.
- Study and interpretation of sketches and drawings.
- Driving techniques.
- Execution of work with loaders, typology of work blocks:
    - Clearing operation techniques.
    - Scarified operation techniques.
    - Excavation operation techniques.
    - Runway construction operation techniques.
    - Techniques of loading and emptying operation.
- Poor operational practices.
- Vehicle stop due to breakdown: signage, communication.
- Usual procedures when running jobs simultaneously.
- Optimization of consumption.
- Completion of daily parts of work, maintenance, breakdowns and repair.

3.1.3 Vocational skills training unit (UFC1.3)

- Work as a team with other machinery operators, transport vehicle drivers and other pit staff.
- Responsibility and autonomy in their work.
- Organize and prepare the cuts, before and during the execution of the works that it executes.
- Plan in advance the work to be done.
- Respect the internal procedures and rules of the company.
- Integration into the system of technical-professional relations.
- Methods to verify the quality of the work.
- Compliance with Safety and Hygiene standards.

3.2 MF2 Tuning and maintenance

Associated with knowledge C2 “Performing set-up and maintenance”.

3.2.1 Practical training unit (UFP2.1)

- Perform complete eye inspections of different loader blades.
- Become familiar with electronic monitoring systems and dashboards.
- Clean and lubricate work machines and equipment.
- Distinguish and select types of oils appropriate to each case (lubrication / grease).
- Change oilers.
- Check oils in different powertrain compartments.
- Check the coolant-antifreeze liquid.
- Cleaning and changing filters.
- Adjust caterpillars.
- Replace blades, joints and teeth of work equipment.
- Replace hoses or conduits of the hydraulic system.
- Change and adjustment of fan belts and power generator.
- Check the fuel tank level and refuel.
- Purge the fuel system.
- Verification of levels and filling of deposits.
- Replace batteries, fuses and lamps.
- Grease the joints of the lifting/descending system.
- Examine the condition of the undercarriage.
- Check tire inflation pressure, or wear status of tracks chains, shingles and bolts.
- Change tires and adjust your inflation pressure.
- Correct leaks and leaks of air, water or oil.
- Make the change of sleeves.
- Replace elementary assemblies (belts and hoses).
- Change spark plugs and heaters.
- Check the state of the battery, electrolyte level and state of charge. Battery replacement.
- Perform small basic maintenance operations of the electrical installation. Disassembly and assembly of:
    - Lighthouses and pilots.
    - Lamps and fuses.
    - Windshield wiper horns and motors.
    - Conventional switches and switches.

3.2.2 Theoretical training unit (UFT2.2)

- Thermal motors: components and operation.
- Mechanical and hydraulic transmissions.
- Cooling of engines.
- Fuels and fuel circuits.
- Manufacturer's maintenance manuals. Maintenance of loader blades. Machine operations stopped and/or disconnected.
- Main tools, tools and accessories. Use and conservation.
- Corrective, preventive and predictive maintenance.
- Technical characteristics of the machines. Capacity, weight, dimensions and power. Capabilities and limitations. Basic principles of operation. Applications.
- Blade loader components, general and design characteristics:
    - Rack.
    - Power train: engine, transmission and final controls.
    - Address.
    - Brakes.
    - Suspension.
    - Working team:
        - Lifting arm.
        - Spoons.
        - Blades and teeth
        - Security elements.
    - Cabin.
        - Control instruments.
        - Alarm panels.
        - Security elements.
        - Start-up and commissioning system.
    - Undercarriage:
        - Caterpillars
        - Tyres.
    - Electrical and lighting system.
- Equipment protection and safety systems.
- Oils, greases and lubricants. Types and characteristics.
- Antifreeze and anticorrosive.
- Fungible elements. Typology and characteristics.
- Caps, bearings and bearings.

- Gears: Gear types, applications and module.
- Batteries: serial and parallel battery association, installation and maintenance.
- Blades, teeth and tips: classes, measures and implementation.
- Electrical circuits: components and operation.
- Environmental risks and waste.

3.2.3 Vocational skills training unit (UFC2.3)

- Responsibility and autonomy in their work.
- Compliance with Safety and Hygiene standards.
- Rationalization of work.
- Analysis of procedures for solving technical problems.
- Control the development and quality of the work.
- Preservation, cleaning and maintenance of tools, tools and machines used.

ET 11.03 PROFESSIONAL KNOWLEDGE FOR EXCAVATOR OPERATORS

1. OBJECT

This Technical Specification aims to establish the minimum professional knowledge for the performance of the excavator operator job, as established in the ITC SM-IND-11 "Requirements for the operation of mobile mining machinery", of the Mining Safety Regulation.

2. MINIMUM PROFESSIONAL KNOWLEDGE

2.1 General knowledge

Carry out the work of the excavator, and with the hydraulic breaker hammer implement, as well as carry out the set-up and maintenance of it.

2.2 Knowledge (C)

C 1. Carrying out tillage operations

C 2. Perform set-up and maintenance

2.3 Performance of tasks (L) and main phases (F)

2.3.1 Knowledge 1: Carry out tillage operations with excavator.

L 1.1. Carry out clearings and removal of montera in order to prepare land for subsequent tillage work.

F 1.1.1. Establishing a work plan, prior to a study of the land to be conditioned.

F 1.1.2. Placing the machine in the highest place of the terrain, but operating with a level base that provides adequate stability, observing that the wheels of the crawlers, goats or motors, remain in the opposite part of the excavation front.

F 1.1.3. Noting that the collection of the brushed material, is carried out in the predetermined place for this purpose.

F 1.1.4. Filling the areas of the land that require it, depositing in them the amount of necessary material.

F 1.1.5. Extending and matching the material with the spoon, so that there is a smooth surface.

L 1.2. Excavate a front using the excavator, in order to extract material or perform a disassembly.

F 1.2.1. Performing the cleaning and preparation of the pit, before starting the excavation of the pit.

F 1.2.2. Excavating and loading the material, preventing the rear of the excavator from rising.

F 1.2.3. Placing the excavator (according to typology) in the place of the cut chosen beforehand, noting that the wheels of the caterpillars or motors of the tracks, remain in the opposite part of the front of excavation.

F 1.2.4. Checking that the transport vehicles are arranged in the most appropriate position to carry out the load, within the radius of action of the excavator, making a turn as short as possible that allows an efficient load cycle, and that there are no people in the work area of the excavator.

F 1.2.5. Carrying out the excavation and loading of the material in the transport vehicles, ensuring that the material falls gently on the vehicle box.

F 1.2.6. Taking advantage of the downtime in selecting the excavated material if necessary and keeping the excavation front healthy and clean, preventing serious accidents from occurring.

L 1.3. Build a half-slope track for vehicle access.

F 1.3.1. Verifying on the spot the type of material to be excavated and the measurements and dimensions specified in the work order for the construction of the track.

F 1.3.2. Performing preliminary work before starting the construction of the track.

F 1.3.3. Placing the machine on the shaft and starting point of the track trace and in a horizontal plane, observing that the cabilla wheel of the excavator track is on the opposite side of the excavation.

F 1.3.4. Carrying out the excavation from the axis of the track outwards, always and firstly dismantling the material from the top of the excavation front, then following the excavation to the plane of the track.

F 1.3.5. Discharging the excavated material, on the edge of the outer embankment of the track.

F 1.3.6. Checking that the width, the unevenness, the slope inside and flat of the track, conform to the specifications indicated in the work order.

F 1.3.7. Advancing the machine to continue the excavation of the track, observing at all times the safety regulations.

L 1.4. Load disaggregated materials in vehicles, for transport.

F 1.4.1. Noting that the transport vehicles are arranged in the most suitable position to carry out the load, within the radius of action of the excavator, making a turn as short as possible that allows an efficient load cycle, and that there are no people in the work area.

F 1.4.2. Carrying out the loading of disintegrated material in the transport vehicle by the side or rear of the box, softly and totally inside the vehicle box taking care not to damage it.

F 1.4.3. Distributing the material well in the box of the transport vehicle, preventing the material from falling down the hauling road.

F 1.4.4. Observing that there are no personnel inside the work area of the machine, to prevent accidents.

L 1.5. Load large blocks and tonnage in transport vehicles.

F 1.5.1. Picking up the rocks of large volume and tonnage, above or inside the bucket of the excavator with front/retro excavator equipment, observing previously that said rock can be loaded well in the box of the transport vehicle.

F 1.5.2. Placing the machine, so that the transport vehicle can approach the machine's bucket in reverse and in front of it, when large blocks and tonnage are loaded.

F 1.5.3. Facilitating the loading of the rock.

F 1.5.4. Depositing the rock in the back of the box, pushing it gently with the spoon and indicating at the same time that the box is slowly lowered, until the rock is loaded in the vehicle.

F 1.5.5. Checking that the rock is well loaded in the vehicle and can not fall when moving it.

F 1.5.6. Ensuring that the driver of the transport vehicle leaves the cab of the vehicle and is located at a safe distance from the loading operation.

L 1.6. Make emptyings for later use.

F 1.6.1 Performing its work plan, depending on the characteristics of the terrain to be excavated and the specifications given in the work order.

F 1.6.2. Placing the machine in the place chosen in advance to start the work, stabilizing it if it has a tire undercarriage.

F 1.6.3. Excavating and conditioning the accesses to the bottom of the emptying and wide spaces to facilitate the maneuvers of the machine and transport vehicles in accordance with the specifications of the work order.

F 1.6.4. Continuously checking that the bottom of the excavation is smooth and clean and emptying with the geometries and dimensions specified in the work order.

F 1.6.5. Keeping the front of the excavation at all times clean, vertical or with the inclination indicated in the work order, avoiding dangerous collapses.

L 1.7. Carry out material removal in front with *hydraulic breaker implement*.

F 1.7.1. Placing the machine in the place chosen in advance to start work on the front bench, stabilizing it if it has a tire undercarriage, in a horizontal plane, at a safety operating distance, observing that the wheel of the excavator's track is on the opposite side of the excavation.

F 1.7.2. Starting the operation from the top of the excavation front, then following the start to the plane of the bench, preventing the rear of the backhoe from rising.

F 1.7.3. Conditioning the work area on the front to facilitate maneuvering and leveling of the machine.

F 1.7.4. Keeping the front of the excavation at all times clean, vertical or with the inclination indicated in the work order, avoiding dangerous collapses.

L 1.8. Carry out parking operation.

F 1.8.1. Noting that the operation is carried out in a firm, horizontal area, without hindering existing traffic, with a spoon in the correct position, gear change in neutral and with actuated parking brake; verifying that after a variable time the machine is stopped, the starter key is removed and the equipment cutter is operated.

F 1.8.2. Verifying that, if the fault operation occurs, the corresponding signaling established in the internal provisions is carried out.

F 1.8.3. If an area is assigned to this operation, noting that there is no personnel or other type of vehicle within the parking area, to prevent accidents. Noting that other transport vehicles or machines located to the right and left of the equipment, maintain an adequate separation to avoid accidents.

2.3.2 Knowledge 2: Carry out the set-up and maintenance of excavation machines.

L 2.1 Carry out the cleaning and lubrication of the machines using the techniques, frequencies and materials indicated in the maintenance manual, for the perfect state of operation and safety of the units.

F 2.1.1. Cleaning inside and outside all the components of the machine, before proceeding to its grease.

F 2.1.2. Replacing damaged greasers with new ones, when it is observed that the fat does not enter the points to be greased.

F 2.1.3. Using the type of lubricant recommended by the manufacturer of the machine, in the amount indicated in the maintenance manual.

F 2.1.4. Performing the daily greasing of the points of the machines, indicated by the maintenance manual of the same. If automatic grease is available, check the level of grease in the tank.

F 2.1.5. Performing the general grease of the machine, using the "grease plane" of the unit and observing the periods of time indicated in the maintenance manual. If automatic grease is available, checking the level of grease in the tank.

F 2.1.6. Disassembling, cleaning and reassembling, those components where the grease does not enter so that the mechanisms work correctly again.

F 2.1.7. Checking the condition of the air filters, observing their condition in case it requires replacement.

F 2.1.8. Performing the drainage of the fuel tank in the form and periods of time, indicated by the manufacturer, and performing at the same time the cleaning of the respirator of said tank.

L 2.2. Verify fluid levels by means of peepholes and level probes, to detect deficiencies of these fluids and replenish them, if necessary, before starting the engine of the machine.

F 2.2.1. Checking that the machine is located on horizontal ground, with the spoon resting on the ground, braked and the engine stopped.

F 2.2.2. Verifying that the engine crankcase oil level is between the maximum and minimum marks, of the level rod.

F 2.2.3. Checking the oil level of the servo transmission by means of the peephole, being between the *maximum* and *minimum* marks .

F 2.2.5. Noting that the coolant level of the engine radiator reaches the *maximum* level marked in the filling mouth of said radiator.

F 2.2.6. Checking through the control panel of the equipment, that the fuel tank is full or has enough for the working day.

F 2.2.7. Noting that the oil level of the hydraulic system tank is between the *maximum and minimum* markings when the equipment is in the position indicated in the machine maintenance manual and refilling if necessary.

F 2.2.8. Checking by means of the control devices, that all the components of the machine work correctly with the engine running.

L 2.3. Perform the maintenance of the undercarriage of the machines, checking the condition of the same and replacing defective elements, so that the units are in the best condition to move safely.

F 2.3.1. Verifying that the tensioning of the tracks is correct in the different circumstances of the dry or wet terrain and conforms to the indications of the machine maintenance manual.

F 2.3.2. Checking previously that, when disassembling a wheel of the machine, the fixing nuts have been loosened and it has been raised and footwear, safely.

F 2.3.3. Noting that, when installing a wheel on the machine, the tread pattern is in the sense indicated by the machine manual.

F 2.3.4. Performing the final tightening of the fixing nuts in the order recommended by the manufacturer and when the wheel is resting on the ground.

F 2.3.5. Checking that the inflation pressure of the tire is indicated in the pressure table established by the manufacturer and according to the measurements of the installed tire.

2.3.6. Checking daily before starting the working day, that the tires:

- There are no cuts or deformations.
- That tread wear is within the allowed limits.
- It has no solid materials between the twin wheels.

L 2.4. Replace steel blades, teeth, tips and cables, from the different equipment of the excavator, with the spare parts and techniques recommended by the manufacturer, to maintain the machine, in the best conditions of profitability and safety.

F 2.4.1. Placing the spoon of the equipment in a way that facilitates the replacement of tips, teeth and blades with maximum security.

F 2.4.2. Replacing the worn tooth tips with others of the same characteristics and measures, checking that they are well attached to their respective teeth.

F 2.4.3. Verifying that the change of teeth of the spoon has been made in accordance with the standards established by the manufacturer, in terms of type, measurements and anchorage.

F 2.4.4. Checking that the ends of the bolts that have been installed in the scarifier are those indicated by the maintenance manual and that the bolts and pins are well placed.

F 2.4.5. Cleaning the seat of the blades well, before installing the new ones.

F 2.4.6. Noting that the fixing screws of the blades to the equipment are perfectly coupled to the corresponding cajeo that these blades have for their coupling.

F 2.4.7. Verifying that the tightening torque of the fixing screws of the blades is done according to the manufacturer's instructions.

F 2.4.8. Replacing a steel cable with a new one in the machine, when it is observed that, in a length of one meter, 20% of its threads are broken.

F 2.4.9. Changing the position of a steel cable of the equipment, reversing the fixation of its ends to avoid fatigue in those sectors of greater friction of the cable and increase the working safety of the machine.

L 2.5. Maintain the excavator's electrical system, checking all circuits and replacing defective elements, for proper operation of the unit.

F 2.5.1. Noting that, when changing the alternator strap, it is replaced by another of the same characteristics and tensioned according to the instructions of the maintenance manual.

F 2.5.2. Verifying when starting the engine, that the alternator works as indicated in the operations manual.

F 2.5.3. Checking when replacing lamps and fuses, which are well installed and are of the same voltage and intensity as those indicated by the manufacturer.

F 2.5.4. Performing the change of batteries, according to the instructions of the maintenance manual, either to replace or recharge them.

F 2.5.5. Checking that the batteries are well installed, starting and stopping the engine.

F 2.5.6. Checking that the electrolyte level covers the plates, adding distilled water if necessary, without exceeding that level.

F 2.5.7. Checking that the holes in the plugs of the battery cups are not clogged, to prevent it from bursting.

F 2.5.8. Verifying that after the completion of the works the cutting *current of* the equipment is activated.

L 2.6. Perform the maintenance of the power train and the various fluid circuits of the machine, following the instructions of the maintenance manual, in order to avoid breakdowns and obtain the maximum performance of the unit.

F 2.6.1. Noting that the machine is located on horizontal ground, with the equipment resting on the ground, the brake applied and the engine stopped.

F 2.6.2. Checking the oil and filter change of the engine when it is hot, by others of the same characteristics, checking its level after starting and stopping the engine.

F 2.6.3. Checking the oil change and servo-transmission filter, with oil of the same type, checking its level before and after starting the engine (on wheeled machines).

F 2.6.4. Replacing the oil of the differential groups when it is hot, with another of the same type, checking that its level is correct (in wheeled machines).

F 2.6.5. Checking that the change of hydraulic oil and its corresponding filter is made, following the instructions of the maintenance manual, as to the type of oil to be replaced and how to perform.

F 2.6.6. Checking that the oil change of the final controls is carried out, following the instructions of the maintenance manual, as to the type of oil to be replaced and form of execution. (on chain machines)

F 2.6.7. Checking that the oil change of the turn motor is made, following the instructions of the maintenance manual, as to the type of oil to be replaced and how to execute.

F 2.6.8. Replacing the primary and secondary filters of the fuel circuit, then purging to remove air from the circuit and checking that there are no failures in the operation of the engine.

F 2.6.9. Cleaning inside and outside the engine cooling circuit, using the materials, frequencies and techniques recommended by the manufacturer and replacing damaged sleeves, if necessary.

F 2.6.10. Replacing the fan strap, following the manufacturer's instructions regarding the type, measurement and adjustment of the fan strap.

F 2.6.11. Changing the damaged hydraulic hoses, for new ones of the same characteristics, after eliminating the internal pressure of the hydraulic circuit.

F 2.6.12. Checking that the cylinders and pipes of the hydraulic system, do not present shocks, friction, or loss of hydraulic fluid.

3. FORMATIVE MODULES

3.1 MF1 Working operations

Associated with knowledge C 1. “Perform excavator tillage operations”.

3.1.1 Practical training unit (UFP1.1)

- Previous work in the cabin.
- Start the engine, interpretation of the control devices and commissioning.
- Become familiar with electronic monitoring systems.
- Check levels.
- Drive the machine.
- Perform movements with the machine and equipment in vacuum.
- Execute work of clearing and removal of montera.
- Opening ditches.
- Dig in front of different kinds of materials.

- Execute disassemblies.
- Build ramps and slopes on half a hillside.
- Feed hoppers.
- Collect materials.
- Loading fragmented materials and blocks in transport vehicles.
- Perform material removal with hydraulic breaker hammer.
- Perform other auxiliary work.
- Carry out stop operations and definitive parking.
- Check the safety measures of the machine.

3.1.2 Theoretical training unit (UFT1.2)

- Excavator machines. Types: of cables, hydraulics.
- Equipment instruction manual. Operational procedure.
- Start-up and commissioning systems.
- Pilots and indicators. Lighting, alarm and signalling system.
- Functions of the controls and controls. Possibilities of unit movements.
- Application of excavation machinery in the extractive industry.
- Techniques for carrying out excavation work and loading materials.
- Natural rocks and stones, soils and lands.
- Soil mechanics: sponge, hardness, cohesion and compactness.
- Land movements.

- Densities and specific weights.
- Internal security provisions.
- Markings on holdings.
- Study and interpretation of sketches and drawings.
- Driving techniques.
- Execution of work with loaders, typology of work blocks:
    - Clearing operation techniques.
    - Excavation operation techniques.
    - Track execution techniques.
    - Loading, lifting and emptying operation techniques.
- Poor operational practices.
- Vehicle stop due to breakdown: signage, communication.
- Usual procedures when running jobs simultaneously.

- Optimization of consumption.
- Basic notions of costs.
- Completion of daily parts of work, maintenance, breakdowns and repair.

3.1.3 Vocational skills training unit (UFC1.3)

- Work as a team with other machinery operators, transport vehicle drivers and other pit staff.
- Responsibility and autonomy in their work.
- Organize and prepare the cuts, before and during the execution of the works that it executes.
- Plan in advance the work to be done.
- Respect the internal procedures and rules of the company.
- Integration into the system of technical-professional relations.
- Methods to verify the quality of the work.
- Compliance with Safety and Hygiene Standards.

3.2 MF2 Tuning and maintenance

Associated with knowledge C2 “Performing set-up and maintenance”.

3.2.1 Practical training unit (UFP2.1)

- Perform complete eye inspections of different excavators.
- Become familiar with electronic monitoring systems and dashboards.
- Clean and lubricate work machines and equipment.
- Distinguish and select types of oils appropriate to each case (lubrication / grease).
- Change oilers.
- Check oils in the different powertrain compartments.
- Check the coolant-antifreeze liquid.
- Cleaning and changing filters.
- Adjust caterpillars.
- Replace blades, joints and teeth of work equipment.
- Replace hoses or conduits of the hydraulic system.
- Replace steel cables in cable excavators.
- Change and adjustment of fan belts and power generator.
- Check the fuel tank level and refuel.
- Purge the fuel system.
- Verification of levels and filling of deposits.
- Replace batteries, fuses and lamps.

- Examine the condition of the undercarriage.
- Grease the joints of the lifting/descending system.
- Check tire inflation pressure, or wear status of tracks chains, shingles and bolts.
- Change tires and adjust your inflation pressure.
- Correct leaks and leaks of air, water or oil.
- Make the change of sleeves.
- Replace elementary assemblies (straps, hoses, fan, alternator...).
- Change spark plugs and heaters.
- Check the state of the battery, electrolyte level and state of charge. Battery replacement.
- Perform small basic maintenance operations of the electrical installation. Disassembly and assembly of:
    - Lighthouses and pilots.
    - Lamps and fuses.
    - Windshield wiper horns and motors.
    - Conventional switches and switches.

3.2.2 Theoretical training unit (UFT2.2)

- Thermal motors: components and operation.
- Mechanical and hydraulic transmissions.
- Cooling of engines.
- Fuels and fuel circuits.
- Manufacturer's maintenance manuals. Maintenance of loader blades. Machine operations stopped and/or disconnected.
- Main tools, tools and accessories. Use and conservation.
- Corrective, preventive and predictive maintenance.
- Technical characteristics of the machines. Capacity, weight, dimensions and power. Capabilities and limitations. Basic principles of operation. Applications.
- Excavator components, general and design characteristics:
    - Chassis.
    - Power train
        - Engine.
        - Transmission.
    - Address.
    - Brakes.

- Suspension.
- Drive.
- Superstructure and turning mechanisms.
- Drive cables in cable excavators.
- Working team:
  - Back-excavation equipment.
  - Front loading equipment.
  - Accessories.
- Cabin.
  - Control instruments.
  - Alarm panels.
  - Security elements.
  - Start-up and commissioning system.
- Undercarriage:
  - Caterpillars.
  - Tyres.
- Electrical and lighting system.

- Equipment protection and safety systems.
- Oils, greases and lubricants. Types and characteristics.
- Antifreeze and anticorrosive.
- Fungible elements. Typology and characteristics.
- Caps, bearings and bearings.
- Steel cables: constitution and implementation.
- Gears: Gear types, applications and module.
- Batteries: serial and parallel battery association, installation and maintenance.
- Blades, teeth and tips: classes, measures and implementation.
- Electrical circuits: components and operation.
- Environmental risks and waste.

3.2.3 Training unit professional skills (UFC2.3)

- Responsibility and autonomy in their work.
- Compliance with Safety and Hygiene Standards.
- Rationalization of work.
- Analysis of procedures for solving technical problems.
- Control the development and quality of the work.

- Preservation, cleaning and maintenance of tools, tools and machines used.

ITC SM-IND-12 MINING CONTROL BODIES. FIELDS, ACHIEVEMENTS, REQUIREMENTS AND PERIODICITY

1. OBJECT

This Supplementary Technical Instruction (hereinafter, "ITC") aims to establish the requirements, obligations and fields of action of the Mining Control Bodies (hereinafter, "OCMs") in development of the provisions of Articles 22,26,27,38,40 and 44 of the Mining Safety Regulations.

2. REQUIREMENTS AND OBLIGATIONS OF MINING CONTROL BODIES

In addition to the requirements established in the Mining Safety Regulation and in this ITC, the CMOs will be governed by the provisions for the Control Bodies in Royal Decree 2200/1995, of December 28, which approves the Infrastructure Regulation for Quality and Industrial Safety.

3. FIELDS OF ACTION OF MINING CONTROL BODIES

CMOs may only operate in one or more of the fields for which they are authorised. These fields of action may be as follows:

1. Inspection of steel cables in extraction facilities.
2. Technical inspection of mobile mining machinery.
3. Inspection of open-cast work.
4. Inspection of underground work.
5. Inspection in extractive activities by drilling.
6. Vibration control in blasts.
7. Inspection of electrical installations on underground holdings.
8. Inspection of profit establishments.

4. ACTION BY MINING CONTROL BODIES

4.1 Enabling

Those who, having obtained their accreditation issued by ENAC, wish to exercise their activity as a CMO must previously submit a responsible declaration to the Mining Authority where they have their registered office, through which they must state the activities they intend to carry out among those defined in paragraph 3, and that for this purpose (i) complies with the relevant requirements required both in the Infrastructure Regulation for Quality and Industrial Safety, as well as in the Mining Safety Regulation, (ii) that they have the documentation that demonstrates it and (iii) the documentation proving that they have insurance, endorsement or other equivalent financial guarantee that covers their civil liability.

The responsible declaration entitles the CMO, from the moment of its presentation, to act throughout the State and for an indefinite period, without prejudice to the powers of verification, control and inspection of the Mining Authority.

4.2 Communication of actions

The CMOs must communicate the actions they carry out, to the Mining Authority in their territory, as well as to the Directorate General of Energy Policy and Mines throughout the national territory, through electronic means.

For this purpose, an electronic information system is created at national level for the monitoring and control of inspections of CMOs, whose management corresponds to the Ministry with competences in mining safety, which will facilitate access to each Mining Authority with territorialized information.

The electronic information system at national level for the monitoring and control of inspections of CMOs aims to provide information in real time to the Mining Authorities for the best performance of their competences in mining safety. In order to achieve this, the aforementioned electronic system will have mandatory instructions for the CMOs, including a minimum content of the information to be provided and the maximum deadlines for communication of the different actions.

5. SCOPE OF THE ACTIVITIES OF MINING CONTROL BODIES

In the Annex that is inserted, for each field of action of the CMOs, it is included;

a) The subject matter and scope of the inspections,

b) The applicable regulatory specifications and,

c) The type of regulatory inspection regulated, defined by its obligation and periodicity.

In addition, and at the request of the Mining Authority, the Mining Control Bodies may verify the performance of the mandatory inspections regulated in the different industrial safety regulations by requesting the certificates issued by the corresponding Control Bodies.

ANNEX

SPECIFICATIONS OF THE FIELDS OF ACTION OF MINING CONTROL BODIES

1. INSPECTION OF STEEL CABLES IN EXTRACTION FACILITIES

Purpose:	▪ Electromagnetic inspection of steel cables in service for extraction facilities in underground extractive industries, using non-destructive testing equipment.
Scope:	▪ Drawstring steel cables, used as extraction cables in vertical transport installations and in inclined planes, in underground work. ▪ Flat, closed and semi-enclosed cables and cables used in the following installations are excluded: - Wells and inclined planes equipped with a manual lathe or a winch exclusively for the transport of material. - Monorail installations with light transport, excluding personnel. - Strobes for manoeuvring wagons in boarding areas in inclined planes. - Telemin cables. ▪ Specific industrial safety requirements for steel inspection imposed by the Mining Authority.
Applicable specifications	▪ Standard UNE 22013 (Level II inspection procedure). ▪ Standard UNE-EN 12927 (equipment and personnel requirements).
Type of action	▪ Mandatory inspections that are carried out initially and periodically depending on the age of the machines: - Once before 1 month of operation has elapsed since the cable was put into service. - At least once every six months along its entire length. - After an accident. ▪ Additionally, the Mining Authority may require these inspections when it deems appropriate.

2. TECHNICAL INSPECTION OF MOBILE MINING MACHINERY

Purpose:	▪ Technical inspection of mobile mining machinery established in section 5 of the ITC SM-IND-10.
Scope:	▪ Mobile mining machinery for which the corresponding Technical Specification is published in the Official State Gazette. ▪ Specific industrial safety requirements for technical inspection of mobile mining machinery imposed by the Mining Authority
Applicable specifications	▪ ET 10.01 Inspection of wheel loaders ▪ ET 10.02 Inspection of rigid frame dumpers on wheels ▪ ET 10.03 Inspection of articulated frame dumpers on wheels
Type of action	▪ Mandatory inspections that are carried out initially and periodically depending on the age of the machines, in accordance with the provisions of the ITC SM-IND-10. - First technical inspection for new machines: ✓ 3 years since its commissioning. - Periodic technical inspections: ✓ Machines up to 6 years old: Every three years. ✓ Machines over 6 and up to 10 years old: Every two years. ✓ Machines more than 10 years old or not attesting to their age: Every 1 year.

3. INSPECTION OF OPEN SKY LABORES

Purpose:	Inspection of opencast work to check the project parameters (exploitation project, work plan) as well as the safety measures planned to prevent damage to people, property and the environment.
Scope:	Including: ▪ Chapter I, Title IV, Mining Safety Regulations. ▪ Chapter II, Title IV, Mining Safety Regulations. ▪ Specific industrial safety requirements for the inspection of opencast work imposed by the Mining Authority Excluded as there is a specific field: ▪ Technical inspection of mobile mining machinery. ▪ Vibration control in blasts.
Applicable specifications	**Content** / **Legislation** Exploitation project. / Chapter II ITC SM-IND-13 Development of the work / Chapter II ITC SM-IND-14
Type of action	▪ Mandatory inspections with a minimum frequency of 3 years, which may be reduced by the Mining Authority

4. INSPECTION OF SUBTERRANEAN WORKS

Purpose:	▪ Inspection of underground work to check the project parameters (exploitation project, work plan), as well as the safety measures planned to prevent damage to people, property and the environment.
Scope:	Including: ▪ Chapter I, Title IV, Mining Safety Regulations. ▪ Chapter III, Title IV, Mining Safety Regulations. ▪ Specific industrial safety requirements for the inspection of underground work imposed by the Mining Authority Excluded as there is a specific field: ▪ Electromagnetic inspection of steel cables. ▪ Technical inspection of machinery according to ITC SM-IND-10. ▪ Inspection of electrical installations. ▪ Vibration control in blasts.
Applicable specifications	

Content	Legislation
Classification of underground work.	ITC SM-IND-16
Exploitation project.	ITC SM-IND-15
Conditions of Access and Wells. Fire-fighting measures.	ITC SM-IND-17
Extraction machines, winches, winches, cages and skips. (Includes inspection of the project and installation). Excluding electromagnetic inspection of steel cables.	ITC SM-IND-18
Movement and transport. (Includes inspection of the project and installation).	ITC SM-IND-18

	Support. (Includes inspection of the project and installation).	ITC SM-IND-19
	Ventilation, drainage and environmental conditions. • Unclassified mines. • Mines with grisu. (Includes inspection of the project and installation).	ITC SM-IND-15 ITC SM-IND-16 ITC SM-IND-18
Type of action	▪ Inspections at the request of the Mining Authority.	

5. INSPECTION IN EXTRACTIVE ACTIVITIES BY SONDEOS

Purpose:	▪ Inspection in extractive industries by drilling to check the project parameters (exploitation project, work plan), as well as the security measures planned to prevent damage to people, property and the environment.
Scope:	▪ Project and general requirements. ▪ Seismic surveys. ▪ Surveys for holdings by dissolution or leaching. ▪ Surveys for the use of geothermal resources. ▪ Specific requirements on industrial safety applicable to the inspection of extractive activities by drilling imposed by the Mining Authority
Applicable specifications	▪ ITC SM-IND-21.
Type of action	▪ Inspections at the request of the Mining Authority.

6. VIBRATION CONTROL IN VOLADURAS

Purpose:	▪ Control of vibrations produced in the execution of blasts.
Scope:	▪ Vibration control.
Applicable specifications	▪ Standard UNE 22381. Control of vibrations produced by blasts. ▪ Specific industrial safety requirements for vibration control imposed by the Mining Authority
Type of action	▪ Inspections at the request of the Mining Authority.

7. INSPECTION OF ELECTRICAL INSTALLATIONS IN SUBTERRANEAN HOLDINGS

<table>
<tr><td>Purpose:</td><td>▪ Inspection of the requirements for electrical installations on underground holdings.</td></tr>
<tr><td>Scope:</td><td>▪ Electrical installations in underground extractive industry.
▪ Specific requirements for industrial safety applicable to electrical installations on underground holdings imposed by the Mining Authority.</td></tr>
<tr><td>Applicable specifications</td><td>
<table>
<tr><th>Content</th><th>Legislation</th></tr>
<tr><td>Electrical installations in underground mining.
(Project and installation)
• Unclassified mines.
• Mines with grisu.</td><td>ITC SM-IND-23</td></tr>
</table>
</td></tr>
<tr><td>Type of action</td><td>Mandatory inspections that are carried out initially, periodically or by substantial modification depending on the type of installation, in</td></tr>
</table>

	accordance with the provisions of ITC SM-IND-23.

8. INSPECTION OF BENEFIT ESTABLISHMENTS

Purpose:	▪ Technical inspection of profit establishments established in ITC SM-IND-22
Scope:	▪ Benefit establishments and specific treatment equipment for which the corresponding Technical Specification is published. ▪ Specific requirements for industrial safety applicable to profit establishments imposed by the Mining Authority
Applicable specifications	▪ ET 22.01 Technical inspection of conveyor belts
Type of action	▪ Mandatory inspections that are carried out on a regular basis every 2 years, in accordance with the provisions of ITC SM-IND-22.

ITC SM-IND-13 OPEN SKY. PROJECT OF EXPLOITATION.

1. OBJECT

This Supplementary Technical Instruction (hereinafter referred to as 'ITC') aims to develop the minimum content of exploitation projects for open pit extractive work, as laid down in Article 23 of the Mining Safety Regulation.

2. BASIC STRUCTURE

Each project shall contain the following basic structure:

- DOCUMENT 1: Memory.
- DOCUMENT 2: Plans.
- DOCUMENT 3: Attachments.
- DOCUMENT 4: Supporting calculations.
- DOCUMENT 5: List of equipment and machinery.
- DOCUMENT 6: Economic and financing study.
- DOCUMENT 7: Budget.
- DOCUMENT 8: Studies of the deposit and the area to be exploited.
- DOCUMENT 9: Benefit establishment and auxiliary facilities.
- DOCUMENT 10: Temporary suspension and abandonment plan.

3. SPECIFIC CONTENT

3.1 DOCUMENT 1: Memory

The memory shall have at least the following content:

1. Background.
2. Object. Geological resource to be extracted.
3. Applicable legislation.
4. Promoter details.
5. Data from the writing team.
6. Location.
7. Area affected.
8. Affected land and land use.
9. Conditions (accesses, tracks, electrical conduits, etc.)
10. Geology of the holding.
11. Estimated resources and reserves. List of suitable and unsuitable material.

12. Purposes and marketing area.
13. Method of exploitation.
14. Pre-clearance operations.
15. Start-up system.
16. Charging system.
17. Transport system.
18. Irrigation system of tracks and platforms.
19. Discharge and extended system.
20. Adopted slopes (i).
21. Life and rhythm of exploitation.
22. Exploitation progress.
23. Banks: number and dimensions (ii).
24. Tracks and accesses.
25. Drainage of the farm.
26. Justification of heaps, waste deposits, rafts and/or sterile dams (iii).
27. Machinery.
28. Organization of work and personnel.
29. Measures against dust.
30. Security (access), fencing and signage of the perimeter of the farm.
31. Internal signage: traffic and security.
32. Valuation of the production obtained.

(i) At least the slopes of the holding shall be defined, zoning it geometrically if necessary, indicating for each zone:

- Maximum angle of individual working slope.
- Maximum angle of general working slope.
- Maximum angle of final individual slope.
- Maximum angle of final general slope.

The angle values considered shall be justified by indicating the criteria for their choice.

The types of breakage that may occur on the slope will be analyzed.

(ii) The number of workbenches and end benches will be defined, indicating the different dimensions that characterize them:

- Bench height.

- Width of berm.
- Name.

(iii) Its number, denomination, location, typology, maximum dimensions and construction system will be defined.

3.2 DOCUMENT 2: Drawings

They must be carried out at scale and in such a way as to allow the details of the works and the characteristics of the area to be exploited and the environment concerned to be defined with sufficient precision.

The drawings must be made and presented in digital format, at least, in dwg format and pdf format. Standard formats will be chosen. All drawings shall clearly indicate the print scale, graphic scale, equidistance of level curves (if applicable) and grid north orientation, as well as the relevant identifying information.

All plans, except for details, will be georeferenced.

The plan document shall contain at least the following:

1. Geographical location plan.
2. General topography map.
3. Detailed topography plan.
4. Orthophotograph.
5. Delimitation plan for parcels: affected properties and services.
6. Urban planning.
7. General geological map.
8. Geology plans of the site.
9. Drawings of the method of exploitation.
10. Plan of photolineations, geotechnical stations and geotechnical zoning.
11. Plan of maximum extraction hole.
12. Exploitation sequence plans. Advances.
13. Location of profiles.
14. Longitudinal profiles.
15. Cross-sectional profiles.
16. Sections type of tracks and accesses.
17. Main track: plotted in plan and profile.
18. Hydrology and drainage.
19. Location of treatment and auxiliary facilities.
20. Detail plans of facilities.

21.Fence and signage.

3.3 DOCUMENT 3: Annexes

In general, those attached to the memory will develop the information contained in it, justifying it. The attachment document shall contain at least the following:

1. Administrative documentation.
2. Cartographic information.
3. Perimeter of operating authorization, according to current coordinate system.
4. Marketing area.
5. Evaluation of reservations.
6. Exploitation programme.
7. Dimension of tracks and accesses.
8. Hydrological and drainage study.
9. Justification of machinery.
10. Justification of personnel.
11. Prevention and control of dust.
12. Conditions (accesses, tracks, electrical conduits)
13. Measurements corresponding to operating costs, mineral treatment and infrastructure maintenance.

3.4 DOCUMENT 4: Supporting calculations

This document contains all the justifications for the calculations carried out that are not included in Document 3: Attachments.

3.5 DOCUMENT 5: List of equipment and machinery

The characteristics of the equipment to be used, both technical and safety, will be defined.

3.6 DOCUMENT 6: Economic and financing study

The economic study shall be broken down into annuities. Based on the resulting cash flows, the necessary financing will be defined, indicating its source (own, external). The total investment, expenses, revenues and profit and profitability shall be included.

3.7 DOCUMENT 7: Budget

The different items constituting the budget for the material implementation of the general exploitation project shall be broken down. Costs for operation, ore treatment and infrastructure maintenance shall be adequately justified by an annex of measurements.

3.8 DOCUMENT 8: Studies of the deposit and the area to be exploited

This document shall include at least the following:

1. Geological studies carried out.
2. Hydrogeology of the area.
3. Photo report presenting the geological details of the environment and the field data obtained.
4. Results of the survey campaigns, with exposure and interpretation of the results obtained.
5. Geophysical work carried out, as well as the interpretation of the results obtained.
6. Pilot tests to verify the desired recovery of the material.
7. Technological tests that allow verifying the extractive interest of the material for its subsequent use.
8. Geological-mining model that brings together the above data, in order to infer from it the available resources and reserves.
9. Geotechnical survey of the site (i)

(i) It shall consist of:

- Characterization of the rocky massif.
- Characterization of geotechnical units.
- Stability calculations
- The short- and long-term stability of the working and restoration slopes adopted or existing where appropriate shall be assessed.
- With regard to the sterile, the stability of the heaps shall be justified, both by the strength of the foundation and by its own design and location. The stability of the settling ponds will also be analysed.
- All calculations will be made in the present conditions and additionally, with a high water table level due to poor drainage.

3.9 DOCUMENT 9: Mineral Benefit Establishments and Auxiliary Facilities

In the case of the need for new harvesting facilities, these will be defined in an estimated way, but always justified, and without prejudice to the regulatory processing of the corresponding projects.

3.10 DOCUMENT 10: Temporary suspension and abandonment plan

The measures and actions planned to guarantee the safety of people and goods and the protection of the environment in the event of suspension, partial abandonment or total abandonment of the work will be detailed.

ITC SM-IND-14 OPEN SKY

1. OBJECT

The purpose of this Supplementary Technical Instruction (hereinafter referred to as 'ITC') is to regulate the mining and industrial safety conditions in the open pit extractive industries, in addition to those set out in Annex I to the Mining Safety Regulation 'Minimum *safety and health provisions in the open pit or underground extractive industries', with a view to* reducing risks to persons, property and the environment, and in accordance with Article 24 of the Mining Safety Regulation.

2. DEFINITIONS

For the purposes of this JTI, the following definitions apply:

2.1 Access: road intended for the circulation of vehicles and/or personnel of a temporary nature for the service to an operating front.

2.2 Height of banks: vertical distance between two levels, from the foot of the bench to the highest part or header.

2.3 Bank: module or step between two levels constituting the slice extracted from sterile ore.

2.4 Berma: horizontal platform, existing in the limits of the excavation on the final slopes, which contributes to improve the stability of a slope and the safety conditions against landslides or falls of stones.

2.5 Coating materials: set of soils and rocks covering the deposit of useful material, which are normally disposed of at a pre-exploitation stage in the so-called clearing operation.

2.6 Track: road intended for the use of vehicles for the usual service of a holding.

2.7 Working platform: horizontal platform, either head or foot, of a bank in operation, before reaching its final situation, in which extractive work is carried out in a bank

2.8 Talud: surface or front face of a bench in an outdoor mining operation, which forms a certain angle with the horizontal (angle or slope inclination), calculated to ensure the stability of that bench and of the bench itself

2.9 Bench slope angle: angle delimited between the horizontal and the line of maximum slope of the face of the bench.

2.10 Working slope angle: angle determined by the feet of the benches between which one of the pits or work platforms is located (this is a provisional slope of the excavation).

2.11 End slope angle: angle of the stable slope bounded by the horizontal and the line joining the foot of the lower bench and the head of the upper bench.

3. HOLDING DESIGN

3.1 General

The heights of the benches and the inclinations of the end and working slopes should be determined in the design of the farm, so as to avoid landslides and mass shifts.

3.2 Bench heights and slopes

The heights and slopes established for the various types of holding, according to the grubbing-up method, are as follows:

TYPE OF HOLDING. STARTING METHOD	Maximum bench height (m)	Maximum bench height with express permission (m)	Maximum height of final bench (m)
• Start with explosive	20	30	40
• Natural Stone Blocks (1)	12	-	36
• Slate blocks	20	-	40
• Starting by mechanical means	Scope of the machine bucket	-	-
• Mixed farms	The above specifications or a combination thereof shall apply, depending on the characteristics of the materials and the method of operation used.		

(1) These requirements do not apply to granite farms on staggered fronts and extraction of large blocks, which will require a technical justification of the tillage method for approval by the Mining Authority.

On the other hand, the Mining Authority may approve higher workbench heights, after a supporting study that considers the type of material, the available starting and loading means, geotechnical study of the stability of banks and slopes and specific security measures adopted. In particular, the geotechnical study has to justify that the relationship between the resistant and destabilising forces acting on the slope of the exploitation remains equal to or greater than 1.2 or equal to or greater than 1.1 if the seismic risk has been considered. The slope or inclination of the workbench shall be that necessary to maintain the stability of the workbench. However, for the case of the final slopes, the Mining Authority may require the analysis of their stability, not only taking into account the circumstances and final conditions of contour that the mining hole presents, but considering the importance of the possible condition of the immediate environment, being able to require, depending on the permanent conditions of these slopes, the adoption of safety factors of up to 1.5 (up to 1.3 if the seismic risk is considered).

In no case shall inverted slopes be admitted.

The slope of the front may be vertical in excavations carried out at the upper level of the work platform by excavators other than bucket excavators, as well as in excavations carried out at the lower level by backhoe excavators.

On holdings with manual grubbing-up, the slope can be vertical only if the bench does not exceed

1.25 m in height. In all other cases, the slope shall not exceed 60°.

When excavation is carried out by ripping or starting with a bulldozer, the slope shall not exceed 25°. In this case, the front height limits indicated above shall not apply.

Crash farms are not allowed, except when they occur due to the presence of natural discontinuity surfaces.

In relation to the maximum final bench heights, the maximum values are indicated without the need for berms, without prejudice to any other limitations that may exist. If the holding continues to progress to lower levels, the corresponding safety berm shall be left.

3.3 Formation of banks. Bermas

When the thickness of the material to be extracted exceeds the maximum permitted height, the exploitation will be carried out by levels forming benches.

Work platforms shall be left on the bench operation in order to prevent possible detachments of active or non-active fronts from falling on workplaces and/or runways located at lower levels.

The final berms will be projected as a result of a geotechnical study that determines the final stable slope.

In order for a berm to be used for the use of vehicles, it must meet the requirements laid down for runways.

3.4 Work platforms

The working platform should be wide enough to allow mobile mining machinery to maneuver easily, without unnecessarily approaching the starting front and maintaining a minimum distance of 5 meters to the edge of the bench, in the normal development of the work.

In special situations, such as the initiation of platforms, controlled turning of material or limitations of their amplitude for various reasons in which there are risks of rollover or falls, buffers or barriers that are difficult to cross under normal working conditions will be placed.

The surface of the work platform must be regular, so as to allow easy manoeuvring of the machinery and ensure its stability. It must have an effective drainage system.

Particular attention will be paid to the conservation and cleaning of existing drains to avoid waterlogging, as well as to the restoration of the surface of the platform, eliminating potholes, softs, rollers, etc. The barefoot stones will be removed from the slopes or falls of the cartons of vehicles.

In the case of nighttime activity, the work platforms must be equipped with the appropriate lighting system for the work to be carried out. On load platforms, this lighting system may be the same as the machines that carry out their work on the platform if this is sufficient. The arrangement and intensity of lighting systems shall be such that they do not give rise to glare.

3.5 Tracks and accesses

In the design of the tracks and accesses, the plan and profile of the route should be considered, with a view to ensuring safe and smooth circulation depending on the types of vehicles to be used and the expected intensity of circulation.

Its construction should take into account the quality of the running surface, as well as the stability

and braking potential of the vehicles to be driven on it. On the other hand, an adequate cross-sectional profile should be designed to facilitate drainage, as well as a longitudinal profile that prevents the existence of badenes.

The separation shoulder between the edge of the track or access and the foot or bottom edge of a slope may not be less than 2 meters.

When there is a risk of landslides or landslides on slopes affecting a track, it must be protected by meshing, bolting, gunitado, etc., of the slope, leaving if necessary a safety shoulder of 5 meters wide.

In those accesses that are obligatory passage of personnel, the shoulder of separation of the lower edge of the slope will be increased by 2 meters more, to have a complementary pedestrian shoulder.

In areas where there is a risk of falling or overturning, the edge of the runway shall be properly marked. If, in addition, the distance from the track to the upper edge of a slope is less than 5 metres of firm ground, a stop or barrier must be placed which is difficult to cross for a vehicle travelling at the normal speed established, or the track width must be indicated and the speed limited.

3.5.1 Width of roads in tracks and accesses

The minimum width of the road of a single lane track shall be one and a half times that of the widest vehicle expected to run on it. In the case of heavy and heavy traffic, this width shall be twice the width of the largest vehicle circulating through it.

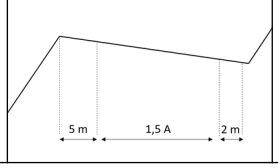
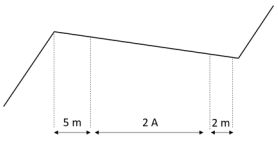
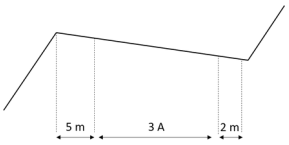
On two-lane tracks, the width of the roadway shall be three times that of the widest vehicle.

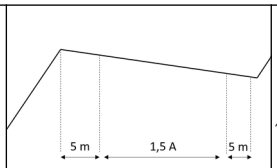
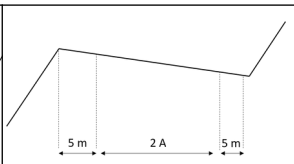
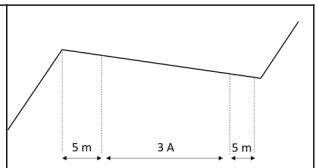
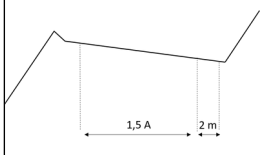
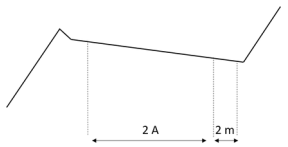
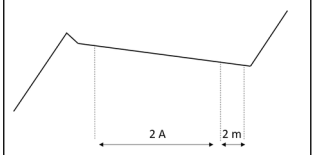
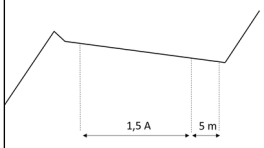
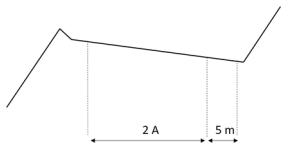
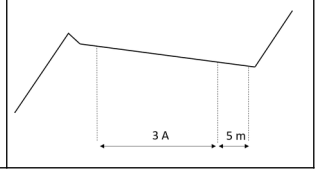
In the case of single-lane tracks with crossings of vehicles, appropriately spaced sidings shall be provided. Its length shall be at least twice the length of the longest vehicles used and its width shall be that of the widest vehicle expected to run on the track. In both gradient shifts and curves lacking visibility, the track shall be double lane or be provided with sidings with an effective signalling device to regulate alternative traffic.

The minimum width of the road of a single-lane access shall be that of the largest vehicle expected to circulate on it.

To facilitate the interpretation of the requirements imposed on the widths of tracks and accesses, tables are attached with examples of sections of both cases.

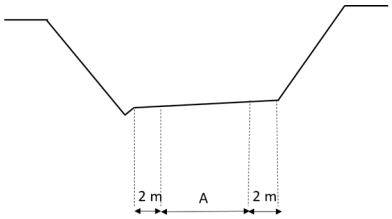
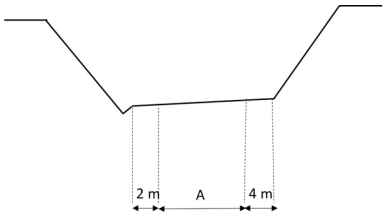
EXAMPLES OF TRACK SECTIONS

Cross section of tracks		One lane		Two lanes
		Normal traffic	Heavy and intense traffic	
No barrier not passable	No safety shoulder			

	With safety shoulder			
With non-transferable barrier	No safety shoulder			
	With safety shoulder			

A = Width in metres of the larger vehicle running on the track

EXAMPLES OF ACCESS SECTIONS

Cross section of accesses	No pedestrian shoulder	With pedestrian shoulder
1 lane		

A = Width in metres of the larger vehicle passing through the access

3.5.2 Earrings

The longitudinal slopes of the tracks and accesses must be adapted to the characteristics of the vehicles and the loads they carry. In any case, the average longitudinal slopes of the tracks must not exceed 10 per 100, with point maximums of 15 per 100.

In the case of access to the working fronts or other special cases, this limit may be exceeded provided that the vehicles, in the most unfavourable real conditions, can stop and resume both directions at full load, but in no case shall the slope exceed 20 per cent. Vehicles or machinery running on these sections shall take specific safety measures.

The transverse slope shall be sufficient to ensure adequate drainage of run-off water.

On tracks with a single lane at mid-slope, the transverse slope shall be reversed to that of the slope and an appropriate ditch shall be provided.

3.5.3 Curves

The minimum permissible radius shall be that which can be carried out by the longest vehicles without the need for manoeuvring.

For curves, an overwidth shall be considered for each lane as follows:

$$s=\frac{I^2}{2R}$$

where:

S = width of each lane in metres.

l = length of vehicles in metres measured between their front end or the trailer, if articulated, and the axle of the rear wheels.

R = radius of the curve in meters.

The curves shall be designed with a radius depending on the vehicle type, expected speed, cant and friction coefficient.

In no case shall reverse cants be allowed.

3.5.4 Conservation

The runways and accesses must be systematically and regularly maintained so that they are kept in good safety conditions at all times.

The health and safety document shall indicate the conditions and frequency of maintenance operations.

Particular attention will be paid to the conservation and cleaning of existing drains to avoid waterlogging, as well as to the restoration of the rolling surface, eliminating potholes, softs, rollers, etc. The barefoot stones will be removed from the slopes or falls of the cartons of vehicles.

In dry weather, regular irrigation shall be carried out in order to reduce dust emission which may limit visibility and pollution.

If circumstances have occurred which dangerously alter the running conditions of a runway, a plan for the repair of the runway must be drawn up and specific running and safety rules must be laid down for the duration of the repair.

Provision should also be made for the maintenance and periodic replacement of established road signs.

4. DESMONTE OPERATION

If due to the thickness of the coating materials, the stripping operation is prior and independent of the operation of exploitation, the same rules and regulations will be followed as in this one, according to the nature of the coating and with the additional precautions due to the intermittent nature of these works and the temporality of the established fronts.

The fronts of the clearing must be as stable as possible, for which they will be given the appropriate slope and will be protected from the action of the waters, by building guard gutters for runoff waters and drains for infiltration waters.

A safety berm must be kept between the foot of the stripping and the head of the operating front to prevent any detachment of the coating from falling on the holding and to allow for the resumption of the stripping work in sufficient safety conditions in due course.

Where, for reasons of thickness, a differentiated stripping operation is not carried out, the coating material shall be considered to be integrated into the design and operating system.

5. EXTRACTION LABORES

5.1 Drilling and blasting

Drilling for the explosive charge will be carried out according to the blasting project approved and executed in order to obtain sanitized fronts avoiding as much as possible the need for foot blasts and secondary chopping.

The blasting shall be carried out in accordance with the requirements laid down in ITC SM-IND-25 of the Mining Safety Regulations.

The operator of the drilling rig must know the work area, its specific conditions and risks, as well as the characteristics of the material to be drilled. The equipment shall be placed in a stable position, avoiding or correcting slopes and sliding surfaces.

Equipment must be braked or locked to prevent movement during drilling. The arm or arms shall be positioned in such a way that their balance is optimal.

The conditions for assembly, use and maintenance defined by the drilling equipment manufacturer must be respected.

In the case of displacement of compressors, suitable means of traction shall be used, mainly if the terrain is rough or if the weight is excessive to be towed manually. Once in the workplace, the compressor shall be placed in a safe location, without the risk of slippage.

5.2 Block extraction and cutting

The mechanical cutting of blocks shall be carried out as set out in the operating project and the corresponding internal safety arrangement (hereinafter referred to as 'DIS').

The operator must know the conditions and characteristics of the material to be cut and will place the equipment and its accessories in a stable way and outside the influence of any other installation.

A DIS will regulate the demolition of the blocks, as well as the work of the personnel at the foot of the banks and blocks or uploaded to them, paying special attention to the existence of cracks and the elements of protection against falls from height.

The work or permanence of personnel outside the operation in the vicinity of the loader blades when working in the extraction of blocks is prohibited.

5.3 Saneo

Before starting the work, it is necessary to inspect the exploitation fronts, making sure that there are no unstable rock masses and carry out, if necessary, their sanitation.

Inspection and sanitation shall be carried out in accordance with the provisions of the relevant DIS.

Sanitation must necessarily be carried out in the affected areas in the following cases:

- After heavy rain, frost or snowfall.
- When there has been the detachment of important masses of rock.
- After every blast.
- After a long stop.

5.4 Drainage

When operating operations fall below the water table, the water table shall be depressed if the maintenance of slope stability or the operating method used so provides. If water at the water table is likely to affect the slope of the excavation, water monitoring systems shall be established at risk sites.

In case of significant presence of water, the slope drainage method shall be defined.

If the exploitation front cuts an aquifer, the groundwater pressure of the aquifer must be reduced by appropriate drainage measures, so as to ensure the stability of the slope and prevent the collapse of the disintegrable layers.

Access to the exploitation of surface run-off water shall be avoided, for which the necessary, suitably arranged guard gutters shall be constructed.

In all places and work platforms, provision should be made for the natural evacuation of rainwater or infiltrated waters, or for their collection and deposit and subsequent pumping.

6. LOADING AND TRANSPORTATION

6.1 Loading

Loading equipment shall be positioned in relation to the working front so that the loading operation can be carried out safely. To this end, the shovel loader and the tipper in the loading sequence shall be positioned as far apart as possible from the front, the tipper being positioned, whenever possible, in the normal direction of the tipper and with its cab in the position furthest from it.

Loading of the dumps must be carried out on the side or rear of the dumps, without the spoon passing over the cab.

During loading, the driver may not leave or return to the cab without prior warning to the loader operator.

For dumpers, the maximum load laid down by the manufacturer shall not be exceeded. The risk of falling material from the box, especially from blocks, should be avoided. To do this, whenever possible, a first bucket with fine material will be loaded and the load will be rationally distributed in the dump box.

When stockpiling equipment is loaded, appropriate precautions must be taken to avoid collapsing stockpiles which could cause accidents.

6.2 Dumping

A DIS shall be established for the discharge, with indications of access, place and form.

When there is a danger of falling or overturning in the discharge, the use of a stop or barrier that is difficult to cross under normal working conditions shall be mandatory. If necessary, the discharge shall be made under the direction of a qualified person designated for that purpose.

Dumping of sterile materials and the collection of useful materials in the vicinity of operating fronts, runways and accesses are prohibited. In the case of holdings with transfer, a safety berm shall be maintained between the sterile collections and the front of the holding. The width of this berm shall be a function of the height and slope of the collection with a minimum of 3 m.

In the absence or defect of natural illumination, artificial illumination of the discharge points shall be mandatory.

6.3 Traffic regulation and signalling

A DIS shall be established for traffic regulation and related signalling.

This DIS shall indicate the maximum speeds allowed for each type of vehicle, the parking and parking conditions, priority rules for the various vehicles, rules for night work where applicable, warning and signal systems in force, pedestrian crossings, as well as any additional information that

is necessary and shall be established not only for permanent or semi-permanent roads, but also for operating blocks.

The entry of any non-operating vehicle shall be prohibited unless it is expressly authorised and informed of the rules and conduct to be followed.

The signs to be established shall be easy to see and interpret and shall be preserved and maintained for as long as the conditions that determined the necessity or appropriateness of their placement persist.

6.4 Parking

The traffic regulation DIS shall also regulate the conditions of parking or detention.

When he interrupts or finishes his work, the driver of a vehicle or mobile mining machinery operator must stop him in a place that does not hinder traffic and work, on firm ground and as flat as possible, preventing any risk of unforeseen displacement. Wheeled vehicles shall be left with the parking brake actuated, shovel buckets and dumper boxes lowered.

If the terrain is sloped, it shall be ensured by precise means that the vehicle or machinery cannot slide, if possible, by placing it on an edge or slope that serves as a stop, preventing its displacement. Wheeled vehicles shall, if necessary, be suitably left with footwear.

Off-duty vehicles and machinery must be parked in such a way that they do not hinder traffic, placing them in an expressly designated area and complying with the security measures established.

When a vehicle or machine is immobilized due to a breakdown in a place of circulation, it must be signposted in accordance with the internal traffic regulation safety provision.

6.5 Transport of personnel

Vehicles used for the transport or movement of personnel must comply with the technical conditions required by the general traffic and road safety regulations in force for this type of vehicle.

In addition, they must be easily identifiable and equipped with acoustic and/or optical warning devices to indicate their presence.

If vehicles not specifically intended for this purpose are used for the movement of staff on the farm, they shall have seats and safety belts, and transport must be carried out in accordance with the safety rules previously established, in compliance with the requirements of the general traffic and road safety regulations in force.

7. MACHINERY

7.1 Operators and drivers

7.1.1. Machine operators

The operation of mobile mining machinery can only be carried out by operators over 18 years of age, who have received the necessary instruction, and know the performance, normal maintenance and limitations of the machine.

The provisions of ITC SM-IND-11 shall also be complied with.

7.1.2. Transport vehicle drivers

Drivers of personnel transport vehicles shall hold a driving licence in accordance with the type of vehicle issued by the traffic authority.

7.2 Use of vehicles and machines

The driver of a vehicle or operator of mobile mining machinery shall examine and check it at the beginning of each shift before putting it into use. If you notice a defect, you must notify the appropriate party immediately, in accordance with the procedure set out in the corresponding DIS. If it is a defect that constitutes a circumstance of insecurity, the driver must not start the work and will stop the machine or vehicle if this circumstance occurs during the work.

The manufacturer's user manual for each vehicle and machine must be accessible at the workplace and written in Spanish.

The loading machines will attack the material in a position perpendicular to the working front, positioning themselves so that they are protected by the bucket or spoon from any unforeseen detachment. Similarly, when a bulldozer or shovel loader works on a platform, access or track, near the edge of a slope, it must approach it in forward motion and remain perpendicular to the edge, to avoid that a possible sinking of the slope caused by the weight of the machinery implies the overturning of the latter.

Maneuvers or works close to a slope edge shall be carried out with the machine perpendicular to the above edge. The corresponding DIS shall define the safety distances at the edge of the slope for each type of operation and type of machine, in order to ensure its stability, depending on the consistency of the terrain and the working slope.

The operations carried out on the slope itself will be carried out on trajectories on the line of maximum slope or as close to it.

A system of warnings and signals will be defined for all those operations or maneuvers with mobile mining machinery that may generate specific risks. This signal system will be known to all those operators who can work in the environment or in the vicinity of the machine. In the event of imminent danger, personnel working in the environment shall be warned against the pre-established signs and, if necessary, stop the vehicle or machinery.

Before commencing any manoeuvre of a vehicle or mobile equipment, the driver or operator shall strictly follow the established system of warnings or signals.

The presence of personnel in the area of action of any mobile mining machinery is prohibited, provided that it is in operation. Machines shall have clearly visible inscriptions, prohibiting such approach.

7.3 Repairs, servicing and maintenance of vehicles and machines

Repairs, overhauls and maintenance of vehicles and machines shall comply with ITC SM-IND-10.

A DIS shall define the programme and rules for carrying out repairs, maintenance and overhauls of the vehicles and machines of the operation, which shall always be carried out in accordance with the manufacturer's instructions.

All vehicles and machinery on a farm shall be checked according to the scope and frequency set by the DIS. In addition, and in accordance with the conditions of use and operation, the necessary additional checks shall be carried out.

The DIS will also collect the creation and maintenance of a register for each vehicle and machine, in which the interventions made to carry out repairs, maintenance and revisions will be recorded, which will be available to the Mining Authority.

When a vehicle or machine is repaired or maintained, it must be immobilised in a safe place in accordance with parking rules.

During the course of a repair, all components and components whose untimely displacement may

present a hazard must be interlocked or restrained.

Especially when it is necessary to work on a tipper or loader with the box or spoon raised, these will be immobilized by a permanent fixation device.

A DIS will regulate the tire swelling procedure.

When a machine is raised for repair, the cat must be on firm ground and positioned properly. When work is to be carried out under the machine, the machine must be on the road.

Refuelling of vehicles and machinery which are not prepared for refuelling in operation shall be carried out with the engine stationary and the electrical circuits disconnected, away from elements which may cause sparks or flames.

Fuel spillage on hot surfaces shall be avoided. In any case, the spilled fuel will be cleaned before starting the engine.

It is prohibited to use open flame devices in the refuelling or fuel storage area. Visible signs indicating this prohibition shall be affixed to refuelling or fuel storage facilities.

Flammable substances must be in containers with inscriptions that warn of the content and its dangerousness and stored in suitable places. Only recommended solvents shall be used, never flammable solvents.

Welding and cutting with torch should be carried out with due precautions and following the DIS for this purpose, when carried out on hazardous parts, such as fuel tanks and hydraulic systems.

Repairs, maintenance and revisions can be carried out in a workshop of the operation, if the provisions of the ITC SM-IND-10 are complied with.

7.4 Trailer and transport of equipment

Towing of vehicles and machinery shall be carried out with the aid of sufficiently sized bars or cables attached to the towing devices. It is prohibited to use it to move.

Vehicles and machinery may not be towed with cables, unless their brakes and steering gear can be used.

In cases where the coupling is not fully reliable, safety chains shall be used.

When the manufacturer sets the maximum speed at which a vehicle or machine can be towed, it shall not be exceeded. As a general rule, the towing speed on tracks and accesses shall not exceed 7 km/h.

Staff are prohibited from being in the vicinity of, or using, the cable or towbar to move around.

When a loading or unloading ramp is used to bring a machine into a transport gondola, care should be taken to ensure that the operation is carried out in a level area. The ramps must be resistant, well positioned and fixed, with a surface that facilitates traction and hinders uncontrolled landslides. For the same purpose, wheels and tracks should be cleaned of mud, snow, etc.

The transport vehicle must be locked to prevent it from moving during the loading operation. The load shall be fixed in such a way as to avoid displacement during transport.

8. VARIOUS

8.1 Access and movement of personnel

The entire holding must be properly marked and, if necessary, all or part of the holding must be enclosed.

In open-cast works, the entry and permanence of any person outside the holding who does not have express authorization to do so is prohibited.

In normal operations in working areas, staff shall in any case be kept at a distance of more than 5 metres from the loaded dumpers. The access of the driver or maintenance personnel must be done at the front, taking care of the possible fall of stones from the box.

To leave or access a machine, stirrups will always be used. Access or descent of running machines is prohibited.

No person shall work under a lift tipper, loading spoon or similar equipment, or be located in the hinge area of articulated vehicles, unless properly secured independently of normal operating controls.

The movement of personnel between the various work areas shall be carried out by means of safe and easily practicable access.

The presence of staff on foot along runways and pits must be limited to the minimum necessary.

On the tracks, pedestrians will remain on the opposite side of the traffic of vehicles, trying to make themselves visible to the driver of the vehicle that is coming towards them.

On the runways and accesses provided with shoulder for the movement of personnel, the latter must circulate through it.

Teams carrying out work on the runways must sufficiently signal their presence.

All personnel performing work in the vicinity of machinery or vehicle transit zones shall be provided with appropriate reflective clothing.

8.2 Dust prevention

With regard to dust prevention and protection, the requirements set out in ITC SM-PRL-07 shall be met.

8.3 Work in the vicinity of overhead power lines

The crossing of machinery or vehicles under overhead power lines shall not be permitted except for specially prepared points, where the requirements imposed by the regulation of high-voltage overhead lines, in terms of types of supports, moorings and distances on the ground, shall be met.

Also, 25 meters before the crossing signs or well visible signs will be placed, warning said crossing and remembering the prohibition of driving with the box raised in the case of dumps, or with any type of tool or tool deployed.

The usual tracks or passages of vehicles running parallel to overhead lines shall maintain a distance from them of 15 metres, measured horizontally between the axis of the line and the edge of the roadway and perpendicular to it.

Within the area delimited by a distance of 10 meters on each side of the axis of the line, measured on the horizontal plant, the presence of machinery and the performance of work with the line in tension is prohibited. The line shall be disconnected and grounded for occasional work in that area; every precaution shall be taken to avoid an error of coordination between such manoeuvres and the

performance of the work. If disconnection is not possible and exceptionally, an internal safety arrangement shall be drawn up for possible work to be carried out in this area, provided that the minimum distance (d) measured in metres between the deployed machinery and the overhead line is:

$$d = 4 + \frac{U(kV)}{100}$$

and the work is carried out under continuous supervision.

8.4 Percussion work

When percussion work is carried out to break rocks, these must be carried out in such a way that there is no risk of injury from projections.

8.5 Recognition of tasks and actions

A DIS shall regulate the inspection procedure of the working areas and fronts of exploitation after a prolonged stop, and shall record this inspection in writing.

Where there is a risk of falling or falling stones, banks should be surveyed at least daily.

Personnel shall not be allowed to remain in the vicinity of a slope or bank where there is a risk of slipping or detachment.

As often as determined, the head and foot of the front of the holding where the work is being carried out shall be inspected for cracks that may indicate the danger of earthmoving. These cracked areas shall be properly marked or fenced.

Measures shall be taken to keep personnel away from hazardous areas that are not in operation. Hazard signals or separation fences shall be placed.

Any worker who has noticed a danger in any part of the work that cannot be easily and quickly remedied by himself must inform the person responsible for the work, who will take the measures he deems appropriate to remedy it and, if he deems it appropriate, will order the withdrawal of the personnel concerned.

ITC SM-IND-15 UNDERGROUND LABORES. DRAFT HOLDING

1. OBJECT.

This Supplementary Technical Instruction (hereinafter "ITC") aims to regulate the minimum content of the project for the exploitation of underground extractive activities, in development of Article 28.2 of the Mining Safety Regulation.

2. BASIC STRUCTURE.

Each project will contain the following basic structure.

- DOCUMENT 1: Memory.
- DOCUMENT 2: Budget.
- DOCUMENT 3: Plans.
- DOCUMENT 4: Technical specifications.

2.1 Memory.

The project report shall justify the totality of the work planned and shall include at least the following headings:

a) Introduction and justification of the project.

b) Geographical location of the holding.

c) Basic studies of the site and the area to be exploited. This section shall at least set out the relevant studies and data under the following headings:

   i. Geological studies and research carried out.

   ii. A hydrogeological study with the required detail according to the type, the dimensions of the exploitation and the importance of the aquifer contributions.

   iii. A geotechnical study, which defines the characterization of the rock mass of the underground work.

d) Method of operation and support: In this section, the project will cover at least the following aspects:

   i. Description of the method of operation and type of support chosen according to the type and characteristics of the deposit, specifying the fundamental operations of grubbing-up, loading and transport.

   ii. Determination of the type and number of machines necessary for all the operations to be carried out, as well as the necessary human resources.

   iii. Disposition of the sterile, justifying its location.

e) Temporary suspension and abandonment plan: This section will detail the measures and actions planned to ensure the safety of people and goods and the protection of the environment in the event of suspension, partial abandonment or total abandonment of work.

f) List of detail projects.

g) Economic viability of the project.

2.1.1 **List of detail projects.**

The projects of those infrastructures that are required for the development of the underground extractive activity and, especially, those that require authorization by the Mining Authority will be included.

a) Project of ventilation of the farm, with the minimum content to be developed:
    i. Ventilation schemes
    ii. Calculation of the required air flow rate
    iii. Determination of the equivalent orifice and calculation of resistances
    iv. Calculation of the ventilation network
    v. Features and installation of main fans
    vi. Considerations, if any, on secondary ventilation
b) Support project, according to ITC SM-IND-19.
c) Electrical installations project.
d) Auxiliary facilities project: Such as compressed air and water distribution network, transport elements, extraction, communication systems, storage of chemicals, and, where appropriate, drainage.
e) Building project of the different dependencies: This shall include, where appropriate, first-aid facilities and hygienic and sanitary facilities.
f) Associated Benefit Establishment Project: Along with the construction details of fixed machines and installations, basic flow schemes describing the process will be included.
g) Project for the installation of machinery for the transport of personnel on trains towed by locomotives, which must include at least the rules of operation and use, the routes, indicating the sections of the galleries and the gauges of the rolling stock and the mechanical and electrical characteristics of the equipment used.
h) Project of blasts, if applicable, according to ITC SM-IND-24.

2.1.2 **Specific environmental conditions.**

Specific risks shall be identified, such as:

i. Grey or other flammable gases
ii. Autocombustions
iii. Flammable powders
iv. Sudden detachment of grisu
v. Ground hits
vi. Water Avenues
vii. Breathable powder

2.1.3 **Signalling.**

The signage to be installed and maintained to facilitate the guidance of personnel in mining work will also be reviewed. Such signs must comply with the provisions of Royal Decree 485/1997 on minimum requirements for safety and health signs at work

2.1.4 Reference to the organization of evacuation and rescue.

Plan of emergency of the exploitation, with special development of the following aspects:

i. Precautions regarding flammable materials to be introduced into the mine and the storage of chemicals in accordance with regulatory provisions.

ii. Emergency lighting.

iii. Emergency communications: The acoustic and optical systems to be used for warning in all the tasks occupied by workers will be reviewed.

iv. Evacuation and rescue measures: They will be related in the emergency plan to implement, with special rigor, the self-rescue equipment available and its location in specific places for emergencies. It shall also outline the rescue organisation's expectation of having adequate qualified staff and intervention equipment.

2.2 Budget.

The budget will include the description of the different items with their unit prices, the evaluation of the studies to be carried out and the total cost of the project.

The economic valuation of the project will be detailed and the expected expenses for the execution of the project will be quantified and, in particular, the disaggregated items destined to the security measures.

2.3 Plans.

The project plans shall be complete and sufficient and shall include all necessary information on the details reflected therein. The plans on which the ground where the underground work and other auxiliary services of the exploitation will be located are represented, will incorporate the references of the official cartography.

The plans of the project will be made on a scale, and in such a way, that it will be possible to define the details of the accesses, galleries, fronts of exploitation, wells and inclined planes, heaps and other facilities and dependencies, with sufficient precision.

The plans necessary to accurately represent the work planned according to each type of holding will be included in the project. As a rule, at least the following drawings shall be included:

i. Geographical location plan.

ii. General topography map.

iii. Detailed topography plan.

iv. Geological map/geotechnical map of the area of exploitation and area of influence.

v. General tasks: in which the work carried out, including abandoned work, which shall be clearly distinguished, and the work carried out, shall be represented. Among the abandoned ones will be indicated the inaccessible ones. If there is a well-founded suspicion of old work not included in the available plans, the owner of the holding shall take the necessary preventive measures, carrying out, if deemed necessary, reconnaissance work.

vi. Detail of areas, tasks and barracks.

vii. General ventilation and environmental control system: will be carried out in accordance with what is required in the section corresponding to Ventilation.

viii. General and detail of the support.

ix. General and detail of the electrical network.

x. General and compressed air detail.

xi. General and detail of internal communications: the general internal communications plan shall include the fixed installations of that communications network.

xii. General and detail of water network (service and drainage).

xiii. General and transport detail.

xiv. General of exteriors.

xv. Plan detail of the establishment of associated benefit and related works. Plant, elevation and sections sufficient to clearly define the mining-industrial facility and its associated services.

xvi. Plans of the accesses to places that are considered necessary for the inspection and monitoring of the work.

2.4 Technical specifications.

The technical specifications shall contain the general descriptions of the work to be carried out, the characteristics of the materials to be used and equipment and the method of implementation, referring to the rules and regulations to be complied with at each stage of the project.

2.4.1 **Annexes and calculations.**

It includes the necessary calculations, both for the incorporation of relevant aspects of the project, as well as for the extension of ends considered in the memory and, in particular, associated with the aspects that may affect the security measures.

The following will be developed, among others that are specifically relevant:

i. Calculations of ventilation networks.

ii. Support calculations.

iii. Calculations of equipment and extraction elements.

iv. Electrical calculations.

v. Circulation schemes and/or boarding circuits: The circuits and means of circulation of minerals, debris, materials and supplies, as well as those of access, circulation and exits of personnel, both in normal situation and in case of emergencies, will be defined in detail. The means of checking the presence of personnel inside the mine shall be specified. In the case of the use of mechanical means of transporting personnel, the requirements necessary for their use and maintenance shall be specified. The gauges and gradients of the galleries shall be determined in relation to the movement of personnel and the maximum dimensions of the transport vehicles.

vi. Calculations for the application of special techniques.

2.4.2 **List of equipment and machinery.**

The equipment and machinery to be used shall be included, indicating their conditions of use and places of use.

To the general list, the equipment of underground mining will be added, such as:

i. Extraction machines.

ii. Mechanized drilling equipment for advance and exploitation work.

iii. Machined starter equipment and transport for operating tasks.

iv. Support equipment, types to use.

v. Gas measurement and control equipment.

vi. Electrical equipment.

3. ADDITIONAL CONTENT FOR MINES WITH GASODYNAMIC PHENOMES, SELF-COMBUSTIONS AND WATER AVENUES.

The project of exploitation shall include the headings corresponding to the security measures to be taken, where appropriate, against each of the following risks:

i. Gasodynamic phenomena. Instant detachments.

ii. Autocombustions.

iii. Water avenues.

3.1. Gasodynamic phenomena. Instant detachments. Rock detachments.

A distinction must be made between estimates of sudden gas detachments or detachments accompanied by abundant coal and, where appropriate, rock projections. Also, if the gas detachments produced are of grisu or other gases, mainly CO2.

The method of exploitation shall specify the measures to be taken to limit the risk of instantaneous detachment, justifying the reasons for its application.

As prevention measures, those that apply shall be described among the following:

i. Pressure-releasing probes and determination of the optimum diameter.

ii. Shots of shock: In this case, precautions must be taken regarding the amount of explosives and the absence of personnel in the return circuits.

iii. Shots of shock with high risk of causing instant detachment: They'll shoot from the outside. If fired from the inside, double-door shelters powered by compressed air will be built for gunners and, in any case, to an empty mine. Sufficient time shall be allowed to elapse before visiting the fronts for the measurement of grisu and procedures using teleindicator seismographs and grisuometers shall be described.

iv. Drainage with long holes.

v. Detection of noises in the rock. Geophones are used to pick up and expand signals. The techniques for locating the noise source shall be detailed.

vi. Microseismic techniques for the study of microruids in the rocky massif.

3.2. Autocombustions.

Describe:

a) General measures to be taken into account when carrying out work in fire-prone jobs.

   i. You're fighting fires.

   ii. Warning of alarm and withdrawal of personnel.

   iii. Staff protection measures.

b) Measures to be taken into account when carrying out work in tasks with a moderate level of

risk.

c) Measures to be taken into account when carrying out work in tasks with a high level of risk.

The project will collect the areas with the different levels of risk classification that are established in the ITC SM-IND-20.

3.3. Water avenues.

The normal drainage operations of the mine must be differentiated from the risks due to the foreseeable or sudden contribution of waterways of greater flow than the usual one foreseen in the drainage stations, such as communication with areas with accumulation of water in old works, cut of hanging water, etc.

First, in the hydrogeological study that must accompany the general exploitation project, the measures to be taken to determine the possible influence of the aquifers of the area and prevent the entry of water to the exploitation, for the evacuation, where appropriate, of the same.

At least the following should be added to these measures:

a) The regulation of river courses, whose waterways can transcend inland.

b) Coating of the wells.

c) Cementation of aquifer areas.

d) Use, where appropriate, of backfilling on holdings.

e) In the case of hanging water risk:

i. Water from other abandoned works, or even from the surface or groundwater, shall be channelled and redirected, ensuring their total drainage.

ii. Particular attention shall be paid to fluctuations in the normal flow rate of the mine. Its decrease or cancellation can be an indication of accumulation of water that bursts abruptly.

iii. Tracing of reconnaissance probes to avoid water shocks.

iv. Drawing of soundings to the roof benches, especially in layers of coal, to remove water and avoid the load of the roofs of the workshops.

v. Placement of partitions or insulation closures. For these closures, which sometimes have to withstand high pressures, their type, thickness, usually in successive rings, material, factory work, concrete and its calculation, which will be based on the following basic points, must be detailed:

- That the efforts transmitted to the ground can be supported by it.
- That they are strong enough to withstand the stresses that originate in their own mass.
- Construction, in certain cases, of a provisional closure with filling of the land intended to eliminate infiltrations during the construction of the definitive closure.
- Fitting of valve pipes with pressure control that allows water to escape during concreting or the restoration of the outlet in cases of closure fatigue or if the evolution of pressure makes it necessary.

ITC SM-IND-16 SUBTERRANEAN LABORES. CLASSIFICATION

1. OBJECT.

The purpose of this Supplementary Technical Instruction (hereinafter referred to as 'ITC') is to establish the general requirements for the classification of underground work, pursuant to Article 29(2) of the Mining Safety Regulation.

2. GENERAL REQUIREMENTS REGARDING THE CLASSIFICATION OF SUBTERRANEAN LABORES.

Underground extractive work shall be classified by the Mining Authority with respect to grisu or other combustible gases, flammable dusts and the risk of propensity to fire.

Where other combustible gases than grisu are present in underground extractive works, the Mining Authority shall classify them in one of the categories provided for that gas and, if necessary, shall lay down special rules to achieve safety levels similar to those of grey works, taking into account the explosive limit concentrations and the minimum flash temperatures of the detached gases.

Likewise, the corresponding Mining Authority will proceed to the classification, when they coexist, with the grisu, either other combustible gases or risk of propensity to fire. In addition, the employer must assess the risk from waterways.

2.1 Division of mines into barracks and their classification.

Mines may be divided into separate barracks, which may be classified into different categories. The division into barracks shall be established by the Mining Authority.

Two barracks shall be considered independent when they have only in common, from the point of view of ventilation, main air inlet and outlet galleries. A common air return to several independent barracks shall be considered to be part of the most dangerous sorting barracks.

In no case may first-class barracks coexist with other barracks of different categories.

All mine personnel shall be duly informed of the classification of the various mine barracks, which shall be duly marked.

2.2 Classification of new underground work.

Any new underground work will be classified with the authorization of the exploitation project by the Mining Authority, which will take into account the nature of the ore exploited, the geological characteristics of the deposit, the history of other mines in the basin and the analogy with other similar mines.

This classification should be considered as provisional, until the development of the work allows to act with greater knowledge of the cause to proceed to the definitive classification. This provisional classification shall not exceed one year. However, if classified, during the provisional period, the Mining Authority may prescribe additional mediations that allow a correct definitive classification.

2.3 Communication of variations in the conditions that motivated the classification.

The operator of a mine classified in a certain category is obliged to give immediate notice to the Mining Authority when the conditions that motivated that classification vary and in the event of any fire-related incident or significant variation of the conditions that could alter the classification of the work.

2.4 Review of the classification of a mine or area.

The Mining Authority, as a result of the data communicated to it according to the previous section or obtained from periodic checks or measures, or of which it may especially order, may review the classification of a mine or area thereof.

Likewise, the entrepreneur may request the Mining Authority to review the classification of a certain mine or area thereof.

3. CLASSIFICATION OF SUBTERRANEAN EXTRACTIVE LABORES WITH RESPECT TO THE RISK OF GRISUS AND OTHERS.

3.1. Classification of mines or areas with grisu or other flammable gases.

Mines or areas into which they are divided, and underground extractive work in general, in which the existence of grisu or other flammable gases is possible, shall be classified in one of the following three categories:

a) No grisu or first class: Those in which no grisu or other flammable gases have been presented. The classification of a coal mine in this category should be considered as exceptional and especially when it has mechanized slits. In addition to the absence of flammable gases, account shall be taken of the improbability of the presence of flammable gases due to reservoir conditions.

b) Weakly greyish or second category: Those in which they can detach in reduced quantity grisu or other flammable gases.

c) Strongly grey or third category: Those in which, in large quantities, grisu or other flammable gases can be detached or in which, suddenly and massively, grisu or other flammable gases can be detached, causing the violent carry-over of significant quantities of ore or their embedded rocks.

In any case, the following shall be considered to be strongly greyish or of a third category:

i. Mines or separate areas where the grey content in the overall air return is greater than 0,5 %.

ii. Mines or independent areas where the grisu is regularly and abundantly detached, so that explosive concentrations are reached in the environment after one hour of stoppage of ventilation and activity.

iii. Mines or areas or works in which, due to the poor mechanical consistency of the ore and due to the effect of gravity, there are detachments of the ore that release such quantities of grisu that its accumulation exceeds contents of 2,5 %, even momentarily.

3.2. Request for cancellation of classification as a grey mine.

If the mine is classified as weakly grey or strongly grey, and would like to be classified as non-grey, the entrepreneur must apply to the Mining Authority, accompanied by a list of the surveys and tests carried out during a period of at least one year, accompanied for this purpose by the corresponding technical justification.

The Mining Authority, in the light of all the information it can gather, and after verifying, paralysing the ventilation of the mine for twenty-four hours, the gray content of different tasks every two hours, will issue its final decision.

3.3. Demonstrations of grisu or flammable gas in top-notch mines.

At the moment when in a mine or area classified in first category a manifestation, however small, of grisu or other flammable gas is presented, the entrepreneur must communicate it within 24 hours to the Mining Authority, which from that moment will consider the mine as of second category and will prescribe that it submit to the following observations:

a) Recognition and verification by the Mining Authority of gases and the atmosphere of the mine or area, especially in the places where the first demonstrations took place and under the same conditions as are required for gray mines.

b) Special monitoring of the atmosphere in research and preparation work, mainly in the vicinity of faults, other geological accidents and old mines.

c) Establishment of interim security measures and deadlines for implementation.

The review and monitoring period shall have a maximum duration of one year, during which, if such demonstrations are maintained or aggravated, the Mining Authority shall maintain the classification of the mine. If no manifestations of flammable gases have occurred during the one-year review and monitoring period, the Mining Authority may reclassify the mine as first class.

3.4. Communication of incidents that can be considered as instantaneous detachment.

The entrepreneur is obliged to report to the Mining Authority, within 24 hours, any incident in which the existence of instantaneous detachment may be suspected and any abnormal manifestation that may announce such incidents, such as projections or displacements of the layer, or sudden and massive releases of gas, whether or not it causes personal misfortunes.

From that moment, the Mining Authority will declare the mine, barracks or layer where the incident has occurred, as a suspect, and a review and monitoring period will open, of a maximum duration of one year, during which the Mining Authority will require the exploitation requirements and the surveillance measures it deems appropriate, as well as the realization of a technical study leading to the determination of the nature and causes of the phenomena that have occurred.

If demonstrations continue or worsen during this monitoring period, the Mining Authority will classify the mine or barracks in the third category. It may also eliminate the surveillance period when it has sufficient evidence that it is an instantaneous detachment, in which case it shall proceed immediately to this classification.

If during the monitoring period there is no further demonstration, but the studies carried out suspect that it may have been due to a sudden gas detachment, the mine will be declared as suspicious, being subject to the rules of exploitation and surveillance dictated by the Mining Authority.

3.5. Request for declassification as a mine with instantaneous landslides.

If the operator of a mine or area classified as a third category intends to declassify it, a monitoring period of not less than two years shall be established, at the end of which the Mining Authority shall decide.

3.6. Additional requirements for first-class coal mines.

In first-class coal mines, it is strictly forbidden to introduce matches, lighters and smoking effects inside the mine, except for exceptions described and processed in the document on safety and health.

3.7. Special case of integral mechanization of farms.

In the case of exploitation projects with integral mechanization, understood as such the grubbing plus support, or others that the Mining Authority considers, will be classified as at least, second category.

4. CLASSIFICATION AS MINES OR ROOMS WITH FLAMMABLE POWDER.

Mines or barracks with flammable dusts are those that explode fuel whose dusts are capable of producing or propagating an explosion. In any case, all underground coal mines will be considered by the Mining Authority as work at risk of dust explosion.

Classified in this category are those which have:

a) A volatile matter content of more than 12 %, if the mine or barracks is classified as grey.

b) A volatile matter content of more than 16 %, if the mine or barracks is classified as non-grey.

Sampling to determine the composition of the dust shall be carried out at different points on the floor, ceiling and walls, at a gallery length of not less than 50 metres and for analysis purposes shall be determined free of moisture, carbon dioxide and ash.

Notwithstanding the foregoing, mines, barracks or sites with a risk of dust explosion shall not be considered to be those where the dust is effectively neutralised by the natural conditions of the mine, for example, because it is in the form of mud or when it is in such quantity that, dispersed in the atmosphere, it does not give rise to a sufficient concentration for the explosion to occur, or where experience or studies carried out at an officially recognised test station show that the dust is not capable of spreading the explosion. The Mining Authority shall determine the mines, barracks or sites to be considered hazardous. The employer must give an account when the conditions that gave rise to the classification vary.

The level of risk shall be determined as a result of the employer's assessment of the flammability and explosiveness of coal and the likelihood of the formation of explosive atmospheres in accordance with the headings of this technical instruction.

4.1. Determination of the risk index.

The dust explosion risk index of a mining operation is determined taking into account the characteristics of the coal itself and those of the operation. The characteristics of the coal itself are evaluated in terms of flammability and explosion severity using the explosiveness index defined at the point.

The characteristics of the holding are evaluated in terms of the probability of formation of an explosive atmosphere, using the procedure described in point 4.3 of this technical instruction.

The risk index refers to the different tasks and layers of a farm, being assignable to each type of work a different index within the same farm. It corresponds to the conditions existing at the time of the assessment, which must be representative of the normal conditions of the holding. If there are significant changes in the characteristics of the coal or in the operating conditions, a reassessment shall be carried out and notified to the Mining Authority.

This risk index is quantified from lowest to highest at the following five levels: trivial risk, low risk, moderate risk, significant risk and severe risk. These levels are obtained by applying Table 1, once the explosiveness of the coal has been calculated and the probability of explosive atmosphere has been evaluated.

TABLE 1

Determination of the level of risk

Probability of explosive atmosphere	*Coal Explosivity*		
	Low explosiveness	*Medium explosiveness*	*High explosiveness*
LOW	Trivial risk	Low risk	Moderate risk
MEDIA	Low risk	Moderate risk	Significant risk
HIGH	Moderate risk	Significant risk	Severe risk

4.2. Explosiveness of coal.

The explosiveness characteristics of a coal are quantified based on the chemical index (IQ) and physical index (IF) at the following three levels: low explosiveness, medium explosiveness and high explosiveness.

4.2.1. Explosivity rates.

The chemical index (IQ) considers the chemical composition of coal, with special relevance to the volatile matter content. Based on the volatile matter content on dry ash-free basis (VSSC), the chemical index is evaluated as follows:

CHEMICAL INDEX (IQ)	Volatile matter content on dry ash-free basis (VSSC)
IQ = 0	VSSC < 9%
IQ = 1	9 % ≤ VSSC ≤ 14 %
IQ = 2	14% < VSSC

The physical index (FI) takes into account the characteristics of the sensitivity to charcoal inflammation (SI) and its explosion severity (SE). Sensitivity (SI) is assessed on the basis of the values obtained in the determination of the parameters minimum cloud ignition temperature (TMI_n), minimum explosive concentration (MEC) and minimum ignition energy (MIE), according to the following criterion:

INFLAMATION SENSIBILITY (SI = T + C + E)		
MIF_n	> 500 ° C	T = 0
MIF_n	≤ 500 ° C	T = 1
CME	> 150 g/m ^{3}	C = 0
CME	≤ 150 g/m ^{3}	C = 1
EMI	> 100 mJ	E = 0
EMI	≤ 100 mJ	E = 1

The explosion severity (SE) is evaluated on the basis of the characteristic constant K_{max}, according to the following criterion:

EXPLOSION SAFETY *(SE)*	
$K_{max} < 20$ bar m/s	*SE = 0*
20 bar m/s ≤ $K_{max} < 100$ bar m/s	*SE = 1*
100 bar m/s ≤ $K_{max} < 200$ bar	*SE = 2*
200 bar m/s ≤ K_{max}	*SE = 3*

Based on SI and SE, the physical index (IF) is valued:

PHYSICAL INDEX	Function of the sum between Inflammation Sensitivity and Explosion Severity (SI + SE)
IF = 0	(SI + SE) = 0
IF = 1	0 < (SI + SE) ≤ 3
IF = 2	3 < (SI + SE) ≤ 6

4.2.2. Explosiveness level of coal.

The level of explosiveness of coal shall be assessed on the basis of chemical and physical indices, establishing three levels of explosiveness: low, medium and high.

4.2.2.1. Low explosiveness.

The explosiveness of a coal is considered to be low when one of the following conditions is met:

a) The chemical index (IQ) is equal to 0 or

b) The chemical index (IQ) is less than or equal to 1 and the physical index (IF) is equal to 0.

4.2.2.2. Medium explosiveness.

The explosiveness of a coal is considered to be average when one of the following conditions is met:

a) The chemical index (IQ) is equal to 1 or

b) The chemical index (IQ) is less than or equal to 2 and the physical index (IF) is less than or equal to 1.

4.2.2.3. High explosiveness.

The explosiveness of a coal is considered to be high when one of the following conditions is met:

a) The chemical index (IQ) is equal to 2 o

b) The physical index (IF) is equal to 2.

4.3. Probability of explosive atmosphere.

To assess the likelihood of formation and existence of an explosive atmosphere by coal dust, four groups of farm characteristics shall be analysed:

i. Type and type of site.

ii. Dust accumulations.

iii. Coal dust conditions.

iv. Presence of grisu.

Each group of characteristics shall be evaluated independently, assigning a score of 0, 1 or 2 points, as specified in the following headings. The sum of the scores of the four groups, which shall be between 0 and 8 points, shall be applied to define the level of probability of formation of the explosive atmosphere of coal dust according to the following scale:

a) Low probability: the sum of the scores is between 0 and 2 points inclusive.

b) Average probability: the sum of the scores is between 3 and 5 points inclusive.

c) High probability: the sum of the scores is between 6 and 8 points, both inclusive.

In any case, work related to the exploitation of a layer of coal in which there is a history of explosion or explosions of coal dust occurring during the working of that layer, shall be considered with high probability.

4.3.1. Type and type of site.

The assessment shall be based on the following criterion:

a)	Start-up workshops or work in progress in coal		
i.	Manual start:		0
ii.	Machined start or loading with side-discharge shovel:		1
iii.	Explosive start-up or front-end loading or mechanised loading:	2	
b)	Galleries and access plans where coal is loaded, transported or transferred		
i.	Continuous transport:		0
ii.	Continuous transport:		1
iii.	Loading, transfer or transfer points:		2
c)	Other sites		
i.	There are no accumulations of coal or dust:	0	
ii.	There are accumulations of coal or dust:		1
iii.	Crushing systems are available:		2

4.3.2. Dust accumulations.

Accumulations refer to particles with an average size (d_{50}) less than 1 mm.

a) Thickness less than 5 mm: 0

b) For d_{50} greater than 0,5 mm

i. Thickness between 5 mm and 50 mm:
0

ii. Thickness of more than 50 mm:
1

c) For d_{50} less than or equal to 0,5 mm

i. Thickness between 5 mm and 50 mm:
1

ii. Thickness of more than 50 mm:
2

4.3.3. Coal dust conditions.

Moisture conditions the dispersibility of the dust, the following criterion being applicable:

a) Humidity content of coal greater than 50 %: 0

b) Humidity content between 10 % and 50 %: 1

c) Moisture content less than 10 %: 2

4.3.4. Presence of grisu.

The presence of grisu increases the sensitivity to ignition and aggravates the severity of explosion:

a) Mines without grisu:
0

b) Mines with grisu: 1

c) Mines with landslides: 2

4.3.5. Work in activity.

Work that is carried out after a current work already classified must retain the risk index corresponding to the closest work, provided that the same conditions of the exploitation and those of the work are maintained.

4.3.6. New jobs.

The exploitation of a new layer of coal or the opening of a mine is considered new work.

A classification according to the provisional risk index should be established, taking into account the explosiveness characteristics of the coal and the probability of explosive atmosphere of the intended work, taking into account the coal layer, the operating conditions and, where appropriate, the analogy with other similar mines in the same basin. This classification shall not last longer than one year.

5. CLASSIFICATION AS MINES OR FOURTHS WITH FUEGOS PROPENSION.

Mines or barracks with propensity to fires shall be classified as those in which there are references that the self-combustion of the ore or its embedded rocks occurs.

For the classification of a mine or barracks, the characteristics of the deposit (thickness of the layers, content of volatiles and sulphur, etc.) will be taken into account, together with those derived from the method and conditions of the exploitation (advancement or removal, filling or sinking, ventilation, etc.), with the frequency with which self-combustion occurs in these conditions being predominant.

In any case, mines or barracks where self-combustion occurs systematically when specific prevention or control measures are no longer applied shall be classified as fire-prone.

5.1. Categories.

All underground coal mining work must be classified by the Mining Authority into the following categories:

a) With a propensity for fires.

b) No propensity for fires.

Such classification may affect independent barracks or the entire mine. In the same mine can coexist independent barracks with different categories.

5.2. Risk levels.

Tasks classified as fire-prone should be assigned a risk level, applying the method described in the following point. The risk levels that are established are:

Level 2: High risk.

Level 1: Moderate risk.

Level 0: Low risk.

The work with the highest level of risk assigned will determine the level of risk of the independent barracks or mine to which it belongs.

The prevention rules applicable to work classified as fire-prone, according to the assigned level of risk, are specified in ITC SM-IND-20.

5.2.1.Determination of the level of risk.

The level of risk of the work classified as fire prone is determined from the IR Risk Index obtained from the characteristics of the work, which mainly participate in the generation of a fire according to Table 2.

TABLE 2

Determination of fire risk in fire-prone work

Basic mining parameters	Characteristics	Risk
1. Coal category.	Low rank. Medium and high range.	A B
2. Reactivity*.	I > 10 and S > 2 %. I ≤ 10 or S ≤ 2 %.	A
3. Friability (ET 16.01).	Stop it. Come down.	A
4. Power of the layer.	More than 4 m. Less than 4 m.	A
5. Geological anomalies, faults and	Frequent. They're short.	A
6. Nature of the hastials.	Weak/fracture materials. Resistant or consolidated.	A

7. Method of exploitation.	With sinking. Filling.	A
8. Working systems.	Cameras, pillars and sub-levels. Long front or short front.	A
9. Driving the farm.	Work in progress. Retirement work.	A
10. Degree of extraction.	Partial recovery. Almost complete recovery.	A B
11. Front forward speed**.	Slow down. Quickly.	A B
12. Ventilation.	v < 0.9 m/s. v ≥ 0.9 m/s.	A B
13. Humidity of coal work.	Wet work. Dry work.	A B
14. Accumulation of coal fines.	Present. Absent or scarce.	A
15. Massifs of protection of labors in coal.	Fractured. Resistant or consolidated.	A B

* I = Index of oxygenated water (ET 16.02).

S = Pyritic sulphur content, according to UNE 32009.

** This feature is related to the foreseeable time of exposure of the front coal to the ventilation current and its effects on self-combustion.

*5.2.2.Assignable risk levels***.**

Table 3 sets out the risk levels based on the Risk Index (RI) obtained.

TABLE 3

Risk levels

Risk index IR = f (∑A, ∑B)	Risk level
∑B = 0	2
∑A>∑B	1
∑A<∑B	0

However, the Mining Authority may assign risk level 2 to any risk level 1 work, depending on the frequency and consequences of the fires produced.

5.3. Classification.

5.3.1. Classification of work in activity.

In any mining operation, in which there are works previously classified as prone, the work that is carried out later in the same layer must retain the category and level of risk corresponding to the closest work, provided that the same conditions of the deposit and exploitation are maintained, otherwise a definitive classification is established. In no case shall this provisional classification last more than one year from the beginning of the exploitation work.

5.3.2. Classification of new tasks.

New work for classification purposes should be considered as work relating to the exploitation of a new layer of coal or the opening of a mine.

A provisional classification should be established, taking into account the nature of the coal to be mined, the result of laboratory tests, the geological characteristics of the site, the conditions under which the exploitation will take place according to the project submitted, and the analogy with other layers or similar mines in the same basin, all according to the exploitation project.

This provisional classification must be established until the data necessary for its definitive classification are available and will be valid for a maximum of one year from the beginning of the coal work.

5.3.3. Communication of variations.

The entrepreneur must notify the Mining Authority, any incident related to the fires or significant variation of the conditions that could alter the current classification of the work.

5.3.4. Review of classification.

The Mining Authority, as a result of the data provided by the entrepreneur and those obtained by the checks carried out, can review the classification of certain tasks.

5.3.4.1. Change to higher risk category or level.

The Mining Authority, after verifying that there are fires, or that there have been variations in the conditions that determine the level of risk, can reclassify a work in the first case, or assign a higher level of risk in the second.

5.3.4.2. Change to lower risk category or level.

Likewise, the entrepreneur can request the Mining Authority to review the classification of the tasks considered as prone to fires, or the change of the assigned risk level, to a lower one. In order for the Mining Authority to be able to review the classification, as far as the category is concerned, it is necessary for the entrepreneur to request it, accompanied by a supporting report that demonstrates that there have been no fires in a period of one year and that the variations in the conditions justify the decrease in the level of risk (variation of the Risk Index).

ET 16.01 DETERMINATION OF COAL FRIABILITY THROUGH TAMBOR TEST

1. OBJECT

The purpose of this Technical Specification is to define a test method for determining the relative friability of a classified coal, such friability being one of the parameters applied for the classification of fire-prone mines.

This method provides a means of measuring the tendency to break coal into small fragments when subjected to continuous handling in the mine, and should be considered as an appropriate means of determining the resemblance of coals to friability.

2. MEANING AND USE

This test provides a measure of the resistance of the carbon to breakage caused by impact and abrasion when the carbon fragments rub against each other and against the walls of the test apparatus.

3. APPARATUS

3.1. Porcelain Bottle Shaker

Consisting of a porcelain bottle of uniform internal dimensions: 184 mm in diameter and 184 mm in height, similar to those used in the spraying of carbon samples for analysis. The iron frame shown in Figure 1 shall be placed inside the bottle.

The two rings, a, shall have an outer diameter of 181 mm and shall be made of iron bands 19 mm wide and 3 mm thick. The three transverse bars, b, of dimensions 165 x 19 x 3 mm shall be fixed radially to the rings by means of small squares, c. The ends of the bars b must be flush with the outer edges of the side rings, a. The bars shall be fixed in such a way that there is a 15,9 mm separation between their outer edge and the outer surface of the ring. Rivets, not screws, shall be used in the construction of the frame. Since the commercially available bottles are not absolutely uniform in size, the dimensions of the frame can be slightly modified to suit individual cases.

The frame shall be fixed within the porcelain flask by wedges between the rings and the inner wall of the flask, so that its axis matches as satisfactorily as possible the axis of the flask. The bottle shall be closed by means of a porcelain lid with recess, resting on a hard rubber washer and hermetically sealed in accordance with the usual procedure for such bottles, i.e. by means of a bolt acting against the lid. The bolt shall be lodged in a strap the end of which shall be fastened by means of a metal band fixed around the bottle body. For stirring, the flask shall be left in a horizontal position on a suitable support and shall be informed of a rotational movement around its cylindrical axis at a speed of 40 rpm.

3.2. Steel jar shaker (optional)

The porcelain flask detailed in 3.1 can be replaced by a steel flask, provided that the internal dimensions are approximately respected (184 mm in diameter and 184 mm in height). A cast iron bottle, internally machined to the required dimensions, is recommended. In order for the bottle to be light enough for rotational movement, a wall thickness of not less than 6.35 mm is permitted, except at each end.

It is recommended that the closure system of the steel jar be of a similar design to that used in porcelain jars.

The wall of the iron bottle, at a distance of approximately 25,4 mm from the top, shall have a minimum thickness of 12,7 mm to correspond to that of the porcelain bottle; in order to allow the metal band to fit level, the bottom 25.4 mm **of the bottle shall also have a minimum thickness of 12.7 mm.**

3.3. Sieves

For sieving the test sample, square aperture sieves of nominal light size 35,5 mm and 25,0 mm shall be used. These sieves shall be fitted with frames of 305 x 762 mm or larger.

For sieving coal after stirring, square aperture sieves with the following nominal lamps shall be used: 25,0 mm; 18 mm; 12.5 mm; 9,00 mm; 1,12 mm and 0,280 mm. For this purpose 200 mm diameter metal frame sieves are suitable.

3.4. Scale

The balance used shall be accurate to 1 g.

4. SAMPLING

4.1. Sample collection

The sample shall be collected in accordance with the method given in UNE 32102-1 'Hard lignites, coals and anthracites. Sampling and preparation. Part 1. Sampling".

4.2. Sample preparation

1. Preliminary sieving of a representative portion, approximately 45 kg, of raw sample using square mesh sieves with 25,0 and 35,5 mm lamps.

   If this pre-screening indicates that pieces of coal smaller than 35.5 mm predominate, successive representative portions of the gross sample are screened until 11 kg of coal of size 25.0 - 35.5 mm are obtained.

   If most of the pieces obtained from preliminary sieving are greater than 35,5 mm, sift successively from representative portions of the gross sample to 23 kg of coal greater than 35,5 mm. The pieces thus obtained (>35.5 mm) are then broken with a hammer until they pass through the 35.5 mm sieve, avoiding as far as possible the production of pieces smaller than 25.0 mm. If the total amount of coal greater than 25,0 and less than 35,5 obtained by sieving before and after hammering is less than the required amount (11 kg), increase the amount by repeating the previous process, taking care to discard all the pieces in which breakages have developed during hammering.

   Care should also be taken to cover the full range of sizes within the 25.0-35.5 mm range in the 11 kg sample pool, and in each 1,000 g subsample of the test referred to in section 6. This can be achieved by using a 31.5 mm sieve to check that half the weight of the samples are between 25.0 and 31.5 mm, and the other half between 31.5 mm - 35.5 mm.

2. Homogenise the total quantity of coal 25,0 mm-35,5 mm and re-screen it to pass through the 35,5 mm sieve and be retained in the 25,0 mm sieve.

   Place only a thin layer of charcoal in the sieve to ensure that the pieces of charcoal are in direct contact with the sieve openings. Place the pieces of charcoal that do not pass through the opening vertically by hand to determine if they can pass the sieve in any position.

5. PROCEDURE

Weigh approximately 1,000 g of prepared charcoal as described in 4 and place it in the bottle. Rotate the bottle for one hour at 40 ± 1 rpm. To normalize the rotation time, use a revolution

counter, either periodically or as a permanent attachment to the machine, to ensure that the total number of revolutions during the test is approximately 2,400. After rotation, perform a coal classification with sieves defined in 3.3. Carry out the sieving in small increments to allow a satisfactory contact between the pieces of coal and the sieve. In the two upper sieves (25.0 mm and 18.0 mm), place vertically with the hand the individual pieces that do not pass easily to determine if they can pass the sieve in any position.

Sieving can be done manually or mechanically, although the first method is preferable.

Carry out at least four tests and, foreseeing that there is sufficient carbon sample, it is advisable to do two or more series of four tests. When only a series of four tests is carried out, sift the contents of each bottle separately to verify that there is satisfactory agreement between the results obtained. When two or more series of four tests are carried out, the contents of the four bottles in each series may be mixed and sieved together. Carry out the weighings with an approximation of 1 g.

6. CALCULATIONS

The product of the percentage by weight of the carbon sample size 25.0 mm - 35.5 mm and the average of the two mesh sizes (30.25 mm) is assigned a value equal to 100% (see Table 1). This value is *S*.

After the test, the weight distribution by size is determined. The products of the weights, as a percentage, of each fraction are calculated by the average of the mesh lights that determine that fraction. The sum of these products is *s* (see Table 1).

Friability is calculated as:

$$100\,\frac{(S-s)}{S}$$

and with an approximation of 0.5%.

The dust index is numerically equal to both percent by weight of the fraction less than 0.280 mm produced during the test and rounded to the unit (see Table 1)

7. REPORT

Refer the friability in percent, rounding to the first decimal place. This is the percentage reduction in average carbon size during the test.

NOTE: Table 1 gives a numerical example of the method for calculating friability, where the mean of the mesh lamps is expressed in mm.

The data correspond to a typical carbon of medium friability. Approximate relative size factors (column 3) are derived from the mean of the mesh lights.

In the right column, S represents the average size of the pieces of coal before the test, and s represents the average size of the coal after the test. The value S is taken, arbitrarily, equal to 100 times its size factor.

Table 1

Friability % = 100 (S-s)/S = 100(100-68.92)/100 = 31.07

				Average number of lights		
Retained	Pass		Weight (%) (1)	mm	Standardization factor (2)	Product (1) x (2)
	SAMPLE					
25,0 mm	35.5 mm		100,0	30,25	1	100,00 = S
	TESTED CARBON					
25,0 mm	35.5 mm		46,2	30,25	1,000	46,20
18,0 mm	25,0 mm		26,9	21,5	0,711	19,13
12.5 mm	18,0 mm		4,0	15,25	0,504	2,02
9,00 mm	12.5 mm		1,6	10,75	0,355	0,57
1,12 mm	9,00 mm		5,5	5,06	0,167	0,92
0.280 mm	1,12 mm		0,5	0,7	0,023	0,01
-	0.280 mm [1)]		15,3 [2)]	0,14	0,005	0,08
TOTAL (sum of (1) x (2) for coal tested)						68,93 = s

1) Includes losses not exceeding 0,5 %.

2) The percentage of “fines and dust” passing through the 0,280 mm sieve represents the proportion of breakage to abrasion rather than tapping and may be denoted as “dust index”, with an approximation of 1 %, to indicate the relative dust-producing properties of coals when subjected to severe handling. The notification of friability and dust index shall be made: Friability % = 31.1 with a dust index of 15.

Dimensions in millimetres

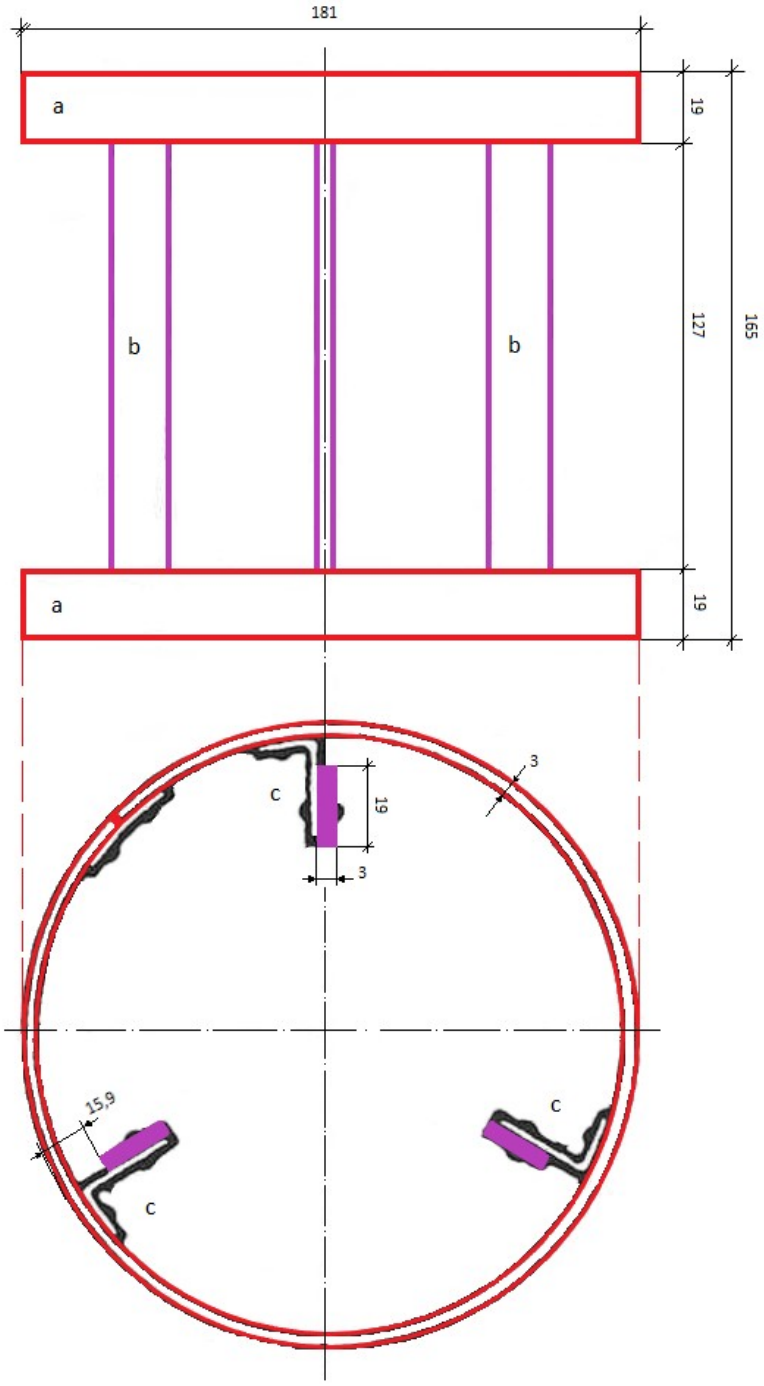


Figure 1. Steel frame used in stirring bottle

ET 16.02 METHOD OF DETERMINING THE OXIGENATED WATER INDEX OF MINERAL AND LAYING RODS

1. OBJECT

The purpose of this Technical Specification is to define the test method for determining the oxygen water index of the ore and the embedded rocks; This index is used to characterize the susceptibility of coal to endogenous fires and is of great importance in the fight against fires.

2. DESCRIPTION OF THE METHOD

The method is based on the establishment and examination of the curve that represents the variation of temperature in function of time, of a sample subjected to the action of oxygenated water in adiabatic conditions.

The experimental device is shown in Figure 1 and consists essentially of a flat-bottomed Dewar vessel in which you can rotate the bar in a magnetic stirrer. The temperature is measured by means of two chromium-aluminium thermocouples connected to a recorder.

A sample of coal that has not been exposed to an oxidizing atmosphere is extracted and ground rapidly to a particle size of less than 0.063 mm.

A 10 g sample is then moistened with 5 cm^3 of oxygenated water. It is necessary to get the oxygenated water completely wet to the coal (it can be added to get it a few drops of a liquid that decreases the surface tension of the oxygenated water).

The sample is then placed, after cooling, in the Dewar glass and 30 cm^3 of oxygenated water is then added.

For the analysis of the results, it is considered that the absolute value of the initial temperature has a negligible value in the development of the reaction, and the time, t_1, necessary to obtain a temperature increase (ΔT) equal to 65 ° C is measured (that is, if the test is started at 25 ° C , the time it takes to reach 90 ° C is measured). The index I is then calculated:

$$I = \frac{100}{t_1}$$

where t_1 is the time expressed in minutes

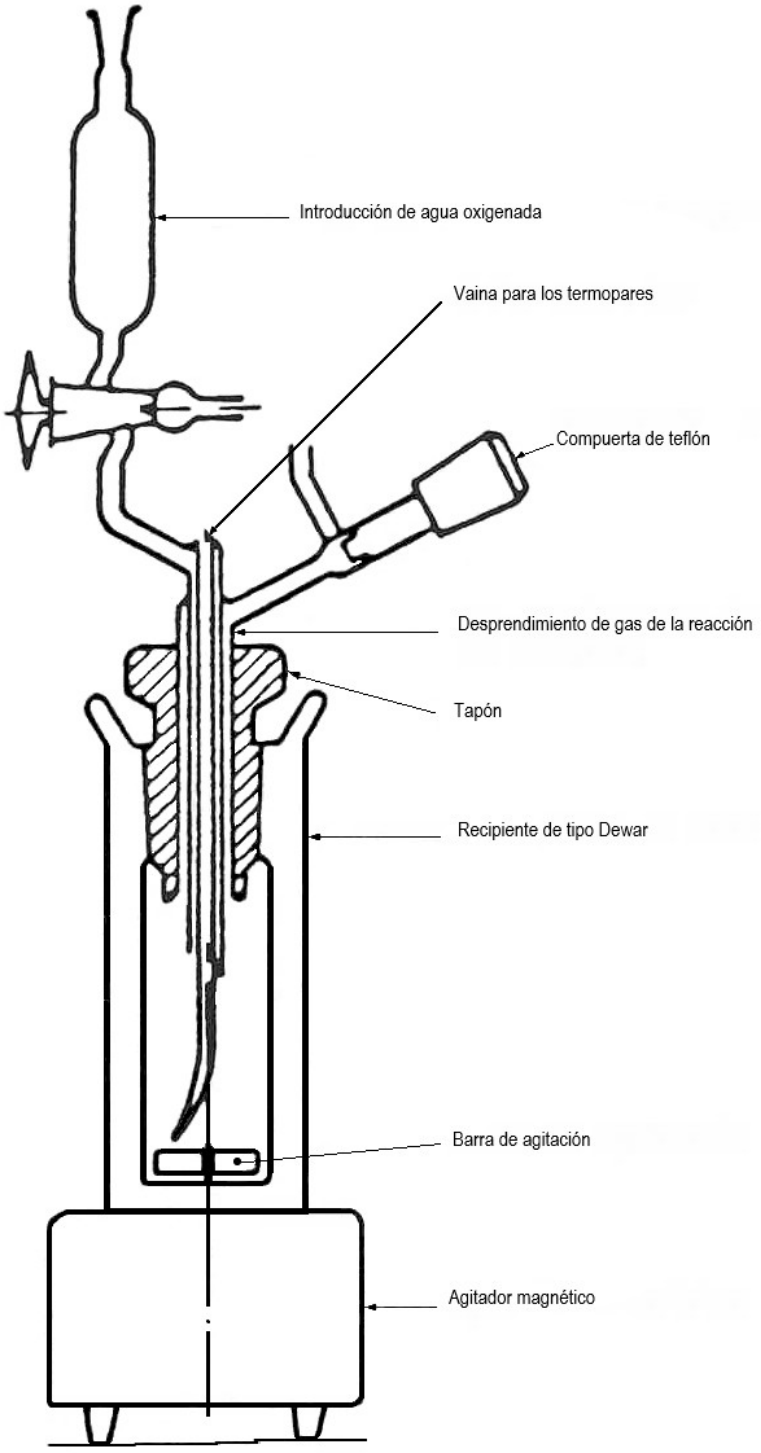


Fig. 1.- Experimental device

ITC SM-IND-17 SUBTERRANEAN LABORES. ACCESSORIES, POWERS AND CABLES

1. OBJECT AND SCOPE.

The purpose of this Supplementary Technical Instruction (hereinafter referred to as 'ITC') is to lay down the general requirements to be met by access areas for underground extractive activities (the access area being understood as the area occupied by external installations for exclusive use and the routes that communicate them) and by access wells for underground work, as well as the minimum requirements to be met for safety reasons by extraction machines and associated systems, cages, skips and their mooring and suspension elements.

It also aims to establish the safety requirements applicable to steel cord cables used as extraction cables in vertical wells and inclined planes in underground work.

Paragraph 5 applies to cord cables used as extraction cables in vertical transport installations and in inclined planes, excluding flat cables and closed and semi-enclosed cables that will be regulated by a specific internal safety provision (hereinafter "DIS"), in addition to the provisions of ITC SM-COM-04.

Cables used in the following installations are also excluded:

1. Wells and inclined planes equipped with a manual volume or a winch exclusively for the transport of material.
2. Monorail installations with light transport, excluding personnel.
3. Strobes for manoeuvring wagons in boarding areas in inclined planes.
4. Telemin cables.

The security measures for these excluded cables shall be collected in a DIS.

In any case, the provisions of Royal Decree 1215/1997 of 18 July 1997 laying down the minimum health and safety requirements for the use of work equipment by workers shall be fully implemented, without prejudice to the more stringent or specific provisions laid down in this JTI.

2. ACCESS TO SUBTERRANEAN LABORES.

2.1. Signalling.

The exterior installations of underground mining works and the roads leading to them shall be marked in such a way that no one may inadvertently enter them.

2.2. Exits to the surface.

All underground work shall have at least two different outlets to the surface, accessible at all times to personnel and properly conditioned and signposted.

In the case of wells, for them to be considered as outlets in the previous sense, they must be equipped with fixed or mechanical means of transport or have other auxiliary means in anticipation of failures in mechanical installations in normal use.

The external mouths of the exits will not be under the same building and the distance between them will be adequate to avoid any type of conditions (structural, environmental, ...) in terms of safety.

In exceptional cases or in periods of preparation, the Mining Authority may allow provisional work with a single outlet well.

2.3. Fall protection.

Appropriate safety measures and devices shall be established at the exit points to prevent falls of persons or materials.

2.4. Fire protection.

The constructions that cover the accesses will be of non-combustible materials. They may not store easily flammable substances or carry out activities liable to produce fires.

Workplaces shall be equipped with appropriate fire-fighting devices and, as required, with fire detectors and alarm systems.

Non-automatic fire-fighting devices shall be properly marked, easily accessible and tampered with and, if necessary, protected against the risk of deterioration.

2.5. Unused accesses.

The mouths of the accesses that exist on the surface and are not in service, will be signposted and cover conveniently in order to prevent access and fall of people.

The same precautionary measures shall apply to all inactive mining work that communicates with the surface.

3. POWERFUL.

3.1. Authorisation of installations.

All the installations inherent in the equipment of a well, as well as the substantial modifications that occur in it, will require the prior authorization of the Mining Authority, which will grant it, if appropriate, in the light of the corresponding detailed project.

3.2. Protection against inadvertent access.

In any well with guided cages, the shipments shall be provided with appropriate barriers or devices that prevent access to the shaft of the well to persons or wagons, when the cage is not in the shipment.

3.3. Lighting.

All in-service shipments, including surface shipments, shall be well lit by fixed lights, with a minimum illumination level of 100 lux.

3.4. Organization of personnel on boarding and signalling maneuvers.

A DIS will establish the organization of the shipments (distances, communication and signaling), the maximum number of people in each cage and the person responsible for the entrances and exits of the relays.

Likewise, the DIS will include the signaling of the maneuvers. In the signal code, every signal must have both for the one who gives it and for the one who receives it a unique meaning, always the same and clearly defined. The acoustic signal of a single blow must necessarily be assigned the meaning of "high". Devices shall be installed in all wells where staff circulate to allow for the exchange of conversations between the driver and all shipments. This telephony will have autonomous power supply and independent of the power supply of the mine.

When the signalling is electrical, the same cable cannot contain more wires than the signalling wires of a single extraction machine. Any lack of tension in the signal system must be detectable from the driver's position.

A special indication shall be used for all transport of personnel. This indication shall be made only at the beginning and at the end of a series of ropes followed by personnel, provided that an optical indicator is visible to the driver for the entire duration of the series of ropes.

In all wells with normal circulation of personnel, the entry of personnel into the cage from any shipment shall be subject to the prior receipt of a permissive indication from the driver. This indication should not be given until after the machine has been braked.

When a cage is stopped in a shipment to take or leave personnel, its setting in motion shall be subject to the prior reception of a marching signal emitted from that shipment. In the event that the embarkation does not have a fixed embarker, the waiting time to be observed by the driver after the reception of the signal shall be specified, having devices capable of emitting this signal.

3.5. Screenplay.

The rigid scripting of wells shall be solidly constructed, carefully aligned and frequently monitored. The calculation of the script and the beams that support it will be carried out with a safety coefficient of four on the maximum static load of the cage or skip with personnel. In the calculation it will be assumed that each section of script resists independently of the others.

The dash must be mounted so that the cage or skip that accidentally exceeds the outer boarding, is stopped by the progressive effort of the rubbing before reaching the pulleys. If the well has a boiler and is used for the circulation of the relay without blocks or with hidden blocks, and there is no automatic device that limits the speed of arrival of the cage to boarding to less than 1.50 m/s, the script must also be arranged so that the cage or skip that exceeds the lower boarding is stopped by a progressive effort before reaching the bottom or the water level if it accumulates.

If cable scripting is used, cables shall be installed in adequate number, quality and arrangement, to avoid friction or collision of the cages or skips with each other, with the counterweight or with the well walls. The scripting cable shall be calculated with a minimum safety coefficient of five for its own weight plus that of the counterweight, and shall never fall below three in service. The distance between two contiguous cables guiding two different cages shall be at least 60 cm in the absence of separation cables and 20 cm in the absence of separation cables. These distances may be varied by the Mining Authority when the speed of the cages, in more or less, recommends increasing or decreasing them.

In the case of rigid scripting, the minimum distance between cages shall be 150 mm if the script is lateral.

In cases of double extraction by the same well, with rigid scripting, the minimum distance between cages or skips of different systems will be 350 mm.

The minimum distance from the cage to the well wall shall be 150 mm in a new installation.

3.6. Taquetes.

Taquettes are devices that allow the support of the cage when it reaches the level of a plant and facilitates its stability during embarkation-disembarkation.

In the case of manned manoeuvres, the boarding tackles of the lower floors should remain out of position when there is no automatic device limiting the speed of arrival of the cage to boarding. The maximum allowable arrival speed for taquetes in position shall be 1,50 m/s.

Taquettes in the intermediate plants between which the cordadas are being given should always remain out of position.

A ticketing system should be provided in the castillete to act whenever the cage or skip exceeds the external shipment and to receive it in the event that, by crashing into the pulleys or acting against the convergent scripting, the extraction cable is broken.

A signal in the engine room shall indicate the position of the tickets. Such markings shall indicate that they are correctly removed.

3.7. Auxiliary installations: Electrical cables and signaling pipes.

The electrical cables that transport the energy and mainly those of signaling and telephony, will be installed in areas as protected as possible against the fall of wagons, materials or objects that could escape through the shaft of the well, being implemented if necessary, any protection protection of said cables.

The installation of pipes shall be such that their anchorages withstand the maximum foreseeable stresses with safety coefficient 1.5. Preferably, they will have anchorages independent of those of the script and, if they are the same, will not reduce the safety coefficient of the script below the value previously established.

The installation and maintenance of pipes carrying solids will be carried out according to the DISs, which will establish the way to operate in cases where it is necessary to "unlock" or repair the pipes.

3.8. Deepening of wells.

3.8.1. Project.

The execution of the works referred to in this section (work to deepen vertical wells from the outside, the repurposing or enhancement of others from the inside and the execution of blind wells or balance wells for the internal service) requires the prior permission of the Mining Authority, to which a project will be sent containing at least:

a) The layout of the well, indicating whether it is undertaken from the outside or from the inside of the mine.

b) Geological-geotechnical study; This includes the forecast of the land to be traversed, which shall include the possibility of cutting layers of coal containing grisu or flammable gases, or even capable of producing instantaneous landslides, and of traversing aquifers with important avenues.

c) Installation and machinery to be used, mainly the one required for loading, transporting debris, equipment and personnel.

d) Description of the operating method. Support. Ventilation and drainage.

e) In the case of the repurposing of existing wells, where the upper section is kept in

service, the strength of the natural or artificial plug separating the two sections would be justified by the calculation.

The project shall make particular mention of compliance with the specifications set out in the following paragraphs and of the precautions taken with a view to ensuring maximum staff safety.

3.8.2. Surveillance.

After any stoppage of the work, caused by the evacuation of the personnel prior to the firing of the explosive or for other reasons, the guard of the relief accompanied by another person must descend to visit the well and ensure that he is in a safe condition for the entry of other people.

At least once a day, the guards shall review the condition of the well and of all equipment from which movable boards, platforms or drain pumps are suspended, and from which persons or materials are transported in the well.

3.8.3. Material and personnel transport facilities.

In the deepening of wells from the surface, and before the depth of the excavation exceeds 15 meters, a safe and resistant castillete must be installed, designed to support the pulleys and their cables at a height of at least 6 meters above the tilting platform.

If work is carried out at night, or if the deepening starts from inside the mine, the tilting site will be sufficiently illuminated.

Capstans used for the transport of personnel shall be certified in accordance with ITC SM COM-04. If the tensile effort exceeds 60 kN, the winch to be used shall be subject to express authorisation by the Mining Authority, which shall indicate the requirements to be complied with.

Appropriate provisions should be made in transport to limit the oscillation of the tank during climbing or descent.

If it is anticipated that the well may cut aquifers with significant waterway, or if the well may be flooded by a mine waterway, relief stops shall be provided from the bottom of the well to any safe site.

3.8.4. Fall protection of objects.

Deepening wells must be closed by watertight and resistant platforms, provided with gates. These gates can only be opened to allow the passage of the vats, and must be closed before the vats are tilted.

The filling of the vats should stop at least 20 cm below the rim and the rocks should not protrude from the level of the rim.

Objects above the edge of the vat shall be attached to the suspension chains or cable in such a way that they cannot fall or be hung.

During the descent of the tank, the driver will stop it at a distance between 5 and 6 meters from the bottom of the well or from a deck or deepening platform on which the tank must be deposited, and must wait for the signal of the watchman or responsible person who receives it to let it support it.

At the elevation, the driver must stop the winch when the tank has been separated between 1 and 2 meters from the bottom, so that the guard checks that the cable is tightly tensioned, the tank is balanced and does not carry debris adhered to the external part, before giving the agreed signal for the driver to continue the elevation.

The transport of equipment and tools can only be carried out in tanks devoid of minerals or rocks.

3.8.5. Movement of personnel.

The particular requirements regarding the movement of people in vats, cages and skip platforms for each specific installation, will be collected in a DIS.

This provision shall lay down the conditions of movement in at least three cases:

1. Circulation of relays.
2. Cordadas isolated from personnel.
3. Review cords.

The maximum speed of movement of personnel in vats shall not exceed 2 m/s.

The maximum number of people that can circulate in a vat is four, unless expressly authorized by the Mining Authority.

It is prohibited to:

i. The movement of personnel in tanks loaded, even partially, with rocks or minerals. Likewise, with bulky materials or equipment.

ii. In the case of the use of two vats, the transport of materials in one of them when personnel circulate in the other, as well as exceeding the speed of 0.2 m/s at the time of crossing.

iii. The circulation of anyone without the helmet lamp on.

iv. Mount in the vats or get off at the plant or on one of the work boards, when the gates are open.

A communication and signalling system shall be provided between the bottom of the well, the work boards and the winch driver. This should be warned of any cordage that carries personnel, as well as the beginning and end of it.

3.8.6. Platforms and boards.

During the execution of the concreting, or in general, of the cladding of the well, the watchman of the relay must check that the platforms or the boards are not overloaded with material.

The movable boards or platforms used in wells must be designed to ensure effective ventilation of the well as a whole.

All movable boards or platforms on which people work in a well must be equipped with devices that prevent them from falling.

During the time people are occupied on a movable board or on a platform in a well, the following precautions shall be strictly observed:

a) The movable deck or platform shall be fitted with fixing or suspension devices in such a way as to prevent any pendulum movement.

b) The gate closing the passage opening of the vat shall be securely secured.

c) If the movable board or platform is constructed in two or more parts joined by flaps, these parts shall be solidly joined to each other by means of buffoons.

d) The mobile dashboard or platform must not be moved, except with express authorization.

e) Moving platforms or movable boards shall preferably be carried out without personnel on them and in the event that the presence of the personnel who move them is necessary, they shall be equipped with a belt and safety harness.

3.8.7. Use of explosives in the deepening of wells.

a) Explosives shall be transported into the well only immediately before use. Previously, people whose presence is not essential for the shooting will have left the work and the unneeded tools will have been removed.

b) The glue shall comply with ITC SM-IND-25 of the Regulation. It will be given by the gunner from the outside or from a sufficiently safe boarding or shelter. The connection end of the glue line may only be connected to the blaster or other source authorised by the person responsible for the blasting, for which the blaster or connection terminals and switch from another source must be locked, which will be in the possession of the person responsible as long as the holes are connected. The person responsible for the blasting will be the last to leave the well boiler verifying that there is no person left in it or in the vicinity where there is a risk.

4. EXTRACTION MACHINES.

4.1. Machinist.

Access to the engine room shall be prohibited to any person outside its service.

The person in charge of operating the extraction machine must be personnel with accredited mining experience and in accredited psychophysical conditions.

When there is no automatic stopping device, during the entry and exit of the relays there will be, in addition to the driver, an assistant in the operation of the machine, who will always be able to intervene if necessary.

For the purposes of the preceding paragraph, automatic stopping devices are those which prevent the descending cage from reaching the bottom at a speed exceeding 2,5 m/s and the ascending cage from reaching the pulleys.

During the movement of any cage with personnel, the driver must remain in his position of manoeuvre and be able, at all times, to act on the adjustment lever or the brakes.

The driver must never leave his manoeuvring position without having previously operated all the brakes.

4.2. Brakes and locking devices.

The extraction machines shall have two brakes, one manoeuvring and one automatic safety brake, on the Koeppe drum, coil or pulley. The controls shall be available to the driver so that the driver can operate them quickly and without changing places.

The safety brake shall be of the counterweight type.

Each brake will be able to stop and keep the machine immobilized even in the most unfavorable conditions.

The two brakes can have the same friction and transmission organs, but their controls must be different and distanced. At least one of the brakes must be able to act even in the event of a lack of supply of the energy normally used for its manoeuvring.

The safety brake shall operate without the intervention of gears.

Brake mechanisms shall be calculated with a minimum safety coefficient of 5 relative to the maximum braking force used in service.

The service brake must be such that:

- The static safety relative to the greatest overweight is $S_F \geq 3$, in which:

$$S_F = \frac{Esfuerzo\ de\ frenado\ referido\ al\ cable}{Carga\ máxima\ desequilibrada}$$

- The braking force referred to the cable shall be considered in this and other subsequent expressions for the minimum pressure of the transmitting fluid (e.g. for the minimum pressure of the compressed air).

- The braking effort in the descent of the most overweight is such that it produces a minimum deceleration of $b_F \geq 2\ m/s^2$.

- Static safety when the machine is disengaged is $S_{FV} \geq 1{,}5$, in which:

$$S_{FV} = \frac{Esfuerzo\ de\ frenado\ en\ un\ tambor}{Peso\ máximo\ unilateral\ con\ jaula\ vacía\ (jaula + cable)}$$

The safety brake must be such that:

- Have a static safety relative to the greater overweight of $S_s \geq 3$, being:

$$S_S = \frac{Esfuerzo\ de\ frenado\ referido\ al\ cable}{Carga\ máxima\ desequilibrada}$$

- The braking effort in the descent of the most overweight is such that it produces a minimum deceleration of $b_s \geq 1.2\ m/s^2$.

- The static safety relative to the greater overweight in the case of braking by counterweight action is $S_H \geq 3$, being:

$$S_H = \frac{Esfuerzo\ de\ frenado\ (\ por\ actuación\ del\ contrapeso\ )}{Carga\ máxima\ desequilibrada}$$

- When operating, in the case of Koeppe pulley, there is no slippage of the cables on the pulley, even when its operation is accompanied by the electric braking of the engine.

- That, even intervening in the most unfavorable circumstances, ensure the stop before the cage or skip crashes into the pulleys.

- To act when the engine power of the machine is lacking, at the end of the race and in cases of overspeed of 20% of the machine. Its action must involve the suppression of the motor effort.

- Act when brake servomotors (e.g. compressed air or pressurized oil) are not fed.

If the drum or winding coil of the cable can be unclutched, an interlock must prevent this by means of a device capable of maintaining the most unfavourable loading conditions before the unclutchable part has been immobilised.

The disengaged cage shall not carry materials or personnel. Its speed of circulation will be reduced, and, when acting the safety brake, the deceleration will be such that it prevents the collision of the cage or skip against the pulleys and the bottom of the shaft of the well.

Each time a clutch manoeuvre is carried out before any service is performed with personnel, the necessary ropes shall be provided to verify that the clutch manoeuvre has been carried out correctly and that the tickets (if any) have been removed. In the case of shipments equipped with boards, check ropes are not necessary.

Each time a revision or repair is carried out that affects the mechanisms of the extraction machine, or of the castillete, or shaft of the well, or elements that act on the regulation and control of the brakes, the necessary cordages without personnel will also be given to verify the correct operation of the extraction.

4.3. Driver's command post.

Extraction machines used for normal or exceptional movement of personnel shall be equipped with:

a) A position indicator of the cage or skip in the well, located in view of the driver.

b) An acoustic signalling device that announces the arrival of the cage or skips to the vicinity of the extreme shipments in service.

Those exceeding 6 m/s must also be provided with:

a) An indicator device and speed recorder. Newly installed equipment must also have a signal recorder.

b) An indicator table indicating the status of the manoeuvre in:

   i. Extraction.

   ii. Staff.

   iii. Others that are considered of interest.

4.4. Cages and skips.

4.4.1. Fall protection.

The cages and platforms of the skips, whatever their characteristics, will have security elements that prevent the fall of personnel to the well and protect against the fall of external objects. They shall be designed in such a way that, if they are accidentally immobilised at any point along their route, they allow the personnel to be evacuated.

They shall also have fasteners for the wagons or tables they transport or a front-facing system along the route to prevent their escape during transport.

Operations for the introduction of special loads into cages such as pipes, rails or those to be transported suspended, and which require the opening or removal of protective barriers from the well so that personnel have to approach less than 3 m from the rim, shall require the use of safety belts.

4.4.2. Mechanical resistance of mooring and suspension elements.

All mooring and suspension organs of cages and skips must be set so that their assembly withstands a load at least equal to 10 times the maximum static load to which they will be subjected in service.

Moorings and suspensions must be tested together or by elements before being put into service and after all heat treatment at a stress equal to three times the maximum static load. A certificate of this test, which has to be carried out by an official approved laboratory, must always be available to the Mining Authority for verification. In the case of a balancing cable, the type of suspension must be such that its coupling to the cable resists an effort, at least, equal to 12 times the weight of the cable suspended from it.

No mooring part may be used for more than 10 years or 30,000 hours of service, whichever occurs first, except for a maximum exceptional extension of 50% authorized by the Mining Authority in accordance with the provisions of technical specification ET 5.09.

The attachment of the cable to the lashing must be such as to withstand a greater stress than the breaking load of the cable.

4.4.3. Moorings and suspensions in multi-wire installations.

Where the extraction installation comprises two or more carrier cables, there must be devices capable of equalising their voltages in anticipation of:

a) Correctly distribute the suspended load.

b) Uniformize the wear of the throats of the rolling elements (Koeppe pulleys or baffle pulleys).

c) Properly position the cage in your script.

For this purpose, it shall have:

i. The possibility of measuring the voltage of each cable.

ii. A tension equalizing or compensating device.

4.4.4. Calculation of cages and skips.

The calculation and design of cages and skips should take into account normal efforts; maximum static load, dynamic caging and de-caging efforts and, where appropriate, box-mounted loads.

The upper frame of the cage or skip in which the lashing and suspensions of the cables are set shall be calculated with a safety coefficient of 8, this coefficient being the ratio of the breaking limit with respect to the normal stresses and the rest of the structure with a safety coefficient 6.

The suspension of loads from the base of the cage or the introduction of concentrated loads inside it must be carried out in an orderly manner and after knowledge of the load assumptions and the calculation developments that served as the basis for the project of the cage.

4.4.5. Dimensions of the roll drums.

Cable roll drums shall be of sufficient size to roll:

i. Three turns of cable safety.

ii. Cable sections that are expected to have to be cut during the life of the cable, due to its lengthening and the sample tests provided for in paragraph 5 of this JTI.

iii. The length of the cordada plus the distance between the beam salvapoleas, pulleys and the external embarkation.

4.5. General measures of revision and maintenance of extraction machines.

4.5.1. Frequency of general reviews.

The preservation of any extraction facility shall be subject to a DIS. At least the following revisions shall be made:

i. Daily: Before the first cordada of personnel, the necessary cordadas will be given to verify that the blocks or boards have been removed and that the machine is well clutched. The correct functioning of the signalling, brakes and locks shall be checked. The state of moorings and well barriers will be observed.

ii. Weekly: The conservation status of the well shaft, tackles, swinging boards, cages, scripting and other elements of the well will be reviewed.

iii. Six-monthly: There will be a general review of pulleys, castillete, scales, signaling facilities, end of race, speed regulators, position recorders of cages or skips, brakes and, in general, of the extraction machine.

Record of revisions: The written parts of those responsible for these reviews will be archived.

4.5.2. Periodic cable reviews.

In addition to the provisions of the previous paragraph, as regards the personnel circulation cables or extraction, balance, guides and friction, the following checks will also be carried out by competent personnel in addition to the reviews prescribed in paragraph 5 of this JTI.

i. Daily: Observation of the personnel circulation and extraction cables.

ii. Weekly: Observation of the number of broken wires (in the whole cable and in a space of 2 m where there are more broken wires), folds, irregularities in the turns, decrease of the section or extraordinary elongation, rusts and as many data can indicate abnormality.

iii. Monthly: Each cable must undergo further examination. Particular attention should be paid to the places where significant deterioration can be expected and where the greatest number of wires cut was found and, in any case, every 100 m. These points should be examined with the wire stationary.

iv. The Mining Authority shall, where it deems it appropriate, request non-destructive testing by mining control bodies.

4.5.3. Registration of cables.

There must be a record of the cables used for the extraction or movement of personnel, including balancing cables, indicating for each of them:

a) The name and address of the manufacturer, together with the certificate of manufacture.

b) The constitution and nature; the results of tests carried out by an official laboratory on the new cable and its components, as well as on successive cut pieces.

c) Date of placement, composure and withdrawal, as well as the cause of the withdrawal or definitive change.

d) The date, mode of execution and results of the weekly or higher periodicity examinations.

e) When suitable equipment is available, the results of non-destructive tests (electromagnetic, X-rays, etc.) in order to compare them with each other and study the evolution of cable life.

f) The date and type of repairs, cuts, turns and incidents.

4.5.4. Withdrawal of cables.

Any cable used in the removal or movement of personnel shall be removed when:

a) Their safety coefficient decreases below the indices set out in paragraph 5 of this JTI.

b) The service time is two years in the facilities with Koeppe pulleys. With the appropriate technical report, the Mining Authority may extend this period.

c) The number of broken wires in a meter of length reaches 12% of the total wires of the cable.

d) In installations with Koeppe multicable pulleys, their safety coefficient does not comply with paragraph 5 of this ITC, even if the installation as a whole complies with it.

e) On multi-wire Koeppe pulleys all cables will be replaced simultaneously.

Any breakage of cable is considered, at least, a situation of serious danger, for the purposes of its communication to the Mining Authority in accordance with the provisions of article 8 of the Mining Safety Regulations.

4.5.5. Lashing and suspension devices.

The lashing and suspension devices of the cage or skip to the extraction cable shall be disassembled and checked from the point of view of wear and corrosion, once a year.

4.5.6. Pr or yecto and inspection of extraction facilities.

The employer shall keep on file and updated the detailed project of the extraction facility, with the expression of the parameters of use (loads, speeds and accelerations, cables, radii of curvature, etc.), in which the possible reforms and modifications that it undergoes during its use will be recorded.

The Mining Authority may request the study of these projects and the inspection of the facilities to mining control bodies, in order to verify that the design parameters that affect safety continue to be met.

5. STEEL CABLES.

5.1. Sizing, installation and commissioning.

5.1.1. Safety coefficients.

The cables shall be sized with the minimum project safety coefficients set out in Table 1.

TABLE 1

Maximum Suspended Cable Length	Project safety coefficients	
	Personnel cordages	Cords of material
L ≤ 500 m	$C_p = 9.5$	$C_p = 7.2$
L> 500 m	$C_p = 9,5 - 0,001\ L$	$C_p = 7,2 - 0,0005\ L$

Note: The maximum length of suspended cable L(m) shall be the measurement between the friction pulley or winding coil and the lowest position the loader can reach in the flat well 0.

For L > 500 m, the minimum design safety coefficient for strands of material shall not be less than 6.

5.1.2. Installation and commissioning.

5.1.2.1. General rules.

The installation and commissioning of cables referred to in this paragraph 5 shall be subject to the following general safety rules:

a) Spliced cables or cables that have been used in other extraction facilities or for other purposes may not be used. Installations equipped with endless cable systems where fittings are required are excluded from this requirement.

b) The installation of a cable already used in the installation itself will be subject to express approval by the Mining Authority.

5.1.2.2. Installation and commissioning.

Before installing a new cable, the entrepreneur must proceed to obtain a sample of the cable from each manufacturing section supplied, following the method established in the UNE 22014 standard *"Cables for mining installations. Method of preparation of samples for testing"*. This cable sample will be stored in the mine premises, duly protected against corrosion and mechanical damage, until one month after the cable is definitively removed from service.

Before the cable is put into service, at least 30 consecutive strands of material transport shall be carried out, with the maximum lifting load and the maximum speed, acceleration and deceleration expected in normal service. During the tests, a continuous record of the speed of each rope (speed-time diagram) will be obtained and at its completion a level 1 cable inspection will be carried out, as established in the UNE 22013 standard *'Inspection procedures for steel cables in service for mining installations'*. The result of this test will be recorded in the Cable Record Book.

When the cable is replaced in an installation, it shall be put into service in accordance with the provisions of ITC SM-IND-10.

5.2. Inspection of cables in service.

5.2.1. Inspection procedures.

The steel ropes covered by this JTI shall be inspected during service using the methods set out in UNE 22013, level I and level II inspections respectively.

5.2.2. Conduct of inspections.

5.2.2.1. Implementation of Level I inspection.

The employer shall designate the person(s) responsible for carrying out the level I inspections who shall be appropriately trained.

The implementation of the level I inspection shall be carried out at the following intervals:

a) The general condition of the cable shall be inspected on a daily basis at a speed of ≤ 1 m/s to identify any visible deformations and concentrated breakage of wires. If any deterioration of these characteristics is detected, an inspection of the area affected by stopped cable will be carried out. The result of the inspection shall be recorded in the Cable Record Book.

b) The cable shall be inspected weekly at a speed of ≤ 1 m/s, noting in particular the number of broken wires, as well as deformations, section decreases and other deterioration. Particular attention shall be paid to those areas which require it as a result of the results of the daily inspection. In each inspection position the diameter and weight of wiring according to UNE 22013 shall be measured.

The results of the inspection shall be recorded in the Cable Record Book.

c) Inspection of the area of the cable contained in the mooring devices. The result of this inspection shall be recorded in the Cable Record Book.

i. Poleas Koeppe: The area of the cable contained in the lashing devices shall be inspected annually from the point of view of the number of broken wires, wear and external and internal corrosion.

ii. Drum machines: in the case of installations for the transport of personnel fitted with drum machines, the lower part shall be cut once during the first

year and once every six months in the following years to a length of at least three metres, including the mooring area. This sample, obtained in accordance with the procedure laid down in standard UNE 22014, shall be tested to determine the measured total breaking load, in accordance with standard UNE 7326 *'Steel cord and cable tensile test'*, in an approved official laboratory, which shall have the appropriate means to periodically monitor the wiring loss coefficient; in addition, a piece of the sample shall be destretched for careful inspection of the inside of the cable from the point of view of the number of broken wires, wear and internal and external corrosion.

5.2.2.2. Implementation of Level II inspection.

Level II inspections must be carried out by officials attached to the Mining Authority or by personnel of a Mining Control Body, and the conclusions of their inspection reports recorded in the Cable Record Book.

A level II inspection, as set out in UNE 22013, shall be carried out before one month of operation has elapsed since the cable has been put into service.

The electromagnetic examination apparatus used shall comply with UNE 22013.

Once the first electromagnetic inspection has been carried out, with a view to obtaining a basic record of the cable that will serve as a reference for subsequent inspections, every cable shall be electromagnetically inspected at least once every six months throughout its entire length. Accessible sections of the cable that cannot be electromagnetically examined shall be inspected using the Level I inspection methodology.

When an accident or incident in the well (fall of objects on the cable, collision of the cage, etc.) may have caused any damage to the cable, the entrepreneur must communicate it to the Mining Authority, attaching a level II inspection report, as soon as possible.

5.3. Removal of cables from the service.

It shall be inferred from the results of the inspections carried out in accordance with the preceding paragraphs whether or not a cable may continue to be in service.

Cables shall be withdrawn from service, unless express authorisation is justified in exceptional cases, where at least one of the following conditions is met:

a) The results of a level II test indicate a loss of metal cross-section of more than 15 per cent.

b) The number of broken wires in a wiring step (excluding filler wires) is greater than:

   i. 15% of the total number of wires located on any cord.

   ii. 5 % of the total number of wires when located on a cord.

c) When the decrease in cable diameter at any point reaches 10 % of the cable diameter.

d) When the outer wires have lost more than a third of their metal section as a result of any type of deterioration.

e) When the rejection factor, determined according to the UNE 22013 standard, reaches the value 100.

5.4. Registration of cables.

The entrepreneur must have a Cable Registration Book in accordance with the UNE 22013 standard, which will be available to the Mining Authority and will be included in the document on safety and health.

5.5. Storage of cables.

Any cable received in the mine must be stored in a room that meets the appropriate conditions to ensure its protection against corrosion, mechanical damage and thermal damage.

The room must be closed, if possible dry, with concrete floor, well aerated, free of dust, vapours and gases and in which there are no significant variations in temperature.

When the cable is stored in rolls they should not be placed directly on the ground. They shall be placed on a wooden platform. The reels may be placed directly on the ground provided that the cable is at least 25 cm from the ground.

Stored cables shall be inspected periodically to ensure that there is no evidence of corrosion or other visible deterioration.

ITC SM-IND-18 SUBTERRANEAN LABORES. CIRCULATION, TRANSPORTATION, VENTILATION AND ABANDONMENT.

1. OBJECT.

The purpose of this Supplementary Technical Instruction (hereinafter referred to as 'ITC') is to lay down minimum safety requirements for wells, inclined planes and transport with motor vehicles in underground work.

It also lays down the minimum safety conditions to be met by conveyor belt installations and aerial cableway installations used in underground work for the transport of personnel.

Finally, it establishes the minimum safety conditions related to the ventilation of underground work and establishes the necessary safety conditions in the suspension and abandonment of such work.

All this in development of article 29.2 of the Mining Safety Regulations.

In any case, the provisions of Royal Decree 1215/1997 of 18 July 1997 laying down the minimum health and safety requirements for the use of work equipment by workers shall be fully implemented, without prejudice to the more stringent or specific provisions laid down in this JTI.

2. CIRCULATION BY WEIGHTS.

The movement of persons in vats, in cages and on skip platforms, to be carried out as indicated in the ITC SM-IND-17, shall include the particular requirements for each specific installation and shall be included in an internal safety provision (hereinafter referred to as "DIS").

This provision shall lay down the conditions of movement in at least three cases:

a) Circulation of relays.

b) Cordadas isolated from personnel.

c) Review cords.

Other manoeuvres in the same well and on boardings shall only be permitted during personnel lanes if they do not affect the safety of the personnel circulating. If there is more than one extraction system in the well, they can only be concurrent with those for the movement of personnel when there is an effective isolation system between compartments to avoid any incident between them. The simultaneous manoeuvres to be performed shall be specified in the DIS.

3. FIXED LIGHTING AND SIGNALING.

The entrance of an inclined plane, in the transition zones, in the branch joints of the plane and in all curves, as well as stations, boardings and points where there are power heads, return drums and tensioning stations, must have a minimum level of illumination 100 lux and be duly signposted so that personnel are sufficiently warned of its presence.

All shipments used for main transport, extreme or intermediate, of an inclined plane must be suitably illuminated (minimum level 100 lux) and properly signposted. Every inclined plane

must have adequate means of communication between the different shipments and driver or braker. The necessary light, gestural and acoustic signalling shall be fixed in each case.

The signage used must comply with Royal Decree 485/1997 on minimum requirements for occupational safety and health signage.

Any inclined plane equipped with conveyor belts shall be equipped with effective means of communication between the driving head and the return drum of the belt and the transhipment stations of the conveyor belts installed in the intermediate plants.

In the transport of personnel on tapes, the up and down stations shall be illuminated with a minimum level of 100 lux throughout their length and at least 10 m before and after the platforms. In chairlifts, their stations will be illuminated with a minimum level of 100 lux throughout their length. For telemins, the coupling and uncoupling stations shall also be illuminated with a minimum level of 100 lux throughout their length.

The luminaires used shall comply with UNE 22532.

4. CIRCULATION AND TRANSPORT OF PERSONNEL BY INCLINATED PLANS.

4.1. Geometrical construction arrangements for inclined planes.

Particular account shall be taken of safety when designing the geometry of the cross-section and the horizontal and vertical alignment of the underground plane or gallery.

Plans and galleries of length must have only one inclination of the gradient, unless otherwise justified. Vertical agreements (both concave and convex) should be avoided as far as possible, unless there are no high or low points (minimum or relative or absolute maximums along the layout of the plane), the parameter of the agreement itself is very large. The radii in the transition curves will be a function of the transit speed.

Based on the gauges required by the functionality of each type of work, the geological-geotechnical structure of the land, the imperatives of the own facilities and the external contours, all type sections will be defined and justified to meet the minimum conditions of stability and security that the indicated circumstances require.

The type section in inclined planes or galleries with circulation in two lanes, will require a minimum width of:

$$1.0\ m + 3\ A + 1.0\ m$$

If it is a one-way plane, the width of the section shall be:

$$1{,}0\ m + 1{,}5\ A + 1{,}0\ m$$

and, in one-way galleries, the minimum section width shall be:

$$0{,}5\ m + 1\ A + 0{,}5\ m$$

Being A, the width of the equipment or vehicle of greater size that circulates through the work.

Although pedestrian traffic is not permitted either in inclined planes or in galleries with the circulation of equipment or vehicles, sidewalks seventy-five centimeters wide shall be arranged on both sides to facilitate conservation operations. Consideration should also be given to a margin for support to be applied to the standard section. Such support should be stipulated a priori, and should always be the maximum provided for in each type section.

Measures to eliminate or mitigate the possible effect of glare on the driver of the equipment or vehicle at the exit of the plane shall be considered. A minimum level of illumination (100 lux) shall be provided in such a way as to ensure adequate visibility at the entrance of the plane, in the transition zones, at the branch joints of the plane and at all curves.

4.2. Movement of personnel on inclined planes free of transport systems.

Sloping planes with a gradient of more than 25° through which a regular movement of personnel takes place must have a staggered passage of personnel or be equipped with scales and equipped with a bar or cable that serves as handrails.

If their inclination exceeds 45°, these planes shall, in addition, have rests not more than every 10 m, with platforms for protection against falls of persons or objects. Conservation work may not be carried out on them other than on scaffolding or with safety belts.

Intermediate accesses to inclined planes with a slope of more than 30° must be so arranged as to prevent the fall of persons.

4.3. Movement of personnel on inclined planes equipped with rail or monorail rolling transport.

4.3.1. General requirements.

Accesses to any inclined plane in transport service must be closed in such a way that personnel cannot enter the plane unexpectedly.

All boardings on an inclined plane must be arranged in such a way that the wagons can be moved only at the will of the manoeuvrers.

Accesses to the head of the inclined planes and to the intermediate floors shall be adequately protected to prevent wagons from penetrating the slope without being previously attached to the towing element.

On all shipments of an inclined plane equipped with a conveyor platform, a device must, in its normal position, prevent unintentional access of vehicles to the plane; it must be removed only if the platform is correctly placed on board.

The lashing systems of wagons must be designed and maintained in such a way that they do not escape during running.

In galleries where inclined planes lead, precautions shall be taken to ensure that persons cannot be reached by the wagons in their normal gear or in the event of escape. Staff shall be protected during the movement of wagons in transverse galleries or shelters constructed for that purpose. This same protection shall be extended to the manoeuvring personnel of the intermediate floors and of the upper floor, when the access gallery to the head of the plane constitutes with it the same vertical alignment. Niches or barriers shall be provided for the protection of personnel in the event of wagon escape or falling objects when moving downward inclined planes.

Repair or maintenance on an inclined plane shall not be permitted during the operation of the wagons.

The transport of persons using wagons or platforms on inclined planes will not be allowed, unless authorization is available from the Mining Authority, fixing the conditions of this

circulation; Injured or sick persons authorised by the employer are exempted from this prohibition.

In planes inclined by those that usually circulate relays of personnel and that have a difference between heights of more than 30 meters, it will be necessary that the mechanical transport system is authorized by the Mining Authority.

In inclined planes equipped with ro-ro transport systems, the transit of personnel shall be permitted only when the transport does not operate.

4.3.2. Machines and winches.

Extraction machines or winches in the service of inclined planes shall be equipped with lever and counterweight brakes, prohibiting the use of devices that prevent their proper operation. In addition, they will have another brake that regulates the gear more perfectly; They shall also have a speed controller driven by the drum shaft to prevent packing.

The installation shall be arranged in such a way that the driver cannot be reached by ascending wagons and is also protected from moving cables.

Drivers in charge of driving a winch should not move away from it without having cut off the engine power and verified that the brake is effectively tied.

The same criteria as those indicated for extraction facilities shall be used for the maintenance of inclined-plane installations in which personnel are permitted to be transported. The personnel operating the extraction machines or winches shall be persons of proven mining experience.

4.4. Movement of personnel on inclined planes equipped with conveyor belts.

4.4.1. General requirements.

Movement of personnel along inclined planes equipped with a conveyor belt shall be permitted provided that there is a remote command along its entire length and a lateral free passage of at least 80 cm.

The remote signalling or command system shall not be required where the conveyor belt and the staff passageway are separated by a fence preventing access to the belt compartment.

It is forbidden to cross, above or below, a conveyor belt, unless at those points duly equipped for it and indicated to the personnel.

It is prohibited to carry out any intervention on a conveyor belt in progress or in its immediate vicinity.

Loading and unloading of auxiliary material on a conveyor belt must be carried out only if the belt is stopped. However, if the material is light enough to be handled by a single person, it can be loaded and unloaded on the go if the staff has sufficient space.

When the slope of the inclined plane is such that falls and / or projection of blocks of the conveyor belt can be expected, the necessary measures must be taken to remedy it (decrease in speed, mode of feeding, enhancements, partitions, etc.).

4.5. Movement of personnel on inclined planes equipped with other transport systems.

Due to the difficulty of establishing rules for the movement of personnel on inclined planes equipped with other transport systems, as a result of the wide variety of existing

procedures, a DIS will reflect the rules of movement. As a general rule, the movement of personnel through inclined planes and galleries with the circulation of heavy or stray vehicles, both rigid and articulated, will be restricted in its entirety, and will only be allowed in exceptional cases.

5. MOTOR VEHICLES.

5.1. General conditions of employment.

As specified in article 21 of the Mining Safety Regulations, a DIS will be drafted to regulate the conditions of circulation, including circumstances such as:

a) Beacons, senses of circulation, overtaking.

b) Movement of personnel through galleries where trains or motor vehicles operate.

c) Speeds of trains or motor vehicles.

d) Braking, inversion and running distances of trains.

The commissioning of these equipment shall comply with the provisions of ITC SM-IND-10, and in any case they may only circulate in galleries where the proportion of grisu is less than 1 %.

If the mine is classified in the third category, internal combustion engine vehicles may only circulate in galleries whose air flow has not passed through operating blocks.

5.2. Fuels.

Fuel storage and equipment loading will be done in fireproof chambers, well ventilated and equipped with fire prevention elements. They shall be at least 5 metres from any trawl gallery and shall have an insulation system that prevents risks to the rest of the mine in the event of a fire.

5.3. General operating conditions.

When running in the same direction as ventilation, the driver shall adjust the speed of the vehicle to be different from that of the air, to facilitate the dilution of gases.

If for any reason the ventilation in the place where they are working is interrupted, the engine must be stopped immediately.

5.4. Other vehicles.

For the use of other types of vehicles, their approval by the Mining Authority will be mandatory.

5.5. Trains.

5.5.1. Gauges.

The galleries where trains run will be at least 80 cm wider (of which 60 cm will always be on one side) and 25 cm higher than the locomotives in circulation. It is understood that the above measures will be free from any rigid obstacles.

5.5.2. Hook up.

The joining devices shall allow for coupling and uncoupling operations in such a way as to avoid the risk of any part of the body being trapped between boxes or between stops. The couplings shall be designed so that they cannot be easily released during running.

5.5.3. Revisions.

A review of all rolling stock shall be carried out annually by completing the operation log.

5.5.4. Signalling.

Trains shall be equipped with audible warning signals, fixed head lighting and continuous red tail light signalling.

5.5.5. Movement of personnel.

In no case shall staff be allowed to ride on the stops, except if a person performs the functions of a hooker, which may be mounted only on the last stop of the train.

5.6. Gauges and protection niches.

In the case of tracked or pneumatic vehicles, in addition to having the precise gauges for the circulation and maneuvering of the same, protection niches will be established for the personnel according to the layout of the gallery.

5.7. Transport of personnel on trains carried by locomotives.

The minimum safety requirements for the transport of personnel by train, in horizontal galleries or with a non-automotive slope are detailed below.

5.7.1. Special conditions for the transport of personnel by train.

In the case of transport of personnel by train, the DIS governing the conditions of movement shall include the following requirements:

1. The transport of personnel by galleries can only be done in wagons for exclusive use for this purpose.
2. These wagons shall have an indicative distinction of their use for personnel, and shall be provided with seats in solidarity with their structure.
3. Wagons shall have the same type of coupling, not being used as such, foreign elements.
4. The place marked as usual to get on and off will remain free of materials or any impediment that hinders access to the train.
5. There will always be a train manager, who will ensure compliance with safety standards, and indicate when to start or stop and who can use this transport.
6. It is forbidden to climb and descent trains and travel at the stops, except if someone performs the functions of hooker, which can only ride on the last stop of the train.
7. The speed of changing trains, places of reduced visibility, crossings with staff, crossings with other trains and when danger signs are found will be reduced, stopping if necessary.
8. The maximum running speed shall be established according to the characteristics of the material, the condition of the tracks and the layout, and shall be included in the project.
9. All hitches will be checked before the train starts running.
10. Before starting, the driver shall ensure that, from his position, he has visibility of the

train as a whole while being straight.

11. During driving, no part of the body shall be removed from the wagon gauge or the driver shall be removed from the machine.
12. Trains with personnel shall not perform recoil manoeuvres.
13. Before being put on the train, in the case of a train of personnel, everyone travelling on the train shall be put off and kept away from the operation, except those who are going to intervene on the train.

5.7.2. Specific conditions for the transport of personnel by train carried by locomotive fed by contact wire.

When the electric locomotive towing the train receives the current by means of contact wire that can be accessed by the personnel, in addition to the measures already indicated in the previous paragraphs, the following shall be added:

1. In the places of ascent and descent of personnel, both in the contact wire and in the feeders, if any, switches-switches will be placed that will be handled exclusively by the driver.
2. Tension will be cut off when personal goes up or down.
3. No one will get on or off the train as long as the person in charge does not give the order and the tension has been cut.

6. TRANSPORTATION OF STAFF IN CINTAS.

6.1. Limits of use.

6.1.1. Maximum speed.

The maximum speed of the band for the transport of personnel must be less than or equal to 2,7 m/s.

6.1.2. Maximum slope.

The slope of the belt must be less than or equal to 16° when personal transport is carried upstream.

The slope of the band when personal transport downstream must be less than or equal to:

a) 12° for belt speeds greater than 2 m/s.

b) 16° for belt speeds less than or equal to 2 m/s.

6.2. Features of the band.

The flexible band used for the transport of personnel must meet the following conditions:

a) In its dimensioning, a safety coefficient greater than or equal to 10 shall be adopted for the transport of ore and full load grubbing-up.

b) The fittings shall be vulcanised and sized with a safety coefficient greater than or equal to 7 for ore transport and full load start-up.

c) Its width must be greater than or equal to 800 mm and shall comply with the

provisions of standard UNE-EN 14973.

The use of bands of 750 mm is permitted, but with a transport speed less than or equal to 1,5 m/s.

6.3. Construction rules.

6.3.1. Up and down platforms.

6.3.1.1. Placement.

The up and down platforms shall be installed attached to and parallel to the tape structure, ensuring the stability of the whole.

The floor layout of the up and down platforms in relation to the tape shall be as specified in Figures 1 and 2.

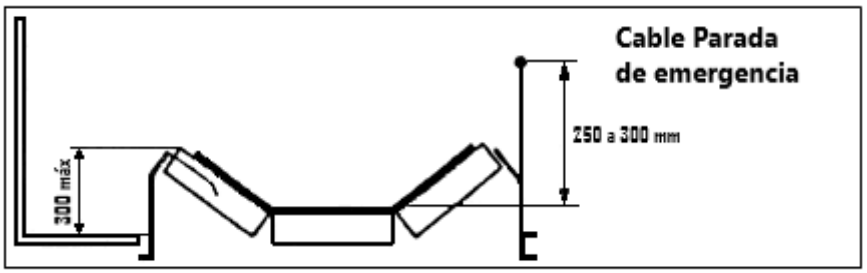


Fig. 1. Side climbing platform. Provision.

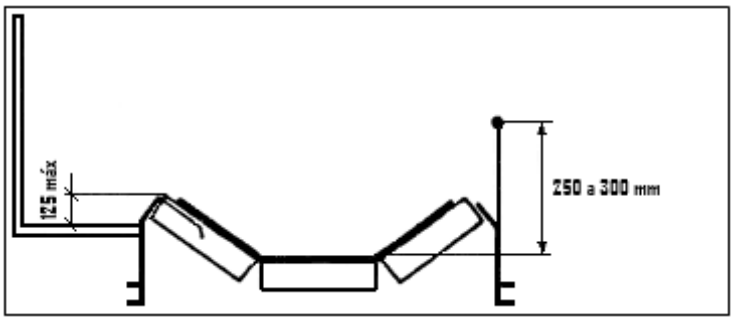


Fig. 2. Downhill platform. Provision.

6.3.1.2. Pending platforms

The maximum slope of the tape in the stations and therefore that of the up and down platforms must be less than or equal to:

- 8° when personal transport downstream.
- 12° when personal transport in the upstream direction.

The slope of the belt shall remain less than or equal to the above limits within 20 m after the climbing platforms in the direction of movement of the personnel transport branch and within 20 m before and within 10 m after the descending platforms in the same direction of movement.

6.3.1.3. Dimensions

The minimum length of the lateral climbing platforms, measured in the direction of belt movement, shall be 1500 mm and their minimum width 500 mm.

The minimum length and width of the central climbing platforms shall be 500 mm.

The length of the descent platforms shall be greater than or equal to five times the band speed in m/s at least 6 metres.

6.3.1.4. Protections and safeguards

All central climbing and lowering platforms shall be equipped with guardrails to prevent the fall of personnel. Where their height above the ground is greater than 500 mm, they shall be equipped with stairs or other means of access.

Side climbing platforms shall be equipped with guardrails and stairs or other means of access, when their height above the ground is greater than 500 mm.

Side-up and downhill stations shall be fitted with roller guards to prevent accidental contact by personnel when climbing on the belt, or the insertion of the foot between the belt and the rollers when descending from the belt.

Central climbing platforms should have a tilting part that facilitates the entry of staff into the band. Its dimensions and position in relation to the tape must be those detailed in Figures 3a and 3b.

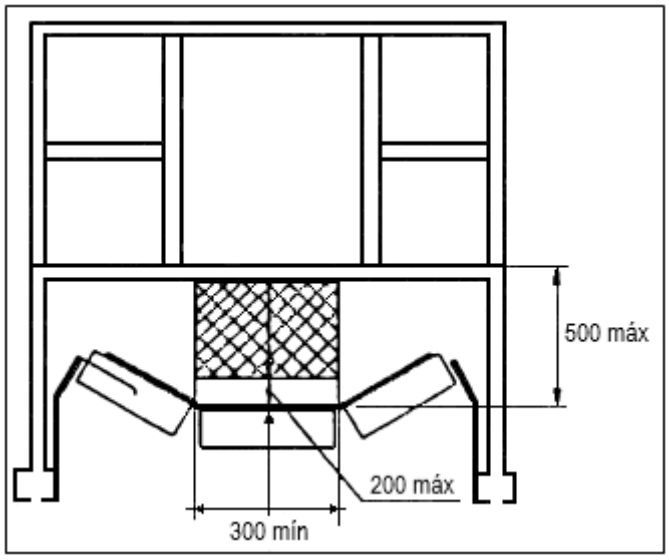


Fig. 3rd. Central climbing platform. Placement (front view).

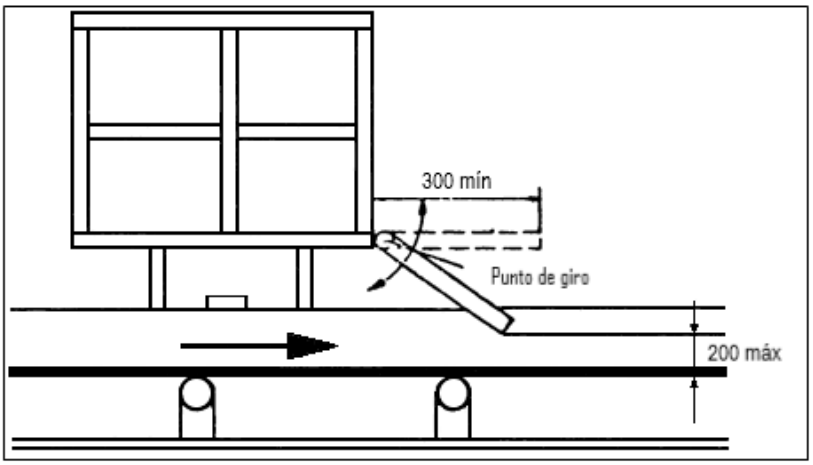


Fig. 3b. Central climbing platform. Placement (side view).

6.3.1.5. Materials

The materials used in the construction of the platforms should preferably be steel products.

The floor of platforms and access stairs and ramps shall be of tramex type grid or other product of difficult sliding on its surface.

6.3.2. Gauges at up and down stations.

6.3.2.1. Transport of personnel on the upper branch.

The gauges shall be as detailed in Figure 4 and in the table below.

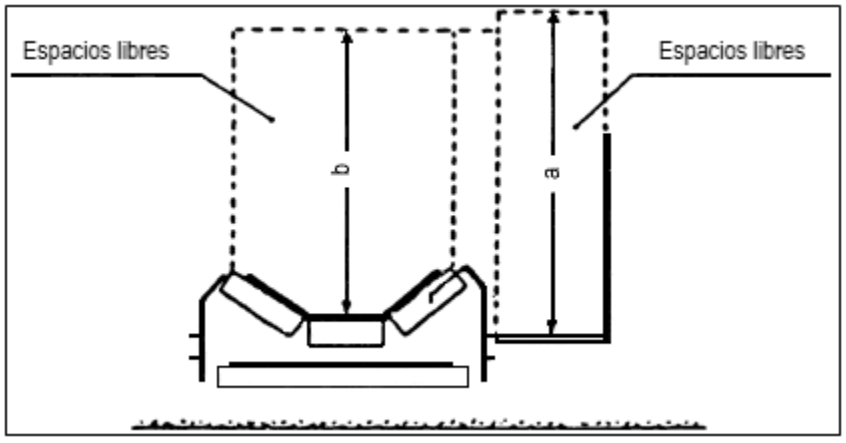


Fig. 4. Platforms of lateral ascent and descent.

	Climbing platforms (mm)	**Downhill platforms (mm)**
a	minimum 1,500	minimum 1,600
b	minimum 1,100	minimum 1,600

The free spaces indicated shall be exempt from any element likely to hinder the staff.

6.3.2.2. Transport of personnel on the upper and/or lower branch.

The corresponding gauges are detailed in Figure 5 and in the table below.

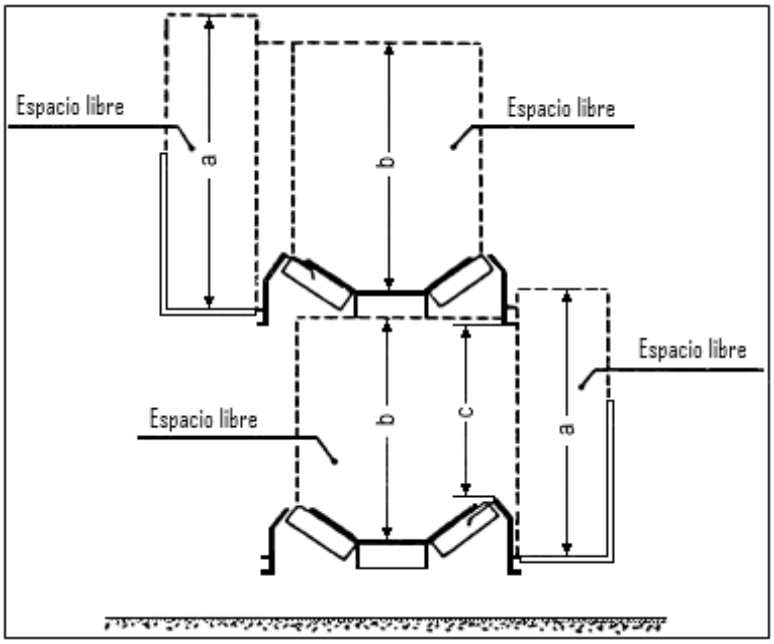


Fig. 5. Up and down platforms. Gauges.

	Climbing platforms (mm)	**Downhill platforms (mm)**
a	minimum 1,500	minimum 1,600
b	minimum 1,100	minimum 1,600
c	minimum 1,000	minimum 1,500

The free spaces indicated shall be exempt from any element likely to hinder the staff.

6.3.3. Gauges along the tape.

They shall be as shown in Figures 6a and 6b (in mm).

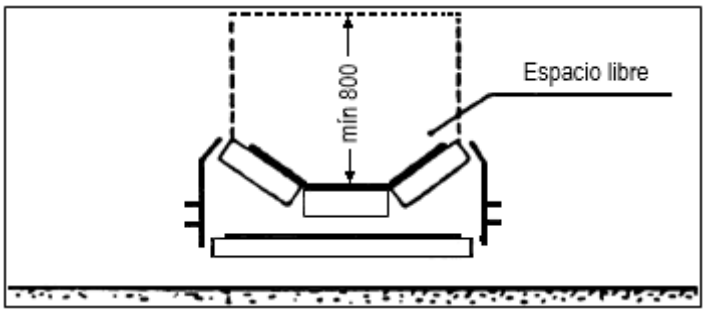


Fig. 6th. Transport of personnel on the upper branch. Gauges.

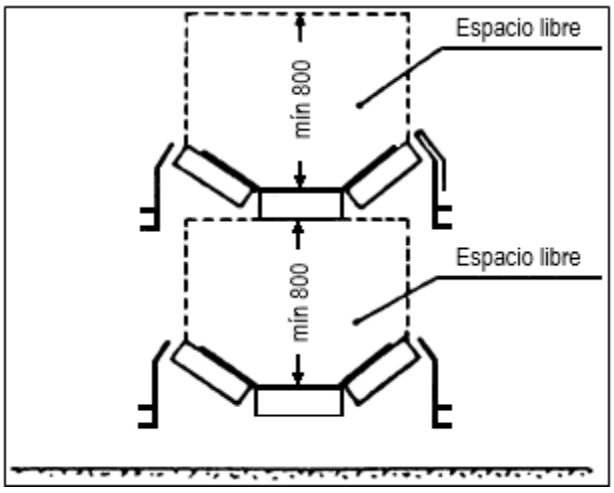


Fig. 6b. Transport of personnel in the upper and lower branch. Gauges.

The free spaces indicated shall be exempt from any element likely to hinder the staff.

6.4. Safety devices.

6.4.1. Signals and indicators.

a) A green light signal shall be installed in front of the climbing station and in a place clearly visible to the staff, indicating the authorisation for the transport of staff.

b) A red light signal shall be placed at the end of the descent platform, in a place clearly visible to the staff on the tape, and shall be permanently lit.

c) There shall be a start warning optical or acoustic signalling system along the tape. The minimum delay between signalling and starting shall be 10 s.

d) Along the belt a communications system will be installed with its command post, understanding as such the place from where the gait and stop maneuvers are carried out.

The communication system shall have headphones or transmitter receivers in place:

i. Every 150 m at most along the path of the belt.

ii. At all up and down stations.

iii. At the ore loading points on the tape.

e) The signs and indicators in Figures 7a and 7b shall be placed in the following places:

i. In the climbing stations and in a very visible place.

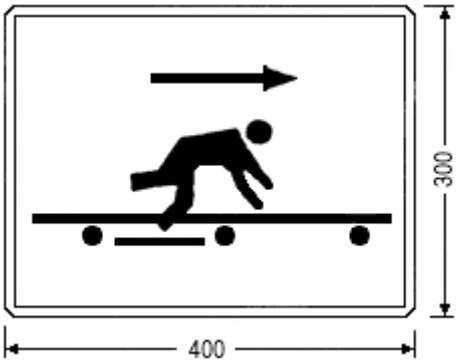
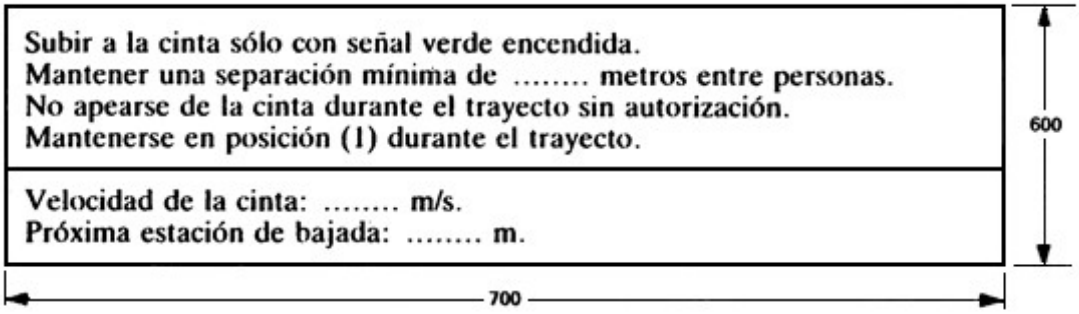


Fig. 7th. Poster indicating the rising position and direction of transport (measured in mm).



(1) Tendido boca abajo en el centro de la banda (caso de transporte ascendente). Sentado en el centro de la banda (caso de transporte descendente).

Fig. 7b. Instructions (measured in mm).

ii. Before the descent stations and in a place well visible from the position occupied by the personnel on the tape, the indicators of figures 8a and 8b will be placed.

Fig. 8a. Indicator of descent station at 20 meters and direction of exit of the tape (measured in mm).

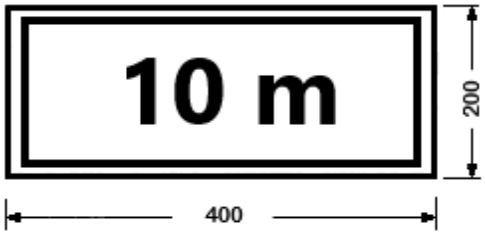


Fig. 8b. Indicator station descent to 10 meters (measured in mm).

All posters shall be reflective and illuminated or have their own illumination.

6.4.2. Automatic tape stop devices.

All conveyor belts used for personnel transport must have the following automatic stop devices.

a) Pull-type emergency switches, lying along the entire belt between the power drum and the forwarding drum, positioned in such a way that they are easily accessible to personnel from the normal position they occupy on the belt during transport and at the up and down stations. This switch must comply with standard UNE-EN 60947.

b) Band slip control device.

c) Belt misalignment switches, placed at least on the driving head and in the forwarding.

d) Overpass protection switches of descent stations, placed at least at a distance from the power drum or forwarding equivalent to twice the maximum travel of the belt to its complete stop, with a minimum of 8 m and 2 m from the end of the descent platform. The construction of such switches should be such that:

   i. Ensure the automatic stop of the tape when a person passes through the point

where they are installed.

ii. They are mechanically or electrically interlocked and can only be rearmed by acting directly on these switches.

6.5. Safety standards.

6.5.1. Rules of use.

A DIS shall regulate the transport of ore and personnel on tapes, taking into account the general rules of this paragraph.

No other type of mechanical drag running parallel to the belt and in the same gallery shall be in operation during the transport of personnel.

6.5.1.1. Transportation of ore.

Simultaneous transport of personnel and ore shall be permitted under the following conditions:

a) That the slope shall be equal to or less than 16°.

b) That it is demonstrated in the project and verified in the installation the impossibility of the recoil of the ore on the band.

c) The distance of the load to the personnel in the normal position they occupy during transport on the belt is greater than 5 m.

d) Do not load ore onto the belt at intermediate points in the personnel transport section.

6.5.1.2. Staff with proven mining experience.

a) At least one person with proven mining experience, knowledgeable about the transport system and its security features, designated by the employer to perform the following functions, shall be assigned to each group of persons transported on the belt:

i. Authorize the personnel of the upload to the tape in the corresponding stations.

ii. Authorize the rise or fall of the personnel of the tape at any point of the journey as a result of any anomalous or emergency situation that had occurred.

iii. Reassemble safety devices and communicate with the tape command post.

iv. Control the descent of personnel at the corresponding stations.

b) Another person with proven mining experience, and appointed by the entrepreneur, must occupy the command position of the tape or tape system to perform the following functions:

i. Issue signals or communications warning of the start of transport of personnel on the tape.

ii. Activate the personnel transport authorisation light signals.

iii. Communicate to the responsible persons of group in the stations of rise the

authorization of rise of the personnel to the tape.

iv. Before the start of the transport of personnel, request from the guard in charge of the transport system the authorization to use the belt for the transport of personnel.

v. After any stop of the belt by operation of the safety devices or by any other anomaly, request from the guard in charge of the transport system authorization for the continuation of the transport of personnel.

c) The employer shall designate the supervisors of the transport system he deems appropriate, whose tasks are as follows.

i. Before the start of the transport of personnel or after any stop due to the operation of the safety devices or any other anomalous situation, authorize those responsible for the command posts to use the belt for the transport of personnel.

ii. Receive the inspection parts of the state of the transport facility carried out by the maintenance service.

d) A DIS will regulate the transportation of personnel on the tapes, including individual transportation or in small groups.

6.5.1.3. Staff obligations:

a) It is mandatory that all personnel to be transported on tapes be trained on their proper use; In particular, they must be instructed on how to get on and off the belt, the correct position to be maintained during transport, the safety and signalling systems and the rules of use set out below.

b) All personnel transported on tapes must observe the following safety standards:

i. Before getting on or off the treadmill, observe the signs indicating the position to be adopted to carry out these maneuvers (meaning of the transport and position of the stations).

ii. At the climbing stations, no person will climb on the belt until authorized by the person in charge and observe the green light of personnel transport authorization on.

iii. During transport, no person may get on or off the belt without the express authorization of the person in charge, except in emergency situations.

iv. Staff should not park on descent platforms.

v. During transport, the personnel shall be placed facing the forward seating of the belt and in a lying position in the case of ascending transport, or seated in the case of descending transport.

vi. During the tour all staff will carry the helmet lamp lit and placed correctly on it.

vii. Each person shall be kept in the centre of the band and shall ensure that all parts of his or her body, clothing and personal protective items or small utensils carried with him or her are placed within the confines of the band.

viii. Tools or utensils that may pose a risk to personnel may not be transported.

ix. During transport, persons shall keep a distance from each other of at least 5 m.

6.5.2. Inspection of the tapes.

a) The tapes shall be inspected daily and weekly by the maintenance staff as follows. The observed anomalies shall be reported to the transport system monitor and shall be reflected in the safety and health document. The actions related to the correction of the observed anomalies must be contemplated in the DIS.

b) The tape inspection shall cover at least the following points:

i. Daily inspection.

It shall be verified on a daily basis that:

- The band does not present holes, or tears or any other similar type of damage. All fittings are in perfect condition.
- The band supports all the rollers along its path.
- There are no ore spills or obstacles along the belt that could prevent the safe operation of the conveyor system.
- The safety devices work correctly and after their operation the tape stops in the intended space.
- Staff up and down platforms are in perfect condition and free of any defects that may compromise staff safety.

ii. Weekly inspection.

Every week it must be verified that:

- The rollers are in good condition and working properly.
- The lateral wear of the belt does not exceed 10 % of its nominal width.
- The cables or suspension elements of the tape (case of hanging tapes) are in perfect condition.
- The gauges in the stations and along the route are within the established limits.
- Alignment devices work properly when the band is separated 75 mm from its normal position.
- Sliding control devices work properly. The belt brake system is in perfect condition.

6.6. Authorisation for the transport of personnel on tapes.

In order to obtain authorization for the transport of personnel on tape, the entrepreneur must submit to the Mining Authority, a project for each particular installation, as specified in ITC SM-IND-15, in which compliance with the requirements of this ITC will be technically justified. This document shall include a DIS that regulates the use of the transport system and provides for at least the provisions of paragraph 6.5 of this JTI.

7. TRANSPORTATION OF STAFF BY AIR TRACTOR CABLE.

7.1. Scope and definitions.

This paragraph lays down the safety conditions to be complied with by installations for the transport of personnel by air-tractor cable used inside mines. It applies to chairlifts and telemins used exclusively for the transport of personnel.

For the purposes of this section, chairlifts are defined as personnel transport cable cars with continuous unidirectional or bidirectional movement, monocable, with open vehicles (chairs), with automatic or fixed coupling and with automatic control in the station.

Likewise, it is defined as chair, the single-person open vehicle that is coupled to the chairlift cable and is defined as telemina, the personnel transport cable car with single-way continuous movement, without vehicle, with automatic control station in the station (mount-pending). The person is attached to the tractor cable by means of a detachable individual system.

7.2. Chairlift.

7.2.1. Tour.

7.2.1.1. Location.

The site must be chosen knowing the problems of detachment, swelling, access of vehicles or materials to the area of the route so that, taken appropriate measures, the facilities, factory works and transport safety are not altered.

7.2.1.2. Outlined.

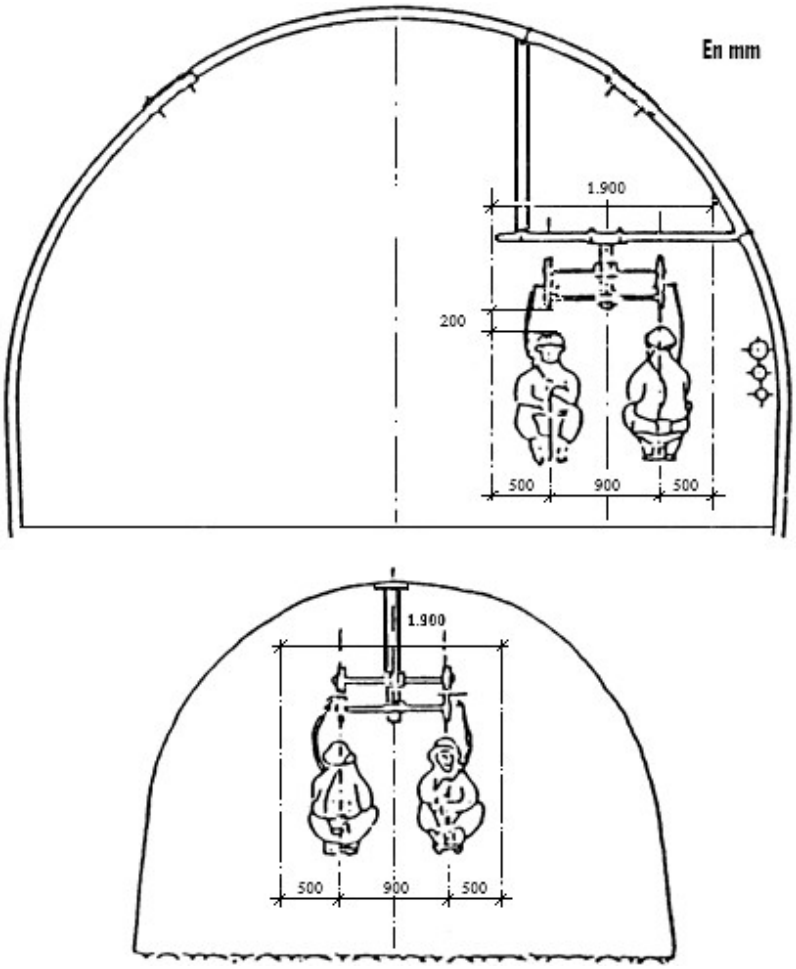
The plan of the route may have a maximum deviation per support of up to thirty sexagesimal minutes, provided that the stability of the whole is guaranteed. In duly justified cases, greater deviations may be accepted, taking appropriate measures in the supports that correspond to the importance of the angle of deviation.

7.2.1.3. Gauge.

Transversal: along the entire length of the chairlift there must be an obstacle-free lateral space of at least 0,5 m measured from the vertical of the cable. For double-circulation chairlifts, the central clearance shall be at least 0,9 m, defined by the distance between the cable support pulleys.

Vertical: along the route a minimum obstacle-free height of 0,2 m between the lowest point of the chair and the ground should be ensured, considering a possible swinging movement of 20°. This free height cannot be greater than 1.5 m.

The distance between the pulleys and the hull of a person 1,70 m high, placed in the chair in the normal transport position, shall not be less than 0,2 m.



7.2.2. Circulation.

7.2.2.1. Speed.

The speed of operation will depend on the characteristics of each installation, taking into account the type of fixation of the chair and especially the modalities foreseen for the embarkation and disembarkation of the personnel.

The maximum speed shall not exceed 3 m/s, although higher speeds may be requested under special conditions, provided that equivalent safety conditions are maintained.

7.2.2.2. Pending.

The permissible slope shall depend on the system of attachment of the chair to the cable. It shall be calculated so that the fixing system has a sliding safety coefficient of three under the operating conditions. The whole fastening system shall comply with JTIs SM-COM-04 and 05.

7.2.2.3. Interval between two chairs.

The separation interval between two consecutive chairs shall be calculated on the basis of ease of embarkation and disembarkation. This longitudinal separation interval must comply with:

$$L \geq V \times t$$

Being:

L= Length between chairs.

V = Speed of the chairlift.

t = Upload time.

(The rise time to consider should not be internal to five seconds.)

7.2.3. Supports.

7.2.3.1. Dimensioned.

In the dimensioning of the supports, the following requests must be considered:

a) Your own weight.

b) The set of cable fairings.

c) The dynamic effects due to the passage through pulleys of the chairs (vibrations, shocks, etc.).

d) Dynamic effects due to accelerations and braking.

In any case, they shall be dimensioned with a minimum safety coefficient of 3 with respect to the breaking voltage of the material and starting from the maximum static working load.

The anchorages of the supports shall be dimensioned with a minimum safety coefficient of 1,5 for sliding, turning or starting, starting from the maximum static working load.

7.2.3.2. Construction.

The supports shall preferably be constructed of steel or reinforced or prestressed concrete. When open metal profiles are used, their minimum thickness shall be 5 mm, and when 2,5 mm are closed, their interior being duly protected against corrosion.

The pulley trains shall be adjustable in orientation in order to allow their alignment with the cable and the uniform distribution of the fairings. The design of the support and guiding pulleys should be such that the passage of the chairs is as smooth as possible.

7.2.4. Cables.

7.2.4.1. Characteristics.

The cables used must be made of anti-gyro cord steel and where possible galvanised and not greased.

7.2.4.2. Dimensioned.

For the sizing of cables, account shall be taken of:

a) The pre-tension corresponding to the counterweight, if any.

b) The weight of the cable itself.

c) The loads applied, assumed to be uniformly distributed throughout the installation and assumed to have an average slope.

d) The resistances to movement offered by the elements of the line, adopting an overall friction coefficient of 0.03.

e) Braking and acceleration forces.

f) The calculation shall be based on a weight per person of 800 N. The following shall be taken as a safety factor:

   i. 4.5 if there is a counterweight.

   ii. 5.5 otherwise.

g) For wire ropes, this shall not be taken into account for the purpose of calculating strength.

7.2.4.3. Splices.

Cables in a mine chairlift installation may carry up to a maximum of four fittings, subject to the following conditions:

a) The length of the splice shall not be less than 1,000 times the diameter of the cable to be spliced.

b) The distance separating the ends of two consecutive splices shall not be less than 3,000 times the diameter of the cable.

c) They must be carried out by specialized personnel.

7.2.5. Shipments.

In the chairlifts, the areas intended for embarkation and disembarkation of personnel at the enginehead and return sites shall be differentiated, so that the latter are not accessible and protected.

All embarkation and disembarkation stations will have a chair storage area, with a chair capacity equivalent to the largest relay.

Whenever boarding or disembarking walkways are placed, they shall have a minimum width of 0.45 m and a minimum length of 6 m. They shall have railings of 0.90 m in height, provided that the height of the walkway is greater than 0.50 m above the level of the gallery floor.

7.2.6. Chairs.

The characteristics of the chairs and the materials used in their construction must be adequate, depending on the type of installation, to ensure the safety of the staff and their comfort. The maximum possible visibility, compatible with the above conditions, shall be ensured.

7.2.6.1. Constitution.

Chairs are generally made up of the following parts:

a) Element of attachment of the chair to the tractor cable.

b) Structure of union between clamp and seat.

c) Seat and footrest.

Tweezers can be supportive or temporary binding. In any case, the provisions of paragraph 7.2.2.2 shall be taken into account with regard to slippage, as well as any damage it may cause to the towing cable. The chair shall be attached to the clip with an articulated system, so that it is always in an upright position regardless of the inclination of the tractor cable. The chair must

be designed in such a way that it is easy to attach and unhook it from the cable or it would leave in case of imminent danger.

7.2.6.2. Safety coefficient.

All the elements related to the chair, its suspension and its connection to the tractor cable must be dimensioned with a safety coefficient of not less than 5, taking into account the main loads acting on them.

7.2.6.3. Fixing systems.

The hooks of the chairs with the cables can be made by means of fixed jaws, automatic jaws or devices that act by friction or other devices that offer sufficient guarantees of safety.

7.2.7. Drive group.

7.2.7.1. Calculation of the elements.

The dimensioning of the drive group elements shall be carried out in accordance with the provisions of the project and paragraphs 7.2.1 and 7.2.2 of this JTI.

7.2.7.2. Pulleys.

The diameter at the bottom of the throats of the driving and forwarding pulleys shall be at least 40 times the nominal diameter of the cable. The depth of the throats should be greater than or equal to 2.5 times the diameter of the cable.

The adhesion between the cable and the drive pulley must be such that the maximum tangential force that occurs in service can be safely transmitted to the cable. For this purpose, the value of this tangential force shall be increased by 25 % in the calculations.

7.2.7.3. Safety requirements.

7.2.7.3.1. Operating conditions.

a) The speed variation of the chairlift according to the conveyor load shall not exceed ± 5 per cent of its rated speed.

b) Both at the start and at the stop, the non-reversal of the direction of movement of the chairlift must be guaranteed.

7.2.7.3.2. Brakes.

a) The movement of the chairlift shall always be carried out under the control of the main tow engine.

b) The driving group must be fitted with at least one manoeuvring brake and another with a safety brake.

c) The brakes shall be capable of braking the chairlift with a maximum deceleration of 2 m/s^2 in any service condition. In any case, the maximum travel until the total braking of the chairlift must be less than or equal to 2/3 of the distance between consecutive chairs.

d) The safety brake shall act directly on the driving pulley. It must be able to operate manually and automatically, but always driven directly by the force of several springs or one or more counterweights.

e) The maximum brake actuation delay shall be 0,3 s.

f) The safety brake shall operate automatically when the power supply to the lifting engine fails.

7.2.7.3.3. Safety devices.

a) There shall be a speed limiter, interlocked with the safety brake, so that it causes its action when the speed of the chairlift exceeds 10 % of its maximum speed.

b) Intensity or pressure limiter that prevents the chairlift from running when the load exceeds the service load value by 15 %, except for temporary start or stop overloads.

7.2.7.3.4. Safety requirements for oleohydraulic installations.

Drive groups using oleohydraulic systems for their operation shall comply with the following conditions:

1. The safety brake may not be loosened if:
    i. The minimum feed pressure is not reached in the main drive motor or manoeuvring brake circuit.
    ii. The level of hydraulic fluid in the tank drops below the set minimum. The hydraulic fluid temperature exceeds its limit value.
2. In case of pipe breakage, failure of the pump drive motor or lack of pressure in the circuit or low level of the hydraulic fluid in the reservoir or excessive temperature of the fluid in the reservoir, the hydraulic drag motor shall be separated from its supply circuit and the safety brake shall be automatically triggered.

7.2.8. Tensioning device.

The cable voltage must be regulated by counterweights or equivalent devices.

The characteristics of the counterweights and the displacement of the counterweights shall be calculated taking into account the maximum variations that may occur in the arrows of the cable in the different spans due to the effect of the loads and the elastic lengthening of the cable.

Spaces intended for the displacement of counterweights and whenever considered appropriate, should be protected from water, landslides, etc., in order to prevent the race essential for the free movement of counterweights from being reduced. It is recommended to mount elastic stops at the ends of the routes.

Reference markings shall be installed in a clearly visible position so that the displacement of the counterweights can be easily seen.

The facilities where the counterweights are located shall be easy to monitor and shall be arranged or marked in such a way as to prevent access by persons outside the service.

7.2.9. Other facilities.

Intermediate or curved stations can be allowed, filling in the first, the requirements of the boarding, and solving, in the second, the lateral movements and the swing of the chairs.

7.2.10. Installation security elements.

7.2.10.1. *Security dispositi vyou.*

All following safety devices shall cause automatic operation of the safety brake of the chairlift driving group.

a) Emergency stop switches of the pull type shall be installed along the chairlift and shall be easily accessible to staff from the normal position they occupy in the chair during transport; such switch must comply with UNE-EN ISO 13849-1:2007 and UNE-EN ISO 13850:2007. The pull cord shall be provided with an outer cover to prevent injury to the fingers or hands when operated. The rearmament of these switches may be automatic, provided that there is a minimum delay of 30 seconds between the shutdown and the re-start of the installation.

b) Along the route, a communications system will be installed that may consist of radiotelephones, telephones or genephones, with headphones or transmitter receivers. They shall be placed:

    i. Every 150 meters, at most, along the route. At all embarkation and disembarkation stations.

    ii. In all the curves.

c) Automatic cable-operated devices (switches or sensors) shall be installed on drive and forwarding pulleys, curves and embarkation and disembarkation stations when exiting the pulley or guide throats.

d) A DIS shall be available on each farm to regulate the operation of the facility and to define at least:

    i. The obligations of personnel on boarding and disembarking.

    ii. Behavior in transport.

    iii. Transport of parts.

    iv. Its use in case of evacuation and rescue.

7.2.10.2. Posters and indicators.

a) A clearly visible sign indicating the proximity of the disembarkation station shall be provided 30 m from the disembarkation station. Posters may be reflective, illuminated or with their own lighting.

b) At boarding stations and in a clearly visible place, a sign shall be affixed with the necessary indications concerning:

    i. The obligations of personnel on boarding and disembarking. Behavior in transport.

    ii. Transport of parts.

    iii. The characteristics of the installation (speed, maximum transport capacity, distance to the next station, etc.).

    iv. Whenever in the circuit there is an intermediate landing station or a curve, a reflective or illuminated sign must be placed indicating the proximity of that station.

7.2.11. Conservation.

Both the installation and the accessory elements shall be kept in a good state of cleanliness in order to facilitate their monitoring and ensure their safety.

Daily and before starting the service a tour will be made in the installation to ensure its normal operation.

The cable shall be inspected according to the following standards:

a) The external appearance of the cable (breakage of wires, corrosion, wear, abrasion, alterations in the cords and wiring, etc.) will be examined weekly.

b) In addition, the internal state of the cable will be monitored, using systems authorized by the Mining Authority.

c) The cable shall be replaced when the reduction of the metal section, measured at a reference length relative to the metal section of the new cable, has exceeded the percentages given in the table below. This reduction of section over the length considered is obtained by totaling:

   i. The section of the broken yarns (a yarn with several breaks in the reference length shall be counted only once).

   ii. The decrease of section corresponding to wear and corrosion (for each thread the maximum decrease within the reference length must be counted).

   iii. The loosening of threads or cords, modification of the steel structure and other damages, which cannot be measured exactly, will be assessed by estimation, establishing a reduction of section that will be assumed equivalent. Strongly damaged wires are considered as broken.

Reduction of section	Reference length
25 %	500 Ø
10 %	40 Ø
6 %	6 Ø

The reference lengths given in the table are expressed in multiples of the cable diameter (Ø). The normal values shall be applied for wear and tear which is also due to normal operating and service conditions. The exception values shall be taken when there has been a strong wear or abnormality in a small length. Special values will be accepted when localized wears covering a certain length occur, especially on moving cables.

d) If the rate of degradation of the cable is particularly rapid, the rate of examination referred to in subparagraph (c) should be increased.

e) The chairlift shall be equipped with a slow manoeuvring device for inspection, with a maximum speed of 1 m/s.

7.3. Teleminas.

7.3.1. Limits of or tilization.

7.3.1.1. Maximum speed.

The cable speed must be less than or equal to 4 km/h.

7.3.1.2. Outlined.

The inclination of the circulation path of personnel hooked to the cable must be between 0° and 25°.

7.3.2. Cables.

7.3.2.1. Dimensioned.

Steel ropes of cords, anti-gyro, not greased and whenever possible galvanized will be used.

The breaking load of the new cable must be greater than or equal to the value obtained by the formula:

$$C_R = S \times T$$

where:

S = 4.5 (safety coefficient).

T = Static voltage of the cable.

7.3.2.2. Static cable voltage

The value of the static voltage T must satisfy the following condition:

$$T \geq 1.32 \times N \times P \times \text{sen } \alpha$$

where:

N = Maximum number of persons to be transported per rope.

P = 800 N (weight per person).

α= Road inclination in sexagesimal degrees.

7.3.3. Construction rules.

7.3.3.1. Gauges.

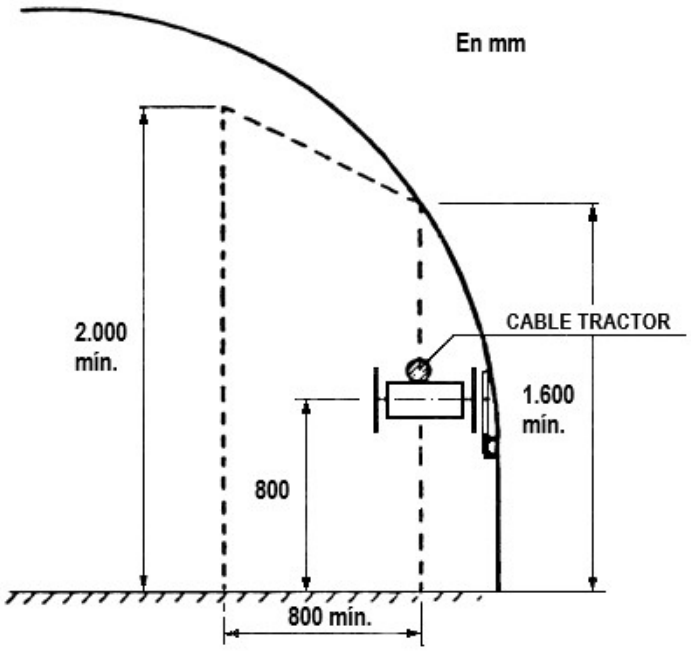


Fig. 9. Road gauges (dimensions in mm).

The minimum free spaces indicated shall be exempt from any element likely to hinder the staff.

7.3.3.2. Rollers.

The normal roller spacing for the tractor branch shall be less than or equal to 10 m.

The distance between retractable rollers on the forwarding branch shall be less than 15 m.

The alignment between supports shall be such that the cable does not rub on the roller flanges and rests on all of them along the path. When changing slope or direction, additional rollers shall be fitted for guiding the cable.

7.3.3.3. Protections and protections.

7.3.3.3.1. Circulation road.

The floor that constitutes the way of movement of the personnel must be free of obstacles (steps, lanes, etc.), and be as uniform as possible. In areas where there may be a risk of slipping on the floor, the necessary precautions should be taken (e.g. by extending a layer of gravel).

7.3.3.3.2. Forwarding cable.

The forwarding cable must be arranged in such a way that it does not pose a risk to staff (e.g. by guiding them through the top of the gallery at an above-ground distance of not less than 2 m).

7.3.3.4. Lighting.

7.3.4. Security elements.

7.3.4.1. Signals and indicators.

a) A green light signal shall be installed in front of the coupling station and shall indicate the authorisation for the use of the telemin. This signalling shall be required only where there is another type of mechanical trawl running parallel to the telemin and in the same gallery, with the exception referred to in point 7.3.5.

b) A red light signal shall be placed at the end of the uncoupling station and shall be permanently lit or a sign marked 'End of journey'.

Fig. 10. End of travel sign (dimensions in mm).

c) The following sign shall be affixed to the coupling station:

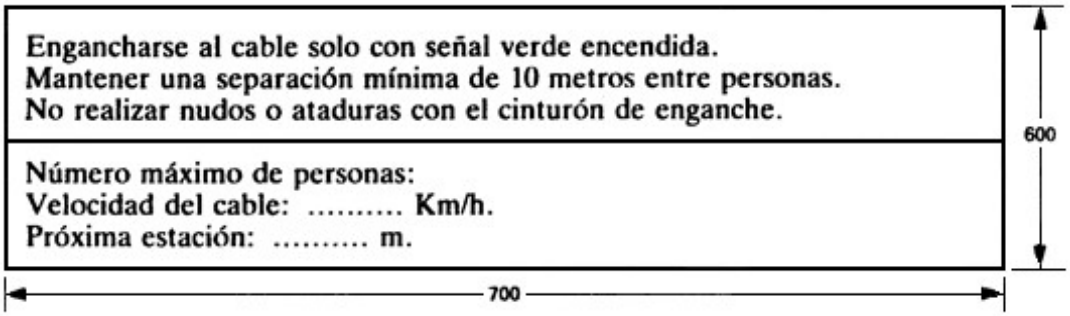


Fig. 11. Sign indicating the conditions of use (dimensions in mm).

d) All the above indicator signs shall be placed in places that are clearly visible to staff in circulation. The posters shall be reflective or illuminated or have their own illumination.

7.3.4.2. Safety devices.

At the end of the uncoupling station, the following devices shall be placed step by step:

a) Automatic disengagement roller.

b) Station overpass protection switch.

The latter device shall be installed at a distance from the inlet of the forwarding pulleys or the winch not less than twice the maximum distance of the cable to its complete stop with a minimum of 3 m. The construction and placement of this switch shall be such that:

i. Ensure the automatic stop of the telemin as a person passes through the point

where it is installed.

ii. It is mechanically or electrically interlocked and can only be rearmed by acting directly on the switch.

iii. The drive pulley must be equipped with a mechanical element that prevents the reversal of rotation after the stop of the telemin.

7.3.5. Safety standards.

No other type of mechanical trawl running parallel to the telemin and in the same gallery shall be in operation during the transport of personnel. In the case of a conveyor belt, simultaneous operation with the telemin shall be permitted only if it is fitted with a protective screen on the side of the staff's travel path which prevents inadvertent contact with the rollers or the belt belt.

The number of people hooked to the cable in a rope must not exceed the limit established in the project.

With regard to personnel, the following safety standards shall be observed:

a) The employer shall appoint the guards responsible for the transport system which he considers appropriate, the task of which shall be at least to receive the parts of the inspection of the condition of the transport facility carried out by the maintenance service.

b) All personnel who are to use the telemin must be instructed on its use; In particular, it must know how to attach and disengage from the cable, the positioning of the coupling belt, the correct position to be maintained during the journey, the safety systems and the rules of use set out below:

i. No person will be hooked to the telemin cable at the stations until they observe the green light for employment authorization.

ii. During transport, the personnel will always be placed in the direction of advance of the cable and will avoid abrupt lateral movements of the cable as far as possible.

iii. During the tour all staff will carry the helmet lamp lit and mounted correctly.

iv. The coupling belt shall be free from knots or ties which may make it difficult to release it in an emergency.

v. Each person shall ensure that clothing, personal protective items or small utensils carried with him or her do not make it difficult for him or her to ride on the cable.

vi. Only the corresponding specific belt shall be used to attach to the cable.

vii. During transport, persons shall keep a distance from each other of at least 10 m.

7.3.6. Telemin inspection.

a) Maintenance personnel shall periodically inspect the telemin as follows. The observed anomalies shall be communicated to the guard in charge of the transport system and shall be reflected in the safety and health document.

b) The telemin inspection shall cover at least the following points:

On a weekly basis, it shall be verified that:

i. The belts and hook are in perfect use.

ii. The cable rests correctly on all rollers and these are aligned and in good condition.

iii. The road does not present irregularities, anomalies or obstacles that may hinder the movement of personnel.

iv. Safety devices work properly.

Every six months it shall be verified that:

i. The cable, inspected according to the method described in paragraph 7.2.11 of this ITC, is in a condition suitable for service.

ii. The rest of the elements of the installation are in perfect condition for a safe use of the telemin.

iii. The inspection manual with the exact description of the operations to be carried out must be included in the transport installation project.

iv. For both surveillance and security reasons, all elements of the installation shall be kept in a good state of cleanliness.

8. CIRCULATION OF THE AIR CURRENT. GENERAL REQUIREMENTS.

All accessible underground work must be covered by a regular flow of air, sufficient and in harmony with the conditions of the work and the hatchery. The introduced external air shall be free from harmful or dangerous gases, vapours and dusts.

The volume of air introduced into the work shall be in relation to its extent, the number of persons, the tonnage extracted and the natural conditions of the mine, taking into account temperature, humidity, dust emission and other hazardous substances.

The minimum air flow of an underground work will be a function of the number of people present in the largest relay at the rate of 40 liters per person and second. The distribution of air in each workshop will be proportional to the personnel of each of them.

In mines with natural ventilation, artificial ventilation means shall be available to regularise it when it is not able to meet the required conditions.

The galleries shall be accessible at all points, including to life-saving equipment equipped with breathing apparatus.

In the work on sack bottom in activity, of more than 15 meters in horizontal or 5 meters in slope, a secondary circulation with independent driving will be established. The project may establish exceptions, duly justified, in the case of large chambers that ventilate by convection or work that can perform it by diffusion.

Whenever possible, the direction of the ventilation current shall be such that in the event of a stop of the general fans the natural current retains the same direction, avoiding reversal.

9. CIRCULATION OF THE AIR CURRENT BY POWERS AND GALLERIES.

Each mine must have different wells or galleries for air intake and exit. Only in exceptional cases and in preparatory work, the air inlet and outlet may be through the same well or gallery, with due separation and duly justified.

If the vents pass through fillers, they shall be kept impermeable, avoiding dust drag. The fillings of the starting blocks shall be carried at a convenient distance from the fronts, so that the current is active and prevents the accumulation of harmful gases or dusts.

10. MAXIMUM SPEED OF THE AIR CURRENT.

The speed of the ventilation current shall not exceed 8 m/s, except for main wells, sleepers and returns which are not normally used for the transport of materials or movement of personnel. The Mining Authority may authorise higher speeds if duly justified in the project.

11. INACTIVE UNDERGROUND LABORES.

In temporary inactive work that is not used for the movement of personnel and is not ventilated, the entrance will be marked clearly visible, warning the personnel of the prohibition of access and will be reliably impeded access. The accumulation of harmful gases in them will be avoided and before putting them into activity they will be adequately ventilated.

Abandoned work shall be hermetically isolated when dangerous gases may accumulate in it or irrespirable atmospheres may occur.

12. MAIN VENTILATORS.

Where natural ventilation is insufficient to maintain general ventilation requirements, main fans shall be installed. In coal mines, the use of main fans will always be mandatory.

The running, starting or stopping speed and the measures to be taken in the event of an accidental stop of the main fans, both outside and inside, shall be subject to an internal safety arrangement.

Where main fans are not permanently monitored, equipment should be provided to signal their accidental stopping in permanently occupied premises.

13. VENTILATION DOORS.

The work shall be arranged in such a way as to avoid, as far as possible, the use of doors to direct or divide the airflow. Doors intended to distribute ventilation shall be established in such a way as to ensure the passage of a volume of air regulated as required, and shall be closed in favour of the current.

The main ventilation doors must be double and flame retardant, when they constitute the only separation between the main currents of entry and return of the mine, and must be installed suitably spaced so that, during its use as a passage, one remains always closed.

The doors shall be properly signposted. The simultaneous movement of persons and trains through the same door is prohibited, unless they have different crossings.

Anyone who has opened a ventilation door should ensure that it is closed. Except during the passage of trains, it is prohibited to fix them in an open position. If they no longer meet their objective, even temporarily, they must withdraw.

Relief doors designed to cope with certain eventualities (fires, explosions, etc.) will normally be kept out of their hinges and arranged so that they can be installed quickly.

14. INSPECTION AND SURVEILLANCE OF VENTILATION.

14.1. Capacity: ventilation drawings and books.

At least once a month, the circulating air shall be accommodated and, in addition, whenever, for a new task or other reason, the direction or distribution of one of the main branches of the ventilation current is modified.

The capacities will be made at the entrance and exit of the mine, at the origin and end of each of the main branches of the current and in the tasks that have been specially indicated. Those of the general galleries will be verified of the stations specially arranged for it.

A book-registration will be kept with the results of the capacity and the determinations prescribed in the previous paragraph. In the general galleries and main routes these measurements and the samplings will be simultaneous.

The register shall contain:

a) The specification of the current investigated and its capacity at the place and time of sampling.

b) The number of persons and internal combustion engines, indicating their power, located in the area covered by the current.

c) The proportion of harmful gases.

d) Temperature and humidity.

The aforementioned book will also record all the modifications and important changes that have occurred in the ventilation circuit, as well as any observations considered of interest.

These measures shall be carried out by personnel suitably trained and appointed by the employer.

A ventilation plan shall be provided with the current status of the ventilation plan, showing at least the direction of the ventilation currents and the position of the doors.

14.2. Work plans and exploitation projects.

The entrepreneur, together with the annual plans of work of each mine, research permit and, where appropriate, with the general exploitation projects, will send to the Mining Authority a Report in which it is exposed:

a) The plan adopted to ensure the health of the various jobs, describing the material to be used.

b) Plans or diagrams on an appropriate scale of the ventilation circuit showing the direction and distribution of the current where the volumes of circulating air per second in the general current and in the various partial currents shall be recorded as accurately as possible.

15. SAFETY CONDITIONS IN SUSPENSION AND ABANDONMENT OF SUBTERRANEAN LABORES.

a) In the case of temporary suspension of work

    i. Particular attention should be paid to the accesses that are intended to be preserved.

ii. The necessary conservation measures must be implemented during the period of suspension.

iii. If necessary, the corresponding insulation works will be carried out.

iv. Proper ventilation of the preserved work will be ensured.

v. Machinery that remains installed shall be subject to a periodic review programme.

b) In the case of abandonment of work;

i. Particular attention will be paid to the enclosures of the entrances of galleries and wells and precise drains to avoid hanging water.

ii. An effective signalling system shall be implemented.

iii. Plans should be drawn up where the dimensions of work are required, the possible waste under them and all the data necessary to describe the projected abandonment.

ITC SM-IND-19 SUBTERRANEAN LABORES. SUSTAINABILITY.

1. OBJECT AND FIELD OF APPLICATION

This Supplementary Technical Instruction (hereinafter "ITC") aims to establish the minimum safety conditions that must be met by the maintenance of underground work, in development of Article 29.2 of the Mining Safety Regulation.

Refurbishment or rehabilitation work is expressly excluded.

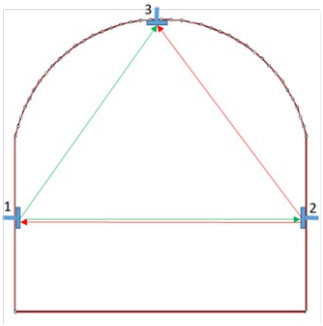
2. DEFINITIONS

For the purposes of this JTI, the following definitions apply:

2.1. Sustainment safety coefficient. It is the ratio between the resistance of the support and the load it must bear.

2.2. Convergence station. They are sections perpendicular to the axis of the excavation where metal plates are anchored (minimum in three points) to control the movements of the contour of the excavation. The measurement of distances between the control points can be done with laser distance meter, invar measuring tape, total station, laser-scanner, etc.

Figure 1. Convergence Station



2.3 Operating galleries. These are the underground works of a linear nature carried out following a layer, reef or mineralized mass whose use lies in allowing the obtaining of the substance to be exploited. This group includes the following tasks:

i) Cross-sectional exploitation gallery. They are those exploitation galleries that start from an infrastructure gallery until reaching the layer, reef or mineralized mass.

ii) Galleries in narrow layer. They are those exploitation galleries whose power is less than 3 meters.

2.4 Infrastructure galleries. These are the underground works of a linear nature that aim to allow communication between two points to make possible the transport of substances or people and services related to the activity. In this type of galleries would be included those of return of ventilation, through which the air passes to the outside, after having traveled a part of the mine.

2.5 Auxiliary work. Recognition, communication and complementary tasks for installations, which are not included in sections 2.1, 2.2 and 2.3, are understood as such. Among these tasks are included asses, which are short galleries that start from a main gallery, designed for various purposes: installation of electric power transformer stations, installation of water tanks, tape heads, rescue booths, etc.

2.6 Rocky massif: It corresponds to the union of the intact rock (rock matrix) and discontinuities, which gives the whole a heterogeneous character and a non-continuous geomechanical behavior. For the purposes of this JTI, rock massifs are classified as:

i) Elastoplastics. They are those in which, beyond their elastic limit, increasing and irreversible deformations take place in the environment of the underground cavity, which can lead to their breakage.

ii) Resistant, with very marked structural discontinuities.

iii) Viscoelastics. They are those in which the deformation they experience, as a result of an excavation, depends largely on the time elapsed since its execution.

2.7 Wells and inclined planes. These are subterranean works of a linear nature whose longitudinal slope is greater than 10 per 100. These include tailings or piqueras, through which the ore is poured so that it falls by gravity from the level of production to the level of transport.

3. SUSTAINABLE REQUIREMENTS

The maintenance of underground work must make it possible to control and maintain the stability of the excavations for the safety of the personnel working or moving through them and for the maintenance of the services, both in the transitional phases of their construction and in those of use.

For the purpose of defining the requirements for the maintenance of underground work, these are grouped according to their duration into:

- Medium and long-term work, whose useful life will be greater than 5 years.
- Short-term work, whose useful life will be less than or equal to 5 years.

3.1 Medium- and long-term work.

In any case, it will be medium and long-term work, the main infrastructure galleries at each level, which will normally be developed parallel to the course of the mineral mass, from which the access galleries to the areas in operation, those associated with the accesses to the mines, as well as the wells and inclined planes and the auxiliary work will depart.

For this type of work, the support must be defined in a project, which will have the characteristics indicated in section 4.1 of this JTI.

3.2 Short-term work.

Included as short-term work are mining galleries within the mineral mass and access infrastructure galleries to the mineral mass.

For this type of work, as long as there is evidence that the geotechnical characteristics of the land, the method of exploitation and/or the system of protection of the work will not vary substantially, the support will be defined in a standard project, the characteristics of which are indicated in section 4.2 of this JTI. In the absence of such evidence, support shall be defined as referred to in paragraph 4.1 of this JTI.

When the works are designed for a duration of less than 2 years, the exceptionality of their limited life will be expressly taken into account.

4. GENERAL REQUIREMENTS CONCERNING THE SUSTAINABILITY PROJECT

The support must be adapted to the type of terrain in each case, so the quality of the rocky massif must be estimated by means of a geomechanical classification. The geomechanical classification shall be used for this purpose; the Q quality index or the RMR quality index

The quality index Q of the rock massif shall be determined by the expression:

$$Q¿ \frac{RQD}{J_n} \cdot \frac{J_r}{J_a} \cdot \frac{J_w}{SRF}$$

where:

- RQD: Rock Quality Designation (% control pieces > 10 cm recovered in a manoeuvre)
- Jr: Parameter related to the roughness of discontinuities
- Jw: Parameter related to the presence of water
- Jn: Parameter related to the number of families of discontinuities
- Ja: Parameter related to alteration and filling of discontinuities
- SRF: Stress Reduction Factor (parameter related to the tensional state in the rock massif)

To estimate the value of the parameters that define the Q index, the tables included in the Annex to this JTI shall be used.

The RMR quality index of the rock massif is given by the following expression:

RMR= A+B+C+D+E-F

where:

- To: Rock resistance intact
- B: RQD
- C: Spacing of discontinuities
- D: Condition of the meetings
- E: General conditions, flow rates and water pressures
- F: Correction for guidance

All these parameters will be evaluated according to the tables included in the Annex to this JTI.

The support project, as set out in JTI SM-IND-15, shall:

- Define a sufficiently robust support according to the geotechnical quality of the rock massif, which meets the required safety coefficient. As a general rule, the support should be designed for placement as soon as possible and as close to the front.

- Determine the free span without support and, where appropriate, define the most appropriate length of the section corresponding to a blast according to the quality of the rock mass.

- To justify the design of the excavation sequence.

- Define the appropriate rhythm of the sustaining cycle, in line with that of drilling and blasting, where appropriate.

- Include reference to the blasting project where appropriate, so that it is justified that the condition to the rocky massif will be minimal.

- Include a surveillance and auscultation control plan, ensuring that at no time is the maximum distance of the support to the front exceeded, depending on the quality of the rock mass and avoiding delays in the placement of the support.

4.1 Medium- and long-term work support project.

4.1.1 Project documents. The project documents must be:

- *Memory*. The project report should contain a detailed description of the data collection processes, both for the land and those relating to excavations and nearby installations, the designs adopted, the construction method and the control measures.

- *Drawings*. The plans of the project must define all the aspects necessary to build and control the work in accordance with the adopted support design. The plans of the project shall be drawn up on a scale and in such a way as to allow the details of the support to be defined with sufficient precision.

- *Budget*. Measurements, represented by units of the International System, unit prices and the amount of works planned shall be entered in the budget.

- *Specifications* . The specification shall specify the types and classes of materials to be used for the start-up procedures and the checks to be carried out.

4.1.2 Identification of work . Each task shall:

- Be named unequivocally and defined geometrically, specifying the useful dimensions of the different sections that compose it
- To be represented topographically, in plan and elevation.
- Specify its intended use indicating the conditions to be met.

4.1.3 Characteristics of the land. The rocky massif must be characterized geomechanically in an area of surrounding terrain whose axes are those of the work and whose section has a width and height six times greater than those of the projected excavation. Lithotypes and structural discontinuities should be studied by defining their geotechnical characteristics, nearby works and the possible presence of water in the surrounding terrain. As a result of the characterization of the terrain, a geotechnical profile must be defined in which the sections of land that have homogeneous characteristics are contemplated throughout the excavation, specifying their geotechnical characteristics and grouping them by geotechnical domains.

Unless justified in the project, the geotechnical domains will be determined according to the Q quality index of the rocky massif, adapted for mines according to the categories indicated in Table 1. The RMR index, related to the Q index, may also be used by the following expression:

$$RMR = 9 \times \ln Q + 44$$

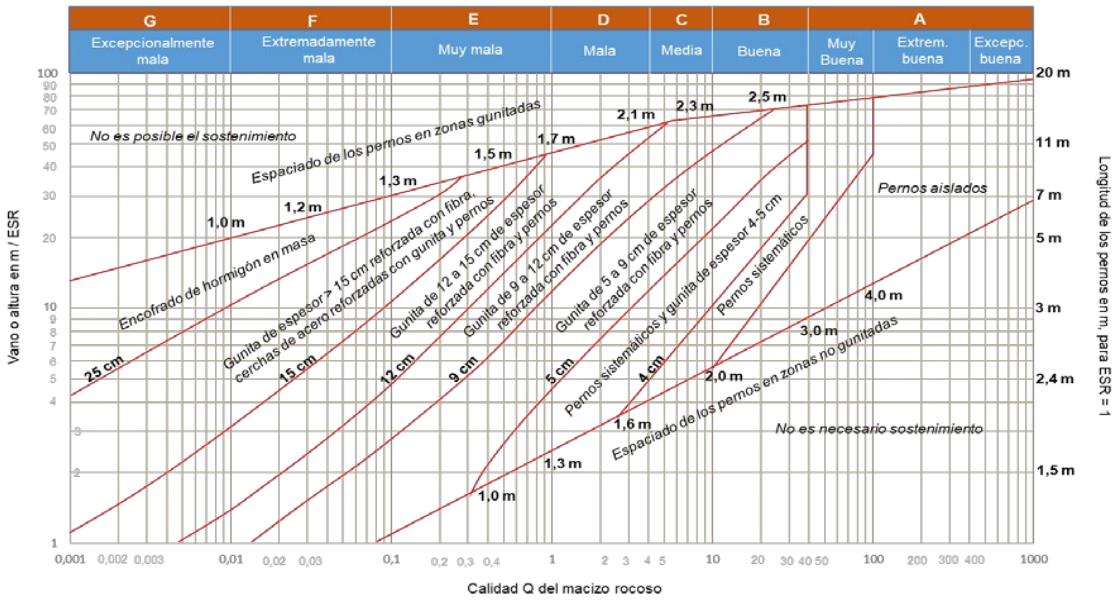
Table 1. Definition of rock mass behavior by geotechnical domain

Geotechnical domains	Q-index	RMR index	Description	Behavior
1	<0.4	<35	Failed, shattered, high alteration	Deformable Shallow/ Laminated
2	0.4-1.0	35-45	Deformed, failed	
3	1.0-4.0	45-55	Little deformed and failed	Blocks
4	4.0-10	55-65	No weathering, no deformation or alteration, some faults	Blocks
5	>10	>65	No weathering, no deformation or alteration	Blocks

4.1.4 Support design . The design of the support must be carried out taking into account the characteristics of the terrain, the dimensions of the work, the conditions imposed by the use of the underground work and the possible influences of nearby excavations.

Based on the equivalent dimension and quality index Q of the rock massif, the support shall initially be defined according to the abacus of the classification shown in Table 2.

Table 2. Support abacus based on the Q quality index of the rock massif



In addition:

- A distinction shall be made between the support or coating, where necessary.
- A construction profile must be drawn in sections, defining the areas in which each type of support must be applied and the excavation sections that result from taking into account the effect of convergence so that the final section is the one required according to the project gauges.

4.1.5 Construction method. As a result of the design work, the structural support elements must be defined, in quality and quantity, as well as the process of their placement, in each differentiated section of the work.

All the stages that make up the advance cycle must be specified, establishing the machinery and procedures provided for in each of them, as well as the conditions of their use and the requirements to be respected in the placement of the support, both as regards the methodology for putting the support elements into operation, and the maximum distance from the front to which they can be placed.

4.1.6 Project level. Support projects will be classified into two categories (Level 1 and Level 2) according to the degree of recognition required.

Level 1. If limited geotechnical information is available and the support design is based on previous data from similar works, geomechanical classifications or bibliographic data, the project must be developed in accordance with the guidelines given for Level 1.

In this case, each lithotype shall be characterised by its simple compressive strength (laboratory tests or on-site burst tests under point load or with the Schmidt hammer). Simple

compressive strength values of the most common lithologies have been included in the Annex to this JTI together with other geomechanical properties.

The support may be sized using analytical methods based on convergence-confinement curves or, instead, numerical models.

The safety coefficient of the support must be greater than 2.5 for the medium term (between 5 and 10 years) and greater than 3 for the long term (greater than 10 years), considering exclusively the static action of gravity.

Level 2 If geotechnical information is available from geomechanical stations in outcrops, calicates or soundings, the sustaining project should be developed according to the guidelines given for Level 2.

In this case, each lithotype must be characterized by determining the resistant and deformation parameters of the rock (single compression tests with strain gauges, traction and triaxial compression).

A discontinuity survey shall be carried out and, if it is estimated that block fall may occur, the resistant parameters of the discontinuities shall be determined.

Also, where appropriate, the long-term behavior of the terrain should be studied considering the effect of a possible water circulation through the rocky massif, designing the support and the drainage method in such a way that the stability of the excavation is not affected by the water.

The coefficient of safety of the support, considering exclusively the static action of gravity, must be higher than 2, for the medium term and 2.5 for the long term, in any of the constructive phases and in the final situation.

4.1.7 Control measures. The support project shall include an auscultation monitoring and control plan that makes it possible to reasonably know the behaviour of the support and the displacements of the surrounding terrain both in the different construction phases and in those of use, as stipulated in paragraph 5 of this JTI.

4.1.8 Sustaining notoriously incompetent land. The support of notoriously incompetent terrain or rocky massifs subjected to dynamic phenomena, before starting the excavation, should be studied specifically for each situation.

In these cases, in the project to be carried out, the justification of the treatment or reinforcement method selected and the sizing of the solution adopted shall be included, clearly specifying the intended work cycle.

In the probable case of the presence of water, a drainage system must be installed and the section of the galleries will be vaulted, with vaulted ledges in case of strong pushes of the terrain.

4.2 Project type of support of work in the short term.

For standard short-term work support projects, the requirements defined in section 4.1 of this JTI shall be followed, with the following caveats or simplifications:

- It will not be mandatory to include the budget.

- Project levels 1 and 2 apply as follows:

i) At both levels, an idealized section of the excavation will be introduced with an area equivalent to that of the actual section and the strength of the support will be determined from the mechanical characteristics of each element that constitutes it.

ii) For Level 1 support type project:

The load on the support, in the case of rocky massifs with elastoplastic behaviour, shall be estimated empirically. In these cases, the rocky massif must be characterized geomechanically.

The load on the support, in the case of resistant rocky massifs with very marked structural discontinuities, will be determined by evaluating the weight of the largest block that can be formed in the underground work. For this, the orientation of the discontinuities, spacing and persistence of the discontinuities, as well as the density of the rock, will be taken into account.

The safety coefficient must, in any case, reach a value of at least 2,5, taking into account only the static action of gravity.

iii) For Level 2 support type project:

The load on support for elastoplastic rock massifs shall be determined by analytical formulations based on convergence-confinement curves, or numerical models may be used instead.

The load on the support, in the case of resistant rock massifs with very marked structural discontinuities, shall be determined by a numerical block model or, instead, the stability shall be calculated analytically on the basis of the stereographic projection. In both cases, the mechanical properties of the discontinuities will be introduced into the calculations, which will be obtained by direct cutting tests in the laboratory, or from field data, estimating their geomechanical properties by means of the commonly accepted empirical procedures. The key elements of block support (bolts and cables) and their strength shall be calculated by both adhesion and traction.

The safety coefficient must reach a minimum value of 2 in short-term galleries and 1.5 in very short-term galleries.

5. MONITORING AND AUSCULTATION CONTROL PLAN

5.1Subject matter

The purpose of the auscultation monitoring and control plan is to establish the rules of control and action in the phenomena of convergence movement produced in underground work.

5.2General requirements

The employer must have the appropriate means to exercise supervision of the support and its adjustment to the standard project and/or project. The ground and state of support shall be examined at least once per relief, taking appropriate measures to ensure the protection of workers.

In the event of a sinking of the excavation front, the debris produced shall not be removed unless the following measures have been taken beforehand.

- Verify the quality of the support close to the sinking and, where appropriate, reinforce it.
- Cut the sinking progression.
- Ensure the behavior of the provisional support placed, reinforcing it if necessary.

Surveillance in highly conflictive areas may include, in addition to extensometry and convergence stations, a laser scanner equipment to control the movements of the terrain around the work and compare values through nearby sections. Depending on the convergence values, policy measures will be established according to the established alert criteria, detailed in section 5.3.3 of this JTI.

Any significant impact that occurs during the execution of the work must be communicated in order to adopt, where appropriate, the appropriate measures to ensure the stability of the works in their construction.

5.3Procedure

5.3.1. Location and measurement of convergence stations.

The location of convergence stations shall be based primarily on geotechnical (such as geotechnical domains as defined in Section 4.1.3 of this JTI) and operational criteria. Thus, DG1 and DG2 are preferred areas of location, as well as areas a priori less stable, such as in junctions, fault influence zones, etc.

5.3.2. Data obtained, classification, on-site observations of convergence stations.

The readings will allow to obtain the following data:

i) Shooting (in millimetres).

ii) Speeds (in millimeters per day).

iii) Accumulated speed (in millimeters per day).

iv) Average speed (in millimeters per day).

v) Number of measures.

Depending on the displacement recorded on the convergence plates of each station, they will be classified according to the absolute convergence achieved or the convergence speed, which will have to be defined specifically for each mining operation in the monitoring and auscultation control plan.

For guidance, except in rocky massifs with viscoelastic behaviour, Table 3 can be used.

Table 3. Classification of convergence measures

CONVERGENCE STATIONS

TYPE	**MOVEMENT % (*)**	**RISK**
1	< 0,5 %	LOW
2	0,5 % to 1 %	LIGERO
3	1 % to 1,5 %	MEDIUM
4	1,5 % to 2 %	HIGH
5	>2 %	VERY HIGH
(*) PERCENTAGE OF WIDTH OF WORK		

To obtain the convergence speeds, the following reading frequency shall be set:

i) New installation convergences: daily measurements.

ii) After one month from installation:

- If convergence speeds and displacement tend to stabilise, measures will be taken on a weekly basis and then on a monthly basis.
- If the absolute convergence exceeds 1,5 % of the width of the work, the frequency of measurements shall be increased, a visual inspection of the condition of the gallery shall be carried out and the cracks observed in the section, if any, shall be indicated in a sketch.

In any case, the worker's safety from data collection will be considered a priority when convergences are excessive and the gallery is unsafe.

5.3.3. Reinforcement actions, rehabilitation and response times.

Depending on the type of convergence, the rate of deformation and on-site observations, reinforcement or, ultimately, rehabilitation work will be carried out in certain sections. Response times shall be conditioned by deformation speeds.

According to its value, the criteria for action and deadlines for implementation will be established within the monitoring and control plan for auscultation. A set of actions should be included according to the convergence values, recorded as % of the diameter or width of the underground work. The deadlines for the implementation of the reinforcement or rehabilitation actions should also be specified according to the convergence speeds recorded in millimetres per day.

6. PARTICULARITIES OF SUSTAINABILITY IN VISCOELASTIC ROCOSE MACHIZOS.

In the case of viscoelastic rock massifs, a risk assessment and management gap with the minimum content set out in this paragraph must be included in the support project and/or the standard project.

The definition of geotechnical domains in section 4.1.3 of this JTI is not directly applicable to viscoelastic rock massifs. The classification system and a basic Q' index shall be defined for each project. From this index, the geotechnical domains (DG'1 to DG'5) and qualities of the rock mass will be defined, which will be associated with the type of support.

6.1 Risk assessment.

The risk assessment for this type of massif shall cover at least the following aspects:

i) Identification and classification of risks of falling ceilings and walls.

ii) Evaluation of probabilities of falls according to the conditions of the strata.

iii) Assessment of workers' exposure to the risk of falling objects.

iv) Classification of risks for the active areas of the holding.

v) Massif control plan.

In addition, during the execution of the tasks, at least the following actions must be carried out:

i) Use of flexible support elements (e.g. high-deformability, high-strength bolts). In areas of extremely poor quality, special actions may be necessary.

ii) Assessment of whether the use of pre-stressed bolts is recommended.

iii) Maintenance of a register containing at least:

- Dates and age of the gallery where sanitizations and rehabilitations are carried out.
- Date and relevant data of blocks when smooth falls occur.

6.2 Risk management and actions.

As a guideline, Table 4 specifies the time of revision of the support by areas, with actions to be taken after this revision, if applicable.

Table 4. Sustainment review time by zones

AREA	DG1	DG2	DG3	DG4	DG5
Z1	DAYS	WEEKS	WEEKS	NOT APPLICABLE	NOT APPLICABLE
Z2	DAYS	DAYS	DAYS	WEEKS	WEEKS
Z3	HOURS	DAYS	DAYS	DAYS	WEEKS
Z4	NOT	HOURS	DAYS	DAYS	DAYS

	ACCESSIBLE				
Z5	NOT ACCESSIBLE	NOT ACCESSIBLE	HOURS	DAYS	DAYS

Z1: Ventilation return galleries

Z2: Main transport galleries and access infrastructure galleries

Z3: Last section in advance of a gallery, close to the tailings

Z4: CTI and borehole chocks, water tanks, tape heads

Z5: Workshops, dining rooms and rest areas, including well hitch

areas

ANNEX.

PARAMETERS FOR DEFINING THE QUALITY INDEX Q

NOTAS PARA EL USO DE LAS TABLAS

1. Cuando no se dispone de sondeos, el RQD se estima a partir de afloramientos, mediante el índice volumétrico de juntas Jv.
2. El parámetro Jn puede estar afectado por foliación, esquistosidad, laminaciones, etc. Sólo si estas juntas paralelas están suficientemente desarrolladas, se contabilizan como una sola familia; si no, se contabilizan como juntas ocasionales.
3. Se tomarán los valores de los parámetros Jr y Ja de la familia de juntas o discontinuidades rellenas más débiles de la zona, pero hay que elegir en primer lugar las juntas de orientación desfavorable, aunque no den el valor mínimo del cociente Jr/Ja.
4. En rocas muy anisótropas, la resistencia a compresión simple de la roca, σc, y a tracción, σt, se evalúan en la dirección más desfavorable para la estabilidad de la estructura subterránea.

CALIDAD DEL TESTIGO (Rock Quality Designation)	RQD
MUY MALA	0-25
MALA	25-50
MEDIA	50-75
BUENA	75-90
MUY BUENA	90-100
Cuando se obtienen valores del RQD inferiores a 10, incluyendo 0, se toma el RQD = 10	

DESCRIPCIÓN	J_n
- Roca masiva	0,5-1
- Una familia de diaclasas	2
- Una familia y algunas juntas ocasionales	3
- Dos familias	4
- Dos familias y algunas juntas	6
- Tres familias	9
- Tres familias y algunas juntas	12
- Cuatro o más familias, roca muy fracturada, "terrones de azúcar", etc.	15
- Roca triturada terrosa	20
En boquillas, se utiliza 2 J_n y en intersecciones de túneles 3 J_n	

DESCRIPCIÓN			
1. Zonas débiles que intersectan la excavación y pueden causar caídas de bloques, según avanza la misma.			SRF
A Varias zonas débiles conteniendo arcilla o roca desintegrada químicamente, roca muy suelta alrededor (cualquier profundidad).			10
B Sólo una zona débil conteniendo arcilla o roca desintegrada químicamente (profundidad de excavación menor de 50 m).			5
C Sólo una zona débil conteniendo arcilla o roca desintegrada químicamente (profundidad de excavación mayor de 50 m).			2,5
D Varias zonas de fractura en roca competente (libre de arcilla), roca suelta alrededor (cualquier profundidad).			7,5
E Sólo una zona fracturada en roca competente (libre de arcilla), (profundidad de excavación menor de 50 m).			5
F Sólo una zona fracturada en roca competente (libre de arcilla), (profundidad mayor de 50 m).			2,5
G Juntas abiertas sueltas, muy fracturadas, etc. (cualquier profundidad).			5
2. Rocas competentes, problemas de tensiones en las rocas.	σ_c/σ_1	σ_t/σ_1	SRF
H Tensiones pequeñas cerca de la superficie.	>200	>13	2,5
J Tensiones medias.	200-10	13-0,66	1,0
K Tensiones altas, estructura muy compacta (normalmente favorable para la estabilidad, puede ser desfavorable para la estabilidad de los hastiales).	10-5	0,66-0,33	0,5-2,0
L Explosión de roca suave (roca masiva).	5-2,5	0,33-0,16	5-10
M Explosión de roca fuerte (roca masiva).	<2,5	<0,16	10-20
σ_c y σ_t son las resistencias a compresión y tracción, respectivamente, de la roca; σ_1 es la tensión principal máxima que actúa sobre la roca.			
3. Roca fluyente, flujo plástico de roca incompetente bajo la influencia de altas presiones litostáticas.			SRF
N Presión de flujo suave.			5-10
O Presión de flujo intensa.			10-20
4. Rocas expansivas, actividad expansiva química dependiendo de la presencia de agua.			SRF
P Presión de expansión suave.			5-10
R Presión de expansión intensa.			10-20
- Observaciones al SRF:			
i Reducir los valores del SRF en un 25-50% si las zonas de rotura sólo influyen pero no intersectan a la excavación.			
ii En los casos en que la profundidad de la clave del túnel sea inferior a la anchura del mismo, se sugiere aumentar el SRF de 2,5 a 5 (ver H).			
iii Para campos de tensiones muy anisótropos (si se miden) cuando $5 \le \sigma_1/\sigma_3 \le 10$, reducir σ_c y σ_t a 0,8 σ_c y 0,8 σ_t; cuando $\sigma_1/\sigma_3 > 10$, reducir σ_c y σ_t a 0,2 σ_c y 0,6 σ_t, donde σ_3 es la tensión principal mínima que actúa sobre la roca.			

DESCRIPCIÓN	J_a	φ°_r
* Contacto entre las dos caras de la junta.		
- Junta sellada dura, sin reblandecimiento, impermeable, p.ej. cuarzo, paredes sanas.	0,75	
- Caras de la junta únicamente manchadas.	1	25-30
- Las caras de la junta están alteradas ligeramente y contienen minerales no reblandecibles, partículas de arena, roca desintegrada libre de arcilla, etc.	2	25-30
- Recubrimiento de limo o arena arcillosa, pequeña fracción arcillosa no reblandecible.	3	20-25
- Recubrimiento de minerales arcillosos blandos o de baja fricción, p.ej. caolinita, mica, clorita, talco, yeso, grafito, etc. y pequeñas cantidades de arcillas expansivas. Los recubrimientos son discontinuos con espesores máximos de 1 ó 2 mm.	4	8-16
*Contacto entre las dos caras de la junta con menos de 10 cm de desplazamiento.	J_a	φ°_r
- Partículas de arena, roca desintegrada libre de arcilla.	4	25-30
- Rellenos de minerales arcillosos no reblandecidos, fuertemente sobreconsolidados. Los recubrimientos son continuos de menos de 5 mm de espesor.	6	16-24
- Sobreconsolidación media o baja, reblandecimiento; rellenos de minerales arcillosos. Los recubrimientos son continuos de menos de 5 mm de espesor.	8	12-16
- Rellenos de arcillas expansivas, p.ej. montmorillonita, de espesor continuo de 5 mm. El valor J_a depende del porcentaje de partículas del tamaño de la arcilla expansiva.	8-12	6-12
* No existe contacto entre las dos caras de la junta cuando ésta ha sufrido un desplazamiento cortante.	J_a	φ°_r
- Zonas o bandas de roca desintegrada o roca machacada y arcilla.	6-8 u 8-12	6-24 "
- Zonas blandas de arcilla limosa o arenosa con pequeña fracción de arcilla, sin reblandecimiento.	5	6-24
- Milonitos arcillosos gruesos	10-13 ó 13-20	6-24 "

DESCRIPCIÓN	J_w	Presión agua kg/cm²
- Excavaciones secas o de fluencia poco importante, p.ej. menos de 5 l/min localmente.	1	<1
- Fluencia o presión medias, ocasional lavado de los rellenos de las juntas.	0,66	1-2,5
- Fluencia grande o presión alta; considerable lavado de los rellenos de las juntas.	0,33*	2,5-10
- Fluencia o presión de agua excepcionalmente altas al dar las pegas, decayendo con el tiempo.	0,1-0,2*	>10
- Fluencia o presión de agua excepcionalmente altas y continuas, sin disminución.	0,05-0,1*	>10
Los valores presentados con el signo * son sólo valores estimativos. Si se instalan elementos de drenaje, hay que aumentar J_w. Los problemas causados por la formación de hielo no se consideran.		

DESCRIPCIÓN	J_r
* Contacto entre las dos caras de la junta mediante un desplazamiento cortante de menos de 10 cm	
- Juntas discontinuas	4
- Junta rugosa o irregular ondulada	3
- Suave ondulada	2
- Espejo de falla, ondulada	1,5
- Rugosa o irregular, plana	1,5
- Suave plana	1
- Espejo de falla, plana	0,5
* No existe contacto entre las dos caras de la junta cuando ambas se desplazan lateralmente	J_r
- Zona conteniendo minerales arcillosos, suficientemente gruesa para impedir el contacto entre las caras de la junta	1
- Arenas, gravas o zona fallada suficientemente gruesa para impedir el contacto entre las dos caras de la junta	1
NOTA: Si el espaciado de la familia de juntas es mayor de 3 m hay que aumentar el J_r en una unidad. Para juntas planas con espejo de falla provisto de lineaciones, si éstas están orientadas en la dirección de mínima resistencia, se puede usar J_r=0,5	

PARAMETERS FOR DEFINING THE RMR QUALITY INDEX

PARAMETROS			ESCALA DE VALORES						
1	Resistencia de la roca intacta	Bajo carga puntual	>10 MPa	4-10 MPa	2-4 MPa	1-2 MPa	Para estos valores es preferible la resistencia a compresión simple		
		A compresión simple	>250 MPa	100-250 MPa	50-100 MPa	25-50 MPa	5-25 MPa	1-5 MPa	<1 MPa
	VALOR		15	12	7	4	2	1	0
2	R.Q.D.		90%-100%	75%-90%	50%-75%	25%-50%	<25%		
	VALOR		20	17	13	8	3		
3	ESPACIADO DE LAS JUNTAS		>2 m	0,6-2 m	200-600 mm	60-200 mm	<60 mm		
	VALOR		20	15	10	8	5		
4	CONDICION DE LAS JUNTAS		Muy rugosas, sin continuidad, cerradas, roca labios sana.	Ligeramente rugosa separación <1 mm, roca labios ligeramente meteorizada.	Ligeramente rugosa separación <1 mm, roca labios muy meteorizada.	Espejo o falla o relleno de espesor <5 mm, o juntas abiertas 1-5 mm, juntas continuas.	Relleno blando de espesor >5 mm, o juntas abiertas >5 mm, juntas continuas.		
	VALOR		30	25	20	10	0		
5	AGUA	FLUJO EN CADA 10 m DE TUNEL, o bien	Ninguno	<10 l/min	10-25 l/min	25-125 l/min	>125 l/min		
		Relación presión del agua en la junta/tensión principal máxima.	0	<0,1	0,1-0,2	0,2-0,5	>0,5		
		CONDICIONES GENERALES	Completamente seco	Manchas de humedad	Muy húmedo.	Goteo.	Flujo de agua.		
		VALOR	15	10	7	4	0		

RESISTANCE OF THE MOST COMMON ROCKS

Tipo de roca	Resistencia a compresión simple (MPa)		
	Mínima	Máxima	Media
Creta	1	2	1,5
Sal	15	29	22
Carbón	13	41	31
Limolita	25	38	32
Esquisto	31	70	43
Pizarra	33	150	70
Lutita	36	172	95
Arenisca	40	179	95
Marga	52	152	99
Mármol	60	140	112
Caliza	69	180	121
Dolomía	83	165	127
Andesita	127	138	128
Granito	153	233	188
Gneis	159	256	195
Basalto	168	359	252
Cuarcita	200	304	252
Dolerita	227	319	280
Gabro	290	326	298
Taconita	425	475	450
Sílice	587	683	635

CHARACTERISTIC PARAMETERS OF THE MOST COMMON ROKS

ROCAS	DENSIDAD (kg/m^3)	MÓDULO DE YOUNG (GPa)	COEFICIENTE DE POISSON	POROSIDAD %	RESISTENCIA A COMPRESIÓN (MPa)	RESISENCIA A TRACCIÓN (MPa)	RESISENCIA A FLEXIÓN (MPa)
Rocas batolíticas							
Granito granodiorita	2500-2750	30-70	0,12-0,25	0,1-2	120-280	4-7	10-20
Gabro	2920-3050	60-100	0,12-0,25	2-5	150-200	5-8	10-22
Rocas extrusivas							
Riolitas	2450-2600	10-20	0,1-0,2	0,4-4	80-160	5-9	10-22
Dacita	2500-2750	8-18	0,09-0,2	0,5-5	80-160	3-8	9-20
Andesita	2300-2750	12-35	0,11-0,2	0,2-8	40-320	5-11	13-25
Basalto	2750-3000	20-100	0,14-0,2	0,2-1,5	30-420	6-12	14-26
Diabasa	2900-3100	30-90	0,12-0,2	0,3-0,7	120-250	6-13	12-26
Tobas volcánicas	1300-2200	-------	0,1-02	8-35	5-60	0,5-4,5	3-8
Rocas sedimentarias							
Arenisca	2100-2500	15-17	0,07-0,12	1-8	10-120	1,5-6	4-16
Caliza de grano fino	2600-2850	50-80	0,1-0,2	0,1-0,8	50-200	4-7	5-15
Caliza de grano grueso	1550-2300	-------	0,12	2-16	4-60	1-3,5	2,5-7
Caliza	1550-2500	-------	0,07-0,12	1,5-6	49-200	1,5-5	3-9
Dolomita	2200-2700	20-30	0,08-0,2	0,2-4	15-200	2,5-6	4-16
Esquistos	2450-2750	-------	-------	0,2-0,4	-------	-------	20-30
Rocas metamórficas							
Mármol	2650-2750	60-90	0,11-0,2	0,1-0,5	50-180	5-8	8-12
Gneis	2600-2780	25-60	0,09-0,2	1-5	80-250	4-7	8-20

ITC SM-IND-20 UNDERGROUND LABORES WITH POTENTIALLY EXPLOSIVE ATMOSPHERS, WITH FUEGUS PROPENSION AND RISK OF GASODINAMIC PHENOMES.

1. OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims to establish the risks, requirements and prevention measures applicable to underground work classified by the presence of potentially explosive atmospheres, by their propensity to fires and in which the existence of the risk of manifestation of gasodynamic phenomena has been determined, as established in Article 32 of the Mining Safety Regulation.

2. DEFINITIONS

For the purposes of this JTI, the following definitions apply:

a) Interlocking: In a control system, activation of a protective device made so that this device can not return by itself to the previous situation, being necessary a rearmament action.

b) Operating area: Set formed by the starting fronts and other tasks associated with them.

3. MINIMUM AIR FLOW SPEED AND FLAMMABLE GAS LIMIT CONTENT

The minimum speed of the air current anywhere in the underground workings in activity shall be that for which a dilution of the gases is achieved so that no risks are generated and their evacuation is carried out continuously, avoiding accumulations.

In order to be able to control this dilution on a constant basis, all areas of exploitation of underground work classified by risk of presence of potentially explosive atmospheres or by their propensity to fire must have an environmental monitoring and control system.

The environmental monitoring and control system shall be designed to maintain concentration levels of any gas capable of forming explosive atmospheres below 25 % LIE (1,1 % Vol. for methane) in all operating areas in operation, with the exceptions specified in paragraph 4.

4. DILUTION OF FLAMMABLE GAS CONTENT

Where the environmental monitoring and control system detects a concentration level of flammable gases above 25 % LIE at any point in the area of operation, the following actions shall be carried out:

1. All work in the affected area will be stopped by de-energizing all electrical and non-electrical equipment. Only the intrinsic safety systems of the environmental monitoring and control system to monitor the evolution of the gas concentration, with the limitations established in the ITC SM-IND-20 and those machines, equipment and systems whose cessation of activity may pose a greater risk to workers and provided that they have the CE marking with category M1 or are adapted as established in Royal Decree 1215/1997, of 18 July, establishing the minimum safety and health requirements for the use by workers of work equipment, for the same category, may also remain in operation.
2. The necessary modifications to the performance parameters of the environmental

monitoring and control system shall be established to dilute the concentration of flammable gases below 25 % LIE.

3. The development of any type of work in the affected area will not be allowed until the concentration of flammable gases is below 25 % LIE.

When the environmental monitoring and control system detects a level of concentration of flammable gases above 40 % LIE (1,8 % Vol. For methane), all personnel shall leave the area of operation concerned, in addition to the actions established by exceeding the level of 25 % LIE.

When the content of flammable gases in the forward-facing sensors has increased above 40 % LIE or more than four outages have occurred due to exceeding 25 % LIE during the working shift, the conditions of the installation, especially secondary ventilation, shall be reviewed before resuming the forward activity and the measures to be applied shall be proposed to avoid a further elevation of the gas content.

The procedure for action in the event of exceedance of these limit values shall be laid down in an internal safety provision (hereinafter referred to as 'ISD').

The values indicated above may be exceeded, in any case not exceeding 100 % LIE, in those sites where the presence of workers is not foreseen at any time, there is no energised work equipment and the impossibility of the presence of ignition sources as established in standard UNE EN 1127-2 is justified in the document on safety and health (hereinafter 'DSS').

5. MONITORING AND ENVIRONMENTAL CONTROL SYSTEM

The environmental monitoring and control system will monitor and control the environmental conditions and will have the appropriate sensors, actuators and functionality, whose characteristics respond to the following sections.

The human oversight regime for the operation of the environmental monitoring and control system must be established in the DSS according to the requirements of each farm.

5.1 Functions of the environmental monitoring and control system

The environmental monitoring and control system shall be capable of:

a) Measure gas concentrations (at least methane and carbon monoxide) at critical points on the farm.

b) Check the state of ventilation on all fronts.

c) Perform, automatically, power cuts and interlocks.

d) Check the performance of actions.

e) Generate alarms to warn the staff of the exploitation area of the existence of risk situations.

f) Indicate, at the local level, the values of parameters, actions and alarms.

g) Transmit to the central station and record in it the above data.

The system may perform other functions provided that they do not compromise the operation of the aforementioned.

5.2 Minimum composition of the environmental monitoring and control system

In a holding area, at least the following elements shall be provided:

5.2.1 Sensors

a) Of methane concentration: Methane sensors will be available on all active fronts and at those locations defined in the project according to the risk conditions. Another sensor shall be provided at the general return of the operating area.

b) Of carbon monoxide concentration: A carbon monoxide sensor shall be provided at the general return of the operating area.

c) Anemometers: An anemometer shall be provided to monitor the main ventilation of the operating area.

d) Of presence of tension: A voltage check shall be available for monitoring the status of the cut-off switches of each branch of the power circuit on which action may be taken.

e) Of vibrations: A vibration detector shall be provided for the continuous monitoring of the vibration level of electric secondary fans that are located within sack bottom work or that are driven internally or externally by return air from work.

f) Flow rate: Minimum air flow sensors shall be provided in the area closest to the front or work to be ventilated of all secondary ventilation circuits.

5.2.2 TO actuators

a) Voltage cut-off: The system will allow action on the voltage cut-off switches of the different branches of the power circuit.

b) Stopping: When necessary, to stop and/or inhibit the starting of secondary fans.

5.2.3 Remote station and central station

At least one remote station shall be available to centralise the signals provided by the sensors and to manage the necessary actions. Depending on its characteristics, the same remote station may offer service to different exploitation areas.

In addition, a central station must be available outside the farm to cover the complete operation of the system in all operating areas, with the characteristics detailed in section 5.4.5.

5.3 F unification of the environmental monitoring and control system

5.3.1 D system design

The environmental monitoring and control system must be designed so that it remains in continuous operation. In underground work classified in the second category, different levels of supervision may be established depending on the operating regime, which must be duly justified in the DSS.

5.3.2 Power outages

The environmental monitoring and control system will cut off all power supplies to a given area when any of the requirements reflected in this ITC occur.

In addition, it shall also cut off the power supply to operating areas classified for the presence of flammable gases when the ventilation flow rate falls to 50 % of the project ventilation flow rate. In this case, the following exceptions may apply:

a) Machines, equipment and systems with CE marking of category M1 or adapted as established in Royal Decree 1215/1997, of 18 July, for the same category.

b) Fans of the affected sub-level that are not located at the bottom of the bag or in the return circuit of the work.

A DIS shall regulate the permitted working conditions in these flow descent situations.

5.3.3 P fan plow

In addition to the situations indicated above, the environmental monitoring and control system shall automatically stop secondary fans located in classified areas when a certain level of vibration is reached on a fan, given the normal operating conditions indicated by the manufacturer.

Vibration stop is not mandatory for auxiliary pneumatic fans or secondary fans installed in declassified areas.

5.3.4 S flagging and abandonment of work

The environmental monitoring and control system shall generate a warning signal which shall be clearly visible to personnel in the affected area in the following situations:

a) Alarm requiring a power outage or fan stop.

b) Alarm that requires the abandonment of the personnel of the work of exploitation.

c) Alarm by lowering the ventilation flow rate to 50% of the project flow.

The signal of abandonment of the work will be generated automatically when one of the requirements contemplated in the regulations occurs.

5.4 C technical characteristics of equipment

The environmental monitoring and control system must be able to remain operational in the event of a main supply voltage cut-off for a period of time which shall not be less than one hour. In the event of an internal failure in the operation of the environmental monitoring and control system, the environmental monitoring and control system shall be capable of keeping the installation in a safe condition and displaying a recognisable failure signal at the central station.

Independent of the individual suitability of each of the components of the environmental monitoring and control system as established in sections 8 and 9 of this JTI, the connection of the different components of the system may take into account the provisions of standard UNE EN 60079-25.

5.4.1 Sensors

The sensors referred to in paragraph 5.2.1(a), (b), (c) and (f) shall indicate locally (on or near the same sensor) the value of the controlled variable in a clear and unambiguous manner.

The actions can be carried out either directly from the device that equips the sensor or from the associated equipment of the monitoring and environmental control system.

5.4.2 E remote stations

Remote stations shall be able to carry out the relevant actions without the intervention of any operator. Likewise, its logic of action will not depend on the existence or not of a permanent link with the central station.

5.4.3 E central station

The computer system used for remote monitoring of environmental parameters shall allow at least the following functions:

a) Real-time tracking of all monitored parameters.

b) Registration and storage of the same, with reference to real time.

c) Programming of alarms, with recording and storage of them together with their time reference (start and end of the alarm).

d) Ability to configure the system by the user to adapt the computer system to the evolution of the operation or changes introduced in any of the components of the system.

All recorded data shall be available for a period of at least one year.

The software will be robust and reliable, for which it can be taken into account the provisions of the series of standards UNE EN 61508, and will be installed in a room according to the specifications of the various components in terms of dust, humidity, and electromagnetic interference. An uninterruptible power supply shall be used to allow the continuity of operation of the system with a range of more than one hour.

5.5 M information antenimiento and analysis

The correct functioning of the system will be checked daily, analyzing the information collected and keeping the system configuration up to date. Records will be kept of both the maintenance, which will have a plan, and the daily parts of review and analysis of results. A communication system will be established with the optional management to inform of the deviations that may arise from these analyses, in order to take the necessary preventive measures.

5.7 Records of the environmental monitoring and control system

The environmental monitoring and control system will have the ability to continuously record and store all the measurements and actions of the equipment that are part of the system. The sampling frequency of any of the measurements made by the system shall be less than one minute.

The register shall contain at least:

a) For sensors

- Unequivocal specification of the sampling point and time and measured parameter.
- Measurement of the parameter offered by the sensor.

b) For actuators

- Unambiguous specification of the point and time of action.

- Type of action and teams associated with it.
- Actuator states.
- Operating parameters of the equipment associated with the actuator.

The entrepreneur must keep the records of the system at the disposal of the Mining Authority or Mining Control Body for inspection purposes for a period of one year.

6. MAIN FORCED VENTILATION

Underground work classified by the possible presence of explosive atmospheres shall have continuous operation of main ventilation equipment which keeps the content of flammable gases within the limits indicated in the preceding paragraphs.

The main fans shall be so arranged as to be protected in the event of an explosion.

6.1 Equipment for measuring and controlling the main ventilation current

The control of the parameters of the main ventilation, as well as the operating parameters of the fans themselves, must be monitored and controlled by the environmental monitoring and control system.

6.2 Reserve fans

All underground work classified in the third category for the possible presence of flammable gases or with a risk of gas-dynamic phenomena as referred to in paragraph 11, shall have a backup fan for each fan installed so that, in the event of failure, the continuation of ventilation can be ensured, so that the evacuation of personnel can always be carried out safely.

The backup fan, in addition to being connected to the mains power supply, will also have independent power for a minimum operating time that allows the safe evacuation of the work from any point.

6.3 Stopping and re-establishing main ventilation

A DIS shall lay down the requirements necessary to ensure the safety of work in the event of stoppages of the main ventilation during both periods of activity and periods of inactivity. This provision shall also lay down the conditions for the safe restoration of the main ventilation.

6.4 Reversal of main ventilation

The main fans must be arranged in such a way that ventilation can be reversed. This investment may only be authorised by the optional management of the mine. The conditions under which the reversal of the main ventilation and its procedure may be carried out shall be recorded in a DIS.

The investment system will be reviewed every year, checking its correct functioning.

7. SECONDARY VENTILATION

In addition to the conditions laid down as general ventilation rules, the following requirements must be met for bottom-of-sack work:

1.- Appropriate measures must be taken so that the air introduced into the work by secondary ventilation is free of dangerous contents of gases, vapours or harmful dusts.

2.- The volume of air introduced into the work shall be calculated taking into account the expected emission of flammable gases and the production of dust or other hazardous substances. In addition, the extension of the tasks to be ventilated, the maximum number of workers to operate simultaneously in them, the amount of ore extracted and the environmental parameters of the exploitation such as temperature and humidity will be taken into account.

3.- The use of auxiliary ventilation means is mandatory to establish secondary ventilation from 10 meters in the horizontal or descending underground works and from 5 meters in the ascending works.

4.- The ventilation project will include the following sections on secondary ventilation:

- Calculation of the required flow rate according to the requirements indicated in this ITC.
- Ventilation systems to be used.
- Type and power of secondary fans.
- Pipe, type of material, type of joints, diameter, acceptable leakage level and analysis of possible recirculations.
- Adaptation of the installation to the general environmental monitoring and control system of the operation.
- Justification for the regulatory adequacy of electrical and non-electrical equipment used if located in areas classified for the risk of explosive atmospheres (all sensors and actuators of the environmental monitoring and control system and all equipment with dusting and air conditioning functions shall be included).

5.- A standard project will be accepted, given the similarity of constraints in the exploitation, fixing in it the margins of variation of the technical parameters.

6.- In the sections in which the pipes overlap, in the combined schemes, a minimum air circulation will be maintained along the flow gallery of more than 0.1 cubic meters per second for each square meter of section of the gallery.

7.- A DIS must be drawn up in which the general conditions for the installation, commissioning, stopping and removal of these equipment are established. Secondary ventilation shall only be stopped voluntarily under the conditions specified and stated in this DIS, which shall also include the conditions for rearmament/starting of such ventilation.

8.- The safety conditions in the use of variants of secondary ventilation systems such as the inclusion of tertiary ventilation systems in blower-suction schemes must be reflected in DIS.

7.1 Specific requirements for electrified secondary ventilation

Both the electro-ventilators and their power supply and associated electrical installation chests shall preferably be installed outside the sack bottom in locations bathed by the main ventilation current. The impossibility of location in these sites must be adequately justified in the project.

The start and stop of the electroventilators may also be carried out at the location of the equipment by personnel authorized by the employer and in communication with the command post of the environmental monitoring and control system.

The shutdown of electrically operated machines working at the bottom of the bag shall never involve the shutdown of the electro-ventilators which ventilate the bag.

Methane sensors will be located in the vicinity of M2-labelled electroventilators.

7.2 Stopping and restoring secondary ventilation

Secondary ventilation shall be stopped whenever main ventilation stops and when indicated by a DIS.

During the shutdown of secondary ventilation, whether in periods of activity or in periods of inactivity, the environmental monitoring and control system will remain active monitoring and recording all the environmental control parameters necessary for a safe start after the shutdown.

In the event of a stoppage of secondary ventilation, a signalling system shall be provided informing of the situation at the point of entry to the bottom of the sac whose ventilation has been interrupted.

By means of a DIS, the actions to be followed for the restoration of secondary ventilation will be established depending on the situations that have caused its stop.

In cases of stoppage due to the detection of flammable gases, work may not be restarted until the environmental monitoring and control system has ensured the return to permissible levels by means of purging processes.

7.3 Maintenance of secondary ventilation system

7.3.1 Maintenance and control of fans

In addition to regular maintenance, in accordance with the manufacturer's instructions, fans in secondary ventilation shall be monitored on an annual basis by means of a vibration sensor, which shall be positioned as close as possible to the fan roller and engine shaft. As a result of the verification, a maintenance report will be issued containing:

- Imbalanced state: Referred to the state of the blade reel, i.e. lack of a blade, damaged blade, or accumulation of dirt on the reel.
- Existence of blade friction: Referred to the possibility that the blades rub against some projection of the housing.
- Deterioration of bearings: Referring to malfunction caused by a failure in the ball or needle bearings of the engine.

7.3.2 Pipeline maintenance

The pipe sections must be subject to a periodic visual inspection in order to locate the possible:

- Breaks and tears.
- Lack of tension in tarpaulins.
- Leaks in the conduit joints.

Control actions shall be carried out whenever the flow of losses (Q_{losses}) exceeds:

$$Q_{losses}\ (m^{3/s}) > Q - 0{,}1\ S$$

where S is the section at the front, in m^2, and Q is the value of the flow rate supplied by the fan, in m^3/s.

7.3.3 Maintenance of dust collectors and other equipment

Dust collection equipment and other equipment shall be maintained in accordance with the manufacturer's instructions and must be cleaned periodically to prevent sealage.

7.4 Situation of the base of secondary ventilation

At the point where the air intake for secondary ventilation is made, the environmental monitoring and control system shall ensure that the flow rate of the main ventilation stream is at least 30 per cent higher than the flow rate supplied by the secondary fan.

7.5 Ventilation from places other than sack bottoms

Ventilation of subterranean sites other than sack bottoms in which the main ventilation does not ensure a correct dilution of the possible flammable gases that may occur and that of those sites that constitute sack bottoms do not require secondary ventilation because they do not reach the required length, must be carried out as established in a DIS.

8. MINIMUM REQUIREMENTS FOR THE USE OF FLAMMABLE GAS DETECTORS

Apparatus used for the detection and/or monitoring of flammable gases shall bear the CE marking and category M1 or M2 according to their intended operation.

The CE marking of measuring systems having performance functions shall include the functionality standard UNE EN 60079-29-1, compliance with which establishes the presumption of conformity with the essential health and safety requirements relating to the measurement.

In addition, the employer must ensure that these devices are used and maintained in accordance with the provisions of standard UNE EN 60079-29-2.

9. MINIMUM REQUIREMENTS FOR THE USE OF WORKING EQUIPMENT

In underground works classified for the possible presence of explosive or potentially explosive atmospheres, the employer may only use equipment that has a CE marking with category M1o M2, both electric and non-electric, or are adapted as established in Royal Decree 1215/1997, of 18 July, for these categories.

The employer must justify in the DSS the use of the different categories of equipment according to the classification of the work in dangerous atmospheric conditions as established in the UNE EN 1127-2 standard.

10. MEASURES TO BE TAKEN IN MINES CLASSIFIED FOR FUEGOS PROPENSION

In underground work classified by its propensity to fire, a DIS must be developed in which the following aspects are reflected, depending on the level of fire risk:

- Identification of key points or areas of underground work with special monitoring for their propensity to fire.
- General measures to be taken in the method of exploitation used.
- Measures implemented in the environmental monitoring and control system of

the farm to:

i. the Prevention of Fire Formation

ii. early detection of fires and

iii. firefighting.

For each of these aspects, both the specific equipment used and the procedures implemented in the system control software will be detailed.

- Technical means, additional to those included in the environmental monitoring and control system, and human resources available for the prevention, detection and fight against fires.
- Training of personnel for the prevention, detection and fight against fires.

11. MEASURES TO BE TAKEN IN MINES WITH RISK OF MANIFESTATION OF GASODYNAMIC PHENOMENOMES

In all mines classified by the presence of flammable gases, the risk of manifestation of gasodynamic phenomena shall be assessed. If the risk is determined after the assessment, the exploitation project must justify the measures taken to ensure that the work is carried out safely. In addition, a DIS should be developed in which the following aspects are reflected:

- Identification of key areas of underground work that may be affected by gasodynamic phenomena.
- General measures to be taken in the method of exploitation used.
- Measures implemented in the environmental monitoring and control system of the farm to:

  i. early detection of phenomena and

  ii. minimising its dangerousness if it occurs.

  For each of these aspects, both the specific equipment used and the procedures implemented in the system control software will be detailed.

- Technical means, additional to those included in the environmental monitoring and control system, and human resources available for the prevention, detection and fight against gasodynamic phenomena.
- Training of personnel for the prevention, detection and fight against gasodynamic phenomena.

ITC SM-IND-21 SOUNDS

1. OBJECT

The purpose of this Supplementary Technical Instruction (hereinafter referred to as 'ITC') is to regulate the mining and industrial safety conditions in addition to those set out in Annex II to the Mining Safety Regulation ('Minimum *safety and health provisions in the extractive industries by drilling')*, in the design and execution of drilling, with the aim of preventing damage to persons, property and the environment, and in accordance with Articles 31 to 34 of the Mining Safety Regulation.

2. DEFINITIONS.

For the purposes of this JTI, the following definitions shall apply:

a) Dissolution and leaching probes, those that are carried out for the exploitation of minerals contained in the earth's crust, by means of their in situ dragging and pumping by a fluid to the surface.

b) Geothermal surveys, those designed to take advantage of a geothermal resource through the implementation of a facility.

c) Research surveys, those that are carried out in order to establish the presence or absence in an area of one or another mineral or to delimit the deposit and evaluate the reserves that it houses.

d) Seismic surveys, those that are carried out during seismic surveys in order to carry out underground explosions.

3. PROJECT

3.1. General

Any type of survey will require a project, with the exception of those subject to the authorization of the exploitation project and/or work plan, as referred to in Article 19.2 of the Mining Safety Regulation, and those research surveys with depths less than 25 meters (singularly or as a sum of the planned actions).

3.2. Project content

The content of any project implementing a survey as specified in the previous paragraph shall be adapted to the following:

N° DOCUMENT 1. Memory

1. Background and object of the project
2. Projected action
3. Situation. Location with coordinates UTM-DATUM ETRS89.

    3.1 Cadastral information

    3.2 Environmental information

    3.3 Servitudes and other areas of special legal status

    3.4 Affected services

4. Budget
5. Deadline for implementation and work plan
6. Abandonment plan
7. Staff to be employed
8. Machinery to be used
9. Liability Insurance
10. Safety and health

Geotechnical study

11. Construction and demolition waste management
12. Study on accessibility and removal of architectural barriers
13. Authorisations required

ANNEXES

1. Work Plan
2. Justification of prices

N° DOCUMENT 2. Drawings

DOCUMENT N° 3. Technical specifications

N° Document 4. Safety and health document

DOCUMENT N° 5. Waste management

DOCUMENT N° 6. Budget

4 GENERAL SECURITY REQUIREMENTS APPLICABLE TO ANY KIND OF SONDEO

4.1 Staff

- The work team on each shift shall consist of at least two operators.
- Every survey must have a vehicle for the evacuation of accidents, as well as a mobile phone or equivalent communication device.
- For each survey, staff will be provided with an emergency telephone list indicating:
    - Phone and address of the nearest doctor, ambulance or Red Cross station.
    - Telephone and address of the nearest Civil Guard, National Police and Local Police post.
    - Telephone and address of the nearest Civil Protection post.
- Access to the survey is prohibited to anyone outside the workplace, with a danger sign in the access areas, easily visible, where this prohibition is clearly manifested.

4.2 Machinery

4.2.1 General

- The use of drilling machinery, the elements of the drilling equipment and the additional

elements shall always be in accordance with the regulations and the indications provided by the manufacturer or by the data sheet of the machinery.

- Repairs or any type of performance on moving machines and mechanisms are prohibited.
- No machinery shall be put into operation without first ensuring that no person is in danger from the use of the machinery. Likewise, it will not be left in operation without supervision.
- Every sounding machine will have an easily accessible first aid kit.
- Every machine shall have a fire extinguisher in an easily accessible place and whose capacity and type shall be in accordance with the power and characteristics of the machinery used.
- All machines must have an external protection that prevents access to their moving parts and if this protection is removed to facilitate controls or repairs, it must be replenished before restarting the movement of the machine. Likewise, they must have the most appropriate protections to the specific risk of each machinery and / or equipment, especially regarding the possible actions of entrapment, puncture, cutting or crushing.
- All engines of the sounding machine must be equipped with an easily accessible mechanism to stop them in case of emergency.
- In pumps, compressors and boilers, the maximum pressures and the diameter of the corresponding pipes shall be clearly indicated on a plate in a visible place, and all these elements shall be equipped with safety valves, which shall be cleaned and controlled with the frequency indicated in the instruction manual.
- Pressure pipes must be able to withstand a pressure twice the maximum expected at work.
- To prevent surface water from entering and objects from slipping into the borehole, the borehole pipe shall protrude at least 30 cm above the surface of the ground.
- At the beginning of each shift, the operator in charge of the survey will review and check the condition of the equipment before putting it into operation, correcting minor defects, communicating it to his replacement in the position and reviewing it in the daily part of the survey. If you notice a defect that constitutes a reason for insecurity, you will proceed to repair it before continuing with the work.
- Whenever starting engines or pumps, the prober shall ensure that nothing prevents the proper functioning of the machinery and that no one is in danger.

4.2.2 Location of the machine

- The access road to the site of the machinery must be defined in the project, having the necessary conditions for the safe movement of the personnel and vehicles involved in it.
- The location of the machinery shall be at the point designated in the project, where the existence of underground pipes and overhead cables shall be indicated.
- The terrain of the site must be sufficiently strong to be able to withstand the maximum stresses to which it may be subjected during the drilling operation. Otherwise, a suitable foundation will be provided for the machine, as specified in the probing project.
- The machine positioning platform shall be as flat and horizontal as possible, shall not be slippery and shall have a clear area in its environment sufficient for the smooth running of the work.

- Where the machinery is operating on the same site for more than one week, the following shall be checked at that interval:
    - The stability of the platform.
    - The firmness of the anchors.
    - The rigidity of the structure.
    - The tension of the winds, if any.
    - The slack of the mooring pieces.
    - Fixing the scales.
- The reviews detailed above will also be made after water or wind storms.
- Documentary records of the periodic reviews detailed in the previous points must be kept.
- The mud raft or detritus discharge must be marked and enclosed, as well as separated from the usual places of passage of personnel outside the survey, and its general conditions must be defined in the survey project.
- The borehole shall be provided with adequate drainage of rainwater or water from the borehole itself outside the work platform.
- The uncontrolled dumping of waste and rubbish, as well as the emission of oils and sludge from the borehole to any drainage network, shall be prohibited.

4.2.3 Installation assembly

- The assembly and disassembly of the drilling rig shall be carried out, whenever possible, during sunny hours.
- In the case of proximity to an in-service power line, the location of the machinery shall be such that it is not below the line, and that any fixed or moving part of the line keeps the minimum safe distance to the power line indicated by the expression:

$$L = 3{,}3\left(\frac{U}{100}\right)$$

  with a minimum of 6 metres, and where:

  U = Nominal line voltage, kV

  L = Safety distance, in metres
- In any case, when the machine is installed less than 25 meters from the vertical of the line, special measures will be taken to prevent the overturning of the tower, and the moorings of the winds will be reinforced.
- In machinery-approach manoeuvres, movements shall preferably be made horizontally and at ground level.
- Before the machine is assembled, the probing operator shall check the condition of all equipment, in particular castille or boom fastening parts, and any defective components must be replaced or repaired before the machine is started.

- During the lifting of the castillete or pen, only the personnel necessary for this type of operation will remain in the vicinity of the machine.
- Once the machine is installed, the operator in charge of the survey will proceed to control its stability, providing, where appropriate, the necessary winds.
- It shall be verified that there are no tools or parts left in the castillete, that the access scales are well fixed and that the wind fasteners are sufficiently firm.
- Before the first start-up of the machine, the operator in charge of the survey shall verify the following aspects:
    - The stability of the platform.
    - The firmness of the anchors.
    - The rigidity of the structure.
    - The tension of the winds, if any.
    - The slack of the mooring pieces.
    - Fixing the scales.
- Documentary records of the initial revisions detailed in the previous point must be kept.

4.2.4 Particular requirements for percussion machines

- The cable attachment to the string shall be checked daily and reworked at least every 50 hours of work.
- The cable shall be checked at the same frequency and replaced when its passage has increased by 50 % compared to the nominal one, or when 20 % of broken wires are observed.
- Documentary records of the initial revisions detailed in the previous points must be kept.
- The breaking capacity of the manoeuvring and percussion cables must be at least five times the weight of the string used, the use of cables larger than that provided for in the data sheet of the drilling machine being prohibited.
- At the end of the working day the sounding mouth must be closed, and the trepane will be left in a stable position and independent of the actuation of the controls.
- The control panel of the machine must be adequately protected so that it cannot be operated by unauthorised personnel.

4.2.5 Particular requirements for roto-percussion and rotary machines

- The cable of the winch must be metallic, anti-spinning, flexible and with a lower resistance than that of the castillete or pen.
- The cable must be checked at least every 50 working hours and replaced when its passage has increased by 50 % compared to the nominal one, or when 20 % of broken wires are observed.
- Documentary record of the initial revisions detailed in the previous points must be kept
- All rods and splices should be standardized, and rods should be removed when they have any of the following deficiencies:

- Be twisted by more than 2 millimeters per linear meter.
- Present a dent or crack detectable to the naked eye, or a worn welding cord.
- Have deep corrosion
- It is verified, at first glance, that the threads are worn.

- The string clamping wedges should not be excessively loose, and should be clamped to the table to avoid projections.
- In rotopercussion drilling, when drilled only with air, the use of a dust collector or any other equivalent system is mandatory.
- Rotor-percussion drilling shall be provided with a deflector to protect personnel and machinery from water that may be ejected by drilling.

4.3 Development of the survey

4.3.1 Requirements for intubation

- The pipe must be inserted into the borehole, whether it is provisional or definitive, with the winch and tubing cable of the machine, suspended by an appropriate mechanism or tool that prevents it from slipping.
- If a pin is used, it must be sufficiently secured to prevent its horizontal displacement, it being prohibited to use shackles or the passage of a cable through perforations in the pipe.
- When cats are used in the recovery of the pipe, they will always be hydraulic and in each support a shovel base of adequate thickness and surface will be prepared. Feeding of cats shall be carried out through a hydraulic power station equipped with a control gauge and safety valve, separated as far as possible from the sounding mouth.
- The joint between the different pipe sections will be made by welding, in case of steel pipe, and by threading and bonding in the polyvinyl chloride (PVC) pipes.
- Welding must be uniform, continuous, total and free of pores or husked, and an electrode of sufficient quality must be used for the welding to be penetrative.
- The pipes, provisional or definitive, must be retained by a clamp or surface clamping system, with a sufficient base to prevent slipping inside the probe.

4.4 Protection and abandonment of the survey

4.4.1 Protection

- In order to prevent surface water from entering the borehole, the final liner pipe must protrude at least 30 centimetres above the surface of the ground.
- The pipe must also be surrounded by a cement plate at least 15 centimetres thick in the centre and 10 centimetres thick at the edges, so that its upper face offers a slope towards the periphery in all directions.
- A cover or protective device shall be fitted to prevent foreign objects from entering.

4.4.2 Temporary stop

- The temporary closing device shall consist of a sheet metal lid of a minimum thickness of 4 mm, welded throughout its perimeter to the lining tube.

- A ventilation vent at least 8 mm in diameter with a protective mesh to prevent the penetration of objects shall be installed on the side wall of the tube.
- Hazard signage and prohibition of access to any person outside work located in the access areas shall not be removed, so that the signage remains active during the temporary stop period.
- Before temporarily stopping a borehole, the detritus produced in the borehole will be evacuated or removed.
- The affected areas must be refilled or dismantled in such a way that they do not give rise to waterlogging or constitute a danger to humans or animals.

4.4.3 Final abandonment

- The operations to be carried out for the definitive abandonment must be detailed in the survey project under the section Abandonment Plan.
- Before leaving a survey, it must be sealed with waterproof materials.
- The sealing material must be waterproof and fill both the intubation of the probe and all the annular space between it and the ground.
- The top of the survey must be filled with concrete up to a minimum of 5 meters deep, leaving a first section of 1 meter filled with natural soil.
- Before leaving a borehole, the detritus produced in the borehole will be evacuated or removed.
- The affected areas must be refilled or dismantled in such a way that they do not give rise to waterlogging or constitute a danger to humans or animals.

5 SPECIFIC REQUIREMENTS FOR SOME TYPES OF SONDEOS

5.1 Seismic surveys

5.1.1 General requirements

- The location of soundings for a seismic study with explosives or vibrator as a source of energy, must be carried out so that the explosion does not affect any nearby construction.
- The project shall include full details of the minimum distances to be maintained from existing constructions, power lines or installations, indicating the loads of the wells and their depth, or the frequency of the vibrator if used.
- During the drilling of seismic soundings with automatic equipment, the proximity of personnel within five meters of the rotating elements shall be strictly prohibited. During the drilling of seismic drilling with manual equipment, this prohibition shall be maintained, with the exception of personnel who directly operate the controls of the drilling equipment during this operation.

5.2 Leaching or dissolving operations

5.2.1 Separation between surveys

- The minimum distance between injection probes in the case of saline holdings shall not be

less than that resulting from the formula:

$$d = 1{,}3\sqrt[3]{V}$$

Where V is the expected final volume, in cubic meters, of the nearest cavity.

5.2.2 Process control

- During the dissolution or leaching process, an inert fluid, such as a hydrocarbon, of lower density than the solvent or leach used, shall be used and kept in contact with the roof of the cavity in order to control the process.
- Cavities will remain constantly filled with fluid.
- Periodically, according to the rate of growth of the cavities, a detailed survey of the cavities will be carried out by means of probes, in order to control their evolution. In the event that any situation not foreseen in the project is detected, the Mining Authority will be immediately informed and the measures leading to the solution of the problem will be taken, in order to avoid risks for people and the environment.

5.3 Geothermal surveys

5.3.1 Development of the survey

- During drilling operations, the following shall be required:
    - Provide the well with the necessary equipment and materials to prevent eruptions. At least one equipment for the prevention of eruptions shall be operated at a distance of not less than 10 metres from the sounding point.
    - Properly protect the aquifers crossed.
    - Protect the formation containing the geothermal resource, by means of cladding pipe, cemented.
- If the exploited geothermal fluid is high-enthalpy vapor or any other high-temperature fluid, it shall:
    - Design the coating pipe, taking into account the additional stresses derived from the high temperature of the subsoil.
    - Complete cementation of the annular space of all lining pipes.
    - Select the type of cement and additives to be used in the cements, according to the nature and temperature of the resource exploited.

5.3.2 Controls

- Periodically, the equipment used and its security facilities will be reviewed, ensuring that they are in proper operating condition. This inspection is mandatory before starting any work and after a long stop.
- At least once a year, the concessionaire must carry out well bottom pressure and temperature surveys, in a sufficient number of surveys, selected in order to obtain information on the pressure and average temperature of the reservoir. The results of such surveys shall be communicated to the Mining Authority.

5.3.3 Geothermal resource treatment

- The treatment and disposal of the geothermal resource exploited, as well as its derivatives, by-products and waste, shall be carried out safely and in accordance with the existing regulations in this regard, in each case.
- The waste deposits, whatever their origin, will be established according to a project drafted by the owner of the survey and approved by the Mining Authority.
- Maximum security measures shall be taken into account in the design of these tanks.

ITC SM-IND-22 BENEFIT ESTABLISHMENTS

1. OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims to establish the minimum safety requirements that benefit establishments must meet, whether fixed or semi-mobile installations, new or used, rented or belonging to subcontracted companies, in development of Article 36 of the Mining Safety Regulation.

2. GENERAL REQUIREMENTS

1. New benefit establishments, or their substantial modifications, require the submission of the corresponding projects to the Mining Authority.
2. The project must expressly justify the correct compliance with the provisions established in the implementing regulations for the auxiliary industrial facilities or equipment that are implemented in the establishment **of** profit, in addition to complying with the initial and / or periodic inspections or reviews that are established. Consideration shall be given, inter alia, to the regulations applicable to the following installations and equipment:
    i. High and low voltage.
    ii. Fire safety.
    iii. Storage of chemicals.
    iv. Pressure apparatus.
    v. Oil installations.
    vi. Work teams.

3. SPECIFIC SECURITY PROVISIONS

3.1. Collections

1. Stockpiles of material must not exceed the amount or height that jeopardises their stability. Those safety limits shall be justified and included in the design of the benefit establishment.

2. The collection or stacking of materials must be done on a ground with sufficient consistency so that its weight does not exceed the expected overload for the pavement, and as horizontal as possible. Water from surface or groundwater streams should be drained in such a way as to avoid accumulation under or in proximity to the collection.

3. Stacking against walls or walls of buildings that are not suitably sized to withstand the thrusts created should not be performed.
4. The passage around the flanks must keep free a safety space of not less than 1.5 meters, depending on the characteristics of the material.
5. The surface of the natural slope must be kept free, preventing detachments or slips of material. Stepping on the surface of the slope is allowed only when an emergency situation occurs, and provided that there is no risk of sinking or detachment or other damage. In any case, all appropriate measures must be taken to avoid risks.

6. When the pile or stacking has an evacuation device below ground level, by feeder and conveyor belt, the prohibition of stepping on the slope surface should be rigorously applied, due to the risk of entrapment due to the sinking of the material. The perimeter of the base of the collection must remain fenced or signposted, except for accesses to unloading vehicles or loading shovels to trace and bring the material closer to the extraction point.
7. Stockpiles near staff accesses should be protected by barriers and signposted by pictograms

3.2. Hoppers and silos.

1. Dry bulk materials should be stored, if possible, in silos that allow them to be discharged from the bottom.
2. Silos must be constructed of fire resistant material, covered and ventilated effectively.
3. If discharged from a vehicle onto the hopper, protection shall be provided to limit the approach of the vehicle in order to prevent it from falling.
4. When unloading on any means of transport, it must be carried out by means of an auxiliary device or equipment that facilitates the manoeuvres of opening, dosing and closing in a progressive and safe manner.
5. In the control systems of the gates, whether hydraulically, pneumatically or electrically operated, a device must be installed for automatic closure in the event of a power failure (this same device must be capable of being closed manually after the energy sources have been recorded). In the case that the operation is manual, it must be carried out by means of a device that allows the maneuver with total safety. If unloading is carried out on collection by means of a tilting gate operated by the weight of the material, the closing latch must be operated by means of a tool that prevents direct contact. In both cases the maneuvers must be carried out from a safe and protected place both from the risk of falling, as well as from entrapment and projection of materials.
6. Cleaning, unblocking and repair operations requiring the entry of personnel into the silos should preferably be carried out from the outside, from the top or through side openings, and an internal safety arrangement should be established to ensure the safety of the operation.
7. If the entry of personnel into the hopper is necessary, a security operating system should be established. To this end, the following sources of danger and prevention measures shall be taken into account, inter alia:
    - Falls. Need to use protective equipment such as seat belts or safety harnesses.
    - Avalanche of material. Prohibition to descend below the upper level of the load.
    - Formation of vaults without signs/signs/marks on the surface of the material, which may cause suction or sudden entrapment of the personnel stepping on them.
    - Harmful atmospheres. Need for adequate protection such as filter masks, even autonomous breathing devices.
    - Help in case of emergency. It is not allowed to carry out these operations alone.
8. In any case, the mechanisms of loading and unloading of materials must be stopped, making sure that they cannot resume their march by inadvertently, until the operation is completed.

9. When discharging with trucks or dump trucks, an optical and/or acoustic warning system should be provided to prevent the unloading of vehicles while a repair operation is being carried out inside the hopper.
10. When an operator enters a silo, he must have a safe lifeline (and be firmly attached to a fixed anchor point) and must be assisted throughout the operation by another operator located outside. Entry into a silo should be prevented during feeding and unloading, or when no precautions have been taken to prevent the untimely resumption of such operations.
11. It will not be allowed to carry out mechanical repairs capable of producing sparks or ignition foci, without having perfectly eliminated all other combustible matter and ventilated its environment. In extreme cases it may be necessary to perform a thorough sweep with inert gases. An internal security arrangement shall be established to regulate such operations.
12. Silos and hoppers must be surrounded by a permanent defense against the risk of impact on them of mobile mining machinery, and their access must be practiced through appropriate means of access to the current regulatory provisions.
13. The risks associated with the material, explosive atmosphere, and inhalation of dust or toxic gases should be taken into account, establishing, where appropriate, the necessary preventive measures to minimize the risk.

3.3. Conveyor belts

1. Matching journeys with crossing routes or traffic routes should be avoided as far as possible; in any case they must be protected from accidental contact by vehicles and pedestrians. Protective guards should also be installed in the intersection areas to prevent the risk of falling materials.
2. The inclination depends on the shape and size of the material, humidity and speed of the tape. Under normal conditions, it is recommended that the inclination of the tape does not exceed 18° or 22° in the case of fine and dry non-granular materials.
3. All mobile work elements (drums, rollers, ...) as well as transmission elements, which generate risk, must be protected by guards or other protective devices.
4. Power heads, pick-up drums and tensioning stations must be specially protected against the risk of entrapment.
5. No moving parts shall be allowed to be cleaned in progress. If for service reasons it is not possible to stop the belt, the use of suitable devices such as cleaning rollers, scrapers or pressure jets should be used.
6. An optical or acoustic start warning signalling system must be installed. The minimum interval between both maneuvers (order and start) should be 10 seconds.
7. It is advisable to have a communications system with the command post, at the points of loading and unloading of the ore, as well as emergency stop devices.
8. It is recommended that the speed of transport of materials does not exceed 3-4 m/s.
9. Places where material is unloaded, either on hoppers, parvas or landfill, should be adequately protected to prevent risks of falls.
10. If the belt is installed in a closed room with a risk of fire, it must be equipped with means of

measuring CO concentration in the vicinity of the driving head. If necessary, respiratory protective equipment should be available for personnel working in the vicinity of such power heads.

11. It is advisable to have a system for detecting the slip of the belt in the driving drum, which causes the automatic stop of the installation, as well as a system of alignment and correction of off-centering of the belt.

12. A pull cable emergency stop system with locking position should be installed along the conveyor belt path.

13. The tensioning devices of the conveyor belt shall have the necessary safety requirements to avoid any danger of crushing and entrapment.

14. It is recommended that the lubrication and adjustment points used are accessible without the need to remove any guards.

3.4. Other transportation and production equipment.

With regard to other possible transport elements used in the profit establishments, among others:

- feeders (plate feeders, swing feeders, vibrating feeders, etc.).
- discharge gutters (fixed or vibrating).
- armored transporter.
- winches.
- bucket lifter, trays or skips.
- endless screw conveyors.
- pneumatic conveyors.
- sludge pumps (centrifugal, diaphragm, etc.).

The respective protection measures should be defined in terms of loading and unloading points, emergency stop devices and cleaning or overhauls, in addition to general measures to protect moving parts (working or transmission).

3.5. Roads and access

1. If vehicles or machines have access to the workplace, the necessary traffic rules will be established, it being advisable to establish a traffic plan that separates heavy vehicles from light vehicles and both, from pedestrian traffic.
2. Traffic routes, including stairways, fixed ladders and loading docks and ramps, must be calculated, sized and positioned in such a way that they can be used easily, safely and in accordance with their intended use by persons on foot or by vehicles and that workers employed in the vicinity of such roads are not at risk.
3. When intended for vehicles, there should be a sufficient safety distance from doors, footsteps, walkways and stairs. Its layout and access must be clearly signposted to ensure the protection of workers. Speed limitations should be specified by regulatory signalling.
4. The loading docks and ramps must be appropriate to the dimensions of the loads carried.

The docks must have at least one exit. Cargo ramps must offer the assurance that workers cannot fall.

5. It shall be possible to safely access all workplaces and evacuate them quickly and safely in the event of an emergency.

3.6. Loading and unloading

1. The risk of falling and/or overturning of vehicles during access and tilting manoeuvres should be prevented by means of containment systems and, failing that, under the guidance of competent personnel, by means of an established signal code, if necessary. In addition, acoustic and/or light warning systems may be provided to regulate discharge operations at specified points (pipes, tanks, ...).
2. Where limited access areas exist, they should be equipped with devices to prevent unauthorised workers from entering them.
3. A DIS reflecting gauge controls in areas affected by power lines.

3.7. Tanks and tanks

1. When tanks or tanks for liquids or pulp have the opening above the ground or the working plane, it must be covered by resistant metal lids or grids, or protected by railings of sufficient height and solidity. In addition, these facilities must be provided with adequate ducts of sufficient capacity to allow the discharge of their contents, preventing spillage of the stored liquid.
2. Gateways or passageways should not be installed above tanks or reservoirs, except where they are indispensable for access to control or sampling points. In these cases, these walkways or service passages must be protected and always kept free of obstacles and dry.
3. Tanks above ground level containing corrosive, toxic or high-temperature liquids or pulps must be surrounded by pits or similar channels, with sufficient capacity, in the event of the tank breaking, to collect all its contents and carry it to auxiliary tanks installed outside the buildings.
4. It is recommended that the perimeter of these deposits be fenced to avoid unnoticed and signposted access.
5. In thickening tanks, in addition to the above requirements, precautionary measures should be taken with regard to existing moving elements, both work and transmission.
6. Pipes, gaskets, flanges, fittings, etc. must be designed, constructed and, where appropriate, maintained in such a way that, taking into account the physical and chemical properties of the material, damage to persons due to leakage or breakage is avoided. Pipeline transfer of suspended materials, fluids, pulps and sludge, by the action of gravity or additional pressure, must be carried out taking into account the following factors:
    i. The tubes must be manufactured in accordance with the regulations corresponding to the requirements of their use and, as a minimum, pass the hydraulic pressure test, carried out individually in each of them.
    ii. When transporting toxic materials, seamless pipes should preferably be used and the tightness of the stopcocks should be protected by means of safety devices.

iii. In order to prevent hammering, the stopcocks should be closed progressively and, where appropriate, balancing devices should be installed to divert the flow accumulated by the inertia.

iv. When the inspection or work inside the pipes is essential, an interior sweep must be previously carried out to eliminate harmful gases, and verification that their atmosphere is breathable, avoiding, as far as possible, that a single person penetrates. If necessary, each operator must carry autonomous breathing equipment.

v. In the case of transport or storage of toxic liquids, suitable substances for the neutralisation of such liquids should be installed at the base of the conduction or reservoirs and inside them.

vi. The tubes must be painted with different colors, depending on the type of fluid they transport according to current regulations.

3.8. Protection against harmful atmospheres

1. In facilities with dust detachments, harmful gases or any other annoying or unhealthy emanation, the appropriate means to eliminate or minimize the associated risks will be applied, in accordance with current legislation. In the project of installation, extension or modification of the profit **stability,** the most appropriate capture, filtration and dispersion procedures (capotages, precipitators, chimneys, or temperatures and output speed, etc.) should be adopted so that the pollutants emitted into the atmosphere always respect the permissible emission and immission limits.
2. With regard to dust protection, the provisions of ITC SM-PRL-07 shall apply.
3. In areas where workers may be exposed to atmospheres harmful to health, adequate breathing and resuscitation equipment must be available in sufficient numbers. In such cases, the presence at the workplace of a sufficient number of workers who know how to handle such equipment shall be ensured. Protective material shall be properly stored and maintained. Where toxic gases exist or may exist in the atmosphere, a protection plan must be in place indicating the equipment available and the preventive measures to be taken.

3.9. Protection against explosive atmospheres and fire.

1. All necessary measures must be taken to prevent, detect and combat the onset and spread of fires and explosions, as well as to prevent the formation of explosive or harmful atmospheres.
2. In particular, account shall be taken of the requirements laid down for the prevention and protection against explosive atmospheres and fires.

3.10. Fire protection in underground conveyor belts.

In addition to the provisions of paragraphs 3.9.1 and 3.9.2, underground conveyor belts shall meet the following requirements:

1. The installation of conveyor belts shall have fire prevention and fire-fighting systems. The entrepreneur will determine the characteristics, type and number of the elements that

constitute it and its location and signage. At least one water distribution network system shall be available, except in situations where water is contraindicated.

2. A CO concentration control system shall be installed in the atmosphere of the mine so that the development of a fire can be detected prematurely at any point in the conveyor belt circuit. The location and number of CO collectors in the mine shall be specified in the safety and health document. In any case, its placement in the vicinity of the driving heads will be mandatory. The location of CO collectors should also be foreseen in changes of position of conveyor belt installations. On conveyor belts where personnel are present during operation, continuous CO meters shall be used during working periods.
3. A communications system must be installed linked to a control post with permanent presence of personnel, in which signals from CO collectors are received, and from which the investigation of any anomalies is communicated directly. In case of emergency, communications must reach the personnel who may be affected by it.
4. The safety and health document should define the tasks that may be affected by the current of fumes produced by a possible inflammation of the band. The mandatory use of individual respiratory protective equipment, preferably chemical oxygen generation, shall be determined on the basis of the risk assessment. In any case, such equipment should be mandatory for personnel working in the vicinity of the driving heads of the conveyor belts.
5. All materials used in the support and coating of the work in which the conveyor belt is installed must be non-combustible 10 meters before and 10 meters after the point where the driving group or groups are located. In coal mines, on tapes installed in layer galleries, in addition to the above requirement, the coal layer shall be coated with a non-combustible material in the same length as mentioned above.
6. In the work where the conveyor belt is installed, combustible materials must not be stored, except, if necessary, if the need is justified. In this case, the storage points or areas shall be equipped with fire-fighting systems appropriate to the characteristics of the stored products. The use of combustible materials in the filling of sinking hoods that may occur during the work where the conveyor belt is installed shall be avoided as far as possible.
7. Hydrokinetic transmissions used in motor groups should, where possible, use fluids that are difficult to flammable and, where appropriate, complementary prevention measures should be taken.
8. In the vicinity of the drive group, a belt slip detection system shall be installed on the drive drum causing the automatic shutdown of the installation. The installation shall be equipped with a belt off-centre correction system. A pull-type emergency stop system with a locking position shall be installed along the conveyor belt path. The belt installation must have cleaning systems in place to ensure clean belt access to the drive drums and forwarding drums.
9. Appropriate lighting points shall be installed to reduce the risks arising from the use of conveyor belts. In particular, luminaires shall be provided at least at the following points:
    - On power heads, unloading and forwarding points.
    - In the tensioning device of the band.
    - At the transfer stations.

10. For the prevention of fires in conveyor belt installations, an internal safety arrangement shall be drawn up covering at least the following aspects:
    - The communication and actions to be carried out in the case of alarm of CO control devices.
    - Periodic cleaning of the area near moving parts of the installation.
    - The maintenance of the belt alignment and the gauges of the parts close to the installation.
    - Welding and cutting operations carried out on or near the installation. Maintenance of the installation and safety devices.
    - The operational procedure to be followed for the start-up of the installation after any stoppage, both planned (maintenance) and unforeseen.

4. MAINTENANCE AND REPAIR OF SERVICE FACILITIES

1. Maintenance and/or repair operations may only be carried out by qualified personnel authorised by the employer, who shall also take the necessary measures to document the repair and maintenance operations carried out throughout the life of the installation.
2. The employer shall take the necessary measures to ensure that the entire installation is properly maintained so that it is kept for the entire period of use under conditions which satisfy all safety and use requirements. Revision operations and replacement operations of components or components indicated by the manufacturer shall, for the purposes of this JTI, be considered as maintenance operations.
3. This maintenance may be carried out by the employer, always following the instructions of the manufacturers and the conditions of use, and taking into account any other normal or exceptional circumstances that may influence its deterioration or mismatch.
4. The application of new safety features on equipment constituting the installation is considered an improvement and will therefore be documented as a maintenance operation.
5. The operator must have an adequate maintenance plan for each installation, which must comply with the corresponding requirements set out in this JTI, as well as in the applicable regulations in force.
6. The repair of security elements of the equipment that are part of the installation must guarantee the correct security function for which they were designed and installed.
7. The maintenance and repair of the work equipment that is part of the installation will comply with the provisions of the ITC-SM-IND-10.

5. PERIODIC TECHNICAL INSPECTION

Benefit establishments must undergo a periodic technical inspection every 2 years by a mining control body (MCO), in order to ensure compliance with all applicable mining and industrial safety requirements included in this JTI, as well as in the specific regulations that apply to them.

Such inspections shall verify:

- Correspondence with the original project and its subsequent modifications, where

appropriate.

- Documentally, that the corresponding mandatory periodic inspections have been carried out that, where appropriate, establish another applicable industrial regulation.
- That the production line complies with the requirements set out in Technical Specification 22.01 'Technical inspection of conveyor belts', as well as in the technical specifications developed in accordance with the provisions of the following paragraph.

The Directorate-General for Energy Policy and Mines shall draw up technical specifications to carry out the periodic technical inspection of certain equipment or components of profit establishments in view of their accidents, where the requirements, the corresponding inspection points and the frequency of inspections are defined.

The following results shall be established for periodic roadworthiness tests:

a) Favourable: The installation or equipment does not present deficiencies or only presents deficiencies that do not have a significant impact on the safety and health of workers. Installation may continue in service.

Favourable with deficiencies: The installation has only minor deficiencies, but the evolution of which may lead to deficiencies that compromise the safety and / or health of workers. The installation may continue in service, but these deficiencies must be remedied before the usual time limit for the next inspection is met.

c) Disadvantaged with deficiencies: The facility has deficiencies that compromise the safety and/or health of workers. The installation cannot be in service until the deficiencies are rectified through the corresponding maintenance and / or repair interventions. A re-inspection with a favourable or favourable result with deficiencies shall be required for re-entry into service.

Negative: The installation has deficiencies that affect the main systems or security elements. The installation cannot be in service until the deficiencies are rectified through the corresponding repair. A re-inspection with a favourable or favourable result with deficiencies shall be required for re-entry into service.

The results of the inspections, which shall be available to the Mining Authority, shall be retained throughout the lifetime of the installation.

ET 22.01 TECHNICAL INSPECTION OF CARRIER CINTAS

1. OBJECT AND SCOPE

This Technical Specification ('TS') aims to establish the procedure for periodic inspections of conveyor belts, as set out in ITC SM-IND-22 of the Mining Safety Regulation.

In the event that the production line is partially run by underground work, it will not apply to conveyor belts located inside.

2. DEFINITIONS

2.1. Band feeder: shortened belt conveyor shape, which normally operates at slow speed, designed to extract or regulate the flow rate of bulk materials from hoppers.

2.2. Conveyor head: conveyor discharge end.

2.3. Channel: Straight or curved dough, open the top or completely closed, smooth, through which the materials are directed and fall by the action of gravity.

2.4. Dumping trolley: a device normally comprising two or more drums, mounted or in a fixed position or on a moving trolley, for discharging conveyor material at selected points or at any point along the length of the conveyor belt.

2.5. Conveyor Tail: Loading end of conveyor.

2.6. Tensioning device: device to compensate for loosening and apply tension to the belt.

2.7. Gravity tensioning device: tensioning device (automatic) driven by a vertical load.

2.8. Transition distance: length of the conveyor occupied by the transition section.

2.9. Command station: refers to the cockpit or common command post, and its adjacent areas, of the equipment implemented in a profit **stable.**

2.10. Point of entry: dangerous point on the drive side at the level of the contact line between the conveyor belt and the moving drum and in some cases between the belt and a roller or fixed part.

2.11. Scraper: fixed or flexible mounted cleaning device in the direction of the width of the belt or pulley of a conveyor, to remove the attached material.

2.12. Inflection point guard: Fixed guard inserted at an inflection point to directly protect this point.

2.13. Fixed locking guard: fixed guard that prevents access to the dangerous zone from all sides.

2.14. Fixed distance guard: fixed guard that does not completely close the dangerous zone, but prevents or reduces access by its dimensions and its distance to the dangerous zone, for example, perimeter fence or tunnel guard.

2.15. Inflection roller: roller used to change the direction of the belt.

2.16. Return Roller: roller supporting the return (empty) branch of the belt.

2.17. Clamping roller: roller used to develop the necessary contact arc (rolling angle) of the belt over the drive drum.

2.18. Bearing roller: roller that supports the supporting branch of the belt.

2.19. Transition rollers: Roller assemblies supporting the belt at the transition distance. The geometry of the rollers can vary over the transition distance to allow the change from the gear profile to the plane.

2.20. Load-bearing rollers in dough: set of rollers that support the belt and keep it in the form of a dough.

2.21. Transition section: section of a belt conveyor in gear on the head, tail or on an intermediate discharge pulley, where the belt profile changes from a gear shape to a flat shape.

2.22. Guidance system: extension adapted to the feed hopper or independent plate installed along the conveyor to center or maintain the material on the belt.

2.23. Drive drum: drum that drives the band.

2.24. Head drum: drum located at the head of the conveyor.

2.25. Tail drum: drum located in the tail of the conveyor. It can be a tension drum.

2.26. Voltage drum: mobile drum used in the tensioning device.

2.27. Feed hopper: collecting device at the loading point of the conveyor intended to receive the material.

2.28. Belt conveyor: conveyor including its structural components, using a movable belt with a continuous rubber or polymer surface as a means of transport. The belt is normally driven by a pulley at one end, passing over a free pulley at the other end. The top of the belt can be supported by free rollers or by an adequate flat surface. The conveyor can be arranged for a horizontal or inclined travel, depending on the angle of the slope of the characteristics of the material to be transported and the type of belt.

2.29. Belt conveyor with containment edges: belt conveyor in which it has its supporting face extended to form side walls of limited height.

2.30. Belt conveyor in dough: belt conveyor, in which the belt is supported horizontally on the central rollers and the sides by inclined rollers producing a transverse curvature in the belt.

2.31 Radial conveyor: belt conveyor that pivots at one end and can be mounted on wheels or skates at any point of its length, allowing it to describe a horizontal arc.

2.32. Working area: area provided for by the manufacturer, where the operators work or operate the conveyors under normal conditions (excluding inspection and cleaning).

2.33. Traffic area: area provided for by the manufacturer, which is accessible or achievable by all persons without opening a guard, activating a sensitive device or using additional means.

3. MAIN SECURITY MEASURES

The main safety measures to be verified for the conveyor belts referred to in this TS shall be as follows:

- Protective measures against the dangers of crushing or shearing.
- Protective measures against cutting or shearing hazards.
- Protective measures against rollover, trawling and entrapment.
- Protective measures against ejection of parts (of machines or of manipulated materials).
- Protective measures against slip, trip and fall hazards.
- Protective measures against electrical hazards.
- Protective measures against thermal hazards.
- Protective measures against hazards due to electromagnetic radiation.
- Protective measures against fire and explosion hazards caused by transported materials.
- Protective measures against hazards caused by non-compliance with ergonomic principles in machine design (non-adaptation of machinery to human characteristics and abilities).
- Protective measures against hazards caused by power failure and other functional disorders.
- Protective measures against hazards arising during maintenance, inspection and cleaning.

ANNEX I

Verification of security measures

In order to verify compliance with the security requirements and measures set out in paragraph 3, one or more of the following possibilities shall apply:

a) Measurement, in those inspection points for which the use of specific instrumentation is needed to obtain the results.

b) Visual examination, at those inspection points for which it is not necessary to use any instrument or equipment outside the machine itself.

c) Evaluation of the documentation, related to the documents provided by the manufacturer, and the records, dossiers and accreditations of the machine or installation.

d) Test, where applicable, whether there is a method prescribed for any particular requirement in the standard cited as reference, or in the manufacturer's instruction manual.

ANNEX II

Inspection phases

The verification procedure shall consist of several phases or stages, which are classified taking into account the state of operation of the installation, the conveyor belt or other moving elements that may exist therein.

Before indicating the types of tests to be applied, it is important to determine at what times during the inspection the movement of the conveyor belt is required, since this situation is the one that adds the most risks to the inspection procedure.

A priori, it would be desirable that, in order to carry out the inspection, the installation be stopped.

On the other hand, for the correct verification of some elements, it will be necessary that the installation is in operation (operation of drums, rollers, other moving elements, etc.), in particular, to be able to check the stop of the installation and its sequence.

In other cases, the opposite will happen, it will be necessary that the installation is stopped; e.g. to check the start-up and its sequence.

This information has been included in the table in Annex VI. In those points where nothing is indicated, it must be understood that the state of operation of the installation is indifferent.

The following verification methods are included in the table:

a) documentary: the purpose of which is to establish the regulatory documentary compliance for making the equipment available to workers (symbol “D” in the table);

b) visual check: whose purpose is only to establish by visual check whether any element is present or missing on the machine, system or component (e.g. guard, visual alarm

device, marking), or that the documents and/or drawings supplied are suitable to meet the requirements of this ET (symbol “V” in the table);

c) measurements: whose purpose is to establish by measurements whether the fixed measurable parameters have been met (e.g. geometric dimensions, safety distances, insulation resistance of electrical circuits, noise) and comply with the requirements of this ET (symbol “M” in the table);

d) test(s)

1. empty test(s): its purpose is to establish by a non-loaded operation (empty), whether the machine, including all safety devices, works as intended and all functions comply with the requirements of this ET and with the technical documentation (symbol “FV” in the table);

2. test(s) under load: its purpose is to establish by a laden operation those aspects that cannot be established by a vacuum operation test, e.g. resistance and/or stability, projections, and to determine that all safety devices and their settings are adequate and the result of their action is in accordance with the requirements of this TS and with the technical documentation (symbol “FC” in the table);

3. Documentary verification/specific measurements (e.g. electrical equipment, EMC, fire/explosion risk): the purpose of which is to establish by documentary verification or specific measurement, whether the established parameters comply with the requirements of the respective standards (e.g. compliance with electrical standards) (symbol “ES” in the table).

Measurements will be taken of widths in corridors and walkways, dimensions of platforms, envelope space in command station, height of accesses under conveyor, emergency exits, etc.

Indoor lighting measurements shall be carried out at the control station, and outdoors (control station and work and traffic areas) when equipment is found to be used in low visibility and at night.

When the inspection of several tapes of the same establishment coincides, the incidents of the common command station will be evaluated once, reflecting the result and the measures to be taken resulting in the rest of the equipment inspected.

With regard to the belt, its length, width, thickness, speed, inclination and misalignment (empty and load test) must be reflected, as well as its general condition, the state of the splice and the verification of the tensioning device implemented. At specific points load test will be required for the verification of absence of material projections, seals, etc. On moving or articulated elements it will be required to measure the free space between moving parts and check the safety devices, end of stroke, stops, etc.

All guards must be checked in their dimensions and their condition specified, as well as tested for operation of their interlocking devices (empty operation), if they are implemented. Other moving work elements such as rollers and drums shall be determined in terms of their condition and dimensions. Speed measurement of the engine drum of the equipment shall be performed.

For electrical equipment, documentary verification of the standards or periodic inspections affecting it shall be considered; If this does not exist, the relevant tests on the matter shall be

carried out.

Adequate performance verification testing of automatic fault detection devices if implemented, as well as overload or shutdown detectors, speed and rotation, safety devices (electric, mechanical action), etc. Vacuum testing of start-up, stop, and emergency stop operation shall be performed, verifying sequential order, actuating organs, audible and luminous warning devices, etc.

For noise measurement, the total time for each reading carried out under stable conditions shall be at least 30 seconds. 6 readings will be made (that do not differ from each other more than 3 dB). Measurements shall be made at the control station with the doors and windows closed and the air-conditioning and/or ventilation systems operating, and at the equipment transmission equipment (usually power head). If observers are present in the cab during the measurements, they must remain silent or not raise the tone of voice too much to give instructions, so that they do not significantly affect the results. If more than one operating speed is available, air conditioning and/or pressurized ventilation systems shall operate at the second speed for systems up to four speeds. For systems with more than four operating speeds, the third and, for systems with infinite continuous variable speeds, the mean value of the speed shall be used. Once the six readings have been obtained, those of lower and higher value will be discarded, and the arithmetic mean of the remaining ones will be taken.

For the measurement of whole body vibrations, different measurements shall be carried out, at least six, of at least three minutes each at different times of the working day. The belt shall operate unladen and the operator shall remain in the cockpit, without observers; if seated, the seat cushioning system shall be maintained under normal conditions of use.

ANNEX III

Classification of deficiencies

Individual elements likely to be inspected, because they have a direct relationship with the safety of the machine or installation, may have a degree of deviation (wear, misalignment, malfunctions, damage, lack of parts, etc.) that distances them from what should be considered their normal situation (under minimum conditions that can guarantee safety).

This degree of deviation results in the first classification in the elements:

a) DN1, where it must be understood that the observed deviation of the element from the minimum safety conditions does not immediately affect it, but that, if its evolution were not controlled, it would lead to a less desirable situation and would not guarantee safety.

b) DN2, where it must be understood that the observed deviation of the element from the minimum safety conditions can immediately affect it, not making sense in this case to control its evolution, since it should not be allowed.

c) DN3, where it must be understood that the observed deviation of the element from the minimum safety conditions clearly affects it.

On the other hand, the deficiencies in the systems to which each of the inspection points belong will be classified according to the risks generated by each of them in that system, from

the point of view of safety, jointly assessing the probability of damage occurring and the severity of it. This classification shall take into account the type of intervention required to remedy it.

Deficiencies in systems shall be classified as:

- Minor deficiencies:
  - When they do not affect the safety and health of persons immediately and, if the damage occurs, it has minimal consequences, or,
  - When a simple intervention, in the workplace itself, by maintenance personnel, can correct them.
- Moderate deficiencies:
  - When they affect the safety and health of persons but do not pose an imminent or serious risk; or
  - When the intervention of maintenance personnel is required, to correct them.
- Major deficiencies:
  - where they pose an imminent or serious risk to the safety and health of persons; or
  - When specialized intervention is required in workshops own or outside the installation.

ANNEX IV

Assessment of inspection points

System	Subsystem	Inspection point	Interpretation of shortcomings	Classification
A.- DOCUMENTATION				
A.1.- DOCUMENTATION				
INSPECTION CERTIFICATE				
		Accreditation without detailed report		DN1
		Previous mandatory inspection without passing		DN3
		Machine without accreditation		DN3
		No minor risks assessed		DN1
		Moderate risks not assessed		DN2
		The measures listed as necessary in the accreditation have not been taken		DN2
		Without taking any of the urgent measures specified in the report		DN3
		Without taking the necessary measures specified in the report		DN2
STATEMENT OF CONFORMITY				
		Non-cut data, impossible to identify the machine		DN3
		Declaration not kept in good condition (unreadable paragraphs)		DN1

Not in the user's possession

DN2

Does not belong to the machine

DN2

Unreadable or erased feature plate, die-cut data on frame

DN2

Some of the rules that give conformity to the band are missing

DN3

Deviations from Annex I or Annex II(A) of Royal Decree 1644/2008

DN1

MANUAL OF INSTRUCTIONS

In foreign language

DN2

It's at the command station, but it doesn't have an appropriate place to store it.

DN1

Quite a few sheets are missing from the operation and safety sections

DN3

Not in the user's possession

DN3

Not present at the command station, but in the user's possession

DN1

It does not belong to the machine, but to the model (n° series outside the specified range), with significant differences

DN3

It does not belong to the machine, but to the model (n° series outside the specified range), without significant differences

DN2

Belongs to a different model

DN3

Some sheets are missing or illegible, affecting any of the operation and / or maintenance sections

DN2

Some sheets are missing or illegible, without affecting the operation and/or maintenance sections

DN1

The manual does not take into account aspects of operation and maintenance

DN1

The manual does not take into account any aspect of operation and maintenance

DN2

OTHERS

Absence of BT Electrical Installation Certificate

DN3

BT electrical installation certificate after deadline

DN2

ADHESIVE PLATE

Not in the cabin

DN1

Not placed on the machine

DN2

Does not allow to read some data

DN2

Partially illegible, but allows you to read the data

DN1

Invalid adhesive plate

DN3

B.- FOB STATION

B.1.- ACCESSORIES

Asideros

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN3

Presence of blows, dents, absence or breakage of elements, keeping two points of support safe

DN2

Presence of blows, dents, absence or breakage of elements, keeping three points of support safe

DN1

Railings

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN3

Presence of blows, dents, absence or breakage of elements

DN2

Stairs

Absence of non-slip surfaces

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN3

Presence of blows, dents, absence or breakage of elements, keeping two points of support safe

DN2

Presence of blows, dents, absence or breakage of elements, keeping three points of support safe

DN1

Non-slip surfaces of stirrups: Does not guarantee foot grip

DN2

Non-slip surfaces of stirrups: Partial loss, ensuring foot grip

DN1

Non-slip surfaces of steps: Does not guarantee foot grip

DN2

Non-slip surfaces of steps: Partial loss, ensuring foot grip

DN1

General

Absence of protection against falling or sliding of materials transported at the command station

DN3

Poor state of protection against falling or slipping of materials transported at the command station

DN2

Walkways

No handrails

DN2

Absence of non-slip surfaces on walkways, being necessary

DN3

Absence of permanent and secure gateways to the command post, if required

DN3

Poor condition of permanent and safe gateways to the command post

DN2

Poor condition of non-slip surfaces on walkways to the command station

DN2

Width of walkways to inadequate control station (minimum free width 0.5 m)

DN1

Corridors

Absence of non-slip surfaces in access to the control station

DN3

Poor condition of non-slip surfaces in access to the control station

DN2

Width of corridors to inadequate control station (minimum free width 0.5 m)

DN3

Platforms

Presence of blows, dents, absence or breakage of anchor elements, screws or welds, affecting the mechanical strength of the structure

DN3

Presence of blows, dents, absence or breakage of anchor elements, screws or welds, which are necessary to repair in the short term

DN2

Presence of blows, dents, absence or breakage of anchor elements, screws or welds, which are necessary to repair in the medium term

DN1

Mesh light or openings that allow the punctual fall of materials

DN1

Mesh light or openings that may allow some materials to fall

DN2

Mesh light or openings that allow the fall of all types of materials

DN3

Absence of access platforms to the command post, being necessary

DN3

Absence of non-slip surfaces in access to the control station

DN3

Poor condition of non-slip surfaces in access to the control station

DN2

Inadequate control station platform width (minimum free width 0,5 m)

DN1

Poor status of access platforms to the command post

DN2

Emergency exit

It does not have its own means for its opening

DN1

There are no means at the command station for opening the emergency exit(s)

DN2

Bulky objects that prevent quick access to the outlet or its means of opening, not being able to be removed immediately (fixed by welding, screws, etc.)

DN2

Bulky objects that prevent quick access to the exit or its means of opening, but that can be removed immediately

DN1

Emergency exit(s) not signalled

DN2

There are some difficulties in opening the emergency exit(s) (in case it is a hinged/corridor door or glass)

DN1

There are major difficulties in opening the emergency exit(s) (in case it is a hinged/corridor door or glass)

DN2

Signaling of the partially illegible emergency exit(s), not allowing their identification

DN2

Signaling of the partially illegible emergency exit(s), allowing their identification

DN1

Changes to the control station that override the emergency exit(s) (welded doors, glass replaced by metal plates, etc.)

DN3

Non-slip surfaces

Absence of non-slip surfaces

DN3

Loss or absence of non-slip surfaces in any part of the cab access, but ensuring the foot grip and safe passage of the operator

DN1

Loss or absence of non-slip surfaces in any part of the cab access, which does not guarantee the foot grip and safe passage of the operator

DN2

B.2.- ENVIRONMENTAL CONDITIONS AND ERGONOMY

Field of view

Cracks due to impacts or other causes of small and dispersed dimensions, which do not affect the operator's field of vision

DN1

Cracks due to impacts or other causes, being close and reducing the operator's field of vision

DN2

Dirt or elements in crystals that reduce the operator's field of vision, difficult to remove

DN2

Dirt or elements in crystals that reduce the operator's field of vision, easy to remove

DN1

Enveloping space

Installation of objects in command station or modifications that reduce space and affect their handling and control

DN2

Installation of objects in command station or modifications that reduce space without affecting their manipulation and control

DN1

Installation of objects in command station or modifications that reduce space and prevent totally or partially their manipulation and control

DN3

Absence of ergonomic design

DN3

Outdoor lighting

Absence of parables

DN3

Insufficient lighting

DN3

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair in the short term

DN1

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the short term

DN2

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair immediately

DN2

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately

DN3

Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)

DN1

Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)

DN2

Interior lighting

Absence of screen

DN3

Cracks in the protection screen but dust ingress is not possible

DN1

Cracks in the protection screen being possible the ingress of dust

DN2

Does not work

DN3

Low intensity, not allowing night reading

DN2

Low intensity, allowing night reading

DN1

Lack of sufficient natural light or lighting at the control station

DN3

Noise

The noise level at the control station or on the work platform is greater than or equal to 80 dB(A) and less than 85 dB(A)

DN1

The noise level at the control station or on the work platform is greater than or equal to 85 dB(A) and less than 87 dB(A)

DN2

The noise level at the control station or on the work platform is greater than or equal to 87 dB(A)

DN3

HVAC system

Air conditioning. The system manages to reach the set temperature after a long time

DN2

Air conditioning. The system manages to reach the set temperature in a somewhat higher time than usual

DN1

Air conditioning. System fails to reach set temperature or does not work

DN3

Heating. The system manages to reach the set temperature after a long time

DN2

Heating. The system manages to reach the set temperature in a somewhat higher time than usual

DN1

Heating. System fails to reach set temperature or does not work

DN3

Does not work

DN3

Air conditioning system malfunction at the control station

DN2

No air conditioning/heating system at the control station

DN3

Vibrations

The full body vibration level is greater than or equal to 0.5 ms-2 and less than 0.7 ms-2

DN1

The full body vibration level is greater than or equal to 0.7 ms-2 and less than 1.15 ms-2

DN2

The full body vibration level is greater than or equal to 1.15 ms-2

DN3

B.3.- ELEMENTS

Glazing

Absence of any of the crystals

DN3

Absence of front safety glass

DN3

Absence of side or rear safety glass

DN2

Cracks due to impacts or other causes of small and dispersed dimensions, which do not affect the mechanical resistance

DN1

Cracks due to impacts or other causes, being close and reducing mechanical resistance

DN2

Cracks due to impacts or other causes affecting the mechanical strength of the glass

DN2

Absence of tempered or laminated safety glass glazing

DN3

Impact glazing breakage

DN2

Dirt of glazing

DN1

Live arists

Existence of very sharp edges

DN3

Existence of live edges of considerable dimensions, but contact with the operator is difficult

DN2

Existence of live edges of considerable dimensions, being possible contact with the operator

DN3

Existence of small live edges, making contact with the operator difficult

DN1

Existence of small living edges, making contact with the operator possible

DN2

Seat

Absence of armrests or headrests

DN3

Seat suspension does not work

DN3

Armrests and headrests. Slacks and anchorages: in poor condition, interfering in operations

DN2

Armrests and headrests. Slacks and anchorages: in poor condition, but does not interfere with operations

DN1

Armrests and headrests: excessive wear of your upholstery

DN1

Upholstered in poor condition, affecting the cushion

DN2

Upholstered in poor condition, but the cushion is not affected

DN1

One of the main settings for seat adjustment does not work

DN1

Adjustments do not allow an ergonomic position

DN3

One of the main and several secondary settings for seat adjustment does not work

DN2

It does not work any of the secondary adjustments for the adjustment of the seat, being able to affect the operator in the medium term

DN2

Does not work any of the secondary settings for seat adjustment

DN1

None of the main settings for seat adjustment work

DN3

The control for adjusting the suspension does not work, but the seat has an effective suspension

DN1

The control for adjusting the suspension does not work, and it is not effective

DN2

Poor condition of the seat, its elements or settings

DN2

Door and Window Burletes

Burletes in poor condition, allowing the entry of dust, noise or water

DN2

Burletes in poor condition, allowing the entry of dust, noise or water in large quantities

DN3

Burletes in poor condition, but with the ability to perform their function

DN1

Lock

Deteriorated lock, which sometimes does not allow the door to be opened

DN1

Deteriorated lock, which often does not allow the door to be opened

DN2

Excessive force to open or close the lock

DN2

Moderate force to open or close the lock

DN1

The key does not close

DN2

There is no lock and no other means that allows the secure closing of the door

DN3

The key does not work in some cases

DN1

Communication devices

Absence of communication devices in isolated control stations without direct communication with the outside

DN3

Malfunction of communication devices in isolated control stations without direct communication with the outside

DN2

Order and cleaning

Loose or poorly fixed ceiling, mid-height or floor elements likely to affect the control organs or injure the operator

DN3

Loose or poorly fixed elements, located on the ceiling, at mid-height or on the ground without affecting the control organs or injuring the operator

DN2

Dirtyness in the cab, affecting drive organs or indicators

DN3

Dirtyness in the cab, without affecting drive organs or indicators

DN2

B.4.- STRUCTURAL STATUS

Anchorage

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Racks

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Poor condition or absence, being in contiguous positions

DN3

Supports

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Unions between fixed elements

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

C.- GENERAL/INSTALLATION

C.1.- BANDA

Features/Documentary evaluation

Inadequate or unknown flammability characteristics (EN ISO 340)

DN3

Unknown flame resistance

DN3

Drum friction against unknown ignition

DN3

Unknown maximum elongation (EN ISO 527-1)

DN2

Inadequate or unknown band electrical conductivity (EN ISO 21178; EN ISO 21179; EN ISO 284)

DN2

Range of unknown working temperatures

DN3

Status

Poor joint condition, up to 10% of the splice length (grapes, vulcanized, ...)

DN2

Poor joint condition, up to 15% of the splice length (grapes, vulcanized, ...)

DN3

Poor joint condition, up to 5% of the splice length (grapes, vulcanized, ...)

DN1

Wear greater than 30% of its nominal thickness in discontinuous or punctual deteriorated areas

DN3

Wear of up to 30% of its nominal thickness in deteriorated areas whose ∑ represents more than 10% of its length

DN2

Wear of up to 30% of its nominal thickness in deteriorated areas whose ∑ represents up to 10% of its length

DN1

Operation

Misalignments greater than 10%, over transverse length, in any area

DN3

Misalignments of up to 10% (over transverse length) in continuous zones

DN3

Misalignments of up to 10% (over transverse length) in isolated areas

DN2

Small misalignments (up to 5% over transverse length) in isolated areas

DN1

Small misalignments (up to 5% over transverse length) in contiguous areas

DN2

Tightened

Absence of working procedure, control and documentary record of tensioning operation

DN3

Deficiencies in working procedure, control and documentary record of tensioning operation

DN2

C.2.- TENSED DEVICE

Status

High structural deterioration

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Operation

Non-operational mechanisms, having some of the chains, cables, ..., an inadequate voltage

DN2

Non-operational mechanisms, having the chains, cables, ..., a suitable voltage

DN1

Non-operational mechanisms, having both chains, cables, ..., an inadequate voltage

DN3

Not marked, absence of pictograms (dangers, ...)

DN1

Automatic horizontal tensioning

Absence of fixed distance guards over the entire length of the route

DN3

Poor condition of fixed distance guards over the entire length of the route

DN2

Incorrect handling of fixed distance guards over the entire travel length

DN1

Manual tensioning

Absence of safety measures or techniques to eliminate hazards associated with tensioning spindles

DN1

Absence of interlocking guards, where guards must be removed to make adjustments

DN3

Poor condition of the interlocked guards, where the guards must be removed to make adjustments

DN2

Incorrect handling of interlocked guards, where guards must be removed to make adjustments

DN1

Gravity-stressed

Absence of fixed guards (closure or distance, in work and traffic areas)

DN3

Poor condition of fixed guards (closure or distance, in work and traffic areas)

DN2

Incorrect handling of fixed guards (closure or distance, in work and traffic areas)

DN1

There is no or insufficient free space above the traffic area (2.5 m) of the counterweight

DN3

Absence of brakes or mechanical locks on a counterweight without guards

DN3

Poor condition of the brakes or mechanical locks in a counterweight without guards

DN2

Malfunction of the brakes or mechanical locks in a counterweight without guards

DN2

C.3.- BAND CLEANING DEVICES

Scraper

Incorrect handling of fixed guards in belt cleaning devices and other similar auxiliary devices

DN1

Absence of fixed guards on belt cleaning devices and other auxiliary devices

DN3

Poor condition of fixed guards in belt cleaning devices and other similar auxiliary devices

DN2

C.4.- TRANSMISSION ELEMENTS

Transmission equipment

Absence of fixed guards on hard-to-access power transmission elements

DN1

Poor condition of fixed guards in power transmission elements of difficult accessibility

DN1

Absence of means for the arrest and retention of the conveyor, in the event of failure of the power supply, stop, ...

DN3

Malfunction of the means for the arrest and retention of the transporter

DN2

Absence of fixed guards on power transmission elements

DN3

Poor condition of fixed guards on power transmission elements

DN2

Incorrect handling of fixed guards on power transmission elements

DN1

C.5.- MOBILE/ARTICULATED ELEMENTS

Mobile trolleys, radial conveyors

Absence of clearing or sensitive devices on accesses to wheels or rollers not protected by fixed guards (located on the front and back of mobile equipment)

DN3

There is no or insufficient free space between the mobile pouring trolley or radial conveyor and any fixed object

DN3

Absence of fixed guards where minimum separation between the radial conveyor and any fixed object is not achievable

DN3

Poor condition of fixed guards where minimum separation between the radial conveyor and any fixed object is not achievable

DN2

Incorrect handling of fixed guards where minimum separation between the radial conveyor and any fixed object is not achievable

DN1

Ineffectiveness of clearing or sensitive devices on accesses to wheels or rollers not protected by fixed guards (located on the front and back of mobile equipment)

DN2

Incorrect handling of clearing or sensitive devices on wheel or roller accesses not protected by fixed guards (located on the front and back of mobile equipment)

DN1

Absence of fixed guards in access to wheels or rollers	DN3
Poor condition of fixed guards in access to wheels or rollers	DN2
Incorrect handling of fixed guards in access to wheels or rollers	DN1
Absence of sensitive devices in work and traffic areas with free space between moving parts and fixed obstacles of less than 0,5 m, not protected by fixed guards	DN3
Poor condition of sensitive devices in work and traffic areas with free space between moving parts and fixed obstacles of less than 0,5 m, not protected by fixed guards	DN2
Incorrect handling of sensitive devices in work and traffic areas with free space between moving parts and fixed obstacles of less than 0,5 m, not protected by fixed guards	DN1
Absence of fixed guards in working and traffic areas with free space between moving parts and fixed obstacles of less than 0,5 m	DN3
Poor condition of fixed guards in working and traffic areas with free space between moving parts and fixed obstacles of less than 0,5 m	DN2
Incorrect handling of fixed guards in work and traffic areas with clearance between moving parts and fixed obstacles of less than 0,5 m	DN1
Fixed-route mobile equipment (canals, feeders, ...)	
Absence of safety devices allowing them to be stopped and kept in the required position when the driving force has been interrupted	DN3
Malfunctioning of safety devices allowing them to be stopped and kept in the required position when the driving force has been interrupted	DN2
Absence of safety devices to limit the travel of such equipment (buffers, bolts or end-of-race switches, ...)	DN3

Malfunction of safety devices to limit the travel of such equipment (buffers, bolts or end-of-race switches, ...)

DN2

Turning mechanisms, range, translation

End-of-career, continuous malfunction

DN2

Deteriorated career ends, compromising safety

DN3

End of race, intermittent malfunction, without compromising safety

DN1

End of race, intermittent malfunction, compromising safety

DN2

Absence of safety/safeguard devices in scope, rotation and translation mechanisms

DN3

Safety devices in reach, turn and translation mechanisms do not work

DN2

Safety devices in reach, turn and transfer mechanisms do not stop the articulated or mobile part correctly

DN2

Absence of end-of-career or mechanical stops on articulated or moving parts

DN3

Poor condition or deterioration of mechanical stops in articulated or moving parts

DN2

C.6.- SPECIFIC POINTS

Charging point

Poor condition of device preventing access to incoming points with absence of collection gutters, boxes, etc., in work areas

DN2

Poor condition of device that prevents access to incoming points with absence of collection gutters, boxes, etc., in traffic areas

DN2

Absence of device preventing access to incoming points with absence of collection gutters, boxes, etc., in working areas

DN3

Absence of device preventing access to incoming points with absence of collection gutters, boxes, etc., in traffic areas

DN3

Malfunction of ATEX equipment implemented

DN2

Absence of indicators, detection devices or overloading devices, in places where there is a risk of sealing or locking

DN3

Malfunction of indicators, detection or overload devices

DN2

Absence of secure unblocking devices (panel with interlocking device) when required

DN3

Poor condition of safe unblocking devices (panel with interlocking device) when needed

DN2

Lack of protection against falling materials in work areas

DN3

Poor state of protection against falling materials in work areas

DN2

Lack of protection against falling materials in traffic zones

DN3

Poor protection status against falling materials in traffic zones

DN2

Poor condition of the interlocked guards

DN2

Incorrect handling of interlocked guards

DN1

Malfunction of indicators, detection devices or overloading devices, in places where there is a risk of sealing or locking

DN2

Absence of collection gutters, boxes, etc., in work areas with a device preventing access to incoming points

DN3

Poor condition of collection gutters, boxes, etc., in work areas with a device that prevents access to incoming points	DN2
Poor condition of inspection panels	DN2
Incorrect handling of inspection panels	DN1
Absence of additional fixed guards on inspection panels	DN3
Poor condition of additional fixed guards on inspection panels	DN2
Incorrect handling of additional fixed guards on inspection panels	DN1
Absence of ATEX equipment, if necessary	DN3
Absence of interlocked guards, if no other type of guard has been implemented	DN3
Absence of inspection panels, if necessary	DN3
Discharge point	
Absence of overload or shut-off detectors, if the flow is likely to be reduced	DN3
Malfunction of overload or shut-off detectors, if the flow is likely to be reduced	DN2
Absence of speed and rotation detectors in mechanical components, if the flow is likely to be reduced	DN3
Malfunction of speed and rotation detectors in mechanical components, if the flow is likely to be reduced	DN2
Poor condition of device preventing access to incoming points with absence of collection gutters, boxes, etc., in work areas	

DN2

Poor condition of device that prevents access to incoming points with absence of collection gutters, boxes, etc., in traffic areas

DN2

Absence of device preventing access to incoming points with absence of collection gutters, boxes, etc., in traffic areas

DN3

Absence of device preventing access of material to incoming points with absence of collection gutters, boxes, etc., in working areas

DN3

Malfunction of ATEX equipment implemented

DN2

Absence of indicators, detection devices or overloading devices, in places where there is a risk of sealing or locking

DN3

Malfunction of indicators, detection or overload devices

DN2

Absence of secure unblocking devices (panel with interlocking device) when required

DN3

Poor condition of safe unblocking devices (panel with interlocking device) when needed

DN2

Lack of protection against falling materials in work areas

DN3

Poor state of protection against falling materials in work areas

DN2

Lack of protection against falling materials in traffic zones

DN3

Poor protection status against falling materials in traffic zones

DN2

Poor condition of the interlocked guards

DN2

Incorrect handling of interlocked guards

DN1

Malfunction of indicators, detection devices or overloading devices, in places where there is a risk of sealing or locking

DN2

Poor condition of collection gutters, boxes, etc., in work areas with a device that prevents access to incoming points

DN2

Poor condition of inspection panels

DN2

Incorrect handling of inspection panels

DN1

Absence of additional fixed guards on inspection panels

DN3

Poor condition of additional fixed guards on inspection panels

DN2

Incorrect handling of additional fixed guards on inspection panels

DN1

Absence of collection gutters, boxes, etc., in work areas with a device preventing access of material to incoming points

DN3

Absence of ATEX equipment, if necessary

DN3

Absence of interlocked guards, if no other type of guard has been implemented

DN3

Absence of inspection panels, if necessary

DN3

Turning point

Incorrect handling of fixed guards at inflection points

DN1

Poor condition of the interlocked guards

DN2

Incorrect handling of interlocked guards

	DN1
Poor condition of fixed guards	
	DN2
Absence of fixed guards at inflection points, if no other type of guard has been implemented	
	DN3
Absence of interlocked guards, if no other type of guard has been implemented	
	DN3
Transfer point	
Poor condition of the device preventing access of the material to the incoming points with absence of collection gutters, boxes, etc., in working areas	
	DN2
Poor condition of the device preventing access of the material to the incoming points with absence of collection gutters, boxes, etc., in traffic areas	
	DN2
Absence of device preventing access of material to incoming points with absence of collection gutters, boxes, etc., in working areas	
	DN3
Malfunction of ATEX equipment implemented	
	DN2
Absence of device preventing access of material to incoming points with absence of collection gutters, boxes, etc., in traffic areas	
	DN3
Malfunction of overload or shutter detectors	
	DN2
Malfunction of speed and rotation detectors in mechanical components	
	DN2
Absence of indicators, detection devices or overloading devices, in places where there is a risk of sealing or locking	
	DN3
Malfunction of indicators, detection or overload devices	
	DN2
Absence of secure unblocking devices (panel with interlocking device) when required	

	DN3
Poor condition of safe unblocking devices (panel with interlocking device) when needed	
	DN2
Lack of protection against falling materials in work areas	
	DN3
Poor state of protection against falling materials in work areas	
	DN2
Lack of protection against falling materials in traffic zones	
	DN3
Poor protection status against falling materials in traffic zones	
	DN2
Absence of static measures	
	DN3
Absence of speed and rotation detectors in mechanical components	
	DN3
Absence of overload or shutter detectors	
	DN3
Poor condition of the interlocked guards	
	DN2
Incorrect handling of interlocked guards	
	DN1
Malfunction of indicators, detection devices or overloading devices, in places where there is a risk of sealing or locking	
	DN2
Absence of inspection panels	
	DN3
Poor condition of inspection panels	
	DN2
Incorrect handling of inspection panels	

DN1

Absence of additional fixed guards on inspection panels

DN3

Poor condition of additional fixed guards on inspection panels

DN2

Incorrect handling of additional fixed guards on inspection panels

DN1

Absence of collection gutters, boxes, etc., in work areas with a device preventing access of material to incoming points

DN3

Poor condition of collection gutters, boxes, etc., in work areas with a device that prevents access of material to incoming points

DN2

Absence of ATEX equipment, if necessary

DN3

Absence of interlocked guards, if no other type of guard has been implemented

DN3

C.7.- RESGUARDS (STATE)

Inspection panels

Does not prevent a medium-sized person from inserting an arm

DN3

Does not prevent a medium-sized person from inserting a finger

DN1

Does not prevent a medium-sized person from entering a hand

DN2

They are not of the right kind, not fully performing their function

DN2

They are not of the right kind, not performing their function

DN3

They are not of the right kind, performing their function

DN1

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Medium structural deterioration

DN2

Poor condition or absence of parts or elements, not being in contiguous positions

DN2

Poor condition or absence of parts or elements, being in contiguous positions

DN3

It is not an interlocked guard when it is opened more than once every 8 hours and leaves exposed to a mechanical hazard

DN3

Can be opened without the use of tools and leaves exposed to a mechanical hazard

DN3

If it must be open to allow to see dangerous zone and does not have additional fixed guard

DN3

High structural deterioration that disables its protective function

DN3

Guards at turning points

Does not prevent a medium-sized person from inserting an arm

DN3

Does not prevent a medium-sized person from inserting a finger

DN1

Does not prevent a medium-sized person from entering a hand

DN2

They are not of the right kind, not fully performing their function

DN2

They are not of the right kind, not performing their function

DN3

They are not of the right kind, performing their function

DN1

Does not protect both edges of the band to a depth of 150 mm

DN2

The separation between the guard and the face of the , drum and between the side of the guard and the transverse surfaces of the drum exceeds 5 mm

DN2

The guard does not extend a minimum distance of 600 mm beyond the drum shaft

DN2

Poor condition or absence of parts or elements

DN2

Absence of guards at turning points

DN3

Interlocked guards

Does not prevent a medium-sized person from inserting an arm

DN3

Does not prevent a medium-sized person from inserting a finger

DN1

Does not prevent a medium-sized person from entering a hand

DN2

They are not of the right kind, not fully performing their function

DN2

They are not of the right kind, not performing their function

DN3

They are not of the right kind, performing their function

DN1

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Poor condition or absence of parts or elements, not being in contiguous positions

DN2

Poor condition or absence of parts or elements, being in contiguous positions

DN3

High structural deterioration that disables its protective function

DN3

Fixed locking guards

Does not prevent a medium-sized person from inserting an arm

DN3

Does not prevent a medium-sized person from inserting a finger

DN1

Does not prevent a medium-sized person from entering a hand

DN2

They are not of the right kind, not fully performing their function

DN2

They are not of the right kind, not performing their function

DN3

They are not of the right kind, performing their function

DN1

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Poor condition or absence of parts or elements, not being in contiguous positions

DN2

Poor condition or absence of parts or elements, being in contiguous positions

DN3

High structural deterioration that disables its protective function

DN3

They do not have captive fasteners (tool help to remove or open them)

DN3

Fixed distance guards

Does not prevent a medium-sized person from accessing the protected area

DN3

They are not of the right kind, not fully performing their function

DN2

They are not of the right kind, not performing their function

DN3

They are not of the right kind, performing their function

DN1

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Poor condition or absence of parts or elements, not being in contiguous positions

DN2

Poor condition or absence of parts or elements, being in contiguous positions

DN3

High structural deterioration that disables its protective function

DN3

They do not have captive fasteners (tool help to remove or open them)

DN3

Thermal guards

The surface of the guard is above normal temperature, there is a risk of small contact burns

DN2

The surface of the guard is above normal temperature, but a person feeling the heat can withdraw without risk of burns

DN1

They are not of the right kind, not fully performing their function

DN2

They are not of the right kind, not performing their function

DN3

They are not of the right kind, performing their function

DN1

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

The surface of the guard is at an excessively high temperature, and there is a risk of serious burns by contact

DN3

Poor condition or absence of parts or elements, not being in contiguous positions

DN2

Poor condition or absence of parts or elements, being in contiguous positions

DN3

High structural deterioration that disables its protective function

DN3

C.8.- ROLLS

Status

Broken or worn rollers, in various positions

DN3

Rollers broken or worn, punctually, in non-contiguous positions

DN1

Broken or worn rollers, in some positions

DN2

Flat surfaces or point wear on rollers

DN1

Flat surfaces or wear on some rollers

DN2

Flat surfaces or wear on most rollers

DN3

Operation

Relative speed reduction relative to the band, intermittently

DN2

Relative speed reduction relative to the band, continuously or completely blocked

DN3

Shock-absorbing rollers

Incorrect handling of fixed locking guards in areas where the separation between feed hopper, guide plates or fixed parts, and the belt is less than 50 mm (prolongation < 300 mm)

DN1

Absence of fixed closure guards in areas where the separation between feed hopper, guide plates or fixed parts, and the band is less than 50 mm

DN3

Poor condition of fixed closure guards in areas where the separation between feed hopper, guide plates or fixed parts, and the band is less than 50 mm

DN2

Fixed locking guard does not extend on the exit side at least 0,3 m beyond the entry point

DN2

The guard does not extend a minimum distance "a" (Table 1 EN 620:2002) in proximity to the point of entry

DN2

Lower rollers

Poor condition of the fixed guards on the lower rollers

DN2

Absence of fixed guards or inflection point guards on convex curves when the band deviation angle is greater than 3°

DN3

Poor condition of fixed guards or inflection point guards in convex curves when the angle of band deviation is greater than 3°

DN2

Incorrect handling of fixed guards or inflection point guards in convex curves when the angle of band deviation is greater than 3°

DN1

Inadequate extension (< 300 mm) beyond the point of entry into the fixed closing guards in convex curves when the angle of deviation of the band is greater than 3°

DN2

Absence of fixed guards on the lower rollers	DN3
Incorrect handling of fixed guards on the lower rollers	DN1
Absence of restraints in working areas	DN3
Poor condition of restraints in working areas	DN2
Absence of restraints in traffic zones	DN3
Poor condition of restraints in traffic zones	DN2
Carrier rollers	
Absence of fixed guards on convex curves when the band deviation angle is greater than 3°	DN3
Poor condition of the fixed guards in convex curves when the angle of deviation of the band is greater than 3°	DN2
Incorrect handling of fixed guards in convex curves when the band deviation angle is greater than 3°	DN1
Inadequate extension (< 300 mm) beyond the point of entry into the fixed closing guards in convex curves when the angle of deviation of the band is greater than 3°	DN2
Absence of fixed guards on transition rollers in gear	DN3
Poor condition of fixed guards on transition rollers in gear	DN2
Incorrect handling of fixed guards on transition rollers in gear	DN1
Incorrect handling of fixed locking guards on carrier rollers	DN1

Incorrect handling of fixed distance guards on carrier rollers

DN1

Poor condition of fixed guards (distance or closure) on carrier rollers

DN2

Absence of fixed guards (distance or closure) on the carrier rollers, necessary if the entry point is not at a safe distance or there is a risk of injury from entrapment or crushing (the belt does not yield to produce at least 50 mm of separation)

DN3

C.9.- TAMBORES

Status

Flat surfaces or wear up to 30% of their nominal thickness (and/or coating thickness if any)

DN3

Flat surfaces or wear up to 10% of their nominal thickness (and/or coating thickness if any)

DN1

Flat surfaces or wear up to 20% of their nominal thickness (and/or coating thickness if any)

DN2

Speed variations of up to 20% with respect to band

DN3

Speed variations of up to 15% with respect to band

DN2

Speed variations of up to 10% with respect to band

DN1

Head/Motive Drum

Absence of guards

DN3

Poor condition of the guards

DN2

Incorrect handling of guards

DN1

Absence of guards in drums of difficult accessibility

	DN1
Tail drum	
Absence of guards	
	DN3
Poor condition of the guards	
	DN2
Incorrect handling of guards	
	DN1
Absence of guards in drums of difficult accessibility	
	DN1
Dump drum to landfill trolley	
Absence of guards	
	DN3
Poor condition of the guards	
	DN2
Incorrect handling of guards	
	DN1
There is no or insufficient safety clearance between the radial conveyor and any fixed object	
	DN3
Voltage drum	
Absence of guards	
	DN3
Poor condition of the guards	
	DN2
Incorrect handling of guards	
	DN1
Absence of guards in drums of difficult accessibility	
	DN1

D.- ELECTRIC INSTALLATION

D.1.- ELECTRIC EQUIPMENT

Wiring

Accumulation of mud or other substances in the cables, with the risk of loosening or breaking	DN2
Accumulation of mud or other substances in cables, without significant weight	DN1
Accumulation of mud or other substances in cables, completely covering cables and other electrical elements	DN3
Damage to the fixing of the cables to the structure, being necessary to repair in the short term	DN2
Damage to the cable attachments to the structure, being necessary to repair in the medium term	DN1
Damage to the fixations of the cables to the structure, being necessary to repair immediately	DN3
Aging, cuts on the insulator, on various wires	DN3
Aging, cuts on the insulation of a cable, being necessary its replacement	DN2
Aging, cuts on the insulator of a cable, being possible its repair	DN1
Wiring subject to mechanical damage	DN3
Absence of identification means of wiring	DN3
Poor state of wiring identification means	DN1
Existence of parts that remain active without marking and/or identifying and/or adequately protecting	DN3
Absence of stop order when safety wiring breaks	DN3

Electrostatic charges

No protective measures (grounding, contact brushes or discharge elements for moving parts, belt conductivity and drums)

DN3

Poor condition of protective measures (grounding, contact brushes or discharge elements for moving parts, belt conductivity and drums)

DN2

Existence of protective measures (grounding, contact brushes or discharge elements for moving parts, belt conductivity and drums) but with slight deterioration

DN1

Enclosures/motors

Inadequate IP protection levels

DN3

Enclosures: accumulation of dust and water

DN1

Enclosures: partial inflow of dust and water

DN2

Existence of parts that remain active without marking, identifying and/or protecting

DN3

Enclosures for electrical equipment in poor condition

DN2

Absence of groundings, contact brushes or discharge elements for moving parts

DN3

Poor condition of groundings, housings, contact brushes or discharge elements for moving parts

DN2

Electrical equipment

Connections in poor condition, but operational

DN1

Bad connections, which can lead to short circuits

DN3

Deterioration of terminals, requiring short-term replacement

	DN2
Deterioration of terminals, requiring replacement in the medium term	
	DN1
Deterioration of terminals, requiring immediate replacement	
	DN3
There are signs of bad contact	
	DN2
Malfunction of some equipment, continuously	
	DN3
Malfunction of some equipment, intermittently, compromising security	
	DN3
Malfunction of some equipment, intermittently, without compromising safety	
	DN2
Existence of parts that remain active without marking and/or identifying and/or adequately protecting	
	DN3
Enclosures for electrical equipment in poor condition	
	DN2
Absence of groundings, contact brushes or discharge elements for moving parts	
	DN3
Inhibition of safety-related circuits due to electromagnetic disturbances	
	DN3
Unforeseen start due to electromagnetic disturbances	
	DN2
Locking of any of the emergency stop controls due to electromagnetic disturbances	
	DN2
Degrees of IP protection in enclosures for improper electrical equipment or motors	
	DN3
Poor condition of groundings, contact brushes or discharge elements for moving parts	
	DN2
Absence of antistatic measures	

DN3

Absence of adequate electrical ATEX equipment, if necessary

DN3

Poor condition or operation of implemented electrical ATEX equipment

DN2

Absence of frames, cabinets, enclosures, ..., for electrical equipment, if necessary

DN3

High deterioration of electrical equipment

DN3

State Electrical protections

Accumulation of dirt affecting fuses

DN2

Accumulation of dirt that does not affect the fuses

DN1

Absence of protections against indirect contacts

DN3

Absence of lid on the fuse box

DN3

Absence or deterioration of some fuses

DN1

Inadequate rated fuse current, by default

DN2

Inadequate rated fuse current, due to excess

DN3

Excessive dirt on the fuse box

DN3

Existence of fuse bridges

DN3

Contactor protection partially allows water or dust to enter

DN2

The protection of the contactors allows totally the ingress of water or dust or there is no protection

DN3

The lid of the fuse box does not close properly, allowing the entry of dust or water in large quantities

DN2

The fuse box lid does not close properly, allowing dust or water to enter in small quantities

DN1

Poor dimensioning of protections against indirect contacts

DN2

Poor condition of the earthings

DN3

Poor condition or deterioration of protections against direct contacts

DN2

Absence of protections against direct contacts

DN3

Failures in electrical circuits, with a through voltage exceeding 50 V

DN3

Failures in electrical circuits, with passing voltage less than 50 V

DN2

Means of disconnection

The device is difficult to operate

DN2

Does not work or there is no current cutting system

DN3

There are some difficulties in its operation

DN1

Existence of parts that remain active without marking and/or identifying and/or adequately protecting

DN3

Untimely start due to the absence of means of disconnection

DN3

Untimely start due to malfunction of disconnection media

DN2

Some sections with individual power cannot be isolated from the power supply

DN3

Risk of electric shock due to absence of means of disconnection

DN3

Risk of electric shock due to malfunction of disconnection media

DN2

Damage to the device, being necessary to repair in the medium term

DN1

Damage to the device, being necessary to repair in the short term

DN2

Damage to the device, being necessary to repair immediately

DN3

E.- OTHER SIST. AUXILIARES

E.1.- LIGHTING DEVICES

Lighting in work areas

Absence of parables

DN3

Insufficient lighting

DN3

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair in the short term

DN1

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the short term

DN2

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair immediately

DN2

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately

DN3

Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)

DN1

Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)

DN2

Lighting in traffic zones

Absence of parables

DN3

Insufficient lighting

DN3

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair in the short term

DN1

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the short term

DN2

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair immediately

DN2

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately

DN3

Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)

DN1

Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)

DN2

E.2.- WARNING AND DANGER INDICATORS

Indicators in auxiliary installations (electric)

In another language, without pictograms accompanying it

DN2

Unreadable Hazard Indicator

DN3

Partially illegible hazard indicator

DN2

Unreadable indicator, not being of danger

DN2

Indicator partially illegible, not dangerous

DN1

Of small dimensions, being impossible its legibility

DN3

Of small dimensions, not allowing their correct legibility, being of danger

DN2

Of small dimensions, not allowing their correct legibility, not being of danger

DN1

Of normal dimensions, but the size of the pictogram or text does not allow its correct legibility, being of danger

DN3

It is not in the danger zone it tries to cover, but allows its readability from that

DN1

It is not in the danger zone that it tries to cover, not allowing its legibility from that point on.

DN2

Of normal dimensions, but the size of the pictogram or text does not allow its correct legibility, not being of danger

DN2

Has been removed or absent

DN3

Inadequate location. There is no relationship between the location of the indicator and the area/hazard it is intended to cover/avoid

DN3

Indicators in working areas

In another language, without pictograms accompanying it

DN2

Unreadable Hazard Indicator

DN3

Partially illegible hazard indicator

DN2

Unreadable indicator, not being of danger

DN2

Indicator partially illegible, not dangerous

DN1

Of small dimensions, being impossible its legibility

DN3

Of small dimensions, not allowing their correct legibility, being of danger

DN2

Of small dimensions, not allowing their correct legibility, not being of danger

DN1

Of normal dimensions, but the size of the pictogram or text does not allow its correct legibility, being of danger

DN3

It is not in the danger zone it tries to cover, but allows its readability from that

DN1

It is not in the danger zone that it tries to cover, not allowing its legibility from that point on.

DN2

Of normal dimensions, but the size of the pictogram or text does not allow its correct legibility, not being of danger

DN2

Has been removed or absent

DN3

Inadequate location. There is no relationship between the location of the indicator and the area/hazard it is intended to cover/avoid

DN3

Indicators in traffic zones

In another language, without pictograms accompanying it

DN2

Unreadable Hazard Indicator

DN3

Partially illegible hazard indicator

DN2

Unreadable indicator, not being of danger

DN2

Indicator partially illegible, not dangerous

DN1

Of small dimensions, being impossible its legibility

DN3

Of small dimensions, not allowing their correct legibility, being of danger

DN2

Of small dimensions, not allowing their correct legibility, not being of danger

DN1

Of normal dimensions, but the size of the pictogram or text does not allow its correct legibility, being of danger

DN3

It is not in the danger zone it tries to cover, but allows its readability from that

DN1

It is not in the danger zone that it tries to cover, not allowing its legibility from that point on.

DN2

Of normal dimensions, but the size of the pictogram or text does not allow its correct legibility, not being of danger

DN2

Has been removed or absent

DN3

Inadequate location. There is no relationship between the location of the indicator and the area/hazard it is intended to cover/avoid

DN3

E.3.- FIRE PROTECTION

Extinction system

Absence of extinguisher

DN3

Close to the lower load limit

DN1

Inside some unmarked compartment

DN3

The extinguishing agent is not suitable for the fire class

DN2

In good condition, but not sealed

DN1

Out-of-date maintenance, more than 6 months

DN3

Out-of-date maintenance, less than 6 months

DN2

Does not work

DN3

Below the lower load limit

DN2

Absence of pictograms or referent signage

DN3

Poor condition or deterioration of pictograms or referent signage

DN2

Loss of legibility of implemented signaling

DN1

Away from the command station or equipment

DN2

Located in a location near the command station or equipment that does not allow easy access to the operator

DN2

Located far away from the command station or equipment

DN2

E.4.- ACÚSTICA SIGNALIZATION

Acoustic warning devices for failure to the operator

Sound duration too short

DN1

Doesn't work or other usual sounds hide it

DN2

It does not exist or has been completely or partially disassembled, nor is there a visual signal

DN3

Acoustic stop warning devices

Sound duration too short

DN1

Doesn't work or other usual sounds hide it

DN2

It does not exist or has been completely or partially disassembled, nor is there a visual signal

DN3

Acoustic warning devices for emergency stops

Sound duration too short

DN1

Doesn't work or other usual sounds hide it

DN2

It does not exist or has been completely or partially disassembled, nor is there a visual signal

DN3

Start-up audible warning devices

Too short sound duration (less than 3 seconds)

DN1

The interval between warning and start-up is less than 10 seconds

DN2

Doesn't work or other usual sounds hide it

DN2

It does not exist or has been completely or partially disassembled, nor is there a visual signal

DN3

No time parameter of sound signalling (3 s, 10 s before starting) warning, at the start of the equipment, is set

DN3

E.5.- LUMINOUS SIGNALIZATION

Luminous warning devices for failure to the operator

Some of the fixations of the optics, housings or protection screens have , damages that are necessary to repair in the short term	DN1
Some of the fixings of the optics, the housings or the protection screens present , damages that are necessary to repair immediately	DN2
Absence of parables	DN3
Colour other than yellow or amber	DN2
Lighting field does not cover the hazardous area	DN2
Flash rate less than 30 times per minute	DN1
Operation too short	DN1
Low luminous intensity, not allowing recognition	DN3
Low luminous intensity, allowing its recognition	DN2
Does not work	DN2
Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)	DN2
Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)	DN1
All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the short term	DN2
All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately	

DN3

It does not exist or has been completely or partially disassembled, nor is there an acoustic signal

DN3

Luminous stop warning devices

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair in the short term

DN1

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair immediately

DN2

Absence of parables

DN3

Colour other than yellow or amber

DN2

Lighting field does not cover the hazardous area

DN2

Flash rate less than 30 times per minute

DN1

Operation too short

DN1

Low luminous intensity, not allowing recognition

DN3

Low luminous intensity, allowing its recognition

DN2

Does not work

DN2

Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)

DN2

Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)

DN1

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the

short term

DN2

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately

DN3

It does not exist or has been completely or partially disassembled, nor is there an acoustic signal

DN3

Emergency stop warning lights

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair in the short term

DN1

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair immediately

DN2

Absence of parables

DN3

Colour other than yellow or amber

DN2

Lighting field does not cover the hazardous area

DN2

Flash rate less than 30 times per minute

DN1

Operation too short

DN1

Low luminous intensity, not allowing recognition

DN3

Low luminous intensity, allowing its recognition

DN2

Does not work

DN2

Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)

DN2

Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)

DN1

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the short term

DN2

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately

DN3

It does not exist or has been completely or partially disassembled, nor is there an acoustic signal

DN3

Start-up warning lights

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair immediately

DN2

Absence of parables

DN3

Colour other than yellow or amber

DN2

Lighting field does not cover the hazardous area

DN2

Flash rate less than 30 times per minute

DN1

Too short operation (less than 3 seconds)

DN1

Low luminous intensity, not allowing recognition

DN3

Low luminous intensity, allowing its recognition

DN2

Does not work

DN2

Isolated and small darkened parts, which prevent proper reflection of light (concentrated or large)

DN2

Isolated and small darkened parts, which prevent proper reflection of light (on all or most lights)

DN1

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair in the short term

DN2

All fixations of the optics, housings or protective screens are damaged, which are necessary to repair immediately

DN3

Some of the fixations of the optics, housings or protection screens are damaged, which are necessary to repair in the short term

DN1

Absence of warning light signals at installation start-up (out of field of vision, warning required), no acoustic signal

DN3

E.6.- TECHNIQUES/DISPOSITIVES AGAINST POWDER EMISSION

Measures against dust emission sources

Poor condition or operation of devices implemented to eliminate or minimize sources of dust emission, producing emission

DN2

Poor condition or operation of devices implemented to eliminate or minimize dust emission sources, resulting in minimal emissions

DN1

Absence of devices to eliminate or minimize dust emission sources, if necessary due to the characteristics of the transported material

DN3

F.- FOB SYSTEM

F.1.- AUXILIARY SAFETY CIRCUITS

Safety circuits for safety devices

Absence of safety circuits for safety devices (sensitive, stroke switches, cable loosening, interlocks, retention, brakes) that are implemented in the equipment

DN3

Continuous malfunction of safety devices (sensitive, stroke switches, loosening of the cable, interlocks,

retention, brakes) that are implemented in the equipment

DN2

Malfunction, intermittently and without compromising safety, of safety devices (sensitive, stroke switches, loosening of the cable, interlocks, retention, brakes) that are implemented in the equipment

DN1

Intermittent malfunction, compromising the safety, of safety devices (sensitive, stroke switches, loosening of the cable, interlocks, retention, brakes) that are implemented in the equipment

DN2

F.2.- AUTOMATIC DETECTION OF AVERIAS

Automatic fault detection

Malfunction, intermittently, compromising safety (misalignment detectors, detection of gutter blockages, hoppers, ..., axis rotation detectors, low band speed, thermal detectors, height and/or width detectors)

DN2

Intermittent malfunction without compromising safety (misalignment detectors, gutter block detection, hoppers, ..., shaft rotation detectors, low belt speed, thermal detectors, height and/or width detectors)

DN1

Absence of automatic failure devices, if necessary (misalignment detectors, gutter block detection, hoppers, ..., shaft rotation detectors, low band speed, thermal detectors, height and/or width detectors)

DN3

Malfunction of existing automatic fault devices (misalignment detectors, gutter block detection, hoppers, ..., shaft rotation detectors, low belt speed, thermal detectors, height and/or width detectors)

DN2

F.3.- DESIGN TEAM

Design

The control system is not designed according to EN 60204-1

DN3

Control system safety parts are not designed according to the requirements of at least Category 1 (EN 954-1)

DN3

Control system safety parts are not designed according to the requirements of at least Category 2 (EN 954-1) when programmable electronic equipment or electronic devices are used for safety-related purposes

DN3

The emergency stop system is not designed according to Category 4 (EN 954-1) when programmable electronic equipment or electronic devices are the only means of transmitting the emergency stop controls

DN3

F.4.- Auxiliary devices

Shutter or overload detectors

Malfunction, intermittently, compromising safety

DN2

Malfunction, intermittently, without compromising safety

DN1

Absence of overload or shutter detectors, verifying that their implementation is necessary

DN3

Malfunction of overload or shutter detectors

DN2

Speed and turn detectors

Malfunction, intermittently, compromising safety

DN2

Malfunction, intermittently, without compromising safety

DN1

Absence of speed and rotation detectors in mechanical components, verifying the need for their implementation

DN3

Malfunction of speed and rotation detectors in mechanical components

DN2

Safety devices by mechanical action

Absence of means for the arrest and retention of the conveyor, in the event of failure of the power supply

DN3

Malfunction of the means for the arrest and retention of the conveyor, in the event of failure of the power supply

DN2

Electrical safety devices

Switching devices are not positive aperture operation according to EN60947-5-1 (safety switches)

DN2

Absence of switching devices (safety switches)

DN3

Absence of automatic start of stop (category 0 or 1, EN 60204-1) when operating the safety device

DN3

Automatic start-stop malfunction (category 0 or 1, EN 60204-1) when operating the safety device

DN2

Response elements

Malfunction of response elements (safety-related contactors, brakes, restraint devices) used for safety purposes

DN2

Absence of response elements (safety-related contactors, brakes, restraint devices) used for safety purposes, if required

DN3

Transmission elements used for security purposes

No stop order due to failure or breakage of transmission elements (e.g. wiring)

DN3

Improper operation of stop order in case of breakage of transmission elements (e.g. wiring)

DN2

F.5.- STARTING FUNCTION

Start-up device

Devices out of reach of the operator

DN3

Devices not easily identifiable and visible

DN3

Uncontrolled movements occur when power is connected or restored after a stop

DN3

Incorrect sequence at the start of conveyors of an installation, absence of interlocking devices

DN3

Status

They show signs of deterioration that decrease their effectiveness

DN2

They show signs of deterioration that render it useless

DN3

They show signs of deterioration that do not diminish their effectiveness

DN1

Start-up sequence

The start-up is not completely sequential, although it does not involve dangerous movements

DN1

Start-up is not completely sequential, leading to dangerous movements

DN2

Start-up is not sequential, compromising safety

DN3

F.6.- PAYMENT FUNCTION

Stopping devices

Devices out of reach of the operator

DN3

Devices are not impulse type

DN3

Devices not easily identifiable and visible

DN3

Absence of stop order when safety wiring breaks

DN3

Absence of means of identification of the stopping devices

DN3

Uncontrolled movements occur when supply is interrupted

DN3

Absence of means for the arrest and retention of the conveyor, in the event of failure of the power supply

DN3

Malfunction of the means for the arrest and retention of the conveyor, in the event of failure of the power supply

DN2

Devices are not of category 0 or 1 (EN 60204-1), as the case may be

DN3

Status

They show signs of deterioration that decrease their effectiveness

DN2

They show signs of deterioration that render it useless

DN3

They show signs of deterioration that do not diminish their effectiveness

DN1

Cable-operated emergency stop switch

The cable does not move freely over or out of the brackets

DN3

Accessible parts of the machine, working areas, traffic areas or control stations without emergency stop

DN3

Absence of signalling on the emergency stop operated

DN3

Inadequate height of emergency stop devices (between 0.6 and 1.7 m)

DN2

The installation starts without reassembling the emergency stop on which it has been operated

DN3

Twisted or inadequately tensioned cable that prevents the correct operation of emergency stops

DN3

Stopping does not occur if the pull-type emergency stop cable is operated in any direction or if the pull-type emergency stop cable is broken

DN3

Cable movement required for stop operation greater than 300 mm

DN3

Emergency stop cables are not arranged over the entire length of the installation

DN3

Horizontal effort on the cable for action exceeding 150 N

DN3

Emergency stop

High deterioration	DN3
Partially or fully disassembled device	DN3
There are great difficulties in its use, compromising safety	DN3
There are great difficulties in its use, not compromising safety	DN2
Stops work with a certain deficiency, compromising safety	DN2
Stops work with a certain deficiency, not compromising safety	DN1
Does not work	DN3
Signaling illegible or absent	DN2
Partially illegible signage	DN1
Damages that do not affect its mechanical strength	DN1
Defects affecting or being able to affect in the short term	DN2
Devices are not positive operation, and automatic interlocking	DN3
There is no one or more emergency stop cables along the entire length of the installation	DN3
There is no power cutting device if the distance is equal to or less than 10 m	DN3
There is not one or more push-button switches at a distance of less than 10 m from any part of the equipment	DN3

Accessible parts of the machine, working areas, traffic areas or control stations without emergency stop

DN3

Inadequate distribution of emergency stop devices (separation distance > 10 m)

DN2

Absence of signalling on the emergency stop operated

DN3

Inadequate height of emergency stop devices (between 0.6 and 1.7 m)

DN2

The installation starts without reassembling the emergency stop on which it has been operated

DN3

Devices are not of category 0 or 1 (EN 60204-1), as the case may be

DN3

Stop sequence

The stop of the installation is not completely sequential, although it does not involve dangerous movements

DN1

The stop of the installation is not completely sequential, leading to dangerous movements

DN2

Installation stop is not sequential, compromising safety

DN3

F.7.- ACTION BODIES

Status

They show signs of deterioration that decrease their effectiveness

DN2

They show signs of deterioration that render it useless

DN3

They show signs of deterioration that do not diminish their effectiveness

DN1

Manipulation, modifications of control devices

DN1

Handling, control modifications

DN1

Absence of controls used for safety

DN3

Absence of circuits used for safety

DN3

Unauthorized access to security and control elements

DN3

Operation

The command does not respond immediately, not being a stop command

DN1

The command does not respond immediately, being a stop command

DN2

It is necessary to apply excessive force, not being a stop command

DN2

It is necessary to apply excessive force, being a stop command

DN3

It is necessary to apply a moderate force, not being a stop command

DN1

It is necessary to apply a moderate force, being a stop command

DN2

There are great difficulties in its use, compromising safety

DN3

There are great difficulties in its use, not compromising safety

DN2

The drive organs work with a certain deficiency, compromising safety

DN2

The drive organs work with a certain deficiency, not compromising safety

DN1

Does not respond or performs an action other than expected

DN3

Not working

DN3

Malfunction of controls used for safety

DN2

Malfunction of circuits used for safety

DN2

Uncontrolled movements occur when power is connected or restored after a stop

DN3

Incorrect sequence at the start of conveyors of an installation, absence of interlocking devices

DN3

Uncontrolled movements occur when supply is interrupted

DN3

Control indicators

Some of the ON/OFF indicators belonging to a stop system are inverted or absent

DN3

Some symbols are missing, not being of some stop control

DN1

Some symbols are missing, being some stop control

DN2

Symbols for stop system controls missing

DN3

All symbols missing

DN3

Not partially legible (identification or any of the functions), not being a stop control

DN1

Not partially legible (identification or any of the functions), being of some stop control

DN2

Non-original

DN1

In foreign language and without pictograms, being of some stop control

DN2

In foreign language and without pictograms, not being of some stop control

DN1

Ilegible, being of some stop command

DN3

Unreadable, not being of any stop command

DN2

Absence of means of identification of the stopping devices

DN3

G.- AREAS

G.1.- STRUCTURAL STATUS WORK AREAS

Anchorage

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Racks

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Poor condition or absence, being in contiguous positions

DN3

Supports

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Unions between fixed elements

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

G.2.- STRUCTURAL STATE TRAFFIC AREAS

Anchorage

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Racks

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Supports

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

Unions between fixed elements

Absence of some sections of welding cords

DN2

High structural deterioration

DN3

Welding cords missing complete or for the most part

DN3

Cracks in small welds

DN1

Cracks in medium-sized welds

DN2

Poor condition or absence, not being in contiguous positions

DN2

Poor condition or absence, being in contiguous positions

DN3

Corrosion, lack of material, bumps or cracks affecting mechanical strength

DN2

Corrosion, lack of material, bumps or cracks that do not affect mechanical strength

DN1

G.3.- WORKING AREAS

Access under fixed-height conveyors

Free height < 2 m

DN3

Absence of fixed guards in moving parts (free height < at 2.5 m, in case of passing under moving parts)

DN3

Poor condition of fixed guards (free height < at 2.5 m, in case of passing under moving parts)

DN2

Absence of handrails or fixed guards preventing lower access to the conveyor, where the working area is located along the conveyor

DN3

Poor condition of handrails or guards preventing lower access to the conveyor, when the working area is located along the conveyor

DN2

Access under variable height conveyors

Absence of means (curtains, bars, ...) that prevent access under the variable height section (0.7-2.5 m)

DN3

Poor condition of media (curtains, bars, ...) that prevent access under the variable height section (0.7-2.5 m)

DN2

Access in proximity to ends and discharge points

Absence of fixed distance guards

DN3

Poor condition of fixed distance guards

DN2

Access over conveyor

Absence of free space for moving parts

DN3

Absence of walkway, handrails or skirting board for access on conveyor

DN3

Poor state of walkway, handrails or skirting board for access on conveyor

DN2

Asideros

Absence of handholds

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN2

Presence of blows, dents, absence or breakage of elements, keeping two points of support safe

DN1

Railings

Absence of railings

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN2

Presence of blows, dents, absence or breakage of elements

DN1

Absence of skirting board

DN2

Poor condition of railings and/or skirting

DN2

Stairs

Absence of ladder, being necessary for the operator to access that maintenance point

DN3

Absence of non-slip surfaces

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN2

Presence of blows, dents, absence or breakage of elements, keeping two points of support safe

DN1

Non-slip surfaces of stirrups: Does not guarantee foot grip

DN2

Non-slip surfaces of stirrups: Partial loss, ensuring foot grip

DN1

Non-slip surfaces of steps: Does not guarantee foot grip

DN2

Non-slip surfaces of steps: Partial loss, ensuring foot grip

DN1

Means of access

Absence of protection against falling and/or ejection of objects, materials in lower work area

DN3

Poor state of protection against falling and/or ejection of objects, materials in lower work area

DN2

Absence of fixed locking guards preventing lower access to the conveyor

DN3

Width of access to unsuitable working areas (minimum free width 0.5 m)

DN1

Walkways

No handrails on sloping walkways

DN3

Poor condition of handrails on sloping walkways

DN2

Absence of non-slip surfaces on walkways

DN3

Poor condition of non-slip surfaces on walkways

DN2

Poor condition of railings and skirting boards in openings

	DN2
Absence of skirting board	
	DN2
Absence of railings in openings	
	DN3
Width of unsuitable working areas (minimum free width 0.5 m)	
	DN1
Absence of permanent and safe walkways in work areas	
	DN3
Poor state of permanent and safe walkways in work areas	
	DN2
Corridors	
Absence of non-slip surfaces in corridors	
	DN3
Poor condition of non-slip surfaces in corridors	
	DN2
Inadequate aisle width (minimum free width 0.5 m)	
	DN3
Platforms	
Presence of blows, dents, absence or breakage of anchor elements, screws or welds, affecting the mechanical strength of the structure	
	DN3
Presence of blows, dents, absence or breakage of anchor elements, screws or welds, which are necessary to repair in the short term	
	DN2
Presence of blows, dents, absence or breakage of anchor elements, screws or welds, which are necessary to repair in the medium term	
	DN1
Mesh light or openings that allow the punctual fall of materials	
	DN1
Mesh light or openings that may allow some materials to fall	
	DN2

Mesh light or openings that allow the fall of all types of materials

DN3

Absence of permanent and secure platforms in traffic zones

DN3

Absence of non-slip surfaces on work area platforms

DN3

Poor condition of non-slip surfaces in working areas

DN2

Poor state of work zone platforms

DN2

Width of platforms in unsuitable working areas (minimum free width 0.5 m)

DN2

Access Departures

Absence of two outlets arranged in such a way that it is impossible to be trapped in the event of fire/explosion (if the equipment is intended to carry fine grain size materials with a possible risk of fire and explosion)

DN3

Floors, trellises

Absence of means of attachment on trellises or floors in working areas

DN3

Poor condition of fixing media on trellises or floors in working areas

DN2

Non-slip surfaces

Absence of non-slip surfaces

DN3

Loss or absence of non-slip surfaces in the area, which does not guarantee the grip of the foot and the safe passage of the operator

DN2

Loss or absence of non-slip surfaces in the area, but which guarantees the grip of the foot and the safe passage of the operator

DN1

G.4.- TRAFFIC AREAS

Access under fixed-height conveyors

Free height < 2 m

DN3

Absence of fixed guards in moving parts (free height < at 2.5 m, in case of passing under moving parts)

DN3

Poor condition of fixed guards (free height < at 2.5 m, in case of passing under moving parts)

DN2

Absence of handrails or fixed guards preventing lower access to the conveyor, where the traffic area is located along the conveyor

DN3

Poor condition of handrails or guards preventing lower access to the conveyor, when the traffic area is located along the conveyor

DN2

Access under variable height conveyors

Absence of means (curtains, bars, ...) that prevent access under the variable height section (0.7-2.5 m)

DN3

Poor condition of media (curtains, bars, ...) that prevent access under the variable height section (0.7-2.5 m)

DN2

Access in proximity to ends and discharge points

Absence of fixed distance guards

DN3

Poor condition of fixed distance guards

DN2

Access over conveyor

Absence of free space for moving parts

DN3

Absence of walkway, handrails or skirting board for access on conveyor

DN3

Poor state of walkway, handrails or skirting board for access on conveyor

DN2

Asideros

Absence of handholds

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN2

Presence of blows, dents, absence or breakage of elements, keeping two points of support safe

DN1

Railings

Absence of railings

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN2

Presence of blows, dents, absence or breakage of elements

DN1

Absence of skirting board

DN2

Poor condition of railings and/or skirting

DN2

Stairs

Absence of ladder, being necessary for the operator to access that maintenance point

DN3

Absence of non-slip surfaces

DN3

Presence of blows, dents, absence or breakage of elements, preventing safe access

DN2

Presence of blows, dents, absence or breakage of elements, keeping two points of support safe

DN1

Non-slip surfaces of stirrups: Does not guarantee foot grip

DN2

Non-slip surfaces of stirrups: Partial loss, ensuring foot grip

DN1

Non-slip surfaces of steps: Does not guarantee foot grip

DN2

Non-slip surfaces of steps: Partial loss, ensuring foot grip

DN1

Means of access

Absence of protection against falling and/or ejection of objects, materials in lower traffic zone

DN3

Poor state of protection against falling and/or ejection of objects, materials in lower traffic zone

DN2

Absence of fixed locking guards preventing lower access to the conveyor

DN3

Width of access to areas of inadequate traffic (minimum free width 0.5 m)

DN1

Walkways

No handrails on sloping walkways

DN3

Poor condition of handrails on sloping walkways

DN2

Absence of non-slip surfaces on walkways

DN3

Poor condition of non-slip surfaces on walkways

DN2

Poor condition of railings and skirting boards in openings

DN2

Absence of skirting board

DN2

Absence of railings in openings

DN3

Width of inadequate traffic areas (minimum free width 0.5 m)

DN1

Absence of permanent and safe walkways in traffic zones

DN3

Poor state of permanent and safe walkways in traffic zones

DN2

Corridors

Absence of non-slip surfaces in corridors

DN3

Poor condition of non-slip surfaces in corridors

DN2

Inadequate aisle width (minimum free width 0.5 m)

DN3

Platforms

Presence of blows, dents, absence or breakage of anchor elements, screws or welds, affecting the mechanical strength of the structure

DN3

Presence of blows, dents, absence or breakage of anchor elements, screws or welds, which are necessary to repair in the short term

DN2

Presence of blows, dents, absence or breakage of anchor elements, screws or welds, which are necessary to repair in the medium term

DN1

Mesh light or openings that allow the punctual fall of materials

DN1

Mesh light or openings that may allow some materials to fall

DN2

Mesh light or openings that allow the fall of all types of materials

DN3

Absence of permanent and secure platforms in traffic zones

DN3

Poor condition of non-slip surfaces in traffic areas

DN2

Platform width of inadequate traffic zones (minimum free width 0.5 m)	DN2
Absence of non-slip surfaces on platforms in traffic zones	DN3
Poor state of traffic zone platforms	DN2
Access Departures	
Absence of two outlets arranged in such a way that it is impossible to be trapped in the event of fire/explosion (if the equipment is intended to carry fine grain size materials with a possible risk of fire and explosion)	DN3
Floors, trellises	
Absence of means of attachment on trellises or floors in traffic areas	DN3
Poor condition of means of attachment on trellises or floors in traffic areas	DN2
Non-slip surfaces	
Absence of non-slip surfaces	DN3
Loss or absence of non-slip surfaces in some section of the access, but that guarantees the grip of the foot and the safe passage of the operator	DN1
Loss or absence of non-slip surfaces in any section of the access, which does not guarantee the grip of the foot and the safe passage of the operator	DN3

ANNEX V

Actions to be taken

Once the inspection of the installation has been carried out, a series of measures must be established depending on the result obtained. These measures are classified as:

a) Urgent measures: those that are aimed at remedying those deficiencies that have resulted in a negative or unfavourable report.

b) Necessary measures: those that are aimed at addressing those deficiencies that have resulted in a favourable report with deficiencies.

c) "Measures to be observed": those aimed at addressing deficiencies involving tolerable risks and resulting in a favourable report. Correction and/or follow-up should be recommended for information purposes only.[65]

Type of measures	**Outcome**		
	Negative or Unfavorable	***Favourable with deficiencies***	***Favorable***
Urgent	X	--	--
Necessary	Depending on the case	X	--
To observe	Depending on the case		

Table 1. Measures to be taken depending on the outcome of the verification.

The inspection report shall reflect the systems, subsystems and elements concerned, as well as the type of measures to be taken in each case.

[65] Any deficiencies reflected in the report must entail some type of measure on the part of the user; to specify this aspect, it will be understood that there is a *measure to be observed* when any of these circumstances occur:

- If there are major deficiencies in non-determining points (weight *1 or 2*) and the system as a whole is not deficient, or
- If there are major deficiencies in non-determining points (weight *1 or 2*) and the system as a whole has deficiency due exclusively to the defect found in a determining point.

ANNEX VI

Periodic inspection form

CARRIER STRIPS Inspection point	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
						Documentary Visual	Test Measurement	Unladen operation	Operation under load	
A.- DOCUMENTATION	1									
A.1 DOCUMENTATION	1									
INSPECTION CERTIFICATE	3					D				
STATEMENT OF CONFORMITY	2					D				
MANUAL OF INSTRUCTIONS	3					D				
OTHERS	3					D				
ADHESIVE PLATE	3					V				
B.- FOB STATION	2									
B.1.- ACCESSORIES	1									
GENERAL	3					V				
ASIDERS	2					V				
BARANDILLAS	3					V				
Scales	3					V				
PASSENGERS	2					V	M			
PASILLOS	2					V	M			
PLATFORMS	3					V	M			
EMERGENCY DEPARTURE	3					V	M			
Anti-slip surfaces	3					V				
B.2.- ENVIRONMENTAL CONDITIONS AND ERGONOMY	2									
FIELD OF VISION	2					V				
ENVOLVENTE SPACE	3					V	M			
EXTERNAL LIGHTING	2					V	M*			
INTERNAL LIGHTING	2					V	M			
NOISE	1						P	PV		

CARRIER STRIPS	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
CLIMATE SYSTEM						V				
VIBRATIONS	1						P	PV		
B.3.- ELEMENTS	1									
CRYSTALIZATION	2					V				
LIVE ARISTS	3					V				
SEATING	1					V				
DOOR BULLETS AND WINDOWS	1					V				
CLOSURE	1					V				
COMMUNICATION DEVICES	2					V				
ORDER AND CLEANING	1					V				
B.4.- STRUCTURAL STATUS	2									
ANCLAJES	2					V				
BASTIERS	3					V				
SUPPORTS	3					V				
UNIONS BETWEEN FIXED ELEMENTS	2					V				
C.-GENERAL/INSTALLATION	3									
C.1.- BANDA	1									
FEATURES/DOCUMENTAL ASSESSMENT	2					V				
STATE	2					V	M			
OPERATION	3						P	PV	FC	
TENSADO	2					V				
C.2.- TENSED DEVICE	3									
STATE	2					V				
OPERATION	2						P	PV	FC	
AUTOMATIC HORIZONTAL TENSATION	3					V				
TENSADO MANUAL	3					V				
THROUGH GRAVITY	3					V				
C.3.- BAND CLEANING DEVICE	1									

CARRIER STRIPS	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
RASCADOR						V				
C.4.- TRANSMISSION ELEMENTS	3									
TRANSMISSION EQUIPMENT	3					V				
C.5.-MOBILE/ARTICULATED ELEMENTS	3									
MOBILE CARS, RADIAL CARRIERS	3					V				
FIXED RECORD MOBILE EQUIPMENT	3					V				
TURNING, SCOPE, TRANSFER MECHANISMS	3						P	PV		
C.6.- SPECIFIC POINTS	2									
LOADING POINT	2						P		FC	
DOWNLOAD POINT	2						P		FC	
INFLEXION POINT	2						P		FC	
TRANSFER POINT	2						P		FC	
C.7.- RESGUARDS (STATE)	3									
SELECTION PANELS	2					V	M			
SURVEYS AT INFLEXION POINTS	3					V	M			
ENCLAVED RESURANCES	3						P	PV		
FIXED CLOSURE RESERVATIONS	3					V	M			
FIXED DISTANCE SURVEYS	3					V	M			
THERMAL SURVEYS	3					V	M			
C.8- ROLLS	3									
STATE	2					V	M			
OPERATION	2						P	PV		
LOVERING ROLLS	3					V				
LOWER ROLLS	3					V				
CARRIER ROLLS	2					V				
C.9- TAMBORES	3									
STATE	2						P	PV		
HEAD/MOTRIX TAMBOR	3					V	M			

CARRIER STRIPS	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
COLLA TAMBOR						V	M			
DOWNLOAD TAMBOR TO GREEN CAR	3					V	M			
TENSION TAMBOR	3					V	M			
D. ELECTRIC INSTALLATION	2									
D.1.- ELECTRIC EQUIPMENT	2									
CABLED	2					V	P	EN		
ELECTROSTATIC CHARGES	3					V	P	EN		
PACKAGING/MOTORS	2					V	P	EN		
ELECTRICAL EQUIPMENT	3					V	P	EN		
STATE ELECTRICAL PROTECTIONS	3					V	P	EN		
MEANS OF DEXCONNECTION	3					V	P	EN		
E.-OTHER AUXILIARY SYSTEMS	2									
E.1.-LIGHTING DEVICES	2									
LIGHTING IN WORK AREAS	2					V	M*			
LIGHTING IN TRAFFIC AREAS	1					V	M*			
E.2.-WARNING AND DANGER INDICATORS	1									
INDICATORS IN AUXILIARY FACILITIES	2					V				
INDICATORS IN WORK AREAS	2					V				
INDICATORS IN TRAFFIC AREAS	2					V				
E.3.-PROTECTION AGAINST FIRE	2									
EXTINCTION SYSTEMS	2					V				
E.4.-ACSUSTICAL SIGNING	1									
ACUSTIC AVERIA NOTICES TO THE OPERATOR	2					V				
ACUSTIC STOP WARNINGS	2						P	PV		
ACUSTIC EMERGENCY STOP WARNINGS	3						P	PV		
ACUSTIC POWERING WARNINGS	2						P	PV		
E.5.-LIGHT SIGNALIZATION	1									
LUMINOUS WARNINGS OF AVERIA TO THE OPERATOR	2						P	PV		

CARRIER STRIPS	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
LUMINOUS STOP WARNINGS	3						P	PV		
LUMINOUS EMERGENCY STOP WARNINGS	3						P	PV		
LIGHTY POWERING WARNINGS	2						P	PV		
E.6.-TECHNIQUES/DISPOSITIVES AGAINST POWDER EMISSION	3									
MEASURES AGAINST POWDER EMISSION	2					V				
F.- FOB SYSTEMS	2									
F.1.-AUXILIARY SAFETY CIRCUITS	2									
SECURITY CIRCUITS FOR SECURITY DEVICES	3					V				
F.2.- AUTOMATIC DETECTION OF AVERIAS	2									
AUTOMATIC DETECTION OF AVERIAS	2					V				
F.3.- DESIGN TEAM	2									
DESIGN	2					D				
F.4.-AUXILIARY DEVICES	2									
OBTURATION OR OVERLOAD DETECTORS	2						P	PV		
SPEED AND TURN DEECTORS	2						P	PV		
SECURITY DEVICES BY MECHANICAL ACTION	2						P	PV		
ELECTRICAL SAFETY DEVICES	3						P	PV		
RESPONSE ELEMENTS	2						P	PV		
TRANSMISSION ELEMENTS USED FOR SECURITY PURPOSES	3						P	PV		
F.5.-FUNCTION OF STARTING	3									
POWERING DEVICE	3					V				
STATE	2					V				
STARTING SEQUENCE	3						P	PV		
F.6.-FUNCTION OF PAYMENT	3									
PARLIAMENT DEVICES	3						P	PV		
STATE	2					V				
CABLE ACTIONED EMERGENCY STOP INTERRUPTOR	3						P	PV		
EMERGENCY STOP	3						P	PV		

CARRIER STRIPS	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
STOP SEQUENCE							P	PV		
F.7.-ACTION AUTHORITIES	3									
STATE	3					V				
OPERATION	3						P	PV		
INDICATORS	2					V				
G.-ZONES	2									
G.1.-STRUCTURAL STATUS OF WORKING AREAS	3									
ANCLAJES	2					V				
BASTIERS	3					V				
SUPPORTS	3					V				
UNIONS BETWEEN FIXED ELEMENTS	2					V				
G.2.-STRUCTURAL STATUS OF TRAFFIC AREAS	2									
ANCLAJES	2					V				
BASTIERS	3					V				
SUPPORTS	3					V				
UNIONS BETWEEN FIXED ELEMENTS	2					V				
G.3.-WORKING AREAS	3									
ACCESS UNDER FIXED HEIGHT CARRIERS	3					V	M			
ACCESS UNDER TRANSPORTERS OF VARIABLE HEIGHT	3					V	M			
ACCESS TO EXTREME PROXIMITIES AND DOWNLOAD POINTS	3					V	M			
ACCESS TO THE CARRIER	3					V	M			
ASIDERS	1					V				
BARANDILLAS	3					V				
Scales	3					V				
MEANS OF ACCESS	3					V				
PASSENGERS	3					V	M			
PASILLOS	2					V	M			
PLATFORMS	3					V	M			

CARRIER STRIPS	Weight	F	DN1	DN2	DN3	Inspection		Test		Observations
ACCESSORIES OUTPUTS						V	M			
SOILS, RELAXED	2					V				
Anti-slip surfaces	3					V				
G.4.-TRAFFIC AREAS	2									
ACCESS UNDER FIXED HEIGHT CARRIERS	3					V	M			
ACCESS UNDER TRANSPORTERS OF VARIABLE HEIGHT	3					V	M			
ACCESS TO EXTREME PROXIMITIES AND DOWNLOAD POINTS	3					V	M			
ACCESS TO THE CARRIER	3					V	M			
ASIDERS	1					V				
BARANDILLAS	3					V				
Scales	3					V				
MEANS OF ACCESS	3					V				
PASSENGERS	3					V	M			
PASILLOS	2					V	M			
PLATFORMS	3					V	M			
ACCESSORIES OUTPUTS	1					V	M			
SOILS, RELAXED	2					V				
Anti-slip surfaces	3					V				

F = Favourable DN1 = Level 1 Deviation DN2 = Level 2 Deviation DN3 = Level 3 Deviation

ANNEX VII

Report template

Logo of the department or Directorate-General of the Autonomous Community	TECHNICAL INSPECTION OF CARRIER CINTAS nº report: xxxxxxxxxxxxxx	Logo of the CMO

INSTALLATION ***Conveyor belt***

Brand:	Model:	Serial number:	Element ID
Year of manufacture:	**CE marking**	**Date of inspection:**	**Next inspection**
	☐		

USER

Company:
Operation:
Address:
Telephone:
e-mail:
Contact person:
Activity:
CIF:

In the following columns appear those systems of the machine in which deficiencies of some kind were found, detailing the elements involved and the severity of the defect

XXXXXX

XXXXXXXXXXXXXXXXX

Item inspected: **Defect:** **Description:**

Equipment used:

Outcome of the inspection: *(see next page)* ***User Signature*** ***Inspector's signature***

	Fdo:	Fdo:

Urgent measures: ***Necessary measures:***

Comments:

Systems	Urgent measures	Necessary	To observe
	☐	☐	☐

	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

Information note on the results: (Explanatory note to be included in the report)

Negative: The installation has deficiencies that affect the main systems or security elements. The installation cannot be made available to the workers until the deficiencies are remedied through the corresponding repair. A re-inspection with a favourable or favourable result with deficiencies shall be required for re-entry into service.

Unfavorable with [x] deficiencies: The facility has deficiencies that compromise the safety and/or health of workers. The installation cannot be made available to the workers until the deficiencies are remedied through the corresponding maintenance and/or repair interventions. A re-inspection with a favourable or favourable result with deficiencies shall be required for re-entry into service.

Favourable with [x] deficiencies: The installation has only minor deficiencies, but the evolution of which may lead to deficiencies that compromise the safety and / or health of workers. The facility can be made available to workers, although these deficiencies must be remedied before the usual deadline for the next inspection is met.

ANNEX VIII

Valuation method[66]:

1. Assessment of deficiencies

Each of the deficiencies of the inspection points, subsystems and systems of the machinery or installation is assigned the following value:

- No defects: You = 0.
- Minor deficiencies and deviation DN1: Vd = 3.
- Moderate deficiencies and DN2 deviation: Vd = 6.
- Major deficiencies and deviation DN3: Vd = 9.

Each inspection point, subsystem and system of the machine or installation is assigned a *weight* (from *1 to 3*) depending on the impact it has on the safety of the machine (Pp, *Pss and Ps*, *respectively*).

2. Assessment of inspection points

The *result* (or *contribution*) of each inspection point Rp shall be equal to the product of its weight by the value of the deficiency it presents:

Rp = Pp x Vd

3. Assessment of subsystems

If *n* inspection points belong to a subsystem, once their individual results have been obtained, the *result of the subsystem* to which they belong is calculated as follows:

$$Resultado\ de\ la\ inspección\ del\ subsistema\,(Rss) = \sum_{i=1}^{n} Rpi = \sum_{i=1}^{n} Ppi\ x\ Vdi$$

Rpi being the result of the *i-th inspection point* of the subsystem and *Vdi* the deficiency it presents.

The *following limits shall be taken into account when classifying the state of the subsystem:*

No defect	Mild deficiency	Moderate deficiency	Major deficiency

[66] For the whole method explained here, the most unfavorable result will always be taken.

$Rss < \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi$	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 6 > Rss \geq$	$\sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi\ x\ 9 > Rss \geq$	$Rss \geq \sum_{i=1\ y\ Ppi\neq 3}^{n} Ppi$
Or,			
	If any inspection point with weight 3 shows deviation DN1	If any inspection point with weight 3 shows deviation DN2	If any inspection point with weight 3 shows deviation DN3

Table 1. Assessment of the subsystems of the machine a

4. Assessment of systems and measures to be implemented

If *m* subsystems belong to a system, after obtaining their individual results, the *result of the system* to which they belong is calculated as follows:

$$Resultado\ de\ la\ inspección\ del\ sistema\ (Rs) = \sum_{j=1}^{m} Rssj\ x\ Pssj$$

Rssj being the result of the *j-th subsystem* and *Pssj* its weight.

The *following limits shall be taken into account when classifying the state of the system:*

Mild deficiency	Moderate deficiency	Major deficiency
$\sum_{j=1}^{m} (6\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij$ ¿	$\sum_{j=1}^{m} (9\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n} Ppij$ ¿	$Rs \geq \sum_{j=1}^{m} (9\ x\ Pssj\ x \sum_{i=1\ y\ P\ pi\neq 3}^{n} P$
Or,		
If any subsystem with weight 3 is mildly deficient	If any subsystem with weight 3 is moderately deficient	If any subsystem with weight 3 has major deficiency

Table 2. Valuation of machine systems

Ppij being the weight of point *i-th belonging* to subsystem *j-th*.

5. Assessment of the general condition of the equipment

With 7 being the number of systems verified on the machine or equipment, and once the individual results of these have been obtained, the *overall result of the Rg machine* is calculated as follows:

$$Resultado\ global\ de\ la\ máquina\ (Rg) = \sum_{k=1}^{7} Psk\ x\ Vdk$$

Psk being the weight of the *k-th system* and *Vdk* the deficiency it presents.

The *following limits shall be taken into account when classifying the condition of the machinery:*

Favorable	Favourable with [ ] deficiencies	Unfavorable with [ ] deficiencies	Negative
$Rg < \sum_{k=1\ y\ Psk\neq 3}^{7} Psk$	$\sum_{k=1\ y\ Psk\neq 3}^{7} Psk\ x\ 6 > Rg \geq k$	$\sum_{k=1\ y\ Psk\neq 3}^{7} Psk\ x\ 9 > Rg \geq k=$	$Rg \geq \sum_{k=1\ y\ Psk\neq 3}^{7} Psk$
Or			
-	If a system with weight 3 is mildly deficient	If a system with weight 3 is moderately deficient	If any system with weight 3 has major deficiency

Table 4. Classification of the result according to the score obtained

ANNEX IX

Personnel responsible for carrying out inspections

For a correct inspection, it will be necessary an inspection team with adequate training and technical knowledge on:

a) Machine mechanics.

b) Elasticity and strength of materials.

c) Electricity.

d) The machine to be evaluated (knowledge of the installed systems and their operation).

In addition, they must also have knowledge about:

h) Safety and health (Law on the Prevention of Occupational Risks, workplaces, signage, etc.).

i) Regulations and implementing legal provisions (Machine Directive, Mining Safety Regulation, Royal Decree 1215/1997, etc.).

j) Specific technical regulations applicable to this type of machinery.

For the verification of some tests, in case of start-up, stop and emergency stop, the presence of the inspection team simultaneously in drive organs and in the work area of the equipment will be required.

ITC SM-IND-23 ELECTRICITY. TECHNICAL REQUIREMENTS FOR SUBTERRANEAN HOLDING FACILITIES

1. OBJECT AND SCOPE

The purpose of this Supplementary Technical Instruction (hereinafter referred to as 'ITC') is to lay down technical requirements for underground electrical installations considered to be for exclusive use in mines.

As regards the technical requirements that are not established here referring to the aforementioned installations, those indicated in Royal Decree 842/2002, of 2 August, approving the Electrotechnical Regulation for low voltage and its supplementary technical instructions ITC-BT 01 to 51, Royal Decree 337/2014, of 9 May, approving the Regulation on technical conditions and safety guarantees in high voltage electrical installations and its supplementary technical instructions ITC-RAT 01 to 23, and Royal Decree 223/2008, of 15 February, approving the Regulation on technical conditions and safety guarantees in high voltage power lines and its supplementary technical instructions ITC-LAT 01 to 09 will apply.

Without prejudice to the provisions of Royal Decree 614/2001 of 8 June 2001 on minimum requirements for the protection of the health and safety of workers from electrical hazards, Royal Decree 681/2003 of 12 June 2003 on the protection of the health and safety of workers exposed to the risks arising from explosive atmospheres at the workplace and Royal Decree 485/1997 of 14 April 1997 on minimum requirements for safety and health signs at work.

2. CLASSIFICATION OF TENSIONS

For the purposes of applying ITC, electrical installations are classified, according to the nominal voltages attributed to them, in accordance with the provisions of Royal Decree 842/2002 of 2 August 2002 and Royal Decree 337/2014 of 9 May 2014. For the following installations and equipment, the maximum rated voltage values shall be:

Fixed lighting: 230 V between phases, between phase and neutral or average value in direct current.

Portable tools not used in conductive locations: 230 V between phases or between phases and neutral.

3. PROTECTION AGAINST DIRECT CONTACTS

3.1 General protection

Protection against direct contact shall be ensured by the use of any of the following protection measures:

a) Total protection by enclosures or barriers.

b) Total protection by isolation of the active parts.

c) Partial protection by distance from the active parts.

Partial protection by means of obstacles.

e) Minimum distances in the areas of operation in indoor facilities.

Minimum insulation distances for outdoor installations.

Its use shall follow the specifications set out in section one of standard UNE 21621-2 where applicable, with the exceptions indicated therein.

3.2 Naked drivers

The use of naked electric conductors is prohibited, with the following exceptions:

a) Drivers housed in envelopes with a degree of protection equal to or greater than IP 2X.

b) The connections of the cables in the electrical glue at the junction of the terminals of the firing line with the threads of the detonators and at the junction of these with each other, according to the requirements of the ITC SM- IND- 25.

c) Employees for welding according to the Low Voltage Electrotechnical Regulation.

d) Protection and grounding conductors.

4. PROTECTION AGAINST INDIRECT CONTACTS

The protective measures specified below are intended to prevent the contact voltage from continuing to be maintained after a defect of such a duration as to be dangerous to persons. In the case of a ground defect, protection shall be provided either by automatic power cut-off, taking into account the specified voltage and time values, or by reducing the indirect contact voltage below the normal limit for which power cut-off is not required.

The protection measures against indirect contact with a protective driver shall be as specified below.

4.1 Grounding of the masses

All masses of the electrical installation must be grounded by a protective conductor.

When the grid neutral is grounded, the grounding shall be carried out away from the grid grounding. If good means or grounding points are available, the protective conductor shall preferably be connected to these points, in as many places as possible. In order to ensure, in the event of failure, that the potential of the protective conductor remains as close as possible to the ground potential, multiple grounding to points distributed as regularly as possible may be necessary.

The protective conductor can be a naked conductor, not coated with insulating material.

4.2 Automatic cutting device

A protective device shall automatically cut off the supply to the part of the installation protected by this device if, as a result of a defect in that part, the contact voltage reaches, at some point in the installation, a value higher than the conventional limit contact voltage U_L, for which the following limit values are set:

U_L = 50 V (Efficient value) for non-conductive sites.

U_L = 24 V (Efficient value) for conductive sites.

In installations with an IT scheme and provided that the corresponding conditions of section 4.7.5 are met, automatic power outage will not be mandatory in the case of the first defect.

The above-mentioned protective devices shall not have automatic rearmament. Its rearmament after a shot will only be possible once the cause of the shot has been remedied.

4.3 Requirements for protective devices

The operating time of the cutting devices for any defect current shall be less than the following time limits:

For low voltage installations (hereinafter BT) and non-conductive sites, see Table 2.

For BT installations and conductive sites, see Table 3.

c) For high voltage installations (hereinafter AT), the contact voltage shall be limited to 50 V (alternating current efficiency) at the first defect and the corresponding automatic switch shall disconnect the power to the protected installation without delay.

Table 2

BT facilities

(non-driver sites)

Expected contact voltage (V) (effective value in alternating current)	Maximum defect duration times(s) (Understands the time elapsed from the detection of the defect to the extinction of the arc in the corresponding cutting device)
< 50	∞
50	5
75	1
90	0,5
110	0,2
150	0,1
220	0,05
280	0,03

Table 3

BT facilities

(driver sites)

Expected contact voltage (V) (effective value in alternating current)	Maximum defect duration times(s) (includes the time elapsed from the detection of the defect to the extinction of the arc in the corresponding cutting device)
< 24	∞
24	5
36	1
43	0,5
53	0,2
72	0,1
106	0,05
134	0,03

The value of the maximum duration of the defect for intermediate values of the expected contact voltage shall be the result of the interpolation of the corresponding values.

4.4 Limitation of use of TN, TT and IT schemes

Within the scope of this JTI, the distribution schemes to be used will be the following:

Scheme TN-S: It is allowed only in exceptional cases justified in the project and meeting the requirements of paragraph 2 of ITC-BT-08; its variant TN-S (neutral and protective conductors separated throughout the scheme) in low voltage networks (hereinafter BT) with nominal voltages not exceeding 230 V and with a maximum network length of 50 m, and provided that monitoring of the continuity of the ground line is ensured.

Scheme TT: It is supported in BT installations powered directly from a BT public distribution network.

IT scheme: Supported on AT and BT networks.

4.5 Protection measures for TN-S schemes.

4.5.1 Team-tential mass connection

All the masses of the electrical installation must be connected by means of protective conductors to the point of the grounded power supply.

The sections of the neutral conductor and the protective conductor shall be equal to each other and shall comply with the requirements of the High and Low Voltage Electrotechnical Regulations.

4.5.2 Condition to be satisfied after a defect

The protective devices and the section of the conductors must be chosen in such a way that, after a protective phase-conductor or phase-mass defect occurs at any point of the installation, the power is cut off as prescribed in the specified time, in accordance with the condition established for the TN schemes in ITC 24 of the Low Voltage Electrotechnical Regulation, and taking into account that the current that ensures the operation of the cutting device will do so in the time allocated in tables 2 and 3 of paragraph 4.3 of this ITC.

If this requirement cannot be met, an additional equipment connection must be provided in accordance with paragraph 14.8.2.1 of UNE 21621-2.

4.5.3 Protective devices

Residual differential current protection devices or over-intensity devices shall be used in the TN-S scheme provided that the cut-off is ensured within the maximum allowed time.

For the choice of these protective devices, the provisions of section 4 of standard UNE 21621-2 may be followed.

4.5.4 Tension Balancing

For low-voltage TN-S systems where a direct phase-to-ground defect may occur, the following condition must be met in order to prevent the protection conductor, or any part attached to it, from reaching a voltage, relative to the ground, greater than U_l, unless the project justifies the impossibility of the defect occurring.

$$\frac{R_B}{R_L} = \frac{U_L}{U_0 - U_L}$$

where:

R_B = Total grounding resistance.

R_L = The lowest expected grounding resistance of masses not attached to the protection conductor, in all cases where a phase conductor ground defect appears.

U_0 = Voltage between phase and neutral.

U_L = Conventional limit contact voltage.

4.6 Protection measures for TT schemes

Its use shall follow the specifications set out in section 11 section two of UNE 21621-2, with the exceptions set out in sections 4.6.1, 4.6.2 and 4.6.3.

4.6.1 Team-tential mass connection

All masses of electrical equipment protected by the same protective device must be interconnected by means of a protective conductor to the same grounding. If several protective devices are mounted in series, this requirement applies to each group of masses protected by each device.

Masses that are accessible simultaneously must be connected to a common ground.

4.6.2 Condition to be satisfied after a defect

In order to comply with paragraph 4.3 of this JTI, the conditions laid down for TT schemes in JTI 24 of the Low Voltage Electrotechnical Regulation shall be met.

The current intensity to be taken into account shall be that which ensures the automatic operation of the protective device within the time allocated in Tables 2 and 3 of paragraph 4.3 of this JTI.

For the choice of these protective devices, the provisions of section 4 of standard UNE 21621-2 may be followed.

4.6.3 Protective devices

Residual differential current protection devices or over-intensity devices shall be used in the TT scheme, provided that the cut-off is ensured within the maximum allowed time.

4.7 Protection measures for IT schemes

4.7.1 General

In IT schemes, the installation must be either grounded or grounded through an impedance whose value, justified by calculation, ensures that in the event of a frank defect the conventional limit voltage U_L is not exceeded and the masses are connected to one or more earthings, individually, in groups or as a whole.

When the defect current, in the case of a single defect to mass, is of a sufficiently low value, and the conventional limit voltage U_L is not exceeded, the power cut-off is not mandatory (see paragraph 4.7.5). Measures should be taken in order to avoid any dangerous risk to a person in contact with simultaneously accessible conductive parts, in the event of two simultaneous defects (ground-phase or phase-phase).

4.7.2 Installation insulation or grounding

In this case the neutral point of the supply, if it is mounted in star, will be the one that connects to earth through the impedance, or an artificial neutral point that can be connected directly to earth, if the impedance resulting from the constitution of this artificial neutral has a value, justified by means of calculation, that guarantees that before a frank defect the conventional limit voltage U_L is not exceeded.

4.7.3 Insulation and installation of the neutral conductor

The neutral conductor, if any, shall be insulated for the same voltage as that assigned to the corresponding phase conductor.

4.7.4 Team-tential connection of the masses

All masses must be grounded individually, in groups or as a whole.

Case (a) Isolated ground feeding, according to the scheme in Figure 3.

In this case the total ground resistance R_A of all masses connected to a grounding and of the corresponding protective conductor shall meet the following condition:

$$I_d \times P_A \leq U_L$$

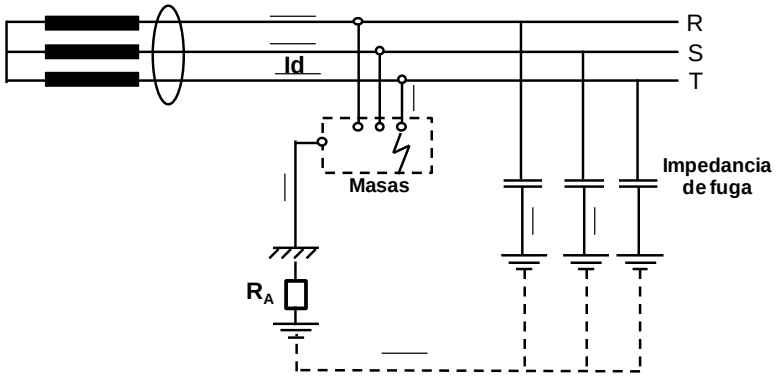
where,

I_d = Defect current intensity in case of a first free-to-ground defect between a phase and mass conductor. The value of Id takes into account the homopolar capacities of the lines and the overall grounding impedance of the masses ($I_d = I_C$)

U_L = Conventional limit contact voltage (50 V or 24 V).

R_A = Sum of ground resistors and mass protection conductors.

Figure 3. Networked ground defect with IT scheme with insulated ground power



Case (b) Grounded feed by limiting impedance and grounding for separate masses, as outlined in Figure 4.

In this case, the mass potential elevation is due to the circulation of the total defect current through the protective conductor and the grounding resistance of the mass. The total defect current is closed by the homopolar capacities of the other two phases and by the grounding resistance of the feed plus the limiting impedance. It must be fulfilled that the mass potential does not exceed the conventional limit voltage.

$$I_d \times P_A \leq U_L$$

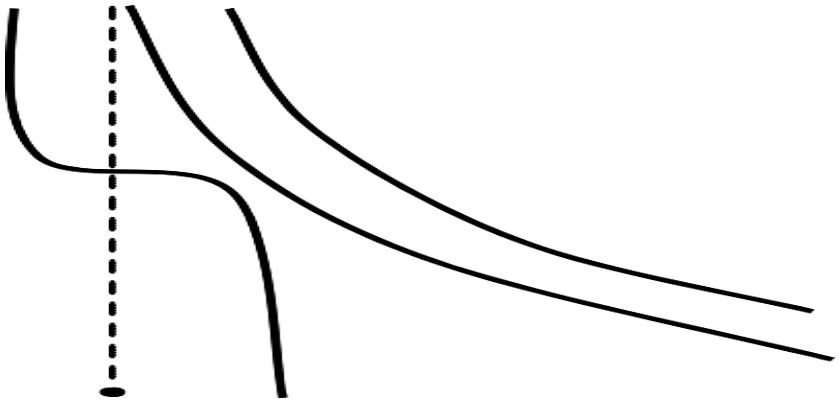
where,

I_d = Defect current intensity in case of a first free-to-ground defect between a phase and mass conductor. The Id value takes into account the homopolar capacities of the lines and the global grounding impedance of the masses and the feed.

U_L = Conventional limit contact voltage (50 V or 24 V).

R_A = Sum of ground resistors and mass protection conductors.

Figure 4 - Networked grounding defect with impedant neutral IT scheme and separate feed and mass groundings.



Case (c) Grounded feeding by limiting impedance and common grounding for the masses, according to the scheme in Figure 5.

The mass potential elevation, sum of the voltage drop in the distributed protection conductor and the voltage drop in the grounding resistance of the transformer RN.

$$\Delta YP_{CP} + \Delta YP_{N} \leq U_{L}$$

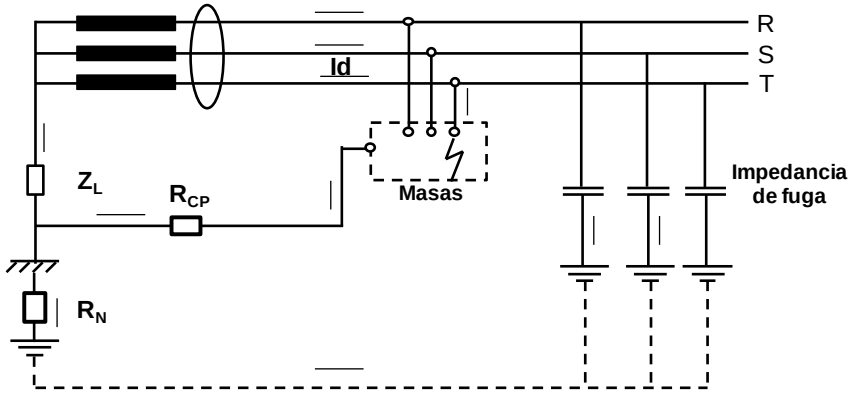
where,

ΔYP_{CP} = Voltage drop in the protective conductor.

ΔYP_{N} = Voltage drop in the grounding resistance of the power supply.

U_{L} = Conventional limit contact voltage (50 V or 24 V).

Figure 5 - Networked grounding defect with IT scheme with neutral impedant and grounding of power and common masses.



In all cases the intensity of defect depends on the ability to leak in each healthy phase and soil.

4.7.5 Operation of protective devices in case of defect

a) At the appearance of the first defect.

If the contact voltage exceeds the conventional limit voltage U_{L}, the protection device shall disconnect the power from the circuit in accordance with paragraph 4.3.

If the contact voltage does not exceed the conventional limit voltage U_L and if the following conditions are met, it is not mandatory to disconnect the power supply:

1.° Protective measures shall cut off the power supply in the event of a second defect (earth-phase or phase-phase) in accordance with the requirements of point (b) of this paragraph.

2.° A permanent insulation controller or other suitable protective device is installed to indicate the appearance of the first defect to mass or ground, in an active part of the electrical installation. This device shall emit an audible and/or visual perceptible signal when the insulation resistance value is less than 50 Ω/V. After activation of the first defect alarm, the defect shall be located and remedied in the shortest possible time. In addition, there shall be an automatic disconnection of all active conductors of the installation or of the part of the installation where the defect is found, when this resistance falls below 10 Ω/V.

b) At the appearance of the second defect (earth-phase or phase-phase).

Provision should be made for such protection that, after the appearance of a first ground defect, the power is disconnected in the event of a second defect. The protection and disconnection conditions shall be as follows:

1° When the masses are grounded by groups or individually, the protection conditions are those corresponding to the TT scheme, except that the neutral must not be grounded.

2° When the masses are interconnected by a protective conductor, collectively grounded, the corresponding conditions of the TN-S scheme apply.

4.7.6 Protective devices: At least one of the following protective devices may be used in the IT scheme:

a) Permanent insulation controller.

b) Residual differential current protection devices (impeding neutral).

c) Residual voltage protection devices (only for special applications); see section 4.2.2 of ITC-RAT 09.

d) In high voltage, directional homopolar protection relays.

For the choice of these protective devices, the provisions of section 4 of standard UNE 21621-2 may be followed.

4.8 Grounding and protective conductors.

4.8.1 Grounding

The characteristics of the earthings, as well as the corresponding special provisions, must comply with the following requirements:

a) BT facilities: They shall be consistent, as appropriate, with the requirements of ITC-BT-18.

AT facilities: They shall be consistent, as appropriate, with the requirements of ITC-RAT 13.

4.8.2 Types of protective conductors and minimum sections

The types of protective conductors shall be those set out in Section 3.4 of ITC-BT-18 and their minimum sections shall follow the provisions of Section 14.6.2 of UNE 21621-2.

In non-perfectly insulated neutral networks, in fixed electrical installations, the conductive elements outside the electrical installation and normally without voltage (pipes, rails, etc.), simultaneously accessible with these masses, must be similarly joined.

The minimum section of the protective conductor, installed independently of the cables or pipes, shall be 35 mm ^{2} in the case of copper or 100 mm ^{2} in the case of steel. It shall be installed in such a way as to avoid contact by mistake or breakdown with an active driver.

Pipes and rails shall not be used as protective conductors.

4.8.3 Grounding for protection reasons

For protective measures in schemes TN-S, TT and IT, see paragraphs 4.5, 4.6 and 4.7.

Protective conductors and groundings for defect voltage control devices shall follow the provisions of paragraph 4.1 of ITC-BT-18.

4.8.4 Main and supplementary equipotential connections

The provisions of paragraphs 14.8.1 and 14.8.2 of standard UNE 21621-2 respectively shall be followed.

The intensity of the operating current of the protective device for the verification of impedance Z between any mass considered and any simultaneously accessible conductive element, in case of doubt as to the effectiveness of the additional equipment connection, shall be that obtained in the corresponding time indicated in Tables 2 or 3, or in ITC-RAT 13.

5. PROTECTION AGAINST OVERINTENDES

The protection against over-intensities, whether caused by overloads or short circuits, as well as the coordination of protection measures against overloads and short circuits, and the coordination of this protection with conductors and electrical equipment, shall follow the specifications set out in section three of standard UNE 21621-2 with the exceptions indicated in paragraphs 5.1 and 5.2.

The nominal short-circuit cutting power of the circuit breakers, reduced by 10%, shall be greater than that required for the conditions set out in paragraphs 5.1 and 5.2 to be met.

5.1 Conditions for the application of automatic cut-off protection against over-intensities due to overloads

a) Drivers under voltage: Protective devices must be selected in such a way that any overload current in conductors is interrupted before it can cause heating detrimental to insulation, fittings, terminals or piping.

Electrical appliances: Any electrical appliance capable of causing an overvoltage due to overload shall be equipped with an overload protection device in such a way as to automatically cut off the power supply to that appliance.

The characteristics of engines subject to periodic or cyclic loads must comply with the safety objectives established in Royal Decree 187/2016, of 6 May, which regulates the safety requirements of electrical equipment intended to be used in certain voltage limits and transposes Directive 2014/35/EU. The standard UNE-EN 60034-1 'Rotating electric machines. Part 1: Assigned characteristics and operating characteristics';

Overload protection can also be obtained by limiting over-intensity to a safety value and time. This can be put into practice by an appropriate study of the design of the facility.

Overload protection devices shall not be installed in conductors supplying certain equipment which, in the event of an accidental interruption of the supply, may cause damage to persons or create a greater risk than that caused by overloading for mechanical or electrical equipment.

Joint protection: It is supported to use a single overload protection device to protect electrical appliances and their power conductors at the same time.

5.2 Location of short-circuit protection devices

a) The device guaranteeing protection against short circuits must be located at the point where there is a decrease in the section of the conductors or a modification in their nature or structure, type of insulation or installation arrangement, which may cause a decrease in the permissible current in these conductors, except in the cases of point (b) below:

b) Installation of the short-circuit protection device referred to in point (a) may be omitted where the following conditions are fulfilled simultaneously:

1° The protective device located "upstream" of the point at which the change takes place must have such operating characteristics as to protect against short circuits the entire length of the conductor installed "downstream" in accordance with the requirements of paragraph 18.3(b) (ii) of UNE 21621-2.

2° The maximum lengths of each conductor of a different section shall be determined in accordance with paragraph 18.4 of UNE 21621-2.

6. PROTECTION AGAINST OVERTENSIONS

The following requirements shall apply:

a) For AT installations.

Section 2 of ITC-RAT 09, Section 1.1 of ITC-RAT 12, and Sections 7.1 and 7.3 of ITC-RAT 13 shall be followed.

b) For BT installations.

The provisions of ITC-BT-23 shall be followed.

c) Surge of atmospheric origin.

Metal and reinforced concrete castilles, guides, pipes, scales and other conductive elements of underground work that extend from the outside to underground work shall be connected to a grounding located on the outside and not connected to the rest of the groundings of the external installations.

In the event that the electrical installations of the underground works have an aerial section, dischargers shall be located outside, less than 30 m from the connection point to the distribution line and with grounding independent of any other.

Conductive elements (rails, pipes, etc.) installed in wells and galleries at a distance of less than 1 000 m from any access to underground work shall be electrically connected to each other at

least every 200 m. Where electrical installations exist, such connection shall also include the naked protective conductor in the event of its existence.

7. SPECIFIC REQUIREMENTS FOR AT FACILITIES

The maximum rated voltage usable inside mines shall be limited by the constraints resulting from compliance with the requirements of paragraphs 3, 4 and 5 of this JTI.

The use of AT is limited to:

a) Energy conductions.

Transformers.

Fixed receivers.

Mobile, semi-mobile or semi-fixed machines.

8. REQUIREMENTS FOR THE INSTALLATION OF ELECTRICAL MATERIAL

The electrical equipment shall comply with the specifications set by the mandatory technical standards included in ITC SM-COM-05, as well as those of UNE 21621-3.

8.1 Substations and processing centres

8.1.1 Electrical protections

8.1.1.1 Overload protection

The overload protection sensors of each power transformer may be located:

a) At the exit of your secondary circuit.

b) At the entrance of your primary circuit.

c) On your power cord, if this is exclusive.

d) Inside the transformer, if thermal probes are used.

8.1.1.2 Short circuit protection

Transformers shall be protected against the effect of internal and external short circuits as specified in paragraph 5 of this instruction.

This protection may be located at the entrance of each transformer or at the beginning of its power cord, if this is exclusive.

In all cases, the protection must act under the effects of minimum bipolar short circuit that may occur in terminals of the secondary of the transformer.

8.1.1.3 Protection against stress mixing

Where the neutral of the transformer secondary is isolated or grounded by a high-value impedance, a voltage limiter shall be provided between that neutral and ground or between a phase and ground, if the neutral is not accessible.

8.1.2. Location

Substations or processing centres must be installed in anchurons or other well-ventilated spaces and protected against the action of water and coastal fall. No combustible materials shall be used for the coating of such anchurons.

8.1.3. Transformers and electrical switchgear

The characteristics of the power transformers and their associated electrical switchgear must meet the safety objectives established in Royal Decree 187/2016, of 6 May. The standard UNE-EN-IEC 60076-11 Power transformers may be used to demonstrate the presumption of conformity. Part 11: Dry type transformers.

For use in underground mining additionally must meet the following requirements:

a) IP 54 and IK 9 (10J) envelope, unless located in an impact protected space.

b) Surface temperature of the envelope < 150 ºC (with an environment at 40 ºC), if they are not located in a space of restricted access to qualified personnel for electrical work.

c) The core of the transformer will have elements for its extraction from the vat. The anchorage of the core to the enclosure shall withstand the weight of the core and coil being in an upright position (90° inclination), and accelerations and decelerations resulting in inertial forces of 2,5 N/kg.

d) They will have wheels or skates that facilitate their transfer, if it is expected to move with the progress of the work.

e) For the protection of overheating they will have thermal probes in low voltage windings.

The grounding of the star centre socket and its connection to the neutral conductor shall be designed to withstand a load imbalance current of 50%.

8.1.4 Fire extinguishers

Fire extinguishers for electrically hazardous fires shall be provided at substations or semi-fixed processing centres.

8.1.5 Communications

Substations or semi-fixed transformation centers shall be linked by a means of communication, with all precedents from which the power supply can be cut off.

8.1.6 Storage of materials

It shall be prohibited to store materials of any kind in sites intended for substations or semi-fixed processing centres.

8.2 Electrical pipelines

8.2.1 Choice and installation of cables

Only isolated conductors shall be used. Cables used for underground work shall meet the requirements of the standards specified in ITC SM-COM-05.

Cables for the transport of high-voltage energy and lighting, signalling and communication installations are classified according to their configuration and structure into:

a) Rigid armed cables (standard UNE 22511 "Electric cables for mine interiors. Rigid cables armed with insulation and PVC cover. Rated voltage 0,6/1 kV to 3,6/6 kV") for use in fixed installations.

b) Armed flexible cables (standard UNE 22512 "Electric cables for mine interiors. Flexible cables armed insulated with EPR. Rated voltage 0,6/1 kV at 3,6/6 kV. Type DM2N") for

the supply of stationary, semi-fixed, semi-mobile and mobile machinery and apparatus.

c) Flexible cables (standard UNE 22513 "Electric cables for mine interiors. Flexible cables insulated with EPR. Rated voltage 0,6/1 kV, 1,8/3 kV and 3,6/6 kV) for the supply of all types of machinery and apparatus.

Cables for the transport of energy, lighting, signalling and low-voltage communication installations must comply with the safety objectives set out in Royal Decree 187/2016 of 6 May 2016 regulating the safety requirements of electrical equipment intended for use within certain voltage limits and transposing Directive 2014/35/EU.

For use in underground mining, communication and signalling cables shall additionally meet the following requirements:

a) Cables for telecommunications (standard UNE 22560 "Electric cables for mine interiors. Telecommunication cables).

b) Cables for signalling and control (standard UNE 22561 "Electric cables for mine interiors. Signalling and control cables, 300/500 V).

8.2.2 Built-in protective driver

All cables used in electrical installations protected against indirect contacts as referred to in paragraph 4 shall be fitted with a protective conductor which may be composed either of one or more conductors connected in parallel or of the cable's own metal armour. If the latter system is used in the case of mobile installations, a system for monitoring the electrical continuity of the armature shall be provided.

8.2.3 Maximum permissible intensity

The maximum permissible intensity for a cable in permanent service shall be so assigned that the equilibrium temperature reached by the insulation corresponds to 95% of the temperature allowed by the insulation for that class of service in conventional applications. For the standard cables referred to in paragraph 8.2.1., the maximum permissible intensity values are set out in the relevant standards.

Where cables are used at speeds other than continuous service, they shall be sized on the basis of the above-mentioned thermal limit.

8.2.4 Protection against short-circuit surges

The cables shall be protected against over-intensities so that the insulation is not deteriorated or prematurely aged; in particular, for the permissible limit temperature in case of short circuit, a value corresponding to that used in conventional applications reduced to 95% shall be taken. For the standard cables referred to in paragraph 8.2.1., the values of the permissible short-circuit current densities, depending on the protection operating time, are set out in the corresponding standard. The short circuit intensity to be applied in the calculation shall be that of the maximum short circuit at the beginning of the cable.

In pipelines with several cables in parallel, all cables individually shall be protected against overload, and a common protection may be provided if two cables are of the same length, section and type.

The overload protection common to an engine and its power cord shall be of such a nature as to cover, in three-phase engines, the risk of two-phase operation.

8.2.5 Voltage drop

The section of the distribution and supply cables to receivers shall be calculated in such a way that the voltage at receiver terminals is not less than:

95 per cent of the nominal, in permanent service; and

at 85% of the nominal, when starting asynchronous engines.

The switchgear will not maintain service in drops below 80% of the nominal. However, higher voltage drops are allowed, if it is justified that the torque of the engines does not fall below the values that they may cause in the same dangerous heating.

8.2.6 Execution of pipelines

The cables used shall be installed in such a way that they meet the following conditions:

a) They will not be crushed as a result of bends or loops.

b) They shall be protected against possible deterioration by transport elements or vehicles.

c) They will be accessible throughout their journey for surveillance and conservation, unless functionally impracticable. The project shall justify the measures to be taken to ensure the characteristics of the cable under these conditions. Cables with lengths of less than 20 m are also exempted from this requirement.

d) When they cross walls, they will not be fixed in the passage area.

The fixing or suspension elements of the cables shall be so designed as not to damage their structure.

In tasks with slopes greater than 45°, the following requirements shall be met:

a) Fixed channels. Rigid armed cables supported by special type staples or suspended by armour shall always be used.

In the first case, the staples shall be anchored in the bars or other rigid elements not exposed to vibrations, less than 10 m apart from each other. These staples shall be designed so that, without damaging the components of the cable, they can withstand the mechanical loads produced by the weight of the entire cable between two successive staples.

In the second case, the armor shall be fixed directly by means of an appropriate anchorage, at its upper end and shall withstand the mechanical loads produced by the weight of the entire cable, with a minimum safety coefficient of five.

If during the laying of a cable that will later be stapled in sections less than 10 m, it is suspended from the armor by its upper end, said armor must withstand the mechanical loads produced by the weight of the entire cable, with a minimum safety coefficient of three.

Certain tensile strength characteristics shall not be required of the truss when laying and stapling the cable simultaneously so that the length of the cable supported by a staple does not exceed 10 m.

b) Removable pipes. The removable pipes on fronts of advance or in starter workshops with slope greater than 45°, will be made with flexible cables attached to flexible

suspension elements that resist the loads caused by the entire weight of the pipeline and by the frictions, with a safety coefficient equal to or greater than five.

Flexible armed cables may alternatively be used, in which case the latter shall be able to withstand the mechanical load produced by the weight of the entire cable with a minimum safety coefficient of five.

For work with slopes of less than 45°, the following requirements shall be met:

a) Fixed pipes: Cables may be placed:

1° Suspended from support, complying with the following requirements:

The arrow of the sections shall not be less than 3% of the length. In any case, the distance between the floor of the gallery and the point of the maximum arrow of the cables shall be greater than the maximum height of the moving material circulating through that gallery.

Suspension parts shall allow the cables to slip, or be calculated to yield as a result of accidental loading, before physical damage to the cables can occur.

2° In perforated trays (installations in "closed electric service zones").

3.° Housed in gutters.

Pipelines in 'closed electrical service areas', gallery junctions and other similar locations where circumstances so require may be provided in factory gutters, covered and easily accessible.

b) Removable pipes: 'Flexible armed' or 'flexible' cables, depending on the type of appliance or machine being fed, shall be used.

If in certain cases the mechanical loads could damage the cables, it will proceed as indicated for work with slopes greater than 45°.

In works where the cables are partially exposed to damage caused by falling debris or ore, they shall be provided with appropriate mechanical protection (channels, etc.).

8.3 Assemblies, leads and splices

The connections, leads and splices used in underground work must meet the requirements of the standards specified in ITC SM-COM-05.

In addition:

a) Only accessories, materials and systems shall be used in connection with connections, leads and fittings, in accordance with the corresponding rules. The conditions for its execution and assembly shall be those laid down by the manufacturer.

In all cases there shall be an automatic device to ensure the following operating conditions for plug-in connectors and extension devices:

1° At no time will there be accessible parts with a voltage greater than U_L.

2° When separating the connecting parts, the protective conductor will be the last to disconnect.

3° At rated voltages exceeding 230 V or intensities exceeding 16 A, the joining or separation of the two connecting parts may only be carried out without voltage in the phases.

8.4 Lighting

8.4.1 Lighting with portable lamps (excluding helmet lamps)

Portable lamps shall be powered at very low voltage (MBTS or MBTP) not exceeding 24 V.

The use of portable lamps shall be reduced to what is strictly necessary and limited to specific locations, such as pump rooms, repair shops, etc., which shall be indicated in the Safety and Health Document.

Portable lamps shall be equipped with at least the protection grades IP 54 and IK 8, as specified respectively in UNE 20324 'Levels of protection provided by enclosures (IP code)' and UNE-EN 50102 'Levels of protection provided by enclosures of electrical materials against external mechanical impacts (IK code)'.

8.4.2 Fixed lighting of galleries and fronts

Fixed lighting for underground work shall meet the requirements of the standards specified in ITC SM-COM-05.

The maximum rated voltage for use shall be 230 V.

For voltages above the very low voltage (MBTS or MBTP) (24 V), a protection system against insulation failures and grounding shall be in place at the beginning of each bypass intended wholly or partly for lighting.

The protection shall be individual for each lamp with an intensity greater than 6 A. The short-circuit protection of a group of luminaires may be provided by a single device, provided that the total intensity of the group is less than 6 A.

Luminaires will be used that must comply with the safety objectives established in Royal Decree 187/2016, of May 6.

The supply conductors of the luminaires shall have a minimum section of 2,5 mm ^{2} and their insulation shall be compatible with the operating temperatures generated in the connecting enclosures.

Under no circumstances are conductors allowed to bear the weight of the luminaire.

The armatures or metal parts of the luminaires shall be interconnected with each other and with the main protective conductor.

The entry of cable into the luminaire shall prevent mechanical stresses on the cable from being transmitted to the connections of its conductors, radii of inadequate curvature also being avoided at the point of entry of the cable.

8.5 Electrical arc welding apparatus

The corresponding requirements of section 3.3 of ITC-BT-45 apply in this respect. To demonstrate the presumption of conformity of electrical welding cables with the safety objectives set out in Royal Decree 187/2016 of 6 May 2016 transposing Directive 2014/35/EU, the standard UNE-EN 50525-2-81 'Low voltage electrical cables. Cables of rated voltage not exceeding 450/750 V (Uo/U). Part 2-81: Cables for general use. Cables for welding machines with cross-linked elastomer insulation';

8.6 Electrical communication and signalling installations

Tensions: Communication facilities shall be powered at rated voltage not exceeding very low voltage (MBTS or MBTP). Nominal voltages up to 230 V are permitted for signalling installations.

b) Power supplies: Communication facilities shall be powered by means of a source incorporating a safety insulation transformer, the presumption of which in accordance with the safety objectives set out in Royal Decree 187/2016 of 6 May 2016 transposing Directive 2014/35/EU may be demonstrated by compliance with standard UNE EN 61558-2-6 'Safety of transformers, inductance coils, power units and similar products for supply voltages up to 1100 V. Part 2-6: Particular requirements and tests for safety transformers and power units incorporating safety transformers' or a current source ensuring a level of safety equivalent to that of the previous safety transformer.

Other requirements.

1° Both communication and signalling facilities shall be protected against short circuits. Their conductors shall be arranged in such a way that they cannot contact those of other pipes or electrical appliances or establish an accidental closure of their own circuit.

2° These installations shall be adequately protected against any risk arising from induction phenomena.

3° Cables used for signalling and communication circuits may not have their mode of protection compromised by other uses.

4° A device reliably indicating any failure in the signal circuit used for extraction shall be installed in the extraction machine rooms. This requirement extends to data transmission facilities where a failure may pose a security risk.

5° In order to ensure the protection of persons and equipment against the transfer of dangerous voltages from power installations or other circuits and malfunctions due to disturbances in the system or external causes, such as proximity of electrical cables, etc., the necessary measures of those indicated for this purpose in Annex B to standard UNE 21621-4 "Electric installations for outdoor works under severe conditions (including opencast mines and quarries) shall be taken. Part 4: installation rules'.

6° In signalling installations using voltages other than very low safety voltage (MBTS) a device shall be provided controlling the output of the safety isolation transformer which shall cut off the power supply to the installation in the presence of a defect on the ground in either of the two phases which may cause contact voltages exceeding the conventional limit voltage U_L.

8.7 Very low voltage installations (MBTS and MBTP)

Very low voltage installations (MBTS and MBTP) will comply with the requirements set out in ITC- BT-36, with the use of very low voltage being mandatory in the following applications:

a) Portable lamps (with a voltage of 24 V or less, in any case).

Portable control circuits.

Portable electrical appliances to be used in wet locations unless circuit separation is used as a protection system.

8.8 Installations in accumulator battery charging rooms

In compliance with the employer's duty to carry out the risk assessment at the workplace, the risks associated with battery charging and storage facilities shall be taken into account. In particular, the risks arising from the possible emanation of gases, electrical risks and risks associated with battery electrolytes shall be taken into account.

For this purpose, the standards of the series UNE-EN-IEC 62485 “Safety Requirements for Batteries and Battery Installations” shall be taken into account.

Depending on the risk assessment, the employer shall, on a case-by-case basis, take the necessary safety measures to minimise such risks by establishing the best possible location of the battery charging room(s).

8.8.1 Batteries at risk of emission of harmful or explosive gases

In the particular case of batteries with a risk of emission of harmful or explosive gases such as hydrogen, mainly during the charging process (e.g. lead-acid batteries), the requirements set out in the following paragraphs shall be met in addition.

8.8.1.1 General conditions

For the purposes of Royal Decree 681/2003 of 12 June 2003 on the protection of the health and safety of workers exposed to the risks arising from explosive atmospheres at the workplace, battery charging rooms are considered as ‘Areas not presenting a risk’ only if they comply with the requirements set out in this subsection et seq.

The employer must justify in the section "General risk assessment in the company" of the document on safety and health the classification of the cargo room as "Area that does not present a risk".

The configuration of these rooms shall be such as to prevent the accumulation of gases in dead spaces outside the scope of ventilation. The walls, support or any lining of the premises shall be made of non-combustible materials.

The installation of any electrical element in the volume within 50 cm of the upper area of the entire charging room is prohibited.

Electrical equipment (protective switchgear, charge rectifiers, etc.) shall be located away from the battery parking area (on charge and at rest) and always on the air inlet side of the room.

8.8.1.2 Cargo room volume

The minimum volume of the cargo room is determined by the formula (*):

$$V = 9{,}3\,x\,10^{-4} \sum_{i=1}^{i=n} C_i\,x\,n_i \left(expresado\ en\ m^3\right)$$

where,

n = Number of batteries (positions charging units).

C_i = Discharge capacity in five hours of battery i.

n_i = Number of battery elements i.

i = Order number of the different batteries (i = 1, 2, 3, ... n).

(*) In this formula it has been taken as a value of the current intensity that decomposes the Ci/50 water and it has been considered that, after one hour without ventilation, the concentration of hydrogen in the room reaches 1%, a value equal to the existing hydrogen plus the detachment by the batteries during the aforementioned hour.

8.8.1.3 Ventilation

Ventilation of the cargo room will be natural or forced.

The minimum required flow rate shall be that determined by the formula (*):

$$V = 4{,}64\ x\ 10^{-5} \sum_{i=1}^{i=n} I_{fi}\ x\ n_i \left(expresado\ en\ m^3/s \right)$$

where,

n = Number of batteries (at charge and at rest after charge).

I_{fi} = Final charging current of a battery element.

n_i = Number of battery elements i.

i = Order number of the different batteries (i=1, 2,3... n).

(*) In this formula we have taken as a value the current intensity that decomposes the water Ci /20 and we consider the hydrogen diluted at 1 per 1,000 in the ventilation current.

The speed of the ventilation current in the places with the largest section shall never be less than 0,2 m/s.

8.8.1.4 Other requirements

a) The batteries must be charged in premises specifically designed for this purpose, in hooks duly separated from the transport routes, so that they are not affected by this service, even in the event of a foreseeable incident.

b) The cargo rooms shall be located in the vicinity of the air inlets and shall be outside the influence of any mining work.

c) The gaps that exist in the vault, ceiling or walls must be filled in a watertight way.

d) Ventilation of the cargo room will be carried out with air that has not previously gone through mining work. This ventilation current may flow directly into the mine ventilation current.

When ventilation in the cargo room is interrupted, the power supply to all circuits installed in the cargo room shall be automatically disconnected.

f) The connection of the electrical equipment after an interruption of the ventilation of the room, can only be done at least 15 minutes, after resuming such ventilation.

g) The charging rooms shall be equipped with an appropriate kit, taking into account possible burns or accidents caused by the electrolyte of the batteries.

h) There will be an evacuation of water, conditioned to the nature of the electrolyte that is handled.

The means to contain and chemically neutralize electrolyte leaks or spills shall be provided in a highly accessible location.

j) In any cargo room it is prohibited to smoke or introduce lighters, matches or ignition tools.

Fire extinguishers with appropriate characteristics shall be available.

9. Electrical installations in underground work with potentially explosive atmospheres

9.1 Requirements for electrical appliances and protective systems

Only equipment and protective systems of category M1 or M2 in accordance with Royal Decree 144/2016 of 8 April 2016 laying down the essential health and safety requirements applicable to equipment and protective systems for use in potentially explosive atmospheres and amending Royal Decree 455/2012 of 5 March 2012 shall be used at sites and stages of operation where it has not been justified that such equipment and protective systems do not present a risk due to the presence of an explosive atmosphere.

When the regulatory limits for the concentration of explosive atmospheres are exceeded, only equipment of category M1 may remain in tension, provided that its disconnection poses a greater risk to workers. Equipment of category M2 located in locations where it may be subject to explosive atmospheres at some stage of operation must be arranged in such a way that its power supply can be cut off.

The regulatory concentration limits for explosive atmospheres of methane shall be those indicated in ITC SM-IND-20, while for explosive atmospheres of other flammable gases 25% of their Lower Explosivity Limit (LIE) shall be considered as the regulatory limit.

The employer shall include in the Health and Safety Document the justification that the category of electrical equipment used in its underground facilities is in accordance with the atmospheric conditions existing in each of the sites and phases of operation.

9.2 Requirements for electrical installations

The assembly of electrical installations in underground installations with possible presence of explosive atmospheres must be carried out according to the requirements established by the UNE EN 50628 standard for this type of holdings.

9.3 Automatic switches and contactors

In addition to the requirements of paragraph 5, the nominal short-circuit cutting power of automatic switches, reduced by 20%, shall be higher than that required for the conditions laid down in that paragraph to be met.

Similarly, the nominal intensity of the contactors shall be considered to be reduced by 20%.

10. Work in electrical installations for exclusive use in mines

Work in electrical installations within the scope of this JTI will be carried out in accordance with the provisions of Royal Decree 614/2001 of 8 June 2001 on minimum requirements for the protection of workers from electrical risk.

10.1. Assembly and supervision of electrical installations

The personnel who carry out assembly and supervision of electrical installations will have the qualification that is necessary according to the type of work to be carried out in accordance with the provisions of Royal Decree 614/2001, of 8 June.

The electrical maintenance manager must supervise that the assembly and supervision of the electrical installations is in accordance with the Mining Safety Regulation and complementary technical instructions that develop it.

The assembly and supervision works carried out by contracted companies will be controlled by the person responsible for them and supervised by the person responsible for electrical maintenance.

Electrical installations must be supervised at the time of commissioning and after having undergone a major modification, as well as after each assembly in a new location. It is considered a major modification that affects more than 50% of the installed power in the area involved. Likewise, it is considered a significant modification that affects the cable network (type and section and their protections) even with power reduction.

10.2. Maintenance and servicing of electrical installations

Electrical installations must be maintained in such a way that they continue to meet the requirements set out in the design of their installation.

The placing out of service of the protection and control devices necessary for the safety of electrical installations shall be carried out only by authorization.

The periodic review plan for each facility, included in the Safety and Health Document, shall set out the periodicity and schedule of operations deemed necessary for the maintenance of safety, as well as the control documents attesting to the operations carried out, with a record of the results and those responsible for them at all levels.

The electrical maintenance officer shall supervise that the overhaul and maintenance operations are carried out as set out in the safety and health document.

10.3 Commissioning of new installations or major modifications of existing installations

The commissioning of electrical installations shall be carried out in accordance with Article 20 of the Mining Safety Regulation, requiring a CMO report and the preparation of an electrical project for the following electrical installations or their major modifications:

a) Installations with an installed power greater than 100 kW.

Fixed lighting installations with an installed power greater than 5 kW.

Installations in conductive sites with a power greater than 25 kW.

10.3.1 Electrical project

The electrical project may be incorporated into the general project of operation or presented independently.

The assembly of installations not covered by paragraph 10.3 and non-substantial modifications of all types of electrical installations shall require the production of a simpler document or technical report justifying compliance with the provisions of this JTI.

For the administrative processing of both the electrical project and the technical report, the procedure set out in Article 19 of the Mining Safety Regulation must be followed.

The minimum content of the electrical project shall be as follows:

1º) Memory.

- Identification data.

- Definition and purpose of the project: location, basic characteristics and intended use.

Legislation to consider.

- Classification and characteristics of the facilities.

- Classification of units according to risk (conductive or non-conductive sites or work sites in hazardous atmospheric conditions due to the presence of explosive atmospheres)

- Power Needs.

- Installation Description:

    - Liaison facilities.

    - Nominal ratio and characteristics of transformers to be used.

    - Nominal ratio and characteristics of chests to be used.

    - Nominal ratio and characteristics of the receivers to be installed and their power.

    - Characteristics and sections of the drivers to be used.

    - Characteristics and installation procedure of the pipes to be used.

- Description of the adopted neutral connection systems and safety devices and how many details are necessary according to the importance of the installation:

    - Cutting and protection devices adopted.

    - Grounding Facilities.

- Description of other installations: signalling lighting, special lighting, reactive energy compensators, communication systems and environmental monitoring and control systems.

2°) Electrical Calculations

- Expected power, installed power, intensities, lengths, sections, pipes and pipes. Grounding calculations.

3°) Plans.

- Situation Plan.

- Drawings of control and protection panels.

- Plans of plant of fronts and pits of exploitation with the exact location of all the elements described the memory.

- Unipheral diagrams and earthing scheme.

4°) Budget.

5°) Specifications.

6°) Adaptation to the document on safety and health

10.4 Periodic inspection of in-service facilities

All installations requiring a CMO report to be put into service shall be regularly inspected every five years.

The periodic inspection of electrical installations shall be carried out taking into account the provisions of Article 41 of the Mining Safety Regulations.

The inspection procedure, the inspectable elements of electrical installations and the classification of defects shall be detailed in the technical development specifications of this JTI.

10.5 Reviews

The following review operations are mandatory, but their enumeration is not limited:

a) At the beginning of each shift, check the correct functioning of the general isolation control devices.

   Such verification may be carried out by automatic verification systems which shall operate by deriving to land the installation controlled by the general isolation control device for a time equivalent to that indicated in Tables 2 and 3 of paragraph 4.3., and which shall disconnect and interlock the rearmament of that installation in the event of a failure of the permanent isolation control device to respond, subject to prior authorisation by the competent mining authority.

b) Weekly, examination of the equipment connection networks of mobile machines.

c) Monthly, checking the setting of the relays and the nominal intensity of the fuse cutters.

d) Monthly, examination of the insulation of portable electrical equipment, in the repair shop.

e) Bimonthly, review of the laying of armed cables and the cable inlets and connectors of flexible cables.

f) Six-monthly, review of fixed mass equipment connection networks and measurement of grounding resistance.

A record of the revisions made shall be kept.

10.6 Additional requirements for work in underground electrical installations with potentially explosive atmospheres

In addition to the above requirements, the following requirements must be met:

a) Work on naked active parts or conductors and cleaning the interior of enclosures of machinery that is in tension are prohibited.

b) The above prohibition does not apply to intrinsic safety systems, with the exception of energy sources and drivers of installations that are not intrinsically safe.

c) If, within an enclosure, non-tensioned parts and non-intrinsically safe circuit-tensioned parts coexist, work may be carried out on the former only if the arrangement of such parts excludes the danger of accidental contact with the parts in tension.

Certified equipment shall, as a general rule, be used for the testing, measurement and use of equipment required for the conduct of investigations, checks, or other similar activities or for health care in a potentially explosive atmosphere.

Where certified equipment is not available on the market, the operations referred to above may be carried out with non-certified equipment, if all of the following conditions are met:

The relevant documentation shall be submitted to the competent mining authority to justify the safety of the operations.

The measuring entity shall train personnel on operations.

In the course of operations, a continuous control of the concentration of the explosive mixture in the atmosphere of the action area shall be carried out, discontinuing all activity if this concentration reaches 25% of the Lower Explosivity Limit (LIE).

d) At the beginning and end of the tests and measurements, the optional management of the workplace must be informed.

11. Signalling

All requirements relating to signalling and documentation of installations prescribed in the electrotechnical regulations shall apply.

All signs of prohibition, danger and warning, as well as the labels prescribed in this ITC, will be in accordance with the provisions of Royal Decree 485/1997, of 14 April, on minimum requirements for safety and health signs at work.

ITC SM-IND-24 VOLADURA PROJECT

1. OBJECT.

The purpose of this Supplementary Technical Instruction is to regulate the minimum content of the blasting project, in accordance with the provisions of Article 42 of the Mining Safety Regulations.

2. MINIMUM CONTENT OF THE VOLADURA PROJECT.

The minimum content shall be as follows:

1. Identification data of the project promoter.
2. In the case of prior knowledge, identifying data of the company or entity consuming explosives, including a copy of the authorization for the use of explosives usual (national, provincial or regional scope) or eventual.
3. Identification data of the farm or work where the blasting will take place.
4. Types of blasting, number of planned blasts, amount (per blast and total) of explosives and type of explosives to be used. Schedule and deadline for blasting.
5. Detailed descriptive memory of the complete blasting process, including drilling, loading and firing of the explosive. It will include, among others, the shooting plans, with the detail of the load, retreading of holes, the initiation system, as well as the actions to be carried out in case of failed holes in the blast, or any other foreseeable anomalous situation.
6. Solution foreseen for the possible surplus of explosives, in accordance with the provisions of the Explosives Regulation, with detailed memory of the specific process of destruction on site, where appropriate.
7. Identification, in case of existence and use on the farm or work site, of the powder magazines for the temporary storage of the explosive.
8. Arrangements for compliance with all applicable requirements for the type of blast in question, with an indication of the safety measures taken.
9. In the case of prior knowledge, necessary technical and human resources foreseen:

   9.1 Technical means to be used throughout the blasting process in question (machinery, equipment and powder guns where appropriate). Declaration of responsibility that such equipment is properly certified and/or approved in accordance with the provisions of the applicable regulations in force.

   9.2 List of personnel who will be involved in the process of handling and consuming the explosive.

   9.3 Copy of the gunner's card(s) and the gunner's assistant(s) of said personnel.

   9.4 Organisation adopted by the blaster.

10. Identification of the constructions, communication routes, fluid reservoirs and pipelines, transport systems, production or transformation centers of electrical energy, transmission lines and distribution of energy, and in general, any installation susceptible of direct or reciprocal influence by blasting.

In case of proximity to buildings or installations that could be affected by the vibrations produced by blasting, detail of the application of standard UNE 22382, on Control of vibrations produced by blasting.

ITC SM-IND-25 VOLADURAS

1. OBJECT

This Supplementary Technical Instruction (hereinafter "ITC") aims to establish the general and specific requirements for carrying out any blasting with the aim of preventing damage to persons, property and the environment, and in development of Article 43 of the Mining Safety Regulation.

2. DEFINITIONS

For the purposes of this JTI:

Demolitions: Those that are made for the demolition of buildings, structures in general or foundations.

b) Blasts close to electrical installations: Those that are close to production centers, transformation and transmission and distribution networks of electrical energy, at any voltage.

c) Blasts close to wave emission: Those that are close to radio stations, TV, radar or high frequency repeaters.

d) Underwater blasts: Those that are carried out under a column of water, in river channels, lakes, reservoirs, or in the sea, which due to their proximity can affect inhabited nuclei, buildings and facilities of any type.

e) Blasts in the presence of potentially explosive atmosphere: Those carried out in the presence of flammable or explosive gases or dusts.

f) Blasts requiring the use of mobile explosives manufacturing units (MEMUs): Those using mobile explosives manufacturing units (MEMUs) of mobile factories and pumping equipment for emulsions, suspensions or gels, in bulk indoors, with the possibility of explosive sensitization.

3. GENERAL

Entities performing blasts shall submit a specific blasting project prepared by a competent technician to the Mining Authority for prior approval.

Blasting projects shall contain at least the information and documentation set out in ITC SM-IND-24.

The approval of the blasting project, by the Mining Authority, which will include the amount of explosives to be used by individual blasting and the projected cumulative total, may be annual, being able, in this case, to accept an increase of up to 10% of the total consumption provided for in accordance with Article 120.4 of Royal Decree 130/2017, of 24 February, approving the Explosives Regulation.

Explosives may only be handled and handled by persons who have the qualifications of a gunner or an assistant gunner.

An internal security provision will regulate the use and handling of explosives.

4. USE OF EXPLOSIVES

4.1. Burrow loading

1. Before loading, the sweeper shall be properly cleaned to avoid chafing, jamming of explosive cartridges, etc.

If water is detected in a borehole, appropriate measures shall be taken, using the appropriate explosive.

If the temperature inside the holes exceeds 65 ºC, they shall not be charged without taking special precautions approved by the Mining Authority.

2. The cargo, in the case of filled explosives, shall consist of a row of cartridges in perfect contact.

In the case of discontinuous loading, with empty or inert intervals between cartridges, the detonation of the cartridges must be ensured by the use of a detonating cord or an appropriate initiation system. In the case of spacers, they shall be made of antistatic material and shall in no case spread the flame.

When loading with hardened explosives, the difference between the diameter of these and that of the borehole must be adequate to avoid the minting of the explosive.

3. If cavities, fissures or cracks are detected during the drilling of a borehole, bulk loading of the borehole shall be strictly prohibited, unless the necessary measures are taken to prevent the accumulation of explosives outside the borehole. The loading of shrouded explosives is also prohibited, unless the necessary measures are taken to prevent excessive accumulation of explosives.

4. During the loading of the boreholes, mainly in the case of bulk explosives, the necessary measures shall be taken by the competent personnel to verify that the quantity of explosive introduced is the theoretical one calculated for the borehole. At the moment when the introduction of a higher quantity of explosive is detected, the loading operation shall be interrupted, such sweeping being considered as failed, unless there is a reasoned guarantee that there is no risk due to possible projections and vibrations.

5. Machines and auxiliaries used for the mechanical loading of boreholes must have been previously approved by the Directorate-General for Energy Policy and Mines

6. The drilling and loading of the boreholes may not be carried out simultaneously on the same front or slit, unless expressly authorized by the Mining Authority, on a reasoned proposal from the optional management of the operation, detailing the conditions of the operation and the security measures adopted, which shall be incorporated, where appropriate, into the internal security provisions.

4.2. Cartridge-bait

1. The cartridge-bait must be prepared immediately before loading. The detonator must be energetic enough to ensure the explosion of the cartridge-bait.

2. The procedure and safety standards adopted for loading, where more than one cartridge-bait is used per bore, shall be explicitly laid down in the internal safety provisions.

3. When detonating cord is used along the sweep, both in the case of wick glue and in the case

of electric glue, glue with non-electric detonators or glue with electronic detonators, the detonator will be attached to the detonating cord, with the bottom of the detonation directed in the direction of detonation.

4. Any priming cartridge that is not used must be deprived of its detonator, performing the operation of the same person who prepared the bait.

4.3. Retacado

1. The retreading of the holes should conveniently ensure the confinement of the explosive.

In general, its length must be equal to the line of least resistance of the sweeper, and, in any case, it can never be less than 20 centimeters, except for the taqueo in which it can be reduced by half.

2. Wood attackers or other suitable materials which are not capable of producing in contact with the walls of the borehole, sparks or electric charges shall be used to carry out the retouching. The design shall be such that there are no sharp angles or edges liable to cause the casing of the cartridges, detonator threads, cords or wicks used to rupture.

4.4. Shooting of holes

1. The Mining Authority may limit in whole or in part during the shooting the number of persons present at the exploitation or work, when circumstances so advise.

2. The shortest possible time will elapse between the loading of the holes and the glue.

In underground works, the sticks will ordinarily be given at pre-established hours, unless expressly authorized by the Mining Authority. The schedule of the sticks will be included in the corresponding internal security provision.

3. Any loaded borehole shall be kept under surveillance when access to it is possible, or is not properly marked, in accordance with internal security provisions.

4. In blasting work, before connecting the firing line to the blaster, if electric, non-electrical or electronic glue is used, or lighting the fuses, if they are used, the person responsible for the blasting line shall check that all accesses to the place where the explosion is to occur are under surveillance.

Such monitoring shall be carried out by operators, preferably, or by means of optical or acoustic signals. When operators have been placed or barriers or signals installed, they shall not be removed until the blaster re-authorises access to the work.

In all cases, before hitting, the person responsible for blasting must ensure that all personnel in the immediate vicinity are adequately protected, and will be the last to leave the work, and will then be placed in an appropriate shelter.

Communication between personnel involved in the firing of the blast shall be ensured by means of portable radio transmitters allowing simultaneous communication. In exceptional cases, the use of mobile phones will be allowed.

5. Whatever the type of hit used, and once it is executed, the front will be recognized by the person responsible for the work, before the resumption of work, paying special attention to the possible existence of failed holes.

6. When two fronts converge or advance in opposite directions, and it is possible that, as a

result of the shots in one of them, projections or falls of stones in the other, the vigilante must suspend work in the threatened work or in the whole sector, in sufficient time, until he reports to the optional management and receives the corresponding instructions.

4.5. Precautions in the case of electric glue

1. In the case of electric glue, before starting to charge the holes, due precautions will be taken to avoid the presence of currents foreign to that of ignition in the workplace.

2. Explosive priming and borehole loading shall not be carried out on opencast holdings when there is a storm in the vicinity.

The use of portable radio transmitters, if any, in the vicinity of blasting shall be regulated in the relevant internal safety arrangement. In general, special care will be taken in the influence of television repeaters, power transmission lines, electrified railway lines, and any other agent capable of producing similar effects.

3. Unless otherwise authorized, a single bait cartridge, fitted with a single detonator, shall be used and may be placed (except for work with flammable gases or dusts) at either end of the sweeper load, but always with the bottom of the detonator directed towards the load.

4. In the electric glue, the conductors of the firing line must be individual and equipped with adequate insulation.

However, the use of those bipolar types that, due to their isolation conditions, have been previously authorized by the Mining Authority, is allowed for the fixed line, which must not be able to be reached by the projections of the glues.

Only naked conductors shall be permitted at the junction of the firing line terminals with the detonator wires and at the junction of the detonators with each other. These bare fittings must not be in contact with the ground or any other material. Diversions from the firing line shall not be permitted and their ends shall remain short-circuited until the firing line is connected to the explosive.

5. All precautions shall be taken to avoid the proximity of the firing line to other electrical power lines, as well as contact with rails or pipes, or any other metal element, in general.

6. In underground works, when there is another line of energy conduction in the gallery where the firing line is to be laid, the firing line must be placed on insulators, on the opposite edge or, only in exceptional cases, it may be placed below the previous one and more than 30 centimeters away.

In any case, before starting the loading of the holes it will be necessary to leave without power any power line that is located in the vicinity of the front.

Any other existing circuit, constituted for other purposes, even if out of use, may not be used as a firing power line.

The length of the steering line shall be as short as possible.

The detonators used shall all be of equal electrical sensitivity.

7. Where there is a risk of accidental explosions due to parasitic currents, atmospheric phenomena, static electricity charges, proximity to high-voltage lines, energy from radio-

frequency equipment, only high-insensitivity electrical detonators shall be used, and other non-electrical or electronic initiation systems shall also be advised for these cases.

8. Electric detonators shall always be connected in series; other types of connection will have to be previously justified in the blasting project.

Only the number of detonators that can be fired safely, depending on the strength of the firing line and the characteristics of the exploder, shall be connected.

9. Before firing and after connecting the detonators to the firing line, the circuit will be checked from the shelter adopted for the operation of the explosive, and with the same precautions as those regulated to give the hit, using a type tester approved by the Directorate General of Energy Policy and Mines.

If any abnormality is observed, before proceeding to correct it, the ends of the firing line shall be short-circuited and, once corrected, proceed in accordance with the provisions of the previous paragraph.

10. Explosors of sufficient capacity and approved type shall be used in the case of electrical coupling. In very special cases, with express authorization, other energy sources may be used for the electrical coupling.

11. Electrical explosives and circuit testers must be checked, cleaned and checked as often as prescribed in internal safety regulations.

Electrical explosives and circuit testers may only be inspected and repaired by the manufacturer, distributor or authorised repairers.

Any electrical exploder or faulty circuit tester must be immediately removed from service.

12. Until the moment of firing, the line shall be disconnected from the exploder, and in short circuit always remaining in the power of the gunner or the person responsible for blasting the hands of that exploder.

4.6. Precautions on the glue with wick

1. It is forbidden to use ordinary wick to shoot more than six holes in each stick. In special cases that will require the prior authorization of the Mining Authority, more than six holes may be set on fire, using quick ignition fuse, attached to the fuse of each hole by means of connectors or similar devices.

2. A single cartridge-bait, fitted with a single detonator, shall be placed on each borehole; the bait cartridge must always be placed at the outermost end of the sweeper load. The detonator shall be inserted in its entire length into the cartridge-bait, to which it shall be attached in the manner prescribed by the internal safety provisions, which shall include the regulations governing the attachment of the detonator to the fuse. The bottom of the detonator capsule shall be directed towards the borehole load.

3. The minimum length of each wick, counted from the mouth of the hole, shall be one and a half metres. In the case of witness fuse, its length shall be half of the minimum indicated above, and it shall be the first one to be lit, the operation of giving fire must be suspended and the workplace must be quickly abandoned when it has been completely consumed.

4. The authorized person shall count the number of blast holes. If you have not been safe, or if you have counted fewer detonations than sweeps, you may not return to the workplace or its

vicinity until at least half an hour has elapsed.

4.7. Other initiation systems

In the corresponding approval of other initiation systems, other than the wick or electric glue, express mention shall be made of the general safety rules that are applicable and of the specific ones corresponding to each specific initiation system.

In the case of other initiation systems, the safety recommendations established by the manufacturers themselves shall be followed.

4.8. Failed sweepers

1. Failed holes are those that have not detonated, have partially detonated, have deflated or have been de-headed. In general, any borehole that retains explosive remnants inside, after blasting.

2. The failed holes will be duly marked in an appropriate and well visible way, to be able to be with wooden rods introduced into the drill, in order to indicate their direction, being mandatory for the person responsible for the work, to inform the person responsible for the blasting, so that he takes the appropriate measures, in order to make them harmless, which will be tried to be done as soon as possible. In the meantime, the affected work will be duly marked, with a ban on access to it, and work can not be carried out on it until the problem is resolved. In the event that it is not resolved during the relay, a written record of this situation will be left.

3. To eliminate the risk posed by failed sweeps, one may proceed using one of the following methods:

- In the case of electrical gluing, by reseparating the borehole, after checking, with the established precautions, that it is in a position to do so and there is no risk of dangerous projections.
- If the taco has disappeared and the explosive remains uncovered, with enough free cane to introduce one or more cartridges, a new bait will be carefully introduced, whether or not accompanied by other explosive cartridges, retaca and fire is given.
- Drilling and loading a new disposal bore parallel to the failed bore and at a distance of not less than 10 times the bore diameter, except in cases where explosives in bulk or coated with machines have been used, in which case this practice shall be prohibited.
- If the failed sweeper is in a detached block, by means of a patch attached to the block with enough load to guarantee its fragmentation.
- In special cases, the mining authorities may authorize other methods of elimination of failed holes by dictating the appropriate prescriptions.

4. Where, in exceptional cases, the unloading, deactivation or unblocking of a borehole is required, such operations may be carried out only by specially trained personnel and under the supervision of the person designated by the person responsible for the blasting of the undertaking consuming explosives.

The removal of explosive cartridges shall be duly covered by the internal security provisions.

5. Internal safety provisions will detail in detail the removal operations of the failed holes, and who will be responsible for ordering and supervising the removal work.

In no case may the faulty holes or those loaded and not fired be left unneutralized, and must be disposed of.

Where it is suspected that unexploded ordnance may be present in the debris, unexploded ordnance shall be decombed with all manner of precautions.

4.9. Taqueo of thick stones

Hard-to-handle coarse stones may be cut in such places and under such conditions as may be prescribed by internal safety regulations, using the following methods:

a) By means of a shaped load or an explosive patch applied to the surface of the block.

b) By means of holes, for which the blocks will have to be carefully examined, in order to ensure that there are no funds loaded in them, in which case, the provisions regarding failed holes will be taken into account.

4.10. Other security measures

It is strictly forbidden to reload sweeping funds, recast failed sweepings and use sweeping funds to continue drilling.

The following shall also be prohibited:

- Cut cartridges, unless, at the reasoned proposal of the optional direction of the works, it is authorized for limited and specifically defined uses. An internal security provision shall lay down these conditions.
- Enter the cartridges violently or crush them heavily with the attacker.
- Undo the cartridges or remove their casing, except when this is necessary for the placement of the detonator, or if they use previously authorized machines that destroy the casing.

5. REQUIREMENTS FOR THE IMPLEMENTATION OF VOLADURAS

5.1. Initiation of explosion

In order to ensure the initiation of the explosive contained in the borehole, detonating cord may be used along the borehole and, necessarily, when inert spacers are available, dividing the explosive charge, unless sequential initiation is carried out on each of these spaced charges.

5.2. Use of detonating cord

The detonating cord should not be used for the descent of cartridges, when there is a risk of rupture or deterioration of the detonating cord due to the weight of the cartridges.

5.3. Protection against projections and vibrations

Appropriate measures should be taken, where appropriate, to prevent the risk of projections, vibrations, airwaves, etc., to the environment.

5.4. Transport

Where the transport of electric detonators is carried out in vehicles equipped with a radio station, those detonators must be packed in a box covered with sheet metal. The loading and unloading operations must be carried out keeping the box closed and the station disconnected, without prejudice to the provisions of the complementary technical instruction number 34 of

the Explosives Regulation, approved by Royal Decree 130/2017, of 24 February.

5.5. Blasts with long loading process

When, for justified reasons, the loading cannot be completed, the Mining Authority may authorize the retention of loaded holes for the time necessary to complete the loading operation, provided that these holes are adequately monitored until they are fired, which must be carried out as soon as possible.

5.6. Blasts in the presence of storms

In those times and areas where the risk of storms is foreseeable, it is advisable to use high-insensitivity electric detonators that must be kept short-circuited and isolated from the ground until the moment of blasting, as well as the use of non-electric detonators or electronic detonators.

In any case, if storms are detected, acoustically or visually, blasting works should be suspended.

5.7. Bulk explosives loaders.

The use of bulk explosive loaders is subject to prior approval of the loader by the Directorate-General for Energy Policy and Mines.

For the use of bulk explosives loaders, account shall be taken of the requirements for use laid down for the established mobile explosives manufacturing units (MEMUS).

5.8. Explosive not consumed.

The explosive left over in a blasting process will be given, as a matter of priority, the following destination:

a) Storage, if there is an authorized tank with sufficient capacity.

b) Return to authorized deposit.

c) Destruction.

Without prejudice to the provisions of Supplementary Technical Instruction No 11 of the Explosives Regulation, approved by Royal Decree 130/2017 of 24 February 2017.

6. SPECIFIC REQUIREMENTS ACCORDING TO TYPES OF VOLADURA

6.1 VOLADURAS IN ROOMED AREAS

For blasting in inhabited areas where there may be a risk of damage to third parties by projection of rock fragments, the following precautions should be taken:

6.1.1 Supervision

Effective monitoring must be carried out by the blaster to ensure that all blast parameters match their original design. You must take care that the different works that compose it - perforation, loading of the holes and connection of the blasting circuit- are executed properly, with special care in the following points:

- Correct pre-marking of the holes.
- Positioning and angulation control of the drilling rig. Check the depths of each hole.
- Detection of existing coke ovens or cracks in the terrain to be flown.
- Control of the loading process, checking the amount of explosive in each hole.

- Control of the execution of the retacados.
- Control of the connection of the blast circuit, with special attention to the distribution of the detonators for a correct sequence.

6.1.2 Burden loading

Where boreholes through coke pits, cracks or, in general, structures that may lead to load accumulations have been detected in the borehole, such boreholes should be discarded, or the affected sections should be left unloaded by inserting intermediate recesses of inert materials.

If it is found that any of the holes that make up the blasting have excessive confinement, so that there is no possible outlet, this sweep will be discarded.

The design and connection of the initiation sequence should be adequate to avoid drops, headers, cargo theft and/or dead-end shooting.

6.1.3 Retacado

Special care should be taken to carry out the retreading of the holes. Inert materials, preferably fine sand or properly compacted clay studs, should be used for its execution.

6.1.4. Additional protections

Elements used as blast protections should allow gases to escape from the boreholes and, at the same time, stop the projected rock fragments. In addition, they must be properly placed and anchored to firm ground to avoid being thrown.

We recommend the use of tight and resistant meshes or nets, as well as rubber bands. These elements can be used alone or in combination with others, such as tyres.

The use of rigid elements that do not allow the passage of gases, such as sheet metal or sheet metal, should be avoided. If used, they should be placed somewhat separate from the mouth of the holes and solidly anchored to firm ground.

Elements of easily flammable materials, such as straw bales, should never be placed on the boreholes and can only be used as protection against frontal projections.

6.1.5. Signage and citizen information

The outer perimeter of the blast area must be properly delimited so as to prevent access by persons outside the works.

Before firing the blast, the proximity of the blast must be notified by appropriate acoustic signals.

When, by proximity, a blast could affect any road open to traffic, this fact must be reported to the local Municipal Police or the Civil Guard, with whom the procedure must be established and traffic cuts carried out, if necessary.

6.2 NEXT VOLADURAS TO ELECTRIC LINES

6.2.1 Protection distances

Except in cases where specific action regulations are authorised, the following distances must be observed when blasting with electric glue in the vicinity of transformer lines or stations, depending on the voltage:

Line voltage (V)	Distance (m)
Up to 1,000	10
From 1,000 to 6,000	20
Of 6,000 11,000	50
From 11,000 to 60,000	100
More than 60,000	200
Railway lines electrified at any voltage	300

In cases where the expected distance between the blasting and the power lines is less than those indicated, a preliminary study is required for the use of the electric ignition to justify the absence of risks, both by current derivations and by induction of currents on the blasting circuit. At least insensitive electric detonators or non-electric or electronic detonators should be used.

The short-circuit and discharge intensity and the step voltage of the processing centres must be supplied by the owner.

6.2.2 Shooting line, connections

When the proximity of the power lines to the blasting area is less than 200 metres, the electric firing line must be oriented as perpendicular as possible to the power line and its ends must be kept together in short circuit and isolated from the ground or any metallic mass, until the moment of blasting. The steering wheel power line can only be used once.

The conductors of the blasting electrical circuit must be anchored to the ground.

All electrical connections should be protected with insulating bushings or other suitable insulation. Electric detonators must be of the type of high insensitivity and must have short circuited the terminals of the supply wires until the moment of their connection to the blasting circuit, unless, upon duly justified request, the Mining Authority authorizes the use of other types of electric detonators.

6.3 NEXT VOLADURAS TO EMISSION OF WAVES

6.3.1 Safety distances to broadcasters

The project should include: the radiated power, the frequency and direction of the radiation, the sensitivity of the electric detonators to be used, the arrangement of the electric firing line, etc., to perform electric blasts at distances to radio-frequency stations, depending on their emitting power, less than:

Issuing power	Distance (m)
Up to 25 W	50
From 25 to 100 W	75
From 100 to 500 W	150
From 500 to 1 kW	300
From 1 to 5 kW	500
From 5 to 10 kW	750
From 10 to 25 kW	1.200
From 25 to 50 kW	1.700
From 50 to 100 kW	2.350
From 100 to 500 kW	5.000
From 500 to 1,000 kW	7.500

The above requirement shall also apply provided that electric blasts are carried out within 300 metres of radar or military fire-direction equipment.

6.3.2 Safety distances to radio-telephones

Because radio-telephones emit in high frequency bands (> 27 MHz) and low powers, the safety distances in this case will be as follows:

Power (W)	Distance (m)
Up to 10	2
From 10 to 30	3,5
From 30 to 60	5
From 60 to 250	10

Radio-telephone antennas or vehicles equipped with radio stations must be covered with a plastic cover.

6.4 VOLADURAS WITH PYROTECHNICAL ARTICLES

Blasts using category P2 pyrotechnic articles shall meet the same requirements as blasts set out in this JTI, except for the gunner's licence, in which case the relevant expert's licence shall be required.

6.5 DEMOLITIONS

6.5.1 General precautions

The drilling, loading and firing of blasts must be carried out under the permanent direction, on site, of a competent technician.

Before blasting, all the necessary checks must be carried out to verify that the structural elements correspond to those foreseen in the construction plans, eliminating, by mechanical or manual means, all those elements that could mean any risk to the safety of the work, both from the point of view of projections, and of the direction of the fall of the structure. Appropriate protection should be provided in areas where the risk of dangerous projections is foreseeable.

From the moment of arrival of the explosive material and blasting accessories at the place of work, the presence of any person outside them is totally prohibited, through effective surveillance or closure of any existing access.

6.5.2 Cutting cartridges

In cases where it is necessary to cut the cartridges to obtain the appropriate loading quantities, this cutting should be carried out in a place away from the rest of the explosive and with due precautions. This same instruction should be applied, where appropriate, for the preparation of spaced loads, which will necessarily be attached to a detonating cord of sufficient weight to ensure their detonation.

6.5.3 Detonators, number and arrangement

The detonators must be arranged so that they are always inside the sweeper.

If justified by the number of detonators required, they may be connected in parallel series. The different series must be balanced so that the dispersion between them does not exceed ± 1 per cent of their resistance.

Retarding must be carried out with sufficiently plastic materials and not flame propagators, so that its permanence is ensured until the execution of the blast.

6.5.4 Loaded and unexploded blasts

Where explosive loading operations do not allow blasting to be carried out within the same working day, loaded boreholes and unused explosives should be kept under constant surveillance.

6.6 VOLADURAS UNDER WATER

6.6.1 Drilling and loading of holes

Only drilling and explosive loading can be simultaneous, in those cases where the work is carried out from the pontoon and the drilling carried out with double linkage, which allows the introduction of the loads from the pontoon through said intubation. In the remaining cases, the operation of loads can only be initiated after the drilling has been completed and the corresponding machinery has been removed.

In any case, a special control of the concentration of the load in each borehole must be carried out, recommending prefabricated rigid loads.

In this type of perforation with intubation, the presence in the pontoon, during the working day, of the explosive necessary for it, which must be stored in suitable chests.

6.6.2 Barley and detonators

Whatever the drilling system and the diameter of the holes, detonating cord must always be used along its rod and the priming of the holes must be external to them.

In all cases, the placement of detonators must be done after the loading of the total boreholes that constitute the stick, and always after removing personnel and drilling rigs from the workplace.

When prefabricated rigid loads are used, priming can be carried out directly by detonators whose connection will be made on the surface.

Connections between detonators and from these to the firing line must always be made by means of connectors that ensure their isolation and placed out of the water on floats or signposted buoys.

It is recommended that detonators and connection systems be used to minimize bypass current losses.

6.6.3 Hydraulic vibrations and shock waves

Particular attention should be paid to the possible effects that may be produced by terrestrial vibrations and waves of hydraulic or tidal shock, using appropriate procedures to combat them.

6.6.4 Signalling and evacuation of persons

In the case of drilling from pontoon, drilling and loading of explosives by divers, or pneumatic hoods, or the application of hollow loads, attached loads, explosive hoses, etc., the work area must be perfectly marked, at a distance of at least 50 meters around its perimeter, by buoys with warning signs.

Prior to the execution of the blasts, the absence of bathers, boats and all kinds of people or things in an environment such that, according to the expected amount of explosive, the risks from the pressure waves generated in the water are prevented. These distances should be specified in the relevant project.

6.6.5 Final inspection

After each blast, after the appropriate period of time to allow the recovery of the visibility of the waters, the flown bottom should be inspected, in order to detect and recover possible explosive remnants from failed holes.

6.7 VOLADURAS IN THE PRESENCE OF POTENTIALLY EXPLOSIVE ATMOSPHERE BY PRESENCE OF GAS AND/OR FLAMMABLE OR EXPLOSIVE POWDER

6.7.1 Explosives

Explosives shall be classified in the following groups:

- First group: Explosives of limited use. Type I.

- Second group: Safety explosives. Type II.
- Third group: Safety explosives. Type III.
- Fourth group: Safety explosives. Type IV.

Only those safety explosives, accessories or blasting devices (explosors, testers, loading machines, etc.) whose cataloguing and packaging expressly state their suitability for use may be used in this type of work.

It shall be prohibited to use type IV security explosives which have been in shell for more than six months and type II and III security explosives which have been in shell for more than one year.

6.7.2 Detonators, explosives and testers

In the case of electric coupling, explosives shall always be used to ensure a draught current passage time of not more than five milliseconds. However, the limitation of the duration of passage of the current is not mandatory when the external circuit is of intrinsic safety whatever its resistance.

In this type of work, the initiation of blasting by means of a slow fuse is strictly prohibited.

6.7.3 Loading of explosives

Except for first-class work, the loading of explosives by mechanical means is prohibited. The bait cartridges shall always be placed at the bottom of the load, with the bottom of the detonator capsule directed towards the mouth of the barrel.

No sweep will be loaded until the work has been carefully recognized by checking that the content in the grisu is within the allowed limits. This check shall be repeated just before the blast hit; in the event that, in this case, the content of flammable gases exceeds the limits allowed in each case, the operation will be suspended, with notice being given to the Facultativa management in order to order the relevant measures.

No borehole shall be charged or fired which, because of its position of proximity to a free surface, gives rise to a danger of detonation in the air. Nor can the stick be fired if when loading any of the holes is perceived in it a breath of gas.

Retarding shall be carried out with materials that are sufficiently plastic; in no case propagate the flame, be antistatic and ensure the effective filling of the borehole.

Except for boreholes drilled in first-class work, the use of gas inhibitors or chillers, flames or incandescent particles shall be mandatory in all other work, together with the retacado itself.

The filling plug must fill the entire section of the borehole and be at least one third of the total depth, but not more than 0.40 metres long.

6.7.4 Recognition of work before loading and firing

No sweeping or complete pasting shall be loaded until the work has been carefully recognized, verifying that the grey content of the atmosphere is not detectable with a safety lamp, or is less than 1 per 100 when the reconnaissance is carried out with a detector of greater precision and sensitivity. This check shall be repeated at the time of leaving the front immediately before firing, and the firing shall not take place as long as the grey percentage is detectable by the safety lamp, or exceeds 1 per cent when reconnaissance is carried out with a detector.

The check described in the previous paragraph shall also be carried out at the place where the electric exploder is to be operated, subject to the conditions indicated in order to be able to make the paste in that place.

In the case of explosive or flammable elements other than grisu, the mining authority shall set maximum permissible percentages for the loading and firing of boreholes.

6.7.5 Glue failures

When it has not detonated a hole of a stick, the explosive cannot be operated again, without first having recognized the line and the front.

6.7.6 Use of detonating cord

The use of detonating cord, not anti-grey, is limited to work of the first class as defined in section 4.9, provided that it has been previously established that the content of the grisu does not exceed 0.40 per 100 on the front, nor at a distance of less than 100 metres from the front.

When the anti-grey detonating cord is used in explosions not classified in the first category, the entire detonating cord shall be placed inside the sweeper behind the retacado.

6.7.7 Taqueo of thick stones

It is strictly forbidden to cut with explosives, debris or thick stones by any procedure other than that of boring the blocks that must be carried out in compliance with the general provisions for all types of holes. In special cases, the Mining Authority may approve other procedures.

6.7.8 Shot under water under pressure

In the case of underwater pressure firing, explosives and detonators shall correspond to types manufactured for this use in accordance with the conditions to be fixed.

6.7.9 Classification of tasks

In second or third category barracks or mines, in those classified with flammable coal dust and in those works in which the existence of gases, dust or other explosive or flammable substances is possible, all types of work shall be classified in the form indicated in the following paragraphs:

1.ª Class Works:

Work which simultaneously satisfies the following conditions shall be considered to be first class:

a) That the front of advance does not cut coal nor has it been cut by any of the holes arranged for the glue.

b) That, although they are developed in sectors with the possibility of existence of grisu, they are horizontal or descending tasks, whose concentration of grisu in the front and up to 100 meters of it is less than 0.5 per 100. If the air that ventilates the work contains grisu from other work, this limit content may be raised to 1 per 100, except if the work is ascending, in which case it must always be less than 0.5 per 100.

c) That even in sectors of the mine considered as dusty, during the last 30 meters there are no accumulations of coal or dust, no starter workshops or coal transport galleries, and the surface of the layers or veins of coal discovered in that section is less than 10 per 100 of the total surface of the work in those 30 meters, including the front of

advance and are more than 3 meters from the last cut layer, unless the uncovered surface of this layer is duly neutralized.

2.ª work class:

Work which satisfies one or other of the following conditions shall be considered to be second class:

Works in which the forward front does not cut coal or have been cut by any of the holes arranged for the paste, but which do not satisfy some of the other minimum conditions required for the first class.

Mixed coal and rock work in which the total surface area of exposed coal on the front does not exceed 10 per cent of the total surface area of the front, or in which the total number of holes which have cut coal is less than five per cent of the total.

3.ª Class Works:

Mixed coal and rock works in which the total surface area of coal exposed on the feeder front exceeds 10 per cent of the total surface area of coal, or in which the total number of boreholes which have cut coal exceeds five per cent of the total number of boreholes, shall be considered to be third class works.

4.ª work class:

The fourth class is considered to be the tracing, preparation or start-up work carried out within the coal layer and covered by the general ventilation current.

5.ª Class Works:

The fifth class is defined as the work of drawing, preparing or starting coal which is not covered by the main ventilation.

6.ª Class Works:

The work of starting coal solids in enclosures is considered to be of the sixth class.

6.7.10 Methods of firing

The methods of firing explosives are as follows:

Modality A. Explosives of limited use. Type I

There are no specific limitations.

Modality B. Safety explosives. Type II

The maximum load per sweep is limited to 2,000 grams.

The maximum duration of the paste shall be 5 s, in which case no boreholes that have cut coal may be loaded.

Modality C. Safety explosives. Type II

The maximum load per sweep is limited to 1,000 grams.

The maximum duration of the stick will be 125 milliseconds.

Modality D. Safety explosives. Type II

The maximum load per sweep is limited to 500 grams.

The maximum duration of the stick will be 125 milliseconds.

Modality E. Safety explosives. Types III and IV

The maximum load per barrel is limited to 2,000 grams for type III explosives and 2,500 grams for type IV explosives.

The maximum duration of the glue shall be 5 s, when the ventilation current is equal to or greater than 0,5 metres per second. Otherwise, the maximum duration of the stick would be 500 milliseconds.

Modality F. Safety explosives. Types III and IV

The maximum load per barrel is limited to 2,000 grams for Type III explosives and 2,500 grams for Type IV explosives.

The maximum duration of the paste will be 500 milliseconds.

Modality G. Safety explosives. Types III and IV

The maximum load per bore is limited to 1,500 grams per type III explosive and 2,000 grams for type IV explosives.

The maximum duration of the stick will be 125 milliseconds.

6.7.11 Implementation of the modalities

For the various types of work, only one of the methods defined in accordance with the limitations set out below and summarised in Table I may be used for each blast.

1. In first class work, any of the modalities A, B, C, D, E, F and G.

2. In second-class work any of the modalities B, C, D, E, F and G.

3. In third-class work, any of the modalities C, D, E, F and G.

4. In work of the fourth class, any of the modalities D, E, F and G.

5. In fifth class jobs, only modality F.

6. In sixth class work, only modality G.

6.7.12 Classification of detonators

Electric detonators are classified as instantaneous, micro-retard and delay.

In micro-retard detonators, the time interval between the holes of a stick, which can influence each other, shall be a maximum of 125 milliseconds and the total duration of the stick of 500 milliseconds.

Class of work						Shooting mode					
First	Second	Third	Fourth	Fifth	Sixth	Name	Explosive type	Maximum load per bore (g)	Maximum duration of the	Maximum time interval between	Comments

									paste	two holes capable of being influenced (ms)	
Yes	No	No	No	No	No	A	I	Unlimited	Unlimited	-	-
Yes	Yes	No	No	No	No	B	II	2.000	5 s	-	No boreholes can be loaded that have cut coal
Yes	Yes	Yes	No	No	No	C	II	1.000	125 ms	125	
Yes	Yes	Yes	Yes	No	No	D	II	500	125 ms	125	
Yes	Yes	Yes	Yes	No	No	E	III	2.000	5 s		Si V ≥ 0,5 m/s
							IV	2.500	500 ms	125	Yes V < 0,5 m/s
Yes	Yes	Yes	Yes	Yes	No	F	III	2.000	500 ms	125	
							IV	2.500	500 ms	125	
Yes	Yes	Yes	Yes	Yes	Yes	G	III	1.500	125 ms	125	
							IV	2.000	125 ms	125	

Table I – Scheme for the application of paragraphs 4.11 and 4.12

6.7.13 Exceptions

Modifications to the working methods not specified in this JTI, the level of safety of which is similar to that pursued by the general rules laid down, may be made with regard to the use of explosives, the loading of boreholes and the maximum duration of the coupling. This will require the approval of the Mining Authority that will decide in the light of the reasoned request of the interested party.

The Mining Authority may agree to exceptions to the above shooting conditions, provided that these are carried out:

- Either from the outside, with the mine empty, or limiting the presence inside only to the personnel indispensable for the execution of the shot, which must take proper shelter.
- Separating the firing front from the rest of the mine by a stagnant barrier and capable of withstanding an explosion, in which case no person will be able to remain between the firing fire and the barrier.

6.8 VOLADURAS MADE WITH MOBILE GRANEL EXPLOSIVE MANUFACTURING UNITS

The use of mobile bulk explosives manufacturing units (hereinafter referred to as 'MEMU') is subject to prior cataloguing of the MEMU unit by the Directorate-General for Energy Policy and Mines.

Upon arrival at the farm, the driver of the vehicle shall:

1. Turn on the dipped-beam headlamps.

2. Turn on the emergency lights.

3. Turn on the orange rotary on the roof of the cabin, if applicable.

These three illuminated devices shall be used at all times on the operating tracks to maximise the visibility of the vehicle, in particular by drivers of heavy machinery.

When driving on the runways and accesses of the operation, the driver of the vehicle must at all times respect the speed limitations, the traffic plan if any and other traffic restrictions imposed by the mining operator.

A clear communication procedure should be established between the MEMU operator and those responsible for the mining operation so that all personnel working on the site are aware of the movement of the vehicle through the site. In particular, the following shall be specified in writing before each supply:

- Estimated time of entry to the site.
- Drivers of machinery on the holding shall be informed when the vehicle enters the holding.
- Front or fronts of work and approximate duration of operation in each.
- Safe path to follow to the fronts and between different work fronts.
- Estimated time of departure from the site.
- Drivers of machinery in the mine or quarry must be informed of the departure of the vehicle from the holding when it occurs.

Mining shall keep tracks and accesses to cargo fronts in a state appropriate for the safe driving of a MEMU-type vehicle or explosive pumper.

Upon arrival at the blast front, the MEMU driver shall:

- Keep the orange cab roof rotary and emergency lights running.
- Turn off the engine and lock the vehicle with the handbrake. The vehicle must be parked following instructions from the optional direction, in a safe area close to the blast to be loaded, away from the fall of blocks from an adjacent front and not interrupting the traffic of the operation.
- Coordinate the sequence of loading of holes with the person responsible for drilling and blasting on the farm. This sequence shall be designed so that the number of movements of the vehicle through the blast zone is kept to a minimum.
- Find out the exact quantities to be manufactured and pumped for each borehole. The optional address must deliver this information in writing and by hand to the vehicle operator before commencing the mixing and loading operation.

All personnel involved in the mixing and loading operation of the MEMU shall wear appropriate personal protective equipment.

Once the sweep loading sequence and the amounts per sweep are clear from the vehicle operator and the personnel in charge of the blast loading, the driver shall approach the vehicle to the first sweeps to be loaded in such a way that they are within a reasonable distance. Special attention should be paid at all times to personnel who may be close to the vehicle.

Movements in the blast zone must be carried out at the minimum necessary speed, taking extreme precautions and avoiding sudden manoeuvres at all times.

The vehicle may have a rear-view camera which enables the driver of the vehicle to reverse the

vehicle with sufficient vision of the rear of the vehicle.

The vehicle shall be equipped with a reversing sound signal to serve as a warning to all nearby personnel during reversing journeys.

The vehicle must be equipped with a guardrail (fixed or folding) that protects against falls from the top of the vehicle, where the access hatches to the main hoppers are located. All vehicle platforms that can be accessed to make adjustments to pumping equipment, etc. shall be protected by fixed railings. Under no circumstances can the vehicle be moved while there are personnel at the top or on any platform of the same. Movements of the vehicle may only be carried out with personnel seated in the driver's cab.

During any movement of the vehicle, the driver shall pay particular attention not to roll on any foreign element, in particular explosive items.

Detonators, multipliers, and other explosive elements necessary to initiate and sequence blasting will remain in a safe place, preferably in their original containers, until they are used in the loading of each of the holes.

Once the vehicle is in the position designated for loading the first holes, the driver shall:

- Operate the handbrake.
- Operate the power take-off of the vehicle.
- Descending from the vehicle and grounding it using a chain or suitable device.
- Operate the protective railing on the top of the vehicle (if it is folding and not fixed).

To begin the mixing and loading operation of the boreholes, the MEMU operator shall access the control panel and operate the mixing and pumping equipment in accordance with its internal operating procedures.

The borehole loading operation must be carried out in a coordinated manner at all times between the MEMU operator and the personnel in charge of operating the hose and verifying the rise of the mixture in the borehole. If direct oral communication is not possible between them due to environmental noise or excessive distance between them, portable intercoms must be used to keep hands free at all times.

Only before loading each borehole can the necessary detonators and multipliers be removed to initiate the borehole of its containers, prepare them for use and lower them to the necessary depth.

Once the mixture is ready to the required density:

- In case of pumpable mixtures, the loading end of the hose should always be lowered to the bottom of the hole. Attention should be paid not to damage the threads or tubes of the detonators at any time. The hose must be collected simultaneously with the pumping of the mixture.
- In the case of non-pumpable mixtures, the load shall be made by gravity by means of an endless screw placed over the mouth of the sweeper.

In both cases, due to the bulk nature of the explosive, the rise height of the mixture should be controlled on a regular basis to avoid the concentration of explosive in cracks or cavities. The frequency of this check (in kg loaded) must be determined by the undertaking consuming explosives and boreholes must be recorded.

The load must be carried out paying attention never to exceed the depth established for the

final retacado. In the case of mixtures with chemical sensitisation, the final expansion of the product during gasification should be taken into account.

The depth of the retacado should always be checked with a measuring tape. If this has been exceeded, the explosive must be removed until the retreading depth is adequate. The operating procedures of the MEMU unit shall specify an appropriate and effective method for the removal of mixture when the mixture exceeds the final safety retracting depth.

When all boreholes of a loading stage have been loaded, the driver of the vehicle shall disconnect the PTO and move it to the new loading position following all precautions described above.

This operation will be repeated as many times as necessary until all blast holes are loaded.

Once the mixing and loading of boreholes has been completed, the pumping system will be cleaned, ensuring that there are no explosive remnants left in the hoppers, pumps, hoses or endless screws. This operation shall always be carried out in accordance with the operating procedures of the explosives manufacturer. These procedures must ensure minimum waste production during the cleaning phase of the equipment.

System cleaning residues shall be disposed of in situ, spread over one or more blast holes, by detonation, in the explosive loading area immediately below the retreading.

Once the unit is cleaned, the vehicle driver must remove the vehicle to a designated safe area. To do this, you must verify that all the lighting devices described above are turned on and coordinate the movements through the farm with those responsible for it.