DRAFT

MINISTRY OF REGIONAL DEVELOPMENT AND PUBLIC WORKS

Regulation amending and supplementing Regulation No RD-02-20-2 of 2015 on the technical rules and norms for the design of road tunnels

(promulgated in State Gazette (SG) issue No 8 of 2016)

§ 1. In Article 2(1), after the words ‘major renovation’, the comma shall be replaced by the conjunction ‘and’ and the words ‘and rehabilitation’ shall be deleted.

§ 2. Article 4 shall be amended, as follows:

1. In paragraph 1, the words ‘the expert council of the contracting authority’ shall be replaced by ‘the Expert Technical and Economic Council (ETEC) of the Road Infrastructure Agency (RIA).’
2. In paragraph 2, the words ‘the expert board referred to in paragraph 1’ shall be replaced by ‘ETEC referred to in paragraph 1’.

§ 3. In Article 10, the first sentence shall be deleted.

§ 4. The following points 24 and 25 shall be inserted in Article 11:

‘24. The level and reliability of ventilation and illumination in the tunnel;

25. The smart traffic management systems.’.

§ 5. The following amendments and supplements shall be introduced in Article 15:

1. In paragraph 1, Table 1 shall be amended as follows:

‘Table 1

Traffic organisation	Length of tunnel tube, m	Traffic intensity (pcu/d)	
		< 2000	> 2000
Unidirectional traffic	up to 1000 m	Class I	Class II
	more than 1 000 m – 3 000 m	Class II	Class III
	> 3000 m	Class III	Class IV
Bidirectional traffic	up to 500 m	Class I	Class II
	More than 500 m – 1 200 m	Class II	Class III
	> 1200 m	Class III	Class IV

’

2. In paragraph 2, the word ‘quantitative’ shall be replaced by ‘justified’ and the words ‘with the application of quantitative assessment methods’ shall be added at the end.

§ 6. Article 16 shall be amended as follows:

‘Article 16. (1) For tunnels longer than 500 m, an analysis and quantitative assessment of the tunnel risk of fatal accidents due to causes (mechanical event, fire, and dangerous goods) shall be carried out. On the basis of the results of the risk analysis carried out, the need for additional measures to ensure safety in the tunnel shall be established in accordance with the requirements of the Regulation.

(2) Where, in an existing tunnel, measures to meet design requirements lead to unreasonably high costs, it shall be checked whether they can be compensated by other measures. The contracting authority may adopt risk reduction measures as an alternative to the design requirements, if such measures result in an equivalent or higher level of safety or protection. Their effectiveness shall be demonstrated on the basis of a risk analysis.

(3) The risk analysis shall examine the risks to the tunnel, taking into account all design and transport factors relevant to safety, considering the parameters in Article 11. The risk analysis shall demonstrate:

the permissible speed in the tunnel, but not exceeding the maximum specified as follows:

a) for tunnels with unidirectional traffic and an emergency stopping lane – 100 km/h;

b) for tunnels with unidirectional traffic without an emergency lane – 90 km/h;

c) for tunnels with bidirectional traffic – 80 km/h.

2. the admissibility of longitudinal ventilation;

3. the admissibility of the transport of dangerous goods as defined in the 1957 European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), ratified by the Act on the Ratification of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) of 1957 and its amending Protocol of 1993 (promulgated in State Gazette, issue No. 28 of 1995) and the relevant national regulations; for tunnels of more than 500 m in length, a risk analysis in accordance with the instructions in Annex 3 and in compliance with the provisions of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) shall be carried out prior to defining or amending the requirements for the transport of dangerous goods; where alternative routes for the transport of dangerous goods exist, they shall be included in the risk analysis; the results of the analysis justify decisions to reduce the likelihood of

occurrence and/or the amount of losses through additional constructive, technical and/or organisational measures;

4. the need for an additional automatic fixed fire-extinguishing installation (AFFEI) as an active measure to prevent the spread of fire to other vehicles.

(4) Risk analysis shall be carried out by an organisation or by experts who are functionally independent of the body responsible for the management of the tunnel. The content and results of the risk analysis shall be attached to the tunnel safety file.

(5) The risk analysis shall include scenario model studies to assess the consequences (losses) and empirical frequency estimates from representative statistics data on road traffic accidents and tunnel accidents. Risk analysis defines the sources of hazards and quantifies the risk. The applicable risk analysis methods at different design stages vary depending on the degree of specification of the functional, technological, and technical solutions. These methods are qualitative, semi-quantitative, and quantitative (probabilistic). The minimum scope of risk assessment in the design and operational phases is set out in Annex 3.

(6) The results of the risk analysis shall provide the possibility to compare the risk with existing eligibility criteria, to prioritise and rank risks, to assess the acceptability of the risk, and to make a reasoned choice of various alternative solutions to eliminate, avoid or reduce the risk."

§ 7. The following amendments and supplements shall be introduced in Article 17:

1. In paragraph 2(4), the word ‘rehabilitation’ shall be replaced by ‘maintenance, repair’;

2. In sub-paragraph (3):

(a) in point 2, after the words ‘recommendations of measures’, a comma shall be inserted and the following words shall be added: ‘control measurements’;

b) point 5 shall be amended to read as follows:

‘5. repair.’

3. In paragraph 4, the following sub-paragraph 3 shall be inserted:

‘3. road safety measures.’

4. In point 1 of sub-paragraph 7, a comma shall be inserted at the end and the words ‘as well as cleaning of deposits, including particulate matter’ shall be added.

§ 8. In Article 18(2), the words ‘the clearance gauge’ shall be replaced with ‘the gauge’.

§ 9. Article 19 shall be amended as follows:

‘Article 19. (1) The clear cross-section represents the portion of the cross-section, free of fixed obstacles, which provides the necessary clearance for accommodating the road clearance gauge and the additional gauge in the tunnel. It also includes a reserve (t), which is defined by the formula:

$t = a + b,$ (1)

where:

a – the tolerance for deviations from the design dimensions during construction;

b – the reserve for future measures during the service life concerning elements of the structure (e.g. increasing the thickness of the cladding, laying a protective coating, installation of cladding elements for noise reduction, respectively sound absorption), the waterproofing and drainage system.

(2) The reserve “b” for future measures during the service life shall have a minimum value of 20 cm. The reserve “t” shall be taken into account by an increase in the clear cross-section shown on the sample cross-section in Annex No 5.

(3) The clearance gauge is intended solely for transport purposes and includes the part of the light cross-section whose contour is not affected by the tunnel structure and the parts of the structures and installations in the tunnels."

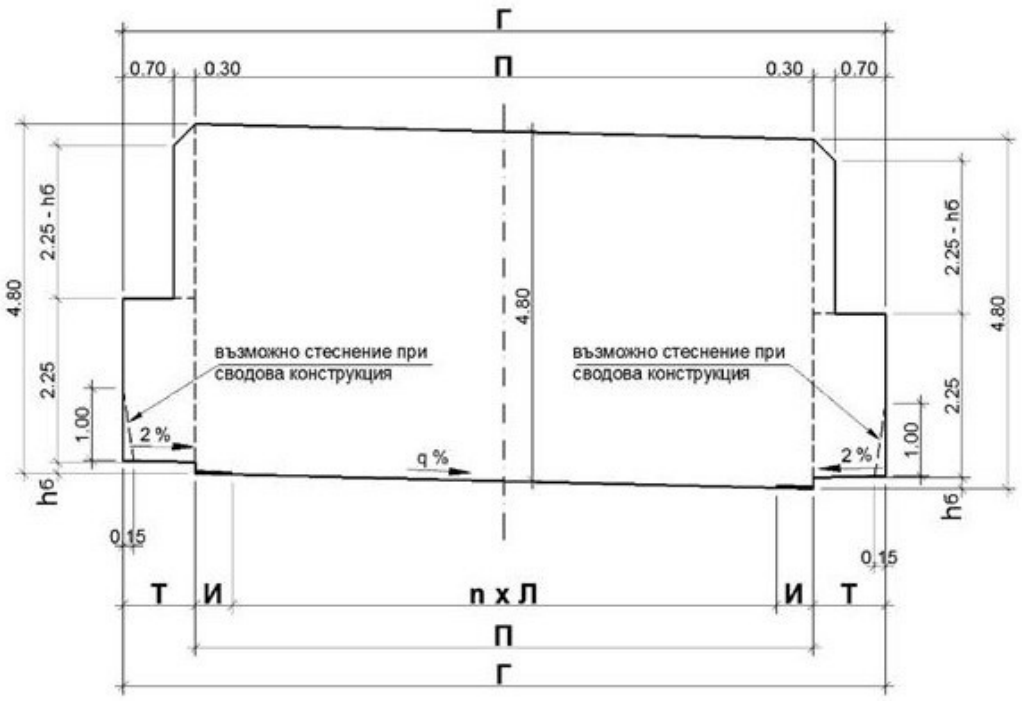
§ 10. In Article 21(3), the word ‘All’ shall be deleted and the word ‘road’ shall be replaced by ‘The road’.

§ 11. Article 23 is amended as follows:

Art. 23. (1) The clearance gauge of the road in road tunnels shall be determined according to the type of carriageway and the radius of the curve (if the tunnel is in a horizontal curve). Deviations from the clearance gauge shall be permitted if it is demonstrated that the tunnel will be able to accommodate the same traffic as in open road sections.

(2) On roads with bidirectional traffic with an additional third lane, the retention of the third lane within the tunnel facility shall be permitted based on the risk analysis.

(3) The clearance gauge of the road for road tunnels in a straight line and in a curve with a radius of curvature of at least 1000 m shall be as shown in Figure 1. 1 and Table 2.



възможно стеснение при сводова конструкция	**possible narrowing in arched construction**
възможно стеснение при сводова конструкция	**possible narrowing in vault construction**

Figure 1. Clearance gauge

Table 2

Class of road/type of carriageway	Horizontal gauge elements in m				
	n x L	n x I	П	n x T	D
AM/G 35.50	3.75+2 x 3.50	2 x 0.50	11.75	2 x 1.00	13.75
AM/D 29.50	2 x 3.75	2 x 0.50	8.50	2 x 1.00	10.50
AM/C 27	3.75+3.50	2 x 0.50	8.25	2 x 1.00	10.25
SP/D 25.50	2 x 3.50	2 x 0.50	8.00	2 x 1.00	10.00
SP/D 23.50	2 x 3.75	2 x 0.50	8.50	2 x 1.00	10.50
Class I/D 20	2 x 3.50	2 x 0.50	8.00	2 x 1.00	10.00
Class I/G 10.50	2 x 3.50	2 x 0.50	8.00	2 x 1.00	10.00
Class II/D 10.50	2 x 3.50	2 x 0.25	7.50	2 x 1.00	9.50
All/D 9.00	2 x 3.00	2 x 0.25	6.50	2 x 1.00	8.50

(4) Where there is a proven need and on the basis of an economic assessment, a 2.5 m wide emergency stopping lane may be added for roads of the classes motorways and express roads.

(5) When repairing existing tunnels, deviations from the specified lane widths shall be permitted, provided they are not less than 3.25 m and a specified safe permissible speed is maintained.

§ 12. Article 24 shall be amended as follows:

‘Article 24. In the case of road tunnels in urban areas with pedestrian traffic, the width of the pavements shall be determined according to the intensity of pedestrian traffic, taking into account the relevant road safety measures.

§ 13. In Article 28(3), the words ‘old declining’ shall be replaced by ‘reinforced’.

§ 14. The following amendments and supplements shall be introduced in Article 29:

1. Sub-paragraph (3) shall be repealed;
2. Sub-paragraph (5) shall be amended as follows:

‘(5) Horizontal curves in tunnels shall be designed with a radius (R) in metres, taking into account the lateral visibility, which is equal to or greater than the stopping distance of vehicles, using the formula:

$$R \geq (\min L_{stop})^2/(8C), \qquad (3)$$

where

$\min L_{stop}$ – the minimum distance for visibility during stopping, in meters, which is equal to or greater than the stopping distance of vehicles (according to the Regulation on the design of roads under Article 36 of the Road Traffic Act)

C – the distance in metres from the driver's eyes to the convex wall of the tunnel; when determining the distance (D), the driver's eyes are assumed to be 1.8 m from the leading strip in the tunnel and 1.10 m above the road surface.

§ 15. Article 30 shall be amended, as follows:

1. Sub-paragraph (2) shall be amended as follows:

‘(2) The location of the portals and the length of the pre-portal sections shall be determined based on topographical and engineering-geological conditions, with portals typically positioned perpendicular to the road axis.’

2. In paragraph 5, the word ‘sloped’ shall be replaced by ‘inclined’.

§ 16. Article 31 shall be amended, as follows:

1. Sub-paragraph (1) shall be amended as follows:

‘(1) Tunnels shall be designed with a longitudinal unilateral or bilateral gradient of not less than 0.3%. The design of concave vertical bends/curves is not allowed, except in special cases (tunnels in urban areas, etc.).

2. In Paragraph 2, the number “400” shall be replaced by ‘500’.

§ 17. In Article 32(1), the second sentence shall be deleted.

§ 18. In Article 33(1), after the word ‘conditions’, a comma shall be inserted and ‘geo-mechanical analysis’ shall be added.

§ 19. Article (34)(1) shall be amended to read as follows:

‘(1) Road links to other roads, car parks, service stations, toll barriers, and other facilities requiring stopping or slowing down of traffic shall be at least 300 m from the portals. Exceptions shall be made, where necessary, in urban areas.’.

§ 20. In Article 93(1)(1), the abbreviation ‘(FH)’ shall be inserted after the words ‘fire hydrants’.

§ 21. In Article 147(6), ‘Article 513’ shall be replaced by ‘Article 508’.

§ 22. In Article 223, the words ‘Table. 6’ shall be replaced by ‘Table’. 7a’.

§ 23. Article 227 shall be amended, as follows:

1. In sub-paragraph 1, the words ‘extra-urban or urban’ shall be replaced by ‘in non-urbanised or urbanised areas’.

2. In sub-paragraph 2, Table 7a shall be amended as follows:

‘Table 7a

Average peak traffic values [pc/km] and traffic flow [pc/h] in one lane

		Average peak traffic values [PCU/km] and traffic flow [PCU/h] in one lane			
		Intercity tunnels			
		Unidirectional traffic		Bidirectional traffic	
Traffic	km/h	PCU/km	PCU/h	PCU/km	PCU/h
Colonial	60	30	1800	23	1400
Difficult	10	70	700–850	60	600
Congestion	0	150	-	150	-
		Average peak traffic values [PCU/km] and traffic flow [PCU/h] in one lane			

		Tunnels in urban areas			
		Unidirectional traffic		Bidirectional traffic	
Traffic	km/h	PCU/km	PCU/h	PCU/km	PCU/h
Colonial	60	33	1980	25	1,500
Difficult	10	100	1000	85	850
Congestion	0	165	-	165	-

‘

§ 24. In Article 231, Tables 8 and 8a shall be amended as follows:

‘Table 8

Limit values for CO concentration (C_{norm}), NO2 and visibility S

Traffic status/operational status	Concentration of		Deterioration of visibility	
			Extinction coefficient* Ke x 10^{-3}	omission S*, at 100 m
	CO [ppm]	NO2 [ppm]	[m-1]	[%]
Column (continuous) movement at peak load at speed 50–100 km/h	70	1	5	60
Hampered by constant stopping and starting, traffic stop on all lanes	70	1	5	60
By exception – permanent stop-and-go traffic, stoppage of traffic on all lanes	100	1	7	50
Continuous maintenance activities in a tunnel not closed to traffic	20	0.5	1	90
***** *The term is clarified in point 3 of Annex 10.*				

Table 8a

Calculation of NOx concentrations depending on the type of means of transport

NO_2/NO_x ratio	PC petrol	PC diesel	LDV petrol	LDV diesel	HGV
Base year 2018	0.05	0.33	0.05	0.32	0.11
Base year 2030	0.05	0.31	0.05	0.31	0.21

‘

§ 25. In Article 235, the words ‘or the NO2 concentration exceeds 3 ppm’ shall be added after the words ‘(229 mg/m3)’.

§ 26. Article 238 shall be repealed.

§ 27. In Article 244, the words ‘for tunnels with unidirectional traffic up to 500 m and tunnels with bidirectional traffic up to 400 m’ shall be replaced by ‘in accordance with the requirements of Table 9’.

§ 28. In Article 251, the words ‘vehicle traffic zone’ shall be replaced by ‘clearance gauge’.

§ 29. In the second sentence of Article 252, the words ‘They may also tolerate changes in the section of the tunnel’ shall be replaced by ‘They are also suitable for tunnels with variable cross-sections’.

§ 30. In Article 282, sub-paragraph 2, Table 10, second column, first row, after the words ‘Maximumheat release rate’, the abbreviations ‘HRRmax, [MW]’ shall be inserted and the abbreviations ‘MW’ shall be deleted.

§ 31. In Article 283, point 2, shall be amended as follows:

(a) Table 11 shall be amended as follows:

‘Table 11

Maximum heat release rate HRRmax, [MW]	Duration of the stages of the fire, [min]		
	at run-up tg	of stationary combustion with HRRmax tmax	of attenuation td
8	5	0	45
15	5	55	15
30	10	50	30
50	10	50	30
100	10	60	20
200	10	60	30

‘

(b) in Table 12, the number ‘400’ shall be replaced by ‘500’ everywhere.

§ 32. Article 290 shall be amended as follows:

‘Article 290. In Table The parameters of the ‘design fire’ (maximum power, smoke flow) shall be given depending on the traffic of lorries. The power of the fire recorded in column 2 of Table. 13, shall be the one by which the ventilation shall be dimensioned. In large spills, the intensity of combustion shall be limited by the influx of air into the fire rather than by the influx of fuel into it.

Table 13

Dimensional power of a standardized design fire

Number of lorries per km per day in a tunnel tube [(LDV+HGV)*km/d]	Maximum power HRRmax of the fire [MW]	Smoke flow rate - 300 °C (smoke emission) Qs [m^3/s]
up to 4 000	30	80
over 4 000	50	120
over 6 000	*Risk analysis and possible increase of fire power to 100 MW and smoke quantity to 200 m^3/s*	

Note: The number of lorries in Table 13 is calculated as the sum of the number of light-duty vehicles (LDV) and heavy-duty vehicles (HGV) in accordance with Article 220.

§ 33. Article 296 shall be amended as follows:

1. In Paragraph 3, the number “400” shall be replaced by “500”.
2. Sub-paragraph (8) shall be repealed;

§ 34. In Article 300, the following subparagraph 6 is inserted:

‘6. in order to prevent recirculation between clean air and exhaust air, the inlets and outlets of the ventilation system must be spaced at least 25 m apart.’

§ 35. In Article 301, Table 16 in the first column, third row, the digit ‘2’ shall be replaced by ‘1’.

§ 36. In Article 314, the words ‘BDS EN 13501-4 +A1:2009’ shall be replaced by ‘BDS EN 13501-4’.

§ 37. In Article 317, the words ‘FE180/E90’ shall be replaced by ‘P/PH90 or protected by construction products ensuring EI90 resistance’.

§ 38. Article 318 shall be amended as follows:

‘Article 318. The jet fans located near the fire site may fail to function. Their number is determined when modeling the impact of fire on ventilation, taking into account the heat resistance of the fans. In the absence of model studies, the distances from the table shall be applied. 17. The terms ‘before’ and ‘after’ in Table. 17 follow the direction of the ventilation flow in the tunnel.

Table 17

Distances at which jet fans are assumed to be destroyed by fire

Heat output of the fire, MW	Distance before the fire [m]	Distance after the fire [m]
5	-	-
20	10	40
30	15	60
50	20	80
100	30	120

‘

§ 39. Article 320 shall be amended as follows:

‘Article 320. The redundancy level of the fans, assumed for the purpose of ventilation design shall be determined for each specific tunnel. In order to ensure efficient operation of the fans in all foreseeable circumstances, the following indicative redundancy levels shall be assumed in the ventilation design:

1. In normal operation, for tunnels with jet fans, 10% of the installed fans shall be considered decommissioned when sizing the ventilation.

2. In the event of a design fire, in addition to the level of redundancy assumed for normal operation, the fans affected (destroyed) by the fire shall be excluded within the distances specified in Article 318.’

§ 40. Article 322 shall be repealed.

§ 41. Article 324 shall be amended as follows:

‘Article 324. The recirculation between the incoming and outgoing air between the two portals of two-pipe tunnels and tunnels with a parallel evacuation tunnel shall be prevented by applying various engineering solutions, for example, the construction of a separation wall between them (Fig. 16a) or distancing of portals (Figure 16b).

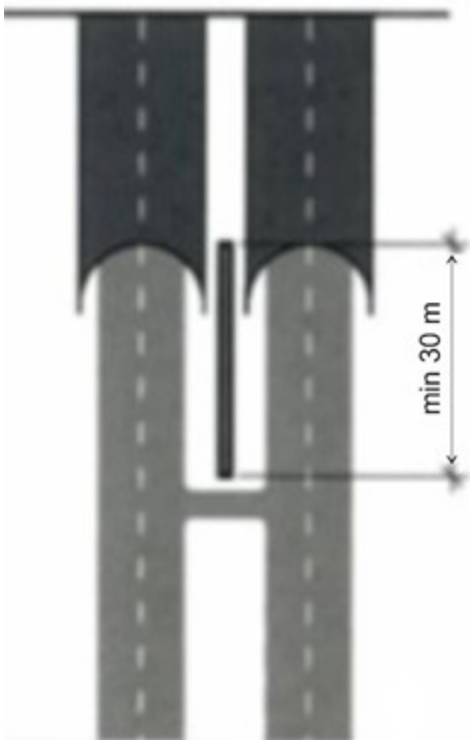


Figure 16a. Building a partition wall between portals

min 30 m

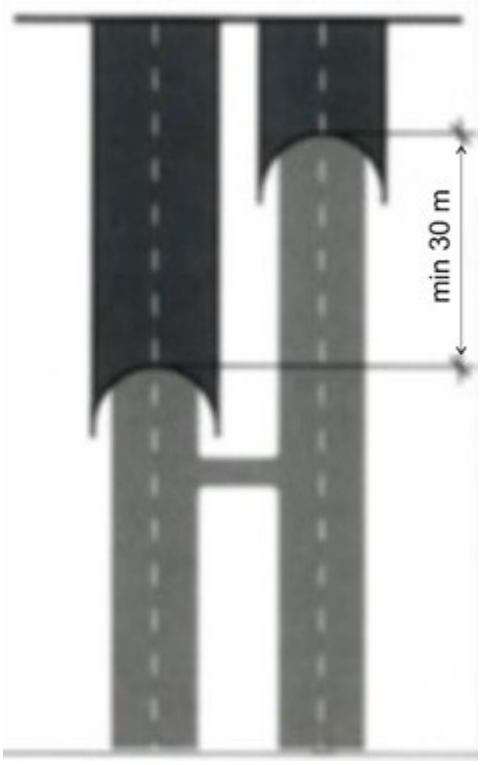
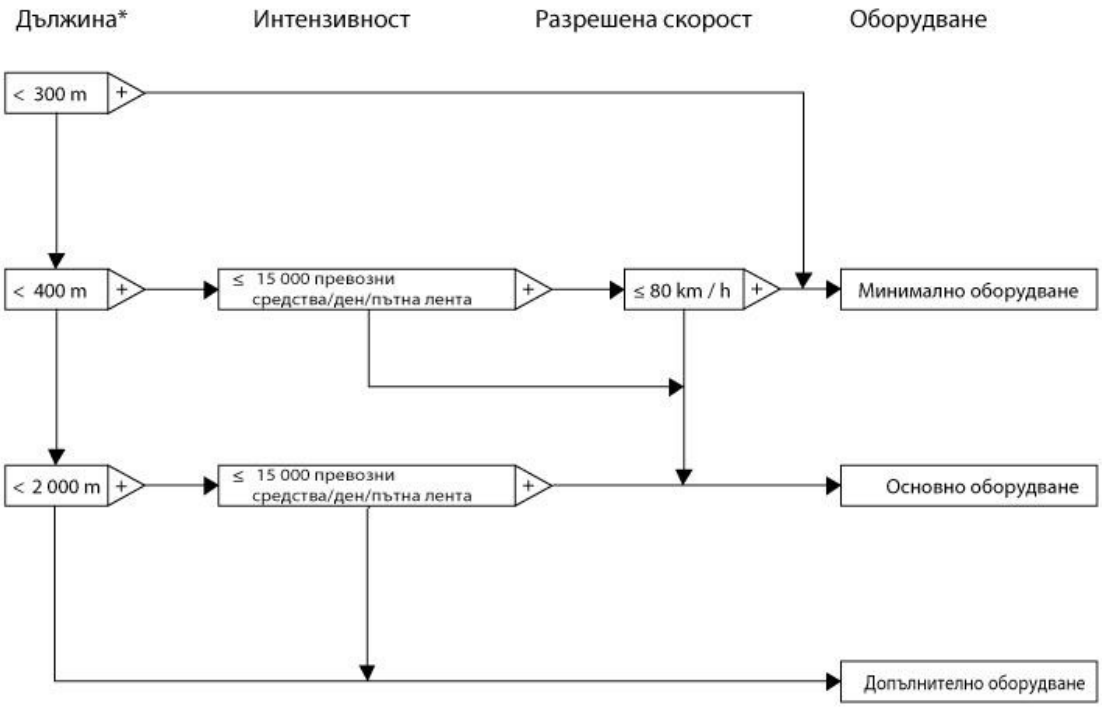


Figure 16б. ‘Distancing of portals.’

min. 30 m

§ 42. Article 420 shall be amended as follows:

‘Article 420. The selection of the appropriate equipment shall be carried out according to Figure 26 with a pre-developed risk analysis. The risk analysis shall also take into account the traffic organisation referred to in Figure 1. 27a, 27b, 27c, 28a, 28b, 28c, 29a, 29b, 29c



* Дължина на тунела, евентуално дължина на поредица от тунели

Дължина*	Length*
Интензивност	Intensity
Разрешена скорост	Permitted speed
Оборудване	Equipment
≤ **15.000** превозни средства/ден/път ма лента	≤ **15.000** vehicles/day/lane
Минимално оборудване	Minimum equipment
≤ 15.000 превозни средства/ден/пътна лента	**≤ 15.000 vehicles/day/lane**
Основно оборудване	Main equipment
Допъл нително оборудва не	Additional equipment
* Дължина на тунела, евентуално дължина на поредица от тунели	* Length of tunnel, possibly length of series of tunnels

Figure 26. Determination of the transport-technical equipment of a tunnel'.

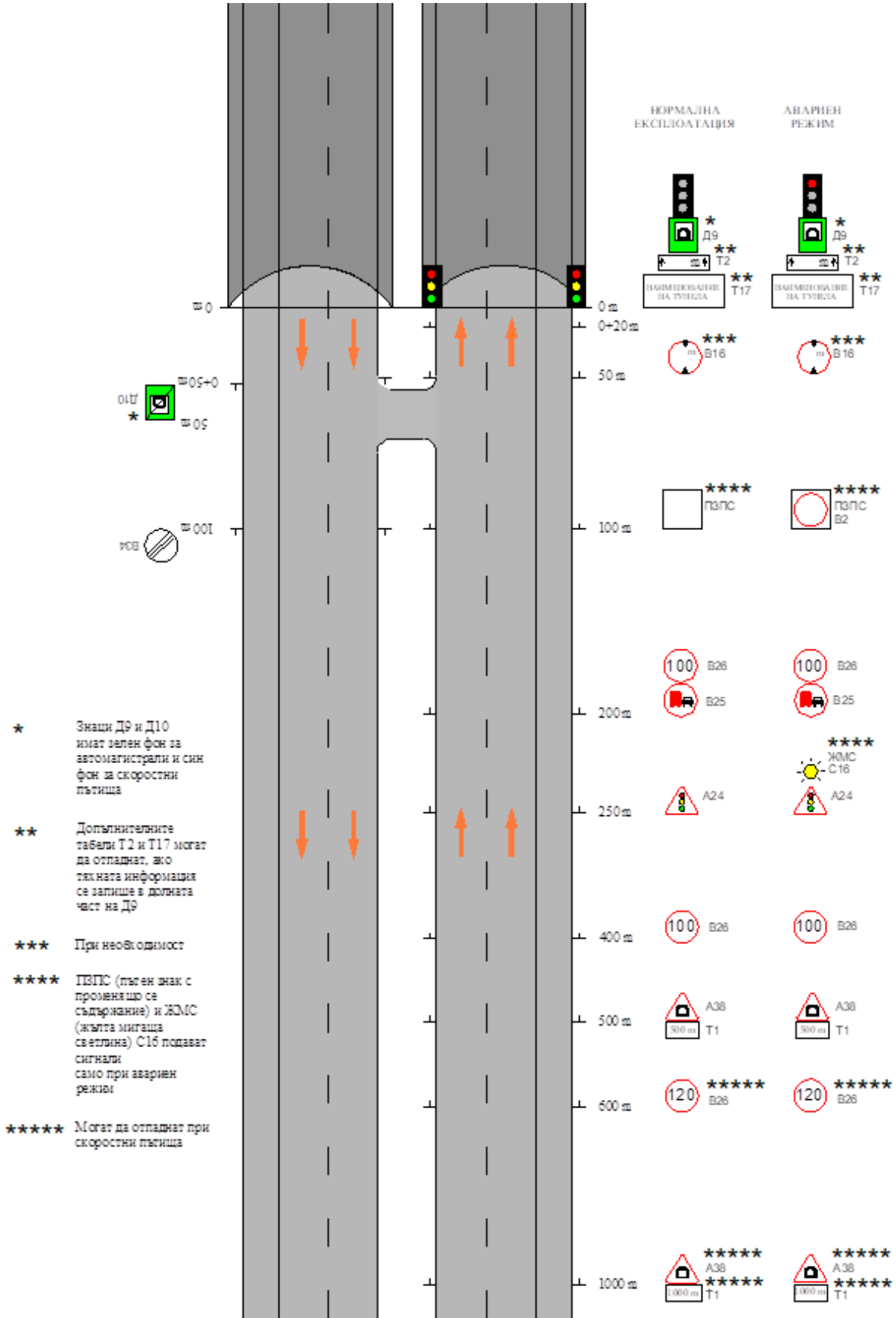
§ 43. The following amendments and supplements shall be introduced in Article 423:

1. In sub-paragraph (1):

(a) the words 'Figure 27' shall be replaced by 'Fig. 27a, Figure 27b and Figure 27c'.

(b) the following Figures 27a, 27b, 27c shall be inserted:

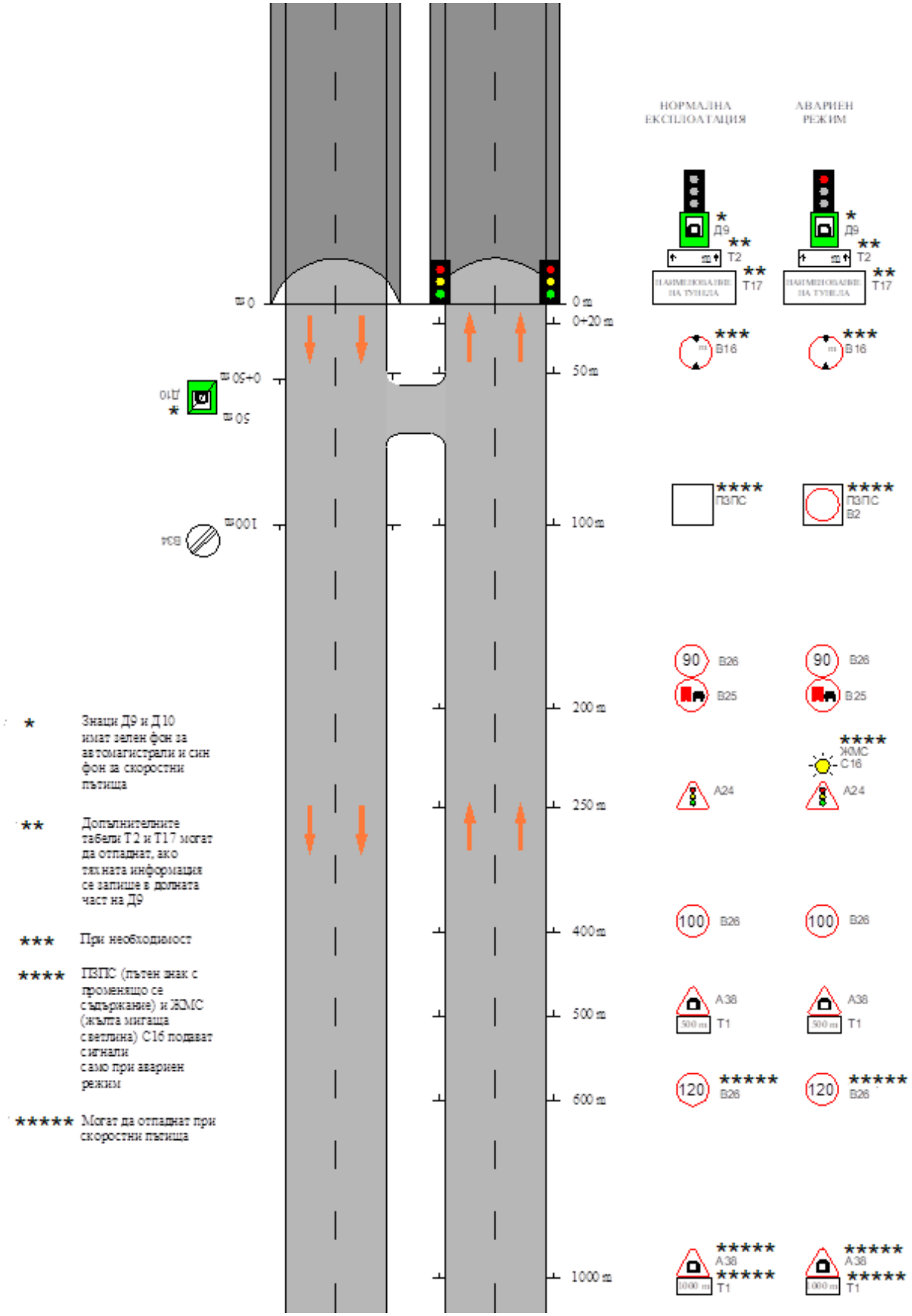
'



* Зие1щД5нД10 KUSTзелен is-: а автомалктралп син ОСН НСКфОТТНК пътища	* SIGNS D9 AND D10 HAVE A GREEN BACKGROUND FOR MOTORWAYS and a blue background for express-ways
** Дагснпопегеопе табели Т2 и Т1"	** The additional plates T2 and T17 can

метат да отпадат, жо сената ннффначи се aanoze в дейната	be omitted, if their information is recorded at the bottom of sign D9
* * * Па- неовсданист	* * * If necessary
**** ГЕТЕОпгенжахс лршеннф се съдардЕкне) и АМС (жнт мигаха светлина) С1т издават сигнали	**** CTS (controlled traffic sign) and YFL (yellow flashing light)' C16 send signals
само при а^арзЕЕ режим	in emergency mode
***** Метат да складат прм сжярктни лвпода	***** May be dropped on express-ways

Figure 27a. Minimum equipment of the traffic light system
in unidirectional traffic and the presence of an emergency stopping lane



* Знаци Д9 и Д10 имат зелен фон за автомагистрали и син фон за скоростни пътища

** Допълнителните табели Т2 и Т17 могат да отпаднат, ако тяхната информация се запише в долната част на Д9

*** При необходимост

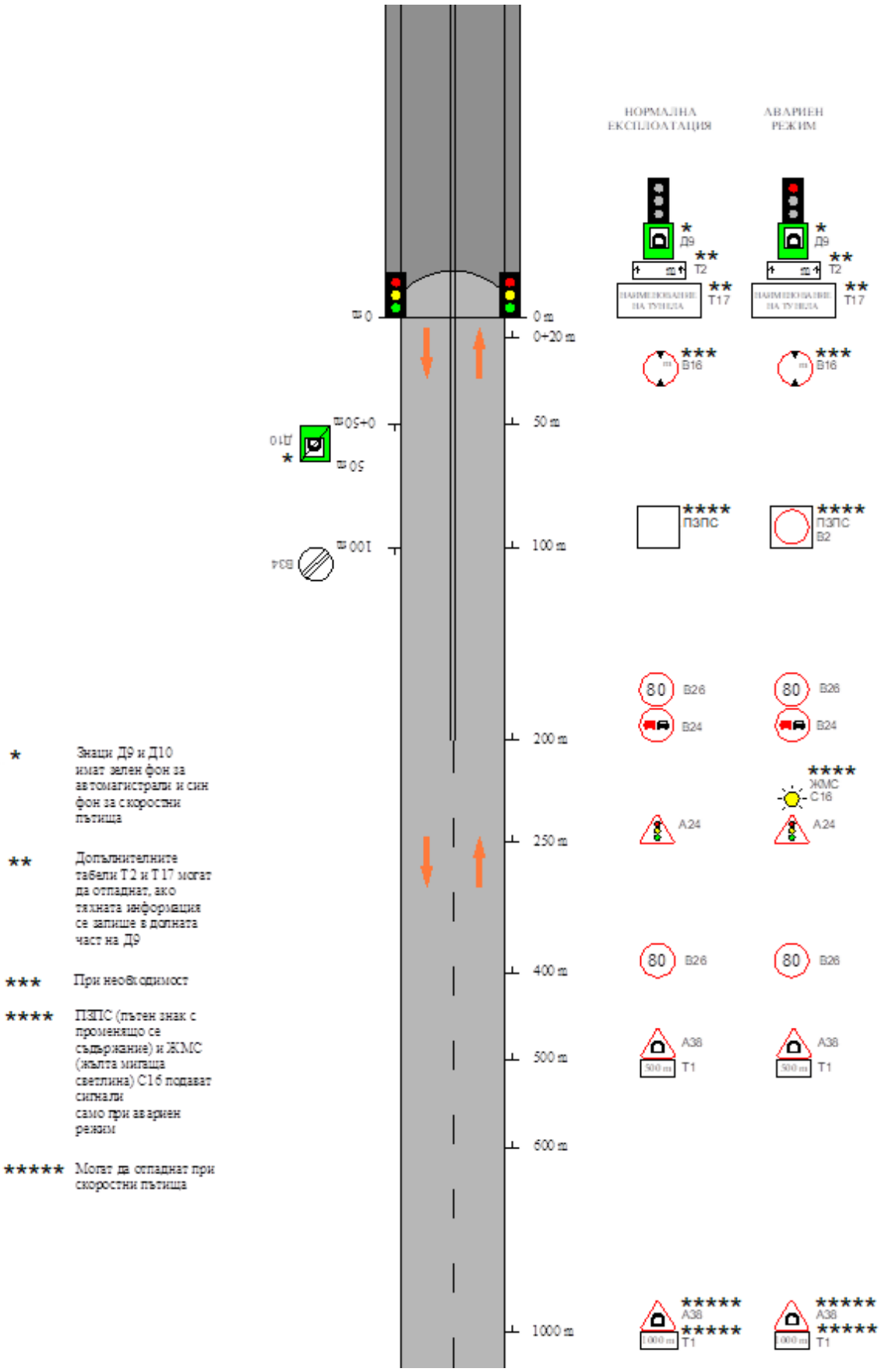
**** ПЗПС (пътен знак с променящо се съдържание) и ЖМС (жълта мигаща светлина) С16 подават сигнали само при аварийен режим

***** Могат да отпаднат при скоростни пътища

* ЗлнциД9иД10 късат зелен фон за азтшагистсЕлк : син ООН К ОО&рКТНК ГЪТКЩа	* Signs D9 and D10 have a green background for motorways and a blue background for express-ways
** Дотплнитаките таБепнТ3 нТ17 мета?	** The additional plates T2 and T17 can be omitted,

Д= ОТПЕЖаТ. ЕЕС ТЕЖата ЖТССИЕЖЕ се запише з долната чест на Д9	if their information is recorded at the bottom of sign D9
* * * Пж нвойидашкг	* * * If necessary
* * * * ГЕГС (пътен жак с зрсаенящо се СдаСтасН:— HJ&MC (жълта мигаща светлоо) С1г nc-jEsac СЖНЕЛЕ	* * * * RSCC (road sign with changing content) and YFL (yellow flashing light) C16 send signals
CS1D 1фН ЗЕриеН режкм	in emergency mode
***** Метат да отпаднат при скоростни лъгнща	***** May be dropped on express ways

Figure 27b. Minimum equipment of the traffic light system
in unidirectional traffic without an emergency stopping lane



* Знаци Д9 и Д10 имат зелен фон за автомагистрали и син фон за скоростни пътища

** Допълнителните табели Т2 и Т17 могат да отпаднат, ако тяхната информация се запише в долната част на Д9

*** При необходимост

**** ПЗПС (пътен знак с променящо се съдържание) и ЖМС (жълта мигаща светлина) С16 подават сигнали само при аварийен режим

***** Могат да отпаднат при скоростни пътища

* жциДЗнДЮ ни =т зел ен ODE ха езгаЕагокзрик Е СЕЕ ±ОЕ ЗлСЗЯК-СЖН ИЪТНЩЕ.	* Signs D9 and D10 have a green background for motorways and a blue background for express-ways
* * Дапивояепките табели Т 2 и Т Г акта? да стада.-аco	* * The additional plates T2 and T17 can be omitted, if their

паота ифодовтан се аташе е делнете част не Д ?	information is recorded at the bottom of sign D9
*** При нжвсцвдюст	*** If necessary
* * * * ПЗПС (пътен знае с	* * * * RSCC (road sign with changing content)
прсисенЕцо се съдърнанне) е НМС (жълта питаха светлина) С1 б издаат ООНеЛЕ	and YFL (yellow flashing light) C16 send signals
сан» фи авариен режкн	in emergency mode
***** ХЬМЕТ ДЕ ТЪП=ГН=71фЕ скоростни пъ1нца	***** May be dropped on express ways

Figure 27в. Minimum equipment of the traffic light system in bidirectional traffic‘.

2. Sub-paragraph (3) shall be amended as follows:

‘(3) Signalling with road signs before and in road tunnels shall comply with the requirements of the Regulation on the signalling of roads with road signs under Article 14(1) of the Road Traffic Act (RTA) and BDS 1517 ‘Road signs’. Dimensions and font‘.

3. In sub-paragraph 5, Figure 27 shall be deleted;

4. Sub-paragraph 6, point 1 shall be amended as follows:

‘1. Road signs B25 and B26 shall be placed at a distance of 200 m before the tunnel with unidirectional traffic, in accordance with the requirements of Article 16(3)(1)(a) and (b).

§ 44. In Article 424(5), the words ‘Regulation No 2 of 2001 on the signalling of roads with road markings (SG, issue No 13 of 2001)’ shall be replaced by ‘the Regulation on the signalling of roads with road markings under Article 14(1) of the ‘RTA’.

§ 45. In Article (425)(1), the figure ‘400’ shall be replaced by ‘500’.

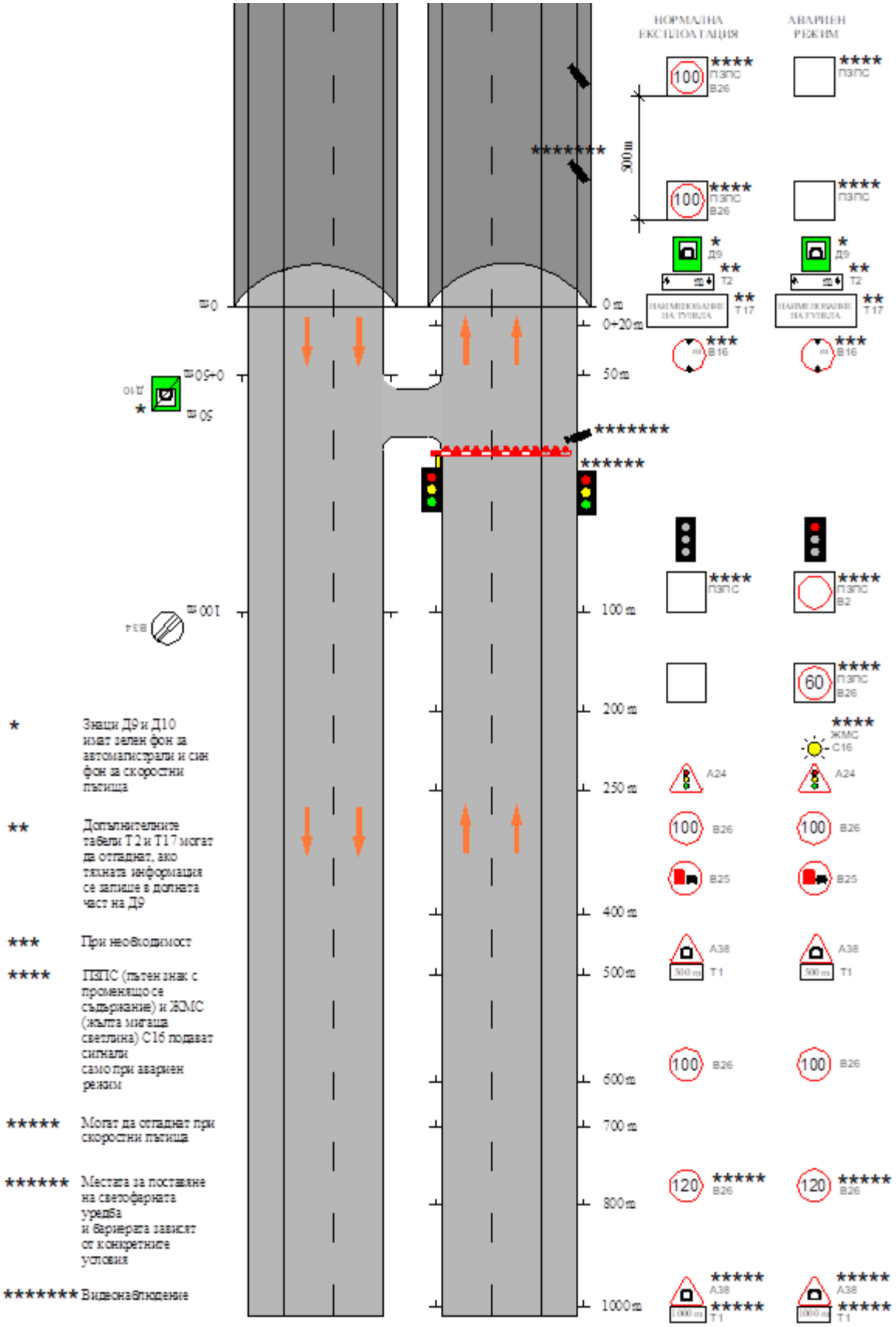
§ 46. The following amendments and supplements shall be introduced in Article 426:

1. In sub-paragraph (1):

(a) the words ‘Figure 28’ shall be replaced by ‘Figure 28a, Figure 28b and Figure 28c’.

(b) the following figures shall be inserted: 28a, 28b, 28c:

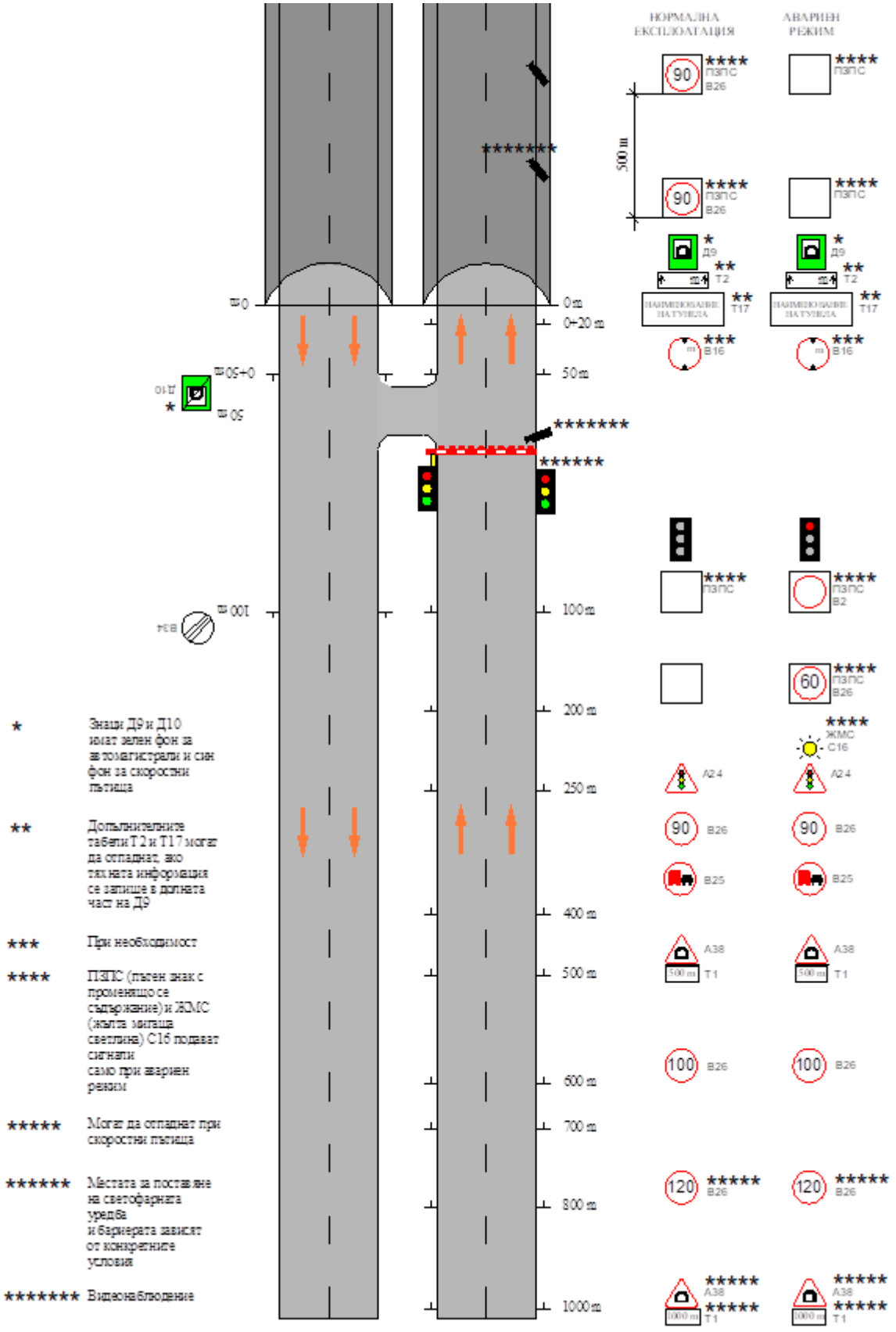
‘



* ЗЗЕЩЕДЗЕДЮ HSBT ZSEE OOH z с£ТСЕЛгСфсЛ£ Е СИ- дан ж сжсростии 1ГШШ@	* SIGNS D9 AND D10 HAVE A GREEN BACKGROUND FOR MOTORWAYS AND A BLUE BACKGROUND FOR EXPRESS-WAYS
** Датнпктепнкзв тайни Т2и ТГ могат да	** The additional plates T2 and T17 can be omitted,

спЕщнат. жо TXXHZS ЗЕЕТССбгапаа Ой ЕЛЕШЕ В ДОГЛЕТс чзсткаД9	if their information is recorded at the bottom of sign D9
*** ПрИЖОВЕОДЕМСЕТ	*** If necessary
**** ШП С (пътен анж с лраьЕЕЕдасв **СЬДЬрйЕЮЕ) Е ЖМС** (жълта доазф светлина) С15 издават опнак	**** RSCC (road sign with changing content) and YFL (yellow flashing light) C16 send signals
СЕМОГЖ аварввд режим	in emergency mode
***** Могат да спаднат при CBDfXXTHH ГЗП-ZiE	***** May be dropped on express ways
****** Местна: = шзлжкне Е а свежфршяз	****** The locations for placing the traffic light system and the barrier
УОКЕЕЕ	depend on the specific conditions
********* ВлдезЕ&Впада-Зсе**	********* Video surveillance**

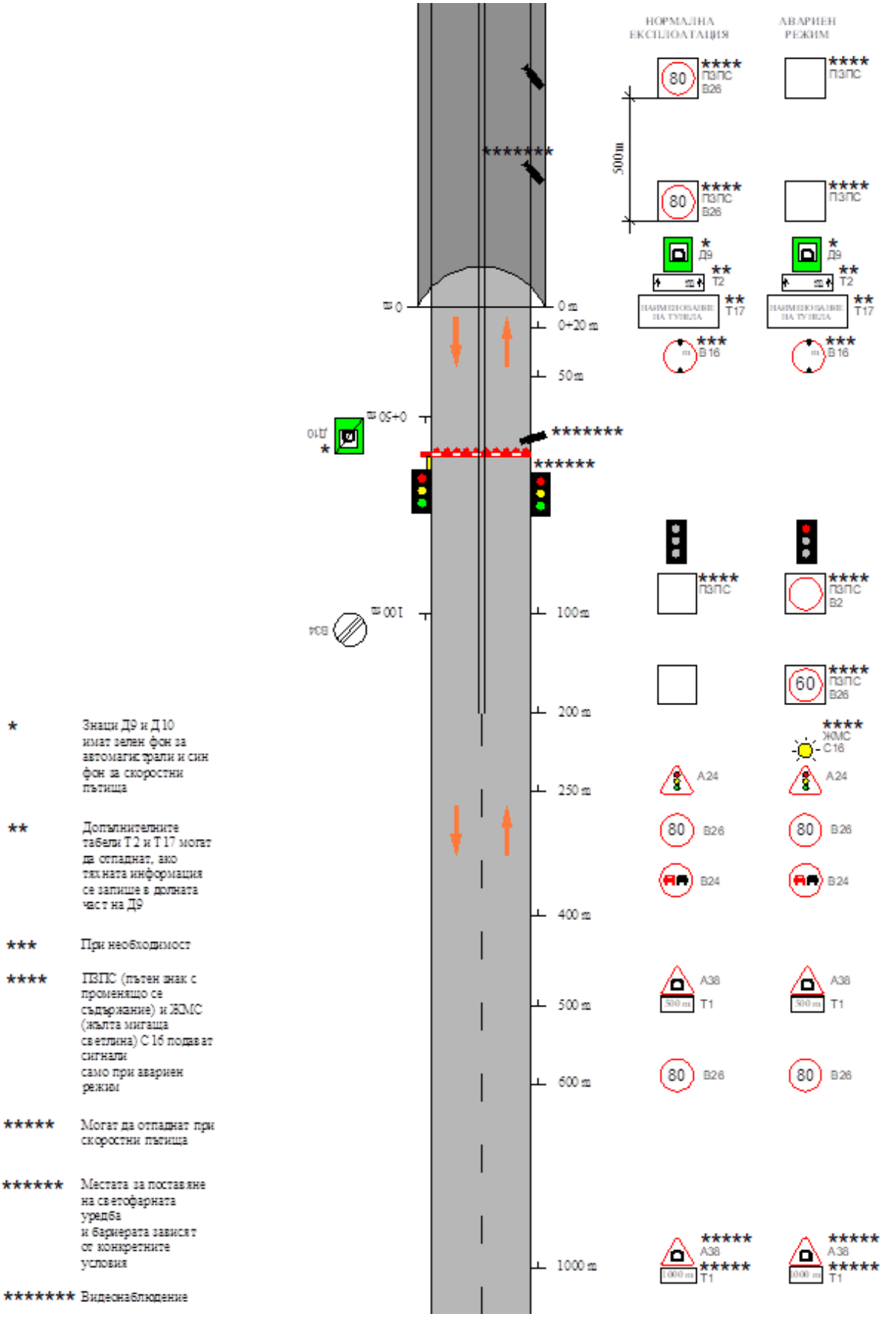
Figure 28a. Main equipment of the traffic light system
in unidirectional traffic and the presence of an emergency stopping lane



* жщ:ДькД10 JBET КЛЕН ф0Н ZE. ЯЖИЕПСТрВЛК К СЖ опи за оирссзж	* Signs D9 and D10 have a green background for motorways and a blue background for express-ways
** Допълнели™ таВзшТЗ н Т1" дога даопЕЗШХ жо	** The additional plates T2 and T17 can be omitted, if their

ТЕЛЕТЕ. ЗЕИСХЗЕЦ^ се зашше s легнете частна^	information is recorded at the bottom of sign D9
*** 1Ък необквЕШКТ tiiti ПЗПС (пкен знак с	*** If necessary
зфогежщосе седеРйжЕ9)е ЖМС (жита мпЕБЕ свеовов) С15 издават сегеже	**** RSCC (road sign with changing content) and YFL (yellow flashing light)
CEiD фЕ ВК-ЗЕЕ рзкнм	C16 send signals in emergency mode
***** Msra да сзсщщет при	***** May be dropped on express ways
□жхтне напада	
****** IfeciarE. s r-хтЕ ne }дада	****** The locations for placing the traffic light system and the barrier
Е Бзр&звта SECT от KoogsraDS ЗОКЖН1	depend on the specific conditions
******* ВжюзвЕпюданк	******* Video surveillance

Figure 28b. Main equipment of the traffic light system
in unidirectional traffic without an emergency stopping lane



* Знаци Д9 и Д10 имат зелен фон за автомагистрали и син фон за скоростни пътища

** Допълнителните табели Т 2 и Т 17 могат да отпаднат, ако тяхната информация се запише в долната част на Д9

*** При необходимост

**** ПЗПС (пътен знак с променящо се съдържание) и ЖМС (жълта мигаща светлина) С 16 подават сигнали само при аварийен режим

***** Могат да отпаднат при скоростни пътища

****** Местата за поставяне на светофарната уредба и бариерата зависят от конкретните условия

******* Видеонаблюдение

* Знаци Д? и Д10 ЕМ2Т ЗеЛЕН МК 3£ ЖНПЕИНЕфгПН Е СИН **ООН si скоростни: пътища**	* Signs D9 and D10 **have a green background for motorways and a blue background for express-ways**
** Допнтинтепюсе та Бели Т 2 Е Т Г и СПТ	** The additional plates T2 and T17 can be omitted,

IE ZmZHZT. 300 тяхната индормъциЕ се заовЕше в югната -■ЕстнаД?	if their information is recorded at the bottom of sign D9
*** ПСЕ неоЕяадЕя:осг ШП2 (пътен з-ак с	*** If necessary
лршенпцо се съдеряЕние) Е лМС {жълта мигаща свепжзи) С15 поща ат **СЕГНсЛЕ**	**** RSCC (road sign with changing content) and YFL (yellow flashing light) C16 send signals
само щж даарнен режим	in emergency mode
***** Могат да отпадаат ЕСЕ	***** May be dropped
СКОрХТНЕ ПЕЕЕЩа	**on express ways**
****** Местата за поставяне	****** The locations for placing
на сзетясарЕата уредБа	the traffic light system
Е Бариевата зависят ос конкретните VOTSES	and the barrier depend on the specific conditions
******* ВндеанЕБПнщенне	******* Video surveillance
НОРМАЛНА	**NORMAL**
I-КС ILJOA I A1Ц1Н	**EXPLOATATION**
АВАРИЕН РЕЖИМ	**EMERGENCY MODE**
****** пале 526**	******RSCC**

Figure 28в. Main equipment of the traffic light system
in bidirectional traffic.

2. Sub-paragraph (3) shall be amended as follows:

‘(3) Road signs with changing content (RSCC) before the road tunnel serve to reduce speed and prohibit overtaking in accidents, breakdowns, and other emergency situations. In a road tunnel of more than 1 000 m in length, RSCC containing traffic prohibitions shall be repeated every 500 m, and an additional T2 plate may indicate the distance to the end of the prohibition.

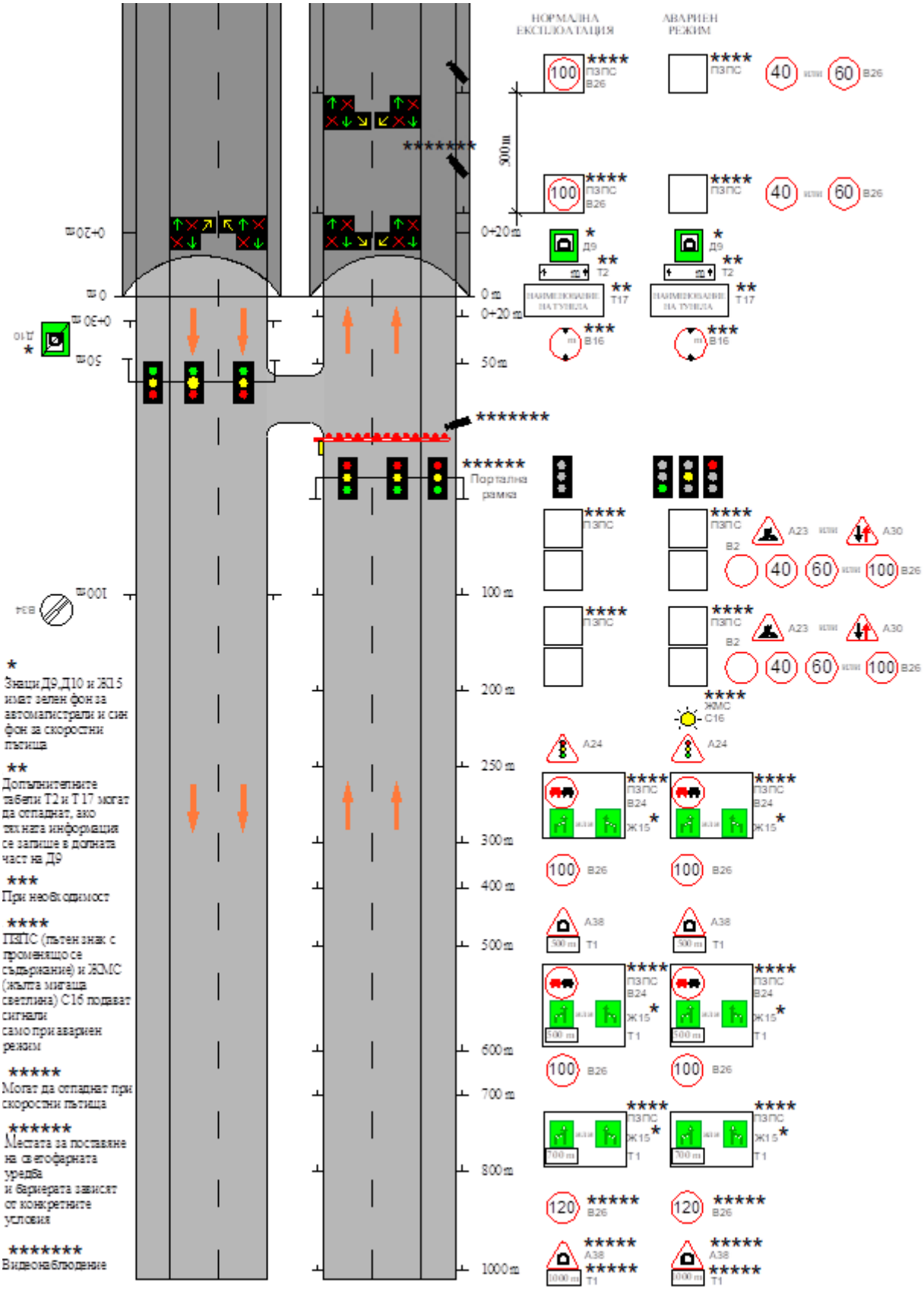
§ 47. The following amendments and supplements shall be introduced in Article 428:

1. In sub-paragraph (1):

(a) the words ‘Figure 29’ shall be replaced by ‘Figure 29a, Figure 29b and Figure 29c’.

(b) the following figures 29a, 29b, 29c shall be inserted:

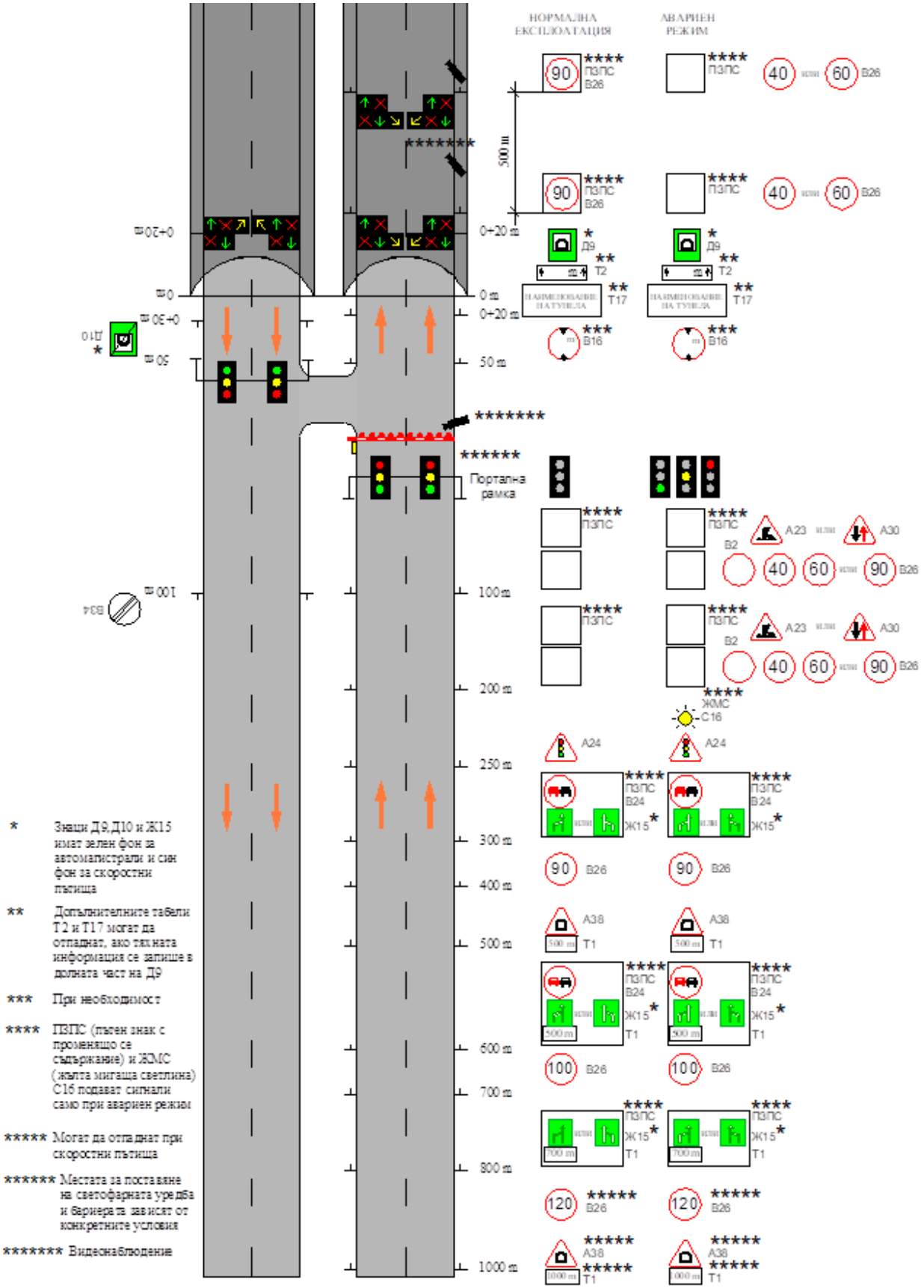
‘



ЗтсщиДЯДЮи^В НЬЕ7 ЗЯЕЕ ООН: =	=
ЕЗ^ЕЛЕСТрЕЛЕ Е ОК z z: z ашрхзЕИ IZZOZ	
ДОПНГСЕГЗПЕЕС* zfianc Т2Е Т Г мсггт	
ДЕ ZCHiflEiT. 2Ю	2Ю
Z. НГ= Н-фррЬЕЦЕЕ ze загасни в ДОПЕЕ z чноиде	

Па- нщ&сдаккт	
ШПС (пътен жж с фшаащасЕ Zilba-ZrlET/ и л3ЕС >ZnZi шжш зкстпшв) Cl 5 nzjzzz □отспи	
□Емопркзвзрвен реят	
Mezz д= апвдгат па- □аарааки яшпшр	

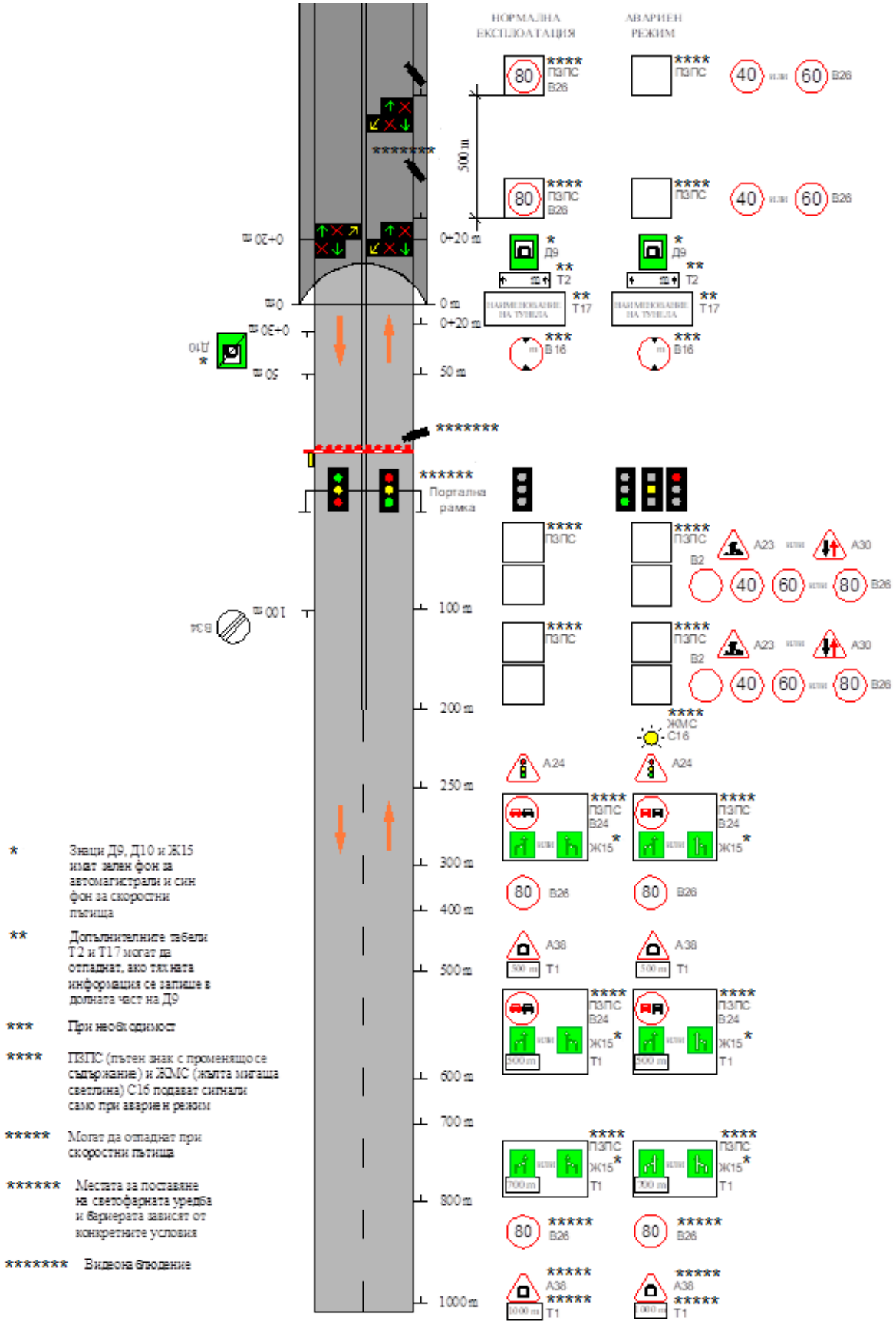
Figure 29a. Additional equipment of the traffic light system
in unidirectional traffic and the presence of an emergency stopping lane



* ЗзазщД^ДЮнШЗ ЕЯлТ £ДЕН МК а азтоАйЗЕ-ттрели ЕСЕН дан: = скоростни пасища	* Signs D9 and D10 have a green background for motorways and a blue background for express-ways
** Дагьлштелкие тз&пе Т2 итП могаода отпадна.	** The additional plates T2 and T17 can be omitted, if their

а® тяхната №i)$cpiai\№i се Елкше е ЮЛЕ= 7= '- ЕОТ на Д г	information is recorded at the bottom of sign D9
*** ПрЕ ЗЗДБЕВДПМКТ	*** If necessary
**** ШП2 {пътен: жак с ЩХПЕКЕЩО се •задържан»} е j=CMC (жнгта мигаща савтпина) CIS ПСДаЪЕТ СЕІНсЈІЕ само при ан-ариен рехш	**** RSCC (road sign with changing content) and YFL (yellow flashing light) C16 send signals in emergency mode
***** Могат да оттаднас при акфосгнн пътища	***** May be dropped on express ways
******# Месата: = лнстзинй за светод^иата уредаа]■ Бариерата шнслсс юзщретн-пе условна	****** The locations for placing the traffic light system and the barrier depend on the specific conditions
******** Вндея£Е?ЕпюдеюЕ	******** Video surveillance
НОРМАЛНА	**NORMAL**

Figure 29б. Additional equipment of the traffic light system in unidirectional traffic without an emergency stopping lane



*jnm: Д?. Д10 е Z15	* Signs D9 and D10 have a green background
ЕЛЕТ зави дан е ЕЕТОМйПСТрЕЛИ Е СЕЕ □ж за оирасни	for motorways and a blue background for express-ways

** Джълюгагсюое -5=ле Т2 иТ17миетде	** The additional plates T2 and T17 can be omitted,
ОТЕсДЕс“ ЕХО ПИЕТЕ ЕНффШЦИ! СЕ запаши в датата -Е“ не Д ?	if their information is recorded at the bottom of sign D9
***** Пркжу&адЕмкт**	***** If necessary**
**** IEIE (пътен жех с щхжвдшдосе	**** RSCC (road sign with changing content)
ТЖТСлНЕЗЕ} Е ЖМС (жита МИЕЩЕ езеТЛЕЕЕ} С15 1КДЕЕЕТ СЕ1НЕЛЕ сама при зо(»ен равни	and YFL (yellow flashing light) C16 send signals in emergency mode
******* МсМЕТ ДЕ ОСЯЕД1ЕТЕСЕ СКОРОСТЕН ПЬТНЦЕ**	******* May be dropped on express ways**
****** Местата: = eocesehs is аяофв|ниа jpaj^is Е £рнер=7= ЕЮКИ ОТ кошретяЕтг успива!	****** The locations for placing the traffic light system and the barrier depend on the specific conditions
******* Еejвое. йжвднний	******* Video surveillance
номдЛНл	

Figure 29в. Additional equipment for the traffic light system in bidirectional traffic’.

2. In sub-pagraph 4, Figure 29 shall be deleted;

§ 48. In Article 430(3), the first sentence shall be amended as follows:

‘In the road tunnel, the signals of two-section traffic lights above the traffic lanes with consecutive light signals (non-flashing lights), in accordance with the Regulation on the signalling of roads with traffic lights under Article 14(1) of the RTA or a flashing yellow light pointing left and/or right and downward arrows at a 45° inclination, shall operate synchronously with the signalling before the tunnel.’

§ 49. In Article 437(3), a comma is inserted after the word ‘hydrants’ and the following shall be added: ‘АСПГИ’.

§ 50. Article 441 shall be amended as follows:

‘Article 441. To satisfy the basic requirement for fire safety under Art. 169, para. 1, item 2 of the Spatial Planning Act, products with assessed and certified compliance with the essential requirements, defined by the regulations under the Act on Technical Requirements for Products, shall be envisaged and used in construction projects. Construction products shall be accompanied by the documents referred to in Regulation No RD-02-20-1 of 2015.’

§ 51. Article 443 shall be amended, as follows:

1. In point 2, the words in brackets ‘connecting gallery (Figure 31b’ shall be replaced by ‘connecting gallery (Fig. 31(b)’;

2. In point 11, after the words ‘the tunnel pipe’, the words ‘under point 1’ shall be added, the words ‘in accordance with point 1’ shall be deleted and the words ‘under point 2’ shall be added.

§ 52. In Article 462, ‘20’ is replaced by ‘15’.

§ 53. In Article 467, the words ‘shall be displayed’ shall be replaced by ‘shall protrude’.

§ 54. In Article 473, the words ‘BDS EN 13501-1 ‘Fire classification of construction products and building elements Part 1: Classification using data from reaction to fire tests’ shall be replaced by ‘the BDS EN 13501 series of standards, delegated regulations’.

§ 55. In Article 480, after the words ‘BDS EN 13501’, a comma shall be inserted and ‘delegated regulations’ shall be added.

§ 56. In Article 481, the word ‘fireproof’ shall be replaced by ‘fire.’

§ 57. In Article 486, Table 19 shall be amended to read as follows:

‘Table 19

Number	Designation of structure or element	Tunnel categories		Fire-resistance criterion *
		I	II [1]	
		fire resistance [min]		
1.	Supporting structures ensuring the stability of the tunnel tube or part thereof	90	120 [2] (180)[3]	R
2.	Bearing structures which do not guarantee the stability of the tunnel tube or part thereof	90	120 [2] (180)[3]	R
3.	Fire protection barriers (walls, ceilings, etc.)	90	120 [2] (180)[3]	EI
4.	Fire doors and shutters in fire barriers other than numbers 5 and 6	60	90	EW
5.	Fire doors to a protected escape route equipped with a self-closing mechanism	90	90	EI,C3 [4]
6.	Sliding fire protection doors or fire protection doors with servo mechanism to a protected escape route	90	90	EI
7.	Fire dampers and smoke control dampers	60	90	EI-S
8.	Structures separating ventilation shafts from the tunnel tube	90	120	R
9.	Ventilation ducts, shafts and air ducts of emergency ventilation	90	90	EI

[1] The fire resistance in this column applies only to sections of tunnels classified as Category II.

[2] The fire resistance of these structures shall be assessed in accordance with the modified hydrocarbon curve.

[3] In the case of the movement of vehicles with dangerous goods in accordance with the ADR, a fire resistance value of 180 minutes on the modified hydrocarbon curve is required, if this requirement is stipulated by the risk analysis.

[4] The durability requirement for self-closure in accordance with Commission Delegated Regulation (EU) 2024/1681 of 6 March 2024 supplementing Regulation (EU) No 305/2011 of the European Parliament and of the Council by establishing classes of performance in relation to the resistance to fire of construction products (OJ L 2024/1681, 13.6.2024), is not mandatory for sliding doors.

* According to the BDS EN 13501 series of standards.

§ 58. In Article 489, after the words ‘comply with the requirements of’, shall be inserted ‘the series of standards’.

§ 59. In Article 491, ‘400’ is replaced by ‘500’.

§ 60. In Article 493, ‘400’ is replaced by ‘500’.

§ 61. In Article 496, the word ‘measurement’ shall be replaced by ‘measuring’.

§ 62. In Chapter Eleven, the title of Section VI shall be amended as follows:

‘Automatic fixed fire-extinguishing installations, water supply for tunnel fire-extinguishing and fire-extinguishing equipment’.

§ 63. Article 500 shall be amended as follows:

‘Article 500. (1) Automatic fixed water-based fire-extinguishing systems, including systems for flooding, water mist or foam, shall be applied where their need has been established in accordance with the tunnel risk analysis referred to in Article 16(1). Automatic fixed fire-extinguishing systems may complement safety systems in tunnels longer than 3000 m with one-way traffic or longer than 1200 m with two-way traffic, with a design fire maximum heat release rate (HRRmax) of 100 [MW] or more.

(2) The requirements of BDS EN 12845 ‘Fixed firefighting systems’ shall apply to the design of automatic fixed fire-extinguishing systems for flooding or foaming in road tunnels. Automatic sprinkler installations. Design, installation and maintenance’, CEN/TS 14816 ‘Fixed fire-extinguishing systems. Water-spreading installations. Design, installation and maintenance’ and BDS EN 13565-2 ‘Fixed firefighting systems. Foam installations. Part 2: Design, construction and maintenance’. The automatic fixed fire-extinguishing system shall be designed in compliance with the information and limitations obtained from representative fire test reports carried out by an accredited laboratory and from the DIOM, the manufacturer’s manual.

(3) The requirements of BDS EN 14972-1 ‘AFFEI’ shall be complied with when designing water mist FFS. Water mist systems Part 1: Design, installation, inspection and maintenance’ and BDS EN ISO 12100 ‘Safety of machinery - General principles for design Risk assessment and risk reduction’.

(4) Fire tests for water mist AFFEI shall be conducted in accordance with the guidelines referred to in Annex A of BDS EN 14972-1. All design parameters and limitations for the operation of the installation shall be determined in accordance with the information and limitations obtained from the representative fire test reports as well as from the manufacturer's Design, Installation, Operation and Maintenance Manual (DIOM).

(5) When designing water-based AFFEI, including systems for flooding, water mist, or foam, a recalculation of the required parameters of fire ventilation may be made, taking into account the change in temperature conditions when activating AFFEI in the event of a fire and the unimpeded operation of both installations.

§ 64. Article 501 shall be amended as follows:

‘Article 501. When designing water-based AFFEI, including systems for flooding, water mist, or foam, the installation gauges in the road tunnel shall be taken into account.

§ 65. Article 502 shall be amended as follows:

‘Article 502. Automatic fixed water-based fire-extinguishing installations, including flooding, mist or foam systems, designed for the road tunnel shall provide:

1. reduction of the design maximum heat release rate (HRRmax) of the fire;

2. halting or significantly delaying the spread of the fire;

3. significant volumetric cooling of combustion products and direct cooling of structural components and equipment without direct influence on the rate of heat release.’

§ 66. Article 503 shall be amended as follows:

‘Article 503. The minimum duration of water-based AFFEI, including flooding, mist, or foam systems, shall be not less than 1 hour after activation.’.

§ 67. Article 504 shall be amended as follows:

‘Article 504. (1) Where the necessary water supply for water-based AFFEI, including systems for flooding, water mist or foam, cannot be provided by a water supply system, one or more water tanks and pump modules shall be provided to ensure the necessary minimum flow and pressure of the installations under the conditions of independent water supply for fire-fighting, as defined by the requirements of the standards and standardisation document referred to in Article 500(2) and (3) and the manufacturer’s DIOM-manual/instructions..

(2) Where fire-fighting tanks and pumping stations are provided outside the tunnel, they shall be located at a distance of not more than 150 m from each of the tunnel portals.

(3) In the absence of technical capability to meet the requirement under paragraph 2, the design of one fire-fighting tank and one pumping station shall be permitted, provided they are located at a distance of no more than 150 m from only one portal of the tunnel.

(4) Operating fire pump modules shall be provided with spare fire pump modules at 100% and shall be electrically powered from two independent sources with automatic switching.

(5) Fire-fighting water tanks shall be ventilated with ventilation pipes.

(6) Fire-fighting tanks, pumping stations and water mains for fire-fighting shall be protected against freezing.

(7) The material of the fire mains and their attachment in the tunnel shall be corrosion resistant, in accordance with the requirements of BDS EN 10217-7 ‘Welded steel tubes for pressure purposes - Technical delivery conditions Part 7: Stainless steel tubes‘.

§ 68. Article 505 shall be amended as follows:

‘Article 505. The acceptance criteria for AFFEI for flooding or foaming shall comply with the requirements of the manufacturer’s instructions.’.

§ 69. Article 506 shall be amended as follows:

‘Article 506. The criteria for accepting AFFEI with water mist shall be in accordance with § 8 of BDS EN 14972-1 and the DIOM‘.

§ 70. Article 507 shall be amended as follows:

‘Article 507. Water supply for fire-fighting in road tunnels includes:

1. water source;
2. pumping station with fire pump modules;
3. fire main for fire-fighting in the tunnel;
4. connection points of the fire main with the fire hydrant;
5. filling stations. ‘.

§ 71. Article 508 shall be amended as follows:

‘Article 508. (1) For road tunnels with unidirectional traffic and a length of more than 500 m, at least one fire main with PC shall be provided in each traffic tunnel tube.

(2) In road tunnels with a single tunnel tube for bidirectional traffic and a length of more than 500 m, one fire main with a hydrant on each side of the roadway shall be provided.

(3) For the supply of water from fire mains for fire-extinguishing in the tunnel, above-ground fire hydrants (according to BDS EN 14384 ‘Pillar fire hydrants’) with a nominal diameter of DN 80 and with a minimum of two outlets with a nominal diameter of not less than 65 mm each, equipped with ‘Storz’ connectors, shall be designed. Fire hydrants shall be located in protected positions in the tunnel at a height from the level of the road sidewalks to the centre of the hydrant outlets of not less than 0.60 m and not more than 1.20 m.

(4) Fire mains with fire hydrant in the tunnel shall be designed as closed systems.

(5) Fire pipelines with fire hydrant shall be dimensioned for a minimum flow rate of 81.0 m^3/h (22.5 l/s) with the simultaneous operation of 3 fire hydrants and a minimum duration of action of 180

minutes (3 hours). The minimum pressure at the design elevation of the adjacent level of the sidewalk at the furthest and least-favoured hydrant shall be not less than 0.6 MPa when water is also supplied from two other hydrants connected to the same pipeline.

(6) Fire hydrants shall be provided at the portals of each tunnel, and inside the tunnel, the fire hydrants shall be located in fire niches at a distance of not more than 150 m from each other. In road tunnels with a single tunnel tube for bidirectional traffic and a length of more than 500 m, the fire hydrants shall be located in fire niches on both sides of the roadway at a distance of not more than 150 m from each other.

§ 72. Article 509 shall be amended as follows:

'Article 509. (1) Where the necessary water supply for fire-fighting cannot be provided by a water supply system, one or more water tanks and pump units shall be provided, located not more than 150 m outside the tunnel portals, in order to provide the necessary minimum flow and pressure for fire-fighting under the conditions of self-contained water supply.

(2) The fire pump modules referred to in paragraph 1 shall be powered by two independent sources of electrical power with automatic switching. The performance of the fire pumps shall ensure the design flow rate and fire-fighting pressure.

(3) The working volume of the fire-fighting tank shall be dimensioned to ensure the required minimum flow rate and the minimum duration of operation in accordance with Article 508(5).

(4) The tanks referred to in paragraph 1 shall store the necessary amount of water for fire-fighting and shall be located next to each portal of the tunnel to ensure a two-way supply to the enclosed fire main.

(5) In the absence of technical capability to fulfil the requirement under paragraph 4, the design of one fire-fighting tank and one pumping station shall be permitted, which shall be located next to one portal of the tunnel.

(6) In the cases referred to in paragraph 5, the working fire pump modules in the pumping station shall be provided with spare fire pump modules at 100%.

(7) Each supply of the included fire main shall be equipped with an isolating shut-off valve and a flow control device with an alarm signal entering a station with a permanent presence for the control of tunnel systems.

§ 73. Article 510 shall be amended as follows:

'Article 510. Water tanks, pump units and fire mains shall be protected against freezing so that an adequate supply of fire-fighting water is always provided.

§ 74. Article 511 shall be amended as follows:

‘Article 511. (1) The fire mains referred to in Article 508 shall have a reaction to fire class of not less than A2. The material of the fire mains and their fastening is corrosion-resistant to external and internal aggression.

(2) Where pipelines, fittings, valves, and equipment are laid in the ground, their corrosion protection shall be ensured.

§ 75. Article 512 shall be amended as follows:

‘Article 512. The installation of shut-off valves on fire-fighting pipelines in vertical shafts is not permitted.’

§ 76. Article 513 shall be amended as follows:

‘Article 513. For the exclusion of individual sections of the fire mains, as well as for directing the entire water quantity to a fire section, the included pipeline network shall be equipped with electrically and manually operated shut-off valves as follows:

1. on all branches of the pipeline;

2. in linear sections of the water supply network that do not have deviations - at a distance specified in the design of the fire-extinguishing network, but not more than 600 m;

3. the shut-off valves shall be numbered consecutively.’

§ 77. Article 514 shall be amended as follows:

‘Article 514. The fire mains are constantly filled with water, are constantly under pressure and are protected against freezing. The pump units shall be automatically activated when the pressure drops in the fire mains.’.

§ 78. Article 515 shall be amended as follows:

‘Article 515. (1) Ventilation valves shall be provided along the fire main in places suitable for discharging air accumulated in the pipeline. They are located at high points along the route of the pipeline.

(2) For the discharge of the fire main during maintenance or repair, provision shall be made for drainage valves located at the lower points of the pipeline, ensuring their connection to the tunnel drainage system.

§ 79. Article 516 shall be amended as follows:

‘Article 516. For buildings and facilities outside the tunnel, water supply for fire-fighting shall be designed in accordance with Regulation No Iz-1971 of 2009 of the Ministry of the Interior and the Ministry of Regional Development and Public Works (SG, issue No 96 of 2009)’.

§ 80. Article 517 shall be amended as follows:

‘Article 517. For tunnels of less than 500 m in length, a reservoir with a water reserve of 80 m^3 shall be provided at each portal for filling fire trucks, located not more than 150 m outside the tunnel portal. Fire-fighting tanks shall be equipped with access points for the suction of water by fire-fighting vehicles or with water abstraction facilities (mobile or stationary motor or electric pumps) and devices for filling fire-fighting vehicles.

§ 81. Article 518 shall be amended as follows:

‘Article 518. The fire-fighting tanks referred to in Article 504(1), Article 509(1) and Article 517 shall be supplied with water from a source with a flow rate that ensures the restoration of the working volume of the fire-fighting tank within a maximum period of 24 hours after a fire.

§ 82. Article 519 shall be amended as follows:

‘Article 519. Two manual fire extinguishers (ABC powder extinguisher with pressure gauge) with ABC-type extinguishing powder - 6 kg shall be provided for in the emergency station. The manual fire extinguishers shall be located in the emergency station in such a way that they are accessible directly from the traffic area of the vehicles. The location of the fire extinguishers shall be indicated by signs (identification of the fire extinguishers with signal red colour RAL 3001). To provide quick access to the emergency station, the door shall be physically accessible, marked with a sign, and a door with an unbreakable glass window marked ‘SOS’ and contact provided when it is opened in the event of an emergency may also be used. In case of heavy traffic of trucks in the tunnel, the two manual fire extinguishers may be equipped with up to 9 kg of powder each.’

§ 83. Article 520 shall be amended as follows:

‘Article 520. (1) When a fire extinguisher is removed, the yellow flashing light of the emergency station and the light signal of the traffic light system at the entrance to the tunnel are activated. The mode of operation of all light signals used to regulate traffic within the tunnel shall be synchronized, depending on the mode of operation of the tunnel (normal, service, or emergency).

(2) At the 24-hour duty station, information is obtained about the location from which the fire extinguisher was taken. The indicator remains on until the fire extinguisher is returned to its place. Replacement of the extinguisher shall be possible only with the help of a special key, which shall be kept by the personnel responsible for the operation of the tunnel.

§ 84. Article 521(2) shall be amended to read as follows:

‘2. five watertight flat fire hoses of type C (nominal diameter 52 mm) with a total length of 100 m (5 x 20 m) and one with a nominal diameter of 75 mm and a length of 20 m;’

§ 85. Article 524 shall be amended as follows:

‘Article 524. In front of every portal of a tunnel longer than 500 m, at a distance not more than 20 m from the tunnel tube, there shall be a space for filling the fire brigade vehicles with water.’

§ 86. In Article 525, the word ‘loading’ shall be replaced by ‘filling’.

§ 87. Article 529 shall be amended, as follows:

1. In point 5, the words ‘2%’ shall be replaced by ‘8%’;

2. In point (6), the figure ‘80’ shall be replaced by ‘100’.

§ 88. In Article 545, ‘400’ is replaced by ‘500’.

§ 89. In Article 546, the number ‘400’ shall be replaced by ‘500’.

§ 90. In Article (580)(3), the number ‘400’ shall be replaced by ‘500’.

§ 91. In Article 595(1), in the title of Figure 49, the words ‘Regulation No 18 of 2001 on road signs’ shall be replaced by ‘the Regulation on the signalling of roads with road signs under Article 14(1) of the RTA.

§ 92. In Article (596)(2), the figure ‘400’ shall be replaced by ‘500’.

§ 93. In Article 601, ‘400’ is replaced by ‘500’.

§ 94. The Additional Provision shall be amended and supplemented as follows:

1. The title shall be changed from ‘Additional Provision’ to ‘Additional Provisions’.

2. Paragraph 1 shall be amended, as follows:

‘**§ 1.** The Regulation has passed the procedure for the exchange of information in the field of technical regulations under Decree No 165 of the Council of Ministers of 2004 on the organisation and coordination of the exchange of information on technical regulations and rules on information society services and on the establishment and operation of a Product Contact Point (SG Issue. 64/2004), which introduced Directive 98/34/EC (OJ L 204, 21.7.1998), as amended by Directive 98/48/EC (OJ L 217, 5.8.1998).’

3. A new Article 2 shall be inserted:

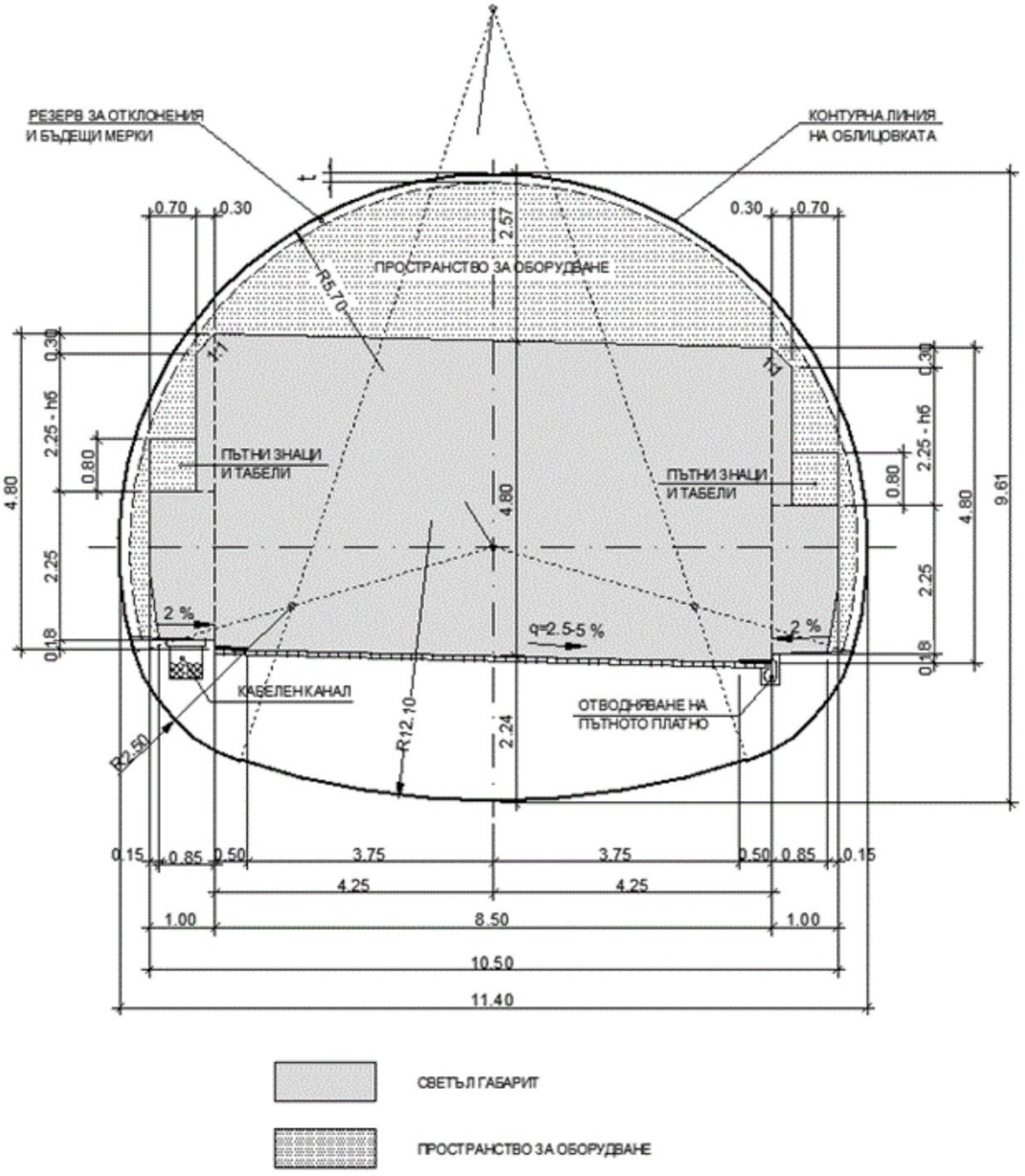
‘**§ 2.** Those standards shall apply in the versions in force, with the exception of harmonised standards within the meaning of Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC (OJ L 88, 4.4.2011), to which the version quoted in the Official Journal of the European Union shall apply.

§ 95. In Annex 3 to Article 16(3)(2) and (5), in point III.5.4, a comma shall be inserted after the words ‘risk analysis in road tunnels’ and the words ‘approved by the European Commission and applied in the countries of the European Union’ shall be added.

§ 96. Annex 5 to Article 19(2) shall be amended as follows:

‘EXAMPLE OF A CROSS-SECTION OF A TUNNEL

(in the case of a clearance gauge with a width of 10.50 m)



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БЪДЕЩИ МЕРКИ	**FUTURE MEASURES**
КрНТУЖА ЛИНИЯ	**CONTOUR LINE**
ОБЛЙйрВКАТА	**Cladding**
ПРОСТРАНСТВО ЗА БОРУДЙгНЕ	**EQUIPMENT SPACE**
ПЬТ№ ЗНALH пъ1жзну	**ROAD SIGNS·**
И ТАБЕЛИ У КАБЕЛЕН КАЧАЛ	**AND PLATES**
ОТВОДНЯВАНЕ	**DRAINAGE**
пътното ПЛАТНО	road SURFACE
СВЕТЪЛ ГАБАРИТ	**CLEARANCE GAUGE**
ПРОСТРАНСТВО ЗА ОБОРУДВАМЕ	**EQUIPMENT SPACE**

§ 97. In Annex No 8 to Article 91(6) and Article 528(2), the words ‘emergency services and ambulance services’ shall be replaced by ‘main components of the single rescue system in accordance with the Disaster Protection Act’.

§ 98. Annex No 10 to Articles 214, 221(4), 229, 230, 232, 233, 241, 248(2), 267, 270, 281, 296, 304 and 307 shall be amended as follows:

‘Methodological guidelines for sizing the ventilation of road tunnels

1. General provisions

1.1. Baseline values

Baseline emissions are referenced to 2018 and reduced by a correction factor taking into account the years up to 2035 (Tables 3a, 3b, 3c). The baseline values are for vehicle emissions at sea level at different speeds and road gradients and are given in Tables 4 to 16. For higher altitudes, a correction factor is used (Table 3).

1.2. Emission technology standards

They are presented in three categories - A, B, and C. They are reported using a correction factor f_e subject to dependencies 7 and 8.

1.2.1. Technological standard *A* applies to countries that comply with European emission standards (European Union countries, USA). For technological standard A f_e = 1 (i.e. the baseline values shall be used)**.**

1.2.2. Technological standard B applies to countries that have adopted and complied with European legislation in the last 10 years. The base year is taken 5 years prior to the year of design of the tunnel.

1.2.3. Technological standard C applies to countries where there is no effective emission control. Values of f_e for standard ‘C’ are given in Table 3d.

1.3. Air quality design values in road tunnels

The amount of fresh air supplied to the tunnel during normal operation shall be calculated based on traffic and vehicle emissions to comply with the safe concentration limits of harmful substances according to the table. 8 of the Regulation. Currently, the content of harmful substances in the air in the tunnel is registered by CO and NO_x, and the deterioration of visibility by the release of dust or diesel soot.

1.4. Transport flow accounting

CO and NO_x emissions, respectively, of substances which impair visibility shall be calculated separately for each lane. Ventilation for continuous traffic flow shall, as a general rule, be dimensioned in relation to forecast traffic flow data, with maximum hourly average rates prevailing. In cases where frequent stop-and-go traffic or congestion is expected, the maximum possible traffic intensity according to the table 7a shall be used. of the Regulation, taking into account the speed of movement of heavy goods vehicles.

1.5. Permissible speed of heavy goods vehicles

The speed of their movement is determined by the dependencies:

$V_F = \min \{V_{max}; 1{,}1 \times V_{perm}\}$, (1)

where: V_{max} is the maximum speed according to Table 1;

V_{perm} – the permissible speed in the tunnel.

For intermediate values of inclinations, between those specified in Table 1, linear interpolation shall be carried out for the determination of Vmax.

Table 1.

Maximum speed of a heavy goods vehicle when climbing and descending a slope

Slope i [%]	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
Vmax [km/h]	49	63	74	83	85	87	90	78	72	63	54	48	40

1.6. Share of passenger cars with a diesel engine

The amount of air required for ventilation depends on the composition of the vehicle fleet and, in particular, on the share of passenger cars with a diesel engine. Where possible, data on the composition of the traffic flow relevant to the specific project should be used. In case of insufficient information, a 20% share of diesel cars in the total number of passenger cars shall be assumed.

1.7. Mass factor for heavy-duty vehicle

The baseline emission values for a heavy-duty truck refer to an average mass of 23t for the expected heavy-duty vehicles. For values between those specified in the table. Linear interpolation shall be carried out.

Table 2

Correction coefficient f_m for emissions of heavy-duty vehicles (HGV) with a mass other than 23t

Type of HGV	Table [t]	CO	NOx	Visibility
Single freight truck, bus	15	0.9	0.9	0.9
Medium-duty truck	23	1.0	1.0	1.0
Tractor unit with trailer, semi-trailer	32	1.2	1.2	1.2

1.8. Taking into account specific boundary conditions

Air currents around the tunnel entrance/exit and density differences between the polluted air in the tunnel and the outside air can significantly affect the ventilation of the tunnel. These effects must be taken into account when sizing the tunnel ventilation system. Wind pressure on the tunnel entrance/exit shall be recorded on the basis of the 95th percentile* of the wind measurements and, in

particular, of the wind component directed perpendicular to the tunnel entrance/exit section. Wind pressure shall be determined by the resultant dynamic wind pressure acting on the surface (area) of the inlet/outlet.

** A percentile is a statistical characteristic of measured data that represents a value with a certain representativeness. For example, the 95th percentile of the measured values of the difference between atmospheric pressures between the two portals is a value that is less than or equal to the recorded values in 95% of the measurements.*

The natural upward and downward air flows, as well as the thermal draft in the event of a fire, are caused by the difference in temperatures and densities of the two air environments. These currents are variable in intensity and direction and it is imperative to take them into account when sizing the ventilation system. Natural differences in temperature depend on local conditions, and the thermal draft in a fire depends on the power of the fire and the assumed spread of the flue gases at the time of the full development of the fire with maximum thermal output.

2. Deterioration of visibility

The presence of solid particles in the air leads to reduced visibility in the tunnel, which is a key factor for safe braking and maintaining distance. Visibility is reduced by the scattering and absorption of light from dust in the air and from smoke in fires. Particulate matter (PM) in the exhaust are emitted from the tailpipe as a result of fuel combustion, while other emissions are due to tyre and brake wear, road surface wear and airborne dust. The scattering or absorption of light depends on the material, size, and density of the particles, and the intensity of the light beam decreases as it passes through air laden with them.

2.1. Main dependencies

When passing through polluted air, the light beam weakens, which can be expressed by the generalized law of Bouguer-Lambert-Beer:

$$E = E_0 \times e^{-K_e L}, \quad (2)$$

where:

E_0 is the luminous flux before passing [lm];

E - luminous flux [lm] after passing through a layer of length L;

K_e - extinction coefficient [m^{-1}];

L - the length of the layer that light travels [m].

The measure of the deterioration of visibility is the extinction coefficient K_e, which is defined as the rate of light intensity attenuation (reduction) along a path of a certain length. It is expressed as follows:

$$K_e = -\frac{1}{L}\ln\left(\frac{E}{E_0}\right) \qquad (3)$$

An alternative dependency for the change in visibility is the percentage of light intensity E that is lost from the intensity of source E_0 at a distance L from it:

$$S = 100e^{-K_e L}, \% \qquad (4)$$

Approximate visibility distance for retro-reflective signs is D(m) = 2/K and D(m) = 6/K for illuminated signs. The visibility of illuminated signs through fire smoke falls below 15 m when K = 0.4. The walking speed when evacuating greatly decreases when visibility drops below 8 m.

3. Amount of air required to dilute the released harmful substances

3.1. Minimum requirements for tunnel ventilation

In mechanically ventilated tunnels, the minimum air exchange is determined by the specific design parameters and depends mainly on traffic. When traffic is light, the amount of clean air may be less. A minimum requirement is to ensure a longitudinal velocity of not less than 1.0–1.5 m/s in the tunnel pipes. However, the ventilation system must be capable of ensuring safe conditions even with higher emissions from heavy goods vehicles.

Allowed CO concentrations are given in ppm (1 ppm = 1 part per million = 10^{-6} m^3 gas in 1 m^3 air). The outdoor air may be pre-polluted with a background concentration of CO. In intercity tunnels, this pollution reaches 2 ppm, in busy places in the city up to 5 ppm, and in unfavorable cases up to 15 ppm. The air intake points shall, as a general rule, be located at a sufficient distance from the air outflow from the tunnel.

The amount of clean air required to comply with safety standards is calculated separately for each of the harmful substances emitted (CO, NO_x, particulate matter (PM)), for the three vehicle groups:

- passenger cars (PC) - with petrol and diesel engines;
- light-duty vehicles (LDV) - with petrol and diesel engines;
- heavy goods vehicles (HGVs).

Data on the distribution of these groups of means of transport in traffic shall be provided. Sometimes, in these statistical (forecast) data, passenger cars and light commercial vehicles are presented together (PC+LDV). In this case, the share of LDV in the total shall be deemed not less than 10%.

3.2. Amount of clean air for ventilating the tunnel

The sufficient quantity of clean air for normal ventilation of the tunnel is the maximum value of the required quantities according to the individual factors, which is calculated according to dependence 5:

$$Q_{че} = \max\left(Q_{не}^{CO}; Q_{не}^{NOx}; Q_{не}^{pM}\right) \quad \left[\frac{m^3}{h}\right] \qquad (5)$$

where:

$Q_{че}$ is the volumetric flow rate of clean air for tunnel ventilation $\left[\frac{m^3}{h}\right]$;

$Q_{не}^{CO}; Q_{не}^{NOx}; Q_{не}^{pM}$ $\left[\frac{m^3}{h}\right]$ - Amount of air needed to reach safe levels for CO, NO_x, and particulate matter PM.

The required air quantity by factor CO shall be calculated according to dependency 6:

$$Q_{не}^{CO} = \frac{n_{PC} q_{CO}^{PC} + n_{LDV} q_{CO}^{LDV} + n_{HGV} q_{CO}^{HGV}}{C_{norm}^{CO} - C_{in}^{CO}} \quad \left[\frac{m^3}{h}\right], \qquad (6)$$

where:

$Q_{не}^{CO}$ $\left[\frac{m^3}{h}\right]$ is the amount of air required to dilute the concentration of CO;

$q_{CO}^{PC}; q_{CO}^{LDV}; q_{CO}^{HGV}$ - corresponding CO emission $\left[\frac{g}{h.pc}\right]$ from passenger cars (PC), light commercial vehicles (LDV) and heavy goods vehicles (HGV);

$n_{PC}; n_{LDV}; n_{HGV}$ - relative number of passenger cars (PC), light-duty vehicles (LDV) and heavy-duty vehicles (HGV) [-] $\left(n_{PC} = \frac{N_{pc}}{N_L}; n_{LDV} = \frac{N_{LDV}}{N_L}; n_{HGV} = \frac{N_{HGV}}{N_L}\right)$;

C_{norm}^{CO} - regulatory concentration of CO, $\left[\frac{g}{m^3}\right]$;

C_{in}^{CO} - concentration of CO in the air entering the tunnel $\left[\frac{g}{m^3}\right]$.

The amount of air required for NO_x factors and particulate matter (PM) is calculated according to relationships similar to (6):

$$Q_{не}^{NOx} = \frac{n_{PC} q_{NOx}^{PC} + n_{LDV} q_{NOx}^{LDV} + n_{HGV} q_{NOx}^{HDV}}{C_{norm}^{NOx} - C_{in}^{NOx}} \left[\frac{m^3}{h}\right], \quad (6a)$$

where:

C_{norm}^{NOx} normative concentration of NO_x, $\left[\frac{g}{m^3}\right]$;

C_{in}^{NOx} - NOx concentration in the incoming tunnel air $\left[\frac{g}{m^3}\right]$.

$$Q_{we}^{PM} = \frac{n_{PC} q_{PM}^{PC} + n_{LDV} q_{PM}^{LDV} + n_{HGV} q_{PM}^{HDV}}{K_{norm}^{PM}} \quad \left[\frac{m^3}{h}\right], \quad (6b)$$

where:

$K_{norm}^{PM}\ [m^{-1}]$ extinction coefficient K.

The emission *q* depends on the type of means of transport (light, cargo, petrol, diesel) and their number in the tunnel. Defined as follows:

• For passenger cars (PC) and light-duty vehicles (LDV) - CO, NO_x, PM

$$q = q_{base}(v,i) \times f_h \times f_t \times f_e + q_{ne}(v) \ , \quad (7)$$

where:

q is the emission of CO, NO_x, $\left[\frac{g}{h.pc}\right]$ and PM $\left[\frac{m^2}{h.pc}\right]$;

$q_{base}(v,i)$ - base emission factor depending on speed (v), gradient (i), and type of means of transport, as provided in the table. 4 to 11;

f_h - Altitude correction factor. For altitudes up to 1000 m f_h=1; Table 3 shows the values of f_h for altitude H = 2000 m; for intermediate values (between 1000 and 2000 m), linear interpolation shall be performed;

f_t - correction factor for the year other than the base year: Table 3a – for passenger cars, table. 3b - for light commercial vehicles;

f_e - correction factor [-] for technological standard 'C' (Table 3d);

$q_{ne}(v)$ - emission of fine particulate matter with an aerodynamic diameter of 2.5 μm (PM2.5) – Table 15 and 16.

• For heavy goods vehicles (HGV) - CO, NO_x, PM

$$q = q_{base}(v,i) f_h f_t f_m f_e + q_{ne}(v) \ , (8)$$

where:

$q_{base}(v,i)$ is the base emission factor depending on speed (v), gradient (i), and type of means of transport, as provided in the table. 12 to 14;

f_m - mass correction coefficient (less than or greater than 23t) - Table. 2;

f_h = 1 for heavy goods vehicles;

f_t -correction coefficient for the year other than the base year - table. 3c for heavy goods vehicles (HGV);

f_e - correction coefficient [-] for technological standard ‘B’ or ‘C’ (from Table 3d).

Table 3.

Correction coefficient f_h at altitude (H = 2000 m) above sea level – passenger cars (PC)

Year	CO		NOx		Visibility
	Petrol	Diesel	Petrol	Diesel	Diesel
2018	2.0	1.0	1.0	1.0	1.0
2020	1.6	1.0	1.0	1.0	1.0
2025	1.0	1.0	1.0	1.0	1.0
2035	1.0	1.0	1.0	1.0	1.0

Table 3a

Correction coefficient (f_t) for years other than the base year – passenger cars

Year	CO		NOx		Visibility	
	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel
2018	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.91	0.92	0.85	0.87	0.98	0.76
2025	0.78	0.8	0.62	0.51	0.95	0.44
2030	0.71	0.74	0.5	0.32	0.93	0.33
2035	0.69	0.72	0.46	0.26	0.92	0.31

Table 3b

Correction coefficient (f_t) for years other than the base year - light commercial vehicles

Year	CO		NOx		Visibility	
	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel
2018	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.8	0.77	0.7	0.82	0.92	0.75
2025	0.57	0.43	0.32	0.49	0.82	0.38
2030	0.49	0.26	0.2	0.34	0.79	0.21
2035	0.48	0.25	0.19	0.29	0.78	0.17

Table 3c

Correction coefficient (f_t) for years other than
the Base – Heavy Duty Vehicles

Year	CO	NOx	Visibility
2018	1.00	1.00	1.00
2020	0.89	0.71	0.96
2025	0.76	0.34	0.92
2030	0.72	0.22	0.91
2035	0.72	0.22	0.91

Table 3d

Correction coefficient (f_e) for technology standard C

Technological standard C			
Type of means of transport	CO	NOx	Visibility
PC Petrol/Diesel	2.9/4.0	2.8/1.2	-/2.0
LDV petrol/diesel	3.5	1.5	2.6
HGV diesel	2.3	1.8	2.8

Baseline emission factors $q_{base}(v,i)$ for the various means of transport and engines shall be amended as follows:

Type of vehicle	Emission of	In Table No.
Passenger cars (PC) with petrol engine	CO	4
Passenger cars (PC) with petrol engine	NOx	5
Passenger cars (PC) with diesel engine	CO	6
Passenger cars (PC) with diesel engine	NOx	7
Passenger cars (PC) with petrol engine	RM	8
Passenger cars (PC) with diesel engine	RM	8a
Light commercial vehicles (LDVs) with petrol engines	CO	9
Diesel light commercial vehicles (LDVs)	CO	9a
Light commercial vehicles (LDVs) with petrol engines	NOx	10
Diesel-powered light duty vehicles (LDVs)	NOx	10a
Light commercial vehicles (LDVs) with petrol engines	RM	11
Diesel-powered light duty vehicles (LDVs)	PM	11a
Heavy Goods Vehicles (HGV) 23t with Diesel Engines	CO	12
Heavy Goods Vehicles (HGV) 23t with Diesel Engines	NOx	13
Heavy Goods Vehicles (HGV) 23t with Diesel Engines	RM	14
The three types of vehicles PC, LDV and HGV	PM2.5	15 and 16

Baseline emissions in Table 4 to 16 are expressed in terms of weight $\left[\frac{g}{h.pc}\right]$. By dividing the emission by the speed of the means of transport, the quantity of harmfulness emitted per km distance is obtained $\left[\frac{g}{km}\right]$ from a single means of transport (pcu). Transformation of the emission into volume flow rate shall be carried out by dividing $\left[\frac{g}{h}\right]$ or $\left[\frac{g}{km}\right]$ by the density of the monitored pollutant, namely:

- density of CO: $\rho_{CO} = 1{,}2\left[\frac{kg}{m^3}\right]$
- NO_2 density: $\rho_{NO_2} = 1{,}9\left[\frac{kg}{m^3}\right]$.

Table 4

Baseline carbon monoxide (CO) emission factor for petrol-powered passenger cars (PC) depending on road gradient and driving speed (V)

Speed V km/h	CO emissions [g/h] from PC with petrol engine at slope [%]						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	5.4	5.4	5.4	5.4	5.4	5.4	5.4
10	7.7	8.8	9.7	11	12	14.1	16.6
20	8.4	10.2	12.6	15.5	22.7	35.4	50.2
30	7.7	9.3	11.1	13.7	17.3	22.8	31.1
40	8.3	10.3	12.9	16.4	22.3	33.2	48.9
50	8.9	11.8	14	18.2	23.8	33.1	46.7
60	8.5	11.4	13.3	18.2	25.3	37.8	59.2
70	9.9	13.3	17.9	25.6	36.4	60.4	109
80	12.5	16.2	21.1	31	49.8	89.1	166.2
90	11.7	15.7	22.7	35.6	67.5	146.1	264.3
100	15.5	20.9	31.6	50.4	85.9	209.4	415.7
	Downhill descent				*Climbing up*		

Table 5

Baseline nitrogen oxides (NOx) emission factor for a petrol-powered passenger car (PC) depending on the road gradient and speed (V) of travel

Speed V	NOx emissions [g/h] from PC with petrol engine at slope [%]

km/h	-6	-4	-2	0	+2	+4	+6
0	0.2	0.2	0.2	0.2	0.2	0.2	0.2
10	1.2	1.3	1.6	1.8	2.1	2.3	2.6
20	1.3	1.6	2	2.4	2.9	3.4	4.2
30	1.3	1.6	2.1	2.7	3.4	4.3	5.4
40	1.4	1.8	2.4	3.1	4.1	5.1	6.2
50	1.3	1.7	2.3	3.2	4.3	5.5	7.1
60	1.3	1.8	2.5	3.6	5.1	6.9	8.6
70	1.3	1.9	2.7	4	5.9	8.3	10.1
80	1.4	2.1	3.2	5.2	7.4	9.8	12.3
90	1.6	2.4	3.7	6.4	9.9	11.8	14.6
100	1.9	3	4.4	7.7	12.1	15.3	17.8
	Downhill descent				Climbing up		

Table 6

Baseline carbon monoxide (CO) emission factor for diesel-powered passenger cars (PC) depending on road gradient and driving speed (V)

Speed V km/h	CO emissions [g/h] from PC with diesel engine at *slope [%]*						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	0.3	0.3	0.3	0.3	0.3	0.3	0.3
10	0.8	0.9	1.1	1.3	1.5	1.8	2
20	0.9	1	1.3	2.8	3.3	3.6	4.1
30	0.9	1.2	1.4	2.4	3	3.5	3.9
40	0.9	1.2	1.4	2	2.7	3.2	3.7
50	1	1.1	1.4	1.8	2.6	3.1	3.6
60	1	1.1	1.2	1.6	2.4	3	3.6
70	1	1.1	1.2	1.6	2.1	2.8	3.4
80	0.9	1.1	1.2	1.6	2.1	2.4	3.2
90	0.9	1	1.2	1.5	1.9	2.1	2.9
100	1	1.1	1.2	1.3	1.6	1.9	2.7
	Downhill descent				*Climbing up*		

Table 7

Baseline nitrogen oxides (NOx) emission factor for passenger cars (PC) with diesel engines depending on road gradient and driving speed (V)

Speed V km/h	NOx emissions [g/h] from PC with diesel engine at slope [%]						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	4.5	4.5	4.5	4.5	4.5	4.5	4.5
10	7.7	9	10.3	12.2	14.5	16.9	19.9
20	7.9	9.5	11.6	14.7	18.4	23.1	28.4
30	8	10.1	12.8	17.3	22.4	29.3	36.9
40	8	10.2	13.5	19	25.8	34.8	45.8
50	8	10.4	14.2	20.6	29.2	40.2	54.7
60	8.4	11.3	16.2	23.9	35.2	51	71.6
70	8.7	12.4	18.7	28.9	43.6	63	87.8
80	7.6	11.9	20	34	56.7	88.8	126.6
90	8.3	13.3	24.5	43.9	70	108.6	171.6
100	9.6	15.1	27	50.9	86.7	131.1	204.2
110	13.3	21.9	37.9	68.5	114.3	178.8	247.4
120	19.3	32.4	53.2	86.2	142.7	239.2	316.1
	Downhill descent				*Climbing up*		

Table 8

Baseline emission factor (visibility) for fine particulate matter (PM) emitted by smoke from petrol-powered passenger cars, depending on road gradient and driving speed (V)

Speed V km/h	Visibility [m^2/h] from a PC with a diesel engine at slope [%]						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	0	0	0	0	0	0	0
10	0.1	0.1	0.1	0.1	0.2	0.2	0.2
20	0.1	0.1	0.1	0.2	0.2	0.2	0.3
30	0.1	0.1	0.1	0.2	0.2	0.3	0.4
40	0.2	0.2	0.2	0.2	0.3	0.4	0.5
50	0.2	0.2	0.2	0.2	0.3	0.4	0.6
60	0.2	0.2	0.2	0.3	0.4	0.6	0.9
70	0.2	0.2	0.3	0.3	0.5	0.9	1.5
80	0.2	0.3	0.3	0.5	0.8	1.3	2.4

Speed V km/h	Visibility [m^2/h] from a PC with a diesel engine at *slope [%]*						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
90	0.3	0.3	0.3	0.6	1.2	2.1	3.8
100	0.5	0.3	0.4	0.7	1.5	2.9	4.9
110	0.7	0.6	0.7	1.1	2	3.7	6.2
120	1	0.9	1.3	2	3.3	5	8
	Downhill descent				*Climbing up*		

Table 8a

Baseline emission factor (visibility) for PM fine particles emitted by smoke from diesel-powered passenger cars (PC) depending on road gradient and driving speed (V)

Speed V km/h	Visibility [m²/h] of PC with diesel engine at *Slope:*						
	-6	*-4*	*-2*	*0*	*2*	*4*	*6*
0	0.4	0.4	0.4	0.4	0.4	0.4	0.4
10	1.1	1.2	1.3	1.5	1.6	1.8	2
20	1.1	1.3	1.5	1.8	2	2.3	2.7
30	1.1	1.4	1.6	2	2.3	2.7	3.1
40	1.2	1.4	1.8	2.3	2.8	3.4	4
50	1.2	1.5	2	2.7	3.4	4.2	4.8
60	1.3	1.6	2.1	2.8	3.8	4.9	6
70	1.3	1.8	2.5	3.2	4.3	5.3	7
80	1.3	1.9	2.8	3.8	5.3	6.6	8.6
90	1.5	2.2	3.2	4.6	6.5	8.2	9.7
100	2	2.6	3.8	5.6	7.6	9.4	10.6
110	2.7	3.5	4.7	6.6	8.9	10.5	11.7
120	3.4	4.6	6.3	7.9	9.6	11.2	12.5
	Downhill descent				*Climbing up*		

Table 9

Baseline carbon monoxide (CO) emission factor for light-duty vehicles (LDV) with petrol engines depending on road gradient and driving speed (V)

Speed V	CO emissions [g/h] from LDV with petrol engine at *slope [%]*

km/h	-6	-4	-2	0	+2	+4	+6
0	4.8	4.8	4.8	4.8	4.8	4.8	4.8
10	35.3	38.1	41.7	45.5	50.2	55.9	61.8
20	35.9	40.1	46.8	51.7	58.3	67.8	83.4
30	36.5	42.2	51.9	57.9	66.5	79.7	105.1
40	37.8	43.2	57.4	67.8	86.2	116.5	123.2
50	39.5	44.2	57.6	70	90	124	141.3
60	40.8	47.1	61.2	69.3	93.8	131.6	204.7
70	44	51.8	71.9	90.8	126.5	193.5	381.1
80	52.1	61.6	81.3	98.3	164.5	272.5	645.7
90	52.3	67.8	99.1	118.4	237.1	581.9	1380.3
100	68.8	94.8	137	148	329.6	953.7	2194.7
110	108.9	150	203.1	238.1	609.9	1709.1	3479.0
120	174.1	240.8	323.1	468.3	1164.6	2709.5	4329.6
	Downhill descent				*Climbing up*		

Table 9a

Baseline carbon monoxide (CO) emission factor for light-duty vehicles (LDV with diesel engines depending on road gradient and driving speed (V))

Speed V km/h	CO emission [g/h] from LDV with diesel engine at *Slope:*						
	-6	*-4*	*-2*	*0*	*2*	*4*	*6*
0	0.4	0.4	0.4	0.4	0.4	0.4	0.4
10	0.9	1	1.2	1.5	1.6	1.8	2.1
20	1	1.2	1.5	1.8	1.9	2.1	2.3
30	1	1.3	1.6	2	2.2	2.4	2.6
40	1.1	1.3	1.7	2	2.3	2.5	2.9
50	1.1	1.4	1.7	2.1	2.5	2.8	3
60	1.1	1.4	1.7	2.1	2.7	3	3.4
70	1.1	1.6	1.8	2.3	3	3.3	3.8
80	1.4	1.7	1.9	2.5	3.3	3.6	4.2
90	1.7	2	2.1	2.6	3.5	3.9	5.1
100	2	2.3	2.2	2.8	3.9	4.6	5.7
110	2.4	2.6	2.5	3	4.4	5.4	6.2
120	2.8	3	3.4	4.2	5.4	6	6.6
	Downhill descent				*Climbing up*		

Table 10

Baseline emission factor of nitrogen oxides (NO_x) for light-duty vehicles (LDV) with petrol engines depending on road gradient and driving speed (V)

Speed V km/h	NOx emissions [g/h] from LDV with petrol engine at *slope [%]*						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	0.4	0.4	0.4	0.4	0.4	0.4	0.4
10	1.7	2.1	2.7	3.4	4.3	5.4	6.4
20	1.8	2.2	3	4.7	6.2	8.8	10.4
30	1.9	2.1	3.1	5.7	8	10.7	13.1
40	1.8	2	3.3	6	9.1	12.7	16.1
50	1.4	1.6	3.6	6	9.9	14.2	18.7
60	0.9	1.7	3.9	7.5	12.3	14.7	21.2
70	0.8	1.9	4.7	9.1	14.6	18.1	24.3
80	0.7	2	5.7	12.3	19.1	21.6	25.5
90	1.1	2.7	7.8	15.2	23.6	24.7	26.8
100	2	3.9	10.1	19.2	27.9	27.8	27.9
110	3.4	6.7	15.2	26.8	33	30.9	28.9
120	4.5	9.8	21.6	33.8	36.1	32.1	29.8
	Downhill descent				*Climbing up*		

Table 10a

Baseline nitrogen oxide (NOx) emission factor for light-duty vehicles (LDV) with diesel engines depending on road gradient and driving speed (V)

Speed V km/h	NOx emission [g/h] from LDV with diesel engine at *Slope:*						
	-6	*-4*	*-2*	*0*	*2*	*4*	*6*
0	3.8	3.8	3.8	3.8	3.8	3.8	3.8
10	5.2	6	7.3	9	11.3	13.7	16
20	5.3	6.6	8.7	11.7	15.9	27.7	34.9
30	5.4	7.2	10.1	14.4	20.4	34	44.6
40	4.9	6.9	10.2	15.7	23.8	40.2	54.3
50	4.5	6.5	10.4	17.1	27.2	41.4	58.6
60	4	7.7	10.7	18.5	37.9	57.5	81.5
70	4.5	9	16.6	29.6	48.6	73.6	104.4
80	4.9	9.4	20	43.2	75.6	108.6	146.2
90	8.5	15.8	30.4	58	102.4	144.9	181.8

100	12.2	23.8	43.1	76.3	122.2	169.6	210.5
110	20.1	40.2	68.9	110.5	156.2	199.6	235.1
120	32.8	62.3	101.1	147.1	192.1	227.7	252.9
	Downhill descent				*Climbing up*		

Table 11

Baseline emission factor (visibility) for PM particulates emitted with the smoke of light-duty vehicles (LDV) with petrol engines, depending on road gradient and driving speed (V)

Speed V km/h	Visibility [m^2/h] of LDV with petrol engine at *slope [%]*						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	0	0	0	0	0	0	0
10	0.1	0.1	0.1	0.1	0.1	0.2	0.2
20	0.1	0.1	0.1	0.1	0.2	0.3	0.5
30	0.1	0.1	0.1	0.1	0.2	0.5	0.8
40	0.1	0.1	0.1	0.2	0.4	0.9	1.1
50	0.1	0.1	0.2	0.2	0.4	0.8	1.5
60	0.1	0.1	0.2	0.3	0.6	1.2	2.4
70	0.2	0.2	0.3	0.6	1.2	2.4	5.1
80	0.5	0.5	0.7	0.9	2	4.3	9.6
90	0.8	0.9	1	1.2	3.1	7.1	13.6
100	1.1	1.2	1.4	2	5.2	9.5	18.8
110	1.4	1.8	2.2	3.9	7.3	14.6	26.1
120	1.7	2.3	3	5.2	9.4	22	32.7
	Downhill descent				*Climbing up*		

Table 11a

Baseline emission factor (visibility) for PM fine particles emitted with the smoke of light-duty vehicles (LDV) with diesel engines, depending on road gradient and driving speed (V)

Speed V km/h	Visibility [m^2/h] from LDV-diesel *Slope:*						
	-6	***-4***	***-2***	***0***	***2***	***4***	***6***
0	0.6	0.6	0.6	0.6	0.6	0.6	0.6
10	1.8	2	2.2	2.6	2.9	3.3	3.6
20	2	2.3	2.8	3.3	3.8	4.6	5.5
30	2	2.3	2.9	3.5	4.7	5.9	7

40	2.1	2.8	3.3	4.2	5.4	7.2	8.5
50	2	2.7	3.7	4.8	6.1	8.8	9.4
60	2.3	3	4.2	5.9	7.2	10.5	11.9
70	2.5	3.3	4.6	6.9	9.8	12.2	14.3
80	3.9	4.6	6.4	9.1	12.3	14.8	17.3
90	5.7	6.7	8.3	11.3	14.6	17.4	20.4
100	7.7	9.1	11	13.3	16.5	19.8	22.7
110	9.2	11.1	13.2	16	19	22.3	25.1
120	10.8	13.2	15.5	18	21.5	24.8	26.9
	Downhill descent				*Climbing up*		

Table 12

Baseline carbon monoxide (CO) emission factor for heavy-duty vehicles (HGV) with an average mass of 23t and diesel engines depending on road gradient and driving speed (V)

Speed V km/h	CO emissions [g/h] from HGV at *slope [%]*						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	3.8	3.8	3.8	3.8	3.8	3.8	3.8
10	11.7	14.1	17.3	21	24.3	28	31.3
20	10	11.4	17.8	22.3	26.2	30.6	35.2
30	8.7	10.1	18.3	23.9	30.6	37.8	42.3
40	5.8	8.7	18.8	26.9	37.3	48.1	55.1
50	4.1	6.2	19.3	29.4	43.2	56.8	64.8
60	3.5	6.1	19.8	34.9	53.3	62.3	67.7
70	3.6	6.1	20.3	40.3	63.1	67.8	70.6
80	3.6	6.1	20.7	45.8	73.3	77.2	76.6
90	3.6	6.1	22.2	47	75.7	83.1	82.4
100	3.6	6.1	22.3	49.6	78.1	88.6	88
	Downhill descent				*Climbing up*		

Table 13

Baseline emission factor of nitrogen oxides (NO_x) from heavy-duty vehicles (HGV) with an average mass of 23t and diesel engines depending on road gradient and driving speed (V)

Speed V km/h	NO_x emission [g/h] from HGV at slope [%]						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	14.4	14.4	14.4	14.4	14.4	14.4	14.4
10	54.2	65.7	77.2	86.5	92.7	98.4	103.8
20	41	55.3	76.2	88.7	98.8	104.1	111.7
30	32.4	48.5	75.2	92.7	103.1	111	127.6
40	23.9	41.6	69.3	105.3	119.2	141.2	174.9
50	20	33.1	64.2	111.8	129.8	167.1	211.7
60	16.2	24.5	62.2	122.9	182	247.5	301.9
70	12.3	16.3	57.5	134	234.2	328	392.10
80	12.3	16.3	57.5	145.1	286.5	408.4	482.30
90	12.3	16.3	57.5	146.6	294.6	419.5	485.40
100	12.3	16.3	57.5	151.7	304.6	428.60	488.50
	Downhill descent				*Climbing up*		

Table 14

Baseline emission factor (visibility) for PM fine particles emitted by smoke from heavy goods vehicles (HGV) with an average mass of 23t and diesel engines, depending on road gradient and driving speed (V)

Speed V km/h	Visibility [m^2/h] from HGV at slope [%]						
	-6	*-4*	*-2*	*0*	*+2*	*+4*	*+6*
0	1.8	1.8	1.8	1.8	1.8	1.8	1.8
10	4.3	4.9	5.6	6.3	7.1	7.9	8.6
20	3.7	4.3	5.6	6.5	7.4	8.5	9.6
30	3.5	4.1	5.6	6.8	8.4	9.9	11.3
40	3.3	3.9	5.8	8	10.5	12.9	15
50	3.1	3.7	5.8	8.6	11.9	14.9	17.5
60	3.1	3.7	6	9.3	14.3	19.3	22.6
70	3.1	3.8	6.3	10.1	16.7	23.6	27.7
80	3.3	3.7	6.6	12.3	19.4	28	32.8
90	3.5	3.9	6.6	14.4	21.7	28.5	33.1
100	3.5	3.9	6.8	15	23	29.4	33.3
	Downhill descent				*Climbing up*		

Table 15

Fine particulate emissions from PC and LDV (non-exhaust gases) dispersed by vehicle traffic in the tunnel

	PC+LDV	
	PM [m2/h]	
Speed (km/h)	Bidirectional traffic	Unidirectional traffic
0	0	0
10	1.1	0.7
20	2.2	1.3
30	3.4	2
40	4.5	2.6
50	5.6	3.3
60	6.7	3.9
70	7.8	4.6
80	9	5.3
90	10.1	5.9
100	11.2	6.6
110	12.3	7.2
120	13.4	7.9

Table 16

Fine particulate emissions from HGVs (non-exhaust gases) dispersed by vehicle traffic in the tunnel

Speed V km/h	HGV	
	PM [m²/h]	
	Bidirectional traffic	Unidirectional traffic
0	0	0
10	5.1	4.4
20	10.1	8.8
30	15.2	13.3
40	20.2	17.7
50	25.3	22.1
60	30.3	26.5
70	35.4	30.9
80	40.4	35.3
90	45.5	39.8
100	50.6	44.2

4. Pressure loss and necessary pressure drop to overcome it

The tunnel design shall be aerodynamic (smooth walls, smooth cross-sectional changes especially at the portals and emergency entrances/exits) in order to reduce air movement losses. Regardless of the chosen ventilation system, the influence of natural factors leading to hydraulic losses or creating positive or negative pressure is taken into account.

• $h_{лз}$ – linear losses due to air friction in the tunnel walls;

• $h_{м}$ – local resistances;

and also variables in direction and magnitude of depressions (pressure) [Pa]:

• $h_{т}$ - natural (thermal) draught caused by the difference between air temperatures outside and inside the tunnel;

• $h_{б-}$ – barometric head resulting from the difference in barometric pressure between the two portals;

• $h_{в-}$ – wind pressure at the portals;

• $h_{пс}$ – piston effect of moving vehicles.

These quantities are determined by the relationships given below:

4.1. Linear pressure losses are determined according to the following relationships:

$$h_{лз} = \lambda \frac{l}{d} \rho \frac{u^2}{2} [Pa] \quad (9)$$

In substituting d with the expression for equivalent diameter $\left(d = \frac{4S_t}{П} \right)$ and the speed with $\left(u = \frac{Q}{S_t} \right)$, the following shall be obtained:

$$h_{mp} = \frac{\lambda \rho}{8} \frac{l.П}{S_i^3} Q^2 \quad [Pa] \text{ , (9a)}$$

where:

λ is a dimensionless linear resistance coefficient [-];

ρ - air density in the section [kg/m^3];

l - length of section [m];

P - the perimeter of the tunnel [m];

S - the light section of the tunnel [m2];

u - airflow velocity [m/s];

Q - air flow rate (volume of air) passing through the section [m^3/s].

4.2. Local resistance losses shall be determined according to the following formula:

$$h_м = \sum \xi_i \frac{\rho}{2S_t^2} Q^2 \, [Pa] \text{ , (10)}$$

where: $\sum \xi_i$ is the sum of the dimensionless coefficients of the local resistances along the route (for entry, exit, turn, and other variations of the geometric characteristics of the ventilation path).

4.3. Natural (thermal) draught is determined by the following formula:

$$h_m = \left(\rho_{in} - \rho_{out}\right) g \Delta H \quad [Pa] \text{ , (11)}$$

where:

ρ_{in}, ρ_{out} is the density of air outside and inside ρ_{out} the tunnel at the corresponding temperatures [kg/m]^3];

ΔH- the elevation difference between the portals [m];

g- acceleration due to gravity [m/s^2].

Depending on the sign of the difference (ρ_{in} - ρ_{out}), the natural thrust changes direction.

In the case of a positive sign ($\rho_{in} > \rho_{out}$), it operates from the lower to the higher portal, which is usually during winter. In the summer, when ($\rho_{in} < \rho_{out}$), the direction is reversed.

4.4. The barometric pressure shall be given by the following formula:

$h_б = \Delta P$ [Pa] , (12)

where:

ΔP is the difference in barometric pressure between the two portals [Pa].

Barometric pressure occurs in long tunnels crossing sufficiently high watersheds, on either side of which the weather conditions may differ.

4.5. The wind pressure shall be determined according to the following formula:

The position of the portals depends on the direction of the prevailing winds:

$$h_в = \rho_0 \frac{V_в^2}{2} \cos^2 \alpha \, [Pa] \text{ , (13)}$$

where:

ρ_0 is the air density at a temperature of t °C, [kg/m^3];

$V_в$ – wind speed, m/s;

α – the angle between the wind direction and the tunnel axis [deg].

4.6. The piston effect of moving vehicles shall be calculated using the following formulae:

For bidirectional traffic: According to the dependency:

$$h_{nc} = \frac{\rho}{2}\frac{i_F S_{nc}}{S_t}\left(N^{+}(V_t - u)^2 + N^{-}(V_t + u)^2\right) \quad [Pa] \text{ (14)}$$

For unidirectional traffic

$$h_{nc} = \frac{\rho}{2}\frac{i_F S_{nc}}{S_t}\left(N^{+}(V_t - u)^2\right) \quad [Pa] \text{ , (14a)}$$

where:

S_{nc} is the area of the vehicle, m^2;

u - airflow velocity [m/s];

V_t - traffic speed [m/s].

The total depression, taking into account the positive/negative action of local and linear resistances, thermal traction, barometric and gravitational head, and wind action, is determined by the relationship:

$h_{total} = h_{лз} + h_{мс} \pm h_m \pm h_б \pm h_в \pm h_{nc}$ (15)

5. The critical speed shall be determined by the following formulae:

Tunnel airflow velocity at which reverse propagation of smoke from a fire in the tunnel is not allowed:

$$V_{cr} = K_I K_g \left(\frac{gHQ_c}{\rho c_p S_t T_f Fr}\right)^{1/3} \text{ (16)}$$

$$T_f = \left(\frac{Q_c}{\rho c_p V_{cr}}\right) + T \text{ (16a)}$$

$$K_I = Fr^{-1/3}; \quad Fr = \frac{\Delta\rho gH}{\rho_o u^2}; K_g = 1 + 0.0374(наклон)^{0,8} \text{ , (16b)}$$

where:

H is the height of the tunnel, m;

$Q_{c\,-}$ – design fire capacity, kW;

C_p – the thermal capacity of air at constant pressure, J/(kg K);

Fr - the Froude criterion [-];

$\Delta\rho = \rho_a - \rho_t$ [ug/m^3] - the difference between the density of air ρ_a and the density of hot fire gases ρ_t;

u - current velocity, m/s;

S_t - the clear cross-section of the tunnel, m^2;

T_f - the temperature of the fire gases, K;

T - the temperature of the air reaching the fire site, K;

Slope:

6. Conversion to standard conditions and transition from ppm to mg/m^3:

Standard conditions: t = 20^{o}C (293K) и P = 760 mmHg.

From ppm to mg/m^3, the conversion shall be as follows:

$$\frac{mg}{m^3} = \frac{ppm \times GMW}{V_a}, \quad (17)$$

where:

V_a = 24.04 *l/mol* under standard conditions;

GMW – molecular mass of the gas component (GMW of CO = 12 + 16 = 28 g/mol).

Recalculation to standard conditions is carried out by adjusting the current temperature and pressure to the standard ones, namely:

$$\frac{mg}{m^3} = \frac{ppm\ GMW}{V_a \frac{T_2}{293} \frac{760}{P_2}}, \quad (18)$$

where:

T2 [K] and P2 [mmHg] are the temperature and pressure at which the sample was taken and the gas concentration was determined.

The volumetric flow rates shall be equated to standard conditions by the expression:

$$Q_o = Q_m \frac{\rho_o}{\rho_m}, \quad (19)$$

where

ρ_o is the standard density (of air 1.2 $\frac{kg}{m^3}$);

ρ_m - the density of the air during the measurement, $\frac{kg}{m^3}$;

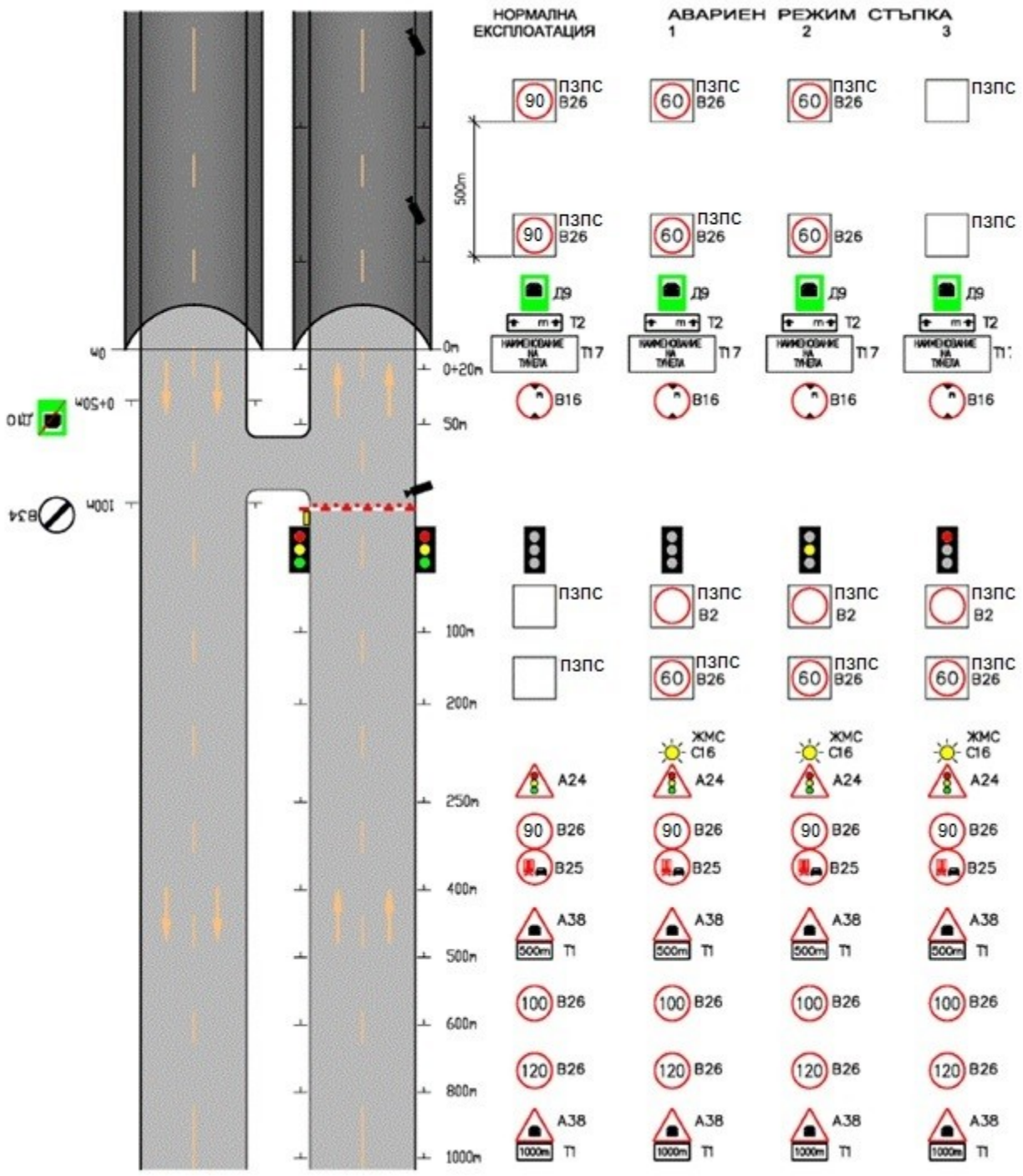
Q_m - measured flow rate, m^3/s.’

§ 99. In Annex 17 to Article 423(2), the words ‘Regulation No 18 of 2001 on the signalling of roads with road signs’ shall be replaced by ‘the Regulation on the signalling of roads with road signs under Article 14(1) of the RTA’.

§ 100. In Annex 19 to Article 428(2), the words ‘Regulation No 17 of 2001 on the regulation of road traffic with light signals (SG, issue No 72 of 2001)’ shall be replaced by ‘the Regulation on the signalling of roads with traffic lights under Article 14(1) of the RTA’;

§ 101. In Annex 20 to Article 431(2) and Article 433, Figure 1 shall be amended to read as follows:

‘



НОРМАЛНА ЕКСПЛОАТАЦИЯ	NORMAL OPERATION
АВАРИЕН 1 РЕЖИМ 2 СТЪПКА 3	EMERGENCY 1 MODE 2 STEP 3
пзпс	RSCC (road sign with changing content)

Figure 1’

Additional provisions

§ 102. Everywhere in the regulation, the words:

1. ‘emergency and rescue services’ shall be replaced by ‘the main components of the unified rescue system in accordance with the Disaster Protection Act’.

2. ‘emergency services’ shall be replaced by ‘the main components of the single rescue system, in accordance with the Disaster Protection Act’.

3. ‘controllable road signs’ shall be replaced by ‘RSCC (road sign with changing content)’.

Transitional and final provisions

§ 103. (1) The procedures initiated for the approval of an investment project and the issuance of a building permit before the entry into force of the Regulation shall be completed in accordance with the previous procedure.

(2) For an investment project approval procedure initiated and the issuance of a building permit shall be deemed to have commenced on the date of submission of the investment project for approval by the competent authority. The existence of an approved conceptual investment project shall also be deemed as the commencement of the proceedings.

§ 104. This Regulation shall enter into force upon its publication in the State Gazette.