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Impact assessment of amendments to Regulations NFS 2016:13 on measuring equipment for determining the environmental charge on emissions of nitrogen oxides in energy production

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1. Background to the current legislation

The Act (1990:613) on the environmental charge on emissions of nitrogen oxide emissions in energy production (the NO_x Act) describes the economic instrument known as the NO_x charge. The NO_x Act stipulates that liable companies must pay an environmental charge to the State for emissions of nitrogen oxides (NO_x emissions) from combustion plants used for energy production. Energy production includes both electricity and heat production. According to Section 5 of the NO_x Act, those who continuously measure and record emissions with measuring equipment, meeting specific requirements, may calculate the charge on the basis of the measured values. The Ordinance (1991:339) on the environmental charge for nitrogen oxide emissions from energy production stipulates that the Swedish Environmental Protection Agency issues regulations concerning requirements on measuring equipment in accordance with section 5, second paragraph, of the NO_x Act. Otherwise, the emissions shall be calculated on a flat rate basis, where the emissions are considered to be equivalent to 250 mg NO₂/MJ supplied fuel. The charge levied is SEK 50 per kilogram of emitted NO_x.

The Swedish Environmental Protection Agency's regulations on measuring equipment for determining the environmental charge for emissions of nitric oxides in energy production (NFS 2016:13) contain requirements on measuring equipment used in the continuous measurement and recording of NO_x emissions. These requirements include, inter alia, measurement and recording of measured values, calibration and maintenance of measuring instrument, as well as comparative measurements.

The NO_x charge covers production units, stationary internal combustion engines, and gas turbines with a useful energy production of at least 25 GWh/calendar year. In 2023, this included 289 facilities, comprising 417 production units. The reported NO_x emissions totalled 11 925 tonnes for a total of 68 236 GWh of energy produced and utilised. The operators covered by the No_x charge report their amount of NO_x emissions, as well as how much energy they have produced during the year. Then, based on this data, the Swedish Environmental Protection Agency calculates the benefit, i.e. the amount that the operators get back for the useful energy. In all industries, there are both net payers and net recipients. The pulp and paper industry is an example of a branch in which most operators are net contributors. Net beneficiaries are usually production units with, inter alia, effective NO_x reduction systems, high degrees of efficiency, and/or those which have flue-gas condensers. This means that measures to reduce the amount of NO_x and measures to increase the amount of energy produced both affect whether an operator is a net receiver or net payer. It is thus of great importance that NO_x emissions and produced useful energy are measured and recorded accurately.

2. Summary of the proposed changes

Since the entry into force of the current regulations NFS 2016:13 on 1 July 2017, ambiguities have emerged from both internal and external sources as to how some paragraphs should be followed and interpreted. This has resulted in that how measuring instruments should be checked and what requirements the Environmental Protection Agency can set, in some cases, has been left open to different interpretations. This may result in some measuring instruments possibly not being fully operational and thus reporting incorrect measured values. Since the NO_x charge's environmental charge and its allocation are based on the measured NO_x emissions of the production units, it is of great importance

that measuring instruments and measurements are reliable so that the trust in the charging system is maintained. The Swedish Environmental Protection Agency has therefore drawn up these proposed amendments to NFS 2016:13 in order to clarify certain requirements and thereby make it easier for operators to comply with the regulations.

In essence, the proposed amendments involve

- a clarified definition of reference point;
- the harmonisation of the requirement for permissible deviation in linearity checks with the other requirements of NFS 2016:13;
- a change in the time interval for how often linearity checks are to be performed in order to harmonise that requirement with other legislation;
- a revised maximum permissible deviation for linearity checks and routine checks of O₂;
- a clarified requirements for the presentation of on routine checks;
- the clarification on the application and use of fixed fuel ratios;
- the clarification of documentation requirements.

3. Description of the problem and proposed changes

Problems with the current regulations, the proposed amendments and the purpose of these are described below.

3.1. Changed time interval for linearity checks

Relates to Section 6

Section 6 of NFS 2016:13 states that the linearity of the measuring instrument must be checked at least once every three calendar years. Changing the time interval so that linearity is checked every calendar year harmonises the time interval requirement with other legislation in the field of metrology. There are several instances where operators have failed to carry out linearity checks every three years and thus have not complied with the requirement in the regulation. This makes it difficult for the Swedish Environmental Protection Agency to assess, as part of its supervisory work, whether all the specific requirements have been met, given that the majority of operators comply with the regulations but some do not. However, very few checks fail, so from a purely technical point of view, the consequences of missing a check are minimal. However, if the check fails, it results in a long time period of potentially inaccurate readings. If, instead, this check is carried out every year, it will be easier for operators to have procedures in place, as there are very few checks that are not carried out at least once every calendar year. Thereby, the follow-up of the requirement will be easier for both the Swedish Environmental Protection Agency and operators.

3.2. Amended deviation for linearity checks of NO/NO₂/CO₂

Relates to Section 6

Section 6 NFS 2016:13 states that no point shall deviate more than 4 % from the ideal line during a linearity check. A requirement being specified as a value figure is not consistent with other requirements in the regulations. By changing the requirement to 4.0 %, the requirement is harmonised with the other requirements in the regulations.

For Section 6, the Environmental Protection Agency also proposes the introduction of a lower limit, so that the deviation limits for NO and NO₂ are not exceeded as long as the deviation is less than 2.0 ppm. This is done so as not to disadvantage low-emission operators, as linearity checks must be carried out within a measurement range that covers expected readings during normal operation; at lower gas concentrations, the 4.0% requirement becomes more stringent.

3.3. Amended deviation for linearity controls and routine checks of O₂

Relates to Section 6 and Section 7, paragraph 3

Section 6 of NFS 2016:13 stipulates that, during a linearity check, no point shall deviate from the ideal line, based on the reference point concentration, by more than 4 %. Section 7 stipulates that the permissible limit for deviation during routine checks of gas concentrations is 4.0 % of the reference point concentration. In comparative measurements, the maximum permissible deviation for systematic difference for O₂ is the absolute value of 0.5 % by volume. The most common reference point currently used by operators for linearity checks and routine checks of O₂ is air, which has an O₂ content of approximately 21 % by volume. If air is used as a reference point, the permissible deviation for these two checks is about 0.84 % by volume, which is not reasonable. This is partly because both linearity checks and routine checks are regarded as more accurate than comparative measurements. Comparative measurement uses an external measuring instrument to measure in parallel with the fixed measuring equipment, which introduces additional sources of error as the entire measuring system is involved and compared against a temporarily installed measuring instrument. This is partly because the O₂ content in air has a very low uncertainty margin and varies very little compared to a reference gas. This, in conjunction with a high permissible deviation, results in greater unfairness for those whose reference gas has been calibrated to match the measured values. Among the operators measuring O₂, an estimated average of measured O₂ concentrations is about 10 % by volume during normal operations. A permissible deviation of 4.0 % of the reference point corresponds, for this content, to 0.4 % by volume. This is also lower than the permitted deviation for O₂ in comparative measurements; therefore, the Swedish Environmental Protection Agency proposes that the maximum permissible deviation limit for linearity checks and routine checks of O₂ be 0.4 % by volume, regardless of the concentration at the reference point.

3.4. Addition regarding documentation in the absence of valid measurement values

Relates to Section 16

Section 16 NFS 2016:13 requires that periods without valid readings shall be documented. It is important that operators know why their measured values are not valid and why the measuring equipment does not function correctly in accordance with the specific requirements of NFS 2016:13. It is also important for the Environmental Protection Agency's supervision of Section 5, third paragraph, of the NO_x Act that the reason for the lack of valid measurement values can be reported to the Agency. The proposed amendment is thus that documentation shall be made together with the reason why valid measured values are missing, if the reason can be determined. The proposed amendment will give operators greater control over their measuring equipment, as well as enable the Swedish Environmental Protection Agency to carry out clearer and more effective supervision.

3.5. Addition regarding documentation in case of corrective measures

Relates to Section 30

Section 30 NFS 2016:13 stipulates that if the requirements for the comparative measurement are not met, the operator shall investigate the cause, and that if the cause can be determined, corrective measures shall be taken without delay. It is important that the investigation and any corrective measures are documented so that the operator can inform the Swedish Environmental Protection Agency that they have complied with the requirement set out in that section. The Swedish Environmental Protection Agency therefore proposes that the investigation and any corrective measures are to be documented. This proposed amendment also simplifies the Swedish Environmental Protection Agency's supervision.

4. Description of alternative solutions and of impacts if no changes are made

4.1. Changed time interval for linearity checks

Relates to Section 6

An alternative solution for Section Error: Reference source not found is to change the time interval to every two years. However, this would still not be consistent with other legislation in the field of metrology and would not facilitate monitoring of the requirement for either the Swedish Environmental Protection Agency or operators. This is also what would happen if no changes were made.

4.2. Amended deviation for linearity checks of NO/NO₂/CO₂

Relates to Section 6

Another option for the proposed amendment for Section Error: Reference source not found is to allow for a wider range of value figures compared with the proposed permitted deviation of 4.0 %. This would require a more extensive investigation as it deviates from the number of value figures that apply to other requirements in NFS 2016:13. If no change is made, the requirement would continue to be inconsistently weighed against the other requirements of NFS 2016:13 concerning the number of value figures and the rounding of measured values.

With regard to the addition of a lower permissible deviation limit of 2.0 ppm, an alternative option would be to choose a fixed deviation other than 2.0 ppm. However, such a change would require a more extensive investigation, as it deviates from the existing requirements set out in Section 7 of NFS 2016:13. If the change is not implemented, low-emission operators will continue to be disadvantaged, as the permissible deviation of 4.0 % becomes tougher at lower gas contents.

4.3. Amended deviation for linearity controls and routine checks of O₂

Relates to Section 6 and Section 7, paragraph 3

Another solution to Section Error: Reference source not found is for the deviation allowed for O₂ in linearity and routine checks to be a fixed value between 0.5 % by volume and 0.84 % by volume, where the latter is 4.0 % of the O₂ content in air, i.e. 21 % by volume. This would still result in a larger permissible deviation compared with the requirement for a systematic difference for O₂ in comparative measurements. However, this is not reasonable as there are fewer sources of error when carrying out linearity checks and routine checks than during a comparative measurement, since these two checks are performed between the fixed measuring equipment and known gas contents, and no external measuring instrument makes parallel readings as is the case with a comparative measurement. If, on the other hand, the maximum permissible deviation in linearity checks and routine checks is less than 0.4 % by volume for O₂, there is a risk that the requirement is too stringent, meaning that many measuring instruments would fail the checks and thus fail to meet the requirements of NFS 2016:13. If no changes are made, there will continue to be an indirect steering effect towards using air as a reference point, resulting in a high permissible deviation. This is then unfair to operators who have a lower reference point and therefore carry out routine checks that are better suited to the typically measured O₂ content.

4.4. Addition regarding documentation in the absence of valid measurement values

Relates to Section 16

Another suggestion regarding the proposed amendment to Section Error: Reference source not found is to require that the cause be both identified and documented if there are no valid measurement values. However, this requirement is not justified, as it is not always possible to determine the cause. Should the cause be required to be determined and the operator cannot do so, that operator would not comply with all the specific requirements of NFS 2016:13, and then there would be a risk that they may have to account for emissions equivalent to 0.25 g NO₂/MJ supplied fuel (in accordance with Section 5 of the NO_x Act). This would be disproportionate to the non-fulfilment of the requirement. Such a case would be difficult for the Swedish Environmental Protection Agency to handle and would require more resources from the operator, who would then be obliged to do everything in their power to determine the cause. If no change is made, there is a continued risk that the operators' checks on measuring equipment will be deficient and that the Swedish Environmental Protection Agency's supervision will be more demanding.

4.5. Addition regarding documentation in case of corrective measures

Relates to Section 30

Unless the amendment in section Error: Reference source not found is implemented, situations may arise in which operators are unable to report their investigations and any corrective measures to the Swedish Environmental Protection Agency at all, or to a sufficient standard. This may mean that the operator would not meet all the specific requirements of NFS 2016:13, meaning that there would be a risk that they would be required to report emissions equivalent to 0.25 g NO₂/MJ supplied fuel (in accordance with Section 5 of the NO_x Act). Furthermore, this could lead to more demanding supervision by the Swedish Environmental Protection Agency, as it would involve more contact with operators to ascertain whether the necessary documentation and supporting evidence is in place. This, in turn, entails more work for operators as they have to prepare and compile documentation, which may be more difficult to do retrospectively.

5. Authorisations forming the basis for decision-making powers

The legislation below sets out the authorisation on which the Swedish Environmental Protection Agency's decision-making powers are based.

The Ordinance (1991:339) on an environmental charge on emissions of nitrogen oxides in energy production, Section 2:

'The Swedish Environmental Protection Agency issues regulations on measuring equipment requirements under Section 5, second paragraph, of the Act (1990:613) on an environmental charge on emissions of nitrogen oxides in energy production.'

The Act (1990:613) on environmental charges for emissions of nitric oxides in energy production, Section 5:

"A charge of SEK 50 per whole kilogramme of nitrogen oxides emitted, calculated as nitrogen dioxide, is levied.

Any person who continuously measures and records emissions using measuring equipment that meets specific requirements may calculate the charge on the basis of the readings.

If such measurements are not taken, the emissions shall be calculated as follows. Where measuring equipment referred to in the second subparagraph is installed, the emissions of a maximum of 1 440 hours per calendar year of non-measurement may be calculated as one and a half times the amount of nitrogen oxides, calculated as nitrogen dioxide, measured under comparable operating conditions. Otherwise, emissions shall be deemed to be equivalent to 0.25 grams of nitrogen oxides, calculated as nitrogen dioxide, per megajoule of supplied fuel.

The government or the authority appointed by the government may issue regulations on the specific measuring equipment requirements referred to in the second paragraph."

6. Who is affected by the proposed changes

According to the Swedish Environmental Protection Agency, those affected by the changes outlined in the impact assessment are operators covered by the NO_x

Act, companies that sell measuring equipment, carry out instrument servicing and performance checks, as well as the Swedish Environmental Protection Agency. We do not believe that municipalities and regions will be affected by the changes; consequently, the impact assessment does not identify any impact on these bodies.

In 2023, there were 205 operators with 289 installations who were liable for payment of the charge(s). These plants include the waste incineration industry, the chemical industry, the power and heating plant industry, the food industry, the pulp and paper industry, the metals industry and the timber industry.

There are both small and large operators who are liable for payment of the charge, and there may therefore be a large difference in the number of employees and annual turnover. In addition, an operator may carry out activities other than energy production that are subject to the NO_x charge. For example, an operator that owns a combined heat and power plant may also be involved in other areas of energy, such as wind and solar power, whilst a chemical company may be subject to the NO_x charge as it produces fuel, whilst also engaging in activities relating to sales, development and sustainability. It is therefore difficult to directly link a change in the regulations to how it will affect different operators. By way of comparison, a smaller and larger operator within the NO_x charge can be described as follows:

- A small company in the timber industry, liable for payment of the charge(s), with one small and one medium-sized production unit, had, in 2023, around 100 employees and a turnover of approximately SEK 100 million. The operator produces timber products but also purchases and sells forest commodities.
- A larger company liable for payment of the charge(s), with more than ten production units of different sizes had, in 2023, around 1 000 employees and a turnover of approximately SEK 9 000 million. The operator generates electricity and heat, but is also involved in solar and wind energy, the development of CCS technologies, the power grid and biogas production.

Against this background, it is difficult to draw conclusions regarding how individual operators are directly affected by the proposed changes, as there is such a large difference between them based on industry, activity and number of production units.

7. Cost-related impacts and other impacts of the proposed amendments

7.1. Changed time interval for linearity checks

Relates to Section 6

Changing the time interval for linearity checks from every three years to every year increases the costs for operators, as they need to pay for two additional linearity checks. According to companies that perform instrument service and performance checks, a linearity check costs SEK 7 500, excluding travel costs. For those operators who currently only perform linearity checks every three years, this means an increased cost of approximately SEK 15 000 over a two-year period. However, linearity checks are usually carried out in conjunction with instrument servicing or the AST (Annual Surveillance Test as specified in standard SS-EN 14181), and a large number of operators carry out instrument servicing every year in accordance with the instrument supplier's recommendations. In addition, operators covered by SS-EN 14181 shall carry out linearity checks every year in accordance with the Ordinance (2013:252) on

large combustion plants and the Ordinance (2013:253) on waste incineration. For these operators, the added cost of linearity checks for NFS 2016:13 each year is not as high, as the checks can be carried out in conjunction with each other. This applies to about one quarter of the operators¹.

For companies that carry out instrument servicing and performance checks, the change should not have a significant impact on their workload, as linearity checks are carried out in conjunction with other performance checks.

7.2. Amended deviation for linearity checks of NO/NO₂/CO₂

Relates to Section 6

By changing the maximum deviation allowed for linearity checks from 4 % to 4.0 %, the requirement becomes more stringent. However, the Swedish Environmental Protection Agency's assessment is that the risk for a check that is currently approved to be rejected with the new requirement is very small and therefore the change is expected to have little effect on operators. In addition, most companies performing instrument service and performance checks already use two value figures in the reporting of their linearity checks and evaluation of results, so the proposed change is already largely used in practice.

The proposed addition of a lower limit of 2.0 ppm for NO and NO₂ does not entail any economic or other type of consequence for the operators. On the contrary, the proposal represents a relaxation of the requirement, as the purpose of the NO_x charge is to create incentives to reduce the emissions of NO_x.

7.3. Amended deviation for linearity controls and routine checks of O₂

Relates to Section 6 and Section 7, paragraph 3

This amendment introduces a stricter requirement for operators who have a reference material with a content higher than 10 % by volume of O₂. This could lead to more failed linearity checks and routine checks compared with the current situation. The Swedish Environmental Protection Agency, however, considers that the change will have minimal consequences, as the majority of measuring equipment for O₂ currently meets the requirement for a systematic difference of 0.5 % by volume in comparative measurements. Therefore, the vast majority of them should meet this new threshold, provided there are no issues with the measuring equipment. For operators using air as reference material, which with a 4,0 % deviation gives a maximum deviation of approximately 0.84 % by volume, and who do not pass the proposed change of a fixed maximum deviation of 0.4 % by volume, this may be an indication that something is wrong with the measuring equipment and that action is needed. Thus, it becomes a stricter requirement for some operators. However, the starting point of the entire policy is to measure the actual emissions and then be able to ensure that the measurements are representative and reliable.

Companies that provide environmental reporting systems where operators can register and follow up on their routine checks need to change the required limit and be able to have different limits for NO/NO₂/CO₂ and O₂ respectively.

7.4. Addition regarding documentation in the absence of valid measurement values

Relates to Section 16

This amendment concerns only the operators, and the consequence is that the documentation requires a bit more labour and time from employees. Depending

¹ Based on the number of operators having at least one contributing generation unit with an installed power of at least 50 MW for the calendar years of 2022 and 2023.

on the cause, it is estimated that it may take from one hour up to half a working day to both identify and document the cause. Thus, the additional task should not entail a significant cost for the operators.

7.5. Addition regarding documentation in case of corrective measures

Relates to Section 30

This amendment concerns only the operators, and the consequence is that the documentation requires a bit more labour and time from employees. Depending on the scope of the investigation and any measures required, it is estimated that it might take between half a day and a full working day to document everything. There may, of course, be cases where it takes longer, but the Swedish Environmental Protection Agency considers this to be unusual. Thus, the additional task should not entail a significant cost for the operators.

8. Comparison between the proposed amendments and alternative solutions

8.1. Changed time interval for linearity checks

Relates to Section 6

A consequence of the proposed amendment is that an additional cost of SEK 15 000 over two years will be incurred for around three quarters of the operators². The majority of the operators probably carry out service on the measuring equipment every year in order to meet the requirements of NFS 2016:13 on care, inspection and maintenance. The Swedish Environmental Protection Agency believes that the additional cost of SEK 7 500 per year is small in this context, because the timing of the instrument service can be combined with linearity controls. In addition, we consider that the benefits of simpler follow-up of the requirement for operators and harmonisation with other metrological legislation compensate for the cost. This is the reason why the Swedish Environmental Protection Agency recommends the amendment rather than no change. In the case of the alternative proposal that linearity checks be carried out every two years, the resulting cost for the operators would be half as high in comparison with the amending proposal. However, no harmonisation with other metrological legislation takes place. Also, the follow-up of the requirement is not facilitated as there is a continued risk that linearity checks are missed if the check is not annual. That is why we are not moving forward with this option either.

8.2. Amended deviation for linearity checks of NO/NO₂/CO₂

Relates to Section 6

The alternative proposals are to use more than two digits or to retain the current single digit value figure. If no change is made, the requirement for a permissible deviation remains inconsistent with the other requirements of NFS 2016:13. This also does not correspond to the number of significant value figures that are already used in practice when reporting linearity checks. Furthermore, there is no indication that more than two value figures are needed. Therefore, the Swedish Environmental Protection Agency does not consider that such a change would offer any direct benefits. Moreover, we consider the risk of an operator meeting the requirement by one value figure but exceeding it by two value figures to be very low. Therefore, the benefit of the amendment outweighs this potential consequence.

² Ibid.

Regarding the proposal to add a lower limit for NO and NO₂ of 2.0 ppm, there are no indications that a fixed value other than 2.0 ppm is needed. A different fixed value would also not be consistent with the requirement set out in Section 7 of NFS 2016:13; therefore, the Swedish Environmental Protection Agency is not pursuing this alternative solution. If no change is made, low-emission operators will continue to be disadvantaged in linearity checks, which is the opposite of the purpose of the NO_x charge. Furthermore, as the proposal does not have any negative consequences for operators, we favour it over the other options.

8.3. Amended deviation for linearity controls and routine checks of O₂

Relates to Section 6 and Section 7, paragraph 3

If a measuring device for O₂, with a reference material higher than 10 % by volume (which today corresponds to a maximum permissible deviation of 0.4 % by volume) does not meet the proposed change with a maximum permissible deviation of 0.4 % by volume, the measuring device is also unlikely to meet the requirement for systematic difference in the comparative measurement of 0.5 % by volume. Therefore, it is unreasonable to have a maximum permissible deviation in routine checks and linearity checks of between 0.5 % by volume and 0.84 % by volume, the latter being the current permissible deviation if air is used as the reference material. In addition, it is unreasonable to set a maximum permissible deviation where the requirement is less than 0.4 % by volume, as there is a risk that it would be a requirement that many measuring devices cannot meet. This could lead to an unnecessary amount of work to review the measuring equipment and also mean that new O₂ instruments would need to be purchased frequently, which is not cost-effective or sustainable. If no change is made compared to the current situation, the tolerance remains too high. This means that it would still be difficult to know if measuring equipment for O₂ has problems, as it is not apparent if the maximum permissible deviation is too high.

8.4. Addition regarding documentation in the absence of valid measurement values

Relates to Section 16

The Swedish Environmental Protection Agency does not consider the alternative solution – requiring that the cause be both identified and documented in the absence of valid measuring data – to be justified, as it is not always possible to identify the cause. If an operator would not be able to meet this requirement, there is a risk that the consequence would be that they may report emissions corresponding to 0.25 g NO₂/MJ of supplied fuel (according to Section 5 of the NO_x Act) instead of measured values, which is disproportionate to the non-fulfilled requirement. On the other hand, if no change is made, there is a risk that operators do not document a known cause of non-response. They would then have to do it retrospectively, which may be more difficult and take longer. Although the proposed change may require more labour force and time, we believe this is offset by the fact that the documentation is carried out immediately after the non-response.

8.5. Addition regarding documentation in case of corrective measures

Relates to Section 30

If no change is made, there is a risk that operators do not document their investigation and any action taken after requirement limits have been exceeded during comparative measurements. They would then have to do it retrospectively, which is more difficult and takes significantly longer. Although the proposed amendment may require additional labour force and time, the Swedish Environmental Protection Agency considers this to be justified by the fact that documentation is carried out in one go during the investigation.

9. Assessment as to whether special consideration must be given to the date of entry into force and whether special information initiatives are required

The plan is for these amendments to come into force on 1 January 2026 via an amending regulation, preceded by an information campaign by the Swedish Environmental Protection Agency to raise awareness of the changes and to support affected parties when the amended regulation comes into force. The planned consultation will also serve as an indication of the changes that are planned. There is not deemed to be a special need for information campaigns because this is existing legislation that is being updated and clarified.

10. Assessment of whether the amendments comply with or exceed the obligations arising from Sweden's accession to the European Union

An adaptation of the regulations to the requirements of SS-EN 14181 means that the requirements of the regulation are linked to an EU standard and thereby comply with Sweden's obligations as a European Union member.

The proposed amendments concern the procedure for various checks of measuring instruments and documentation. Measuring instruments can meet the requirements of both the new proposals in the regulations and standard SS-EN 14181.