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II

(Non-legislative acts)

DECISIONS

COMMISSION DECISION (EU) 2019/56

of 28 May 2018

on aid scheme SA.34045 (2013/c) (ex 2012/NN) implemented by Germany for baseload consumers under Paragraph 19 StromNEV

(notified under document C(2018) 3166)

(Only the German version is authentic)

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union, and in particular the first subparagraph of Article 108(2) thereof,

Having regard to the Agreement on the European Economic Area, and in particular Article 62(1)(a) thereof,

Having given notice to the parties concerned to submit their comments ⁽¹⁾ and having regard to their comments,

Whereas:

1. PROCEDURE

- (1) By complaints submitted by the *Bund der Energieverbraucher e.V.* on 28 November 2011, by the *GWS Stadtwerke Hameln GmbH* on 8 December and by citizens since December 2011, the Commission was informed that Germany had implemented since 2011 a full exemption from network charges for certain large electricity consumers. By letter dated 29 June 2012, Germany provided the Commission with further information on that aid scheme.
- (2) By letter dated 6 March 2013 ('the Opening Decision'), the Commission informed Germany that it had decided to initiate the procedure laid down in Article 108(2) of the Treaty on the Functioning of the European Union (hereafter: TFEU or Treaty) in respect of the aid scheme. Germany submitted its comments on the Opening Decision on 8 April 2013.
- (3) The Opening Decision was published in the *Official Journal of the European Union* ⁽²⁾. The Commission invited interested parties to submit their comments on the aid scheme.
- (4) The Commission received comments from interested parties. It forwarded them to Germany, which was given the opportunity to react; its comments were received by letter dated 5 November 2013.
- (5) During a meeting of 17 October 2013 and by letters notified on 7 April 2015, 20 July 2016, 6 July 2017, 18 September 2017, 3 October 2017 and 23 October 2017, the Commission requested Germany to provide information.
- (6) Germany submitted replies to those requests on 6 December 2013, 28 May 2015, 15 September 2015, 14 October 2016, 3 August 2017, 20 September 2017, 24 October 2017 and 26 October 2017. The latest information was submitted on 11 December 2017.

⁽¹⁾ OJ C 128, 4.5.2013, p. 43.

⁽²⁾ Commission Decision of 6 March 2013 on state aid SA.34045 (2012/C) – Germany – Exemption from network charges for large electricity consumers (§19 StromNEV) – Invitation to submit comments pursuant to Article 108(2) of the Treaty on the Functioning of the European Union (OJ C 128, 4.5.2013, p. 43).

2. DETAILED DESCRIPTION OF THE AID

2.1. NETWORK CHARGES IN GERMANY

- (7) The system of network charges in Germany is governed by the German Energy Act (*Energiewirtschaftsgesetz*, 'EnWG'). For the purposes of this Decision, only the EnWG as modified by Article 1 of the Law of 26 July 2011 on the review of provisions governing the energy market ⁽³⁾ ('the Law of 26 July 2011') and before the amendments introduced by Article 1 of the Law of 26 July 2016 on the further development of the electricity market ⁽⁴⁾ ('EnWG 2011') is relevant.
- (8) Paragraph 21 of the EnWG 2011 requires that the charges that the network operators ⁽⁵⁾ charge to their end users are *proportionate* (*angemessen*), non-discriminatory, transparent and are calculated on the basis of the costs of an efficient network management. Paragraph 24 of the EnWG 2011 empowers the federal government to lay down detailed rules on the methodology for the calculation of network charges by ordinance. Point 1 of the first sentence of Paragraph 24 of the EnWG 2011 empowers the federal government to determine the general methodology of calculating network charges. Point 3 of the same sentence empowers the federal government to determine in which cases of atypical network use individual network charges can be approved.
- (9) Adopted on the basis of Paragraph 24 of the EnWG 2011, the Ordinance on Electricity Network Charges (*Stromnetzentgeltverordnung*, 'StromNEV' ⁽⁶⁾) contains detailed provisions on the determination of network charges. Paragraph 3(2) of the StromNEV clarifies that network charges are paid for the services provided by the network operator at the network level to which a user is connected as well as all for the use of all upstream network levels. Paragraph 16(1) of the StromNEV establishes the guiding principle according to which network charges need to reflect the costs actually caused by network users.
- (10) Against this background and in line with the empowerment laid down in point 1 of the first sentence of Paragraph 24 of the EnWG 2011, the StromNEV provides for the general methodology that network operators have to follow for calculating network charges. This calculation methodology is laid down in Paragraphs 4 to 14 of the StromNEV 2011.
- (11) This methodology consists of first taking the various annual cost elements of all networks together. Those are the construction costs of the electricity network (transmission and distribution lines, substations), the maintenance and the costs for operating the network, including the costs linked to so-called system services (primary, secondary and minute reserves ⁽⁷⁾), re-dispatching ⁽⁸⁾ and electricity to cover network

⁽³⁾ BGBl. I p. 1554.

⁽⁴⁾ BGBl. I p. 1786.

⁽⁵⁾ A network operator is the operator responsible for the operation and safe management of an electric network. Network operators are generally distinguished between transmission system operators and distribution system operators depending on whether they operate a transmission network or a distribution network.

⁽⁶⁾ While the StromNEV had been first introduced in 2005, it has been amended various times. This decision refers to 'StromNEV' in general, where the relevant provision has not been modified by the various amendments. However, where a quoted provision has been modified, this decision explicitly refers to the relevant version of the StromNEV as follows:

— 'StromNEV 2010' refers to the version of the StromNEV as amended by Article 6 of the Law of 3 September 2010 (BGBl. I p. 2074);

— 'StromNEV 2011' refers to the version of the StromNEV as amended by Article 7 of the Law of 26 July 2011 (BGBl. I p. 1554);

— 'StromNEV 2014' refers to the version of the StromNEV as amended by Article 1 of the Ordinance of 14 August 2013 (BGBl. I p. 3250).

⁽⁷⁾ An electric grid needs to be constantly in balance between the electricity injected and consumed. Imbalances can occur when the consumption is different from what had been forecasted, or in case of a power plant failure or the sudden drop of wind or sun. The Transmission System Operators (TSOs) have the responsibility to keep the network in balance and to inject electricity when consumption is higher than electricity effectively injected and to obtain that production is reduced or consumption increased when consumption is lower than injection. As electricity cannot easily be stored, a TSO must ensure that he can very quickly (within seconds or minutes) resort to positive or negative energy. TSOs therefore contract reserves (also called 'Regelleistung'). In Germany a distinction is made between three main network reserves: (a) the primary reserve under which energy must be made available to the TSO within 30 seconds after request; (b) the secondary reserve under which the energy must be made available within five minutes and the minute reserve (also called tertiary reserve) under which the energy must be made available within 15 minutes (see BNetzA website: <https://www.smard.de/blueprint/servlet/page/home/wiki-article/446/396>).

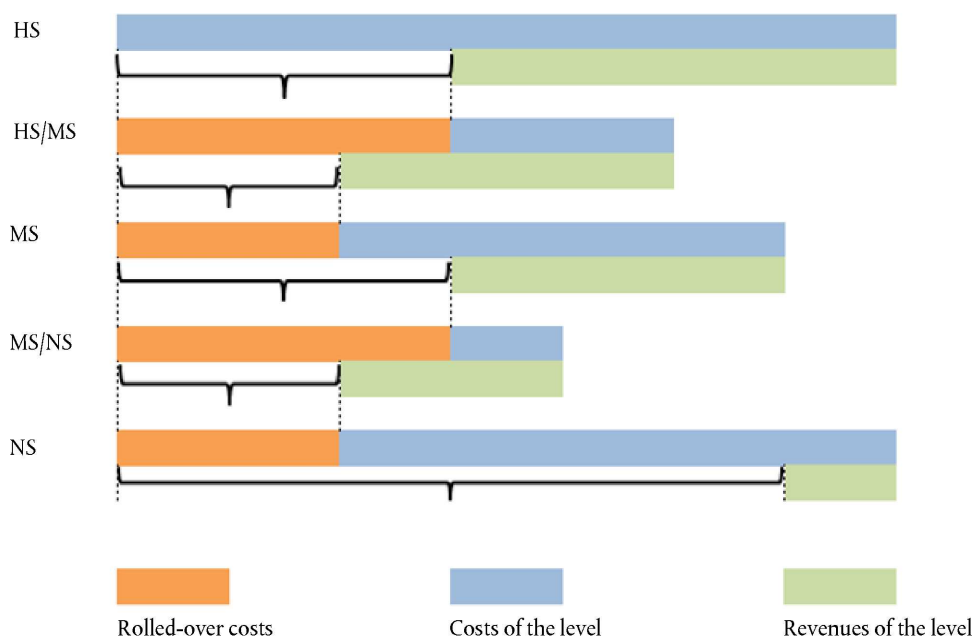
⁽⁸⁾ Re-dispatching measures are linked to network congestion management. Network congestion occurs when the electricity generated exceeds the capacity of the network elements that connect the generation facilities to the consumption points. By lowering the real power output of one or more power plants at one end of the congested area and at the same time increasing the real power output of one or more other power plants at the other end, it is possible to relieve congestion while keeping the total real power in the grid close to constant. Redispatch is a request issued by the transmission system operator to power plants to adjust the real power they inject in order to avoid or eliminate network congestion. The TSO has to compensate the power plants for the redispatching order (https://www.bundesnetzagentur.de/DE/Sachgebiete/ElektrizitaetundGas/Unternehmen_Institutionen/Versorgungssicherheit/Engpassmanagement/Redispatch/redispatch-node.html).

losses ⁽⁹⁾). Their annual amount is calculated based on the profit and loss account of the network operators (Paragraph 4 of the StromNEV 2011). They include not only material costs and personnel costs but also loan interests (Paragraph 5 of the StromNEV), depreciation (Paragraph 6 of the StromNEV 2011), a remuneration for the network operator's own capital (Paragraph 7 of the StromNEV 2011) and taxes (Paragraph 8 of the StromNEV 2011). Revenues like connection costs and subsidies have to be deducted (Paragraph 9 of the StromNEV). Metering costs, however, are not included in the network costs and are also subject to separate metering fees. The costs linked to the purchase of balancing energy ⁽¹⁰⁾ are not included in the network costs as it is invoiced separately to the users responsible for the imbalance.

- (12) The total annual costs of the networks are then allocated to the different network and network levels (high voltage, substation levels, medium voltage, low voltage). Annex 2 of the StromNEV 2011 contains the list of those network levels.
- (13) The next step in the determination of the network charges will be to convert the total annual costs of the networks into the network charges. They are determined top-down for each voltage level (from high voltage to low voltage). First the so-called specific annual costs of the high voltage level are determined by dividing the total annual costs of the high voltage level by the annual peak load measured on that high voltage level, as the peak load of the network level is viewed as the main cost determining factor. This is expressed in EUR/kW. Via the 'simultaneity function' of each grid level described in recital 14 below, the specific annual costs will be converted into a price per connection capacity, in EUR/kW and into a price per unit of electricity consumed, in EUR/kWh. The same exercise is then done for the next voltage level. However the total annual costs of the next voltage level will be composed on its own costs and of rolled-over costs from the upstream voltage level. The rolled over costs correspond to the total costs of the upstream level minus the network charges obtained from network users (final consumers and electricity suppliers directly connected to that voltage level). The following figure 1 shows the roll-over of costs. In a network in which electricity flows top-down, network users will thus have to bear the costs of the network level to which they are connected, as well as part of the costs of the upstream networks as those networks are used to transmit the electricity to them as well.

Figure 1

Roll-over of network costs for the determination of network charges ⁽¹⁾



⁽¹⁾ In the figure, HS stands for high voltage, MS stands for medium voltage, NS stands for low voltage, HS/MS stands for the substation in which high voltage is transformed to medium voltage, MS/NS stands for the

⁽⁹⁾ When electricity is transported, part of it is lost in the transmission so that additional electricity must be injected to match the quantity of electricity that was initially fed into the grid.

⁽¹⁰⁾ Germany has explained that in the case of balancing costs, a distinction must be made between the costs linked to the reserves and the actual supply of the negative or positive balancing energy. Under the reserves, the service providers are remunerated for their availability. However, when energy is actually withdrawn from them based on a call of the TSO, they are in addition remunerated for the energy actually supplied. The costs of the actual (positive or negative) energy supply are directly invoiced to the operator responsible for the imbalance.

substation converting medium voltage to low voltage. Source: Commission based on description provided by Germany and completed with the information contained in Figure 1 of the BNetzA Report 'Netzentgeltssystematik Elektrizität' of December 2015 available under https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Netzentgelte/Netzentgeltssystematik/Bericht_Netzentgeltssystematik_12-2015.pdf?__blob=publicationFile&v=1.

- (14) In order to ensure an allocation to the various network users reflecting the actual costs caused by an individual network user as required by Paragraph 16(1) of the StromNEV, the simultaneity function is applied for the voltage level being considered. The simultaneity function referred to above under recital 13 is described in Paragraph 16(2) StromNEV and Annex 4 of StromNEV 2011. This function attributes to each network user a 'simultaneity factor' between 0 and 1. The simultaneity factor expresses the probability — based on historical figures — that the electricity consumption of the individual network user in question contributes to the annual peak load of the network level concerned. The simultaneous annual peak load of the network is an important cost driver of the network given that this annual peak load is important for the dimensioning of network in which electricity is flowing top-down. The idea behind the simultaneity function is that network users which have a higher probability of contributing to the annual peak load will pay a higher capacity tariff. The users of each network level are the final consumers directly connected to the high voltage level as well as downstream network levels. The simultaneity factors of all network users of the network level considered are then introduced into a graph on the y-axis and put in correlation with the number of annual hours of full use (x-axis). This results into the simultaneity function. This function is linear and continuous but composed of two linear parts which intersect at a kink ⁽¹¹⁾ at 2 500 annual usage hours made ⁽¹²⁾. The simultaneity function is then converted into a tariff per connection capacity ⁽¹³⁾ in EUR/kW and into a tariff per unit of electricity consumed ⁽¹⁴⁾ in EUR/kWh.
- (15) When establishing the network charges, network operators must also take into account the maximum revenue level allowed for each one of them by the Federal Network Agency (*Bundesnetzagentur*, 'BNetzA') (on the maximum revenue level allowed, see also recital 43). In practice, this maximum revenue level, which is established by benchmarking with other network operators, will have as consequence that high costs resulting from inefficiencies cannot be recovered through network charges. This system aims at improving the efficiency of the network operators. Where a modification of the maximum revenue level authorized would lead to a reduction of network charges, the network operator has to adapt the network charges (Paragraph 17(2) of the Ordinance on the introduction of efficiency incentives for energy supply networks – *Verordnung über die Anreizregulierung der Energieversorgungsnetze*, ARegV 2011 ⁽¹⁵⁾).

⁽¹¹⁾ Germany has explained that though this kink at 2 500 annual hours of full use is now a convention, it is based on empirical figures. Empirically, the simultaneity function is never entirely linear but increases with a softer slope around 2 500 full hours of full use while it increases with a steep slope below 2 500 annual hours of full use. That leads to two segments in the simultaneity function and therefore also leads to four network tariffs: one consumption and capacity tariff for users below 2 500 hours of full use and one consumption and capacity tariff for users above 2 500 hours of full use. The only alternative would be to build the simultaneity function as a concave curve but that would result in the necessity to calculate an individual consumption tariff for each network user in Germany (as the slope of the function changes on each point of the curve). This would have considerably increased the administrative burden linked to the determination of network charges in Germany, delayed the calculation of network charges for network users and reduced transparency and predictability of network charges for network users.

⁽¹²⁾ For an example of the simultaneity function, see *Bericht der Bundesnetzagentur zur Netzentgeltssystematik Elektrizität*, Stand Dezember 2015, available under: https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Netzentgelte/Netzentgeltssystematik/Bericht_Netzentgeltssystematik_12-2015.pdf?__blob=publicationFile&v=1.

⁽¹³⁾ It is obtained by multiplying the specific annual costs of the network level with the value at which the simultaneity function crosses the x-axis at 0 and at 2 500 annual hours of full use (respectively for users with annual hours of full use below and above 2 500 hours). For instance, for 2017, Amprion applied the following capacity tariff for the high voltage level:

< 2 500 h/a	≥ 2 500 h/a
6,3 EUR/kWa	36,55 EUR/kWa

⁽¹⁴⁾ It is obtained by multiplying the specific annual costs of the network level concerned with the slope of the simultaneity function up to its kink at 2 500 hours of full use (for users with annual hours of full use below 2 500 hours) and with the slope of the simultaneity function above its kink at 2 500 hours of full use (for users with more than 2 500 hours of full use). For instance, for 2017, Amprion applied the following consumption tariff for the high voltage level:

< 2 500 h/a	≥ 2 500 h/a
1,512 ct/kWh	0,302 ct/kWh

⁽¹⁵⁾ Ordinance of 29 October 2007, BGBl. I p. 2529. The ARegV has been modified several times. This decision refers to 'ARegV' in general, where the relevant provision has not been modified by the various amendments. However, where a quoted provision has been modified, this decision explicitly refers to the relevant version of the ARegV as follows:
— 'ARegV 2011' refers to the version of the ARegV as amended by Article 5 of the Law of 28 July 2011 (BGBl. I p. 1690).

- (16) The methodology described in recitals 11 to 15 above implements the ‘principle of cost-causality’ when determining the network charges for the majority of network users. Paragraph 19 of the StromNEV addresses the network charges to be paid in line with the principle of cost-causality by so-called atypical network users, i.e. users with a consumption or load pattern that differs significantly from the consumption or load profile of the other users as provided for in point 3 of the first sentence of Paragraph 24 of the EnWG 2011. The heading of Paragraph 19 of the StromNEV is ‘atypical network use’.
- (17) Paragraph 19(2) of the StromNEV identifies two groups of atypical network users: Firstly, users whose annual peak load predictably and significantly deviates from the simultaneous annual peak load of all other network users connected to the same network (first sentence of Paragraph 19(2) of the StromNEV). Typically this concerns network users who are systematically consuming outside peak load times because for instance they are running equipment at night. This first category of atypical network users is hereinafter designated as ‘non-peak consumers’. Secondly, users with an annual electricity consumption reaching minimum 7 000 hours of use⁽¹⁶⁾ and exceeding 10 gigawatt hours (GWh) (second sentence of Paragraph 19(2) of the StromNEV). This second category of atypical network users is hereinafter designated as ‘baseload consumers’.
- (18) Before the amendment introduced by Article 7 of the Law of 26 July 2011 and described more in detail below in section 2.2, Paragraph 19(2) of the StromNEV as amended by the Law of 3 September 2010 (‘StromNEV 2010’⁽¹⁷⁾) stated that both non-peak and baseload consumers were to pay individual network charges as also explicitly provided under the empowerment laid down in point 3 of the first sentence of Paragraph 24 of the EnWG 2011 (see recital 7 above).
- (19) Such individual network charges were to take due account of the consumption pattern of the atypical network user. More precisely, the third sentence of Paragraph 19(2) of the StromNEV 2010 required that the individual network charge should reflect the contribution of the atypical network user to a reduction of the overall network charges or their contribution to avoiding an increase in network charges. To this end, in 2010, the BNetzA published a guidance paper⁽¹⁸⁾ outlining the so-called ‘physical path methodology’ that should be applied to determine the network costs caused by the baseload consumers and thereby their individual network charges. The physical path methodology aims at identifying the stand-alone costs of a particular network user. It measures the costs of a virtual use of an existing direct line from the consumption site to an adequate generation installation by computing the capital and operational expenditures of the part of the network used to connect the baseload consumer to the closest power plant that can cover the entire needs of the baseload consumer and adding the costs of network services⁽¹⁹⁾ that the baseload consumer has been using, if any.
- (20) The second sentence of Paragraph 19(2) of the StromNEV 2010, however, required both non-peak and baseload consumers to pay a minimum contribution of at least 20 % of the published network charge, that is to say the individual network charge calculated based on the contribution of the atypical network user to a reduction of the overall network charges or their contribution to avoiding an increase in network charges could not be lower than 20 % of the published network charge. Germany has explained that this minimum contribution aims at guaranteeing that also atypical network users pay a minimum contribution to the management of the public grid to which they are connected. Concerning baseload consumers in particular, Germany has indicated that if they are located very close to a baseload power plant⁽²⁰⁾, the network charges calculated based on the physical path

⁽¹⁶⁾ The requirement of 7 000 hours of full use was foreseen by StromNEV 2010 to be applicable as of 1 January 2011 and hence applied already prior to the introduction of the complete exemption of baseload consumers. Prior to that amendment, the requirement had been 7 500 hours of full use.

⁽¹⁷⁾ See footnote 6.

⁽¹⁸⁾ BNetzA, *Leitfaden zur Genehmigung von individuellen Netzentgelten nach § 19 Abs. 2 S. 1 und S. 2 StromNEV ab 2011* (29.9.2010).

⁽¹⁹⁾ Network services are services delivered by the network operator to keep the network in balance. The main network services are the reserves, re-dispatching measures and energy for network losses.

⁽²⁰⁾ A baseload power plant is a power station that usually provides a continuous supply of electricity throughout the year with some minimum power generation requirement. Baseload power plants will only be turned off during periodic maintenance, upgrading, overhaul or service. Several interested parties indicate that baseload power plants generally reach 7 500 hours of full use per year and are typically nuclear power plants, lignite-fired power plants, run-of-river power plants and to a certain extent coal-fired power plants. They can be distinguished from medium load power plants reaching between 3 000 and 5 000 hours of full use per year, typically coal-fired power plants and gas turbines and from peak power plants generally running around 1 000 hours of full use over the year and typically constituted of pumping stations, gas turbines and oil-fired power plants. Also the BNetzA lists the following power plants as baseload power plants: nuclear power plants, run-of-river power plants and lignite-fired power plants. Coal-fired power plants can be considered as baseload power plants but only with a derating factor of 0,8 (see Leitfaden zur Genehmigung individueller netzentgeltvereinbarungen nach § 19 Abs. 2 S. 1 und 2 StromNEV, Paragraph 1.3.2.2.1). Coal-fired power plants can be considered as baseload power plants but only up to 80 %.

methodology could be close to zero. Those baseload consumers, however, still benefit from the public network and the secured electricity supply that it provides. Germany has moreover explained that the minimum contribution was taking account of the fact that the physical path methodology can only serve as a proxy to determine the individual network costs.

2.2. THE FULL EXEMPTION BETWEEN 2011 AND 2013

- (21) In the StromNEV as amended by Article 7 of the Law of 26 July 2011, which entered into force on 4 August 2011 but was retroactively applicable as of 1 January 2011 ('StromNEV 2011' ⁽²¹⁾), the system of individual network charges for baseload consumers was abolished and replaced by a full exemption from the obligation to pay network charges. Individual network charges for non-peak consumers remained in place as well as their obligation to pay at least 20 % of the published network charge.
- (22) According to the second sentence of Paragraph 19(2) of the StromNEV 2011 end users were to be exempted from network charges if their annual energy consumption reaches at least 7 000 hours of full use and exceeds 10 GWh of consumption. That exemption ('the full exemption') constitutes the subject-matter of both the Opening Decision and this Decision.
- (23) The threshold of 7 000 hours of full use is what characterizes a baseload consumer in the sense that this threshold can only be reached if the end user concerned remains almost constantly connected to the network with the same load. Hours of (full) use are defined under Paragraph 2(2) of the StromNEV as the quotient of the annual power output and the annual peak load of the respective network user.
- (24) Pursuant to the third sentence of Paragraph 19(2) of the StromNEV 2011, the exemption provided for in the second sentence of the same paragraph was to be granted only once the competent regulatory authority (either the BNetzA or one of the regional regulators, '*Landesregulierungsbehörde*' ⁽²²⁾) had verified that the legal conditions were fulfilled. Once that verification was completed, the BNetzA or the Landesregulierungsbehörde delivered an authorisation that entitled the baseload consumer to the full exemption as of 1 January 2011 (provided all conditions were met at that date) and for an indefinite period (provided that the requirements continued to be met).
- (25) The full exemption resulted in a reduction of revenues for network operators. This financial loss has been compensated through a special surcharge as of 2012 (see section 2.4 below). For the year 2011, however, no special surcharge was introduced and the financial loss was borne by the network operators in 2011.
- (26) The full exemption was abolished by an amendment ⁽²³⁾ to the StromNEV as of 1 January 2014.

2.3. BENEFICIARIES AND AID AMOUNT

- (27) Germany has provided a provisional list of undertakings entitled to an exemption under the second sentence of Paragraph 19(2) of the StromNEV 2011. Based on this information, more than 200 undertakings were exempted from network charges under the second sentence of Paragraph 19(2) of the StromNEV 2011 in the period 2011 to 2013. The large majority of those undertakings belong to various branches of the manufacturing sector, in particular, the chemical industry (including industrial gases), paper, textile, steel, non-ferrous metal industry, oil refineries and glass manufacturing. Only occasionally have undertakings involved in the service sector (for instance web hosting) obtained a full exemption. Those undertakings were undertakings with large data centres.

⁽²¹⁾ See also footnote 6.

⁽²²⁾ The BNetzA is a federal government agency of the German Federal Ministry of Economics and Technology. Its core task is to ensure compliance with the Telecommunications Act (TKG), Postal Act (PostG) and Energy Act (EnWG) and their respective ordinances in order to guarantee the liberalisation of the markets for telecommunications, post and energy. It also assumes responsibility for rail regulation. In all those regulatory areas, it monitors non-discriminatory access to the networks under transparent circumstances, and examines the access charges. To achieve its regulatory aims, the Bundesnetzagentur has effective procedures and instruments at its disposal, including rights of information and investigation along with the power to impose graded sanctions and the right to adopt regulatory decisions. It has an Advisory Council consisting of 16 members of the German Bundestag and 16 representatives of the German Bundesrat; the Bundesrat representatives must be members or political representatives of the government of a federal state. The members and deputy members of the Advisory Council are appointed by the federal government upon the proposal of the German Bundestag and the German Bundesrat (Paragraph 5 of the Act on the Federal Network Agency for Electricity, Gas, Telecommunications, Posts, and Railways of 7 July 2005, BGBl. I p. 1970). The BNetzA is directed by a president and two vice-presidents. They are proposed by the Advisory Council to the Government (Paragraph 3 of the Act on the Federal Network Agency for Electricity, Gas, Telecommunications, Posts, and Railways of 7 July 2005, BGBl. I p. 1970). They are nominated by the President of the Federal Republic of Germany. The BNetzA is however not the only regulatory authority in Germany. In some of the Bundesländer separate regulatory authorities have been established (the *Landesregulierungsbehörden*).

⁽²³⁾ Article 1 of Ordinance of 14 August 2013 amending several ordinances in the area of the energy markets, BGBl. I p. 3250.

- (28) The estimates provided by Germany indicate that the losses incurred by the network operators due to the full exemption over the period 2011 to 2013 amount to approximately EUR 900 million compared to a situation in which baseload consumers would have paid the normal charge. The loss is, however, probably lower as in the calculation of the 2011 network charges network operators normally took into account the fact that the baseload consumers would have been eligible for individual network charges under Paragraph 19(2) of the StromNEV 2010. However, the estimation is further complicated by the fact that the threshold for eligibility for individual charges had changed as of 1 January 2011 (7 000 hours of full use instead of 7 500 hours of full use), and that the individual charges may not have been attractive for certain baseload consumers, because it may not have led to a significant reduction of their network charges, depending on their geographical location and other factors influencing the calculation of the individual network charges.

2.4. FINANCING MECHANISM

2.4.1. THE FINANCING MECHANISM AS DESCRIBED IN PARAGRAPH 19 OF THE STROMNEV 2011

- (29) Given that the exempted baseload consumers were connected to different network levels, the full exemption led to losses in revenue both for the transmission system operators ('TSO') and the distribution system operators ('DSO'). The sixth sentence of Paragraph 19(2) of the StromNEV 2011 obliged the TSO to compensate the DSO for their losses in revenue resulting from the full exemption. However, for the reasons set out in detail under section 2.4.3, such compensation *de facto* only took place as of 2012. In 2011, the losses were born by the TSO and DSO to whose network the exempted baseload consumers were connected.
- (30) Furthermore, pursuant to the seventh sentence of Paragraph 19(2) of the StromNEV 2011, the TSO had to set off the sum of their payments to the DSO and their own losses amongst themselves. For the detailed rules on how to carry out that set-off, Paragraph 19(2) of the StromNEV 2011 referred to Paragraph 9 of the Combined Heat and Power Generation Act (*Kraft-Wärme-Kopplungsgesetz*, 'KWKG')⁽²⁴⁾ applicable at the time, which was to be applied by analogy. The set-off served to spread the financial burden between the TSO in such a way that each TSO bore the same burden in proportion to the electricity supplied to final consumers (directly or indirectly) connected to their respective network area. Paragraph 9 of the KWKG, to which the seventh sentence of Paragraph 19(2) of the StromNEV 2011 referred, established the system by which TSOs were compensated through the so-called CHP-surcharge for the extra costs resulting from their obligation to pay support to producers of cogenerated electricity connected to their network under the KWKG and their obligation to compensate DSOs for the support that they also paid to producers of cogenerated electricity connected to their network under the KWKG⁽²⁵⁾. The analogous application of Paragraph 9 of the KWKG implied that network operators could introduce a surcharge to obtain compensation for the financial losses resulting from the full exemption and that the revenues collected from this surcharge had to be transferred from DSOs to the TSOs⁽²⁶⁾.
- (31) In addition, Paragraph 19(2) of the StromNEV 2011 stipulated that Paragraph 20 of the StromNEV 2011 was applicable by analogy. Paragraph 20 of the StromNEV 2011 stated that electricity grid operators had to make sure, prior to publishing their network charges for electricity, that the revenues of the charges were sufficient to cover their expected costs.
- (32) Since the entry into force of the ARegV, which establishes a regulatory system that is aimed at incentivising network operators to a more efficient network management, network charges do not need to be approved by the BNetzA anymore (as a result of Paragraph 23a of the EnWG). Instead, point 1 of Paragraph 32(1) ARegV 2011

⁽²⁴⁾ Law for the Support of Combined Heat and Power Generation of 25 October 2008 (BGBl. I p. 2101). This law has been amended by Article 11 of the Law on the Review of the Legal Framework for the Support of Electricity Production from Renewable Energy Sources of 28 July 2011 (BGBl. I p. 1634). Paragraph 9 of the KWKG has not changed between 1 January 2011 and 31 December 2013. The KWKG was overhauled on 21 December 2015 by the Law for maintaining, modernizing and deployment of Combined Heat and Power Generation (BGBl. I p. 2498); however, the compensation mechanism foreseen by Paragraph 9 was maintained (though more detailed) and was included in Paragraphs 26 to 28 of the KWKG of 21 December 2015. The Law for maintaining, modernizing and deployment of Combined Heat and Power Generation was again amended by law of 22 December 2016 amending the provisions on electricity production from cogeneration and autogeneration (BGBl. I p. 3106).

⁽²⁵⁾ For a detailed description of the compensation system under Paragraph 9 KWKG (which became Paragraph 29 of the KWKG 2016 after the amendments introduced by law of 22 December 2016 amending the provisions on electricity production from cogeneration and autogeneration (BGBl. I p. 3106), see Commission decision of 23 May 2017 on the aid scheme SA.42393 (2016/C) (ex 2015/N) implemented by Germany for certain end consumers (reduced CHP surcharge, section 2.3).

⁽²⁶⁾ See in particular Paragraph 9(7) of the KWKG providing for the introduction of the surcharge per electricity consumed on top of network charges and Paragraph 9(4) of the KWKG giving the TSOs the right to obtain compensatory payment from the DSOs (i.e. to obtain that DSOs transfer the revenues of the surcharge to the TSOs).

provides that the BNetzA approves the maximum revenue level that network operators are allowed to obtain from network users. According to Paragraph 17 ARegV 2011 this authorized maximum revenue level must be respected when network operators determine network charges.

- (33) Network operators continue, however, to be obliged to make sure prior to publishing their network charges for electricity, that the revenues of the charges were sufficient to cover their expected costs (but within the limit of the authorized maximum revenue level).
- (34) As explained below, the BNetzA adopted a regulatory decision in order to regulate more in detail the surcharge system, which was eventually put in place as of 2012 (see section 2.4.2). By contrast, in 2011, the sixth and seventh sentences of Paragraph 19(2) of the StromNEV 2011 were not implemented and each network operator bore its own costs (see section 2.4.3).

2.4.2. FINANCING VIA THE 'PARAGRAPH 19-SURCHARGE' AS OF 2012

- (35) The legal framework for the compensation and the set-off of the losses in revenue resulting from the full exemption was concretized by a regulatory decision of the BNetzA adopted on 14 December 2011 ⁽²⁷⁾ ('the regulatory decision of 14 December 2011') on the basis of Paragraph 29(1) of the EnWG and point 6 of Paragraph 30(2) of the StromNEV 2011 ⁽²⁸⁾. The decision imposed on the DSO the obligation to collect from end users a surcharge called the 'Paragraph 19-surcharge'. The BNetzA further imposed on the DSO the obligation to transfer the proceeds from this surcharge to the TSO on a monthly basis (as also provided for under Paragraph 9(5) of the KWKG to which the seventh sentence of Paragraph 19(2) of the StromNEV 2011 refers).
- (36) The purpose of the Paragraph 19-surcharge was to establish a financing mechanism that distributes the financial burden resulting from the application of Paragraph 19(2) of the StromNEV 2011 in a transparent and homogenous way and thus to create equal conditions for all electricity consumers across Germany.
- (37) The amount of the Paragraph 19-surcharge was not calculated by the BNetzA but needed to be calculated each year by the TSO on the basis of the methodology set out by the BNetzA. This implied that the TSO had to determine on the one hand the forecasted financial losses resulting from the full exemption compared to the full network charge and on the other hand the forecasted consumption in order to determine the Paragraph 19-surcharge per kWh. For the first year of operation (that is to say 2012), however, the BNetzA set the amount that needed to be recovered through the Paragraph 19-surcharge at EUR 440 million. This amount served as a basis for the calculation of the surcharge. Of this amount, EUR 300 million needed to be recovered in order to compensate for the losses in revenue resulting from the full exemption. The remaining EUR 140 million were destined to cover the losses in revenue resulting from individual network charges based on the first sentence of Paragraph 19(2) of the StromNEV 2011.
- (38) Before the amendments introduced by Article 7 of the Law of 26 July 2011 in the StromNEV, the loss of revenues resulting from individual network charges for atypical network users were recouped, to the extent that the network operator was an efficient company and hence could under the ARegV recoup its entire costs, through network charges: as network operators knew in advance that some users would pay less, they could already factor that in in the calculation of network charges under Paragraph 20 of the StromNEV. Under the sixth and seventh sentence of Paragraph 19(2) of the StromNEV 2011, however, the loss of revenues resulting from individual network charges for non-peak consumers and the full exemption for baseload consumers had to be compensated through a dedicated surcharge.
- (39) In addition, the regulatory decision of 14 December 2011 provided that the TSO had to establish for each year what the real need in terms of financial resources was for the previous year. Where the proceeds from the Paragraph 19-surcharge exceeded the amount actually needed to compensate the TSO for the losses in revenue resulting from the full exemption and the compensation of DSO, the surcharge in the subsequent year would have to be reduced by the difference. Where the proceeds were insufficient, the surcharge was increased accordingly.

2.4.3. FINANCING MECHANISM FOR 2011

- (40) The regulatory decision of 14 December 2011 explicitly stated that the losses in revenue incurred in 2011 were not covered by the compensation and set-off mechanism described in recital 30.
- (41) As regards the losses incurred in 2011, the DSO were thus not entitled to be compensated by the TSO. Both the DSO and the TSO had to cover those losses in revenue from their own resources.

⁽²⁷⁾ BK8-11-024.

⁽²⁸⁾ While Paragraph 29(1) of the EnWG empowers the BNetzA to determine by regulatory decision which is binding on the network operators the concrete modalities of grid access, point 6 of Paragraph 30(2) of the StromNEV 2011 stated that such regulatory decision in particular can concern the determination of appropriate network charges.

- (42) They could include those losses in their so-called regulatory accounts ('Regulierungskonto') established under the ARegV.
- (43) As mentioned in recital 32, the ARegV established a regulatory system that is aimed at incentivising network operators to a more efficient network management and under which network operators are subject to a maximum revenue level established by the BNetzA. This authorized maximum revenue level is established for a regulatory period of 5 years the maximum. In order to establish this maximum revenue level, network operators are obliged to provide the BNetzA with various accounting data (including costs and revenues) prior to the start of a regulatory period. In addition, the maximum revenue level that network operators are allowed to obtain from network users is evolving during the 5 year regulatory period to take into account inefficiencies of network operators in order to induce them to increase efficiency. This implies that the approved maximum revenue will decrease during the regulatory period. The efficiency of a network operator is measured prior to the regulatory period based on a comparison of the network operators by the BNetzA. The first regulatory period was from 2009 to 2013. The second regulatory period started in 2014 to end in 2018.
- (44) The positive or negative differences ⁽²⁹⁾ between the approved maximum revenue level and the actually obtained revenues are booked on a special regulatory account, which is an accounting tool administered by the BNetzA (Paragraph 5 of the ARegV) in order to steer network operators towards more efficiency.
- (45) At the end of the 5 year period 2009-2013, excess revenues were set off against excess revenue reductions. The resulting positive balance or negative balance was transferred to the next regulatory period (Paragraph 5(4) of the ARegV 2011) and spread over the five years of the second regulatory period as a decrease or increase of the otherwise applicable maximum revenue level.
- (46) However, if the revenues obtained in a given year of the regulatory period were to exceed by more than 5 % the approved maximum revenue level, the network operator concerned would have to adapt its network charges (to avoid that the same situations occurs again in the following year and to avoid that the reduction of network charges would be postponed until the next regulatory period). If the revenues obtained in a given year of the regulatory period were to be below the approved maximum revenue level by more than 5 %, the network operator concerned would have the right to adapt its network charges (to avoid that the same situations occurs again in the following year and avoid a sudden increase of network charges in the next regulatory period). The network operator has, however, in the latter case the choice to adapt the network charges or not..
- (47) It is in this framework that the losses in revenue incurred by the network operators due to the full exemption in 2011 had to be compensated. At the time of the 'Verprobung' ⁽³⁰⁾ for 2011 (and which took place in 2010), the full exemption was not known and could not have been taken into account when network charges were established for 2011. As Germany has confirmed by Email of 24 October 2017, based on the then applicable ARegV 2011, the losses in revenue incurred in 2011 (that is to say the difference between allowed revenues and actually obtained revenues) could not be recouped by an adaptation of the 2011 network charges given that network charges had to be set in advance in the framework of the 'Verprobung' pursuant to Paragraph 20 of the StromNEV and could not be modified over the course of that year. They were actually obliged to set this loss off with profits from other years of the regulatory period. This is also why network operators challenged the full exemption and the BNetzA regulatory decision of 14 December 2011.
- (48) The losses in revenue incurred by the network operators due to the full exemption could also not be recouped through an increase in network charges in 2012 given that network charges for 2012 could only be linked to forecasted costs to be incurred in 2012. By contrast, the losses in revenue – if not already compensated by efficiency gains in 2011 – had to be booked on the *Regulierungskonto*. Where, at the end of the first regulatory period, the losses in revenue for 2011 were set off against additional revenues in other years of that regulatory period, no compensation of the losses would occur. Only where the losses could not be set off against additional revenues in the regulatory period ending in 2013 could the loss of revenues in 2011 lead to an indirect compensation over the next regulatory period by leading to a slight increase of the approved maximum revenue level of the next regulatory period. However, even in that situation, as the ARegV does not compensate full costs, but only costs of an efficient operator, there would normally not be a full compensation.

⁽²⁹⁾ Before being booked, the amounts are first corrected in function of the volume of electricity transmitted to avoid that the difference in revenues results from the mere fact that network users consumed more or less electricity in comparison to the assumptions used for the determination of the approved maximum revenue level.

⁽³⁰⁾ When network operators set network charges, they have to verify in accordance with Paragraph 20 of the StromNEV that network charges that are aimed to be published are suitable to cover the costs listed in Paragraph 4 of the StromNEV. This is designated as the 'Verprobung' of the network charges.

2.5. OBJECTIVE OF THE FULL EXEMPTION

- (49) It follows from the explanatory memorandum to the StromNEV 2011 that the full exemption for baseload consumers had been introduced because of the alleged stabilizing effects that baseload consumers have on the network ⁽³¹⁾.

2.6. GROUNDS FOR INITIATING THE PROCEDURE

- (50) In its Opening Decision, the Commission concluded that the full exemption conferred a selective advantage on such baseload consumers that have an annual electricity consumption exceeding 7 000 hours of full use and 10 GWh of consumption. Moreover, the Commission found that the Paragraph 19-surcharge, which was introduced in 2012, constituted a State resource and that the TSO had been appointed to administer it while being monitored by the BNetzA through the *Regulierungskonto*. As regards the year 2011, the Commission expressed its concerns that the full exemption could have been financed through State resources already before the Paragraph 19-surcharge was imposed. The Commission indicated that the existence of State resources could be derived from the fact that Paragraph 9 of the KWKG entitled the network operators to levy a surcharge from the network users, the proceeds of which would be administered by the TSO. Also, the Commission considered that the losses in revenue due to the full exemption in 2011 could have been compensated via the *Regulierungskonto* which the Commission found to be monitored by the BNetzA.
- (51) The Commission also noted that Germany had not presented any compatibility ground for the aid and had merely referred to the stabilising impact on networks without quantifying that impact. The Commission therefore opened the formal investigation procedure.

2.7. DEVELOPMENTS AFTER THE OPENING DECISION

- (52) As network operators were not guaranteed that they would recoup the loss of revenues resulting from the full exemption in 2011, several of them challenged exemption decisions of the BNetzA and also directly the regulatory decision of 14 December 2011. By order of 8 May 2013, the Higher Regional Court of Düsseldorf ⁽³²⁾ concluded that the full exemption in place between 2011 and 2013 was illegal and revoked the full exemption granted to the undertaking concerned by the procedure before that Court. The Higher Regional Court found that the full exemption granted under the second sentence of Paragraph 19(2) of the StromNEV 2011 did not respect the limits of Paragraph 24 of the EnWG 2011 which entitled the federal government merely to define the modalities of calculating individual network charges, but not to introduce a full exemption from network charges. The Higher Regional Court further observed that network charges are the price for a service supplied to them (that is to say the access to and the use of the network) and that the full exemption could not be seen as an individual network charge or a price for a service but corresponded to a privilege, an exception to the principle that a proportionate network charge should be paid to network operators for the use of the network. It noted that the stabilising effect of baseload consumers could at most justify a reduced network charge but not a full exemption given that also those baseload consumers were using the network. Finally the Higher Regional Court observed that the Paragraph 19-surcharge did not correspond to a network charge but to a surcharge that is collected in addition to network charges; it did not correspond to the price for the use of the network but merely corresponded to a surcharge introduced to cover the financial losses caused to network operators by the full exemption..
- (53) By judgment of 6 October 2015 ⁽³³⁾, the Federal Court of Justice confirmed the order of the Higher Regional Court of Düsseldorf of 8 May 2013. The Federal Court of Justice confirmed that the full exemption granted under the second sentence of Paragraph 19(2) of the StromNEV 2011 did not respect the limits of Paragraph 24 of the EnWG 2011 which entitled the government merely to define the modalities of calculating individual network charges, but not to introduce a full exemption from network charges. The Federal Court of Justice further observed that the first and the third sentence of Paragraph 24(1) of the EnWG 2011 were based on the principle that network operators are entitled to a compensation for the use of their networks and that the stabilising effect of baseload consumers could not be seen as a compensation to the network operator for the use of the network given that this stabilising impact was not a compensation paid in exchange of the use of the network but simply the consequence of the use of the network. The Federal Court of Justice also observed that while this stabilising impact could be of economic interest to network operators and could justify reduced network charges, it cannot automatically be assumed to justify a full exemption simply based on the number of hours of full use, in particular given that also baseload consumers are contributing to the peak load of the network. Reductions will have to take account of the specific impact of each baseload consumer on the network.

⁽³¹⁾ BT-Drs. 17/6365, p. 34.

⁽³²⁾ VI-3 Kart 178/12 (V). On 6 March 2013 the Higher Regional Court had rendered a similar judgment after having been seized by a network operator challenging the regulatory decision of 14 December 2011.

⁽³³⁾ EnVR 32/13.

Finally, the Federal Court of Justice also confirmed that the Paragraph 19-surcharge did not correspond to a network charge but to a surcharge that is collected in addition to network charges; it did not correspond to the price for the use of the network but merely corresponded to a surcharge introduced to cover the financial losses caused to network operators by the full exemption.

- (54) Both the Higher Regional Court of Düsseldorf and Federal Court of Justice declared the full exemption in the second sentence of Paragraph 19(2) of the StromNEV 2011 and the individual exemption granted on that basis for void. However, it appears from German Administrative Law that the German State could de facto not ask for reimbursement by the beneficiaries due to prescription rules. Moreover, as described in recital 55, the new Paragraph 32(7) of the StromNEV 2014 provides that the exemption decisions adopted on the basis of the second sentence of Paragraph 19(2) of the StromNEV 2011 stopped being valid only on 1 January 2014.
- (55) By ordinance of 14 August 2013 ⁽³⁴⁾ Germany abolished the full exemption as of 1 January 2014 and reintroduced as of that date individual network charges for end users with an annual electricity consumption reaching 10 GWh and at least 7 000 hours of full use. The BNetzA was required to lay down detailed rules on the methodology for determining the individual network costs under the StromNEV as amended by Article 1 of the ordinance of 14 August 2013 ('StromNEV 2014'). To this end, the BNetzA reintroduced the physical path methodology by a regulatory decision ⁽³⁵⁾ adopted on the basis of Paragraph 29 of the EnWG. Although slightly modified, the methodology corresponds in substance to the physical path methodology as it was applied for the calculation of individual network charges under the StromNEV 2010 (see recital 19 of this Decision). The regulatory decision on the physical path methodology was upheld by order of 13 December 2016 of the Federal Court of Justice ⁽³⁶⁾. The Federal Court of Justice specifically acknowledged that the physical path methodology ensures an assessment of the network costs caused by baseload consumers in line with the cost-causality principle.
- (56) Both the order of 8 May 2013 of the Higher Regional Court of Düsseldorf and the order of 6 October 2015 of the Federal Court of Justice had an effect only on the parties to the procedure and did not lead to a general revocation of all exemption decisions. Paragraph 32(7) of the StromNEV 2014 therefore provides that exemption decisions adopted by a regulator on the basis of the second sentence of Paragraph 19(2) of the StromNEV 2011 would stop to be valid as of 1 January 2014. Pending requests for exemption decisions adopted by a regulator on the basis of Paragraph 19(2) of the StromNEV 2011 as well as cases in which the exemption decision was revoked by a Court would be subject to the second sentence of Paragraph 19(2) of the StromNEV 2014 (with retroactive effect as of 1 January 2012. For 2011 in those same cases, the StromNEV as predating the introduction of the full exemption was applied (i.e. the individual network charges based on the physical path – if relevant).
- (57) By order of 12 April 2016 ⁽³⁷⁾, the Federal Court of Justice annulled the regulatory decision of 14 December 2011 (see recitals 35 to 39 of this Decision). The Court found that that decision was not covered by the empowerment laid down in Paragraph 24 of the EnWG. In the aftermath of that judgment the German legislator amended Paragraph 24 of the EnWG and thereby retroactively remedied the lack of an empowerment for the Paragraph 19-surcharge ⁽³⁸⁾.

3. COMMENTS FROM INTERESTED PARTIES

- (58) The Commission received comments from Ahlstrom GmbH, AlzChem AG, Aurubis AG, Bender GmbH, Fitesa Germany GmbH, Evonik Industries AG, Hans Adler OHG, Lindes Gas Produktionsgesellschaft, Norske Skog Walsum GmbH, Oxxynova GmbH, Ruhr Oel GmbH, Saalemühle Alsleben GmbH, Sasol Wax GmbH, SETEX-Textil GmbH, Bundesverband der Energieabnehmer e.V., Currenta GmbH & Co. KG, Air Liquide Deutschland GmbH, InfraServ GmbH & Co. KG, Naturin Viscofan GmbH, Wirtschaftsvereinigung Stahl, Wirtschaftsvereinigung Metalle, Hydro Aluminium Rolled Products GmbH, Norsk Hydro ASA, Papierfabrik Scheufelen GmbH & Co. KG, ThyssenKrupp Steel Europe AG, Trimet Aluminium AG, UPM GmbH, Verband der Chemischen Industrie e.V., Verband der Industriellen Energie- und Kraftwirtschaft e.V. and Xstrata Zink GmbH/Glencore. All comments received argue that the full exemption does not constitute State aid. The arguments put forward by the various comments in order to support this view are summarized in the following recitals.
- (59) The interested parties consider that the full exemption did not confer an advantage on the exempted baseload consumers. According to the interested parties, the full exemption was a compensation for the baseload

⁽³⁴⁾ Ordinance amending several Ordinances in the field of Energy Law (BGBl. I p. 3250).

⁽³⁵⁾ BK4-13-739.

⁽³⁶⁾ EnVR 34/15.

⁽³⁷⁾ EnVR 25/13.

⁽³⁸⁾ See Paragraph 24 of the EnWG as amended by Article 1 of the Act on the electricity market of 26.7.2016 (BGBl. I p. 1786).

consumers' contribution to the overall stability of the electricity network. One interested party considers that the full exemption corresponds to the compensation of a service of general economic interest within the meaning of the *Altmark* judgment⁽³⁹⁾. In particular, it is put forward that the baseload consumption qualifying for the full exemption was a prerequisite for a continuous electricity generation from power plants equipped with synchronous generators. The latter are considered necessary for the stability of the network as they help to avoid frequency shifts. Several interested parties refer in this respect to a study of 20 January 2012 into the minimum generation by conventional⁽⁴⁰⁾ power plants needed in Germany to ensure a secured network management in the context of high renewable penetration⁽⁴¹⁾ (the '2012 Study'). Alternatively, several interested parties consider the advantage not to be selective but to be justified by the logic and nature of network charges in Germany. They explain in this respect that the predictability of the consumption pattern of the baseload consumers leads to a significant reduction of network costs as it would reduce the need for balancing energy and reserves. Moreover, the continuous consumption pattern would conserve the network equipment longer and thereby reduce material costs. The aforementioned costs would otherwise have to be borne by the TSO as part of their network responsibilities defined in Paragraph 11 of the *EnWG*. Some of the interested parties also argue that baseload consumers contribute to voltage control and the prevention of black-outs and that the full exemption compensates them for that. Finally, the comments consider the exempted baseload consumption to guarantee the feed-in of electricity produced from intermittent renewable energy sources. Thereby, both grid expansion costs and compensation payments under the Renewable Energy Act (*Erneuerbare Energien Gesetz*, '*EEG*')⁽⁴²⁾ would be reduced.

- (60) Furthermore, the interested parties consider the full exemption not to be financed through State resources. According to the interested parties, the second sentence of Paragraph 19(2) of the *StromNEV* 2011 was part of the overall system of network charges and therefore constituted a mere price regulation. The fact that the full exemption is dependent on an authorization to be delivered by the *BNetzA* is considered to be a purely formal act which in itself would not suffice to establish that the full exemption is financed through State resources.
- (61) The interested parties argue in particular that the full exemption could not be regarded to be financed through State resources following the introduction of the Paragraph 19-surcharge in 2012. The Paragraph 19-surcharge is considered to be part of the overall system of network charges. Accordingly, the interested parties reject the qualification of the Paragraph 19-surcharge as a parafiscal levy. By way of explanation, the interested parties submit that the amount of the Paragraph 19-surcharge was not determined by the State, but was rather calculated by the network operators on the basis of the losses in revenue resulting from the full exemption. The Paragraph 19-surcharge would serve the mere purpose of equalising the financial burden resulting from the full exemption for all network users in Germany. Also, the proceeds of the Paragraph 19-surcharge would neither accrue to the State budget nor be under State control. In this regard, the interested parties explain that the TSO had a discretion as to the use of the proceeds of the Paragraph 19-surcharge. The interested parties reject the finding that the TSO centralised the proceeds of the Paragraph 19-surcharge and thereby acted similarly to a fund. It is explained that the joint project group '*Horizontaler Belastungsausgleich*' (*PG HOBA*), to which the Opening Decision refers, was created on a voluntary basis and merely served the purpose of a technical coordination between the TSO.
- (62) The interested parties also submit that the Paragraph 19-surcharge was not hypothecated to the financing of the exemption from network charges. The advantage of the exemption would have also materialized without the Paragraph 19-surcharge in which case the losses in revenue resulting from the full exemption would have to be borne by the network operators. The compensation mechanism described in section 2.4 of this Decision needed to be regarded independently from the advantage granted to baseload consumers. Without the compensation mechanism the network operators would have simply taken the losses in revenue into account when calculating the network charges for the non-exempted undertakings as in 2011.
- (63) The interested parties submit that the exemption from network charges did not distort competition or affect trade between Member States, as it only reduced the financial burden and competitive disadvantage that result from network charges in Germany, which are considered to be significantly higher than in other Member States.

⁽³⁹⁾ Judgment of 24 July 2003, *Altmark Trans GmbH and Regierungspräsidium Magdeburg v Nahverkehrsgesellschaft Altmark GmbH*, C-280/00, ECLI:EU:C:2003:415.

⁽⁴⁰⁾ Conventional power plants are generally opposed to power plants like wind turbines and solar panels that developed in recent years. The following power plants are generally considered as conventional power plants: nuclear power plants, coal, oil, lignite and gas-fired power plants and hydro power plants.

⁽⁴¹⁾ IAEW/Consentec/FGH, *Studie zur Ermittlung der technischen Mindesterzeugung des konventionellen Kraftwerksparks zur Gewährleistung der Systemstabilität in den deutschen Übertragungsnetzen bei hoher Einspeisung aus erneuerbarer Energien, Abschlussbericht 20. Januar 2012*.

⁽⁴²⁾ BGBl. I p. 2074 and BGBl. I p. 1634.

- (64) Only a limited number of interested parties argue that the exemption from network charges is compatible with the Internal Market. Their arguments essentially refer to the contribution of baseload consumers to the stability of the network and hence to security of supply in Europe. Moreover, they argue that in light of the Union's climate policies the exemption would strengthen the competitiveness of energy-intensive undertakings and therefore prevent them from shifting their activities to outside of the Union, which would result in negative consequences for the Union's economy, as it would e.g. lead to a loss of value chains and increase the Union's dependency on imports.
- (65) Finally, a limited number of interested parties claim that any recovery would be in violation of the principle of the protection of legitimate expectations. To this end, they argue that by finding that the full exemption was financed through State resources, the Commission would deviate from the interpretation of the State aid notion applied prior to the full exemption both in its own case practice as well as the case-law of the European Court of Justice, in particular its interpretation of State resources in the *PreussenElektra*-judgment.
- (66) After expiry of the deadline for interested party comments, the Commission received comments from two additional interested parties (Wacker Chemie AG and Koehler Kehl GmbH). Wacker Chemie AG submitted comments on the physical path methodology developed by the BNetzA to determine individual network charges of baseload consumers as of 2014. Wacker considered that the physical path method was not an adequate way to determine individual charges because the network charge would depend on whether the baseload consumer would be located close to a baseload power plant or not. Wacker also criticized the fact that hydro plants were not considered as baseload plants and that the plant in question had to be able to cover the entire potential load of the baseload consumer. Wacker considered that the full exemption had been a simpler principle adequately reflecting the contribution of the baseload consumer to the stability of the network. Wacker, however, did not provide any elements describing the stabilizing effects of baseload consumers. Koehler Kehl GmbH submitted comments on a report published by the BNetzA on 20 March 2015 ⁽⁴³⁾. Koehler Kehl GmbH refers to statements in the report, which confirm the contribution of baseload electricity consumption to the network stability in the period of 2011-2013. On that basis, Koehler Kehl GmbH argues that a different treatment of baseload consumers does not amount to a selective advantage. To the extent that the evaluation report suggests that stable baseload electricity consumption is becoming less relevant for network stability, Koehler Kehl GmbH however questions the validity of the report. To this end, its comments challenge the methodology applied to establish the report as being inaccurate, as the report relies e.g. on statements made by low voltage network operators to which, however, no baseload consumer is connected. The report therefore would not contain any valid statement that would reject the stabilizing effect of baseload consumption. In addition, the comments highlight the continuous need for baseload generation plants and thus baseload consumption for providing network stabilizing.

4. COMMENTS FROM GERMANY

- (67) Germany considers the full exemption subject of the Opening Decision not to be State aid, as it neither conferred a selective advantage nor was financed through State resources. Alternatively, they consider the exemption to be compatible with the internal market. In this regard, they also stress the need of keeping a level-playing field for energy-intensive industries in Europe while the share of electricity from renewable energies increases.
- (68) Germany considers that the full exemption was within the logic of the system of network charges in Germany, in particular with the principle that network charges should be proportionate (to costs) and non-discriminatory. They submit that the principle of cost-causality enshrined in Paragraph 16(1) of the StromNEV as well as the requirement set out in the second sentence of Paragraph 17(1) of the StromNEV, according to which network charges have to reflect the actual hours of use, made it necessary to treat baseload consumers differently than other end consumers. They added that the exemption should be viewed as an adequate compensation for the baseload consumers' contribution to the stability of the network.
- (69) Germany explains that baseload consumers are very different from 'typical consumers'. While typical consumers had a volatile consumption that cannot entirely be predicted, baseload consumers were consumers that are constantly withdrawing the same amount of electricity from the grid. The high predictability of baseload electricity consumption reduced the need for balancing electricity and reserves as well as the need for re-dispatching. In general, the high predictability facilitates network planning and maximized the use of the generation fleet (provided that the generation fleet is mostly composed of conventional plants). However, if they were subject to the network charges calculated according to Paragraph 16 and Paragraph 17 of the StromNEV, baseload consumers would have to fully contribute to all those costs while they are not causing such costs.

⁽⁴³⁾ BNetzA, *Evaluierungsbericht zu den Auswirkungen des § 19 Abs. 2 StromNEV auf den Betrieb von Elektrizitätsversorgungsnetzen – Evaluierungsbericht gemäß § 32 Abs. 11 StromNEV*, 20.3.2015.

As baseload consumers were generally located in the vicinity of electricity generation capacities, they were using a smaller portion of the grid and there were less grid losses connected to their consumption. Moreover, the exempted baseload consumption would not contribute to an increased need for grid development (unless they are themselves the reason for the grid expansion) as only the variation of load on top of the constant baseload consumption were to be taken into account for capacity reinforcement of the grid. Finally, baseload consumers also had a positive impact on frequency regulation given that a constant load of a certain size could mitigate frequency disturbances and give the network operator more time to react.

- (70) Germany further explains that the general system of network charges did not adequately reflect the network costs caused by the exempted baseload consumption in comparison to consumers with variable consumption patterns. In particular, the simultaneity function was based on historical figures but could not guarantee that variable consumers would consume at the same time as they did in the past. Hence, while variable consumers with a low amount of hours of full use were empirically also characterized by a low simultaneity factor, their electricity consumption nevertheless could (due to the unpredictability of the consumption) fluctuate around the annual peak load. This obliged network operators to build in a safety margin when they develop the network. This safety margin was not needed for baseload consumer. As a consequence, the simultaneity function would overestimate the costs caused by baseload consumption in relation to variable consumers.
- (71) Finally, Germany explains that a large and stable load lead to economies of scale that the network charge determination on the basis of the simultaneity function did not take into account. The network charge determination on the basis of the simultaneity function would therefore overestimate the network charges due by baseload consumers.
- (72) Germany concludes on this point that compared to variable consumers baseload consumers lead to a series of cost reductions and cost savings that benefitted all network users. Those savings could not be calculated with accuracy but they could be computed indirectly by allocating the individual costs of the baseload consumer (incremental costs).
- (73) Germany considers that the legal requirement of having an electricity consumption exceeding 10 GWh and reaching 7 000 hours of full use was justified and consistent as it ensured stable and significant baseload consumption. In order to reach 7 000 hours of use, end users would need to take electricity out of the network corresponding to the maximum annual peak load in every quarter of an hour over a period corresponding to 80 % of the year. The 7 000 hours of full use were thus not a function of the quantity of electricity consumed but of the stability of the consumption. In other terms, 7 000 hours of full use could be reached only if the consumer had exactly the same take off at least 80 % of the entire year. Germany also explains that the 10 GWh-requirement has been defined as such because network users would consider leaving the general system of network charges only at a certain level of electricity consumption ⁽⁴⁴⁾.
- (74) With regard to the potential involvement of State resources, Germany considers that the State did not exercise any control over the financing of the exemption. It submits that the mere approval of the exemption by the regulatory authorities was not sufficient to establish such control.
- (75) Furthermore, Germany argues that the Paragraph 19-surcharge did not qualify as a levy within the meaning of the Essent judgment ⁽⁴⁵⁾. In support of that argument, Germany submits that the Paragraph 19-surcharge was not determined by the State, but by the TSO, which were mainly private companies. Also, contrary to the Essent judgment, no surplus of the Paragraph 19-surcharge would accrue to the State budget. Finally, the TSO were considered to be free in the use of the proceeds of the Paragraph 19-surcharge.
- (76) Germany also contends that the mere fact that the Paragraph 19-surcharge had been introduced by the BNetzA was not in itself sufficient to establish State control. In this regard, Germany explains that the Paragraph 19-surcharge was introduced in order to allow for an equalisation of the losses in revenue following the exemption. Such equalisation across Germany was necessary due to the regulatory specificities in Germany, where the transmission network is divided into four geographical areas and four TSO. The alternative would have consisted in increasing the network charges for the non-exempted end users within a concerning network area, which however would have led to geographically different cost burdens in Germany. The amount of the cost burden thus depended on the amount of exemptions within the respective network area.

⁽⁴⁴⁾ The cumulative requirements of exceeding 10 GWh of consumption and reaching 7 000 hours of full use can already be reached with a load of 1,4 MW.

⁽⁴⁵⁾ Judgment of 17 July 2008, *Essent Netwerk Noord*, C-206/06, ECLI:EU:C:2008:413.

- (77) As regards 2011, Germany explains that the losses in revenues that occurred in 2011 could not be recouped through network charges in 2011 as network charges had to be established in advance. They could also not be recouped in 2012 as network charges have to be calculated based on the forecasted network costs. Hence, in the absence of the Paragraph 19-surcharge, losses in revenue following the exemption may have partially, if at all, been compensated via the *Regulierungskonto* in accordance with the provisions laid down in Paragraph 5 of the ARegV 2011. If then the losses in revenue would have led to a negative difference between the obtained revenues and the authorized maximum revenue level, this difference would be booked on the regulatory account. If at the end of the regulatory there was still a negative balance, it might translate into an increase of the maximum authorized revenue levels in the next regulatory period. In this regard, Germany explains furthermore that the competent regulatory authority neither had ownership of the *Regulierungskonto* nor control over it. The *Regulierungskonto* served the mere purpose of offsetting the proceeds from network charges that exceed the approved maximum revenue level over the course of specific regulatory period under the system described in recital 41. Accordingly, no liquid assets were registered on the *Regulierungskonto* that could be used to finance the losses in revenue resulting from the exemption.
- (78) Germany also considers the full exemption not to be creating an additional burden on the State budget. In particular, the TSO could not be assimilated to the State. By coordinating their procedures as to the administration of the Paragraph 19-surcharge for the purpose of efficiency and transparency, they would not have acted similarly to a fund.
- (79) Germany moreover expressed its view that the full exemption from network charges did not create a distortion of competition in the internal market. In this regard, Germany referred to the high level of electricity costs that would burden energy-intensive undertakings active in Germany more than their competitors active in other Member States. In this regard, Germany also argued that it should be allowed for Member States to adopt measures which maintain the competitiveness of the European industry, in particular energy-intensive industries and highlight in this respect that Germany had a very ambitious renewable policy compared to other Member States and that this ambitious policy required important network investments. Network charges would thus increase. A limitation of the energy costs that resulted from the deployment of renewable energy was necessary to ensure a level playing field compared with industries in other Member States or in third countries. Without the limitation, the German industry would be threatened.
- (80) Furthermore, Germany explains that even if the full exemption would qualify as aid it would in any event constitute compatible aid under Article 107(3)(b) or (c) of the Treaty given that the full exemption in place between 2011 and 2013 was necessary in order to incentivize an electricity consumption pattern that was beneficial for the network and its stability. Germany explains in this respect that the full exemption was necessary to keep baseload consumers within the system of general electricity supply and to prevent that they switch to a system of self-supply or to build a direct line to a power plant at the detriment of network stability. In that way, the full exemption contributed to the objective of security of supply. In that connection, Germany repeats that baseload consumers facilitate a secure network management through their predictability and stable consumption. In addition, Germany stresses that the exempted baseload consumption was a prerequisite for the minimum conventional electricity generation necessary to guarantee the stability of the network and referred also to the 2012 Study. In particular, Germany explains that in the period 2011-2013 the electricity mix in Germany was still dominated by conventional power plants and was not yet very flexible. Without a large and constant offtake of electricity conventional power plants with synchronous generators would not have been able to run on a continuous mode and deliver the same ancillary services⁽⁴⁶⁾. This would be relevant in particular in the light of the increasing share of electricity produced from intermittent renewable energy sources and the decision to close 8 nuclear plants after the Fukushima accident. Without the conventional power plants with synchronous generators, the network operators would have been required to implement other network stabilizing measures, which would in turn have increased the general network costs. Germany therefore is of the view that the objective of the full exemption was in line with the overall objectives set out in Paragraph 1 of the EnWG, namely a safe, reasonably priced and efficient electricity supply. Germany also argues that the full exemption was needed to facilitate the development of renewable electricity given that it guaranteed that there would always be consumers to consume the renewable electricity whenever it was produced. Absent the baseload consumers there was a risk that renewable electricity would be produced at times when there is no electricity demand. This would, however, oblige network operators to curtail renewable electricity installations and compensate them, thereby increasing the costs of renewable electricity support.

⁽⁴⁶⁾ Directive 2009/72/EC defines ancillary service as: 'a service necessary for the operation of a transmission or distribution system.' Examples of such services that TSOs can acquire from generators are frequency (balancing of the system) and non-frequency (voltage control and black-start) ancillary services to ensure the management of the system.

- (81) Finally, Germany explains that the full exemption also aimed at implementing Article 14 of Regulation (EC) No 714/2009 of the European Parliament and of the Council ⁽⁴⁷⁾ as well as recital 32 and Article 32(1) of Directive 2009/72/EC of the European Parliament and of the Council ⁽⁴⁸⁾, which require network charges to be applied in a non-discriminatory manner. Germany claims that the full exemption ensured that the network charges reflected the different cost-causalities of baseload and normal electricity consumption.

5. ASSESSMENT OF THE AID SCHEME

- (82) The assessment below is based on and limited to an assessment of the legal framework, the market situation, the electricity mix and the network situation in the years 2011 to 2013 only.

5.1. EXISTENCE OF AID WITHIN THE MEANING OF ARTICLE 107(1) OF THE TREATY

- (83) Under Article 107(1) of the Treaty, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods, in so far as it affects trade between Member States, is incompatible with the internal market ⁽⁴⁹⁾.

5.1.1. EXISTENCE OF AN ADVANTAGE

- (84) The concept of advantage within the meaning of Article 107(1) of the Treaty embraces not only positive benefits, such as subsidies, but also measures which, in various forms, mitigate the charges which are normally included in the budget of an undertaking and which, therefore, without being subsidies in the strict sense of the word, are similar in character and have the same effect ⁽⁵⁰⁾.
- (85) Electricity consumers normally have to pay a charge for using the electricity network. This charge reflects the cost created by that consumer for the network. For undertakings using the electricity network, network charges thus constitute part of their normal production costs. By fully exempting baseload consumers with an annual electricity consumption exceeding 10 GWh and reaching 7 000 hours of full use, the second sentence of Paragraph 19(2) of the StromNEV 2011 relieved them from a financial burden and production costs that they otherwise would have to bear. The second sentence of Paragraph 19(2) of the StromNEV 2011 therefore conferred an advantage to baseload consumers fulfilling the eligibility criteria.
- (86) Some interested parties have claimed that the exemption did not constitute an advantage because it amounted to the payment for a service (stable consumption) at market conditions (invoking the so-called Market Economy Operator Principle, 'MEOP') or to the payment of a compensation for a service of general economic interest.

No compensation for a service of general economic interest

- (87) In its 'Altmark' ruling, the Court of Justice has clarified that following four criteria must all be met for a compensation for a service of general economic interest not to constitute State aid under Art. 107(1) of the Treaty ⁽⁵¹⁾:
- (a) the recipient undertaking must actually have public service obligations to discharge and the obligations must be clearly defined;
 - (b) the parameters on the basis of which the compensation is calculated must be established in advance in an objective and transparent manner, to avoid it conferring an economic advantage which may favour the recipient undertaking over competing undertakings;

⁽⁴⁷⁾ Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003 (OJ L 211, 14.8.2009, p. 15).

⁽⁴⁸⁾ Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (OJ L 211, 14.8.2009, p. 55).

⁽⁴⁹⁾ The assessment is without prejudice to the ongoing infringement case 2014/2285 on Paragraph 24 of the EnWG.

⁽⁵⁰⁾ Judgment of 23 February 1961, *De Gezamenlijke Steenkolenmijnen in Limburg v High Authority*, 30/59, ECLI:EU:C:1961:2; Judgment of 19 May 1999, *Italy v Commission*, C-6/97, ECLI:EU:C:1999:251, paragraph 15; Judgment of 5 October 1999, *France v Commission*, C-251/97, ECLI:EU:C:1999:480, paragraph 35.

⁽⁵¹⁾ Judgment of 24 July 2003, *Altmark Trans GmbH and Regierungspräsidium Magdeburg v Nahverkehrsgesellschaft Altmark GmbH*, C -280/00, ECLI:EU:C:2003:415, paragraphs 87-93.

- (c) the compensation cannot exceed what is necessary to cover all or part of the costs incurred in the discharge of public service obligations, taking into account the relevant receipts and a reasonable profit for discharging those obligations;
- (d) where the undertaking which is to discharge public service obligations, in a specific case, is not chosen pursuant to a public procurement procedure which would allow for the selection of the tenderer capable of providing those services at the least cost to the community, the level of compensation needed must be determined on the basis of an analysis of the costs which a typical undertaking, well run and adequately provided with the necessary means, would have incurred in discharging those obligations, taking into account the relevant receipts and a reasonable profit for discharging the obligations.
- (88) However, it is observed that those four cumulative conditions are not fulfilled in the present case. First, the German legislation does not identify any service of general economic interest that would consist in stable consumption and it does not entrust baseload consumers with any public service obligation⁽⁵²⁾. Second, the law does not contain any parameters on the basis of which costs should be calculated to avoid overcompensation. Third, for many of the baseload consumers, having a consumption reaching 7 000 hours of full use and exceeding 10 GWh simply corresponds to their normal consumption profile and does not imply any particular costs. The full exemption is in those cases then necessarily leading to overcompensation as it exceeds what compensation would have been necessary to cover the extra costs related to the alleged public service obligation. Finally, the undertakings were not chosen pursuant to a public procurement procedure and the exemption has not been determined on the basis of an analysis of the costs which a typical undertaking, well run and adequately provided with the necessary means, would have incurred in discharging those obligations, taking into account the relevant receipts and a reasonable profit for discharging the obligations. Germany has on the contrary indicated that it was hard to quantify the value that stable load had for the network.

The full exemption does not correspond to the behaviour of a market operator

- (89) As to the argument that the full exemption was akin to the payment that a market operator would make to buy the service in questions, it is observed that no convincing argument has been submitted that would demonstrate that the value of the full exemption corresponds to the price at which network operators would be – absent the provision of the second sentence of Paragraph 19(2) of the StromNEV 2011 – willing to purchase the alleged service from baseload consumers.
- (90) First, the fact that network operators have challenged the exemption in front of national courts (see recitals 52 and 53) shows that network operators would not by themselves have bought the alleged service against the full exemption going beyond the level of individual network charges (on individual network charges, see below section 5.1.2). The BNetzA conducted a survey amongst network operators for the purposes of an evaluation report of 30 March 2015 on the impact of Paragraph 19(2) of the StromNEV on the management of electricity networks and focussing on data relating to the period 2011 to 2013 (the ‘2015 Evaluation Report’)⁽⁵³⁾. That report reveals that network operators having baseload consumers connected to their grid are divided over the usefulness of baseload consumers for the stability of the network. Some indicated that in the period 2011 to 2013 baseload consumers caused lower network costs – but crucially still did cause costs — compared to other network users with variable and non-predictable load while others explained that flexible load would be more useful to regulate volatility⁽⁵⁴⁾. Also one TSO explained that the contribution of baseload consumers to the stability of the networks depended on the specific circumstances of the network⁽⁵⁵⁾. Finally, several of those network operators had observed that the concerned baseload consumers had already the same load pattern before the introduction of the exemption so that the exemption would not be needed in order for them to modify their behaviour. In other words: the service had been provided in any event, already absent the measure. Those findings further confirm that network operators would not all on their own motion ‘purchase’ the stable load from baseload consumers, and none of them at the price of a full exemption.
- (91) Second, even assuming that in some cases the network operators would have actively purchased the alleged service, they would have procured it only to the limit necessary to facilitate the management of the grid and against a price reflecting the differentiated contribution to stability. By contrast, the full exemption is granted to

⁽⁵²⁾ See also judgment of 26 November 2015, *Spain v Commission*, T-461/13, ECLI:EU:T:2015:891, paragraphs 67-75.

⁽⁵³⁾ Evaluierungsbericht zu den Auswirkungen des § 19 Abs. 2 StromNEV auf den Betrieb von Elektrizitätsversorgungsnetzen, BNetzA, 30 March 2015. See also replies of the Federal Government on this report to Members of the German Parliament (BT-Drucksache 18/5763, available under: <http://dipbt.bundestag.de/doc/btd/18/057/1805763.pdf>).

⁽⁵⁴⁾ See negative replies in figures 6 and 7 of the report and the findings on p. 38 of the 2015 Evaluation Report.

⁽⁵⁵⁾ See p. 38 of the 2015 Evaluation Report.

baseload consumers reaching 7 000 hours of full use and exceeding 10 GWh without consideration being given to either the network level at which they are connected, or their effective contribution to the stability of the networks ⁽⁵⁶⁾, or the fact that there might already be enough of those baseload consumers to enable a stable management of the network. Also, if stable demand (rather than cost reduction) were the key to the safe management of the network, there is no reason to exclude from the exemption stable consumers consuming less than 10 GWh.

- (92) Third, it is noted that German Courts also concluded that the full exemption could not be seen as the payment for a service first because for many baseload consumers the 'service' merely corresponded to their normal consumption mode and second because the full exemption did not take into consideration the concrete stability increase delivered. According to those Courts, only a reduction taking into account the concrete impact of each baseload consumer on the network could have been justified (see recitals 52 and 52).
- (93) Part of the interested parties based the argument that the full exemption corresponded to the payment that a market operator would make to buy baseload consumers' service on the 2012 Study (see recital 59 of this Decision).
- (94) It is observed, first, that the exemption has been introduced by a regulatory act, by the State acting in its capacity as regulatory authority. In that regard, it is necessary to apply the most recent case-law of the General Court, *EDF v Commission* ⁽⁵⁷⁾. According to that judgment, the Member State needs to demonstrate, where it invokes the MEOP, that its regulatory decision was taken in its capacity as shareholder, and not in its capacity as public authority. In the present case, Germany (at federal level) has no shareholding in the network operators. In any event, Germany has not submitted any documents that would indicate that it took into consideration shareholdings of regional and local authorities in the network operators. Germany has, indeed, not produced any contemporaneous evidence showing any commercial considerations, nor have interested parties. The study postdates the BNetzA regulatory decision of 14 December 2011. Hence, the MEOP is not applicable in the present case.
- (95) It is observed, second, even if the MEOP was applicable, quod non, that this study post-dates the introduction of the exemption. Hence, a market economy operator could not have relied on it when deciding the exemption.
- (96) Even if the 2012 Study was relevant for the application of the MEOP, quod non, it does not support the claims made. The interested parties claim that in order to secure the necessary minimum generation by such power plants, there is a need for a stable and large demand as this will ensure the profitability of the plant concerned and ensure that they are not mothballed. It must, however, be noted that the 2012 Study itself does not at all relate to the usefulness of baseload consumers for maintaining the required minimum generation from conventional power plants in Germany to ensure a secured network management. It is not the object of the 2012 Study and baseload consumers are in fact not mentioned in it. By contrast, the summary of the results of the study ⁽⁵⁸⁾ underlines that the minimum generation capacity needed in Germany to ensure a secured network management has been estimated based on the demand existing in Germany. In other words, the minimum generation capacity needed in Germany to ensure a secured network management depends on the consumption volume but also type of load that needs to be satisfied. If the demand had been smaller or if there was no need to ensure baseload generation in order to cover baseload consumption, the minimum generation capacity needed in Germany would have been different. Baseload consumers are part of the reason why this amount of generation capacity is needed in the first place. Their demand can therefore hardly be described as a service. In any event, the mere existence of baseload consumers would not be sufficient to ensure that the concerned power plants remain on the market. This will ultimately depend on the price at which the electricity is sold. If this price is too low, it will not enable the baseload power plant to remain on the market. It will also depend on the production level of renewable electricity. At times of low demand but high renewable electricity production, the renewable electricity has priority dispatch and priority access over power plants using fossil fuels. Finally, it should be noted that part of the conventional power plants mentioned in the 2012 study on the minimum generation from conventional power plants are not baseload power plants but conventional power plants that can be ramped up rapidly like gas turbines. Baseload consumers will not constitute an incentive for this type of plants to remain on the market as their profitability is linked to the possibility to obtain higher electricity prices when the system is under stress.

⁽⁵⁶⁾ For the purposes of the full exemption, no distinction is made between consumers with an absolutely stable consumption over 8 760 hours of full use and consumers whose consumption is less stable.

⁽⁵⁷⁾ Judgment of 16 January 2018, *EDF v Commission*, T-747/15, ECLI:EU:T:2018:6, paragraphs 218 to 251.

⁽⁵⁸⁾ See p. (i) of the 2012 Study, under the heading 'Ergebniszusammenfassung'.

- (97) Some interested parties have also argued that the exemption is justified because baseload consumers are part of the five stage load shedding plan that has been put in place by TSOs to avoid blackouts when the system is overloaded. This plan is described in the Transmission Code 2007 (Network and System Rules of the German Transmission System Operators). They also claim that this load shedding would occur outside any contractual relationship and without compensation and that the full exemption compensates them for their contribution to security of supply.
- (98) On this point, it is noted first that these claims are contradicted by the Transmission Code 2007 itself. Article 7.3.4(6) of the Transmission Code 2007 explicitly indicates that load shedding will be assured by contractual arrangements with the network customers. In addition there is no correlation between the full exemption and the load shedding in the sense that the inclusion in the five stage load shedding plan is not a requirement to be eligible for the full exemption. Interested parties admit on this point that their stable consumption only increases the likelihood to be included in the plan. Also consumers who do not qualify as baseload consumers can be part of the plan. In fact, the five stage load shedding plan will have to include consumers other than baseload consumers. Indeed, it includes between 35 % to 50 % of the system load (after shedding of pumps) ⁽⁵⁹⁾. Based on the information submitted by Germany the beneficiaries of the full exemption would in total reach a peak load of around 3,5 GW which represents around 4,2 % of peak demand in Germany in 2013 ⁽⁶⁰⁾. Hence, even assuming that the exemption could constitute remuneration for the inclusion in the five stage plan it would still constitute a selective advantage given that it would be limited to baseload consumers and excluded for all other consumers that are also part of the five stage load shedding plan.
- (99) Finally some interested parties seem to imply that baseload consumers would need to comply with specific technical specifications when connecting to the grid and that to meet those specifications baseload consumers would need to make investments in devices that improve the stability of the network because delivering reactive power ⁽⁶¹⁾ but for which they are not compensated.
- (100) It is noted, however, that the full exemption cannot be seen as remuneration for this alleged service that a market economy operator would have paid. Indeed, the situation described by the interested parties does not correspond to a service that network operators would buy. It corresponds to a technical specification that consumers need to meet in order to be connected to the network. In particular, they need to ensure that their shift factor remains between - 0,9 and + 0,9. Depending on the circumstances, this might indeed require the consumer to invest into specific equipment that make sure that their shift factor remains between the prescribed values. This cannot be considered as a service to the grid but constitutes a preventive measure against bigger network disturbances. If consumers, including baseload consumers, were not complying with that technical specification, they would be responsible for significant voltage disturbance in the grid. Interested parties themselves acknowledge that this specification is necessary to ensure safe network management. In addition, technical specifications apply to any consumer requesting connection to the concerned network and not specifically to baseload consumers so even if the exemption could be seen as a 'remuneration' (which however is not the case), it would still constitute a selective advantage given that it would be limited to baseload consumers and excluded for all other consumers that are subject to the same requirement.

5.1.2. EXISTENCE OF A SELECTIVE ADVANTAGE

- (101) Both the interested parties and Germany have argued that the full exemption did not constitute a selective advantage as that exemption was justified by the nature and logic of the network charge system in Germany. They underline that the network charge system in Germany is based on cost-causality but that baseload

⁽⁵⁹⁾ Stage 1: 49,8 Hz Alerting of personnel and scheduling of the power station capacity not yet activated, according to the TSO's directions, shedding of pumps.

Stage 2: 49,0 Hz Instantaneous load shedding of 10 - 15 % of the system load.

Stage 3: 48,7 Hz Instantaneous load shedding of a further 10 - 15 % of the system load.

Stage 4: 48,4 Hz Instantaneous load shedding of a further 15 - 20 % of the system load.

Stage 5: 47,5 Hz Disconnection of all generating facilities from the network.

⁽⁶⁰⁾ Peak demand in Germany accounted for 83,1 GW in 2013, see RAP (2015): Report on the German power system. Version 1.0. Study commissioned by Agora Energiewende available under https://www.agora-energiewende.de/fileadmin/downloads/publikationen/CountryProfiles/Agora_CP_Germany_web.pdf

⁽⁶¹⁾ In a network using alternative current, both real power and reactive power are needed for electricity to be transmitted. The real power is the power consumed and transported over the electric lines. Reactive power by contrast is needed to maintain the voltage of the line (see for instance explanations provided by Amprion: <https://www.amprion.net/%C3%9Cbertragungsnetz/Physikalische-Grundlagen/Blind-Wirkleistung/>). It is produced by synchronous generators and other reactive power compensation devices. Reactive power tends to decrease when the electric lines are long so that long lines require the installation of reactive power compensation devices in the middle of the line.

consumers have a consumption and load pattern that is very different from typical network users, which have a variable and unpredictable consumption and load. Baseload consumers contributed to the reduction of various network costs which justified the full exemption.

- (102) The full exemption can only amount to State aid to the extent that the advantage granted to baseload consumers is selective. In order to establish that an advantage is selective, the Commission has to demonstrate that a measure differentiates between economic operators who are, in light of the objective of the reference system identified, in a comparable factual and legal situation and that such a differentiation cannot be justified by the nature or the general scheme of the reference system ⁽⁶²⁾.
- (103) In order to verify whether, under the relevant legal regime, the full exemption constitutes a selective advantage for certain undertakings over others which are, in the light of the objective pursued by that regime, in a comparable factual and legal situation, it is necessary to first define the reference framework within which the measure concerned fits ⁽⁶³⁾.

5.1.2.1. *The reference system*

- (104) The Commission agrees that, for the purposes of the present decision, the relevant reference framework is the German network charge system. This network charge system is based on the principle that network charges must be cost-based and non-discriminatory. Indeed, Paragraph 21 of the EnWG establishes the principle that network charges must be proportionate ('angemessen'), non-discriminatory and transparent (see recital 7 of this Decision). The cost-causality principle is enshrined in Paragraph 16 of the StromNEV and implicit in Paragraph 3 of the StromNEV which states that network charges correspond to the payment for the use of the networks. The StromNEV sets out detailed rules on the methodology for a cost-reflective determination of network charges.
- (105) Paragraph 24 of the EnWG 2011 empowers the federal government to specify by ordinance the methodology for determining the general network charges to be paid. As set out in recital 7 of this Decision, Paragraph 24 of the EnWG makes a distinction in this respect between the generality of users and atypical network users which can be charged an individual network charge. The StromNEV implements this distinction and also contains two sets of methodologies: the methodology applicable to typical network users (Paragraphs 15, 16 and 17 of the StromNEV) and the methodology applicable to atypical network users (see recitals 17 to 20 of this Decision).
- (106) Paragraphs 15, 16 and 17 of the StromNEV provide for the general calculation method to determine the network charges. This methodology has been described in recitals 10 and 14 of this Decision. In particular, the simultaneity function described in Paragraph 16(2) of the StromNEV and Annex 4 to the StromNEV allows for an allocation of the network costs to the various network users according to the probability that the electricity consumption of the individual user in question contributes to the annual peak. Germany has submitted that in a system in which electricity flows from the top down, the annual peak element is one of the main cost drivers of the network.
- (107) Germany has however demonstrated that while this general methodology enables a reliable determination of the network costs caused by most end users, the simultaneity function – if applied in the same way to all network users – de facto overestimated the costs caused by baseload consumers in the period 2011-2013. This is explained by the fact that the calculation methodology based on the simultaneity function spreads the entire network costs between all users while these costs contain costs that baseload consumers did not cause, or caused in the period 2011-2013 to a much lower degree. In particular, the costs that are linked to balancing out sudden variations in the demand are not caused by baseload consumers, as they have a predictable and a much more constant consumption. The same is true for measures that need to be taken to keep the frequency of the network despite variations in load.

⁽⁶²⁾ Judgment of 29 April 2004, *Netherlands v Commission*, C-159/01, ECLI:EU:C:2004:246, paragraph 43; Judgment of 6 September 2006, *Portugal v Commission*, C-88/03, ECLI:EU:C:2006:511, paragraph 80; Judgment of 8 September 2011, *Commission v Netherlands*, C-279/08 P, ECLI:EU:C:2011:551, paragraph 62; Judgment of 21 December 2016, *Commission v Hansestadt Lübeck*, C-524/14 P, ECLI:EU:C:2016:971, paragraphs 53-60; Judgment of 21 December 2016, *Commission v Workd Duty Free Group SA*, joined cases C-20/15 P and C-21/15 P, ECLI:EU:C:2016:981, paragraphs 92-94.

⁽⁶³⁾ Judgment of 6 September 2006, *Portugal v Commission*, C-88/03, ECLI:EU:C:2006:511, paragraph 56 and Judgment of 21 December 2016, *Commission v Hansestadt Lübeck*, C-524/14 P, ECLI:EU:C:2016:971, paragraph 55.

- (108) It is true that baseload consumers contribute to peak load like all other network users and that peak load is relevant for the dimensioning of the network, and hence for one factor creating network costs. However, it is not relevant for allocating other network costs (for example the costs linked to the reserves needed to supply balancing energy). If all network users had unpredictable and variable consumption patterns, it would still be rational to allocate those costs using the same allocation key, i.e. in proportion to their contribution to peak load. However, baseload consumers have a predictable and much more stable load pattern. In 2011-2013 given the energy mix, baseload consumers generated much less need for system services than other network users. Hence, in a network charge system based on the cost-causality principle, costs for system services that are not needed for baseload consumers could not be allocated to them by using the same key as for network users having a variable and unpredictable load.
- (109) Also, the calculation methodology based on the simultaneity function does not take into account economies of scale. Where a network is constantly used up to its full capacity, the costs per unit are much lower than for where the same network is used by variable consumers only from time to time up to its full capacity but generally only up to 30 % of its capacity. Finally, due to the variability and unpredictability of the consumption of users in general, network operators have to take a safety margin into account when they dimension the network. Indeed, the simultaneity factor only expresses the likelihood that a given consumer will consume at the moment of peak load but cannot guarantee this. Such a safety margin is however not needed to the same degree for baseload consumers, if at all. Hence if the network charges of baseload consumers would be calculated on the basis of the network charge methodology using the simultaneity function, they would again be overestimated
- (110) The Commission therefore considers that the possibility provided for in Paragraph 24 of the EnWG 2011 to determine individual network charges for atypical users such as baseload consumers is in line with the principle of cost-causality and non-discrimination. It must be regarded as an integral part of the reference system as it serves as a corrective to take into account the network costs actually caused by atypical network users such as baseload consumers.
- (111) The Commission also considers that the provision according to which the individual network charges paid by atypical network users cannot go below 20 % of the published network charges forms an integral part of the rules governing individual network charges under the StromNEV. First, this minimum contribution has continuously been a requirement as regards the group of atypical network users addressed in the first sentence of Paragraph 19(2) of the StromNEV and was in particular applicable in the period 2011 to 2013 (see recital 21 of this Decision). Second, it also applied to baseload consumers under the StromNEV 2010 (see recital 20 of this Decision). And finally, the minimum contribution network charge of 20 % for atypical end users such as baseload consumers corresponds – as Germany has explained (see recital 20) – to a safety net that ensures that atypical consumers contribute to a minimum to remunerating the benefit that derives from being connected to the network. Specifically as regards baseload consumers, the minimum contribution of 20 % also takes into account that the physical path methodology, while mirroring closely the network costs caused by baseload consumers, still implies a certain approximation.

5.1.2.2. *Deviation from the reference system*

- (112) However, the Commission considers that the full exemption introduced by the Law of 26 July 2011 is at odds with the concept of individual network charges set out in point 3 of the first sentence of Paragraph 24 of the EnWG 2011 pursuant to which atypical forms of network use might be subject to individual network charges.
- (113) The cost-causality principle and the principle that network charges should be proportionate and non-discriminatory imply that network charges are determined based on the individual network costs attributable to a given network user. The full exemption from network charges would therefore be in line with those principles only if it were demonstrated that baseload consumers do not cause any network costs. This has however not been demonstrated. On the contrary, baseload consumers do cause network costs in particular when they are being newly connected to an existing network given that their connection might necessitate an increase of the capacity of such a network. Likewise, where a network has not yet been built, it would need to be dimensioned so as to satisfy at least the demand of baseload consumers. This has also been recognized by German regional courts and the Federal Court of Justice. They have explicitly concluded that the full exemption was contrary to Paragraph 24 of the EnWG 2011 (see recitals 52 and 52 of this Decision). It must further be observed that the other category of atypical network users referred to in the first sentence of Paragraph 19(2) of the StromNEV continued to be subject to individual network charges calculated on the basis of their individual load profile during the years 2011 to 2013 (see recital 21 of this Decision). The full exemption for baseload consumers therefore introduced

a discrimination against both other groups of atypical network users that were still subject to individual network charges and all other end users given that the full exemption deviates from the principle of cost causality and proportionality of network charges.

- (114) It is noted that before the full exemption introduced from 2011 baseload consumers were subject to individual network charges that had to be determined so as to take into account the reduction of network costs or the mitigation of increases in network costs that were due to baseload consumers. Those individual network charges might however not be lower than 20 % of the published network charges. In order to calculate those costs, the BNetzA had defined the physical path methodology (see recital 19). The Commission considers that this methodology is a reliable methodology to approximate the costs caused by baseload consumers in the period 2011 to 2013 given the characteristics of the electricity system at that time. Indeed, this methodology determines the network charges based on the costs that can be attributed to the baseload consumer, that is to say the capital costs and fixed operating costs related to the part of the network that connects the baseload consumer to the nearest baseload power plant that can de facto cover its entire demand. While it is true that this method leads – as one interested party has criticized – to differentiated network charges depending to the location of the baseload consumer on the network, this is precisely the point of individual network charges, namely to verify the costs caused to the network by each baseload consumer individually. If a baseload consumer is further away from a baseload power plant, it also means that he will be using a much large portion of the network to have the electricity transported from the power plant that is able to de facto cover its demand. Also the fact that the physical path is calculated by reference to a power plant covering the entire demand of the baseload consumer is justified. If the power plant were to cover only part of the demand of the baseload consumer, it would imply that he is using again several parts of the network in order to cover his demand and is thus also responsible for higher network costs. As to the fact that the physical path methodology would not accept hydropower plants as baseload power plants, it is noted that the 2010 guidance paper of of the BNetzA referred to under recital 19 above accepts hydro power plants as baseload power plants. In addition, the physical path methodology also takes into account network losses and any network services that the baseload consumer has been using, if any. The adequacy of the physical path methodology to determine the network costs caused by baseload consumers has notably been confirmed by the Federal Court of Justice in 2016 ⁽⁶⁴⁾.
- (115) The Commission considers thus that a different treatment of atypical users (i.e. non-peak consumers and baseload consumers) compared to the other network users is an integral part of the reference system and expressed in its structure, as long as it is based on the concept of individual network costs attributable to a given network user.
- (116) The full exemption in force between 2011 and 2013 however deviates from the determination of individual network charges applicable to atypical users given that the full exemption does not rest on an individual determination of the costs caused by the caseload consumer. Although both non-peak consumers and baseload consumers are in light of the objective of the network charge system, in a comparable factual and legal situation (they are atypical users for which the published network charges would between 2011-2013 not have led to cost-reflective network charges) they were treated differently.
- (117) In addition, the full exemption also deviates from the reference system in that it does not require the baseload consumer to pay at least 20 % of the published network charges as required for other atypical users, namely the non-peak consumers. This difference in treatment corresponds to a discrimination given that there is no reason why baseload consumers should be exempted from that requirement. In particular, there is no reason why individual network charges for non-peak consumers should be subject to a safety net while baseload consumers would not, knowing that also baseload consumers – like non-peak consumers benefit from being connected to the network. Also, the individual network charges calculated by using the physical path methodology will imply a certain approximation.

5.1.2.3. *No justification in the nature and logic of the network charge system*

- (118) The concept of aid does not encompass measures creating different treatment of undertakings in relation to charges where that difference is attributable to the nature and general scheme of the system of charges in question ⁽⁶⁵⁾. The burden of proof for that latter part of the test is on the Member State.

⁽⁶⁴⁾ EnVR 34/15, paragraph 27.

⁽⁶⁵⁾ Judgment of 29 April 2004, *Netherlands v Commission*, C-159/01, ECLI:EU:C:2004:246, paragraph 42; Judgment of 8 September 2011, *Commission v Netherlands*, C-279/08 P, ECLI:EU:C:2011:551, paragraph 62.

- (119) It is observed that Germany has not put forward any element showing that the full exemption would be justified by the nature and general scheme of the network charge system in Germany. It has put forward that the full exemption could help ensuring security of supply by securing the existence of conventional power plants needed to ensure security of supply and could also help facilitating the promotion of renewable electricity. Those objectives, however, are external to network charges and must therefore be examined under the compatibility assessment in line with the case law of the Court ⁽⁶⁶⁾ (see section 3.3.1).

5.1.2.4. Conclusion

- (120) The full exemption cannot be justified by the logic of the network charges in Germany to the extent that it goes beyond a reduction of the published network charges reflecting the contribution of baseload consumers to cost savings or the avoidance of costs. The full exemption notably constitutes an unjustified deviation from the reference system as it exempts the baseload consumers from the costs that the reference system would allocate to them, that is to say the individual network costs calculated on the basis of the physical path methodology and which cannot go below 20 % of the published network charges.
- (121) The Commission therefore concludes that insofar as baseload consumers were exempted from paying network charges going beyond the network costs caused by their consumption or, where those costs amounted to less than the minimum contribution of 20 % of the published network charges, were exempted from that minimum contribution, the exemption is not within the logic of the reference system, and does confer a selective advantage.

5.1.3. IMPUTABILITY

- (122) The full exemption has been provided by Article 7 of the Law of 26 July 2011 (see recital 21 of this Decision), and has been implemented by administrative acts confirming the exemption requests (see recitals 24 of this Decision). It is therefore imputable to the State.
- (123) Also the Paragraph 19-surcharge that financed the exemption is imputable to the State. First, the Paragraph 19-surcharge was provided for by Article 7 of the Law of 26 July 2011 (see recital 21 of this Decision) and was further implemented by the BNetzA, a government agency (see section 2.4.2 and footnote 22 of this Decision). The fact that the calculation of the charge is carried out by private entities mandated by law to do so does not affect that conclusion, because those private entities – the TSO – have no margin of discretion when carrying out that task, and have been mandated by the State to carry out that task, as part of their entrustment pursuant to Paragraph 19(2) of the StromNEV 2011 as TSO. Furthermore, the BNetzA has the normal supervisory powers over the TSO, and can address binding decisions to the TSO, if they fail to comply with their obligations (Paragraphs 29 and 54 of the EnWG 2011). Finally, for the year 2012, the BNetzA directly determined which total amount had to be compensated from the Paragraph 19-surcharge (see recital 37 of this Decision).

5.1.4. EXISTENCE OF STATE RESOURCES

- (124) For selective advantages to amount to aid within the meaning of Article 107(1) of the Treaty, they must be granted directly or indirectly through State resources. The concept of 'intervention through State resources' covers not only advantages which are granted directly by the State but also 'those granted through a public or private body appointed or established by that State to administer the aid' ⁽⁶⁷⁾. In this sense, Article 107(1) of the Treaty covers all the financial means by which the public authorities may actually support undertakings, irrespective of whether or not those means are permanent assets of the public sector ⁽⁶⁸⁾.

⁽⁶⁶⁾ See Commission Notice on the notion of State aid as referred to in Article 107(1) of the Treaty on the Functioning of the European Union (OJ C 262, 19.7.2016, p. 1), point 138; See Judgment of 8 September 2011, *Paint Graphos and others*, joined cases C-78/08 to C-80/08, ECLI:EU: C:2011:550, paragraphs 69 and 70; Judgment of 6 September 2006, *Portugal v Commission*, C-88/03, ECLI:EU: C:2006:511, paragraph 81; Judgment of 8 September 2011, *Commission v Netherlands*, C-279/08 P, ECLI:EU: C:2011:551; Judgment of 22 December 2008, *British Aggregates v Commission*, C-487/06 P, ECLI:EU:C:2008:757; Judgment of 18 July 2013, *P Oy*, C-6/12, ECLI:EU:C:2013:525, paragraphs 27 et seq.

⁽⁶⁷⁾ Judgment of 22 March 1977, *Steinike & Weinlig v Germany*, C-78/76, ECLI:EU:C:1977:52, paragraph 21; judgment of 13 March 2001, *PreussenElektra*, C-379/98, ECLI:EU:C:2001:160, paragraph 58; judgment of 30 May 2013, *Doux Elevage*, C-677/11, ECLI:EU: C:2013:348, paragraph 26; judgment of 19 December 2013, *Association Vent de Colère*, C-262/12, ECLI:EU:C:2013:851, paragraph 20; judgment of 17 March 1993, *Slovan Neptun*, joined cases C-72/91 and C-73/91, ECLI:EU:C:1993:97, paragraph 19; judgment of 9 November 2017, *Commission v TV2/Danmark*, C-656/15 P, ECLI:EU:C:2017:836, paragraph 44.

⁽⁶⁸⁾ Judgment of 30 May 2013, *Doux Elevage and Cooperative agricole UKL-ARREE*, C-677/11, ECLI:EU:C:2013:348, paragraph 34; judgment of 27 September 2012, *France v Commission*, T-139/09, ECLI:EU:T:2012:496, paragraph 36; judgment of 19 December 2013, *Association Vent de Colère*, C-262/12, ECLI:EU:C:2013:851, paragraph 21.

- (125) The mere fact that the advantage is not financed directly from the State budget is not sufficient to exclude that State resources are involved. It results from the case-law of the Court of Justice of the European Union that it is not necessary to establish in every case that there has been a transfer of money from the budget or from a public entity for the advantage granted to one or more undertakings to be capable of being regarded as a State aid within the meaning of Article 107(1) of the Treaty ⁽⁶⁹⁾.
- (126) The private nature of the resources does not prevent them from being regarded as State resources within the meaning of Article 107(1) of the Treaty ⁽⁷⁰⁾. This was also recalled in the ruling *France v Commission* ⁽⁷¹⁾ ruling where the General Court concluded that the relevant criterion for assessing whether the resources are public, regardless their initial origin, is the degree of intervention of the public authority in the definition of the measures in question and their methods of financing. Hence, the mere fact that a subsidy scheme benefiting certain economic operators in a given sector is wholly or partially financed by contributions imposed by the public authorities and levied on certain undertakings is not sufficient to take away from that scheme its status of aid granted by the State within the meaning of Article 107(1) of the Treaty ⁽⁷²⁾. Equally, the fact that the resources would at no moment be the property of the State does not exclude that the resources might constitute State resources, if they are under the control of the State ⁽⁷³⁾. In fact the concept of aid granted through State resources serves to bring within the scope of Article 107(1) of the Treaty not only aid granted directly by the State, but also aid granted by public or private bodies designated or established by the State ⁽⁷⁴⁾.
- (127) This line of reasoning was also applied in *Essent* ⁽⁷⁵⁾. In that case, the Court of Justice had to assess a law which provided that the operators of the Dutch electricity network had to collect a price surcharge on electricity consumed by private electricity clients and pass on the proceeds of that surcharge to SEP, a joint subsidiary of the four electricity generators, in order to compensate the latter for so-called 'stranded costs'. This surcharge had to be transmitted by network operators to SEP which had to collect the proceeds and use them up to a certain amount defined in the law for the purposes of covering stranded costs. In this regard, the Court observed that SEP had been appointed by the law to manage a State resource ⁽⁷⁶⁾. The Court found that the Dutch system involved State resources ⁽⁷⁷⁾.
- (128) On the basis of this case-law, it can be concluded that subsidies financed through parafiscal charges or contributions imposed by the State and managed and apportioned in accordance with the provisions of the legislation imply a transfer of State resources, even where they are not administered by public authorities but by private entities designated by the State that are separate from the public authorities.
- (129) This has been confirmed by the Court of Justice in the *Vent de Colère* case ⁽⁷⁸⁾ where the Court in particular observed that the fact that part of the funds collected were not channelled to the *Caisse des Dépôts et Consignations* but were retained by the undertakings subject to the obligation to purchase renewable electricity at feed-in tariffs was not sufficient to exclude an intervention through State resources.
- (130) The Court of Justice excluded the transfer of State resources in only very specific circumstances: For instance, the Court ⁽⁷⁹⁾ considered that a decision by which a national authority extends to all traders in a certain sector an agreement which introduces the levying of a contribution in an inter-trade organisation recognised by that national authority, thus rendering that contribution compulsory, in order to make it possible to implement certain promotional and public relations activities, does not constitute State aid. The Court noted in this respect that the measure was not financed from State resources since it was not the State but the inter-trade organisation

⁽⁶⁹⁾ See judgment of 16 May 2002, *France v Commission*, C-482/99, ECLI:EU:C:2002:294, paragraph 36; judgment of 17 July 2008, *Essent Netwerk Noord*, C-206/06, ECLI:EU:C:2008:413, paragraph 70; judgment of 19 December 2013, *Association Vent De Colère! and Others*, C-262/12, ECLI:EU:C:2013:851, paragraphs 19-21; judgment of 13 September 2017, *ENEA*, C-329/15, ECLI:EU:C:2017:671, paragraph 25; see also judgment of 30 May 2013, *Doux Elevage and Cooperative agricole UKL-ARREE*, C-677/11, ECLI:EU:C:2013:348, paragraph 34 and judgment of 19 March 2013, *Bouygues Telecom v Commission*, joined cases C-399/10 P et C-401/10 P, ECLI:EU:C:2013:175, paragraph 100.

⁽⁷⁰⁾ Judgment of 12 December 1996, *Air France v Commission*, T-358/94, ECLI:EU:T:1996:194, paragraphs 63-65; judgment of 9 November 2017, *Commission v TV2/Danmark*, C-656/15 P, ECLI:EU:C:2017:836, paragraph 48.

⁽⁷¹⁾ Judgment of 27 September 2012, *France v Commission*, T-139/09, ECLI:EU:T:2012:496.

⁽⁷²⁾ Judgment of 27 September 2012, *France v Commission*, T-139/09, ECLI:EU:T:2012:496, paragraph 61.

⁽⁷³⁾ Judgment of 12 December 1996, *Air France v Commission*, T-358/94, ECLI:EU:T:1996:194, paragraphs 65-67; judgment of 16 May 2002, *France v Commission*, C-482/99, ECLI:EU:C:2002:294, paragraph 37; judgment of 30 May 2013, *Doux Elevage and Cooperative agricole UKL-ARREE*, C-677/11, ECLI:EU:C:2013:348, paragraph 35.

⁽⁷⁴⁾ To this effect, see judgment of 22 March 1977, *Steinike & Weinlig*, C-78/76, ECLI:EU:C:1977:52, paragraph 21; judgment of 17 March 1993, *Sloman Neptun*, joined cases C-72/91 and C-73/91, ECLI:EU:C:1993:97, paragraph 19, and judgment of 10 May 2016, *Germany v Commission*, T-47/15, ECLI:EU:T:2016:281, paragraph 81; judgment of 9 November 2017, *Commission v TV2/Danmark*, C-657/15 P, ECLI:EU:C:2017:837, paragraph 36.

⁽⁷⁵⁾ Judgment of 17 July 2008, *Essent Netwerk Noord*, C-206/06, ECLI:EU:C:2008:413.

⁽⁷⁶⁾ Judgment of 17 July 2008, *Essent Netwerk Noord*, C-206/06, ECLI:EU:C:2008:413, paragraph 74.

⁽⁷⁷⁾ Judgment of 17 July 2008, *Essent Netwerk Noord*, C-206/06, ECLI:EU:C:2008:413, point 66.

⁽⁷⁸⁾ Judgment of 19 December 2013, *Association Vent de Colère*, C-262/12, ECLI:EU:C:2013:851, paragraph 27.

⁽⁷⁹⁾ Judgment of 30 May 2013, *Doux Elevage*, C-677/11, EU:C:2013:348; judgment of 15 July 2004, *Pearle*, C-345/02, EU:C:2004:448.

that decided how to use the resources stemming from the levy. Those resources were entirely dedicated to pursuing objectives determined by that organisation. Hence, the resources were not constantly under public control and were not available to State authorities.

- (131) In *PreussenElektra*, the Court found that the Electricity feed-in Act (*Stromeinspeisungsgesetz*)⁽⁸⁰⁾, in its version applicable in 1998, did not involve a public or private body established or appointed to administer the aid⁽⁸¹⁾. This conclusion was based on the observation that the *Stromeinspeisungsgesetz* put in place a mechanism that was limited at directly obliging electricity supply undertakings and upstream electricity network operators to purchase renewable electricity at a fixed price, without any body administering the stream of payments⁽⁸²⁾. The situation under the *Stromeinspeisungsgesetz* was characterized by a multitude of bilateral relationships between renewable electricity generators and electricity suppliers. There was no surcharge established by the State to compensate the electricity suppliers for the financial burden resulting from the supply obligation. Therefore, nobody had been appointed to administer such a surcharge and the corresponding financial flows.
- (132) By contrast, the Court indicated in the *Vent de Colère* case that the French support system was different from the situation examined in the *PreussenElektra* case in two respects: In *PreussenElektra* the private undertakings concerned had not been appointed by the Member State concerned to manage a State resource, but were bound by an obligation to purchase by means of their own financial resources. In addition, in *PreussenElektra* there was no mechanism established and regulated by the State for offsetting additional costs arising from the purchase obligation and through which the State offered the private operators bound by the obligation to purchase the certain prospect that the additional costs would be covered in full⁽⁸³⁾.
- (133) The Court has recently confirmed this differentiated approach to the assessment of State resources. In the *ENEA S.A.* case, the Court ruled that a national measure placing an obligation on both private and public undertakings to purchase electricity produced by cogeneration does not constitute an intervention by the State or through State resources when the extra costs resulting from that purchase obligation cannot be passed on entirely to end users and are not financed by a compulsory contribution imposed by the State or by a full offset mechanism⁽⁸⁴⁾.
- (134) In light of those principles, for the purposes of examining whether the financing of the full exemption, as resulting from the second sentence of Paragraph 19(2) of the StromNEV 2011, involves State resources, it is necessary to differentiate between the financing of the full exemption in 2011 and the financing of that exemption during the years 2012 and 2013, that is to say following the introduction of the § 19-surcharge.

5.1.4.1. **Financing through State resources after the BNetzA imposed the Paragraph 19-surcharge (years 2012 and 2013)**

- (135) Based on the compensation mechanism provided for in the sixth and the seventh sentence of Paragraph 19(2) of the StromNEV 2011 described under section 2.4 of this Decision, the BNetzA imposed by regulatory decision of 14 December 2011 on the DSO the obligation to collect from end users the Paragraph 19-surcharge and to transfer the proceeds from this surcharge to the TSO on a monthly basis.
- (136) In recitals 49 to 84 of the Opening Decision, the Commission indicated why it considered that the full exemption had to be regarded as financed from State resources. Those reasons can be summarized as follows:
- (a) the full exemption corresponds to a policy of the State;
 - (b) the network operators are being provided a guarantee in the law that the financial losses resulting from the full exemption will be fully compensated through a surcharge on the electricity consumption of network users; that is to say they do not need to finance the exemption from their own financial means;
 - (c) the TSO have been entrusted with the management of the financial flows resulting from the exemption and the Paragraph 19-surcharge;

⁽⁸⁰⁾ BGBl. I p. 2633.

⁽⁸¹⁾ Judgment of 13 March 2001, *PreussenElektra*, C-379/98, ECLI:EU:C:2001:160, paragraphs 58 and 59.

⁽⁸²⁾ Judgment of 13 March 2001, *PreussenElektra*, C-379/98, ECLI:EU:C:2001:160, paragraph 56. See also judgment of 17 July 2008, *Essent Network Noord*, C-206/06, ECLI:EU:C:2008:413, paragraph 74, where the Court notes that in *PreussenElektra*, the undertakings had not been appointed by the State to manage a State resource.

⁽⁸³⁾ Judgment of 19 December 2013, *Association Vent de Colère*, C-262/12, ECLI:EU:C:2013:851, paragraphs 34-36.

⁽⁸⁴⁾ Judgment of 13 September 2017, *ENEA*, C-329/15, ECLI:EU:C:2017:671, paragraph 30.

- (d) the TSO are not free to use the proceeds of the surcharge as they wish given that the Paragraph 19-surcharge must be limited to the financial losses resulting from the exemption; any excess revenues resulting from the surcharge must be deducted from the surcharges to be paid in following years;
- (e) the Paragraph 19-surcharge does not correspond to the payment for a service or a good.
- (137) The Commission does not share the view expressed by both Germany and the interested parties that the full exemption could not be regarded as financed through State resources because the financial resources that finance the exemption would not transit through the State budget. As recalled in recitals 125 to 129 of this Decision, the Court has repeatedly ruled that the concept of State resources can also be fulfilled if the aid is financed through private means, which are imposed by the State and managed and apportioned in accordance with the provisions of the legislation. According to the Court, such a financing scheme implies a transfer of State resources, despite the fact that those resources are not administered by the public authorities but by private entities designated by the State that are separate from the public authorities
- (138) The Commission considers that the losses in revenue resulting from the full exemption from network charges in 2012 and 2013 were passed on entirely to end users by a full offset mechanism financed by a compulsory contribution imposed on them by the State.
- (139) As described in recitals 35 to 39 of this Decision, the legal framework in place in 2012 and 2013 provided for a financing mechanism that would offset the losses in revenue encountered by the network operator to which the exempted baseload consumers was connected. The TSO were obliged to compensate the DSO for their losses in revenue and equalise this additional financial burden amongst them. Pursuant to the regulatory decision of the BNetzA of 14 December 2011 adopted on the basis of Paragraph 29(1) of the EnWG and point 6 of Paragraph 30(2) of the StromNEV 2011, the TSO were compensated for this financial burden through the Paragraph 19-surcharge.
- (140) The Paragraph 19-surcharge constituted a parafiscal levy on end users. As such, it did not form part of the general system of network charges as suggested by the comments submitted by the interested parties. The BNetzA itself has explained in its decision of 14 December 2011 that the Paragraph 19-surcharge had a special purpose, namely to compensate TSO for their financial losses, and therefore did not correspond to a general network charge but rather constituted 'another charge' within the meaning of Paragraph 17(8) of the StromNEV, that has to be collected separately from the general network charges. This was further confirmed by German courts and in particular by the Federal Court of Justice, which concluded that the Paragraph 19-surcharge did not correspond to a network charge but corresponded to a surcharge that was aiming at covering the financial losses resulting from the exemption provided under the second sentence of Paragraph 19(2) of the StromNEV 2011 (see recitals 52 and 53 of this Decision).
- (141) The Paragraph 19-surcharge amounts to a compulsory contribution imposed by the State. It had been provided for in the StromNEV 2011 and has then been introduced via binding regulatory decision of the BNetzA, a high federal public authority entrusted with administrative and regulatory tasks and acting under the supervision of the Ministry for economic affairs and energy. Its president and vice-presidents are nominated by the Minister, while its council is composed of representatives of the Bundesrat and Bundestag ⁽⁸⁵⁾.
- (142) Furthermore, the network operators had been appointed to levy and administer the Paragraph 19-surcharge in accordance with the legal framework in place. In this regard, it is to be recalled that the Court has repeatedly ruled that also a private entity can be appointed with the administration of State resource. Also, it follows from the Essent-judgment that more than just one entity can be appointed to carry out the administration of the surcharge.
- (143) First, the DSOs and the TSOs were obliged to levy and collect the Paragraph 19-surcharge from the end users and DSOs were obliged to transfer the Paragraph 19-surcharge to the TSO.
- (144) Second, the TSO could use the proceeds from the Paragraph 19-surcharge for the sole purpose of compensating for the losses in revenue stemming from the exemption for baseload consumers under the second sentence of Paragraph 19(2) StromNEV 2011 and the equalisation mechanism described in recital 35 of this Decision. This is demonstrated by the fact that the amount of the Paragraph 19-surcharge was adapted to the financial needs triggered by the full exemption. In particular, any proceeds in year x in excess of the amount required to compensate for that financial burden led to a reduction of the surcharge in year x + 2 (see recital 39). The Commission therefore does not share the view of Germany and the interested parties according to which the network operators could use the proceeds of the Paragraph 19-surcharge as they wish.

⁽⁸⁵⁾ See Paragraphs 1, 3, 4 and 5 of the Act on the Federal Network Agency for Electricity, Gas, Telecommunications, Postal Services and Railways of 7 July 2005 (BGBl. I p. 1970, 2009).

- (145) In light of the above, it is noted that the introduction of the Paragraph 19-surcharge gave a guarantee for the network operators that their losses in revenue resulting from the exemption granted under the second sentence of Paragraph 19(2) of the StromNEV 2011 were fully compensated and is therefore different from both the *PreussenElektra* and the *ENEA* ⁽⁸⁶⁾ cases in which the undertakings on which the purchase obligation rested had to finance the obligation through their own financial means and could not pass on the costs to their customers.
- (146) In that respect, the view presented by the interested parties that the proceeds of the Paragraph 19-surcharge were not hypothecated to the financing of the exemption under the second sentence of Paragraph 19(2) of the StromNEV 2011 cannot be accepted. Indeed, as of 2012, the exemption from network charges could not be financed differently than via the Paragraph 19-surcharge which was calculated so as to correspond exactly to the financial needs created by the exemption.
- (147) Based on those elements, the Commission maintains its conclusion that the advantage granted to baseload consumers in the form of the full exemption in 2012 and 2013 must be considered as financed through State resources.

5.1.4.2. *Financing through State resources before the Paragraph 19-surcharge was imposed (year 2011)*

- (148) While the full exemption under the second sentence of Paragraph 19(2) StromNEV 2011 was applicable as of 1 January 2011, the Paragraph 19-surcharge only entered into force on 1 January 2012 (see recital 40 of this Decision). In its Opening Decision, the Commission therefore questioned whether the exemptions granted in 2011 were equally financed through State resources and invited Germany to provide additional information on how the full exemption was financed in 2011.
- (149) On the basis of the additional information provided by Germany, but also taking into account the comments made by interested parties, the Commission does not consider the financing mechanism in place in 2011 to involve State resources.
- (150) As Germany has explained (see recital 77) and as the BNetzA has explicitly stated in the regulatory decision of 14 December 2011, no compensation and set-off mechanism was in place in 2011. In particular, the sixth and the seventh sentence of Paragraph 19(2) of the StromNEV 2011 were not yet applicable. Accordingly, the losses incurred due to the full exemption from network charges in 2011 were not passed on to the end users by a full offset mechanism or – in the absence of the Paragraph 19-surcharge in 2011 – by a compulsory contribution imposed by the State.
- (151) Instead, as the regulatory decision of 14 December 2011 establishes, the DSO and the TSO had to cover the losses in revenues encountered due to the full exemption in 2011 from their own resources.
- (152) They were entitled to include those losses as costs in their regulatory accounts established under the ARegV 2011. However, as set out in recital 47, the losses in revenue incurred in 2011 could not be recouped by an adaptation of the 2011 network charges given that those charges have to be set in advance and cannot be modified in the course of the year. The loss in revenues – if not compensated by other increases in revenues, and hence own resources of the TSO and DSO, for 2011 – had to be booked on the *Regulierungskonto*. Where at the end of the regulatory period ending in 2013 the losses in revenue for 2011 were compensated by additional revenues in other years of that regulatory period, then no compensation of the losses would occur, and the losses would be covered by own resources of the TSO and DSO. Only where the losses could not be set off against additional revenues in the regulatory period ending in 2013 could the losses of revenue encountered in 2011 lead to compensation over the next regulatory period. However, even in that situation, there was no guarantee of full compensation. Rather, the level of compensation depended on other factors, in particular the efficiency (or not) of the DSO and TSO, as the ARegV is not based on real costs, but on ideal costs of an efficient undertaking.
- (153) The network operators therefore enjoyed no guarantee that their losses in revenue resulting from the full exemption in 2011 would be compensated. In other words, in 2011, the network operators had to finance the full exemption from their own financial means.

⁽⁸⁶⁾ Judgment of 13 March 2001, *PreussenElektra*, C-379/98, ECLI:EU:C:2001:160 and judgment of 13 September 2017, *ENEA*, C-329/15, ECLI:EU:C:2017:671.

- (154) The Commission therefore concludes that the advantage granted to baseload consumers in the form of a full exemption from network charges in 2011 had to be financed through the own resources of the network operators and was not financed through State resources ⁽⁸⁷⁾.

5.1.5. EFFECT ON TRADE BETWEEN MEMBER STATES

- (155) In accordance with the Court's settled case-law, for the purpose of categorising a national measure as State aid, it is necessary, not to establish that the aid has a real effect on trade between Member States but only to examine whether that aid is liable to affect such trade ⁽⁸⁸⁾. In particular, when aid granted by a Member State strengthens the position of an undertaking compared with other undertakings competing in intra-Community trade, the latter must be regarded as affected by that aid ⁽⁸⁹⁾.
- (156) As indicated above, the large majority of the undertakings concerned are active in the chemical industry (including industrial gases), paper, textile, steel, non-ferrous metal industry, oil refineries and glass manufacturing. Some beneficiaries also operate data centres as service providers. All those sectors are open to trade between Member States with cross-border exchanges of goods. By exempting the undertakings concerned from a cost that undertakings active in the same sector in other Member States normally have to bear (network charges), the full exemption is strengthening the position of the exempted undertakings as compared with other undertakings competing in intra-community trade, the full exemption from network charges is therefore liable to affect trade between Member States.

5.1.6. IMPACT ON COMPETITION

- (157) A measure granted by the State is considered to distort or threaten to distort competition when it is liable to improve the competitive position of the recipient compared to other undertakings with which it competes ⁽⁹⁰⁾.
- (158) The manufacturing sectors, in which the exempted undertakings are typically active, as well as the market for data centres, are open to competition. In many of these sectors electricity costs represent a large share of production costs, which Germany has confirmed in its letter of 6 December 2013 as concerns the paper, the cement, the chemical sectors and the aluminium and other metal industries. In this context, the full exemption from network charges lowers the production costs of the exempted undertakings. It is therefore liable to improve the competitive position of the beneficiaries of the exemption compared to their competitors in other Member States. It is also likely to improve their competitive position compared to undertakings that do not reach an annual electricity consumption of 10 GWh and 7 000 hours of full use but which are active in the same sector. The full exemption hence threatens to distort competition.
- (159) It is noted that neither an effect on trade nor a distortive effect on competition can be excluded because of an allegedly higher level of electricity costs in Germany compared to the electricity costs in other Member States. The second sentence of Paragraph 19(2) of the StromNEV 2011 granted a full exemption from network charges to baseload consumers. As a consequence, these consumers did not experience any financial burden from using the electricity grid, whereas competing undertakings in other Member States had to pay network charges. In addition, the Court has already ruled that a Member State was seeking to approximate, by unilateral measures, the conditions of competition in a particular sector of the economy to those prevailing in other Member States cannot deprive the measures in question of their aid character ⁽⁹¹⁾.

5.1.7. CONCLUSION ON THE EXISTENCE OF AID

- (160) In light of the above the full exemption from network charges in place in 2012 and 2013 for baseload consumers exceeding an annual electricity consumption of 10 GWh and reaching 7 000 hours of full use amounts to State aid to the extent that it exempted those consumers from the network costs caused by their electricity consumption and from the minimum contribution of 20 % of the published network charge.
- (161) The exemption from network charges granted in 2011 was not financed through State resources and therefore did not amount to State aid.

⁽⁸⁷⁾ Judgment of 13 March 2001, *PreussenElektra*, C-379/98, ECLI:EU:C:2001:160 and judgment of 13 September 2017, *ENEA*, C-329/15, ECLI:EU:C:2017:671.

⁽⁸⁸⁾ Judgment of 8 May 2013, *Libert and Others*, joined cases C-197/11 and C-203/11, ECLI:EU:C:2013:288, paragraph 76.

⁽⁸⁹⁾ Judgment of 8 May 2013, *Libert and Others*, joined cases C-197/11 and C-203/11, ECLI:EU:C:2013:288, paragraph 77.

⁽⁹⁰⁾ See judgment of 17 September 1980, *Phillip Morris*, 730/79, ECLI:EU:C:1980:209, paragraph 11.

⁽⁹¹⁾ Judgment of 3 March 2005, *Wolfgang Heiser v Finanzamt Innsbruck*, C-172/03, ECLI:EU:C:2004:678, paragraph 54.

5.2. UNLAWFULNESS

- (162) By failing to notify the measure before its implementation, Germany did not fulfil their obligations under Article 108(3) of the Treaty. The aid measure thus constitutes unlawful State aid.

5.3. COMPATIBILITY WITH THE INTERNAL MARKET

- (163) The compatibility assessment below only covers the full exemption granted to baseload consumers in 2012 and 2013 to the extent that it constitutes aid (see recital 160).
- (164) In its Opening Decision, the Commission raised doubts as to whether the full exemption from network charges for baseload consumers could be declared compatible with the internal market. Accordingly, the Commission invited Germany to submit additional comments as regards the compatibility of the full exemption with the internal market.
- (165) Germany has submitted that the full exemption could be declared compatible based on Article 107(3)(b) or (c) of the Treaty given that it aimed at the following objectives:
- guaranteeing security of electricity supply;
 - facilitating the promotion of renewable electricity;
 - implementing a system of access to the network system without discrimination between system users as required by Article 32 of Directive 2009/72/EC;
 - ensuring that network charges reflect the actual costs incurred as required by Article 14 of Regulation (EC) No 714/2009.
- (166) In general, Germany also considered that the full exemption would reinforce the competitiveness of the European industry and be in line with the Union objective of reindustrialising Europe.

5.3.1. COMPATIBILITY BASED ON ARTICLE 107(3)(b)

- (167) With regard to Germany's first compatibility base, it is noted that the full exemption is not linked to any specific and concrete 'important project of common European interest'. Germany has not described any such project the execution of which would be promoted through the full exemption from network charges. Germany has also not submitted any information that would show that the full exemption would remedy a serious disturbance of the economy in Germany. The full exemption can thus not be justified under Article 107(3)(b) of the Treaty.

5.3.2. COMPATIBILITY BASED ON ARTICLE 107(3)(c)

- (168) Article 107(1) of the Treaty provides for the general principle of prohibition of State aid within the Union. However, the Commission may declare an aid measure compatible directly under Article 107(3)(c) of the Treaty if it is aimed at and is appropriate to reach a well-defined objective of common interest ⁽⁹²⁾, is necessary to reach this objective, has an incentive effect and is proportionate, provided that the positive effects for the common objective outweigh the negative effects on competition and trade.
- (169) The Member State has the burden of proof for compatibility ⁽⁹³⁾.
- (170) As Germany has argued that the full exemption was helping to promote the production of electricity from renewable sources and security of supply, the Commission has verified that the measure at stake would fall within the scope of the Community Guidelines on State Aid for Environmental Protection ⁽⁹⁴⁾ ('EAG'). However, the EAG do not contain compatibility rules for measures aimed at ensuring security of supply. As to the promotion of renewable electricity, they only contain compatibility criteria for aid granted to installations

⁽⁹²⁾ Judgment of 14 January 2009, *Kronoply v Commission*, T-162/06, ECLI:EU:T:2009:2, especially paragraphs 65, 66, 74 and 75; judgment of 8 June 1995, *Siemens v Commission*, T-459/93, ECLI:EU:T:1995:100, paragraph 48.

⁽⁹³⁾ Judgment of 28 April 1993, *Italy v Commission*, C-364/90, ECLI:EU:C:1993:157, paragraph 20; judgment of 15 June 2005, *Regione autonoma della Sardegna v Commission*, T-171/02, ECLI:EU:T:2005:219, paragraphs 166-168.

⁽⁹⁴⁾ Community Guidelines on State Aid for Environmental Protection (2008/C 82/01) (OJ C 82, 1.4.2008, p. 1).

producing renewable electricity (Section 1.5.6 of the EAG). These criteria, however, do not relate to measures such as the one concerned in the present case, which would consist of exempting consumers of electricity from the network charges in order to 'incentivize' them to remain connected to the grid so that when electricity from renewable installations is produced, there would be a higher likelihood that consumers would also consume the electricity. The EAG do not apply to the measure examined here. The Commission has thus examined the compatibility of the full exemption directly under Article 107(3)(c) of the Treaty.

5.3.2.1. *Objective of common interest and appropriateness of the aid*

5.3.2.1.1. **Compliance with European legislation on network charges**

- (171) With regard to that argument, it is referred to the findings in recitals 85 to 121 of this Decision. As demonstrated in those findings, the full exemption granted to eligible baseload consumers between 2011 and 2013 conferred a selective advantage to the extent that it also exempted them from the network costs caused by their electricity consumption. This is not in line with the objective of ensuring that network charges reflect the actual costs incurred as required by Article 14 of Regulation (EC) No 714/2009 and is also not in line with the non-discrimination principle. The Commission therefore does not share the view of Germany that the full exemption from network charges contributes to these objectives, or would be required on the basis of European legislation.

5.3.2.1.2. **Promotion of security of supply and of renewable electricity.**

- (172) Germany claims that the full exemption was contributing to security of supply and to the promotion of renewable electricity in three different manners (see recital 165):
- It first argues argued that the baseload consumers delivered a necessary stability service in the period 2011 to 2013 before the network stabilizing measures could be introduced. Germany has argued that the continuous and constant electricity consumption by the exempted baseload consumers would relieve and stabilize the network. The predictability of the exempted baseload consumption would contribute to an efficient utilization of the generation capacities, while frequency and voltage deviations would be reduced. This would reduce the need for reserves and balancing electricity. Furthermore, Germany has explained that the exempted baseload consumers are often located close to large power plants. Therefore, the distance over which the electricity needs to be transported is relatively low, which would reduce transport losses and the need to have devices to ensure reactive power. Interested parties have also underlined that baseload consumers are often included in the 5 steps load shedding plan of TSOs without any contract and without any compensation. Also certain interested parties have indicated that end users are subject to technical specifications when they want to be connected to the grid and that this requires certain investments which improve voltage control without being remunerated.
 - Also, Germany argues that conventional power plants were needed to ensure a secured management of the network at a time when renewable electricity started to be deployed more rapidly and when flexibility solutions for the electricity system had not yet been developed (like demand-response⁽⁹⁵⁾) as they deliver important ancillary services to the network and that in order to maintain the existence of those conventional power plants, baseload consumers were needed, in particular in the light of the increasing share of electricity produced from renewable energy sources.
 - At the same time, Germany argues that the stable offtake of electricity by baseload consumers ensured that renewable electricity was always consumed when it was produced, which reduced the necessity to adopt (other and more costly) network stabilizing measures (curtailment). This facilitated the energy transition and contributed to the promotion of renewable electricity.
- (173) It is noted in general that the objectives of ensuring security of supply and of promoting renewable electricity have been recognized as constituting objectives of common interest⁽⁹⁶⁾.

⁽⁹⁵⁾ Demand-response designates changes in electric usage by final consumers from their normal consumption patterns in response to changes in the price of electricity over time (reduce their consumption when prices are high and increase consumption when prices are low).

⁽⁹⁶⁾ On security of supply, see Article 194(1)(b) of the Treaty and Article 3(11) of Directive 2009/72/EC and judgment of 22 October 2013, *Staat der Nederlanden v Essent and Others*, joined cases C-105/12 to C-107/12, ECLI:EU:C:2013:677, paragraph 59; on the promotion of renewable energy, see Article 194(1)(c) of the Treaty and Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources (OJ L 140, 5.6.2009, p. 16), Paragraph 48 of the EAG and recital 231 of Commission Decision of 23 July 2014 on State aid SA.38632 – Germany – EEG 2014 – Reform of the Renewable Energy Law (OJ C 325 of 2 October 2015, p. 4).

(174) It is noted however, that it is not clearly established that the full exemption could contribute to and was appropriate to reach the attainment of the objectives of security of supply and the promotion of renewable electricity. In particular, Germany has not demonstrated that the full exemption could contribute and was appropriate to reach the objectives pursued. As will be explained below, the full exemption leads to contradictory results in terms of the objectives attained and could even constitute a hindrance for the attainment of the objectives concerned.

5.3.2.1.2.1. *Baseload consumption can constitute an obstacle to the objective of promoting renewable electricity and security of supply*

(175) In order to demonstrate that the full exemption from network charges granted under the second sentence of Paragraph 19(2) sentence of the StromNEV 2011 could contribute to and was appropriate to ensure security of supply between 2011 and 2013, Germany has referred to a certain number of characteristics of baseload consumers that facilitate network management and that benefit all network users: their stable and predictable demand reduces the need for balancing measures, reserves and re-dispatching. Also, being located generally closer to power plants, they cause less electricity losses during transport and less need for reactive power compensation devices.

(176) It is noted that these elements can reduce network costs and facilitate network management and could indirectly be considered as facilitating the TSO's obligations in ensuring security of supply. However, assuming that exactly the same characteristics that were already taken into account to justify individual network charges can again be taken into account to consider that the exemption would pursue an objective of common interest, the exemption would in any event not be necessary, would not have any additional incentive effect and would not ensure the proportionality of the aid as explained more in detail below (sections 5.3.2.2 to 5.3.2.4). In addition, as will be seen below, the exemption and the conditions under which it is granted could also constitute a hindrance to flexibility measures that Germany introduced in 2013 to promote security of supply (recital 179 below) and could also increase the costs of the promotion of renewable electricity (recital 181 below). For those reasons, the exemption cannot be viewed as appropriate to reach the objectives of security of supply and promotion of renewable electricity.

(177) Germany and interested parties also mention that the full exemption would be useful for frequency regulation and voltage control.

(178) It is noted, however, that the frequency regulation and the voltage control that Germany and interested parties are referring to do not correspond to a service delivered by the baseload consumers but by conventional power plants, which both Germany and interested parties admit in their submissions. In fact, the argument made is that baseload consumers are needed to maintain the viability of conventional power plants. This argument is examined under recitals 183-188 and reference is made to those findings. As far as the contribution to the five stage load shedding plan is concerned, reference is made to the observations made under recital 97 where it is concluded that the full exemption could not be viewed as the remuneration for participation in the five stage load shedding plan. As to devices that baseload consumers need to install in order to comply with the requirement that the shift factor remains between + 0,9 and - 0,9, it has already been observed that this obligation aims at ensuring the safe and normal management of the grid and is imposed on any consumer requesting for access to the grid and not just baseload consumers (see recital 99 and following). It can thus hardly be seen as justifying an exemption for baseload consumers.

(179) It is noted further that in its submissions Germany indicated that the full exemption induced value for security of supply only for a transitory period (2011 to 2013) pending the introduction of various measures to make the electricity system more flexible. However, already in 2012 did Germany adopt the Ordinance on interruptible load contracts ('ABLAV Ordinance')⁽⁹⁷⁾ aiming at purchasing three gigawatt ('GW') of interruptible load to flexibilise demand. It entered into force in 2013 (the last year of the full exemption) and was based on Paragraph 13(4a) of the EnWG 2011. The purpose was to make available to network operators interruptible loads to address situations in which there is too much demand compared to the available generation. Those situations can occur more often in electricity systems with high (intermittent) renewable penetration given that

⁽⁹⁷⁾ BGBl. I p. 2998.

a sudden drop in the wind or the sun radiation leads to a sudden decrease of generation. Also wind and solar energy can be lower than initially expected based on the weather forecast. It is observed however, that the full exemption for baseload consumers actually constitutes an incentive for those consumers not to offer interruptible load under the ABLAV Ordinance given that they would then not reach the 7 000 hours of full use and thus runs against the objectives of another measure aimed at security of supply. For 2013, the full exemption therefore constituted a hindrance to another measure ensuring security of supply by de-incentivizing baseload consumers from offering interruptible load.

- (180) In addition, Germany has argued that the exempted baseload consumption would contribute to the promotion of renewable electricity by reducing the costs of such promotion. In particular, Germany has indicated that the stable offtake of electricity by baseload consumers ensured that renewable electricity was always consumed when it was produced, which reduced the necessity to curtail and compensate the renewable electricity installations in case of curtailment.
- (181) It is noted that indeed, in the absence in 2011-2013 of storage installations coupled with renewable electricity installations and in the absence also of flexible demand and incentives to increase consumption at times when renewable electricity is abundant, the existence of baseload consumption could indirectly reduce the likelihood that renewable electricity installations be curtailed. The exemption could therefore be viewed as facilitating the promotion of renewable electricity. However, the exemption could also indirectly increase the costs of the promotion of renewable electricity. Indeed, when renewable electricity is not available due to the sudden decrease of wind or sun, the inflexibility of baseload consumers induced by the exemption will make it necessary to ramp up conventional power plants, most likely coal-fired or gas-fired power plants to cover the demand of baseload consumers in case of sudden drops in intermittent renewable electricity generation. This could be perceived as increasing the costs of the promotion of renewable electricity.
- (182) Finally, it is noted that the exemption is granted to baseload consumers irrespective of where they are located. However, as the 2012 Study shows (section 2.3) under certain conditions the network can be congested because the electricity produced for instance in the North is exceeding the transmission capacity needed to deliver the electricity to the South where the consumption point is located. That congestion could be linked to strong wind conditions. In fact the 2012 Study contains a scenario (Figure 2.3) in which strong wind conditions are simulated to identify potential network bottlenecks. In such situation, it is necessary to curtail power plants that are located before the bottleneck and ramp up power plants located after the bottleneck. Redispatching measures involve compensation both to the curtailed power plants and to the power plants that need to ramp up. If the baseload consumer is located after the bottleneck, he will not reduce the costs of renewable electricity support but increase them. As the full exemption is devoid of any locational signal and being granted without any consideration for network bottlenecks, the exemption could increase the costs of renewable electricity deployment.

5.3.2.1.2.2. *Unclear link between the full exemption and the security of supply*

- (183) Germany has also argued that the exemption would (indirectly) contribute to security of supply because it would ensure the presence of constant consumption which is itself a prerequisite for conventional generation capacities, which it considers to be necessary not only to provide network stabilizing services but also to meet the electricity demands in a market environment that is increasingly marked by flexible and decentralized generation capacities based on renewables energies. Germany and several interested parties have submitted that conventional power plants (equipped with synchronous generators) deliver a certain number of important network services that network operators need to keep the network in operation, principally voltage regulation and frequency regulation. They argue that if conventional plants do not run on a continuous basis, those system services would be more difficult to acquire and in any event more expensive (for instance due to the need for a larger reserve). Conventional power plants could however only operate on a constant basis if there is sufficient constant demand to consume the electricity produced. More specifically, Germany claims that the 2012 Study shows that Germany would need in coming years between 8 and 25 GW of conventional power plants to ensure secured network management and has argued that in order to maintain those conventional power plants a constant and stable demand was needed.
- (184) It is noted first that the 2012 Study was realised after the full exemption was granted, which excludes its use to show the necessity of the full exemption to ensure the viability of the concerned conventional power plants. In addition, as will be shown below, the contribution of the exemption to the security of supply is not established.

- (185) Second, the 2012 Study does not itself refer to the need to secure a certain minimum constant consumption nor has Germany indicated how the baseload consumers relate to the minimum conventional generation needs. Germany has merely explained that the baseload consumers by their constant offtake constituted an incentive for conventional power plants to remain on the market. However, the 2012 Study makes a distinction between conventional baseload plants (i.e. to nuclear power plants, run-of-river power plants and lignite power plants) and conventional power plants that are more flexible. The minimum generation need refers to both types of generation. Germany and third parties, however, in their arguments do not make this distinction and have not explained how baseload consumption relates to both types of generation. When they refer to conventional power plants, they seem to refer to baseload power plants only given that they refer to constant production and the need to have equally constant consumption. By contrast, the 2012 Study makes clear that the conventional generation needed cannot only be baseload. The 2012 Study in fact insists on the flexibility needs of the system and the time necessary to modify and adapt generation to fluctuations. It is hard to see what the relationship is between those flexible plants and baseload consumers. Indeed, as already mentioned in recital 96, for conventional power plants that can be ramped up rapidly like gas turbines, baseload consumers will not constitute an incentive to remain on the market as their profitability is linked to the possibility to obtain higher electricity prices when the system is under stress.
- (186) In addition, the argument that the exemption would contribute to security of supply because helping to secure the existence of (baseload) conventional power plants is based on a circular reasoning: As baseload consumers themselves require continuous electricity supply they are themselves accountable for a part of the minimum generation identified in the 2012 Study. By arguing that baseload consumers are needed to maintain the operation of power plants, Germany and the interested parties are using a circular argument insofar as those power plants are required to cover those consumers' own demand. Such an argument cannot support the view that the full exemption was appropriate to achieve security of supply.
- (187) Finally, it is noted that Germany's and interested parties' argument rests on the assumption that baseload consumers are decisive to secure the offtake of the electricity produced by those plants and their viability.
- (188) However, the 2012 Study reveals that the existence of baseload consumers is not sufficient to ensure constant offtake from baseload power plants and to guarantee their viability. On page 1 of the 2012 Study, it is observed that the continuous deployment of renewable electricity installations and the priority dispatch of renewable electricity lead to a reduction of electricity supply by conventional (including conventional baseload) power plants. In addition, Germany itself admits that at times of lower demand and high renewable electricity production, the baseload consumers would consume the renewable electricity due to priority dispatch and access instead of consuming the electricity that would normally have been supplied by conventional baseload power plants. This shows that the consumption by baseload consumers will not ensure the viability of conventional baseload power plants and will not make redundant the system stability measures (higher reserve requirements, quick ramping up of power plants when renewable production decreases, etc.) that Germany and interested parties claim could be spared with a continuous operation of conventional power plants.

5.3.2.1.2.3. Conclusion on the appropriateness of the aid to ensure security of supply and to promote renewable electricity

- (189) Based on the above elements, the Commission concludes that Germany has not demonstrated that the full exemption could contribute to and was appropriate to contribute to the security of supply or indirectly to the promotion of renewable electricity.
- (190) Even assuming that full exemption from network charges of baseload consumers was appropriate to contribute to the objective of ensuring the security of supply and indirectly the deployment of electricity from renewable sources it still is necessary to verify whether it can be considered as necessary to reach those objectives, has an incentive effect, is proportionate and whether the negative impact of the measure remain smaller than its positive effect. It will be demonstrated below that these requirements have not been fulfilled. This reasoning constitutes subsidiary reasoning, as the Commission considers that the aid cannot be declared compatible already for the sole reason that it is not, in reality, capable of contributing to an objective of common interest.

5.3.2.1.3. Competitiveness of the European industry

- (191) Germany has underlined that the decision to phase out nuclear energy and to increase the share of renewable electricity would imply an increase in electricity costs (both costs related to electricity production and electricity transmission) which will penalize in particular electro-intensive industries like paper, cement, chemical, aluminium and other non-ferrous metal industries in comparison to competitors in other Member States facing significantly less costs from renewable policies. The exemption would create a level playing field.
- (192) It is noted however that the exemption is not creating a level playing field nor is it linked to costs that would be induced by renewable energy policies. Indeed, the full exemption from network charges representing the individual costs of the baseload consumers is exempting German baseload consumers from their entire network costs, including the costs of the network path that is connecting the baseload consumer to the closest baseload power plant. Those costs have no relationship with renewable energy policies and correspond to costs that competitors in other Member States have to pay as part of their normal production costs and that consumers and competitors in Germany need to compensate via the Paragraph 19-surcharge.
- (193) Finally, it is noted that the full exemption aiming at improving the competitiveness of the concerned consumers seems to be contrary to Article 14 of Regulation (EC) No 714/2009 as not being cost-reflective, and to Article 32 of Directive 2009/72/EC as not in line with the non-discrimination principle. In addition, exemptions from network charges decided by the legislator or the Government do not seem in line with Article 37(1)(a) of Directive 2009/72/EC establishing the principle that tariffs must be established by the regulator.
- (194) For those reasons, it is concluded that the full exemption from network charges corresponding to the individual costs attributable to the baseload consumers concerned in so far as it would aim at reinforcing the competitiveness of the beneficiaries is not capable of contribution to an objective of common interest.

5.3.2.2. Necessity of the full exemption

- (195) In any event, as is demonstrated below (recitals 197 to 199, even assuming that Germany had demonstrated that the full exemption could contribute to and was appropriate to ensure indirectly the promotion of renewable electricity and security of supply, it is not demonstrated that the full exemption was needed in 2012-2013 to reach those objectives. This would only have been the case if Germany had demonstrated that the full exemption was necessary to maintain baseload consumption and prevent baseload consumers from disconnecting from the network.
- (196) However, as the elements below show, Germany did not demonstrate that without the full exemption, baseload consumers would leave the public network and would either construct a direct line to a power plant or become self-suppliers. Also, Germany did not demonstrate that absent the full exemption, the beneficiaries concerned would change their consumption pattern and have variable unpredictable load profile.

The full exemption is not needed to avoid that baseload consumers build a direct line

- (197) Germany has not demonstrated that if the baseload consumers benefiting of the exemption would still be subject to individual network charges as would normally result from Paragraph 24 of the EnWG, they would stop contributing to the objective of common interest (stabilizing the network and promotion of renewable electricity) by building a direct connection to a power plant.
- (198) This seems highly unlikely given that individual network charges would be calculated based on the physical path methodology which examines the costs related to the use of the network path between the connection point of the baseload consumer to the network (offtake point) and the nearest baseload power plant. In that sense, individual network charges are mimicking the costs that would be implied by the construction of a direct line to the nearest baseload power plant suitable to match the baseload demand of the baseload consumer. All costs

being equal, a baseload consumer will prefer to remain connected to the network instead of engaging in a lengthy and uncertain permit procedure. Given that the direct line will in many cases go through properties that do not belong to the baseload consumer, various permits and authorisation will be required and they are difficult to obtain as the general public often opposes electric lines). In addition, in most instances, individual network charges will actually be lower than the costs involved in the construction of a direct line. Indeed, a direct line would imply for the concerned baseload consumer significant investment costs and would also require lengthy and costly permit procedures to build the line. All fixed costs of the line would have to be borne by one single user while under the physical path methodology he only bears his share of those fixed costs.

The full exemption is not needed to avoid that baseload consumers become self-suppliers

- (199) Germany has not demonstrated either that if the beneficiaries of the full exemption would be subject to individual network charges as would normally result from Paragraph 24 of the EnWG, they would be at risk of becoming self-suppliers. Germany has not submitted any documents which would show a trend of baseload consumers becoming self-suppliers due to the level of their individual network charges before the introduction of the full exemption. On the contrary, the data submitted by Germany shows that the full exemption is not impacting on the decision of baseload consumers to engage in self-supply. Germany has provided figures for the ten largest beneficiaries in terms of electricity consumption for the period 2013 to 2015 (a period covering the last year of the full exemption and two years during which individual network charges were applied). This data shows that six out of these 10 undertakings did not have a self-supply installation in 2013 and did not acquire any self-supply installation after the reintroduction of individual network charges⁽⁹⁸⁾. The data relating to the four other companies⁽⁹⁹⁾ reveal that one of those companies entirely injects into the grid the electricity produced. The remaining three companies all had self-supply installations already in 2013 and continued to use them throughout the entire period 2013 to 2015 with a decreasing trend for one, an increasing trend for the second and a rather stable trend for the third company. This confirms that the full exemption is not necessary for preventing self-supply and that baseload consumers chose self-supply models on the basis of other factors. This has been confirmed by Germany in its comments regarding State aid SA.46526 (2017/N)⁽¹⁰⁰⁾ in which Germany first indicated that self-supply solutions in the energy-intensive industry⁽¹⁰¹⁾ were driven by synergies with heat requirements, synergies with waste gases and production residues and not by the possibility to escape payment of the charge on electricity that consumers pay in Germany to finance the support of renewable electricity (the so-called EEG-surcharge)⁽¹⁰²⁾. Germany in addition showed that despite a significant increase of the EEG-surcharge in the period 2011 to 2014 (with the EEG-surcharge representing more than the electricity wholesale price as of 2013), self-supply in the four main sectors resorting to self-supply (paper, chemical industry, steel manufacturing, oil refineries) remained stable in the period 2010 to 2014⁽¹⁰³⁾.

The alleged contribution to the stability of the grid is already taken into account in individual network charges

- (200) In order to justify the full exemption Germany has referred to the stability and predictability of baseload consumption as an important element to facilitate network management and thus indirectly facilitate security of supply.
- (201) It is noted, however, that all these elements are already taken into account for the calculation of individual network charges given that this calculation allocates to each baseload consumer only the costs linked to the network connection between that baseload consumer and the nearest baseload power plant that can cover its demand. Costs for balancing energy are anyway not included in network charges in general neither in the individual network charges. Costs for the various reserves and re-dispatching costs are not included in the individually calculated network charges and energy losses due to the transport of electricity are allocated in proportion to the network portion used. Also the reduced need for reactive power compensation devices will be taken into account given that those devices will only be included in the calculation of the individual network charges if they are located on the network path between the baseload power plant and the baseload consumer.

⁽⁹⁸⁾ Those companies belonged to the [...] and to the [...] sector.

⁽⁹⁹⁾ Those companies belonged to the [...] sector, the [...] sector and the [...] industry.

⁽¹⁰⁰⁾ Commission Decision of 19 December 2017 on SA.46526 (2017/N) – Germany – Reduced surcharge for self-generation under EEG 2017.

⁽¹⁰¹⁾ Germany has indicated that most baseload consumers were energy-intensive undertakings.

⁽¹⁰²⁾ See recital 60 of the Commission decision in case SA.46526.

⁽¹⁰³⁾ See recital 61 of the Commission decision in case SA.46526.

- (202) Given that this calculation allocates to each baseload consumer only the costs linked to the network connection between that baseload consumer and the nearest baseload power plant that can cover its demand, it must be concluded, that the individual network charges already adequately take into account the benefits induced by baseload consumers in terms of network management and indirectly security of supply. There is thus no need for any aid measure in the form of a full exemption and Germany has not brought forward any element that would show that with network charges based on individual costs (for instance by using the physical path methodology), the beneficiaries would become consumers with a variable and unpredictable consumption profile.

5.3.2.3. *Incentive effect*

- (203) Further, Germany has not demonstrated that the full exemption from network charges would have an incentive effect. An aid has an incentive effect when it changes the behaviour of the undertakings concerned in such a way that they engage in an additional activity which they would not carry out without the aid or which they would carry out in a restricted or different manner.
- (204) Several elements in the file show that in many cases the full exemption was granted to baseload consumers for adopting a consumption pattern that corresponds to their usual consumption pattern given that their production process involves constant electricity consumption. Individual network charges for baseload consumers exist since 2005. Initially those individual network charges were possible only for baseload consumers reaching 7 500 hours of full use. At least for baseload consumers who were already benefitting from individual network charges under that initial regime, the full exemption did hence not change their behaviour compared with their behaviour during the application of individual network charges and thus had no incentive effect. In addition, the number of baseload consumers obtaining individual network charges in 2014 is very close to the number of baseload consumers having obtained an exemption in 2011 to 2013 and the applicants are often the same. This also confirms that for most of the baseload consumers, the full exemption has not modified their behaviour compared to what they would anyway do based on individual network charges. The German national courts have made the same observations (see recital 52). Finally, the 2015 Evaluation Report also highlights that several network operators had observed that the baseload consumers concerned already had the same consumption pattern before the full exemption had been introduced ⁽¹⁰⁴⁾.

5.3.2.4. *Proportionality, negative impact on trading conditions and overall balance*

- (205) Even assuming that for some baseload consumers the full exemption was appropriate, and necessary to contribute to an objective of common interest and had an incentive effect, it should be noted that the full exemption was not proportionate and that the negative impact of the aid outweighs its hypothetical positive impact.
- (206) In order to be proportionate, the full exemption would have had to be limited to the amount necessary to trigger the change in the behaviour of the concerned baseload consumer that is beneficial for either the security of supply or the promotion of renewable electricity.
- (207) However, Germany has not demonstrated that the full exemption is calibrated to being limited to what would be necessary to incentivize a change in the consumption pattern of baseload consumers, nor that the full exemption is the least distortive tool to keep the baseload consumers' contribution to the stability and security of the network. In this respect, some interested parties have claimed that in order to be sure that they would reach the 7 000 hours of full use, their employees needed to reserve part of their time to the monitoring of the consumption and that a continuous consumption also involved continuous production and thus possibly increased stocks when product demand was decreasing. However, the same interested party admits that those costs differed for each company. Therefore, even assuming that in order to reach 7 000 hours of full use some of the baseload consumers would face additional costs, there was no guarantee that the exemption would in all cases correspond to what would have been necessary to cover those extra costs and Germany did not demonstrate that it had been the case.
- (208) It is noted in addition that the measure does not seem to promote security of supply beyond what is already taken into account to compute individual network charges. Such additional contribution has not been demonstrated. In any event, both Germany and interested parties admit that it cannot be quantified.
- (209) In addition, it is noted that even if it was assumed that baseload consumers would contribute to security of supply beyond the stabilizing effect on networks already taken into account in the determination of individual

⁽¹⁰⁴⁾ See p. 38 of the 2015 Evaluation Report.

network charges and would also indirectly contribute to the promotion of renewable electricity, Germany has not demonstrated that the aid is limited to what would be necessary to achieve those positive effects. In its 2015 Evaluation Report, the BNetzA noted that network operators having baseload consumers connected to their network were split between those finding that baseload consumers had stabilizing effects and those finding that they had no such stabilizing effects (see figures 6 and 7 of the report and the findings on p. 38 of the report). As the report does not make this distinction, it is unclear whether for those network operators having identified stabilizing effects, the effects concerned would go beyond those already taken into account to calculate individual network charges. One TSO explained that the contribution of baseload consumers to the stability of the networks depended on the specific circumstances of the network: in the event of overload, baseload consumers were threatening network stability while at times of underload, they were contributing to it so that the key to network stability was actually flexible load⁽¹⁰⁵⁾. However, baseload consumers by definition do not constitute flexible load but stable and inflexible load. Indeed, if the baseload consumers were to offer flexibility services (reduction of consumption upon request of the network operator for instance), they would not comply with the definition of baseload consumers anymore as they would not reach the 7 000 hours of full use anymore. This confirms at the very least, that — assuming that under certain conditions baseload consumers contribute to network stability beyond what is already taken into account to compute individual network charges — baseload consumers' additional contribution to stability would depend on each case but cannot be automatically presumed for any baseload consumer exceeding 10 GWh of consumption and reaching 7 000 hours of full use. Nor can it be presumed that it would warrant a full exemption from network charges in all cases.

- (210) In addition, as to Germany's and interested parties' argument that the exemption would secure the existence of baseload conventional power plants which are themselves important providers of ancillary services, it should be noted that the argument rests on the assumption that the minimum generation needs identified in the 2012 Study would remain constant irrespective of demand in Germany, which is not the case. On the contrary, as mentioned in recital 93 of this Decision, the 2012 Study underlines on page (i) (part 'Ergebniszusammenfassung') that the extent of the minimum generation is highly dependent on the current situation, in particular the renewable production but also the demand load. Germany has not provided any elements that would demonstrate that the full exemption is limited to the baseload consumption that is allegedly needed to secure the existence of baseload conventional power plants nor that it would over time be calibrated to adapt to changing needs.
- (211) Germany has argued that there would be no undue distortion of trading conditions as the impact on competition would be limited given that the measure significantly contributed to security of supply and would hardly have any impact on competition with undertakings from other Member States given the very high electricity prices in Germany compared to other Member States.
- (212) However, as result from the findings under section 5.3.2.1 to 5.3.2.4 it is not demonstrated that the full exemption would be appropriate to achieve security of supply and promotion of renewable electricity, nor that it would be necessary and have an incentive effect. Also, as demonstrated under (205)-(211) of this Decision, the aid is not limited to amount needed to reach the objectives and leads to overcompensation. The hypothetical positive impact of the aid is therefore extremely limited, if existing at all.
- (213) By contrast, the full exemption does not seem to observe Article 32 of Directive 2009/72/EC and Article 14 of Regulation (EC) No 714/2009.
- (214) Concerning the distortion of competition with other Member States and contrary to Germany's views, they cannot be considered as being insignificant. First, the measure fully exempts the beneficiaries from network charges while all their competitors remain under the obligation to pay network charges in their respective Member States, in line with the applicable European legislation. This can have an important distortive impact on competition given that, as Germany has pointed out itself, most of the beneficiaries are electro-intensive undertakings. Electricity costs are thus an important factor of their competitiveness. Second, the circumstance that electricity prices would be high in Germany and would heavily burden the production costs of electro-intensive companies in Germany has not been demonstrated. It is noted to the contrary that between 2011 and 2013 electro-intensive users benefitted in Germany from reductions of the electricity tax, of the EEG-surcharge and of the CHP-surcharge
- (215) Based on those elements, it is concluded that the negative impact of the aid exceeds the hypothetical positive contribution that it might have had in terms of the promotion of renewable electricity or the security of supply.

⁽¹⁰⁵⁾ See p. 38 of the 2015 Evaluation Report.

5.3.3. CONCLUSION

(216) The aid granted in 2012 and 2013 is not compatible with the internal market.

6. RECOVERY

(217) According to the Treaty and the Court's established case-law, the Commission is competent to decide that the Member State concerned must abolish or alter aid when it has found that it is incompatible with the internal market⁽¹⁰⁶⁾. The Court has also consistently held that the obligation on a Member State to abolish aid regarded by the Commission as being incompatible with the internal market is designed to re-establish the previously existing situation⁽¹⁰⁷⁾.

(218) In this context, the Court has established that this objective is attained once the recipient has repaid the amounts granted by way of unlawful aid, thus forfeiting the advantage which it had enjoyed over its competitors on the market, and the situation prior to the payment of the aid is restored⁽¹⁰⁸⁾.

(219) In line with the case-law, Article 16(1) of Council Regulation (EU) 2015/1589⁽¹⁰⁹⁾ stated that 'where negative decisions are taken in cases of unlawful aid, the Commission shall decide that the Member State concerned shall take all necessary measures to recover the aid from the beneficiary [...]'.
 (220) Thus, given that the aid in question was implemented in violation of Article 108(3) of the Treaty and is incompatible with the internal market, it must be recovered from the beneficiaries in order to re-establish the situation that existed on the market prior to their granting. Recovery should cover the time from when the advantage accrued to the beneficiary, that is to say when the aid was put at the disposal of the beneficiary, until effective recovery, and the sums to be recovered should bear interest from the date on which they accrued to the beneficiary until effective recovery.

(221) As regards the claim put forward by some interested parties that the recovery would be in violation of the principle of the protection of legitimate expectations, it should be pointed out that the Court of Justice has repeatedly held that the right to rely on the principle of the protection of legitimate expectations extends to any person in a situation where a Union institution has caused him to entertain expectations which are justified by precise assurances provided to him. However, if a prudent and alert economic operator could have foreseen the adoption of a Union measure likely to affect his interests, he cannot plead that principle if the measure is adopted⁽¹¹⁰⁾. In light of that case-law, the judgment in *PreussenElektra* could not create any legitimate expectations because it has not put into question the possibility to mandate private bodies to administer an aid scheme and to qualify parafiscal levies and charges as State resources. Rather, it concerned one narrow situation already identified in *Van Tiggele*⁽¹¹¹⁾. In addition, the Commission has concluded on the existence of State aid in a big number of schemes financed on the basis of a surcharge imposed by the State⁽¹¹²⁾.

⁽¹⁰⁶⁾ See judgment of 12 July 1973, *Commission v Germany*, C-70/72, ECLI:EU:C:1973:87, paragraph 13.

⁽¹⁰⁷⁾ See judgment of 14 September 1994, *Spain v Commission*, joined cases C-278/92, C-279/92 and C-280/92, ECLI:EU:C:1994:325, paragraph 75.

⁽¹⁰⁸⁾ See judgment of 17 June 1999, *Belgium v Commission*, C-75/97, ECLI:EU:C:1999:311, paragraphs 64 and 65.

⁽¹⁰⁹⁾ Council Regulation (EU) 2015/1589 of 13 July 2015 laying down detailed rules for the application of Article 108 of the Treaty on the Functioning of the European Union (OJ L 248, 24.9.2015, p. 9).

⁽¹¹⁰⁾ See judgment of 22 June 2006, *Forum 187 v Commission*, joined cases C-182/03 and C-217/03, ECLI:EU:C:2006:416, paragraph 147.

⁽¹¹¹⁾ See judgment of 24 January 1978, *Van Tiggele*, C-82/77, ECLI:EU:C:1978:10.

⁽¹¹²⁾ See for example: Commission Decision of 4 July 2006 on State aid NN162a/2003 and N317a/2006 – Austria – Support of renewable Electricity Production under the Austrian Green Electricity Act (OJ C 221 of 14 September 2006, p. 8); Commission Decision of 8 February 2012 on State aid SA.33384 – Austria – Green Electricity Act 2012 (OJ C 156 of 2 June 2012, p. 1); Commission Decision of 14 April 2010 on State aid N94/2010 – UK – Feed in tariffs to support the generation of renewable electricity from low carbon sources (OJ C 166 of 25 June 2010, p. 2); Commission Decision of 24 April 2007 on State aid C 7/2005 – Slovenia – Slovenian Electricity Tariffs (OJ C 219 of 24 August 2007, p. 9); Commission Decision of 26 October 2009 on State aid N 354/2009 – Slovenia – Support for production of electricity from renewable energy sources and in co-generation installations (OJ C 285 of 26 November 2009, p. 2); Commission Decision of 25 September 2007 on State aid N 571/2006 – Ireland – RES-E support programme (OJ C 311 of 21 December 2007, p. 2); Commission Decision of 18 October 2011 on State aid SA.31861 – Ireland – Biomass electricity generation (OJ C 361 of 10 December 2011, p. 2); Commission Decision of 2 July 2009 on State aid N 143/2009 – Cyprus – Aid scheme to encourage electricity generation from large commercial wind, solar, photovoltaic systems and biomass (OJ C 247 of 15 October 2009, p. 2); Commission Decision of 19 March 2003 on State aid N 707/2002 and N 708/2002 – Netherlands – MEP stimulerend duurzame energie & MEP Stimulerend warmtekrachtkoppeling (OJ C 148 of 25 June 2003, p. 8); Commission Decision of 5 June 2002 on State aid C 43/2002 (ex NN 75/2001) – Luxembourg – Compensation fund for the organisation of the electricity market (OJ L 159 of 20 June 2009, p. 11); Commission Decision of 23 July 2014 on State aid SA.38632 – Germany – EEG 2014 – Reform of the Renewable Energy Law (OJ C 325 of 2 October 2015, p. 4); Commission Decision of 8 March 2011 on State aid C 24/2009 – Austria – State aid for energy-intensive businesses under the Green Electricity Act in Austria (OJ L 235 of 10 September 2011, p. 42).

- (222) In any event, the Court clarified in *Essent* ⁽¹¹³⁾ the boundaries of the *PreussenElektra* judgment and repeated its earlier case law that also qualifies as State resource an advantage financed from surcharge imposed by the State and managed by an entity designated by the State.
- (223) The interpretation of State resources adopted in this decision is in line with the well-established case law of the Court as well as the decisional practice of the Commission. As it could have been foreseen by any prudent and alert economic operator, recovery would not be in violation of the principle of the protection of legitimate expectations.
- (224) In light of the above, especially with respect to recital 216, the aid should be recovered as it is incompatible with the internal market and the sums to be recovered should bear interest from the date on which they accrued to the beneficiary until effective recovery.
- (225) Recovery should only cover the full exemption from network charges granted during the period from 1 January 2012 until 31 December 2013 by comparison of the individual network charges that would have been due absent the exemption, as only that part qualifies as State aid.
- (226) The recoverable amounts are for each of the years concerned, the individual network charges that the beneficiaries would have had to pay without the full exemption.
- (227) The individual network charges referred to in the previous recital should be calculated on the basis of the physical path methodology as it was set out by the BNetzA in its guidance document '*Leitfaden zur Genehmigung individueller netzentgeltvereinbarungen nach § 19 Abs. 2 S. 1 und 2 StromNEV*' issued on 26 October 2010.
- (228) The recoverable amount, for each of the years concerned, equals at least 20 % of the amount that the beneficiary would have paid if he had had to pay the published network charges.
- (229) Where the total amount of advantage received by a beneficiary is less than EUR 200 000 and where the advantage meets all the other criteria laid down in either Commission Regulation (EU) No 1407/2013 ⁽¹¹⁴⁾ or Commission Regulation (EC) No 1998/2006 ⁽¹¹⁵⁾, such advantage should be deemed not to constitute State aid in the meaning of Article 107(1) of the Treaty, and should therefore not be subject to recovery.

7. CONCLUSION

- (230) It is concluded that Germany has unlawfully put into effect during the period 1 January 2012 until 31 December 2013 aid in the form of a full exemption from network charges for baseload consumers reaching an annual electricity consumption of at least 10 GWh and 7 000 hours of full use in breach of Article 108(3) of the Treaty.
- (231) The State aid amounts to the network costs actually caused by the exempted baseload consumers in 2012 and 2013 or, where those network costs amount to less than the minimum network charges of 20 % of the published network charges, to those minimum network charges. To this extent, the full exemption granted under the second sentence of Paragraph 19(2) of the *StromNEV* 2011 deviates from the reference system as it was in place. Accordingly, the State aid amounts to the value of the individual network charges that the baseload consumers did not pay in 2012 to 2013 and corresponds to at least 20 % of the network charges published in the respective years.
- (232) The State aid does not meet the conditions of any of the derogations provided for in Article 107(2) and (3) of the Treaty and cannot be considered compatible with the internal market for any other reason. Consequently, it is incompatible with the internal market.
- (233) In accordance with Article 16(1) of Regulation (EU) 2015/1589 the Commission must require that the Member State concerned takes all necessary measures to recover the aid from the beneficiaries. Germany should therefore be required to recover the incompatible aid,

⁽¹¹³⁾ See judgment of 17 July 2008, *Essent Netwerk Noord*, C-206/06, ECLI:EU:C:2008:413, paragraph 74.

⁽¹¹⁴⁾ Commission Regulation (EU) No 1407/2013 of 18 December 2013 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to *de minimis* aid (OJ L 352, 24.12.2013, p. 1).

⁽¹¹⁵⁾ Commission Regulation (EC) No 1998/2006 of 15 December 2006 on the application of Articles 87 and 88 of the Treaty to *de minimis* aid (OJ L 379, 28.12.2006, p. 5).

HAS ADOPTED THIS DECISION:

Article 1

1. The full exemption of baseload consumers in Germany from paying network charges, which Germany has unlawfully put into effect in 2012 and 2013, constitutes State aid within the meaning of Article 107(1) of the Treaty insofar as those consumers were exempted from paying network charges corresponding to the network costs caused by them or, where those network costs amounted to less than the minimum network charges of 20 % of the published network charges, from paying those minimum network charges.

2. The State aid referred to in paragraph 1 was put into effect by Germany in breach of Article 108(3) of the Treaty and is incompatible with the internal market.

Article 2

Individual aid granted under the scheme referred to in Article 1 does not constitute State aid if, at the time it is granted, it fulfils the conditions laid down by the regulation adopted pursuant to Article 2 of Council Regulation (EC) No 994/98 ⁽¹¹⁶⁾ which is applicable at the time the aid is granted.

Article 3

(1) Germany shall recover the incompatible aid granted under the scheme referred to in Article 1 from the beneficiaries.

(2) The sums to be recovered shall bear interest from the date on which they were put at the disposal of the beneficiaries until their actual recovery.

(3) The interest shall be calculated on a compound basis in accordance with Chapter V of Commission Regulation (EC) No 794/2004 ⁽¹¹⁷⁾.

(4) Germany shall cancel all outstanding payments of aid under the scheme referred to in Article 1 with effect from the date of adoption of this Decision.

Article 4

(1) Recovery of the aid granted under the scheme referred to in Article 1 shall be immediate and effective.

(2) Germany shall ensure that this Decision is implemented within four months following the date of notification of this Decision.

Article 5

(1) Within two months following notification of this Decision, Germany shall submit the following information:

(a) the list of beneficiaries that have received aid under the scheme referred to in Article 1 and the total amount of aid received by each of them under the scheme;

(b) the total amount (principal and recovery interests) to be recovered from each beneficiary;

(c) a detailed description of the measures already taken and those planned to comply with this Decision;

(d) documents demonstrating that the beneficiaries have been ordered to repay the aid referred to in Article 1.

(2) Germany shall keep the Commission informed of the progress of the national measures taken to implement this Decision until recovery of the aid granted under the scheme referred to in Article 1 has been completed. Upon a simple request by the Commission, Germany shall immediately submit information on the measures already taken and those planned to comply with this Decision. It shall also provide detailed information concerning the amounts of aid and interest already recovered from the beneficiaries.

⁽¹¹⁶⁾ Council Regulation (EC) No 994/98 of 7 May 1998 on the application of Articles 92 and 93 of the Treaty establishing the European Community to certain categories of horizontal State aid (OJ L 142, 14.5.1998, p. 1).

⁽¹¹⁷⁾ Commission Regulation (EC) No 794/2004 of 21 April 2004 implementing Council Regulation (EU) 2015/1589 laying down detailed rules for the application of Article 108 of the Treaty on the Functioning of the European Union (OJ L 140, 30.4.2004, p. 1).

Article 6

This Decision is addressed to the Federal Republic of Germany.

Done at Brussels, 28 May 2018.

For the Commission
Margrethe VESTAGER
Member of the Commission

ACTS ADOPTED BY BODIES CREATED BY INTERNATIONAL AGREEMENTS

Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:

<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocsts.html>

Regulation No 48 of the Economic Commission for Europe of the United Nations (UNECE) — Uniform provisions concerning the approval of vehicles with regard to the installation of lighting and light-signalling devices [2019/57]

Incorporating all valid text up to:

Supplement 10 to the 06 series of amendments — Date of entry into force: 19 July 2018

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1. SCOPE

This Regulation applies to vehicles of categories M, N, and to their trailers (category O) ⁽¹⁾ with regard to the installation of lighting and light-signalling devices.

2. DEFINITIONS

For the purpose of this Regulation:

- 2.1. 'Approval of a vehicle' means the approval of a vehicle type with regard to the number and mode of installation of the lighting and light-signalling devices.
- 2.2. 'Vehicle type with regard to the installation of lighting and light-signalling devices' means vehicles which do not differ in the essential respects mentioned in paragraphs 2.2.1 to 2.2.4.

The following are likewise considered not to be 'vehicles of a different type': vehicles which differ within the meaning of paragraphs 2.2.1 to 2.2.4, but not in such a way as to entail a change in the kind, number, positioning and geometric visibility of the lamps and the inclination of the dipped-beam prescribed for the vehicle type in question, and vehicles on which optional lamps are fitted or are absent:
 - 2.2.1. The dimension and the external shape of the vehicle;
 - 2.2.2. The number and positioning of the devices;
 - 2.2.3. The headlamp-levelling system;
 - 2.2.4. The suspension system.
- 2.3. 'Transverse plane' means a vertical plane perpendicular to the median longitudinal plane of the vehicle.
- 2.4. 'Unladen vehicle' means a vehicle without driver, crew, passengers and load, but with a full supply of fuel, spare wheel and the tools normally carried.
- 2.5. 'Laden vehicle' means a vehicle loaded to its technically permissible maximum mass, as stated by the manufacturer, who shall also fix the distribution of this mass between the axles in accordance with the method described in Annex 5.
- 2.6. 'Device' means an element or an assembly of elements used to perform one or more functions.
 - 2.6.1. 'Lighting function' means the light emitted by a device to illuminate the road and objects in the direction of vehicle movement.
 - 2.6.2. 'Light-signalling function' means the light emitted or reflected by a device to give to other road users visual information on the presence, identification and/or the change of movement of the vehicle.

⁽¹⁾ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2 — www.uncece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

- 2.7. 'Lamp' means a device designed to illuminate the road or to emit a light signal to other road users. Rear registration plate lamps and retro-reflectors are likewise to be regarded as lamps. For the purpose of this Regulation, light-emitting rear registration plates and the service-door-lighting system according to the provisions of Regulation No 107 on vehicles of categories M₂ and M₃ are not considered as lamps.
- 2.7.1. Light source
- 2.7.1.1. 'Light source' means one or more elements for visible radiation, which may be assembled with one or more transparent envelopes and with a base for mechanical and electrical connection.
- 2.7.1.1.1. 'Replaceable light source' means a light source which is designed to be inserted in and removed from the holder of its device without tool.
- 2.7.1.1.2. 'Non-replaceable light source' means a light source which can only be replaced by replacement of the device to which this light source is fixed.
- (a) in case of a light source module: a light source which can only be replaced by replacement of the light source module to which this light source is fixed;
- (b) in case of adaptive front-lighting systems (AFS): a light source which can only be replaced by replacement of the lighting unit to which this light source is fixed.
- 2.7.1.1.3. 'Light source module' means an optical part of a device which is specific to that device. It contains one or more non-replaceable light sources and it may optionally contain one or more holders for approved replaceable light sources.
- 2.7.1.1.4. 'Filament light source' (filament lamp) means a light source where the element for visible radiation is one or more heated filaments producing thermal radiation.
- 2.7.1.1.5. 'Gas-discharge light source' means a light source where the element for visible radiation is a discharge arc producing electro-luminescence/fluorescence.
- 2.7.1.1.6. 'Light-emitting diode (LED) light source' means a light source where the element for visible radiation is one or more solid state junctions producing injection-luminescence/fluorescence.
- 2.7.1.1.7. 'LED module' means a light source module containing as light sources only LEDs. However it may optionally contain one or more holders for approved replaceable light sources.
- 2.7.1.2. 'Electronic light source control gear' means one or more components between supply and light source, whether or not integrated with the light source or the applied lamp, to control voltage and/or electrical current of the light source.
- 2.7.1.2.1. 'Ballast' means an electronic light source control gear between supply and light source, whether or not integrated with the light source or applied lamp, to stabilise the electrical current of a gas-discharge light source.
- 2.7.1.2.2. 'Ignitor' means an electronic light source control gear to start the arc of a gas-discharge light source.
- 2.7.1.3. 'Variable intensity control' means the device which automatically controls rear light signalling devices producing variable luminous intensities to assure the unvarying perception of their signals. The variable intensity control is part of the lamp, or part of the vehicle, or split between the said lamp and the vehicle.
- 2.7.2. 'Equivalent lamps' means lamps having the same function and authorized in the country in which the vehicle is registered; such lamps may have different characteristics from those installed on the vehicle when it is approved on condition that they satisfy the requirements of this Regulation.
- 2.7.3. 'Independent lamps' means devices having separate apparent surfaces in the direction of the reference axis ^(?), separate light sources and separate lamp bodies.
- 2.7.4. 'Grouped lamps' means devices having separate apparent surfaces in the direction of the reference axis ^(?) and separate light sources, but a common lamp body.
- 2.7.5. 'Combined lamps' means devices having separate apparent surfaces in the direction of the reference axis ^(?), but a common light source and a common lamp body.

^(?) In the case of lighting devices for the rear registration plate and direction-indicators of categories 5 and 6, the 'light-emitting surface' shall be used.

- 2.7.6. 'Reciprocally incorporated lamps' means devices having separate light sources or a single light source operating under different conditions (for example, optical, mechanical, electrical differences), totally or partially common apparent surfaces in the direction of the reference axis ⁽³⁾ and a common lamp body ⁽⁴⁾.
- 2.7.7. 'Single-function lamp' means a part of a device which performs a single lighting or light-signalling function.
- 2.7.8. 'Concealable lamp' means a lamp capable of being partly or completely hidden when not in use. This result may be achieved by means of a movable cover, by displacement of the lamp or by any other suitable means. The term 'retractable' is used more particularly to describe a concealable lamp the displacement of which enables it to be inserted within the bodywork.
- 2.7.9. 'Driving-beam (main-beam) headlamp' means the lamp used to illuminate the road over a long distance ahead of the vehicle.
- 2.7.10. 'Passing-beam (dipped-beam) headlamp' means the lamp used to illuminate the road ahead of the vehicle without causing undue dazzle or discomfort to oncoming drivers and other road-users.
- 2.7.10.1. 'Principal passing-beam (principal dipped-beam)' means the dipped-beam produced without the contribution of infrared (IR) emitter and/or additional light sources for bend lighting.
- 2.7.11. 'Direction-indicator lamp' means the lamp used to indicate to other road-users that the driver intends to change direction to the right or to the left.
- A direction-indicator lamp or lamps may also be used according to the provisions of Regulation No 97 or Regulation No 116.
- 2.7.12. 'Stop lamp' means a lamp used to indicate to other road users to the rear of the vehicle that the longitudinal movement of the vehicle is intentionally retarded.
- 2.7.13. 'Rear-registration plate illuminating device' means the device used to illuminate the space reserved for the rear registration plate; such a device may consist of several optical components.
- 2.7.14. 'Front position lamp' means the lamp used to indicate the presence and the width of the vehicle when viewed from the front.
- 2.7.15. 'Rear position lamp' means the lamp used to indicate the presence and width of the vehicle when viewed from the rear.
- 2.7.16. 'Retro-reflector' means a device used to indicate the presence of a vehicle by the reflection of light emanating from a light source not connected to the vehicle, the observer being situated near the source.
- For the purposes of this Regulation the following are not considered as retro-reflectors:
- 2.7.16.1. Retro-reflecting number plates;
- 2.7.16.2. The retro-reflecting signals mentioned in the ADR (European Agreement concerning the international carriage of dangerous goods by road);
- 2.7.16.3. Other retro-reflective plates and signals which shall be used to comply with national requirements for use as regards certain categories of vehicles or certain methods of operation;
- 2.7.16.4. Retro-reflecting materials approved as Class D or E or F according to UN Regulation No 104 and used for other purposes in compliance with national requirements.
- 2.7.17. 'Conspicuity marking' means a device intended to increase the conspicuity of a vehicle, when viewed from the side or rear (or in the case of trailers, additionally from the front), by the reflection of light emanating from a light source not connected to the vehicle, the observer being situated near the source.
- 2.7.17.1. 'Contour marking' means a conspicuity marking intended to indicate the horizontal and vertical dimensions (length, width and height) of a vehicle.
- 2.7.17.1.1. 'Full contour marking' means a contour marking that indicates the outline of the vehicle by a continuous line.

⁽³⁾ In the case of lighting devices for the rear registration plate and direction-indicators of categories 5 and 6, the 'light-emitting surface' shall be used.

⁽⁴⁾ Examples to enable a decision regarding reciprocal incorporation of lamps can be found in Annex 3, Part 7.

- 2.7.17.1.2. 'Partial contour marking' means a contour marking that indicates the horizontal dimension of the vehicle by a continuous line, and the vertical dimension by marking the upper corners.
- 2.7.17.2. 'Line marking' means a conspicuity marking intended to indicate the horizontal dimensions (length and width) of a vehicle by a continuous line.
- 2.7.18. 'Hazard warning signal' means the simultaneous operation of all of a vehicle's direction-indicator lamps to show that the vehicle temporarily constitutes a special danger to other road-users.
- 2.7.19. 'Front fog lamp' means a lamp used to improve the illumination of the road ahead of the vehicle in case of fog or any similar condition of reduced visibility.
- 2.7.20. 'Rear fog lamp' means a lamp used to make the vehicle more easily visible from the rear in dense fog.
- 2.7.21. 'Reversing lamp' means the lamp used to illuminate the road to the rear of the vehicle and to warn other road-users that the vehicle is reversing or about to reverse.
- 2.7.22. 'Parking lamp' means a lamp which is used to draw attention to the presence of a stationary vehicle in a built-up area. In such circumstances it replaces the front and rear position lamps.
- 2.7.23. 'End-outline marker lamp' means the lamp fitted near to the extreme outer edge and as close as possible to the top of the vehicle and intended to indicate clearly the vehicle's overall width. This lamp is intended, for certain vehicles and trailers, to complement the vehicle's front and rear position lamps by drawing particular attention to its bulk.
- 2.7.24. 'Side marker lamp' means a lamp used to indicate the presence of the vehicle when viewed from the side.
- 2.7.25. 'Daytime running lamp' means a lamp facing in a forward direction used to make the vehicle more easily visible when driving during daytime.
- 2.7.26. 'Cornering lamp' means a lamp used to provide supplementary illumination of that part of the road which is located near the forward corner of the vehicle at the side towards which the vehicle is going to turn.
- 2.7.27. 'Objective luminous flux' means:
- (a) in the case of a light source:
- The value of the objective luminous flux, not including any tolerances, as indicated in the relevant data sheet of the applicable light source Regulation according to which the light source is approved;
- (b) in the case of an LED module:
- The value of the objective luminous flux as indicated in the technical specification submitted with the LED module for approval of the lamp of which the LED module is a part;
- 2.7.28. 'Adaptive front lighting system' (or 'AFS') means a lighting device type-approved according to Regulation No 123, providing beams with differing characteristics for automatic adaptation to varying conditions of use of the dipped-beam (passing-beam) and, if it applies, the main-beam (driving-beam).
- 2.7.28.1. 'Lighting unit' means a light-emitting component designed to provide or contribute to one or more front lighting function(s) provided by the AFS.
- 2.7.28.2. 'Installation unit' means an indivisible housing (lamp body) which contains one or more lighting unit(s).
- 2.7.28.3. 'Lighting mode' or 'mode' means a state of a front lighting function provided by the AFS, as specified by the manufacturer and intended for adaptation to specific vehicle and ambient conditions.
- 2.7.28.4. 'System control' means that part(s) of the AFS receiving the AFS control signals from the vehicle and controlling the operation of the lighting units automatically.
- 2.7.28.5. 'AFS control signal' (V, E, W, T) means the input to the AFS in accordance with the paragraph 6.22.7.4 of this Regulation.
- 2.7.28.6. 'Neutral state' means the state of the AFS when a defined mode of the class C passing-beam ('basic passing-beam') or of the main beam in the maximum condition of activation, if any, is produced, and no AFS control signal applies.

- 2.7.28.7. 'Adaptive main-beam' means a main-beam of the AFS that adapts its beam pattern to the presence of oncoming and preceding vehicles in order to improve the long-range visibility for the driver without causing discomfort, distraction or glare to other road users.
- 2.7.29. 'Exterior courtesy lamp' means a lamp used to provide supplementary illumination to assist the entry and exit of the vehicle driver and passenger or in loading operations;
- 2.7.30. 'Interdependent lamp system' means an assembly of two or three interdependent lamps providing the same function.
- 2.7.30.1. 'Interdependent lamp marked "Y"' means a device operating as part of an interdependent lamp system. Interdependent lamps operate together when activated, have separate apparent surfaces in the direction of the reference axis and separate lamp bodies, and may have separate light source(s).
- 2.7.31. 'Manoeuvring lamp' means a lamp used to provide supplementary illumination to the side of the vehicle to assist during slow manoeuvres.
- 2.7.32. 'Lamps marked "D"' means independent lamps, approved as separate devices in such a way that they are allowed to be used either independently or in an assembly of two lamps to be considered as a 'single lamp'.
- 2.8. 'Light emitting surface' of a 'lighting device', 'light-signalling device' or a retro-reflector means the surface as declared in the request for approval by the manufacturer of the device on the drawing, see Annex 3 (see e.g. Parts 1, and 4).

This shall be declared according to one of the following conditions:

- (a) in the case where the outer lens is textured, the declared light emitting surface shall be all or part of the exterior surface of the outer lens;
- (b) in the case where the outer lens is non-textured the outer lens may be disregarded and the light emitting surface shall be as declared on the drawing, see Annex 3 (see e.g. Part 5).
- 2.8.1. 'Textured outer lens' or 'Textured outer lens area' means all or part of an outer lens, designed to modify or influence the propagation of light from the light source(s), such that the light rays are significantly diverted from their original direction.
- 2.9. 'Illuminating surface' (see Annex 3).
- 2.9.1. 'Illuminating surface of a lighting device' (paragraphs 2.7.9, 2.7.10, 2.7.19, 2.7.21 and 2.7.26) means the orthogonal projection of the full aperture of the reflector, or in the case of headlamps with an ellipsoidal reflector of the 'projection lens', on a transverse plane. If the lighting device has no reflector, the definition of paragraph 2.9.2 shall be applied. If the light emitting surface of the lamp extends over part only of the full aperture of the reflector, then the projection of that part only is taken into account.

In the case of a dipped-beam headlamp, the illuminating surface is limited by the apparent trace of the cut-off on to the lens. If the reflector and lens are adjustable relative to one another, the mean adjustment should be used.

In the case of AFS being installed: where a lighting function is produced by two or more simultaneously operated lighting units on a given side of the vehicle, the individual illuminating surfaces, taken together, constitute the illuminating surface to be considered (for example, in the figure of paragraph 6.22.4 below, the individual illuminating surfaces of the lighting units 8, 9 and 11, regarded together and taking into account their respective location, constitute the illuminating surface to be considered for the right-hand side of the vehicle).

- 2.9.2. 'Illuminating surface of a light-signalling device other than a retro-reflector' (paragraphs 2.7.11 to 2.7.15, 2.7.18, 2.7.20 and 2.7.22 to 2.7.25) means the orthogonal projection of the lamp in a plane perpendicular to its axis of reference and in contact with the exterior light-emitting surface of the lamp, this projection being bounded by the edges of screens situated in this plane, each allowing only 98 per cent of the total luminous intensity of the light to persist in the direction of the axis of reference.

To determine the lower, upper and lateral limits of the illuminating surface only screens with horizontal or vertical edges shall be used to verify the distance to the extreme edges of the vehicle and the height above the ground.

For other applications of the illuminating surface, e.g. distance between two lamps or functions, the shape of the periphery of this illuminating surface shall be used. The screens shall remain parallel, but other orientations are allowed to be used.

In the case of a light-signalling device whose illuminating surface encloses either totally or partially the illuminating surface of another function or encloses a non-lighted surface, the illuminating surface may be considered to be the light emitting surface itself (see e.g. Annex 3, Parts 2, 3, 5 and 6).

- 2.9.3. 'Illuminating surface of a retro-reflector' (paragraph 2.7.16) means, as declared by the applicant during the component approval procedure for the retro-reflectors, the orthogonal projection of a retro-reflector in a plane perpendicular to its axis of reference and delimited by planes contiguous to the declared outermost parts of the retro-reflectors' optical system and parallel to that axis. For the purposes of determining the lower, upper and lateral edges of the device, only horizontal and vertical planes shall be considered.
- 2.10. The 'apparent surface' for a defined direction of observation means, at the request of the manufacturer or his duly accredited representative, the orthogonal projection of:
- Either the boundary of the illuminating surface projected on the exterior surface of the lens;
- Or the light-emitting surface;
- Only in the case of a light-signalling device producing variable luminous intensities, its apparent surface that may be variable as specified in paragraph 2.7.1.3 shall be considered under all conditions permitted by the variable intensity control, if applicable.
- In a plane perpendicular to the direction of observation and tangential to the most exterior point of the lens. Different examples of the application of apparent surface can be found in Annex 3 to this Regulation.
- 2.11. 'Axis of reference' (or 'reference axis') means the characteristic axis of the lamp determined by the manufacturer (of the lamp) for use as the direction of reference ($H = 0^\circ$, $V = 0^\circ$) for angles of field for photometric measurements and for installing the lamp on the vehicle.
- 2.12. 'Centre of reference' means the intersection of the axis of reference with the exterior light-emitting surface; it is specified by the manufacturer of the lamp.
- 2.13. 'Angles of geometric visibility' means the angles which determine the field of the minimum solid angle in which the apparent surface of the lamp is visible. That field of the solid angle is determined by the segments of the sphere of which the centre coincides with the centre of reference of the lamp and the equator is parallel with the ground. These segments are determined in relation to the axis of reference. The horizontal angles β correspond to the longitude and the vertical angles α to the latitude.
- 2.14. 'Extreme outer edge' on either side of the vehicle, means the plane parallel to the median longitudinal plane of the vehicle and touching its lateral outer edge, disregarding the projection:
- 2.14.1. Of tyres near their point of contact with the ground, and of connections for tyre-pressure gauges;
- 2.14.2. Of any anti-skid devices mounted on the wheels;
- 2.14.3. Of devices for indirect vision;
- 2.14.4. Of side direction-indicator lamps, end-outline marker lamps, front and rear position lamps, parking lamps, retro-reflectors and side-marker lamps.
- 2.14.5. Of customs seals affixed to the vehicle, and of devices for securing and protecting such seals.
- 2.14.6. Of service-door lighting systems on vehicles of categories M_2 and M_3 as specified in paragraph 2.7.
- 2.15. 'Overall dimensions' means the distance between the two vertical planes defined in paragraph 2.14 above.
- 2.15.1. 'Overall width' means the distance between the two vertical planes defined in paragraph 2.14 above.
- 2.15.2. 'Overall length' means the distance between the two vertical planes perpendicular to the median longitudinal plane of the vehicle and touching its front and rear outer edge, disregarding the projection:
- (a) of devices for indirect vision;
- (b) of end-outline marker lamps;
- (c) of coupling devices, in the case of motor vehicles.

For trailers in the 'overall length' and in any measurement in length the drawbar shall be included, except when specifically excluded.

- 2.16. 'Single and multiple lamps'
- 2.16.1. 'A single lamp' means:
- (a) a device or part of a device having one lighting or light-signalling function, one or more light source(s) and one apparent surface in the direction of the reference axis, which may be a continuous surface or composed of two or more distinct parts; or
 - (b) any assembly of two lamps marked 'D', whether identical or not, having the same function; or
 - (c) any assembly of two independent retro-reflectors, whether identical or not, that have been approved separately; or
 - (d) any interdependent lamp system composed of two or three interdependent lamps marked 'Y' approved together and providing the same function.
- 2.16.2. 'Two lamps' or 'an even number of lamps' in the shape of a band or strip, means two lamps with a single light emitting surface, providing such a band or strip is placed symmetrically in relation to the median longitudinal plane of the vehicle.
- 2.17. 'Distance between two lamps' which face in the same direction means the shortest distance between the two apparent surfaces in the direction of the reference axis. Where the distance between the lamps clearly meets the requirements of the Regulation, the exact edges of apparent surfaces need not be determined.
- 2.18. 'Operating tell-tale' means a visual or auditory signal (or any equivalent signal) indicating that a device has been switched on and is operating correctly or not.
- 2.19. 'Closed-circuit tell-tale' means a visual (or any equivalent signal) indicating that a device has been switched on, but not indicating whether it is operating correctly or not.
- 2.20. 'Optional lamp' means a lamp, the installation of which is left to the discretion of the manufacturer.
- 2.21. 'Ground' means the surface on which the vehicle stands which should be substantially horizontal.
- 2.22. 'Movable components' of the vehicle mean those body panels or other vehicle parts the position(s) of which can be changed by tilting, rotating or sliding without the use of tools. They do not include tiltable driver cabs of trucks.
- 2.23. 'Normal position of use of a movable component' means the position(s) of a movable component specified by the vehicle manufacturer for the normal condition of use and the park condition of the vehicle.
- 2.24. 'Normal condition of use of a vehicle' means:
- 2.24.1. For a motor vehicle, when the vehicle is ready to move with its propulsion engine running and its movable components in the normal position(s) as defined in paragraph 2.23;
 - 2.24.2. And for a trailer, when the trailer is connected to a drawing motor vehicle in the conditions as prescribed in paragraph 2.24.1 and its movable components are in the normal position(s) as defined in paragraph 2.23.
- 2.25. 'Park condition of a vehicle' means:
- 2.25.1. For a motor vehicle, when the vehicle is at standstill and its propulsion engine is not running and its movable components are in the normal position(s) as defined in paragraph 2.23;
 - 2.25.2. And for a trailer, when the trailer is connected to a drawing motor vehicle in the condition as described in paragraph 2.25.1 and its movable components are in the normal position(s) as defined in paragraph 2.23.
- 2.26. 'Bend lighting' means a lighting function to provide enhanced illumination in bends.
- 2.27. 'Pair' means the set of lamps of the same function on the left- and right-hand side of the vehicle.
- 2.27.1. 'Matched pair' means the set of lamps of the same function on the left- and right-hand side of the vehicle, which, as a pair, complies with the photometric requirements.
- 2.28. 'Emergency stop signal' means a signal to indicate to other road users to the rear of the vehicle that a high retardation force has been applied to the vehicle relative to the prevailing road conditions.

2.29. Colour of the light emitted from a device

2.29.1. 'White' means the chromaticity coordinates (x,y) ^(§) of the light emitted that lie inside the chromaticity areas defined by the boundaries:

W ₁₂	green boundary	$y = 0,150 + 0,640 x$
W ₂₃	yellowish green boundary	$y = 0,440$
W ₃₄	yellow boundary	$x = 0,500$
W ₄₅	reddish purple boundary	$y = 0,382$
W ₅₆	purple boundary	$y = 0,050 + 0,750 x$
W ₆₁	blue boundary	$x = 0,310$

With intersection points:

	x	y
W ₁	0,310	0,348
W ₂	0,453	0,440
W ₃	0,500	0,440
W ₄	0,500	0,382
W ₅	0,443	0,382
W ₆	0,310	0,283

2.29.2. 'Selective-yellow' means the chromaticity coordinates (x,y) ^(§) of the light emitted that lie inside the chromaticity areas defined by the boundaries:

SY ₁₂	green boundary	$y = 1,290 x - 0,100$
SY ₂₃	the spectral locus	
SY ₃₄	red boundary	$y = 0,138 + 0,580 x$
SY ₄₅	yellowish white boundary	$y = 0,440$
SY ₅₁	white boundary	$y = 0,940 - x$

With intersection points:

	x	y
SY ₁	0,454	0,486
SY ₂	0,480	0,519
SY ₃	0,545	0,454
SY ₄	0,521	0,440
SY ₅	0,500	0,440

2.29.3. 'Amber' means the chromaticity coordinates (x,y) ^(§) of the light emitted that lie inside the chromaticity areas defined by the boundaries:

A ₁₂	green boundary	$y = x - 0,120$
A ₂₃	the spectral locus	
A ₃₄	red boundary	$y = 0,390$
A ₄₁	white boundary	$y = 0,790 - 0,670 x$

^(§) CIE Publication 15.2, 1986, Colorimetry, the CIE 1931 standard colorimetric observer.

With intersection points:

	x	y
A ₁	0,545	0,425
A ₂	0,560	0,440
A ₃	0,609	0,390
A ₄	0,597	0,390

2.29.4. 'Red' means the chromaticity coordinates (x,y) ⁽⁶⁾ of the light emitted that lie inside the chromaticity areas defined by the boundaries:

R ₁₂	yellow boundary	$y = 0,335$
R ₂₃	the spectral locus	
R ₃₄	the purple line	(its linear extension across the purple range of colours between the red and the blue extremities of the spectral locus).
R ₄₁	purple boundary:	$y = 0,980 - x$

With intersection points:

	x	y
R ₁	0,645	0,335
R ₂	0,665	0,335
R ₃	0,735	0,265
R ₄	0,721	0,259

2.30. Night-time colour of the light retro-reflected from a device excluding retro-reflective tires according to Regulation No 88

2.30.1. 'White' means the chromaticity coordinates (x,y) ⁽⁶⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

W ₁₂	blue boundary:	$y = 0,843 - 1,182 x$
W ₂₃	purple boundary	$y = 0,489 x + 0,146$
W ₃₄	yellow boundary	$y = 0,968 - 1,010 x$
W ₄₁	green boundary	$y = 1,442 x - 0,136$

With intersection points:

	x	y
W ₁	0,373	0,402
W ₂	0,417	0,350
W ₃	0,548	0,414
W ₄	0,450	0,513

2.30.2. 'Yellow' means the chromaticity coordinates (x,y) ⁽⁶⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

Y ₁₂	green boundary	$y = x - 0,040$
Y ₂₃	the spectral locus	
Y ₃₄	red boundary	$y = 0,200 x + 0,268$
Y ₄₁	white boundary	$y = 0,970 - x$

⁽⁶⁾ CIE Publication 15.2, 1986, Colorimetry, the CIE 1931 standard colorimetric observer.

With intersection points:

	x	y
Y_1	0,505	0,465
Y_2	0,520	0,480
Y_3	0,610	0,390
Y_4	0,585	0,385

2.30.3. 'Amber' means the chromaticity coordinates (x,y) ⁽⁷⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

A_{12}	green boundary	$y = 1,417 x - 0,347$
A_{23}	the spectral locus	
A_{34}	red boundary	$y = 0,390$
A_{41}	white boundary	$y = 0,790 - 0,670 x$

With intersection points:

	x	y
A_1	0,545	0,425
A_2	0,557	0,442
A_3	0,609	0,390
A_4	0,597	0,390

2.30.4. 'Red' means the chromaticity coordinates (x,y) ⁽⁷⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

R_{12}	yellow boundary	$y = 0,335$
R_{23}	the spectral locus	
R_{34}	the purple line	
R_{41}	purple boundary	$y = 0,978 - x$

With intersection points:

	x	y
R_1	0,643	0,335
R_2	0,665	0,335
R_3	0,735	0,265
R_4	0,720	0,258

2.31. Day-time colour of the light reflected from a device

2.31.1. 'White' means the chromaticity coordinates (x,y) ⁽⁷⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

W_{12}	purple boundary	$y = x - 0,030$
W_{23}	yellow boundary	$y = 0,740 - x$
W_{34}	green boundary	$y = x + 0,050$
W_{41}	blue boundary	$y = 0,570 - x$

⁽⁷⁾ CIE Publication 15.2, 1986, Colorimetry, the CIE 1931 standard colorimetric observer.

With intersection points:

	x	y
W_1	0,300	0,270
W_2	0,385	0,355
W_3	0,345	0,395
W_4	0,260	0,310

2.31.2. 'Yellow' means the chromaticity coordinates (x,y) ⁽⁸⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

Y_{12}	red boundary	$y = 0,534 x + 0,163$
Y_{23}	white boundary	$y = 0,910 - x$
Y_{34}	green boundary	$y = 1,342 x - 0,090$
Y_{41}	the spectral locus	

With intersection points:

	x	y
Y_1	0,545	0,454
Y_2	0,487	0,423
Y_3	0,427	0,483
Y_4	0,465	0,534

2.31.3. 'Red' means the chromaticity coordinates (x,y) ⁽⁸⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

R_{12}	red boundary	$y = 0,346 - 0,053 x$
R_{23}	purple boundary	$y = 0,910 - x$
R_{34}	yellow boundary	$y = 0,350$
R_{41}	the spectral locus	

With intersection points:

	x	y
R_1	0,690	0,310
R_2	0,595	0,315
R_3	0,560	0,350
R_4	0,650	0,350

2.32. Day-time colour of the fluorescent a device

2.32.1. 'Red' means the chromaticity coordinates (x,y) ⁽⁸⁾ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

FR_{12}	red boundary	$y = 0,346 - 0,053 x$
FR_{23}	purple boundary	$y = 0,910 - x$
FR_{34}	yellow boundary	$y = 0,315 + 0,047 x$
FR_{41}	the spectral locus	

⁽⁸⁾ CIE Publication 15.2, 1986, Colorimetry, the CIE 1931 standard colorimetric observer.

With intersection points:

	x	y
FR ₁	0,690	0,310
FR ₂	0,595	0,315
FR ₃	0,569	0,341
FR ₄	0,655	0,345

- 2.33. 'Rear-end collision alert signal (RECAS)' means an automatic signal given by the leading vehicle to the following vehicle. It warns that the following vehicle needs to take emergency action to avoid a collision.
- 2.34. 'Gonio(photo)meter system (if not otherwise specified in a particular Regulation)' means a system used for the photometric measurements specified by the angular coordinates in degrees on a sphere with a vertical polar axis according to CIE publication No 70, Vienna 1987, i.e. corresponding to a gonio(photo)meter system with a horizontal ('elevation') axis fixed to the ground and a second, moveable ('rotation') axis perpendicular to the fixed horizontal axis (see Annex 14 to this Regulation).
- Note:* The abovementioned CIE publication specifies a procedure to correct the angular coordinates in the case where an alternative gonio(photo)meter system is used.
- 2.35. 'H plane' means the horizontal plane containing the centre of reference of the lamp.
- 2.36. 'Sequential activation' means an electrical connection where the individual light sources of a lamp are wired such that they are activated in a predetermined sequence.

3. APPLICATION FOR APPROVAL

- 3.1. The application for approval of a vehicle type with regard to the installation of its lighting and light-signalling devices shall be submitted by the manufacturer or his duly accredited representative.
- 3.2. It shall be accompanied by the following documents and particulars in triplicate:
- 3.2.1. A description of the vehicle type with regard to the items mentioned in paragraphs 2.2.1 to 2.2.4 above, together with the restrictions on loading, particularly the maximum permissible load in the boot;
- 3.2.2. A list of the devices prescribed by the manufacturer for the lighting and light-signalling assembly. The list may include several types of device for each operation. Each type shall be duly identified (component, type-approval mark, name of manufacturer, etc.), in addition the list may include in respect of each function the additional annotation 'or equivalent devices';
- 3.2.3. A layout drawing of the lighting and light-signalling equipment as a whole, showing the position of the various devices on the vehicle;
- 3.2.4. If necessary, in order to verify the conformity to the prescriptions of the present Regulation, layout drawing(s) for each individual lamp showing the illuminating surface as defined in paragraph 2.9, the light-emitting surface as defined in paragraph 2.8, the axis of reference as defined in paragraph 2.11 and the centre of reference as defined in paragraph 2.12. This information is not necessary in the case of the rear registration plate lamp (paragraph 2.7.13);
- 3.2.5. The application shall include a statement of the method used for the definition of the apparent surface (see paragraph 2.10).
- 3.2.6. Where an AFS is fitted on the vehicle, the applicant shall submit a detailed description providing the following information:
- 3.2.6.1. The lighting functions and modes for which the AFS has been approved;
- 3.2.6.2. The related AFS control signals and their technical characteristics as defined according to Annex 10 to Regulation No 123;
- 3.2.6.3. The provisions being applied to adapt automatically the front lighting functions and modes according to paragraph 6.22.7.4 of this Regulation;
- 3.2.6.4. Special instruction, if any, for the inspection of the light sources and the visual observation of the beam;

- 3.2.6.5. The documents according to paragraph 6.22.9.2 of this Regulation;
- 3.2.6.6. The lamps that are grouped or combined with or reciprocally incorporated in the AFS;
- 3.2.6.7. Lighting units which are designed to comply with the requirements of paragraph 6.22.5 of this Regulation.
- 3.2.7. For vehicles of M and N categories a description of the electric power supply conditions for the devices indicated in paragraphs 2.7.9, 2.7.10, 2.7.12, 2.7.14 and 2.7.15 above, including, if applicable, information on a special power supply/electronic light source control gear, or variable intensity control.
- 3.3. An unladen vehicle fitted with a complete set of lighting and light-signalling equipment, as prescribed in paragraph 3.2.2 above, and representative of the vehicle type to be approved shall be submitted to the Technical Service responsible for conducting approval tests.
- 3.4. The document provided in Annex 1 to this Regulation shall be attached to the type-approval documentation.
4. APPROVAL
- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of the Regulation in respect of all the devices specified in the list, approval of that vehicle type shall be granted.
- 4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 06, corresponding to the 06 series of amendments) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign this number to another vehicle type or to the same vehicle type submitted with equipment not specified in the list referred to in paragraph 3.2.2 above, subject to the provisions of paragraph 7 of this Regulation.
- 4.3. Notice of approval or of extension or refusal of approval or production definitively discontinued of a vehicle type/part pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark consisting of:
- 4.4.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval⁽⁹⁾;
- 4.4.2. The number of this Regulation, followed by the letter 'R', a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1.
- 4.5. If the vehicle conforms to a vehicle type approved, under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1 need not be repeated, in such a case the Regulation and approval numbers and the additional symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.8. Annex 2 to this Regulation gives examples of arrangements of approval marks.
5. GENERAL SPECIFICATIONS
- 5.1. The lighting and light-signalling devices shall be so fitted that under normal conditions of use as defined in paragraphs 2.24, 2.24.1 and 2.24.2 and notwithstanding any vibrations to which they may be subjected, they retain the characteristics prescribed by this Regulation and enable the vehicle to comply with the requirements of this Regulation. In particular, it shall not be possible for the lamps to be inadvertently maladjusted.

⁽⁹⁾ The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev.3 — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

- 5.2. The illuminating lamps described in paragraphs 2.7.9, 2.7.10 and 2.7.19 shall be so installed that correct adjustment of their orientation can easily be carried out.
- 5.2.1. In the case of headlamps fitted with measures to prevent discomfort to other road-users in a country where traffic operates on the side of the road opposite to that of the country for which the headlamp was designed, such measures shall be achieved automatically or by the vehicle user with the vehicle in the park condition without the need for special tools (other than those provided with the vehicle ⁽¹⁰⁾). Detailed instructions shall be provided by the vehicle manufacturer with the vehicle.
- 5.3. For all light-signalling devices, including those mounted on the side panels, the reference axis of the lamp when fitted to the vehicle shall be parallel to the bearing plane of the vehicle on the road; in addition it shall be perpendicular to the median longitudinal plane of the vehicle in the case of side retro-reflectors and of side-marker lamps and parallel to that plane in the case of all other signalling devices. In each direction a tolerance of $\pm 3^\circ$ shall be allowed. In addition, any specific instructions as regards fitting laid down by the manufacturer shall be complied with.
- 5.4. In the absence of specific instructions, the height and orientation of the lamps shall be verified with the vehicle unladen and placed on a flat, horizontal surface, in the condition defined in paragraphs 2.24, 2.24.1 and 2.24.2 and, in the case where an AFS is installed, with the system in its neutral state.
- 5.5. In the absence of specific instructions lamps constituting a pair shall:
- 5.5.1. Be fitted to the vehicle symmetrically in relation to the median longitudinal plane (this estimate to be based on the exterior geometrical form of the lamp and not on the edge of its illuminating surface referred to in paragraph 2.9);
- 5.5.2. Be symmetrical to one another in relation to the median longitudinal plane, this requirement is not valid with regard to the interior structure of the lamp;
- 5.5.3. Satisfy the same colorimetric requirements and have substantially identical photometric characteristics. This shall not apply to a matched pair of Class F3 front fog lamps;
- 5.5.4. Have substantially identical photometric characteristics.
- 5.6. On vehicles whose external shape is asymmetrical the above requirements shall be satisfied so far as is possible.
- 5.7. Grouped, combined or reciprocally incorporated or single lamps
- 5.7.1. Lamps may be grouped, combined or reciprocally incorporated with one another provided that all requirements regarding colour, position, orientation, geometric visibility, electrical connections and other requirements, if any, are fulfilled.
- 5.7.1.1. The photometric and colorimetric requirements of a lamp shall be fulfilled when all other functions with which this lamp is grouped, combined or reciprocally incorporated are switched OFF.
- However, when a front or rear position lamp is reciprocally incorporated with one or more other function(s) which can be activated together with them, the requirements regarding colour of each of these other functions shall be fulfilled when the reciprocally incorporated function(s) and the front or rear position lamps are switched ON.
- 5.7.1.2. Stop lamps and direction-indicator lamps are not permitted to be reciprocally incorporated.
- 5.7.1.3. Where stop lamps and direction-indicator lamps are grouped, the following conditions shall be met:
- 5.7.1.3.1. Any horizontal or vertical straight line passing through the projections of the apparent surfaces of these functions on a plane perpendicular to the reference axis, shall not intersect more than two borderlines separating adjacent areas of different colour;
- 5.7.1.3.2. Their apparent surfaces in the direction of the reference axis, based upon the areas bounded by the outline of their light emitting surfaces, do not overlap.

⁽¹⁰⁾ This does not apply to dedicated objects that may be added to the exterior of the headlamp.

- 5.7.2. Single lamps
- 5.7.2.1. Single lamps as defined in paragraph 2.16.1(a), composed of two or more distinct parts, shall be installed in such a way that:
- (a) either the total area of the projection of the distinct parts on a plane tangent to the exterior surface of the outer lens and perpendicular to the reference axis shall occupy not less than 60 per cent of the smallest quadrilateral circumscribing the said projection; or
 - (b) the minimum distance between the facing edges of two adjacent/tangential distinct parts shall not exceed 75 mm when measured perpendicularly to the reference axis.
- These requirements shall not apply to a single retro-reflector.
- 5.7.2.2. Single lamps as defined in paragraph 2.16.1(b) or (c), composed of two lamps marked 'D' or two independent retro reflectors, shall be installed in such a way that:
- (a) either the projection of the apparent surfaces in the direction of the reference axis of the two lamps or retro reflectors occupies not less than 60 per cent of the smallest quadrilateral circumscribing the projections of the said apparent surfaces in the direction of the reference axis; or
 - (b) the minimum distance between the facing edges of the apparent surfaces in the direction of the reference axis of two lamps or two independent retro reflectors does not exceed 75 mm when measured perpendicularly to the reference axis.
- 5.7.2.3. Single lamps as defined in paragraph 2.16.1(d) shall fulfil the requirements of paragraph 5.7.2.1.
- Where two or more lamps and/or two or more separate apparent surfaces are included into the same lamp body and/or have a common outer lens these shall not be considered as an interdependent lamp system.
- However, a lamp in the shape of a band or strip may be part of an interdependent lamp system.
- 5.7.2.4. Two lamps or an even number of lamps in the shape of a band or strip shall be placed symmetrically in relation to the median longitudinal plane of the vehicle, extending on both sides to within at least 0,4 m of the extreme outer edge of the vehicle, and are not less than 0,8 m long; the illumination of such a surface shall be provided by not less than two light sources placed as close as possible to the ends; the light-emitting surface may be constituted by a number of juxtaposed elements on condition that these individual light-emitting surfaces, when projected on a transverse plane fulfil the requirements of paragraph 5.7.2.1.
- 5.8. The maximum height above the ground shall be measured from the highest point and the minimum height from the lowest point of the apparent surface in the direction of the reference axis.
- Where the (maximum and minimum) height above the ground clearly meets the requirements of the Regulation, the exact edges of any surface need not be determined.
- 5.8.1. For the purposes of reducing the geometric visibility angles, the position of a lamp with regard to height above the ground, shall be measured from the H plane.
- 5.8.2. In the case of dipped-beam headlamp, the minimum height in relation to the ground is measured from the lowest point of the effective outlet of the optical system (e.g. reflector, lens, projection lens) independent of its utilization.
- 5.8.3. The position, as regards width, will be determined from that edge of the apparent surface in the direction of the reference axis which is the furthest from the median longitudinal plane of the vehicle when referred to the overall width, and from the inner edges of the apparent surface in the direction of the reference axis when referred to the distance between lamps.
- Where the position, as regards width, clearly meets the requirements of the Regulation, the exact edges of any surface need not be determined.
- 5.9. In the absence of specific instructions, the photometric characteristics (e.g. intensity, colour, apparent surface, etc.) of a lamp shall not be intentionally varied during the period of activation of the lamp.
- 5.9.1. Direction-indicator lamps, the vehicle-hazard warning signal, amber side-marker lamps complying with paragraph 6.18.7 below, and the emergency stop signal shall be flashing lamps.

- 5.9.2. The photometric characteristics of any lamp may vary:
- (a) in relation to the ambient light;
 - (b) as a consequence of the activation of other lamps; or
 - (c) when the lamps is being used to provide another lighting function;
- provided that any variation in the photometric characteristics is in compliance with the technical provisions for the lamp concerned.
- 5.9.3. The photometric characteristics of a direction indicator lamp of categories 1, 1a, 1b, 2a or 2b may be varied during a flash by sequential activation of light sources as specified in paragraph 5.6 of Regulation No 6.
- This provision shall not apply when direction indicator lamps of categories 2a and 2b are operated as emergency stop signal according to paragraph 6.23.1 of this Regulation.
- 5.10. No red light which could give rise to confusion shall be emitted from a lamp as defined in paragraph 2.7 in a forward direction and no white light which could give rise to confusion, shall be emitted from a lamp as defined in paragraph 2.7 in a rearward direction. No account shall be taken of lighting devices fitted for the interior lighting of the vehicle. In case of doubt, this requirement shall be verified as follows:
- 5.10.1. For the visibility of red light towards the front of a vehicle, with the exception of a red rearmost side-marker lamp, there shall be no direct visibility of the apparent surface of a red lamp if viewed by an observer moving within Zone 1 as specified in Annex 4;
- 5.10.2. For the visibility of white light towards the rear, with the exception of reversing lamps and white side conspicuity markings fitted to the vehicle, there shall be no direct visibility of the apparent surface of a white lamp if viewed by an observer moving within Zone 2 in a transverse plane situated 25 m behind the vehicle (see Annex 4);
- 5.10.3. In their respective planes, the zones 1 and 2 explored by the eye of the observer are bounded:
- 5.10.3.1. In height, by two horizontal planes 1 m and 2,2 m respectively above the ground;
- 5.10.3.2. In width, by two vertical planes which, forming to the front and to the rear respectively an angle of 15° outwards from the vehicle's median longitudinal plane, pass through the point or points of contact of vertical planes parallel to the vehicle's median longitudinal plane delimiting the vehicle's overall width; if there are several points of contact, the foremost shall correspond to the forward plane and the rearmost to the rearward plane.
- 5.11. The electrical connections shall be such that the front and rear position lamps, the end-outline marker lamps, if they exist, the side-marker lamps, if they exist, and the rear registration plate lamp can only be switched ON and OFF simultaneously.
- 5.11.1. This condition does not apply:
- 5.11.1.1. When front and rear position lamps are switched ON, as well as side-marker lamps when combined or reciprocally incorporated with said lamps, as parking lamps; or
- 5.11.1.2. When side-marker lamps flash in conjunction with direction indicators; or
- 5.11.2. To front position lamps when their function is substituted under the provisions of paragraph 5.12.1 below.
- 5.11.3. In the case of an interdependent lamp system, all light sources shall be switched ON and OFF simultaneously.
- 5.12. The electrical connections shall be such that the main-beam and dipped-beam headlamps and the front fog lamps cannot be switched on unless the lamps referred to in paragraph 5.11 are also switched on. This requirement shall not apply, however, to main-beam or dipped-beam headlamps when their luminous warnings consist of the intermittent lighting up at short intervals of the main-beam headlamp or the intermittent lighting up at short intervals of the dipped-beam headlamp or the alternate lighting up at short intervals of the main-beam and dipped-beam headlamps.

- 5.12.1. The dipped-beam headlamps and/or the main-beam headlamps and/or the front fog lamps may substitute the function of the front position lamps, provided that:
- 5.12.1.1. Their electrical connections are such that in case of failure of any of these lighting devices the front position lamps are automatically re-activated; and
- 5.12.1.2. The substituting lamp/function meets, for the respective position lamp, the requirements concerning:
- (a) the geometric visibility prescribed for the front position lamps in 6.9.5; and
- (b) the minimum photometric values according to the angles of light distribution; and
- 5.12.1.3. Appropriate evidence demonstrating compliance with the requirements indicated in paragraph 5.12.1.2 above is provided in the test reports of the substituting lamp.
- 5.13. Tell-tale
- Where a closed-circuit tell-tale is prescribed by this Regulation it may be replaced by an 'operating' tell-tale.
- 5.14. Concealable lamps
- 5.14.1. The concealment of lamps shall be prohibited, with the exception of the main-beam headlamps, the dipped-beam headlamps and the front fog lamps, which may be concealed when they are not in use.
- 5.14.2. In the event of any failure affecting the operation of the concealment device(s) the lamps shall remain in the position of use, if already in use, or shall be capable of being moved into the position of use without the aid of tools.
- 5.14.3. It shall be possible to move the lamps into the position of use and to switch them on by means of a single control, without excluding the possibility of moving them into the position of use without switching them on. However, in the case of grouped main-beam and dipped-beam headlamps, the control referred to above is required only to activate the dipped-beam headlamps.
- 5.14.4. It shall not be possible deliberately, from the driver's seat, to stop the movement of switched-on lamps before they reach the position of use. If there is a danger of dazzling other road users by the movement of the lamps, they may light up only when they have reached their position of use.
- 5.14.5. When the concealment device has a temperature of $-30\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ the headlamps shall be capable of reaching the position of use within three seconds of initial operation of the control.
- 5.15. The colours of the light emitted by the lamps ⁽¹⁾ are the following:
- | | |
|----------------------------------|--|
| Main-beam headlamp: | White |
| Dipped-beam headlamp: | White |
| Front fog lamp: | White or selective yellow |
| Reversing lamp: | White |
| Direction-indicator lamp: | Amber |
| Hazard warning signal: | Amber |
| Stop lamp: | Red |
| Emergency stop signal: | Amber or red |
| Rear-end collision alert signal: | Amber |
| Rear registration plate lamp: | White |
| Front position lamp: | White |
| Rear position lamp: | Red |
| Front fog lamp | White or selective yellow |
| Rear fog lamp: | Red |
| Parking lamp: | White in front, red at the rear, amber if reciprocally incorporated in the side direction-indicator lamps or in the side-marker lamps. |

⁽¹⁾ Measurement of the chromaticity coordinates of the light emitted by the lamps is not part of this regulation.

Side-marker lamp:	Amber; however the rearmost side-marker lamp can be red if it is grouped or combined or reciprocally incorporated with the rear position lamp, the rear end-outline marker lamp, the rear fog lamp, the stop lamp or is grouped or has part of the light emitting surface in common with the rear retro-reflector.
End-outline marker lamp:	White in front, red at the rear
Daytime running lamp:	White
Rear retro-reflector, non-triangular:	Red
Rear retro-reflector, triangular:	Red
Front retro-reflector, non-triangular:	Identical to incident light ⁽¹²⁾
Side retro-reflector, non-triangular:	Amber; however the rearmost side retro-reflector can be red if it is grouped or has part of the light emitting surface in common with the rear position lamp, the rear end outline marker lamp, the rear fog lamp, the stop-lamp, the red rearmost side-marker lamp or the rear retro-reflector, non-triangular.
Cornering lamp:	White
Conspicuity marking:	White to the front; White or yellow to the side; Red or yellow to the rear ⁽¹³⁾ .
Adaptive front-lighting systems (AFS):	White
Exterior courtesy lamp:	White
Manoeuvring lamp:	White
5.16.	Number of lamps
5.16.1.	The number of lamps mounted on the vehicle shall be equal to the number indicated in the individual specifications of this Regulation.
5.17.	Any lamp may be installed on movable components provided that the conditions specified in paragraphs 5.18, 5.19 and 5.20 are fulfilled.
5.18.	Rear position lamps, rear direction-indicators and rear retro-reflectors, triangular as well as non-triangular, may be installed on movable components only:
5.18.1.	If at all fixed positions of the movable components the lamps on the movable components meet all the position, geometric visibility, colorimetric and photometric requirements for those lamps.
5.18.2.	In the case where the functions referred to in paragraph 5.18 are obtained by an assembly of two lamps marked 'D' (see paragraph 2.16.1), only one of the lamps needs to meet the position, geometric visibility and photometric requirements for those lamps at all fixed positions of the movable components; or
5.18.3.	Where additional lamps for the above functions are fitted and are activated, when the movable component is in any fixed open position, provided that these additional lamps satisfy all the position, geometric visibility and photometric requirements applicable to the lamps installed on the movable component.

⁽¹²⁾ Also known as white or colourless retro-reflector.

⁽¹³⁾ Nothing in this Regulation shall preclude the Contracting Parties applying this Regulation from allowing the use of white conspicuity markings to the rear in their territories.

5.18.4. In the case where the functions referred to in paragraph 5.18 are obtained by an interdependent lamp system either of the following conditions shall apply:

- (a) should the complete interdependent lamp system be mounted on the moving component(s), the requirements of paragraph 5.18.1 shall be satisfied. However, additional lamps for the above functions may be activated, when the movable component is in any fixed open position, provided that these additional lamps satisfy all the position, geometric visibility, colorimetric and photometric requirements applicable to the lamps installed on the movable component; or
- (b) should the interdependent lamp system be partly mounted on the fixed component and partly mounted on a movable component, with the exception of direction indicator lamps, the interdependent lamp(s) specified by the Applicant during the device approval procedure shall meet all the position, outwards geometric visibility, colorimetric and photometric requirements for those lamps, at all fixed positions of the movable component(s).

The inwards geometric visibility requirement(s) is(are) deemed to be satisfied if this(these) interdependent lamp(s) still conform(s) to the photometric values prescribed in the field of light distribution for the approval of the device, at all fixed positions of the movable component(s).

For direction indicator lamps, the interdependent lamp(s) specified by the Applicant during the device approval procedure shall meet all the position, geometric visibility, photometric and colorimetric requirements at all fixed positions of the movable component(s). This does not apply where, to fulfil or complete the geometric visibility angle, additional lamps are activated when the movable component is in any fixed open position, provided that these additional lamps satisfy all the position, photometric and colorimetric requirements applicable to the direction indicator lamps installed on the movable component.

5.19. When the movable components are in a position other than a 'normal position of use', the devices installed on them shall not cause undue discomfort to road users.

5.20. When a lamp is installed on a movable component and the movable component is in the 'normal position(s) of use', the lamp shall always return to the position(s) specified by the manufacturer in accordance with this Regulation. In the case of dipped-beam headlamps and front fog lamps, this requirement shall be considered satisfied if, when the movable components are moved and returned to the normal position 10 times, no value of the angular inclination of these lamps, relative to its support, measured after each operation of the movable component, differs by more than 0,15 per cent from the average of the 10 measured values. If this value is exceeded each limit specified in paragraph 6.2.6.1.1 shall then be modified by this excess to decrease the allowed range of inclinations when checking the vehicle according to Annex 6.

5.21. The apparent surface in the direction of the reference axis of front and rear position lamps, front and rear direction-indicator lamps and retro-reflectors shall not be hidden more than 50 per cent by any movable component, with or without a light-signalling device installed on it, in any fixed position different from the 'normal position of use'.

Fixed position of a movable component means the stable or natural rest position(s) of the movable component specified by the vehicle manufacturer, whether locked or not.

If the above requirement is not practicable:

5.21.1. Additional lamps satisfying all the position, geometric visibility, colorimetric and photometric requirements for the above indicated lamps shall be activated when the apparent surface in the direction of the reference axis of these lamps is more than 50 per cent hidden by the movable component; or

5.21.2. A remark in the communication form (item 10.1 of Annex 1) shall inform other Administrations that more than 50 per cent of the apparent surface in the direction of the reference axis can be hidden by the movable components; and

A notice in the vehicle shall inform the user that in certain position(s) of the movable components other road users shall be warned of the presence of the vehicle on the road; for example by means of a warning triangle or other devices according to national requirements for use on the road.

5.21.3. Paragraph 5.21.2 does not apply to retro-reflectors.

- 5.22. With the exception of retro-reflectors, a lamp even bearing an approval mark is deemed not to be present when it cannot be made to operate by the sole installation of a light source and/or a fuse.
- 5.23. Lamps approved with light source(s) according to Regulation No 37, except when such light sources are used as non-replaceable light source(s) as defined in paragraph 2.7.1.1.2 of this Regulation, shall be fitted in a vehicle in such a way that the light source can be correctly replaced without the need for expert assistance and without the need for special tools, other than those provided with the vehicle by the manufacturer. The vehicle manufacturer shall provide with the vehicle a detailed description of the procedure for replacement.
- 5.23.1. In the case where a light source module includes a holder for an approved replaceable light source according to Regulation No 37, this light source shall be replaceable as required in paragraph 5.23 above.
- 5.24. Any temporary fail-safe replacement of the light-signalling function of a rear position lamp is allowed, provided that the replacement function in case of a failure is similar in colour, main intensity and position to the function that has ceased to operate and provided that the replacement device remains operational in its original safety function. During replacement, a tell-tale on the dashboard (paragraph 2.18 of this Regulation) shall indicate occurrence of a temporary replacement and need for repair.
- 5.25. Where an AFS is fitted, it shall be considered equivalent to a pair of dipped-beam headlamps and, if it provides main-beam function(s), it shall be considered equivalent to a pair of main-beam headlamps.
- 5.26. Rear direction-indicator lamps, rear position lamps, stop lamps (except stop lamps of category S4) and rear fog lamps with variable luminous intensity control are allowed, which respond simultaneously to at least one of the following external influences: ambient lighting, fog, snowfall, rain, spray, dust clouds, contamination of the light emitting surface, provided that their prescribed intensity relationship is maintained throughout variation transitions. No sharp variation of intensity shall be observed during transition. Stop lamps of category S4 may produce variable luminous intensity independent from the other lamps. It may be possible for the driver to set the functions above to luminous intensities corresponding to their steady category and to return them to their automatic variable category.
- 5.27. For vehicles of M and N categories, the applicant shall demonstrate to the Technical Service responsible for type approval testing that the electric power supply conditions for the devices indicated in paragraphs 2.7.9, 2.7.10, 2.7.12, 2.7.14 and 2.7.15 above comply, when the electrical system of the vehicle is in a constant voltage operating condition, representative for the relevant category of powered vehicle as specified by the applicant, with the following provisions:
- 5.27.1. The voltage supplied at the terminals of devices which, according to their type approval documentation, have been tested by the application of a special power supply/electronic light source control gear, or in a secondary operating mode or at a voltage requested by the applicant, shall not exceed the voltage specified for the relevant devices or functions as they have been approved.
- 5.27.2. In all cases of electric power supply conditions not covered by paragraph 5.27.1, the voltage at the terminals of the device(s) or function(s) shall not exceed 6,75 V (6 Volt-Systems), 13,5 V (12 Volt-Systems) or 28 V (24 Volt-Systems) by more than 3 per cent. The means of controlling the maximum voltage at the terminals of the device may, for convenience, be located within the body of the device.
- 5.27.3. The provisions of paragraphs 5.27.1 and 5.27.2 shall not apply to devices which include an electronic light source control gear or a variable intensity control being part of the device.
- 5.27.4. A report shall be attached to the approval documentation describing the methods used to demonstrate compliance and the results obtained.
- 5.28. General provisions relating to geometric visibility
- 5.28.1. There shall be no obstacle on the inside of the angles of geometric visibility to the propagation of light from any part of the apparent surface of the lamp observed from infinity. However, no account is taken of obstacles, if they were already presented when the lamp was type-approved.
- 5.28.2. If measurements are taken closer to the lamp, the direction of observation shall be shifted parallel to achieve the same accuracy.

- 5.28.3. If, when the lamp is installed, any part of the apparent surface of the lamp is hidden by any further parts of the vehicle, proof shall be furnished that the part of the lamp not hidden by obstacles still conforms to the photometric values prescribed for the approval of the device.
- 5.28.4. When the vertical angle of geometric visibility below the horizontal may be reduced to 5° (lamp at less than 750 mm above the ground measured according to the provisions of paragraph 5.8.1 above) the photometric field of measurements of the installed optical unit may be reduced to 5° below the horizontal.
- 5.28.5. In the case of an interdependent lamp system the geometric visibility requirements shall be fulfilled when all its interdependent lamps are operated together.
- 5.29. A LED module does not need to be replaceable, if so stated in the communication sheet of the component type approval.
- 5.30. All lamps (devices) shall, where applicable, be type approved according to the corresponding device UN Regulations as specified in the relevant subparagraphs of paragraph 6 of this Regulation when installed on a vehicle.
- 5.31. Lamps installed on a vehicle which is approved according to this Regulation and approved for one or more replaceable light source categories according to UN Regulations Nos 37, 99 or 128, shall be fitted with light sources approved according to these light source categories only.
- This requirement does not concern light source modules, LED modules and non-replaceable light sources, except for when they are required to be approved by the applicable UN Regulation.
6. INDIVIDUAL SPECIFICATIONS
- 6.1. Main-beam headlamp (Regulations Nos 98 and 112)
- 6.1.1. Presence
- Mandatory on motor vehicles. Prohibited on trailers.
- 6.1.2. Number
- Two or four, type approved according to Regulations Nos 98 or 112, excluding Class A headlamp.
- For vehicles of the category N₃: Two extra main-beam headlamps may be installed.
- Where a vehicle is fitted with four concealable headlamps the installation of two additional headlamps shall only be authorized for the purpose of light-signalling, consisting of intermittent illumination, at short intervals (see paragraph 5.12 above) in daylight.
- 6.1.3. Arrangement
- No individual specifications.
- 6.1.4. Position
- 6.1.4.1. In width: No individual specifications.
- 6.1.4.2. In height: No individual specifications.
- 6.1.4.3. In length: At the front of the vehicle. This requirement shall be deemed to be satisfied if the light emitted does not cause discomfort to the driver either directly or indirectly through the devices for indirect vision and/or other reflecting surfaces of the vehicle.
- 6.1.5. Geometric visibility
- The visibility of the illuminating surface, including its visibility in areas which do not appear to be illuminated in the direction of observation considered, shall be ensured within a divergent space defined by generating lines based on the perimeter of the illuminating surface and forming an angle of not less than 5° with the axis of reference of the headlamp. The origin of the angles of geometric visibility is the perimeter of the projection of the illuminating surface on a transverse plane tangent to the foremost part of the lens of the headlamp.

- 6.1.6. Orientation
- Towards the front.
- Not more than one main-beam headlamp on each side of the vehicle may swivel to produce bend lighting.
- 6.1.7. Electrical connections
- 6.1.7.1. Except when they are used to give intermittent luminous warnings at short intervals the main-beam headlamps may be switched ON, only when the master light switch is in headlamps ON position or in 'AUTO' (automatic) position and the conditions for automatic activation of dipped-beam exist. In the latter case, the main beam headlamps shall be switched off automatically when the conditions for automatic activation of dipped-beam ceased to exist.
- 6.1.7.2. The control of the main-beam headlamps may be automatic regarding their activation and deactivation, the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:
- (a) ambient lighting conditions;
 - (b) the light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;
 - (c) the light emitted by the rear light-signalling devices of preceding vehicles.
- Additional sensor functions to improve performance are allowed.
- For the purpose of this paragraph, 'vehicles' means vehicles of categories L, M, N, O, T, as well as bicycles, such vehicles being equipped with retro-reflectors, with lighting and light-signalling devices, which are switched ON.
- 6.1.7.3. It shall always be possible to switch the main-beam headlamps ON and OFF manually and to manually switch OFF the automatic control of the main-beam headlamps.
- Moreover, the switching OFF, of the main-beam headlamps and of their automatic control, shall be by means of a simple and immediate manual operation; the use of sub-menus is not allowed.
- 6.1.7.4. The main-beam headlamps may be switched on either simultaneously or in pairs. In case the extra two main-beam headlamps are installed, as permitted under paragraph 6.1.2 for vehicles of the category N₃, only, no more than two pairs may be simultaneously lit. For changing over from the dipped to the main beam at least one pair of main-beam headlamps shall be switched on. For changing over from the main-beam to the dipped-beam all main-beam headlamps shall be switched off simultaneously.
- 6.1.7.5. The dipped-beams may remain switched on at the same time as the main beams.
- 6.1.7.6. Where four concealable headlamps are fitted their raised position shall prevent the simultaneous operation of any additional headlamps fitted, if these are intended to provide light signals consisting of intermittent illumination at short intervals (paragraph 5.12) in daylight.
- 6.1.8. Tell-tale
- Circuit-closed tell-tale mandatory.
- 6.1.8.1. If the control of the main-beam headlamps is automatic as described in paragraph 6.1.7.1 above an indication shall be provided to the driver that the automatic control of the main-beam function is activated. This information shall remain displayed as long as the automatic operation is activated.
- 6.1.9. Other requirements
- 6.1.9.1. The aggregate maximum intensity of the main-beam headlamps which can be switched on simultaneously shall not exceed 430 000 cd, which corresponds to a reference value of 100.
- 6.1.9.2. This maximum intensity shall be obtained by adding together the individual reference marks which are indicated on the several headlamps. The reference mark '10' shall be given to each of the headlamps marked 'R' or 'CR'.

6.1.9.3. Automatic activation and deactivation of the main-beam headlamps:

6.1.9.3.1. The sensor system used to control the automatic activation and deactivation of the main-beam headlamps, as described in paragraph 6.1.7.1, shall comply with the following requirements:

6.1.9.3.1.1. The boundaries of the minimum fields in which the sensor is able to detect light emitted from other vehicles defined in paragraph 6.1.7.1 above are defined by the angles indicated below.

6.1.9.3.1.1.1. Horizontal angles: 15° to the left and 15° to the right.

Vertical angles:

Upward angle	5°		
Mounting height of the sensor (centre of sensor aperture above the ground)	Less than 2 m	Between 1,5 m and 2,5 m	Greater than 2,0 m
Downward angle	2°	2° to 5°	5°

These angles are measured from the centre of the sensor aperture relative to a horizontal straight line through its centre and parallel to the longitudinal median plane of the vehicle.

6.1.9.3.1.2. The sensor system shall be able to detect on a straight level road:

- (a) an oncoming power-driven vehicle at a distance extending to at least 400 m;
- (b) a preceding power-driven vehicle or a vehicle-trailer combination at a distance extending to at least 100 m;
- (c) an oncoming bicycle at a distance extending to at least 75 m, its illumination represented by a white lamp with a luminous intensity of 150 cd with a light emitting area of $10 \text{ cm}^2 \pm 3 \text{ cm}^2$ and a height above a ground of 0,8 m.

To verify compliance with (a) and (b) above, the oncoming and preceding power-driven vehicle (or vehicle-trailer combination) shall have position lamps (if applicable) and dipped-beam headlamps switched ON.

6.1.9.3.2. The transition from main-beam to dipped-beam and vice versa according to the conditions indicated in paragraph 6.1.7.1 above may be performed automatically and shall not cause discomfort, distraction or glare.

6.1.9.3.3. The overall performance of the automatic control shall be verified by:

6.1.9.3.3.1. Means of simulation or other means of verification accepted by the Type Approval Authority, as provided by the applicant.

6.1.9.3.3.2. A test drive according to paragraph 1 in Annex 12. The performance of the automatic control shall be documented and checked against the applicant's description. Any obvious malfunctioning shall be contested (e.g. excessive angular movement or flicker).

6.1.9.3.4. The control of the main-beam headlamps may be such that the main-beam headlamps are switched ON automatically only when:

- (a) no vehicles, as mentioned in paragraph 6.1.7.1 above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.1 and 6.1.9.3.1.2; and
- (b) the detected ambient lighting levels are as prescribed in paragraph 6.1.9.3.5 below.

6.1.9.3.5. In the case where main-beam headlamps are switched ON automatically, they shall be switched OFF automatically when oncoming or preceding vehicles, as mentioned in paragraph 6.1.7.1 above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.1 and 6.1.9.3.1.2

Moreover, they shall be switched OFF automatically when the illuminance produced by ambient lighting conditions exceeds 7 000 lx.

Compliance with with this requirement shall be demonstrated by the applicant, using simulation or other means of verification accepted by the Type Approval Authority. If necessary the illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the Type Approval Authority.

6.2. Dipped-beam headlamp (Regulations Nos 98 and 112)

6.2.1. Presence

Mandatory on motor vehicles. Prohibited on trailers.

6.2.2. Number

Two, type approved according to Regulations Nos 98 or 112, excluding Class A headlamp.

6.2.3. Arrangement

No special requirement.

6.2.4. Position

6.2.4.1. In width: that edge of the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane shall be not more than 400 mm from the extreme outer edge of the vehicle.

The inner edges of the apparent surfaces in the direction of the reference axes shall be not less than 600 mm apart. This does not apply, however, for M₁ and N₁ category vehicles; for all other categories of motor vehicles this distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.

6.2.4.2. In height: not less than 500 mm and not more than 1 200 mm above the ground. For category N₃G (off-road) vehicles ⁽¹⁴⁾ the maximum height may be increased to 1 500 mm.

6.2.4.3. In length: at the front of the vehicle. This requirement shall be deemed to be satisfied if the light emitted does not cause discomfort to the driver either directly, or indirectly through the devices for indirect vision and/or other reflecting surfaces of the vehicle.

6.2.5. Geometric visibility

Defined by angles α and β as specified in paragraph 2.13:

α = 15° upwards and 10° downwards,

β = 45° outwards and 10° inwards.

The presence of partitions or other items of equipment near the headlamp shall not give rise to secondary effects causing discomfort to other road users.

6.2.6. Orientation

Towards the front

6.2.6.1. Vertical orientation

6.2.6.1.1. The initial downward inclination of the cut-off of the dipped-beam to be set in the unladen vehicle state with one person in the driver's seat shall be specified within an accuracy of 0,1 per cent by the manufacturer and indicated in a clearly legible and indelible manner on each vehicle close to either headlamp or the manufacturer's plate by the symbol shown in Annex 7.

The value of this indicated downward inclination shall be defined in accordance with paragraph 6.2.6.1.2.

⁽¹⁴⁾ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2 — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

6.2.6.1.2. Depending on the mounting height in metres (h) of the lower edge of the apparent surface in the direction of the reference axis of the dipped-beam headlamp, measured on the unladen vehicles, the vertical inclination of the cut-off of the dipped-beam shall, under all the static conditions of Annex 5, remain between the following limits and the initial aiming shall have the following values:

$h < 0,8$

Limits: between $-0,5$ per cent and $-2,5$ per cent

Initial aiming: between $-1,0$ per cent and $-1,5$ per cent

$0,8 < h < 1,0$

Limits: between $-0,5$ per cent and $-2,5$ per cent

Initial aiming: between $-1,0$ per cent and $-1,5$ per cent

Or, at the discretion of the manufacturer,

Limits: between $-1,0$ per cent and $-3,0$ per cent

Initial aiming: between $-1,5$ per cent and $-2,0$ per cent

The application for the vehicle type-approval shall, in this case, contain information as to which of the two alternatives is to be used,

$h > 1,0$

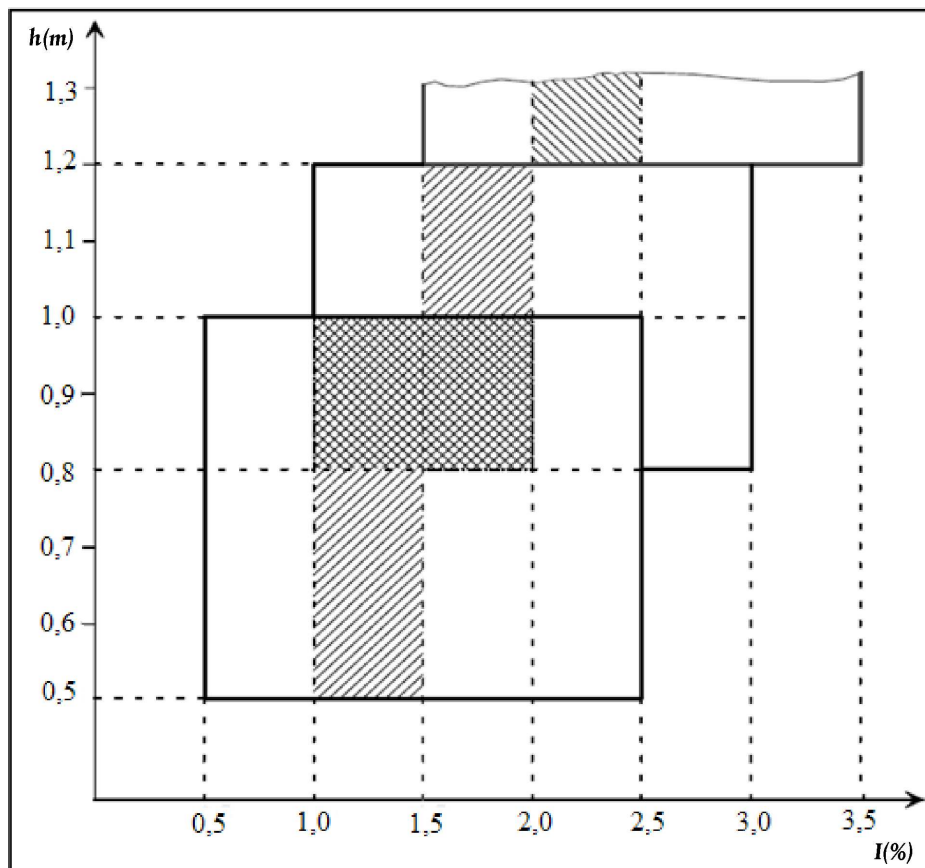
Limits: between $-1,0$ per cent and $-3,0$ per cent

Initial aiming: between $-1,5$ per cent and $-2,0$ per cent

The above limits and the initial aiming values are summarized in the diagram below.

For category N₃G (off-road) vehicles where the headlamps exceed a height of 1 200 mm, the limits for the vertical inclination of the cut-off shall be between: $-1,5$ per cent and $-3,5$ per cent.

The initial aim shall be set between: -2 per cent and $-2,5$ per cent.



6.2.6.2. Headlamp levelling device

6.2.6.2.1. In the case where a headlamp levelling device is necessary to satisfy the requirements of paragraphs 6.2.6.1.1 and 6.2.6.1.2, the device shall be automatic.

6.2.6.2.2. However, devices which are adjusted manually, either continuously or non-continuously, shall be permitted, provided they have a stop position at which the lamps can be returned to the initial inclination defined in paragraph 6.2.6.1.1 by means of the usual adjusting screws or similar means.

These manually adjustable devices shall be operable from the driver's seat.

Continually adjustable devices shall have reference marks indicating the loading conditions that require adjustment of the dipped-beam.

The number of positions on devices which are not continuously adjustable shall be such as to ensure compliance with the range of values prescribed in paragraph 6.2.6.1.2 in all the loading conditions defined in Annex 5.

For these devices also, the loading conditions of Annex 5 that require adjustment of the dipped-beam shall be clearly marked near the control of the device (Annex 8).

6.2.6.2.3. In the event of a failure of devices described in paragraphs 6.2.6.2.1 and 6.2.6.2.2, the dipped-beam shall not assume a position in which the dip is less than it was at the time when the failure of the device occurred.

6.2.6.3. Measuring procedure

6.2.6.3.1. After adjustment of the initial inclination, the vertical inclination of the dipped-beam, expressed in per cent, shall be measured in static conditions under all the loading conditions defined in Annex 5.

6.2.6.3.2. The measurement of the variation of dipped-beam inclination as a function of load shall be carried out in accordance with the test procedure set out in Annex 6.

6.2.6.4. Horizontal orientation

The horizontal orientation of one or both dipped-beam headlamps may be varied to produce bend lighting, provided that if the whole beam or the kink of the elbow of the cut-off is moved, the kink of the elbow of the cut-off shall not intersect the line of the trajectory of the centre of gravity of the vehicle at distances from the front of the vehicle which are larger than 100 times the mounting height of the respective dipped-beam headlamps.

6.2.7. Electrical connections

6.2.7.1. The control for changing over to the dipped-beam shall switch off all main-beam headlamps simultaneously.

6.2.7.2. The dipped-beam may remain switched on at the same time as the main beams.

6.2.7.3. In the case of dipped-beam headlamps according to Regulation No 98, the gas-discharge light sources shall remain switched on during the main-beam operation.

6.2.7.4. One additional light source or one or more LED module(s), located inside the dipped-beam headlamps or in a lamp (except the main-beam headlamp) grouped or reciprocally incorporated with the respective dipped-beam headlamps, may be activated to produce bend lighting, provided that the horizontal radius of curvature of the trajectory of the centre of gravity of the vehicle is 500 m or less. This may be demonstrated by the manufacturer by calculation or by other means accepted by the Type Approval Authority.

6.2.7.5. Dipped-beam headlamps may be switched ON or OFF automatically. However, it shall be always possible to switch these dipped-beam headlamps ON and OFF manually.

6.2.7.6. The dipped-beam headlamps shall be switched ON and OFF automatically relative to the ambient light conditions (e.g. switch ON during night-time driving conditions, tunnels, etc.) according to the requirements of Annex 13.

6.2.7.7. Without prejudice to paragraph 6.2.7.6.1, the dipped-beam headlamps may switch ON and OFF automatically relative to other factors such as time or ambient conditions (e.g. time of the day, vehicle location, rain, fog, etc.)

6.2.8. Tell-tale

6.2.8.1. Tell-tale optional

6.2.8.2. A visual tell-tale whether flashing or not is mandatory:

- (a) in the case where the whole beam or the kink of the elbow of the cut-off is moved to produce bend lighting; or
- (b) if one or more LED modules are used to produce the principal dipped-beam, except when they are wired so that the failure of any one LED module causes all of them to stop emitting light.

It shall be activated:

- (a) in the event of a malfunction of the displacement of the kink of the elbow of the cut-off; or
- (b) in case of a failure of any one of the LED module(s) producing the principal dipped-beam, except when they are wired so that the failure of any one LED module causes all of them to stop emitting light.

It shall remain activated while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the device, which starts and stops the engine, is switched on and off.

6.2.9. Other requirements

The requirements of paragraph 5.5.2 shall not apply to dipped-beam headlamps.

Dipped-beam headlamps with a light source or LED module(s) producing the principal dipped beam and having a total objective luminous flux which exceeds 2 000 lumens shall only be installed in conjunction with the installation of headlamp cleaning device(s) according to Regulation No 45 ⁽¹⁵⁾.

With respect to vertical inclination the provisions of paragraph 6.2.6.2.2 above shall not be applied for dipped-beam headlamps with a light source or LED module(s) producing the principal dipped beam and having an objective luminous flux which exceeds 2 000 lumens.

In the case of filament lamps for which more than one test voltage is specified, the objective luminous flux which produces the principal dipped beam, as indicated in the communication form for the type approval of the device, is applied.

In the case of dipped-beam headlamps equipped with an approved light source, the applicable objective luminous flux is the value at the relevant test voltage as given in the relevant data sheet in the Regulation, according to which the applied light source was approved, without taking into account the tolerances to the objective luminous flux specified on this datasheet.

Only dipped-beam headlamps according to Regulation Nos 98 or 112 may be used to produce bend lighting.

If bend lighting is produced by a horizontal movement of the whole beam or the kink of the elbow of the cut-off, it shall be activated only if the vehicle is in forward motion; this shall not apply if bend lighting is produced for a right turn in right-hand traffic (left turn in left-hand traffic).

6.3. Front fog lamp (Regulation No 19)

6.3.1. Presence

Optional on motor vehicles. Prohibited on trailers.

6.3.2. Number

Two; complying with the requirements of the 03 and subsequent series of amendments to Regulation No 19.

6.3.3. Arrangement

No special requirement.

⁽¹⁵⁾ Contracting Parties to the respective regulations can still prohibit the use of mechanical cleaning systems when headlamps with plastic lenses, marked 'PL', are installed.

- 6.3.4. Position
- 6.3.4.1. In width: that point on the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle.
- 6.3.4.2. In height:
- Minimum: Not less than 250 mm above the ground.
- Maximum: For M₁ and N₁ category vehicles: not more than 800 mm above the ground.
- For all other categories except N₃G (off-road) ⁽¹⁶⁾ vehicles: not more than 1 200 mm above the ground.
- For category N₃G vehicles: the maximum height may be increased to 1 500 mm.
- No point on the apparent surface in the direction of the reference axis shall be higher than the highest point on the apparent surface in the direction of the reference axis of the dipped-beam headlamp.
- 6.3.4.3. In length: at the front of the vehicle. This requirement shall be deemed to be satisfied if the light emitted does not cause discomfort to the driver either directly, or indirectly through the devices for indirect vision and/or other reflecting surfaces of the vehicle.
- 6.3.5. Geometric visibility
- Defined by angles α and β as specified in paragraph 2.13:
- $\alpha = 5^\circ$ upwards and downwards,
- $\beta = 45^\circ$ outwards and 10° inwards.
- The presence of partitions or other items of equipment near the front fog lamp shall not give rise to secondary effects causing discomfort to other road users ⁽¹⁷⁾.
- 6.3.6. Orientation
- Toward the front.
- 6.3.6.1. Vertical orientation
- 6.3.6.1.1. In the case of class 'B' front fog lamps the vertical inclination of the cut-off to be set in the unladen vehicle state with one person in the driver's seat shall be – 1,5 per cent or lower ⁽¹⁷⁾.
- 6.3.6.1.2. In the case of class 'F3' front fog lamps:
- 6.3.6.1.2.1. When the total objective luminous flux of the light source does not exceed 2 000 lumens:
- 6.3.6.1.2.1.1. The vertical inclination of the cut-off to be set in the unladen vehicle state with one person in the driver's seat shall be – 1,0 per cent or lower
- 6.3.6.1.2.2. When the total objective luminous flux of the light source exceeds 2 000 lumens:
- 6.3.6.1.2.2.1. Depending on the mounting height in metres (h) of the lower edge of the apparent surface in the direction of the reference axis of the front fog lamp, measured on the unladen vehicles, the vertical inclination of the cut-off shall under all the static conditions of Annex 5 automatically remain between the following values:
- $h \leq 0,8$
- Limits: between – 1,0 per cent and – 3,0 per cent
- Initial aiming: between – 1,5 per cent and – 2,0 per cent
- $h > 0,8$
- Limits: between – 1,5 per cent and – 3,5 per cent
- Initial aiming: between – 2,0 per cent and – 2,5 per cent,

⁽¹⁶⁾ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2 — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

⁽¹⁷⁾ New vehicle types which do not comply with this provision may continue to be approved until 18 months after the entry into force of Supplement 4 to the 03 series of amendments.

6.3.6.1.2.2.2. The initial downward inclination of the cut-off to be set in the unladen vehicle state with one person in the driver's seat shall be specified within an accuracy of one decimal place by the manufacturer and indicated in a clearly legible and indelible manner on each vehicle close to either the front fog lamp or the manufacturer's plate or in combination with the indication referred to in paragraph 6.2.6.1.1 by the symbol shown in Annex 7 to this Regulation. The value of this indicated downward inclination shall be defined in accordance with paragraph 6.3.6.1.2.2.1.

6.3.6.2. Front fog lamp levelling device

6.3.6.2.1. Where a levelling device is fitted for a front fog lamp, independent or grouped with other front lighting and light signalling functions, it shall be such that the vertical inclination, under all the static loading conditions of Annex 5 of this Regulation, shall remain between the limits prescribed in paragraph 6.3.6.1.2.2.1.

6.3.6.2.2. In the case where the front fog lamp of category 'F3' is part of the dipped-beam headlamp or is part of an AFS system, the requirements of paragraph 6.2.6 shall be applied during the use of the front fog beam as part of the dipped-beam.

In this case the levelling limits defined in paragraph 6.2.6 may be applied also when this front fog lamp is used as such.

6.3.6.2.3. The levelling device may also be used to automatically adapt the inclination of the front fog beam in relation to the prevailing ambient conditions, provided that the limits for the downward inclination specified in paragraph 6.3.6.1.2.2.1 are not exceeded.

6.3.6.2.4. In the case of a failure of the levelling device, the front fog beam shall not assume a position in which the cut off is less inclined than it was at the time when the failure of the device occurred.

6.3.7. Electrical connections

It shall be possible to switch the front fog lamps ON and OFF independently of the main-beam headlamps, the dipped-beam headlamps or any combination of main- and dipped-beam headlamps, unless:

(a) the front fog lamps are used as part of another lighting function in an AFS; however, the switching ON of the front fog lamps function shall have the priority over the function for which the front fog lamps are used as a part; or

(b) the front fog lamps cannot be simultaneously lit with any other lamps with which they are reciprocally incorporated as indicated by the relevant symbol ('/') according to paragraph 10.1 of Annex 1 of Regulation No 19.

6.3.8. Tell-tale

Circuit-closed tell-tale mandatory. An independent non-flashing warning light.

6.3.9. Other requirements

In the case where there is a positive indication in the communication form in item 10.9 of Annex 1 of Regulation No 19 the alignment and the luminous intensities of the class 'F3' front fog beam may be automatically adapted in relation to the prevailing ambient conditions. Any variations of the luminous intensities or alignment shall be performed automatically and in such a way that no discomfort, neither for the driver nor to other road users, is caused.

6.4. Reversing lamp (Regulation No 23)

6.4.1. Presence

Mandatory on motor vehicles and on trailers of categories O₂, O₃ and O₄. Optional on trailers of category O₁.

6.4.2. Number

6.4.2.1. One device mandatory and a second device optional on motor vehicles of category M₁ and on all other vehicles with a length not exceeding 6 000 mm.

6.4.2.2. Two devices mandatory and two devices optional on all vehicles with a length exceeding 6 000 mm, except vehicles of category M₁.

- 6.4.3. Arrangement
No special requirement.
- 6.4.4. Position
- 6.4.4.1. In width: no special requirement.
- 6.4.4.2. In height: not less than 250 mm and not more than 1 200 mm above the ground.
- 6.4.4.3. In length: at the rear of the vehicle
- However, if installed, the two optional devices mentioned in paragraph 6.4.2.2 may be fitted on the side of the vehicle, provided that the requirements of paragraphs 6.4.5.2 and 6.4.6.2 below are fulfilled.
- 6.4.5. Geometric visibility
- 6.4.5.1. Devices installed at the rear of the vehicle:
Defined by angles α and β , as specified in paragraph 2.13:
 $\alpha = 15^\circ$ upwards and 5° downwards,
 $\beta = 45^\circ$ to right and to left if there is only one device,
 45° outwards and 30° inwards if there are two.
- 6.4.5.2. Two optional devices mentioned in paragraph 6.4.2.2 if fitted on the side of the vehicle:
The geometric visibility is considered to be ensured if the reference axis of the respective device is directed outwards with an angle β not exceeding 15° relative to the median longitudinal plane of the vehicle. The vertical aim of the two optional devices may be directed downwards.
- 6.4.6. Orientation
- 6.4.6.1. Rearwards
- 6.4.6.2. In addition, if the two optional devices mentioned in paragraph 6.4.2.2, are fitted on the side of the vehicle, the provisions of paragraph 6.4.5.2 above shall apply.
- 6.4.7. Electrical connections
- 6.4.7.1. They shall be such that the lamp can light up only if the reverse gear is engaged and if the device which controls the starting and stopping of the engine is in such a position that operation of the engine is possible. It shall not light up or remain lit if either of the above conditions is not satisfied.
- 6.4.7.2. Moreover, the electrical connections of the two optional devices mentioned in paragraph 6.4.2.2 shall be such that these devices cannot illuminate unless the lamps referred to in paragraph 5.11 are switched on.
The devices fitted on the side of the vehicle may be switched on for slow manoeuvres in forward motion of the vehicle up to a maximum speed of 10 km/h, provided that the following conditions are fulfilled:
- (a) the devices shall be activated and deactivated manually by a separate switch;
 - (b) if so activated, they may remain illuminated after reverse gear is disengaged;
 - (c) they shall be automatically switched off if the forward speed of the vehicle exceeds 10 km/h, regardless of the position of the separate switch; in this case they shall remain switched off until deliberately being switched on again.
- 6.4.8. Tell-tale
Tell-tale optional.
- 6.4.9. Other requirements
None.

6.5. Direction-indicator lamp (Regulation No 6)

6.5.1. Presence (see figure below)

Mandatory. Types of direction-indicator lamps fall into categories (1, 1a, 1b, 2a, 2b, 5 and 6) the assembly of which on one vehicle constitutes an arrangement ('A' and 'B').

Arrangement 'A' shall apply to all motor vehicles.

Arrangement 'B' shall apply to trailers only.

6.5.2. Number

According to the arrangement.

6.5.3. Arrangements (see figure below)

A: Two front direction-indicator lamps of the following categories:

1 or 1a or 1b,

If the distance between the edge of the apparent surface in the direction of the reference axis of this lamp and that of the apparent surface in the direction of the reference axis of the dipped-beam headlamp and/or the front fog lamp, if there is one, is at least 40 mm;

1a or 1b,

If the distance between the edge of the apparent surface in the direction of the reference axis of this lamp and that of the apparent surface in the direction of the reference axis of the dipped-beam headlamp and/or the front fog lamp, if there is one, is greater than 20 mm and less than 40 mm;

1b,

If the distance between the edge of the apparent surface in the direction of the reference axis of this lamp and that of the apparent surface in the direction of the reference axis of the dipped-beam headlamp and/or the front fog lamp, if there is one, is less than or equal to 20 mm;

Two rear direction-indicator lamps (category 2a or 2b);

Two optional lamps (category 2a or 2b) on all vehicles in categories M₂, M₃, N₂, N₃.

Two side direction-indicator lamps of the categories 5 or 6 (minimum requirements):

5

For all M₁ vehicles;

For N₁, M₂ and M₃ vehicles not exceeding 6 metres in length.

6

For all N₂ and N₃ vehicles;

For N₁, M₂ and M₃ vehicles exceeding 6 metres in length.

It is permitted to replace category 5 side direction-indicator lamps by category 6 side direction-indicator lamps in all instances

Where lamps combining the functions of front direction-indicator lamps (categories 1, 1a, 1b) and side direction-indicator lamps (categories 5 or 6) are fitted, two additional side direction-indicator lamps (categories 5 or 6) may be fitted to meet the visibility requirements of paragraph 6.5.5.

B: Two rear direction-indicator lamps (Categories 2a or 2b)

Two optional lamps (category 2a or 2b) on all vehicles in categories O₂, O₃ and O₄.

A maximum of three optional category 5 or one optional category 6 device per side on vehicles of type O₂ exceeding 9 m in length.

Where an AFS is fitted, the distance to be considered for the choice of the category is the distance between the front direction-indicator lamp and the closest lighting unit in its closest position contributing to or performing a passing-beam mode.

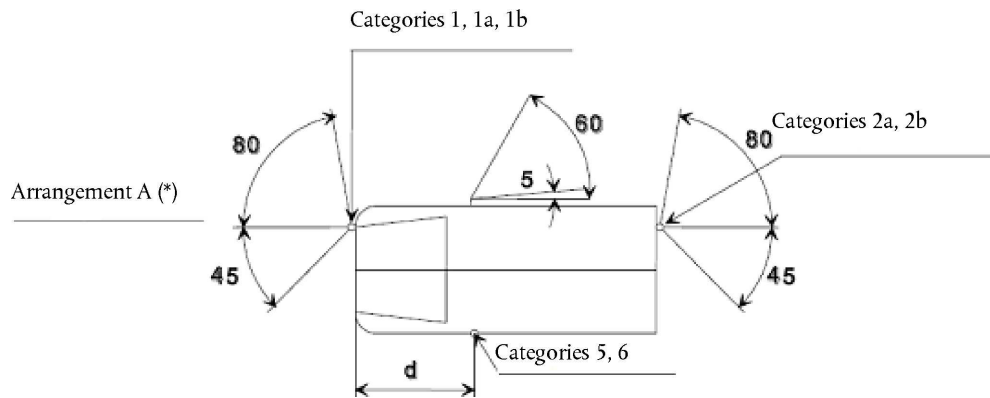
- 6.5.3.1. In addition, for vehicles of categories:
- (a) M_2 , M_3 , N_2 and N_3 of above 6 m and up to including 9 m in length one additional category 5 device is optional;
 - (b) M_2 , M_3 , N_2 and N_3 exceeding 9 m in length three additional category 5 devices distributed as evenly as practicable along each side are mandatory;
 - (c) O_3 and O_4 three category 5 devices distributed as evenly as practicable along each side are mandatory.
- These requirements do not apply if there are at least three amber side marker lamps that flash in phase and simultaneously with the direction indicator lamps on the same side of the vehicle.
- 6.5.4. Position
- 6.5.4.1. In width: the edge of the apparent surface in the direction of the reference axis farthest from the median longitudinal plane of the vehicle shall not be more than 400 mm from the extreme outer edge of the vehicle. This condition shall not apply to the optional rear lamps.
- The distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall not be less than 600 mm.
- This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.
- 6.5.4.2. In height: above the ground.
- 6.5.4.2.1. The height of the light-emitting surface of the side direction-indicator lamps of categories 5 or 6 shall not be:
- Less than: 350 mm for M_1 and N_1 category of vehicles, and 500 mm for all other categories of vehicles, both measured from the lowest point; and
- More than: 1 500 mm, measured from the highest point.
- 6.5.4.2.2. The height of the direction-indicator lamps of categories 1, 1a, 1b, 2a and 2b, measured in accordance with paragraph 5.8, shall not be less than 350 mm and not more than 1 500 mm.
- 6.5.4.2.3. If the structure of the vehicle does not permit these upper limits, measured as specified above, to be respected, and if the optional rear lamps are not installed, they may be increased to 2 300 mm for side direction-indicator lamps of categories 5 and 6, and to 2 100 mm for the direction-indicator lamps of categories 1, 1a, 1b, 2a and 2b.
- 6.5.4.2.4. If optional rear lamps are installed, they shall be placed at a height compatible with the applicable requirements of paragraph 6.5.4.1, the symmetry of the lamps, and at a vertical distance as large as the shape of the bodywork makes it possible, but not less than 600 mm above the mandatory lamps.
- 6.5.4.3. In length (see figure below)
- The distance between the light-emitting surface of the side direction-indicator lamp (categories 5 and 6) and the transverse plane which marks the forward boundary of the vehicle's overall length, shall not exceed 1 800 mm.
- However, this distance shall not exceed 2 500 mm:
- (a) for M_1 and N_1 category vehicles;
 - (b) for all other categories of vehicles if the structure of the vehicle makes it impossible to comply with the minimum angles of visibility.
- Optional category 5 side direction indicator lamps, shall be fitted, spaced evenly, along the length of the vehicle.
- Optional category 6 side direction indicator lamp shall be fitted in the area between the first and last quartiles of the length of a trailer.
- 6.5.5. Geometric visibility
- 6.5.5.1. Horizontal angles: (see figure below)
- Vertical angles: 15° above and below the horizontal for direction indicator lamps of categories 1, 1a, 1b, 2a, 2b and 5.

However:

- (a) where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1), the downward angle of 15° may be reduced to 5°;
- (b) where an optional rear lamp is mounted above 2 100 mm (measured according to the provisions of paragraph 5.8.1 above) the upward angle of 15° may be reduced to 5°.

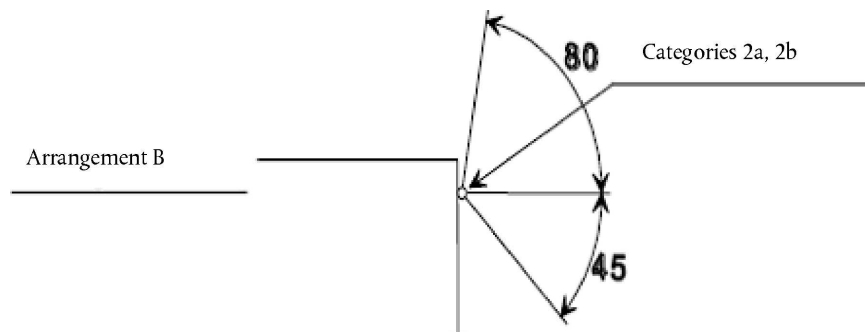
30° above and 5° below the horizontal for direction indicator lamps of category 6.

Figure (see paragraph 6.5)



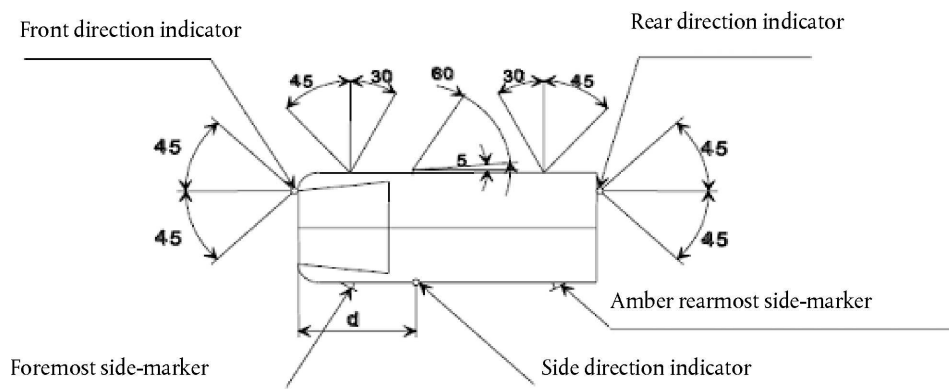
(*) The value of 5° given for dead angle of visibility to the rear of the side direction-indicator is an upper limit $d \leq 1,80$ m (for M_1 and N_1 category vehicles $d \leq 2,50$ m).

For the direction indicator lamps of categories 1, 1a, 1b, 2a and 2b mounted below 750 mm (measured according to the provisions of paragraph 5.8.1), the inward angle of 45° may be reduced to 20° under the H plane.



6.5.5.2. Or, at the discretion of the manufacturer, for M_1 and N_1 category vehicles: Front and rear direction indicator lamps, as well as side-marker lamps (**).

Horizontal angles: (see figure below)



(**) The value of 5° given for the dead angle of visibility to the rear of the side direction-indicator is an upper limit. $d \leq 2,50$ m

However, for the direction indicator lamps of categories 1, 1a, 1b, 2a and 2b mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.

Vertical angles: 15° above and below the horizontal. However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1), the downward angle of 15° may be reduced to 5°.

To be considered visible, the lamp shall provide an unobstructed view of the apparent surface of at least 12,5 square centimetres, except for side direction-indicators of categories 5 and 6. The illuminating surface area of any retro-reflector that does not transmit light shall be excluded.

6.5.6. Orientation

According to the specifications for installation by the manufacturer, if any.

6.5.7. Electrical connections

Direction-indicator lamps shall switch on independently of the other lamps. All direction-indicator lamps on one side of a vehicle shall be switched on and off by means of one control and shall flash in phase.

On M₁ and N₁ vehicles less than 6 m in length, with an arrangement complying with paragraph 6.5.5.2 above, the amber side-marker lamps, when mounted, shall also flash at the same frequency (in phase) with the direction indicator lamps.

A direction indicator capable of being activated in different modes (static or sequential), shall not switch between both modes once activated.

If two optional lamps (category 2a or 2b) are installed on vehicles in categories M₂, M₃, N₂, N₃, they shall be operated in the same mode as the other mandatory rear direction indicator lamps (category 2a or 2b); i.e. static or sequential.

6.5.8. Tell-tale

Operating tell-tale mandatory for direction-indicator lamps of categories 1, 1a, 1b, 2a and 2b. It may be visual or auditory or both. If it is visual it shall be a flashing light which, at least in the event of the malfunction of any of these direction-indicator lamps, is either extinguished, or remains alight without flashing, or shows a marked change of frequency. If it is entirely auditory it shall be clearly audible and shall show a marked change of frequency, at least in the event of the malfunction of any of these direction-indicator lamps.

It shall be activated by the signal produced according to paragraph 6.2.2 of Regulation No 6 or another suitable way ⁽¹⁸⁾.

If a motor vehicle is equipped to draw a trailer, it shall be fitted with a special visual operational tell-tale for the direction-indicator lamps on the trailer unless the tell-tale of the drawing vehicle allows the failure of any one of the direction-indicator lamps on the vehicle combination thus formed to be detected.

For the optional direction-indicator lamps on motor vehicles and trailers, operating tell-tale shall not be mandatory.

6.5.9. Other requirements

The light shall be a flashing light flashing 90 ± 30 times per minute.

Operation of the light-signal control shall be followed within not more than one second by the emission of light and within not more than one and one-half seconds by its first extinction. If a motor vehicle is equipped to draw a trailer, the control of the direction-indicator lamps on the drawing vehicle shall also operate the indicator lamps of the trailer. In the event of failure, other than short-circuit, of one direction-indicator lamp, the others shall continue to flash, but the frequency in this condition may be different from that prescribed.

⁽¹⁸⁾ New vehicle types which do not comply with this provision may continue to be approved until 18 months after the entry into force of Supplement 4 to the 03 series of amendments.

6.6. Hazard warning signal

6.6.1. Presence

Mandatory.

The signal shall be given by simultaneous operation of the direction-indicator lamps in accordance with the requirements of paragraph 6.5 above.

All direction indicators of the category 1 (1, 1a, 1b) activated simultaneously shall operate in the same mode; i.e. static or sequential.

All direction indicators of the category 2 (2a, 2b) activated simultaneously shall operate in the same mode; i.e. static or sequential.

6.6.2. Number

As specified in paragraph 6.5.2.

6.6.3. Arrangement

As specified in paragraph 6.5.3.

6.6.4. Position

6.6.4.1. Width: As specified in paragraph 6.5.4.1.

6.6.4.2. Height: As specified in paragraph 6.5.4.2.

6.6.4.3. Length: As specified in paragraph 6.5.4.3.

6.6.5. Geometric visibility

As specified in paragraph 6.5.5.

6.6.6. Orientation

As specified in paragraph 6.5.6.

6.6.7. Electrical connections

6.6.7.1. The signal shall be operated by means of a separate manual control enabling all the direction-indicator lamps to flash in phase.

6.6.7.2. The hazard warning signal may be activated automatically in the event of a vehicle being involved in a collision or after the de-activation of the emergency stop signal, as specified in paragraph 6.23. In such cases, it may be turned 'off' manually.

In addition, the hazard warning signal may be switched on automatically to indicate to other road-users the risk of imminent danger as defined by Regulations; in this case, the signal shall remain switched 'on' until it is manually or automatically switched 'off'.

6.6.7.3. On M_1 and N_1 vehicles less than 6 m in length, with an arrangement complying with paragraph 6.5.5.2 above, the amber side-marker lamps, when mounted, shall also flash at the same frequency (in phase) with the direction-indicator lamps.

6.6.8. Tell-tale

Flashing circuit-closed tell-tale mandatory.

6.6.9. Other requirements

As specified in paragraph 6.5.9, if a power-driven vehicle is equipped to draw a trailer the hazard warning signal control shall also be capable of bringing the direction-indicator lamps on the trailer into action. The hazard warning signal shall be able to function even if the device which starts or stops the engine is in a position which makes it impossible to start the engine.

- 6.7. Stop lamp (Regulation No 7)
- 6.7.1. Presence
- Devices of S1 or S2 categories: mandatory on all categories of vehicles.
- Devices of S3 or S4 category: mandatory on M₁ and N₁ categories of vehicles, except for chassis-cabs and those N₁ category vehicles with open cargo space; optional on other categories of vehicles.
- 6.7.2. Number
- Two S1 or S2 category devices and one S3 or S4 category device on all categories of vehicles.
- 6.7.2.1. Except in the case where a category S3 or S4 device is installed, two optional category S1 or S2 devices may be installed on vehicles in categories M₂, M₃, N₂, N₃, O₂, O₃, and O₄.
- 6.7.2.2. Only, when the median longitudinal plane of the vehicle is not located on a fixed body panel but separates one or two movable parts of the vehicle (e.g. doors), and lacks sufficient space to install a single device of the S3 or S4 category on the median longitudinal plane above such movable parts, either:
- Two devices of the S3 or S4 category type 'D' may be installed; or
- One device of the S3 or S4 category may be installed offset to the left or to the right of the median longitudinal plane, or
- An interdependent lamp system of category S3 or S4 may be installed.
- 6.7.3. Arrangement
- No special requirement.
- 6.7.4. Position
- 6.7.4.1. In width:
- For M₁ and N₁ category vehicles:
- For S1 or S2 categories devices that point on the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle;
- For the distance in between the inner edges of the apparent surfaces in the direction of the reference axes there is no special requirement.
- For all other categories of vehicles:
- For S1 or S2 categories devices the distance in between the inner edges of the apparent surfaces in the direction of the reference axes shall be not less than 600 mm. This distance may be reduced to 400 mm if the overall width of the vehicle is less than 1 300 mm.
- For S3 or S4 category devices: the centre of reference shall be situated on the median longitudinal plane of the vehicle. However, in the case where the two devices of the S3 or S4 category are installed, according to paragraph 6.7.2, they shall be positioned as close as possible to the median longitudinal plane, one on each side of this plane.
- In the case where one S3 or S4 category lamp offset from the median longitudinal plane is permitted according to paragraph 6.7.2, this offset shall not exceed 150 mm from the median longitudinal plane to the centre of reference of the lamp.
- 6.7.4.2. In height:
- 6.7.4.2.1. For S1 or S2 categories devices:
- Above the ground, not less than 350 mm nor more than 1 500 mm (2 100 mm if the shape of the bodywork makes it impossible to keep within 1 500 mm and if the optional lamps are not installed).
- If the optional lamps are installed, they shall be positioned at a height compatible with the requirements of the width and the symmetry of the lamps, and at a vertical distance as large as the shape of the bodywork makes it possible, but not less than 600 mm above the mandatory lamps.

6.7.4.2.2. For S3 or S4 categories devices:

The horizontal plane tangential to the lower edge of the apparent surface shall: either not be more than 150 mm below the horizontal plane tangential to the lower edge of the exposed surface of the glass or glazing of the rear window, or not be less than 850 mm above the ground.

However, the horizontal plane tangential to the lower edge of the apparent surface of a S3 or S4 category device shall be above the horizontal plane tangential to the upper edge of the apparent surface of S1 or S2 categories devices.

6.7.4.3. In length:

6.7.4.4. For S1 or S2 categories devices: at the rear of the vehicle.

6.7.4.5. For S3 or S4 categories devices: no special requirement.

6.7.5. Geometric visibility

Horizontal angle:

For S1 or S2 categories devices: 45° to the left and to the right of the longitudinal axis of the vehicle.

However, for the stop lamps of categories S1 and S2 mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.

For S3 or S4 categories devices: 10° to the left and to the right of the longitudinal axis of the vehicle;

Vertical angle:

For S1 or S2 categories devices: 15° above and below the horizontal.

However,

(a) where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°;

(b) where an optional lamp is mounted above 2 100 mm (measured according to the provisions of paragraph 5.8.1 above) the upward angle of 15° may be reduced to 5°.

For S3 or S4 categories devices: 10° above and 5° below the horizontal.

6.7.6. Orientation

Towards the rear of the vehicle.

6.7.7. Electrical connections

6.7.7.1. All stop lamps shall light up simultaneously when the braking system provides the relevant signal defined in Regulations Nos 13 and 13-H.

6.7.7.2. The stop lamps need not function if the device, which starts and/or stops the engine, is in a position that makes it impossible for the engine to operate.

6.7.8. Tell-tale

Tell-tale optional, however, a tell-tale indicating failure is mandatory if required by the component regulation.

Where the above tell-tale is fitted, this tell-tale shall be an operating tell-tale consisting of a non-flashing warning light which comes on in the event of the malfunctioning of the stop lamps.

6.7.9. Other requirements

6.7.9.1. The S3 or S4 category device may not be reciprocally incorporated with any other lamp.

- 6.7.9.2. The S3 or S4 category device may be installed outside or inside the vehicle.
- 6.7.9.2.1. In the case where it is installed inside the vehicle:
The light emitted shall not cause discomfort to the driver through the devices for indirect vision and/or other surfaces of the vehicle (i.e. rear window).
- 6.8. Rear registration plate lamp (Regulation No 4)
- 6.8.1. Presence
Mandatory.
- 6.8.2. Number
Such that the device illuminates the site of the registration plate.
- 6.8.3. Arrangement
Such that the device illuminates the site of the registration plate.
- 6.8.4. Position
- 6.8.4.1. In width: such that the device illuminates the site of the registration plate.
- 6.8.4.2. In height: such that the device illuminates the site of the registration plate.
- 6.8.4.3. In length: such that the device illuminates the site of the registration plate.
- 6.8.5. Geometric visibility
Such that the device illuminates the site of the registration plate.
- 6.8.6. Orientation
Such that the device illuminates the site of the registration plate.
- 6.8.7. Electrical connections
In accordance with paragraph 5.11.
- 6.8.8. Tell-tale
Tell-tale optional. If it exists, its function shall be carried out by the tell-tale required for the front and rear position lamps.
- 6.8.9. Other requirements
When the rear registration plate lamp is combined with the rear position lamp, reciprocally incorporated in the stop lamp or in the rear fog lamp, the photometric characteristics of the rear registration plate lamp may be modified during the illumination of the stop lamp or the rear fog lamp.
- 6.9. Front position lamp (Regulation No 7)
- 6.9.1. Presence
Mandatory on all motor vehicles.
Mandatory on trailers over 1 600 mm wide.
Optional on trailers which are not more than 1 600 mm wide.
- 6.9.2. Number
Two.
- 6.9.3. Arrangement
No special requirement.

6.9.4. Position

6.9.4.1. In width: that point on the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle.

In the case of a trailer, that point on the apparent surface in the direction of the reference axis which is farthest from the median longitudinal plane shall not be more than 150 mm from the extreme outer edge of the vehicle.

The distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall:

For M₁ and N₁ category vehicles: No special requirement;

For all other categories of vehicles: Not less than 600 mm. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.

6.9.4.2. In height: above the ground, not less than 250 mm nor more than 1 500 mm (2 100 mm for O₁ and O₂ categories of vehicles, or if for any other categories of vehicles the shape of the bodywork makes it impossible to keep within 1 500 mm).

6.9.4.3. In length: no individual specification.

6.9.4.4. Where the front position lamp and another lamp are reciprocally incorporated, the apparent surface in the direction of the reference axis of the other lamp shall be used to verify compliance with the positioning requirements (paragraphs 6.9.4.1 to 6.9.4.3).

6.9.5. Geometric visibility

6.9.5.1. Horizontal angle: 45° inwards and 80° outwards.

However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.

In the case of trailers, the angle inwards may be reduced to 5°.

Vertical angle: 15° above and below the horizontal. However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°.

6.9.5.2. For M₁ and N₁ category vehicles, as an alternative to paragraph 6.9.5.1 above, at the discretion of the manufacturer or his duly accredited representative, and only if a front side-marker lamp is installed on the vehicle:

Horizontal angle: 45° outwards to 45° inwards.

However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.

Vertical angle: 15° above and below the horizontal.

However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°.

To be considered visible, the lamp shall provide an unobstructed view of the apparent surface of at least 12,5 cm². The illuminating surface area of any retro-reflector that does not transmit light shall be excluded.

6.9.6. Orientation

Forwards.

6.9.7. Electrical connections

In accordance with paragraph 5.11.

However, if a front position lamp is reciprocally incorporated with a direction-indicator the electrical connection of the front position lamp on the relevant side of the vehicle or the reciprocally incorporated part of it may be such that it is switched off during the entire period (both ON and OFF cycle) of activation of the direction-indicator lamp.

- 6.9.8. Tell-tale
- Circuit-closed tell-tale mandatory.
- This tell-tale shall be non-flashing and shall not be required if the instrument panel lighting can only be switched ON simultaneously with the front position lamps.
- However, a tell-tale indicating failure is mandatory if required by the component Regulation.
- 6.9.9. Other requirements
- 6.9.9.1. If one or more infrared radiation generator(s) is (are) installed inside the front position lamp, it (they) is (are) allowed to be activated only when the headlamp on the same side of the vehicle is switched on and the vehicle is in forward motion. In the event that the front position lamp or the headlamp on the same side fails, the infrared radiation generator(s) shall be automatically switched off.
- 6.9.9.2. In case an AFS providing a bending mode is installed, the front position lamp may be swivelled together with a lighting unit to which it is reciprocally incorporated.
- 6.10. Rear position lamp (Regulation No 7)
- 6.10.1. Presence
- Devices of R or R1 or R2 categories: Mandatory
- 6.10.2. Number
- Two.
- 6.10.2.1. Except the case where end-outline marker lamps are installed, two optional position lamps may be installed on all vehicles in categories M₂, M₃, N₂, N₃, O₂, O₃, and O₄.
- 6.10.3. Arrangement
- No special requirement.
- 6.10.4. Position
- 6.10.4.1. In width: that point on the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle. This condition shall not apply to the optional rear lamps.
- The distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall:
- For M₁ and N₁ category vehicles: have no special requirement;
- For all other categories of vehicles: be not less than 600 mm. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.
- 6.10.4.2. In height: above the ground, not less than 350 mm nor more than 1 500 mm (2 100 mm if the shape of the bodywork makes it impossible to keep within 1 500 mm and if the optional lamps are not installed). If the optional lamps are installed, they shall be placed at a height compatible with the applicable requirements of paragraph 6.10.4.1, the symmetry of the lamps, and at a vertical distance as large as the shape of the bodywork makes it possible, but not less than 600 mm above the mandatory lamps.
- 6.10.4.3. In length: The rear of the vehicle.
- 6.10.5. Geometric visibility
- 6.10.5.1. Horizontal angle: 45° inwards and 80° outwards.
- However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.
- Vertical angle: 15° above and below the horizontal.

However,

- (a) where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°;
- (b) where an optional lamp is mounted above 2 100 mm (measured according to the provisions of paragraph 5.8.1 above) the upward angle of 15° may be reduced to 5°.

6.10.5.2. For M₁ and N₁ category vehicles, as an alternative to paragraph 6.10.5.1 above, at the discretion of the manufacturer or his duly accredited representative, and only if a rear side-marker lamp is installed on the vehicle,

Horizontal angle: 45° outwards to 45° inwards. However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.

Vertical angle: 15° above and below the horizontal.

However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°.

To be considered visible, the lamp shall provide an unobstructed view of the apparent surface of at least 12,5 square centimetres. The illuminating surface area of any retro-reflector that does not transmit light shall be excluded.

6.10.6. Orientation

Rearwards.

6.10.7. Electrical connections

In accordance with paragraph 5.11.

However, if a rear position lamp is reciprocally incorporated with a direction-indicator, the electrical connection of the rear position lamp on the relevant side of the vehicle or the reciprocally incorporated part of it may be such that it is switched OFF during the entire period (both ON and OFF cycle) of activation of the direction-indicator lamp.

6.10.8. Tell-tale

Circuit-closed tell-tale mandatory. It shall be combined with that of the front position lamps.

However, a tell-tale indicating failure is mandatory if required by the component Regulation.

6.10.9. Other requirements

None.

6.11. Rear fog lamp (Regulation No 38)

6.11.1. Presence

Devices of F or F1 or F2 categories: Mandatory.

6.11.2. Number

One or two.

6.11.3. Arrangement

No special requirement.

6.11.4. Position

6.11.4.1. In width: if there is only one rear fog-lamp, it shall be on the opposite side of the median longitudinal plane of the vehicle to the direction of traffic prescribed in the country of registration, the centre of reference may also be situated on the median longitudinal plane of the vehicle.

- 6.11.4.2. In height: not less than 250 mm nor more than 1 000 mm above the ground. For rear fog lamps grouped with any rear lamp or for category N₃G (off-road) vehicles, the maximum height may be increased to 1 200 mm.
- 6.11.4.3. In length: at the rear of the vehicle.
- 6.11.5. Geometric visibility
- Defined by angles α and β as specified in paragraph 2.13:
 α = 5° upwards and 5° downwards;
 β = 25° to right and to left.
- 6.11.6. Orientation
- Rearwards.
- 6.11.7. Electrical connections
- These shall be such that:
- 6.11.7.1. The rear fog-lamp(s) cannot be switched on unless the main beams, dipped-beams or front fog-lamps are lit;
- 6.11.7.2. The rear fog-lamp(s) can be switched off independently of any other lamp;
- 6.11.7.3. Either of the following applies:
- 6.11.7.3.1. The rear fog lamp(s) may continue to operate until the position lamps are switched off, and the rear fog lamp(s) shall then remain off until deliberately switched on again;
- 6.11.7.3.2. A warning, at least audible, additional to the mandatory tell-tale (paragraph 6.11.8) shall be given if the ignition is switched off or the ignition key is withdrawn and the driver's door is opened, whether the lamps in (paragraph 6.11.7.1) are on or off, whilst the rear fog lamp switch is in the 'on' position.
- 6.11.7.4. Except as provided in paragraphs 6.11.7.1, 6.11.7.3 and 6.11.7.5, the operation of the rear fog lamp(s) shall not be affected by switching on or off any other lamps.
- 6.11.7.5. The rear fog lamp(s) of a drawing motor vehicle may be automatically switched off while a trailer is connected and the rear fog lamp(s) of the trailer is (are) activated.
- 6.11.8. Tell-tale
- Circuit-closed tell-tale mandatory. An independent non-flashing warning light.
- 6.11.9. Other requirements
- In all cases, the distance between the rear fog-lamp and each stop-lamp shall be greater than 100 mm.
- 6.12. Parking lamp (Regulation No 77 or 7)
- 6.12.1. Presence
- On motor vehicles not exceeding 6 m in length and not exceeding 2 m in width, optional.
- On all other vehicles, prohibited.
- 6.12.2. Number
- According to the arrangement.
- 6.12.3. Arrangement
- Either two lamps at the front and two lamps at the rear, or one lamp on each side.

- 6.12.4. Position
- 6.12.4.1. In width: that point on the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle.
- Furthermore, if there are two lamps, they shall be on the sides of the vehicle.
- 6.12.4.2. In height:
- For M_1 and N_1 category vehicles: no special requirement;
- For all other categories of vehicles: above the ground, not less than 350 mm nor more than 1 500 mm (2 100 mm if the shape of the bodywork makes it impossible to keep within 1 500 mm).
- 6.12.4.3. In length: no special requirement.
- 6.12.5. Geometric visibility
- Horizontal angle: 45° outwards, forwards and rearwards.
- However, where a front or rear parking lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the inward angle of 45° may be reduced to 20° under the H plane.
- Vertical angle: 15° above and below the horizontal.
- However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°.
- 6.12.6. Orientation
- Such that the lamps meet the requirements for visibility forwards and rearwards.
- 6.12.7. Electrical connections
- The connection shall allow the parking lamp(s) on the same side of the vehicle to be lit independently of any other lamps.
- The parking lamp(s) and, if applicable, the front and rear position lamps according to paragraph 6.12.9 below, shall be able to operate even if the device which starts the engine is in a position which makes it impossible for the engine to operate. A device which automatically deactivates these lamps as a function of time is prohibited.
- 6.12.8. Tell-tale
- Circuit-closed tell-tale optional. If there is one, it shall not be possible to confuse it with the tell-tale for the front and rear position lamps.
- 6.12.9. Other requirements
- The functioning of this lamp may also be performed by simultaneously switching on the front and rear position lamps on the same side of the vehicle. In this case, lamps that meet the requirements of front or rear position lamps are deemed to meet the requirements of parking lamps.
- 6.13. End-outline marker lamp (Regulation No 7)
- 6.13.1. Presence
- Devices of A or AM categories (visible from the front), and devices of R, R_1 , R_2 , RM_1 or RM_2 Categories (visible from the rear):
- Mandatory on vehicles exceeding 2,10 m in width. Optional on vehicles between 1,80 and 2,10 m in width. On chassis-cabs the rear end-outline marker lamps are optional.
- 6.13.2. Number
- Two visible from the front and two visible from the rear.
- Additional lamps may be fitted as follows:
- (a) two visible from the front;
- (b) two visible from the rear.

6.13.3. Arrangement

No special requirement.

6.13.4. Position

6.13.4.1. In width:

Front and rear: as close as possible to the extreme outer edge of the vehicle. This condition is deemed to have been met when the point on the apparent surface in the direction of the reference axis which is farthest from the vehicle's median longitudinal plane is not more than 400 mm from the extreme outer edge of the vehicle.

6.13.4.2. In height:

Front: Motor vehicles — the horizontal plane tangential to the upper edge of the apparent surface in the direction of the reference axis of the device shall not be lower than the horizontal plane tangential to the upper edge of the transparent zone of the wind-screen.

Trailers and semi-trailers — at the maximum height compatible with the requirements relating to the width, design and operational requirements of the vehicle and to the symmetry of the lamps.

Rear: At the maximum height compatible with the requirements relating to the width, design and operational requirements of the vehicle and to the symmetry of the lamps.

The additional lamps, as specified in paragraph 6.13.2(b), shall be fitted as far separated in height as practicable in respect to the mandatory ones, provided that their position is compatible with design/operational requirements of the vehicle and symmetry of the lamps.

6.13.4.3. In length, no special requirement.

The additional lamps, as specified in paragraph 6.13.2(a), shall be fitted as close as practicable to the rear; this requirement shall be deemed to be satisfied if the distance between the additional lamps and the rear of the vehicle does not exceed 400 mm.

6.13.5. Geometric visibility

Horizontal angle: 80° outwards.

Vertical angle: 5° above and 20° below the horizontal.

6.13.6. Orientation

Such that the lamps meet the requirements for visibility forwards and rearwards.

6.13.7. Electrical connections

In accordance with paragraph 5.11.

6.13.8. Tell-tale

Tell-tale optional. If it exists, its function shall be carried out by the tell-tale required for the front and rear position lamps.

However, a tell-tale indicating failure is mandatory if required by the component regulation.

6.13.9. Other requirements

Provided that all other requirements are met, the mandatory or optional lamps, visible from the front and the mandatory or optional lamps visible from the rear on the same side of the vehicle may be combined into one device.

Two of the lamps visible from the rear may be grouped, combined or reciprocally incorporated in accordance with paragraph 5.7.

The position of an end-outline marker lamp in relation to corresponding position lamp shall be such that the distance between the projections on a transverse vertical plane of the points nearest to one another on the apparent surfaces in the direction of the respective reference axes of the two lamps considered is not less than 200 mm.

The additional lamps, as specified in paragraph 6.13.2(a), used to mark the rear end outline of the vehicle, the trailer or the semi-trailer shall be fitted in such a way to make it visible within the fields of vision of the approved main rear-view devices for indirect vision.

6.14. Rear retro-reflector, non-triangular (Regulation No 3)

6.14.1. Presence

Mandatory on motor vehicles.

Provided that they are grouped together with the other rear light-signalling devices, optional on trailers.

6.14.2. Number

Two, the performances of which shall conform to the requirements concerning Class IA or IB retro-reflectors in Regulation No 3. Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.14.4 below), are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.

6.14.3. Arrangement

No special requirement.

6.14.4. Position

6.14.4.1. In width: that point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle.

The distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall:

For M_1 and N_1 category vehicles: have no special requirement;

For all other categories of vehicles: be not less than 600 mm. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.

6.14.4.2. In height: Above the ground, not less than 250 mm nor more than 900 mm (not more than 1 200 mm if grouped with any rear lamp(s), 1 500 mm if the shape of the bodywork makes it impossible to keep within 900 mm or 1 200 mm respectively).

6.14.4.3. In length: at the rear of the vehicle.

6.14.5. Geometric visibility

Horizontal angle: 30° inwards and outwards.

Vertical angle: 10° above and below horizontal.

However, where a retro-reflector is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 10° may be reduced to 5°.

6.14.6. Orientation

Rearwards.

6.14.7. Other requirements

The illuminating surface of the retro-reflector may have parts in common with the apparent surface of any other lamp situated at the rear.

- 6.15. Rear retro-reflector, triangular (Regulation No 3)
- 6.15.1. Presence
- Mandatory on trailers.
- Prohibited on motor vehicles.
- 6.15.2. Number
- Two, the performances of which shall conform to the requirements concerning Class IIIA or Class IIIB retro-reflectors in Regulation No 3. Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.15.4 below), are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.
- 6.15.3. Arrangement
- The apex of the triangle shall be directed upwards.
- 6.15.4. Position
- 6.15.4.1. In width: that point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle.
- The inner edges of the retro-reflectors shall not be less than 600 mm apart. This distance may be reduced to 400 mm if the overall width of the vehicle is less than 1 300 mm.
- 6.15.4.2. In height: Above the ground, not less than 250 mm nor more than 900 mm (not more than 1 200 mm if grouped with any rear lamp(s), 1 500 mm if the shape of the bodywork makes it impossible to keep within 900 mm or 1 200 mm respectively).
- 6.15.4.3. In length: at the rear of the vehicle.
- 6.15.5. Geometric visibility
- Horizontal angle: 30° inwards and outwards.
- Vertical angle: 15° above and below the horizontal. However, where a retro-reflector is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 15° may be reduced to 5°.
- 6.15.6. Orientation
- Rearwards.
- 6.15.7. Other requirements
- The illuminating surface of the retro-reflector may have parts in common with the apparent surface of any other lamp situated at the rear.
- 6.16. Front retro-reflector, non-triangular (Regulation No 3)
- 6.16.1. Presence
- Mandatory on trailers.
- Mandatory on motor vehicles having all forward facing lamps with reflectors concealable.
- Optional on other motor vehicles.
- 6.16.2. Number
- Two, the performances of which shall conform to the requirements concerning Class IA or IB retro-reflectors in Regulation No 3. Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.16.4 below), are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.

- 6.16.3. Arrangement
No special requirement.
- 6.16.4. Position
- 6.16.4.1. In width: that point on the illuminating surface which is farthest from the vehicle's median longitudinal plane shall not be more than 400 mm from the extreme outer edge of the vehicle.

In the case of a trailer, the point of the illuminating surface which is farthest from the vehicle's median longitudinal plane shall not be farther than 150 mm from the extreme outer edge of the vehicle.

The distance between the inner edges of the two apparent surfaces in the direction of the reference axes shall:

For M₁ and N₁ category vehicles: have no special requirement;

For all other categories of vehicles: be not less than 600 mm. This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.
- 6.16.4.2. In height: above the ground, not less than 250 mm nor more than 900 mm (1 500 mm if the shape of the bodywork makes it impossible to keep within 900 mm).
- 6.16.4.3. In length: at the front of the vehicle.
- 6.16.5. Geometric visibility

Horizontal angle: 30° inwards and outwards. In the case of trailers, the angle inwards may be reduced to 10°. If because of the construction of the trailers this angle cannot be met by the mandatory retro-reflectors, then additional (supplementary) retro-reflectors shall be fitted, without the width limitation (paragraph 6.16.4.1 above), which shall, in conjunction with the mandatory retro-reflectors, give the necessary visibility angle.

Vertical angle: 10° above and below the horizontal. However, where a retro-reflector is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 10° may be reduced to 5°.
- 6.16.6. Orientation
Towards the front.
- 6.16.7. Other requirements

The illuminating surface of the retro-reflector may have parts in common with the apparent surface of any other lamp situated at the front.
- 6.17. Side retro-reflector, non-triangular (Regulation No 3)
- 6.17.1. Presence

Mandatory: On all motor vehicles the length of which exceeds 6 m.

On all trailers.

Optional: On motor vehicles the length of which does not exceed 6 m.
- 6.17.2. Number

Such that the requirements for longitudinal positioning are complied with. The performances of these devices shall conform to the requirements concerning Class IA or IB retro-reflectors in Regulation No 3. Additional retro-reflecting devices and materials (including two retro-reflectors not complying with paragraph 6.17.4 below), are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.
- 6.17.3. Arrangement
No special requirement.

- 6.17.4. Position
- 6.17.4.1. In width: no special requirement.
- 6.17.4.2. In height: Above the ground, not less than 250 mm nor more than 900 mm (not more than 1 200 mm if grouped with any lamp(s), 1 500 mm if the shape of the bodywork makes it impossible to keep within 900 mm or 1 200 mm respectively or if the presence of the device is not mandatory according to paragraph 6.17.1).
- 6.17.4.3. In length: at least one side retro-reflector shall be fitted to the middle third of the vehicle, the foremost side retro-reflector being not further than 3 m from the front;
- The distance between two adjacent side retro-reflectors shall not exceed 3 m. This does not, however, apply to M_1 and N_1 category vehicles.
- If the structure, design or the operational use of the vehicle makes it impossible to comply with such a requirement, this distance may be increased to 4 m. The distance between the rearmost side retro-reflector and the rear of the vehicle shall not exceed 1 m. However, for motor vehicles the length of which does not exceed 6 m, it is sufficient to have one side retro-reflector fitted within the first third and/or one within the last third of the vehicle length.
- For M_1 vehicles the length of which exceeds 6 m but does not exceed 7 m it is sufficient to have one side retro-reflector fitted not further than 3 m from the front and one within the last third of the vehicle length.
- 6.17.5. Geometric visibility
- Horizontal angle: 45° to the front and to the rear.
- Vertical angle: 10° above and below the horizontal. However, where a retro-reflector is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 10° may be reduced to 5°.
- 6.17.6. Orientation
- Towards the side.
- 6.17.7. Other requirements
- The illuminating surface of the side retro-reflector may have parts in common with the apparent surface of any other side lamp.
- 6.18. Side-marker lamps (Regulation No 91)
- 6.18.1. Presence
- Mandatory: On all vehicles the length of which exceeds 6 m, except for chassis-cabs.
- The SM1 type of side-marker lamp shall be used on all categories of vehicles; however the SM2 type of side-marker lamps may be used on the M_1 category of vehicles.
- In addition, on M_1 and N_1 category vehicles less than 6 m in length, side-marker lamps shall be used, if they supplement the reduced geometric visibility requirements of front position lamps conforming to paragraph 6.9.5.2 and rear position lamps conforming to paragraph 6.10.5.2.
- Optional: On all other vehicles.
- The SM1 or SM2 types of side-marker lamps may be used.
- 6.18.2. Minimum number per side
- Such that the rules for longitudinal positioning are complied with.
- 6.18.3. Arrangement
- No individual specifications.

6.18.4. Position

6.18.4.1. In width: no individual specifications.

6.18.4.2. In height: Above the ground, not less than 250 mm nor more than 1 500 mm (2 100 mm if the shape of the bodywork makes it impossible to keep within 1 500 mm).

6.18.4.3. In length: at least one side-marker lamp shall be fitted to the middle third of the vehicle, the foremost side-marker lamp being not further than 3 m from the front. The distance between two adjacent side-marker lamps shall not exceed 3 m. If the structure, design or the operational use of the vehicle make it impossible to comply with such a requirement, this distance may be increased to 4 m.

The distance between the rearmost side-marker lamp and the rear of the vehicle shall not exceed 1 m.

However, for vehicles the length of which does not exceed 6 m and for chassis-cabs it is sufficient to have one side-marker lamp fitted within the first third and/or within the last third of the vehicle length. For M_1 vehicles the length of which exceeds 6 m but does not exceed 7 m it is sufficient to have one side-marker lamp fitted not further than 3 m from the front and one within the last third of the vehicle length.

6.18.5. Geometric visibility

Horizontal angle: 45° to the front and to the rear; however for vehicles on which the installation of the side-marker lamps is optional this value can be reduced to 30°.

If the vehicle is equipped with side-marker lamps used to supplement the reduced geometric visibility of front and rear direction indicator lamps conforming to paragraph 6.5.5.2 above and/or position lamps conforming to paragraphs 6.9.5.2 and 6.10.5.2 above, the angles are 45° towards the front and rear ends of the vehicle and 30° towards the centre of the vehicle (see the figure in paragraph 6.5.5.2 above).

Vertical angle: 10° above and below the horizontal. However, where a lamp is mounted below 750 mm (measured according to the provisions of paragraph 5.8.1 above), the downward angle of 10° may be reduced to 5°.

6.18.6. Orientation

Towards the side.

6.18.7. Electrical connections

On M_1 and N_1 category vehicles less than 6 m in length amber side-marker lamps may be wired to flash, provided that this flashing is in phase and at the same frequency with the direction-indicator lamps at the same side of the vehicle.

On M_2 , M_3 , N_2 , N_3 , O_3 and O_4 vehicles mandatory amber side marker lamps may flash simultaneously with the direction-indicator lamps on the same side of the vehicle. However, where there are direction indicator lamps of category 5 installed according to paragraph 6.5.3.1 on the side of the vehicle these amber side marker lamps shall not flash.

6.18.8. Tell-tale

Tell-tale optional. If it exists its function shall be carried out by the tell-tale required for the front and rear position lamps.

6.18.9. Other requirements

When the rearmost side-marker lamp is combined with the rear position lamp reciprocally incorporated with the rear fog-lamp or stop lamp, the photometric characteristics of the side-marker lamp may be modified during the illumination of the rear fog lamp or stop lamp.

Rear side-marker lamps shall be amber if they flash with the rear direction-indicator lamp.

- 6.19. Day-time running lamp (Regulation No 87)
- 6.19.1. Presence
- Mandatory on motor vehicles. Prohibited on trailers.
- 6.19.2. Number
- Two.
- 6.19.3. Arrangement
- No special requirement.
- 6.19.4. Position
- 6.19.4.1. In width: the distance between the inner edges of the apparent surfaces in the direction of the reference axes shall not be less than 600 mm.
- This distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.
- 6.19.4.2. In height: above the ground not less than 250 mm nor more than 1 500 mm.
- 6.19.4.3. In length: at the front of the vehicle. This requirement shall be deemed to be satisfied if the light emitted does not cause discomfort to the driver either directly or indirectly through the devices for indirect vision and/or other reflecting surfaces of the vehicle.
- 6.19.5. Geometric visibility
- Horizontal: outwards 20° and inwards 20°.
- Vertical: upwards 10° and downwards 10°.
- 6.19.6. Orientation
- Towards the front.
- 6.19.7. Electrical connections
- 6.19.7.1. The daytime running lamps shall be switched ON automatically when the device which starts and/or stops the engine (propulsion system) is set in a position which makes it possible for the engine (propulsion system) to operate. However, the daytime running lamps may remain OFF while the following conditions exist:
- 6.19.7.1.1. The automatic transmission control is in the park position; or
- 6.19.7.1.2. The parking brake is in the applied position; or
- 6.19.7.1.3. Prior to the vehicle being set in motion for the first time after each manual activation of the propulsion system.
- 6.19.7.2. The daytime running lamps may be switched OFF manually when the vehicle speed does not exceed 10 km/h provided they switch ON automatically when the vehicle speed exceeds 10 km/h or when the vehicle has travelled more than 100 m and they remain ON until deliberately switched off again.
- 6.19.7.3. The daytime running lamp shall switch OFF automatically when the device which starts and/or stops the engine (propulsion system) is set in a position which makes it impossible for the engine (propulsion system) to operate or the front fog lamps or headlamps are switched ON, except when the latter are used to give intermittent luminous warnings at short intervals ⁽¹⁹⁾.
- 6.19.7.4. The lamps referred to in paragraph 5.11 may be switched ON when the daytime running lamps are switched ON.

⁽¹⁹⁾ New vehicle types which do not comply with this provision may continue to be approved until 18 months after the entry into force of Supplement 4 to the 03 series of amendments.

- 6.19.7.5. If the distance between the front direction-indicator lamp and the daytime running lamp is equal or less than 40 mm, the electrical connections of the daytime running lamp on the relevant side of the vehicle may be such that either:
- (a) it is switched OFF; or
 - (b) its luminous intensity is reduced during the entire period (both ON and OFF cycle) of activation of a front direction-indicator lamp.
- 6.19.7.6. If a direction-indicator lamp is reciprocally incorporated with a daytime running lamp, the electrical connections of the daytime running lamp on the relevant side of the vehicle shall be such that the daytime running lamp is switched OFF during the entire period (both ON and OFF cycle) of activation of the direction-indicator lamp.
- 6.19.8. Tell-tale
- Closed-circuit tell-tale optional, however a tell-tale indicating failure is mandatory if required by the component regulation.
- 6.19.9. Other prescriptions
- No prescription.
- 6.20. Cornering lamp (Regulation No 119)
- 6.20.1. Presence
- Optional on motor vehicles.
- 6.20.2. Number
- Two.
- 6.20.3. Arrangement
- No special requirement.
- 6.20.4. Position
- 6.20.4.1. In width: one cornering lamp shall be located on each side of the vehicle's median longitudinal plane.
- 6.20.4.2. In length: not further than 1 000 mm from the front.
- 6.20.4.3. In height: minimum: Not less than 250 mm above the ground;
maximum: Not more than 900 mm above the ground.
- However, no point on the apparent surface in the direction of the reference axis shall be higher than the highest point on the apparent surface in the direction of the reference axis of the dipped-beam headlamp.
- 6.20.5. Geometric visibility
- Defined by angles α and β as specified in paragraph 2.13:
- $\alpha = 10^\circ$ upwards and downwards,
 $\beta = 30^\circ$ to 60° outwards.
- 6.20.6. Orientation
- Such that the lamps meet the requirements for geometric visibility.
- 6.20.7. Electrical connections
- The cornering lamps shall be so connected that they cannot be activated unless the main-beam headlamps or the dipped-beam headlamps are switched ON at the same time.

- 6.20.7.1. The cornering lamp on one side of the vehicle may only be switched ON automatically when the direction-indicators on the same side of the vehicle are switched ON and/or when the steering angle is changed from the straight-ahead position towards the same side of the vehicle.
- The cornering lamp shall be switched OFF automatically when the direction-indicator is switched OFF and/or the steering angle has returned in the straight-ahead position.
- 6.20.7.2. When the reversing lamp is switched ON, both cornering lamps may be switched on simultaneously, independently from the steering wheel or direction-indicator position. If so activated, both cornering lamps shall be switched OFF either:
- (a) when the reversing lamp is switched OFF; or
 - (b) when the forward speed of the vehicle exceeds 10 km/h.
- 6.20.8. Tell-tale
- None.
- 6.20.9. Other requirements
- The cornering lamps shall not be activated at vehicle speeds above 40 km/h.
- 6.21. Conspicuity markings (Regulation No 104)
- 6.21.1. Presence
- 6.21.1.1. Prohibited: on vehicles of categories M₁ and O₁.
- 6.21.1.2. Mandatory:
- 6.21.1.2.1. To the rear:
- Full contour marking on vehicles exceeding 2 100 mm in width of the following categories:
- (a) N₂ with a maximum mass exceeding 7,5 tonnes and N₃ (with the exception of chassis-cabs, incomplete vehicles and tractors for semi-trailers);
 - (b) O₃ and O₄ (with the exception of incomplete vehicles)
- 6.21.1.2.2. To the side:
- 6.21.1.2.2.1. Partial contour marking on vehicles exceeding 6 000 mm in length (including the drawbar for trailers) of the following categories:
- (a) N₂ with a maximum mass exceeding 7,5 tonnes and N₃ (with the exception of chassis-cabs, incomplete vehicles and tractors for semi-trailers);
 - (b) O₃ and O₄ (with the exception of incomplete vehicles)
- 6.21.1.2.3. A line marking may be installed instead of the mandatory contour marking if the shape, structure, design or operational requirements of the vehicle make it impossible to install the mandatory contour marking.
- 6.21.1.2.4. If the exterior surfaces of the bodywork are partially constituted of flexible material, this line marking shall be installed on (a) rigid part(s) of the vehicle. The remaining portion of conspicuity markings may be fitted on the flexible material. If the exterior surfaces of the bodywork are constituted fully of flexible material, the line marking may be fitted on the flexible material.
- 6.21.1.2.5. In cases where the manufacturer, after verification by the Technical Service, can prove to the satisfaction of the Type Approval Authority that it is impossible, due to the operational requirements which may require special shape, structure or design of the vehicle, to comply with the requirements contained in paragraphs 6.21.2 to 6.21.7.5 below, then partial fulfilment of some of these requirements is acceptable. This is conditional upon a portion of the requirements being met where possible, and the application of conspicuity markings that partially meet requirements maximised on the vehicle structure. This may include fitting of additional brackets or plates containing material compliant with Regulation No 104 where structure is available to ensure clear and uniform signalling compatible with the objective of conspicuity.

Where partial fulfilment is deemed acceptable, retro-reflective devices like retro-reflectors of class IVA of Regulation No 3 or brackets containing retro-reflecting material compliant with photometric requirements of Class C of Regulation No 104 may substitute part of the required conspicuity markings. In this case, at least one of these retro-reflective devices shall be installed per 1 500 mm.

The necessary information shall be indicated in the communication form.

6.21.1.3. Optional:

6.21.1.3.1. To the rear and to the side:

On all other categories of vehicles, not otherwise specified in paragraphs 6.21.1.1 and 6.21.1.2 above, including the cab of tractor units for semi-trailers and the cab of chassis-cabs.

Partial or full contour marking may be applied instead of mandatory line markings, and full contour marking may be applied instead of mandatory partial contour marking.

6.21.1.3.2. To the front:

Line marking on vehicles of categories O₂, O₃ and O₄.

Partial or full contour marking may not be applied to the front.

6.21.2. Number

According to the presence.

6.21.3. Arrangement

The conspicuity markings shall be as close as practicable to horizontal and vertical, compatible with the shape, structure, design and operational requirements of the vehicle; if this is not possible, the full or partial contour markings, when fitted, shall follow as close as practicable the contour of the outer shape of the vehicle.

Furthermore, the conspicuity markings shall be spaced as evenly as possible over the horizontal dimensions of the vehicle such that the total length and/or width of the vehicle can be identified.

6.21.4. Position

6.21.4.1. Width

6.21.4.1.1. The conspicuity marking shall be as close as practicable to the edge of the vehicle.

6.21.4.1.2. The cumulative horizontal length of the conspicuity marking elements, as mounted on the vehicle, shall equate to at least 70 per cent of the overall width of the vehicle, excluding any horizontal overlap of individual elements.

6.21.4.2. Length

6.21.4.2.1. The conspicuity marking shall be as close as practicable to the ends of the vehicle and reach to within 600 mm of each end of the vehicle.

6.21.4.2.1.1. For motor vehicles, each end of the vehicle, or in the case of tractors for semi-trailers each end of the cab;

However, an alternative marking mode within 2 400 mm from the front end of the motor vehicle is allowed where a series of retro-reflectors of Class IVA of Regulation No 3 or Class C of Regulation No 104 are mounted followed by the required conspicuity marking as follows:

(a) retro-reflector size minimum 25 cm²;

(b) one retro-reflector mounted not more than 600 mm from the front end of the vehicle;

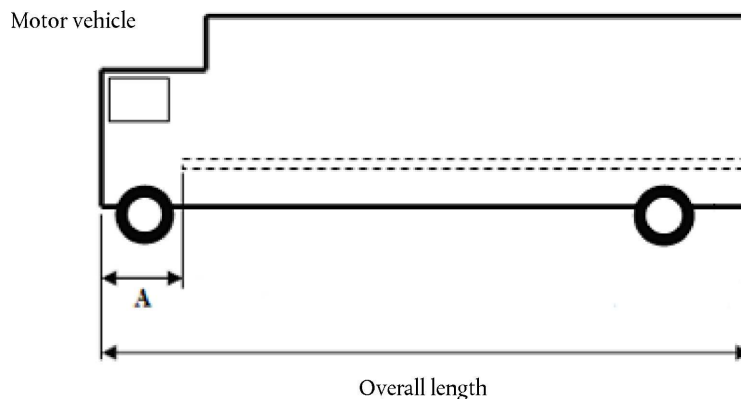
(c) additional retro-reflectors spaced not more than 600 mm apart;

(d) the distance between the last retro-reflector and the start of the conspicuity marking shall not exceed 600 mm;

6.21.4.2.1.2. For trailers, each end of the vehicle (excluding the drawbar).

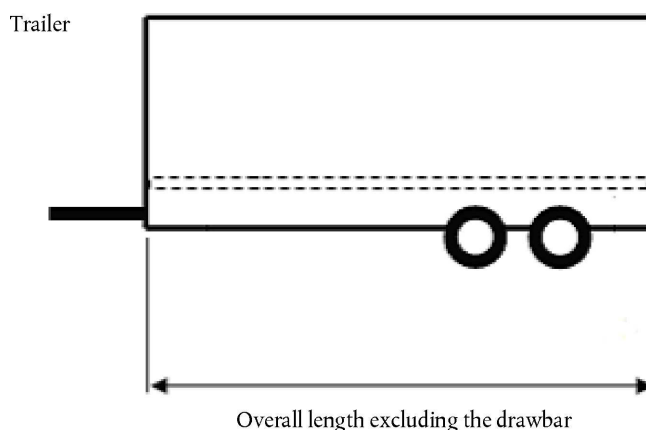
6.21.4.2.2. The cumulative horizontal length of the conspicuity marking elements, as mounted on the vehicle, excluding any horizontal overlap of individual elements, shall equate to at least 70 per cent of:

6.21.4.2.2.1. For motor vehicles, length of vehicle, or in the case of tractors for semi-trailers, if fitted, the length of the cab; however, when using the alternative marking mode per paragraph 6.21.4.2.1.1, the distance beginning within 2 400 mm from the front end of vehicle to its rear end.



A is the distance between the foremost conspicuity marking and the front end of the vehicle. The maximum value of A is 2 400 mm (see paragraph 6.21.4.2.1.1).

6.21.4.2.2.2. For trailers, the overall length of the vehicle (excluding the drawbar).



6.21.4.3. Height

6.21.4.3.1. Line markings and contour markings lower element(s)

As low as practicable within the range:

Minimum: not less than 250 mm above the ground.

Maximum: not more than 1 500 mm above the ground.

However, a maximum mounting height of 2 500 mm may be accepted where the shape, structure, design or operational conditions of the vehicle prevent compliance with the maximum value of 1 500 mm or, if necessary, to fulfil the requirements of paragraphs 6.21.4.1.2, and 6.21.4.2.2, or the horizontal positioning of the line marking or the lower element(s) of the contour marking.

The necessary justification for installation of conspicuity material higher than 1 500 mm shall be indicated in the communication form.

6.21.4.3.2. Contour markings upper element(s):

As high as practicable, but within 400 mm of the upper extremity of the vehicle.

6.21.5. Visibility

The conspicuity marking shall be considered visible, if at least 70 per cent of the illuminating surface of the installed marking is visible when viewed by an observer positioned at any point within the observation planes defined below:

6.21.5.1. For rear and front conspicuity markings (see Annex 11, Figures 1a and 1b) the observation plane is perpendicular to the longitudinal axis of the vehicle situated 25 m from the extreme end of the vehicle and bounded by:

6.21.5.1.1. In height, by two horizontal planes 1 m and 3,0 m respectively above the ground;

6.21.5.1.2. In width, by two vertical planes which form an angle of 4° outwards from the vehicle's median longitudinal plane and which pass through the intersection of the vertical planes parallel to the vehicle's median longitudinal plane delimiting the vehicle's overall width, and the plane perpendicular to the longitudinal axis of the vehicle that delimits the end of the vehicle.

6.21.5.2. For side conspicuity markings (see Annex 11, Fig. 2) the observation plane is parallel to the longitudinal median plane of the vehicles situated 25 m from the extreme outer edge of the vehicle and bounded by:

6.21.5.2.1. In height, by two horizontal planes 1,0 m and 1,5 m respectively above the ground;

6.21.5.2.2. In width, by two vertical planes which form an angle of 4° outwards from a plane perpendicular to the vehicle's longitudinal axis and which pass through the intersection of the vertical planes perpendicular to the vehicle's longitudinal axis delimiting the vehicle's overall length and the extreme outer edge of the vehicle.

6.21.6. Orientation

6.21.6.1. To the side:

As close as practicable to being parallel to the median longitudinal plane of the vehicle, compatible with the shape, structure, design and operation requirements of the vehicle; if this is not possible, it shall follow as close as practicable the contour of the outer shape of the vehicle.

6.21.6.2. To the rear and to the front:

As close as practicable to being parallel to the transverse plane of the vehicle, compatible with the shape, structure, design and operation requirements of the vehicle, if this is not possible, it shall follow as close as practicable the contour of the outer shape of the vehicle.

6.21.7. Other requirements

6.21.7.1. Conspicuity markings shall be considered continuous if the distance between adjacent elements are as small as possible and do not exceed 50 per cent of the shortest adjacent element length. However, if the manufacturer can prove to the satisfaction of the Type Approval Authority that it is impossible to respect the value of 50 per cent, the distance between adjacent elements may be larger than 50 per cent of the shortest adjacent element, and it shall be as small as possible and not exceed 1 000 mm.

6.21.7.2. In the case of a partial contour marking, each upper corner shall be described by two lines at 90°, to each other and each at least 250 mm in length; if this is not possible, the marking shall follow as close as practicable the contour of the outer shape of the vehicle.

6.21.7.3. The distance between the conspicuity marking fitted to the rear of a vehicle and each mandatory stop lamp should be greater than 200 mm.

6.21.7.4. Where rear marking plates conforming to the 01 series of amendments to Regulation No 70 are installed these may be considered, at the discretion of the manufacturer, as part of the conspicuity marking to the rear, for the purposes of calculating the length of the conspicuity marking and its proximity to the side of the vehicle.

6.21.7.5. The locations on the vehicle designated for conspicuity markings shall allow for the installation of markings of at least 60 mm in width.

6.22. Adaptive front lighting system (AFS) (Regulation No 123)

Where not otherwise specified below, the requirements for main-beam headlamps (paragraph 6.1) and for dipped-beam headlamps (paragraph 6.2) of this Regulation apply to the relevant part of the AFS.

6.22.1. Presence

Optional on motor vehicles. Prohibited on trailers.

6.22.2. Number

One.

6.22.3. Arrangement

No special requirements.

6.22.4. Position

The AFS shall, prior to the subsequent test procedures, be set to the neutral state;

6.22.4.1. In width and height:

For a given lighting function or mode the requirements indicated in the paragraphs 6.22.4.1.1 through 6.22.4.1.4 below shall be fulfilled by those lighting units which are energized simultaneously for that lighting function or mode of a function, according to the applicant's description.

All dimensions refer to the nearest edge of the apparent surface(s) observed in the direction of the reference axis, of the lighting unit(s).

6.22.4.1.1. Two symmetrically placed lighting units shall be positioned at a height in compliance with the requirements of the relevant paragraphs 6.1.4 and 6.2.4, where 'Two symmetrically placed lighting units' shall be understood to be two lighting units, one on each side of the vehicle, positioned such that the (geometric) centres of gravity of their apparent surfaces are at the same height and at the same distance from the vehicle's longitudinal median plane within a tolerance of 50 mm, each; their light emitting surfaces, illuminating surfaces, and light outputs, however, may differ.

6.22.4.1.2. Additional lighting units, if any, on either side of the vehicle shall be positioned at a distance not exceeding 140 mm ⁽²⁰⁾ in horizontal direction (E in the figure) and 400 mm in vertical direction above or below (D in the figure) from the nearest lighting unit;

6.22.4.1.3. None of the additional lighting units described in paragraph 6.22.4.1.2 above shall be positioned lower than 250 mm (F in the figure) nor higher than indicated in paragraph 6.2.4.2 of this Regulation (G in the figure) above the ground;

6.22.4.1.4. Additionally, in width:

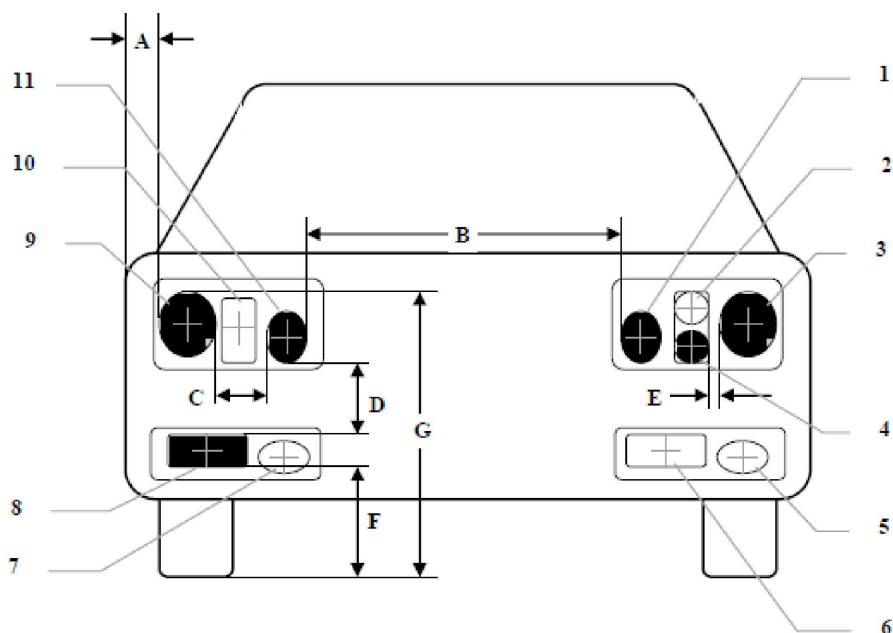
For each mode of the passing-beam lighting:

The outer edge of the apparent surface of at least one lighting unit on each side of the vehicle shall not be more than 400 mm from the extreme outer edge of the vehicle (A in the figure); and,

The inner edges of the apparent surfaces in the direction of the reference axes shall be not less than 600 mm apart. This does not apply, however, for M₁ and N₁ category vehicles; for all other categories of motor vehicles this distance may be reduced to 400 mm where the overall width of the vehicle is less than 1 300 mm.

Apparent surfaces of lighting units 1 through 11 of an AFS (example)

⁽²⁰⁾ In case of additional 'two symmetrically placed lighting units' the horizontal distance may be 200 mm (C in the figure).



Lighting units being simultaneously energized for a given lighting mode:

No 3 and 9: (two symmetrically placed lighting units)

No 1 and 11: (two symmetrically placed lighting units)

No 4 and 8: (two additional lighting units)

Lighting units not being energized for said lighting mode:

No 2 and 10: (two symmetrically placed lighting units)

No 5: (additional lighting unit)

No 6 and 7: (two symmetrically placed lighting units)

Horizontal dimensions in mm:

$A \leq 400$

$B \geq 600$, or, ≥ 400 if vehicle overall width $< 1\,300$ mm, however no requirement for category M_1 and N_1 vehicles

$C \leq 200$

$E \leq 140$

Vertical dimensions in mm:

$D \leq 400$

$F \geq 250$

$G \leq 1\,200$

6.22.4.2. In length:

All lighting units of an AFS shall be mounted at the front. This requirement is deemed to be satisfied if the light emitted does not cause discomfort to the driver either directly or indirectly through the devices for indirect vision and/or other reflecting surfaces of the vehicle.

6.22.5. Geometric visibility

On each side of the vehicle, for each lighting function and mode provided:

The angles of geometric visibility prescribed for the respective lighting functions according to paragraphs 6.1.5 and 6.2.5 of this Regulation, shall be met by at least one of the lighting units that are simultaneously energized to perform said function and mode(s), according to the description of the applicant. Individual lighting units may be used to comply with the requirements for different angles.

6.22.6. Orientation

Towards the front.

The AFS shall, prior to the subsequent test procedures, be set to the neutral state, emitting the basic passing-beam.

6.22.6.1. Vertical orientation:

- 6.22.6.1.1. The initial downward inclination of the cut-off of the basic passing-beam to be set in the unladen vehicle state with one person in the driver's seat shall be specified with a precision of 0,1 per cent by the manufacturer and indicated in clearly legible and indelible manner on each vehicle, close to either the front lighting system or the manufacturer's plate, by the symbol shown in Annex 7.

Where differing initial downward inclinations are specified by the manufacturer for different lighting units that provide or contribute to the cut-off of the basic passing-beam, these values of downward inclination shall be specified with a precision of 0,1 per cent by the manufacturer and indicated in clearly legible and indelible manner on each vehicle, close to either the relevant lighting units or on the manufacturer's plate, in such a way that all the lighting units concerned can be unambiguously identified.

- 6.22.6.1.2. The downward inclination of the horizontal part of the 'cut-off' of the basic passing-beam shall remain between the limits indicated in paragraph 6.2.6.1.2 of this Regulation under all the static loading conditions of the vehicle of Annex 5 to this Regulation; and the initial aiming shall be within the specified values.

- 6.22.6.1.2.1. In case the passing-beam is generated by several beams from different lighting units, the provisions according to paragraph 6.22.6.1.2 above apply to each said beam's 'cut-off' (if any), which is designed to project into the angular zone, as indicated under item 9.4 of the communication form conforming to the model in Annex 1 to Regulation No 123.

6.22.6.2. Headlamp levelling device

- 6.22.6.2.1. In the case where a headlamp levelling device is necessary to satisfy the requirements of paragraph 6.22.6.1.2, the device shall be automatic.

- 6.22.6.2.2. In the event of a failure of this device, the passing-beam shall not assume a position in which the dip is less than it was at the time when the failure of the device occurred.

6.22.6.3. Horizontal orientation:

For each lighting unit the kink of the elbow of the cut-off line, if any, when projected on the screen, shall coincide with the vertical line through the reference axis of said lighting unit. A tolerance of 0,5 degree to that side which is the side of the traffic direction shall be allowed. Other lighting units shall be adjusted according to the applicant's specification, as defined according to Annex 10 of Regulation No 123.

6.22.6.4. Measuring procedure:

After adjustment of the initial setting of beam orientation, the vertical inclination of the passing-beam or, when applicable, the vertical inclinations of all the different lighting units that provide or contribute to the cut-off(s) according to paragraph 6.22.6.1.2.1 above of the basic passing-beam, shall be verified for all loading conditions of the vehicle in accordance with the specifications in paragraphs 6.2.6.3.1 and 6.2.6.3.2 of this Regulation.

6.22.7. Electrical connections

6.22.7.1. Main-beam lighting (if provided by the AFS)

- 6.22.7.1.1. The lighting units for the main-beam may be activated either simultaneously or in pairs. For changing over from the dipped-beam to the main-beam at least one pair of lighting units for the main-beam shall be activated. For changing over from the main-beam to the dipped-beam all lighting units for the main-beam shall be de-activated simultaneously.

- 6.22.7.1.2. The main-beam may be designed to be adaptive, subject to the provisions in paragraph 6.22.9.3, the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:

(a) ambient lighting conditions;

- (b) the light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;
- (c) the light emitted by the rear light-signalling of preceding vehicles;

Additional sensor functions to improve performance are allowed.

For the purpose of this paragraph, 'vehicles' means vehicles of categories L, M, N, O, T, as well as bicycles, such vehicles being equipped with retro-reflectors, with lighting and light-signalling devices, which are switched ON.

- 6.22.7.1.3. It shall always be possible to switch the main-beam headlamps, adaptive or non-adaptive, ON and OFF manually and to manually switch OFF the automatic control.

Moreover, the switching OFF, of the main-beam headlamps and of their automatic control, shall be by means of a simple and immediate manual operation; the use of sub-menus is not allowed.

- 6.22.7.1.4. The dipped-beams may remain switched ON at the same time as the main beams.

- 6.22.7.1.5. Where four concealable lighting units are fitted their raised position shall prevent the simultaneous operation of any additional headlamps fitted, if these are intended to provide light signals consisting of intermittent illumination at short intervals (see paragraph 5.12) in daylight.

- 6.22.7.2. Passing-beam lighting:

- (a) the control for changing over to the dipped-beam shall switch off all main-beam headlamps or deactivate all AFS lighting units for the main-beam simultaneously;
- (b) the dipped-beam may remain switched on at the same time as the main-beams;
- (c) in the case of lighting units for the dipped-beam being equipped with gas discharge light sources, the gas-discharge light sources shall remain switched on during the main-beam operation.

- 6.22.7.3. Switching ON and OFF the passing-beam may be automatic, however subject to the requirements for 'Electrical connection' in paragraph 5.12 of this Regulation.

- 6.22.7.4. Automatic operation of the AFS

The changes within and between the provided classes and their modes of the AFS lighting functions as specified below, shall be performed automatically without causing discomfort, distraction or glare, neither for the driver nor for other road users.

The following conditions apply for the activation of the classes and their modes of the passing-beam and, where applicable, of the main-beam and/or the adaptation of the main-beam.

- 6.22.7.4.1. The class C mode(s) of the passing-beam shall be activated if no mode of another passing-beam class is activated.

- 6.22.7.4.2. The class V mode(s) of the passing-beam shall not operate unless one or more of the following conditions is/are automatically detected (V-signal applies):

- (a) roads in built-up areas and the vehicle's speed not exceeding 60 km/h;
- (b) roads equipped with a fixed road illumination, and the vehicle's speed not exceeding 60 km/h;
- (c) a road surface luminance of 1 cd/m² and/or a horizontal road illumination of 10 lx being exceeded continuously;
- (d) the vehicle's speed not exceeding 50 km/h.

- 6.22.7.4.3. The class E mode(s) of the passing-beam shall not operate unless the vehicle's speed exceeds 60 km/h and one or more of the following conditions is/are automatically detected:

- (a) the road characteristics correspond to motorway conditions ⁽²¹⁾ or the vehicle's speed exceeds 110 km/h (E-signal applies);
- (b) in case of a class E mode of the passing-beam which, according to the system's approval documents/communication sheet, complies with a 'data set' of Regulation No 123, Annex 3, Table 6, only.

⁽²¹⁾ Traffic directions being separated by means of road construction, or, a corresponding lateral distance of opposing traffic is identified. This implies a reduction of undue glare from vehicles headlamps in opposing traffic.

Data set E1: the vehicle's speed exceeds 100 km/h (E1-signal applies);

Data set E2: the vehicle's speed exceeds 90 km/h (E2-signal applies);

Data set E3: the vehicle's speed exceeds 80 km/h (E3-signal applies).

6.22.7.4.4. The class W-mode(s) of the passing-beam shall not operate unless the front fog lamps, if any, are switched OFF and one or more of the following conditions is/are automatically detected (W-signal applies):

(a) the wetness of the road has been detected automatically;

(b) the windshield wiper is switched ON and its continuous or automatically controlled operation has occurred for a period of at least two minutes.

6.22.7.4.5. A mode of a class C, V, E, or W passing-beam shall not be modified to become a bending mode of said class (T-signal applies in combination with the signal of said passing-beam class according to paragraphs 6.22.7.4.1 through 6.22.7.4.4 above) unless at least one of the following characteristics (or equivalent indications) are evaluated:

(a) the angle of lock of the steering;

(b) the trajectory of the centre of gravity of the vehicle.

In addition the following provisions apply:

(i) a horizontal movement of the asymmetric cut-off side-wards from the longitudinal axis of the vehicle, if any, is allowed only when the vehicle is in forward motion ⁽²²⁾ and shall be such that the longitudinal vertical plane through the kink of the elbow of the cut-off does not intersect the line of the trajectory of the centre of gravity of the vehicle at distances from the front of the vehicle which are larger than 100 times the mounting height of the respective lighting unit;

(ii) one or more lighting units may be additionally energized only when the horizontal radius of curvature of the trajectory of the centre of gravity of the vehicle is 500 m or less.

6.22.7.5. It shall always be possible for the driver to set the AFS to the neutral state and to return it to its automatic operation.

6.22.8. Tell-tale:

6.22.8.1. The provisions of paragraphs 6.1.8 (for the main-beam headlamp) and 6.2.8 (for the dipped-beam headlamp) of this Regulation apply to the respective parts of an AFS.

6.22.8.2. A visual failure tell-tale for AFS is mandatory. It shall be non-flashing. It shall be activated whenever a failure is detected with respect to the AFS control signals or when a failure signal is received in accordance with paragraph 5.9 of Regulation No 123. It shall remain activated while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the device which starts and stops the engine is switched on and off.

6.22.8.3. If the main-beam is adaptive, a visual tell-tale shall be provided to indicate to the driver that the adaptation of the main beam is activated. This information shall remain displayed as long as the adaptation is activated.

6.22.8.4. A tell-tale to indicate that the driver has set the system into a state according to paragraph 5.8 of Regulation No 123 is optional.

6.22.9. Other requirements

6.22.9.1. An AFS shall be permitted only in conjunction with the installation of headlamp cleaning device(s) according to Regulation No 45 ⁽²³⁾ for at least those lighting units, which are indicated under item 9.3 of the communication form conforming to the model in Annex 1 to Regulation No 123, if the total objective luminous flux of the light sources of these units exceeds 2 000 lm per side, and which contribute to the class C (basic) passing-beam.

⁽²²⁾ This provision does not apply for passing-beam lighting when bend lighting is produced for a right turn in right-hand traffic (left turn in left-hand traffic).

⁽²³⁾ Contracting Parties to the respective Regulations can still prohibit the use of mechanical cleaning systems when headlamps with plastic lenses, marked 'PL', are installed.

- 6.22.9.2. Verification of compliance with AFS automatic operating requirements
- 6.22.9.2.1. The applicant shall demonstrate with *a concise description* or other means acceptable to the Type Approval Authority:
- (a) the correspondence of the *AFS control signals*
 - (i) to the description required in paragraph 3.2.6 of this Regulation; and
 - (ii) to the respective AFS control signals specified in the AFS type approval documents; and
 - (b) compliance with the *automatic operating* requirements according to paragraphs 6.22.7.4.1 through 6.22.7.4.5 above.
- 6.22.9.2.2. To verify, whether, according to the paragraph 6.22.7.4, the AFS automatic operation of the passing-beam functions does not cause any discomfort, the technical service shall perform a test drive which comprises any situation relevant to the system control on the basis of the applicants description; it shall be notified whether all modes are activated, performing and de-activated according to the applicant's description; obvious malfunctioning, if any, shall be contested (e.g. excessive angular movement or flicker).
- 6.22.9.2.3. The overall performance of the automatic control shall be demonstrated by the applicant by documentation or by other means accepted by the Type Approval Authority. Furthermore the manufacturer shall provide a documentation package which gives access to the design of 'the safety concept' of the system. This 'safety concept' is a description of the measures designed into the system, for example within the electronic units, so as to address system integrity and thereby ensure safe operation even in the event of mechanical or electrical failure which could cause any discomfort, distraction or glare, either to the driver or to oncoming and preceding vehicles. This description shall also give a simple explanation of all the control functions of the 'system' and the methods employed to achieve the objectives, including a statement of the mechanism(s) by which control is exercised.
- A list of all input and sensed variables shall be provided and the working range of these shall be defined. The possibility of a fall-back to the basic passing-beam (class C) function shall be a part of the safety concept.
- The functions of the system and the safety concept, as laid down by the manufacturer, shall be explained. The documentation shall be brief, yet provide evidence that the design and development has had the benefit of expertise from all the system fields which are involved.
- For periodic technical inspections, the documentation shall describe how the current operational status of the 'system' can be checked.
- For Type Approval purposes this documentation shall be taken as the basic reference for the verification process.
- 6.22.9.2.4. To verify, that the adaptation of the main-beam does not cause any discomfort, distraction or glare, neither to the driver nor to oncoming and preceding vehicles, the technical service shall perform a test drive according to paragraph 2 in Annex 12. This shall include any situation relevant to the system control on the basis of the applicant's description. The performance of the adaptation of the main-beam shall be documented and checked against the applicant's description. Any obvious malfunctioning shall be contested (e.g. excessive angular movement or flicker).
- 6.22.9.3. Adaptation of the main-beam
- 6.22.9.3.1. The sensor system used to control the adaptation of the main-beam, as described in paragraph 6.22.7.1.2, shall comply with the following requirements:
- 6.22.9.3.1.1. The boundaries of the minimum fields in which the sensor is able to detect light emitted from other vehicles as defined in paragraph 6.22.7.1.2 above are given by the angles indicated in paragraph 6.1.9.3.1.1 of this Regulation.
 - 6.22.9.3.1.2. The sensor system sensitivity shall comply with the requirements in paragraph 6.1.9.3.1.2 of this Regulation.

- 6.22.9.3.1.3. The adaptive main-beam shall be switched off when the illuminance produced by ambient lighting conditions exceeds 7 000 lx.

Compliance with this requirement shall be demonstrated by the applicant, using simulation or other means of verification accepted by the Type Approval Authority. If necessary the illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the Type Approval Authority.

- 6.22.9.4. The aggregate maximum intensity of the lighting units that can be energized simultaneously to provide the main-beam lighting or its modes, if any, shall not exceed 430 000 cd, which corresponds to a reference value of 100.

This maximum intensity shall be obtained by adding together the individual reference marks indicated on the several installation units that are simultaneously used to provide the main-beam.

- 6.22.9.5. The means according to the provisions of paragraph 5.8 of Regulation No 123, which allow the vehicle to be used temporarily in a territory with the opposite direction of driving than that for which approval is sought, shall be explained in detail in the owner's manual.

- 6.23. Emergency stop signal

- 6.23.1. Presence

Optional

The emergency stop signal shall be given by the simultaneous operation of all the stop or direction-indicator lamps fitted as described in paragraph 6.23.7.

- 6.23.2. Number

As specified in paragraph 6.5.2 or 6.7.2.

- 6.23.3. Arrangement

As specified in paragraph 6.5.3 or 6.7.3.

- 6.23.4. Position

As specified in paragraph 6.5.4 or 6.7.4.

- 6.23.5. Geometric visibility

As specified in paragraph 6.5.5 or 6.7.5.

- 6.23.6. Orientation

As specified in paragraph 6.5.6 or 6.7.6.

- 6.23.7. Electrical connections

- 6.23.7.1. All the lamps of the emergency stop signal shall flash in phase at a frequency of $4,0 \pm 1,0$ Hz.

- 6.23.7.1.1. However, if any of the lamps of the emergency stop signal to the rear of the vehicle use filament light sources the frequency shall be $4,0 + 0,0/- 1,0$ Hz.

- 6.23.7.2. The emergency stop signal shall operate independently of other lamps.

- 6.23.7.3. The emergency stop signal shall be activated and deactivated automatically.

- 6.23.7.3.1. The emergency stop signal shall be activated only when the vehicle speed is above 50 km/h and the braking system is providing the emergency braking logic signal defined in Regulations Nos 13 and 13-H.

- 6.23.7.3.2. The emergency stop signal shall be automatically deactivated if the emergency braking logic signal as defined in Regulations Nos 13 and 13-H is no longer provided or if the hazard warning signal is activated.

- 6.23.8. Tell-tale
Optional
- 6.23.9. Other requirements
- 6.23.9.1. Except as provided in paragraph 6.23.9.2 below, if a motor vehicle is equipped to tow a trailer, the control of the emergency stop signal on the motor vehicle shall also be capable of operating the emergency stop signal on the trailer.

When the motor vehicle is electrically connected to a trailer, the operating frequency of the emergency stop signal for the combination shall be limited to the frequency specified in paragraph 6.23.7.1.1. However, if the motor vehicle can detect that filament light sources are not being used on the trailer for the emergency stop signal, the frequency may be that specified in paragraph 6.23.7.1.
- 6.23.9.2. If a motor vehicle is equipped to tow a trailer fitted with a service braking system of either continuous or semi-continuous type, as defined in Regulation No 13, it shall be ensured that a constant power supply is provided via the electrical connector for the stop lamps to such trailers while the service brake is applied.

The emergency stop signal on any such trailer may operate independently of the towing vehicle and is not required to operate either at the same frequency as, or in phase with that on the towing vehicle.
- 6.24. Exterior courtesy lamp
- 6.24.1. Presence
Optional on motor vehicles
- 6.24.2. Number

Two, however further exterior courtesy lamps to illuminate steps and/or door handles are permitted. Each door handle or step shall be illuminated by not more than one lamp.
- 6.24.3. Arrangement

No special requirement, however the requirements of paragraph 6.24.9.3 apply.
- 6.24.4. Position

No special requirement.
- 6.24.5. Geometric visibility

No special requirement.
- 6.24.6. Orientation

No special requirement.
- 6.24.7. Electrical connections

No special requirement.
- 6.24.8. Tell-tale

No special requirement.
- 6.24.9. Other requirements
- 6.24.9.1. The exterior courtesy lamp shall not be activated unless the vehicle is stationary and one or more of the following conditions is satisfied:
(a) the engine is stopped; or

(b) a driver or passenger door is opened; or

(c) a load compartment door is opened.

The provisions of paragraph 5.10 shall be met in all fixed positions of use.

6.24.9.2. Approved lamps emitting white light with the exception of main beam head lamps, day time running lamps and reversing lamps may be activated as courtesy lamp function. They may also be activated together with the exterior courtesy lamps and the condition of paragraphs 5.11 and 5.12 above may not apply.

6.24.9.3. The technical service shall, to the satisfaction of the Type Approval Authority, perform a visual test to verify that there is no direct visibility of the apparent surface of the exterior courtesy lamps, if viewed by an observer moving on the boundary of a zone on a transverse plane 10 m from the front of the vehicle, a transverse plane 10 m from the rear of the vehicle, and two longitudinal planes 10 m from each side of the vehicle; these four planes to extend from 1 m to 3 m above and perpendicular to the ground as shown in Annex 14.

At the request of the applicant and with the consent of the Technical Service this requirement may be verified by a drawing or simulation.

6.25. Rear-end collision alert signal

6.25.1. Presence

Optional

The rear-end collision alert signal shall be given by the simultaneous operation of all the direction indicator lamps fitted as described in paragraph 6.25.7.

6.25.2. Number

As specified in paragraph 6.5.2.

6.25.3. Arrangement

As specified in paragraph 6.5.3.

6.25.4. Position

As specified in paragraph 6.5.4.

6.25.5. Geometric visibility

As specified in paragraph 6.5.5.

6.25.6. Orientation

As specified in paragraph 6.5.6.

6.25.7. Electrical connections. Compliance with these requirements shall be demonstrated by the applicant, by simulation or other means of verification accepted by the Technical Service responsible for type approval.

6.25.7.1. All the lamps of the rear-end collision alert signal shall flash in phase at a frequency of 4,0 +/- 1,0 Hz.

6.25.7.1.1. However, if any of the lamps of the rear end collision alert signal to the rear of the vehicle use filament light sources the frequency shall be 4,0 + 0,0/- 1,0 Hz.

6.25.7.2. The rear-end collision alert signal shall operate independently of other lamps.

6.25.7.3. The rear-end collision alert signal shall be activated and deactivated automatically.

6.25.7.4. The rear-end collision alert signal shall not be activated if the direction indicator lamps, the hazard warning signal or the emergency stop signal is activated.

6.25.7.5. The rear-end collision alert signal may only be activated under the following conditions:

Vr	activation
$V_r > 30 \text{ km/h}$	$TTC \leq 1,4$
$V_r \leq 30 \text{ km/h}$	$TTC \leq 1,4/30 \times V_r$

'Vr (Relative Speed)': means the difference in speed between a vehicle with rear-end collision alert signal and a following vehicle in the same lane.

'TTC (Time to collision)': means the estimated time for a vehicle with rear-end collision alert signal and a following vehicle to collide assuming the relative speed at the time of estimation remains constant.

6.25.7.6. The activation period of the rear-end collision alert signal shall be not more than 3 seconds.

6.25.8. Tell-tale

Optional

6.26. Manoeuvring lamps (Regulation No 23)

6.26.1. Presence

Optional on motor vehicles.

6.26.2. Number

One or two (one per side)

6.26.3. Arrangement

No special requirement, however the requirements of paragraph 6.26.9 apply.

6.26.4. Position

No special requirement.

6.26.5. Geometric Visibility

No special requirement.

6.26.6. Orientation

Downwards, however the requirements of paragraph 6.26.9 apply.

6.26.7. Electrical Connections

Manoeuvring lamps shall be so connected that they cannot be activated unless the main-beam headlamps or the dipped-beam headlamps are switched ON at the same time.

The manoeuvring lamp(s) shall be activated automatically for slow manoeuvres up to 10 km/h provided that one of the following conditions is fulfilled:

- (a) prior to the vehicle being set in motion for the first time after each manual activation of the propulsion system; or
- (b) reverse gear is engaged; or
- (c) a camera-based system which assists parking manoeuvres is activated

The manoeuvring lamps shall be automatically switched off if the forward speed of the vehicle exceeds 10 km/h and they shall remain switched off until the conditions for activation are met again.

6.26.8. Tell-tale

No special requirement.

- 6.26.9. Other requirements
- 6.26.9.1. The Technical Service shall, to the satisfaction of the Type Approval Authority, perform a visual test to verify that there is no direct visibility of the apparent surface of these lamps, if viewed by an observer moving on the boundary of a zone on a transverse plane 10 m from the front of the vehicle, a transverse plane 10 m from the rear of the vehicle, and two longitudinal planes 10 m from each side of the vehicle; these four planes to extend from 1 m to 3 m above and parallel to the ground as shown in Annex 14.
- 6.26.9.2. At the request of the applicant and with the consent of the Technical Service the requirement of 6.26.9.1 may be verified by a drawing or simulation or deemed be satisfied if the installation conditions comply with paragraph 6.2.3 of Regulation No 23, as noticed in the communication document in Annex 1, paragraph 9.
7. MODIFICATIONS AND EXTENSIONS OF APPROVAL OF THE VEHICLE TYPE OR OF THE INSTALLATION OF ITS LIGHTING AND LIGHT-SIGNALLING DEVICES
- 7.1. Every modification of the vehicle type, or of the installation of its lighting or light-signalling devices, or of the list referred to in paragraph 3.2.2 above, shall be notified to the Type Approval Authority which approved that vehicle type. The Authority may then either:
- 7.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle still meets the requirements; or
- 7.1.2. Require a further test report from the Technical Services responsible for conducting the tests.
- 7.2. Confirmation of extension or refusal of approval, specifying the alteration, shall be communicated by the procedure specified in paragraph 4.3 above to the Parties to the Agreement applying this Regulation.
- 7.3. The Type Approval Authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
8. CONFORMITY OF PRODUCTION
- The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:
- 8.1. Any vehicle approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraphs 5 and 6 above.
- 8.2. The holder of the approval shall in particular:
- 8.2.1. Ensure existence of procedures for effective quality control of the vehicle as regards all aspects relevant to compliance with the requirements set out in paragraphs 5 and 6 above;
- 8.2.2. Ensure that for each type of vehicle at least the tests prescribed in Annex 9 to this Regulation or physical checks from which equivalent data may be derived are carried out;
- 8.3. The Type Approval Authority may carry out any test prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments.
- 8.4. The Type Approval Authority shall strive to obtain a frequency of inspection of once per year. However, this is at the discretion of the Type Approval Authority and their confidence in the arrangements for ensuring effective control of the conformity of production. In the case where negative results are recorded, the Type Approval Authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

9.1. The approval granted in respect of a type of vehicle pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a vehicle bearing the approval mark does not conform to the type approved.

9.2. If a Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF TYPE APPROVAL AUTHORITIES

The Contracting Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

12. TRANSITIONAL PROVISIONS

12.1. General

12.1.1. As from the official date of entry into force of the most recent series of amendments, no Contracting Party applying this Regulation shall refuse to grant approval under this Regulation as amended by this most recent series of amendments.

12.1.2. As from the official date of entry into force of the most recent series of amendments, no Contracting Party applying this Regulation shall refuse national or regional type approval to a vehicle type approved under this Regulation as amended by this most recent series of amendments.

12.1.3. During the time period from the official date of entry into force of the most recent series of amendments and its mandatory application to new type approvals, Contracting Parties applying this Regulation shall continue to grant approvals to those types of vehicles which comply with the requirements of this Regulation as amended by all the applicable preceding series of amendments.

12.1.4. Existing approvals under this Regulation granted before the date of mandatory application of the most recent series of amendment shall remain valid indefinitely and Contracting Parties applying this Regulation shall continue to recognize them and shall not refuse to grant extensions of approvals to them (except for what indicated in paragraph 12.1.6 below).

12.1.5. When the vehicle type approved to any of the preceding series of amendments meets the requirements of this Regulation as amended by the most recent series of amendments, the Contracting Party which granted the approval shall notify the other Contracting Parties applying this Regulation thereof.

12.1.6. Notwithstanding paragraph 12.1.4 above, Contracting Parties whose application of this Regulation comes into force after the date of entry into force of the most recent series of amendments are not obliged to accept approvals which were granted in accordance with any of the preceding series of amendments to this Regulation.

12.1.7. Until the United Nations Secretary-General is notified otherwise, Japan declares that in relation to the installation of lighting and light signalling devices, Japan will only be bound by the obligations of the Agreement to which this Regulation is annexed with respect to vehicles of categories M₁ and N₁.

12.2. Transitional provisions applicable to 03 series of amendments.

Contracting Parties applying this Regulation:

- (a) from 10 October 2007 (12 months after the date of entry into force), shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 03 series of amendments;
- (b) up to 9 October 2009 (36 months after the date of entry into force) shall not refuse national or regional type approval of a vehicle type approved to any of the preceding series of amendments to this Regulation;
- (c) from 10 October 2009 (36 months after the entry into force) may refuse first national or regional entry into service of a vehicle of categories N₂ (with a maximum mass exceeding 7,5 tonnes), N₃, O₃ and O₄ exceeding 2 100 mm in width (for rear markings) and exceeding 6 000 mm in length (for side markings), except tractors for semi-trailers and incomplete vehicles, which do not meet the requirements of the 03 series of amendments to this Regulation;
- (d) notwithstanding paragraph 12.1.4, from 10 October 2011 (60 months after the date of entry into force) shall no more recognize approvals to this Regulation granted to type of vehicles of categories N₂ (with a maximum mass exceeding 7,5 tons), N₃, O₃ and O₄ exceeding 2 100 mm in width (for rear markings) and exceeding 6 000 mm in length (for side markings), except tractors for semi-trailers and incomplete vehicle, under any preceding series of amendment, that ceases to be valid;
- (e) from 12 June 2010 (36 months from the entry into force of Supplement 3 to the 03 series of amendments) shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by Supplement 3 to the 03 series of amendments;
- (f) up to 11 January 2010 (18 months after the official date of entry into force of Supplement 4 to the 03 series of amendments) shall continue to grant approvals to new vehicle types which do not meet the requirements on vertical orientation of front fog lamps (paragraph 6.3.6.1.1) and/or on direction indicator operating tell-tale (paragraph 6.5.8) and/or on daytime running lamps switching off (paragraph 6.19.7.3);
- (g) up to 10 October 2011 (60 month after the official date of entry into force) shall continue to grant approvals to new vehicle types which do not meet the requirements on cumulative length of conspicuity markings (paragraph 6.21.4.1.3) ⁽²⁴⁾.

12.3. Transitional provisions applicable to 04 series of amendments.

Contracting Parties applying this Regulation:

- (a) from 7 February 2011 for vehicles of categories M₁ and N₁, and from 7 August 2012 for vehicles of other categories (respectively 30 and 48 months after the official date of entry into force) shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 04 series of amendments;
- (b) after 22 July 2009 (date of entry into force of Supplement 2 to the 04 series of amendments) shall continue to grant approvals to vehicle types which do not meet the requirements of paragraph 5.2.1 as amended by the Supplement 2 to 04 series of amendments if they are fitted with headlamps approved to Regulation No 98 (prior to Supplement 9) or Regulation No 112 (prior to Supplement 8);
- (c) from 24 October 2012 (36 months from the entry into force of Supplement 3 to the 04 series of amendments) shall grant approvals only if the vehicle type to be approved meets the requirements on voltage limitation of paragraphs 3.2.7 and 5.27 to 5.27.4 of this Regulation as amended by Supplement 3 to the 04 series of amendments;
- (d) up to 7 February 2011 for vehicles of categories M₁ and N₁ and to 7 August 2012 for vehicles of other categories (respectively 30 and 48 months after the official date of entry into force of Supplement 2 to the 04 series of amendments) shall continue to grant approvals to new vehicle types which do not meet the requirements on switching OFF of daytime running lamps reciprocally incorporated with front direction indicator lamps (paragraph 6.19.7.6).

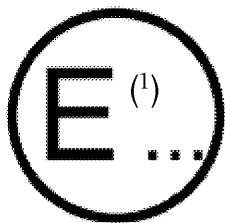
⁽²⁴⁾ Note by the secretariat: for paragraph 6.21.4.1.3, please refer to the text of the 03 series of amendments as contained in document E/ECE/324/Rev.1/Add.47/Rev.6 — E/ECE/TRANS/505/Rev.1/Add.47/Rev.6

- 12.3.1. Notwithstanding the transitional provisions above, Contracting Parties whose application of Regulation No 112 comes into force after 7 August 2008 (date of entry into force of the 04 series of amendments to the present Regulation) are not obliged to accept approvals if the vehicle type to be approved does not meet the requirements of paragraph 6.1.2 and 6.2.2 of this Regulation as amended by the 04 series of amendments to this Regulation with regard to Regulation No 112.
- 12.4. Transitional provisions applicable to 05 series of amendments.
- Contracting Parties applying this Regulation:
- (a) from 30 January 2015 (48 months from the official date of entry into force) shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 05 series of amendments.
- (b) until 30 July 2016 for new vehicles types of categories M₁ and N₁ and until 30 January 2018 for new vehicle types of other categories (respectively 66 and 84 months after the official date of entry into force) shall grant approvals if the new vehicle type to be approved meets the requirements of one or more of paragraphs 6.2.7.6.2 or 6.2.7.6.3 to 6.2.7.6.3.3 instead of those of paragraph 6.2.7.6.1 of this Regulation as amended by the 05 series of amendments.
- 12.5. Transitional provisions applicable to 06 series of amendments.
- Contracting Parties applying this Regulation:
- From 18 November 2017 (60 months after the date of entry into force) shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 06 series of amendments.
-

ANNEX 1

COMMUNICATION

(maximum format: A4 (210 × 297 mm))



issued by: Name of administration:
.....
.....
.....

- concerning (2): Approval granted
Approval extended
Approval refused
Approval withdrawn
Production definitively discontinued

of a type of vehicle with regard to the installation of lighting and light- signalling devices, pursuant to Regulation No 48.

Approval No Extension No

- 1. Trade name or mark of the vehicle:
2. Manufacturer's name for the type of vehicle:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Submitted for approval on:
6. Technical Service responsible for conducting approval tests:
7. Date of test report:
8. Number of test report:
9. Concise description:
Lighting and light-signalling devices on the vehicle:
9.1. Main-beam headlamps: yes/no (2)
9.2. Dipped-beam headlamps: yes/no (2)
9.3. Front-fog lamps: yes/no (2)
Comments: Reciprocally incorporated in headlamp: yes/no (2)
9.4. Reversing lamps: yes/no (2)
9.5. Front direction-indicators: yes/no (2)
9.6. Rear direction-indicators: yes/no (2)
9.7. Side direction-indicators: yes/no (2)
9.8. Hazard warning signal: yes/no (2)
9.9. Stop-lamps: yes/no (2)
9.9.1. Tell-tale indicating failure, as required by component regulation, fitted:
yes/no (2)

- 9.10. Rear registration plate
illuminating device: yes/no ⁽²⁾
- 9.11. Front position lamps: yes/no ⁽²⁾
- 9.11.1. Tell-tale indicating failure, as required by component regulation, fitted:
yes/no ⁽²⁾
- 9.12. Rear position lamps: yes/no ⁽²⁾
- 9.12.1. Tell-tale indicating failure, as required by component regulation, fitted:
yes/no ⁽²⁾
- 9.13. Rear fog-lamps: yes/no ⁽²⁾
- 9.14. Parking lamps: yes/no ⁽²⁾
- 9.15. End-outline marker lamps: yes/no ⁽²⁾
- 9.15.1. Tell-tale indicating failure, as required by component regulation, fitted:
yes/no ⁽²⁾
- 9.16. Rear retro-reflectors,
non-triangular: yes/no ⁽²⁾
- 9.17. Rear retro-reflectors, triangular: yes/no ⁽²⁾
- 9.18. Front retro-reflectors,
non-triangular: yes/no ⁽²⁾
- 9.19. Side retro-reflectors,
non-triangular: yes/no ⁽²⁾
- 9.20. Side marker lamps: yes/no ⁽²⁾
- 9.21. Daytime running lamps: yes/no ⁽²⁾
- 9.21.1. Tell-tale indicating failure, as required by component regulation, fitted:
yes/no ⁽²⁾
- 9.22. Adaptive front lighting system (AFS): yes/no ⁽²⁾
- 9.23. Cornering lamps: yes/no ⁽²⁾
- 9.24. Conspicuity markings: Rear Side
- 9.24.1. Full contour markings: yes/no ⁽²⁾ yes/no ⁽²⁾
- 9.24.2. Partial contour markings: yes/no ⁽²⁾ yes/no ⁽²⁾
- 9.24.3. Line markings: yes/no ⁽²⁾ yes/no ⁽²⁾
- 9.24.4. Exemption regarding conspicuity marking according to paragraph 6.21.1.2.5.
Rear
yes/no ⁽²⁾
Comments:
- Side
yes/no ⁽²⁾
Comments

- 9.25. Emergency stop signal: yes/no ⁽²⁾
- 9.26. Manoeuvring lamps: yes/no ⁽²⁾
- 9.27. Exterior courtesy lamps: yes/no ⁽²⁾
- 9.28. Equivalent lamps: yes/no ⁽²⁾
- 9.29. Maximum permissible load in the boot:
10. Comments:
- 10.1. Any comments on movable components:
- 10.2. Method used for the definition of the apparent surface:
- (a) Boundary of the illuminating surface ⁽²⁾ or
- (b) Light-emitting surface ⁽²⁾
- 10.3. Other comments (valid for right-hand or left-hand drive vehicles):
- 10.4. Comments concerning AFS (according to paragraphs 3.2.6 and 6.22.7.4 of this Regulation):
- 10.5. Comments regarding the extent of coverage of the conspicuity marking if it is less than the minimum value of 70 per cent required by paragraphs 6.21.4.1.2 and 6.21.4.2.2 of this Regulation.
- 10.6. For vehicles of M and N categories comments regarding the electrical supply conditions (according to paragraphs 3.2.7 and 5.27 of this Regulation)
- 10.7. Comments regarding conspicuity marking (according to paragraphs 6.21.1.2.5 and 6.21.4.3.1 of this Regulation)
- 10.8. Comments regarding conspicuity marking (Incomplete vehicle or Complete Vehicles according to paragraphs 6.21.1.2.1 and 6.21.1.2.2.1 of this Regulation):
- Incomplete vehicles: yes/no ⁽²⁾
- Complete vehicles: yes/no ⁽²⁾
- Completed vehicles: yes/no ⁽²⁾
11. Position of the approval mark:
12. Reason(s) for extension (if applicable):
13. Approval granted/extended/refused/withdrawn ⁽²⁾
14. Place:.....
15. Date:.....
16. Signature:.....
17. The following documents, bearing the approval number shown above, are available on request:

⁽¹⁾ Distinguishing number of the country which has granted/refused/withdrawn approval (see approval provisions in the Regulation).

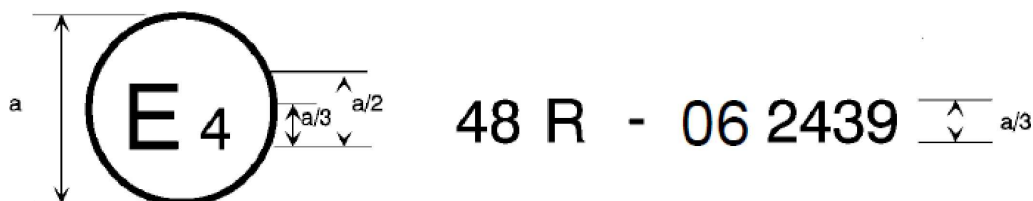
⁽²⁾ Strike out what does not apply.

ANNEX 2

ARRANGEMENTS OF APPROVAL MARKS

MODEL A

(See paragraph 4.4 of this Regulation)

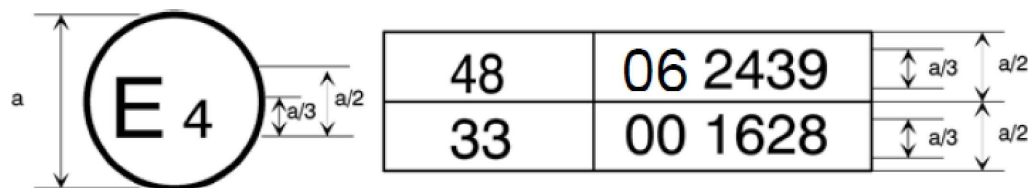


a = 8 mm min.

The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to the installation of lighting and light-signalling devices, been approved in the Netherlands (E 4) pursuant to Regulation No 48 as amended by the 06 series of amendments. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No 48 as amended by the 06 series of amendments.

MODEL B

(See paragraph 4.5 of this Regulation)



a = 8 mm min.

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E 4) pursuant to Regulation No 48 as amended by the 06 series of amendments and Regulation No 33 ⁽¹⁾. The approval number indicates that, at the dates when the respective approvals were given, Regulation No 48 was amended by the 06 series of amendments and Regulation No 33 was still in its original form.

⁽¹⁾ The second number is given merely as an example.

ANNEX 3

EXAMPLES OF LAMP SURFACES, AXES, CENTRES OF REFERENCE, AND ANGLES OF GEOMETRIC VISIBILITY

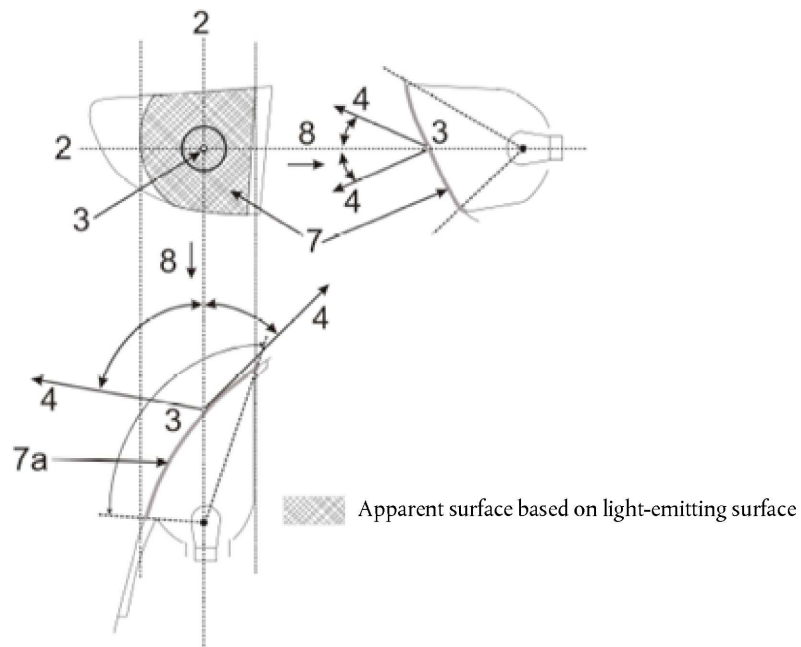
These examples show some arrangements to aid the understanding of the provisions and are not intended to be design-restrictive.

KEY for all examples in this annex:

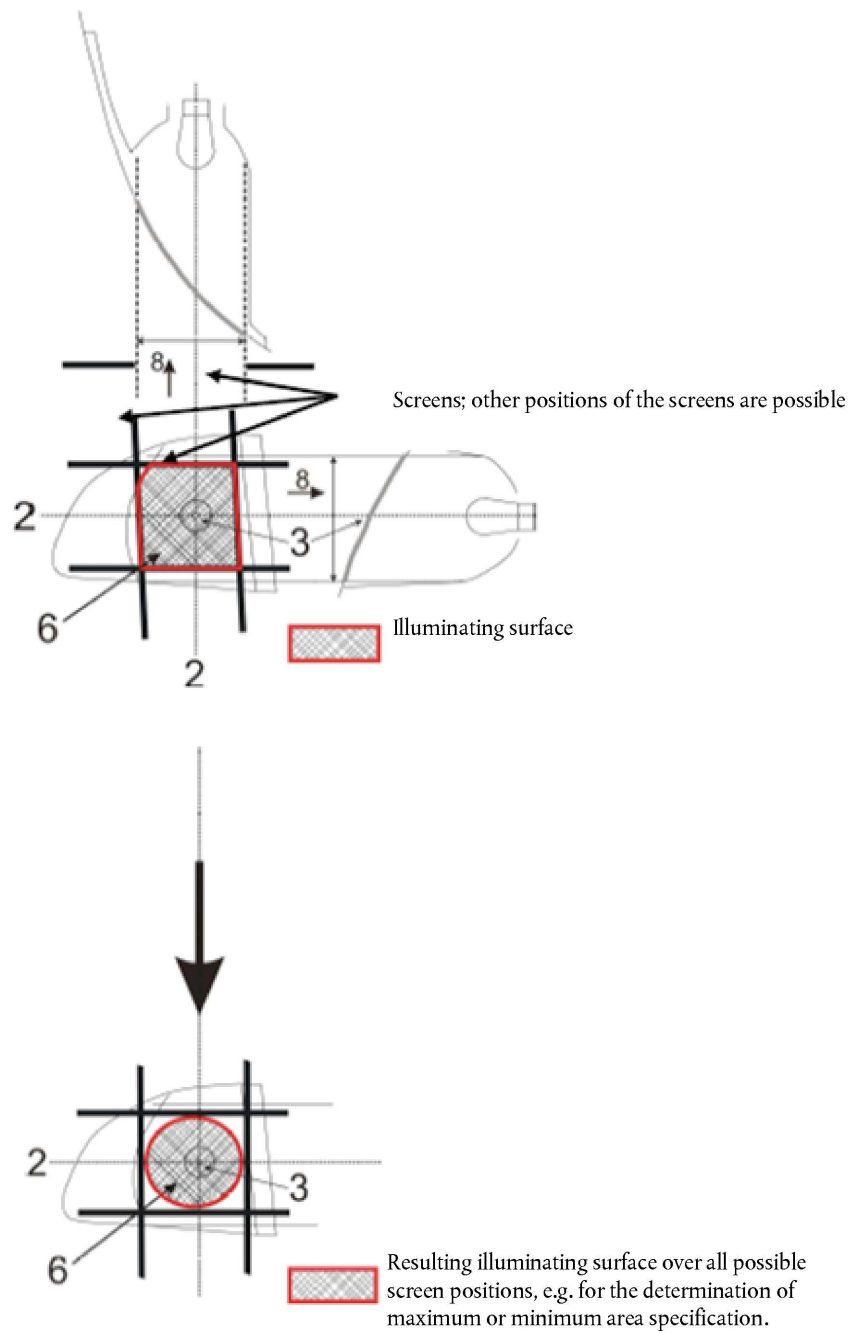
1. Illuminating surface	IO Inner optical part
2. Axis of reference	LG Light guide
3. Centre of reference	L Outer lens
4. Angle of geometric visibility	R Reflector
5. Light-emitting surface	S Light source
6. Apparent surface based on the illuminating surface	X Not part of this function
7a. Apparent surface based on the light-emitting surface according to paragraph 2.8(a) (with outer lens)	F1 Function one
7b. Apparent surface based on the light-emitting surface according to paragraph 2.8(b) (without outer lens)	F2 Function two
8. Direction of visibility	

PART 1

Light emitting surface of a light-signalling device other than a retro-reflector

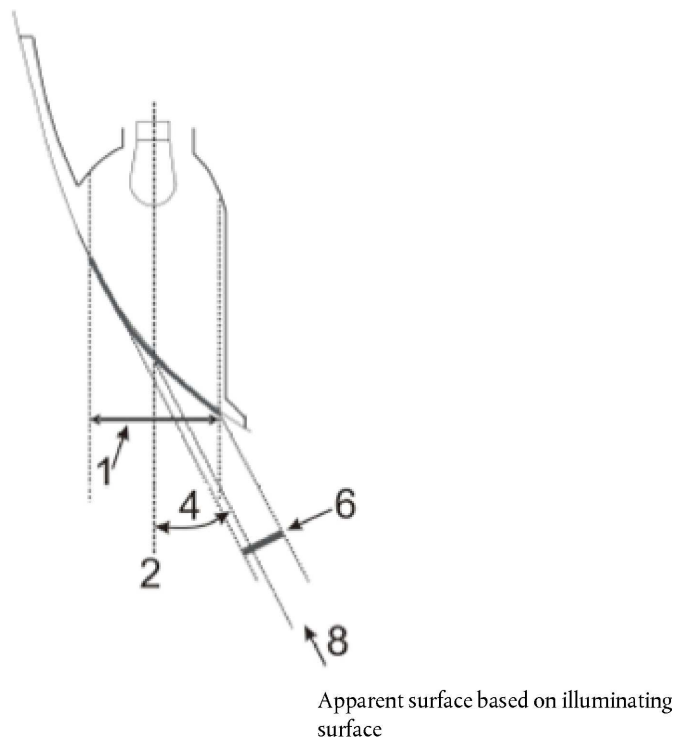
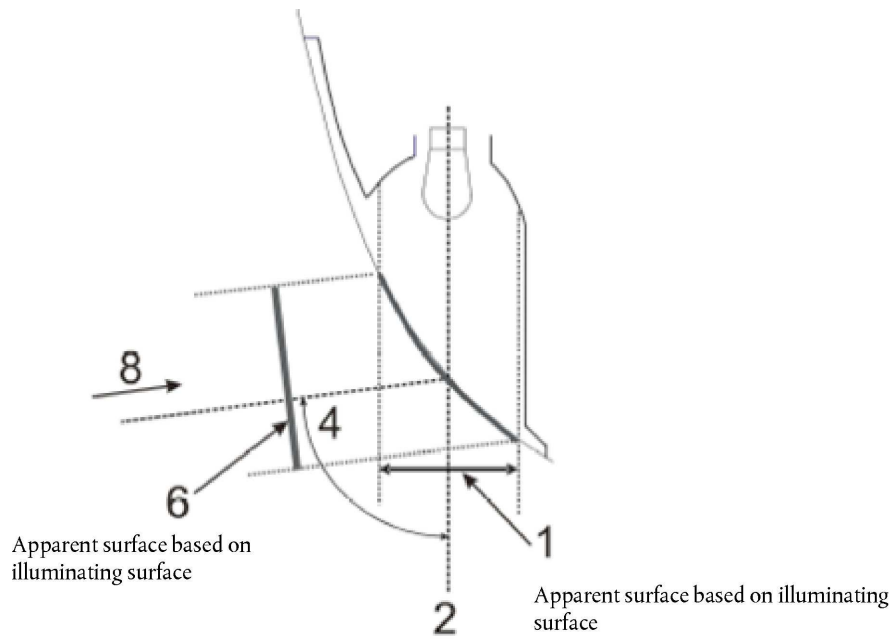


PART 2

Illuminating surface of a light-signalling device other than a retro-reflector

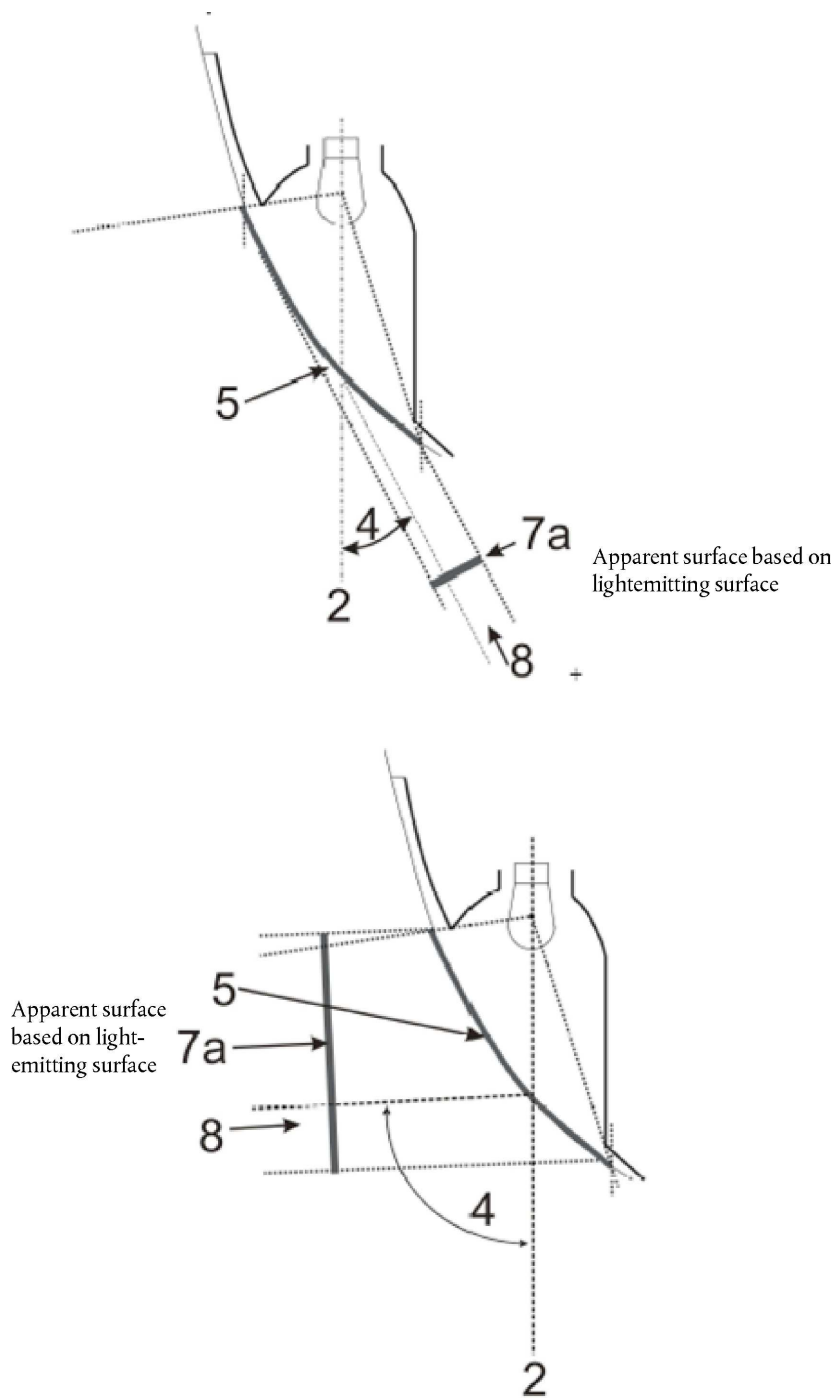
PART 3

Examples of apparent surface based on illuminating surface in different directions of geometric visibility



PART 4

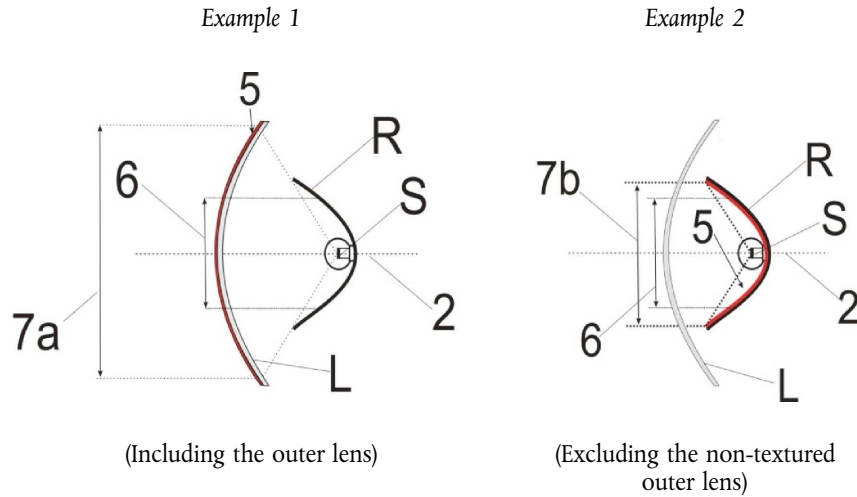
Examples of apparent surface based on light emitting surface in different directions of geometric visibility



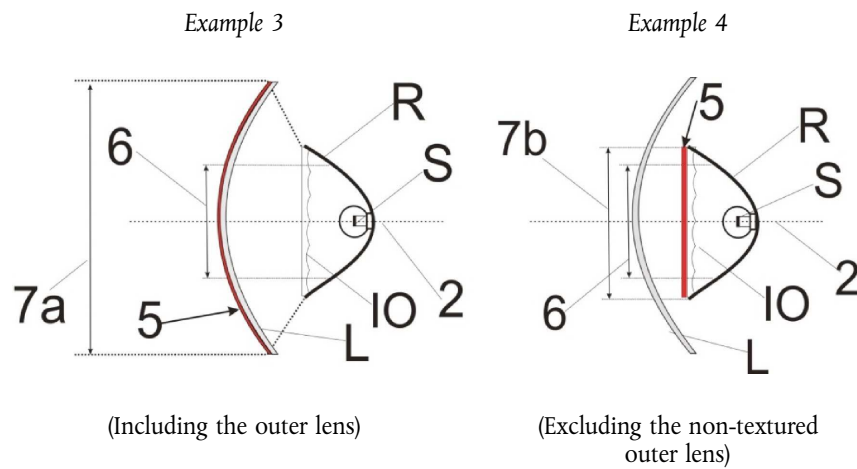
PART 5

Example of illuminating surface in comparison with light-emitting surface in the case of a ‘single function lamp’ (see paragraphs 2.8 to 2.9 of this Regulation)

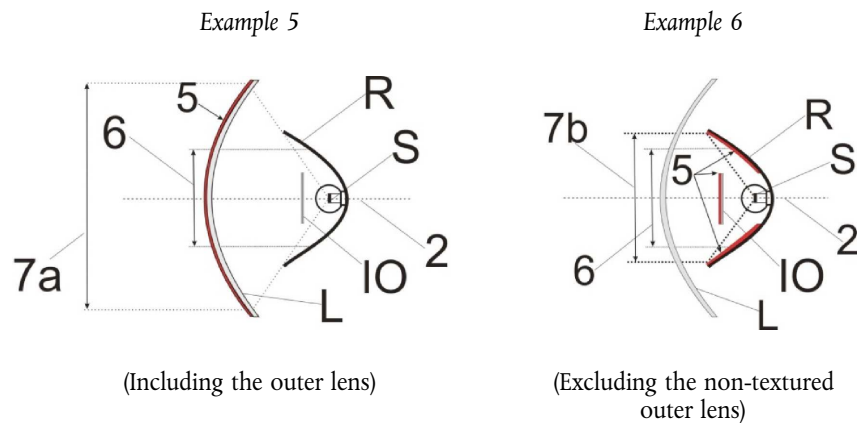
Examples of a light source with a reflector optic behind an outer lens:



Examples of a light source with a reflector optic with an inner lens behind an outer lens:

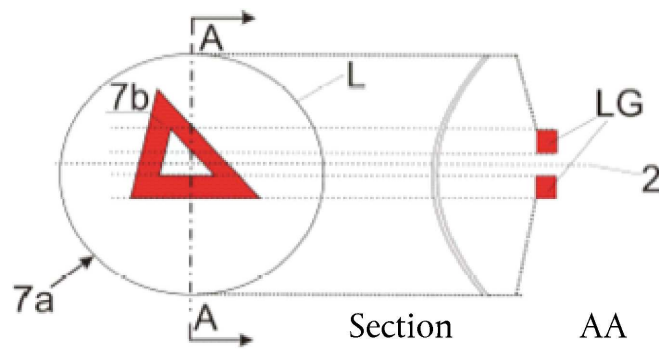



Examples of a light source with a reflector optic with a partial inner lens behind an outer lens:



Example of a light guide optic behind an outer lens:

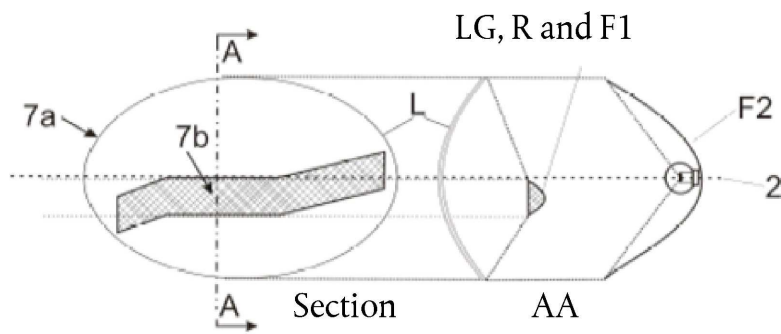
Example 7




 In the case where the non-textured outer lens is excluded, "7b" is the apparent surface according to paragraph 2.8. b).

Example of a light guide optic or a reflector optic behind an outer lens:

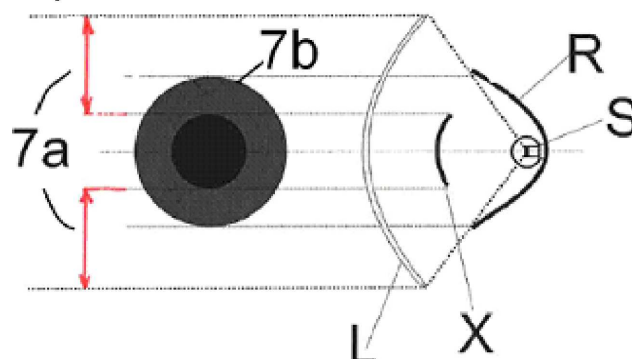
Example 8




 In the case where the non textured outer lens is excluded, "7b" is the apparent surface according to paragraph 2.8. b), and F1 shall not transparent to F2.

Example of a light source with a reflector optic in combination with an area which is not part of this function, behind an outer lens:

Example 9



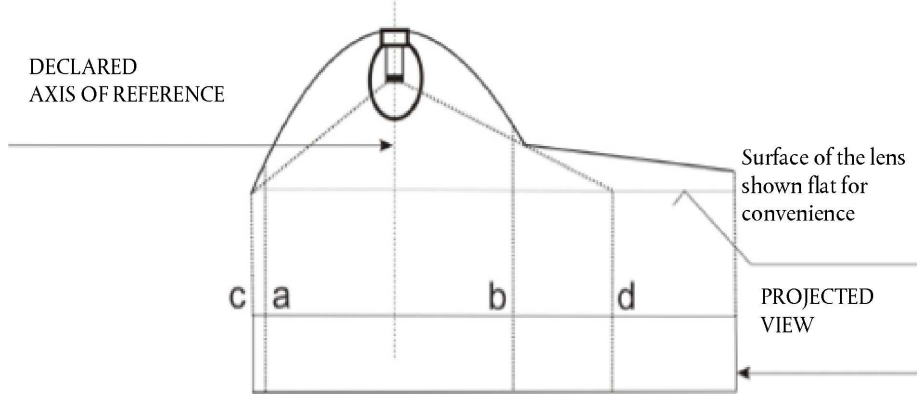
 In the case where the non textured outer lens is excluded, "7b" is the apparent surface according to paragraph 2.8. b).

PART 6

Examples showing the determination of the light-emitting surface in comparison with illuminating surface (See paragraphs 2.8 and 2.9 of this Regulation)

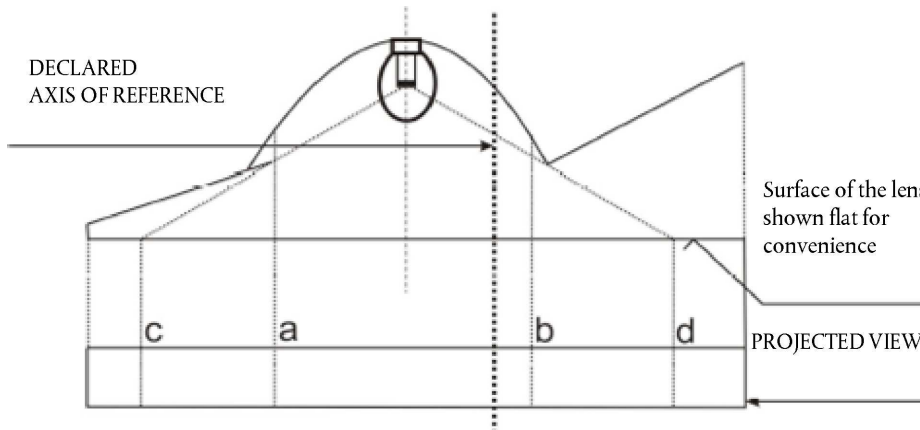
Note: Reflected light could/may contribute to the determination of the light emitting surface

Example A



	Illuminating surface	Declared light-emitting surface according to 2.8(a)
Edges are	a and b	c and d

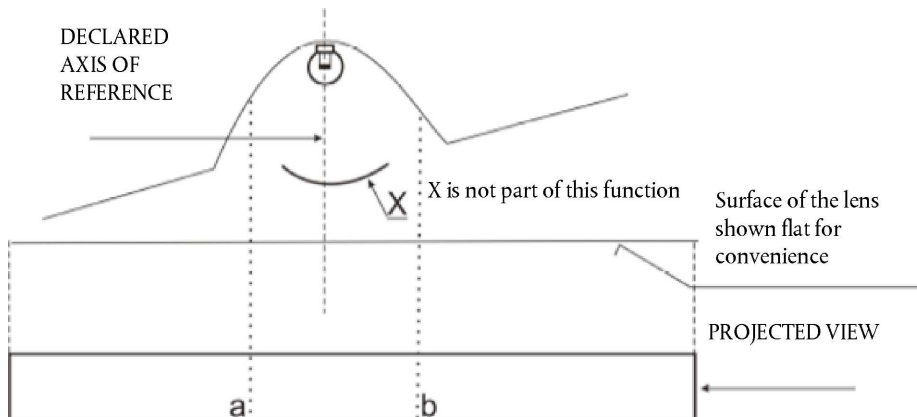
Example B



	Illuminating surface	Declared light-emitting surface according to 2.8(a)
Edges are	a and b	c and d

Example C

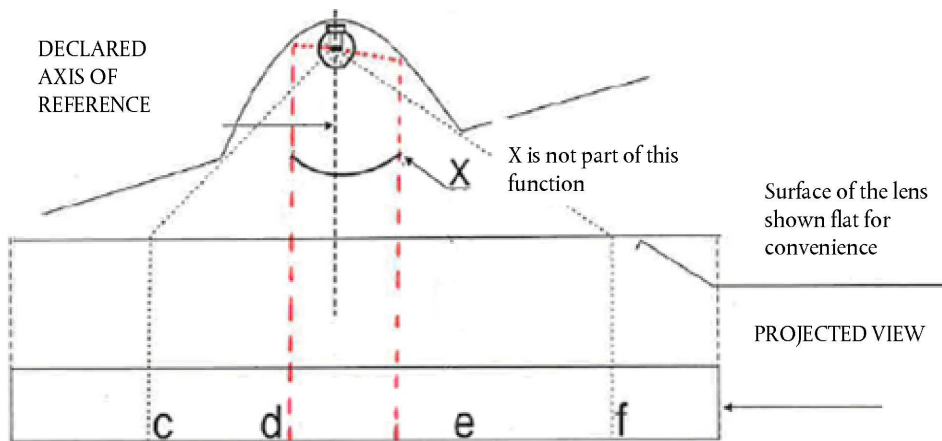
Example to determine the illuminating surface in combination with an area which is not part of the function:



	Illuminating surface
Edges are	a and b

Example D

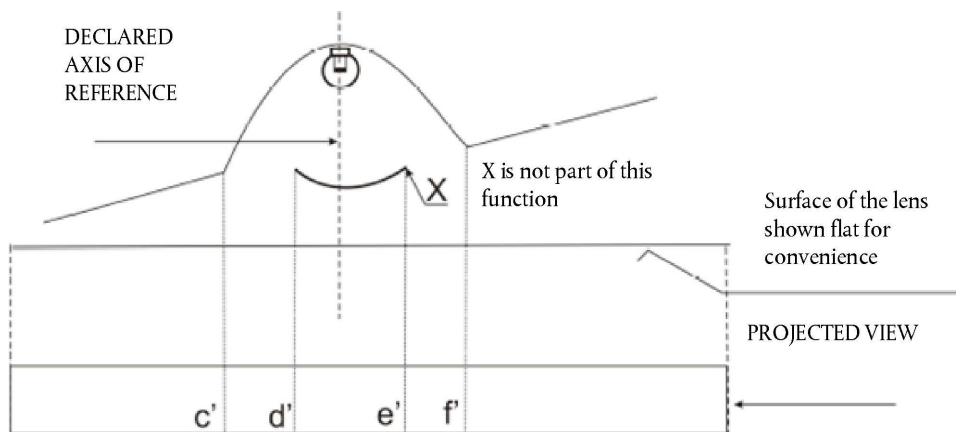
Example to determine a light emitting surface according to 2.8(a) in combination with an area which is not part of the function:



	Declared light-emitting surface according to 2.8(a)
Edges are	c-d and e-f

Example E

Example to determine the apparent surface in combination with an area which is not part of the function and a non-textured outer lens (according to 2.8(b)):

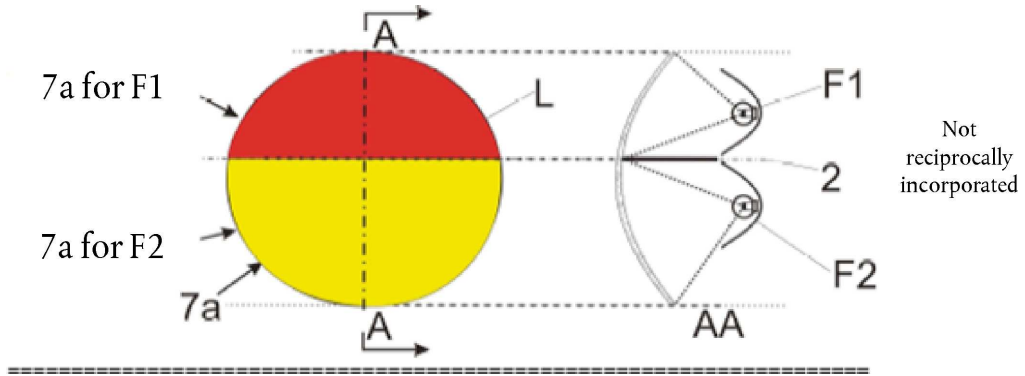


	Declared Light emitting surface according to 2.8(b) for example
Edges are	c'-d' and e'-f'

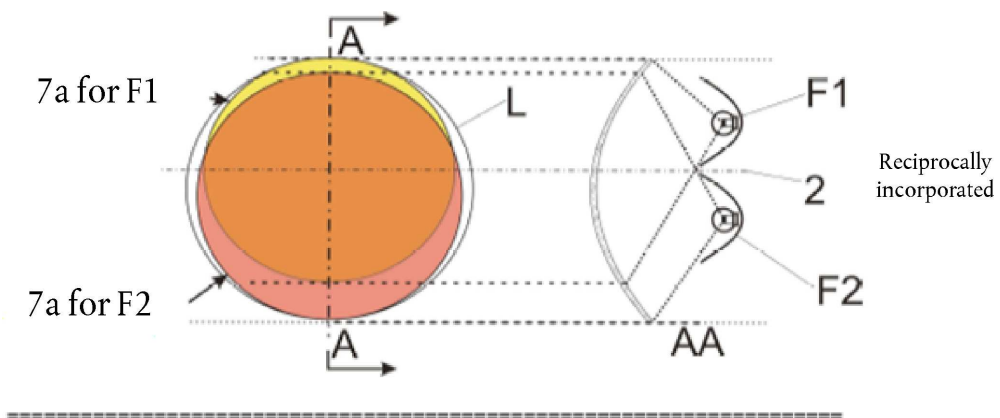
PART 7

Examples to enable a decision regarding the reciprocal incorporation of two functions

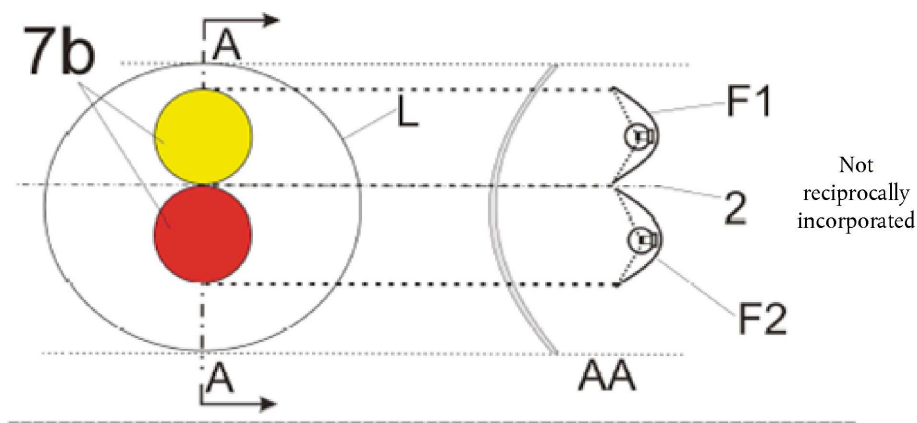
In the case with a textured outer lens and a wall in between:



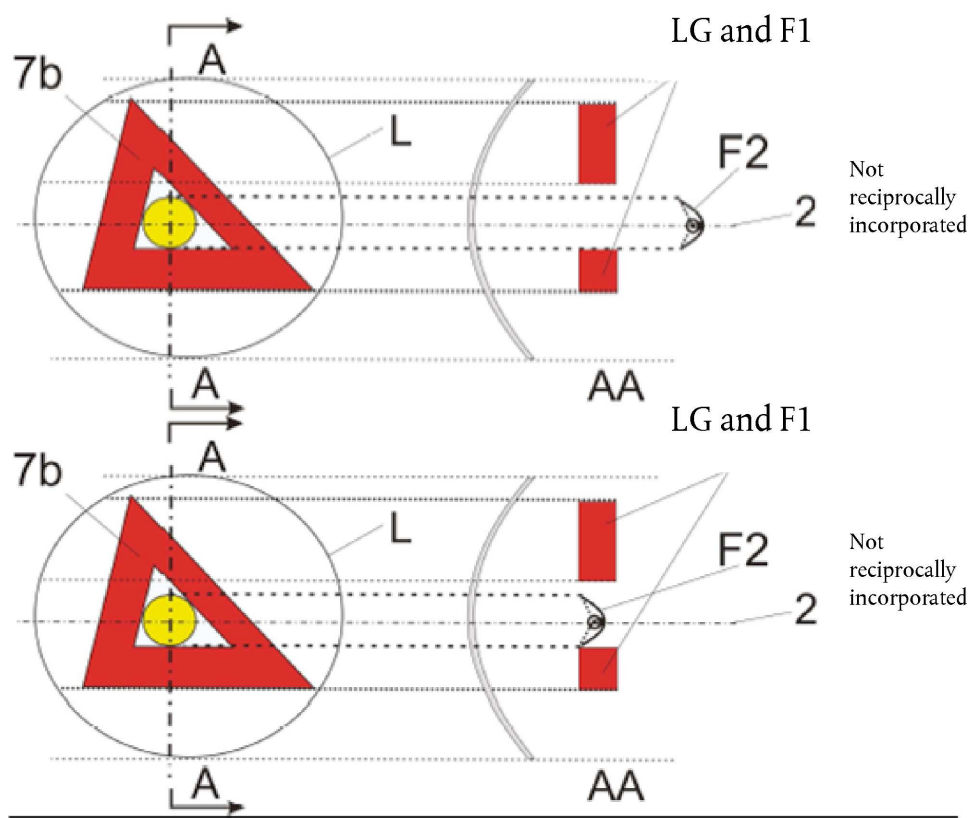
In the case with a textured outer lens:



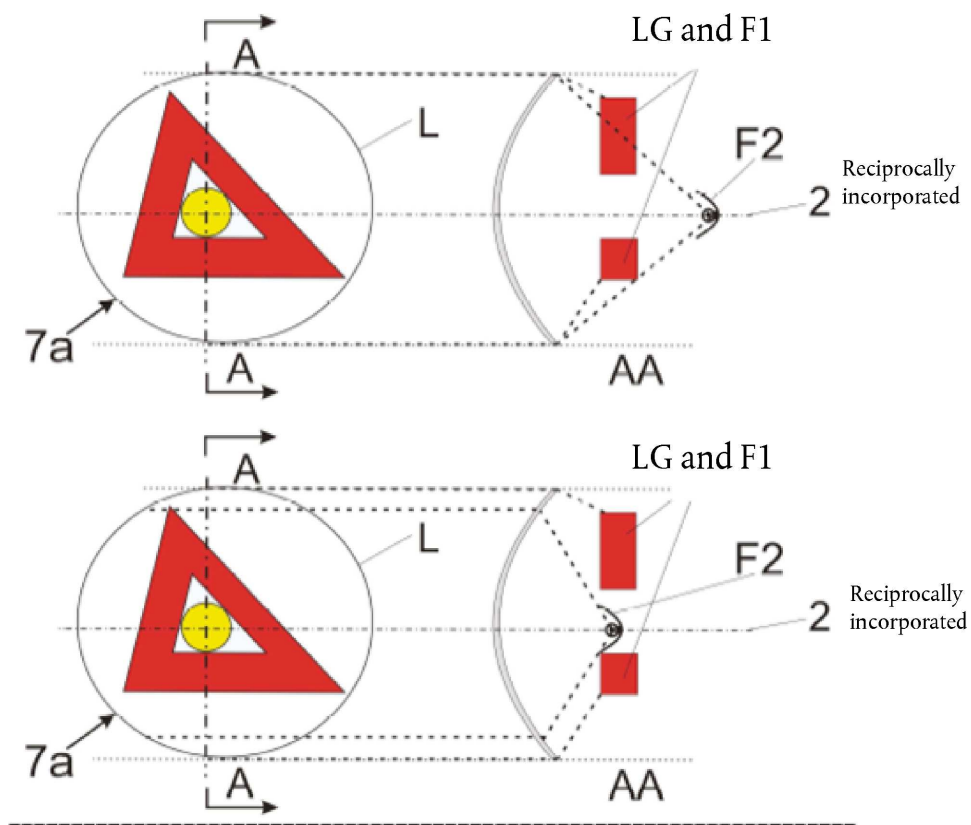
In the case where the non-textured outer lens is excluded:



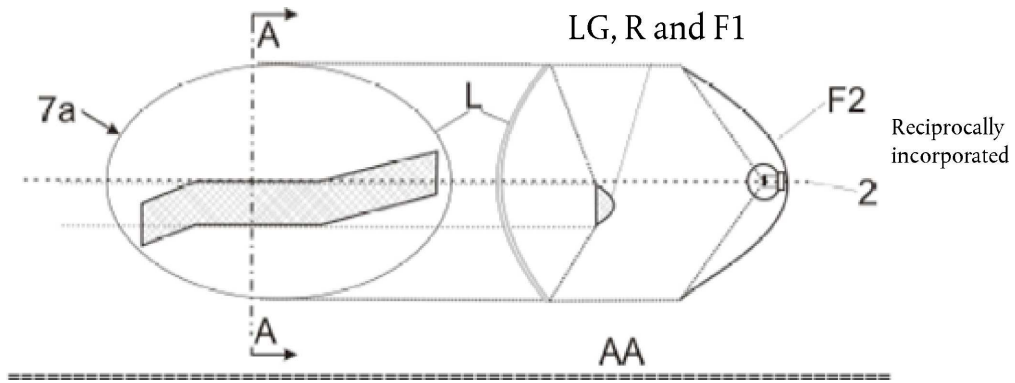
In the case where the non-textured outer lens is excluded:



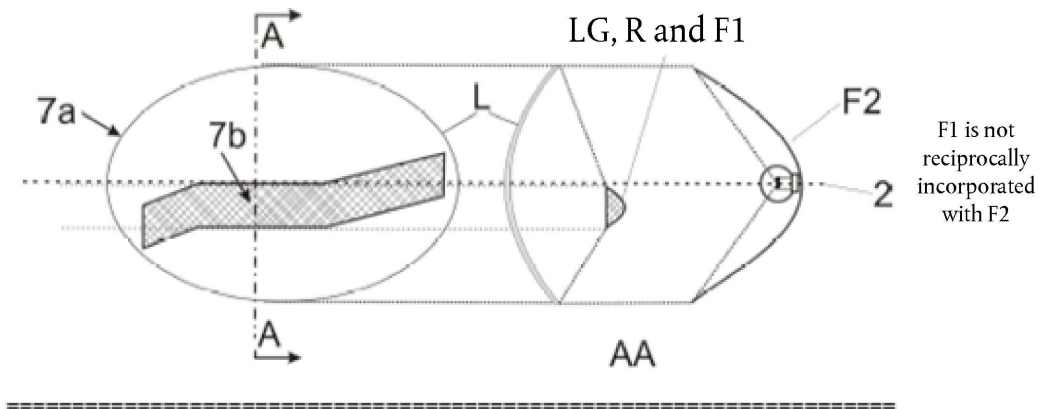
In the case where the outer lens (textured or not) is included:



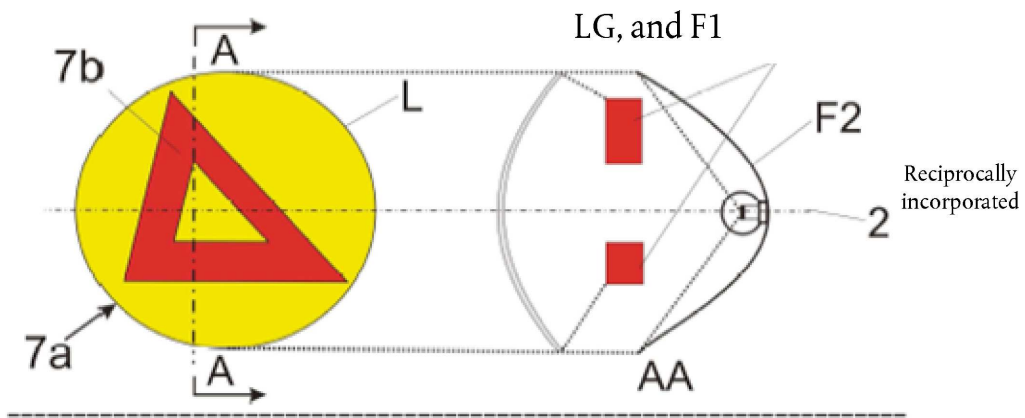
In the case where the outer lens (textured or not) is included:



In the case where the non-textured outer lens is excluded, '7b' is the apparent surface according to paragraph 2.8 and F1 shall not be transparent to F2:



In the case where the non-textured outer lens is excluded or not:



ANNEX 4

VISIBILITY OF A RED LAMP TO THE FRONT AND VISIBILITY OF A WHITE LAMP TO THE REAR

(See paragraphs 5.10.1 and 5.10.2 of this Regulation)

Figure 1

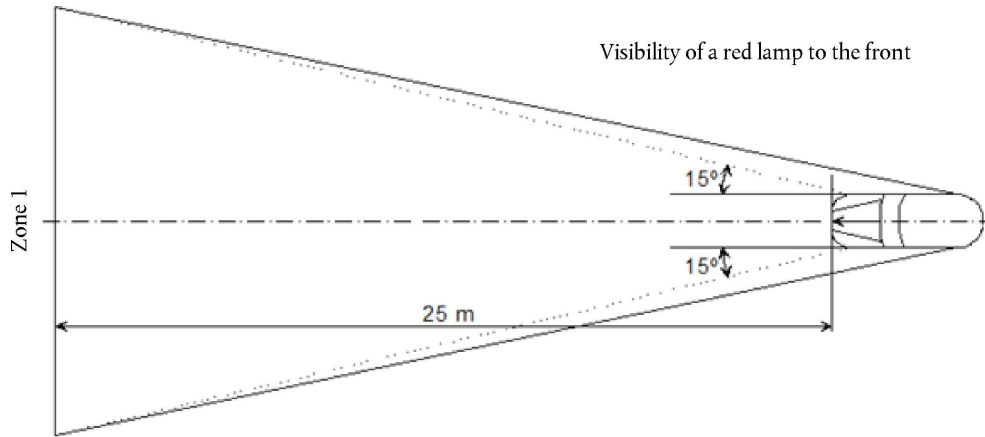
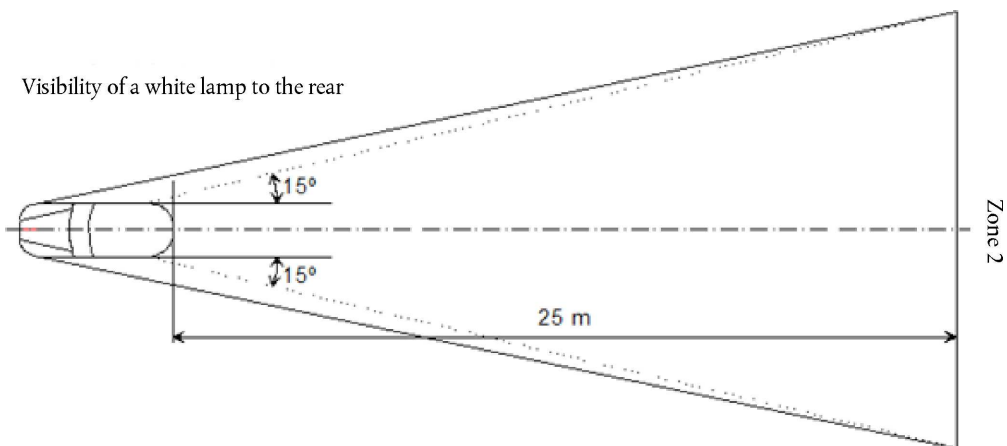


Figure 2



ANNEX 5

STATES OF LOADING TO BE TAKEN INTO CONSIDERATION IN DETERMINING VARIATIONS IN THE VERTICAL ORIENTATION OF THE DIPPED-BEAM HEADLAMPS

Loading conditions on axles referred to in paragraphs 6.2.6.1 and 6.2.6.3.1.

1. For the following tests, the mass of the passengers shall be calculated on the basis of 75 kg per person.
2. Loading conditions for different types of vehicles:
 - 2.1. Vehicles in category M₁ ⁽¹⁾:
 - 2.1.1. The angle of the light beam of the dipped-beam headlamps shall be determined under the following load conditions:
 - 2.1.1.1. One person in the driver's seat;
 - 2.1.1.2. The driver, plus one passenger in the front seat farthest from the driver;
 - 2.1.1.3. The driver, one passenger in the front seat farthest from the driver, all the seats farthest to the rear occupied;
 - 2.1.1.4. All the seats occupied;
 - 2.1.1.5. All the seats occupied, plus an evenly distributed load in the luggage boot, in order to obtain the permissible load on the rear axle or on the front axle if the boot is at the front. If the vehicle has a front and a rear boot, the additional load shall be appropriately distributed in order to obtain the permissible axle loads. However, if the maximum permissible laden mass is obtained before the permissible load on one of the axles, the loading of the boot(s) shall be limited to the figure which enables that mass to be reached;
 - 2.1.1.6. Driver, plus an evenly distributed load in the boot, in order to obtain the permissible load on the corresponding axle.

However, if the maximum permissible laden mass is obtained before the permissible load on the axle, the loading of the boot(s) shall be limited to the figure which enables that mass to be reached.
 - 2.1.2. In determining the above loading conditions, account shall be taken of any loading restrictions laid down by the manufacturer.
 - 2.2. Vehicles in categories M₂ and M₃ ⁽¹⁾:

The angle of the light beam from the dipped-beam headlamps shall be determined under the following loading conditions:

 - 2.2.1. Vehicle unladen and one person in the driver's seat;
 - 2.2.2. Vehicles laden such that each axle carries its maximum technically permissible load or until the maximum permissible mass of the vehicle is attained by loading the front and rear axles proportionally to their maximum technically permissible loads, whichever occurs first.
 - 2.3. Vehicles in category N with load surfaces:
 - 2.3.1. The angle of the light beam from the dipped-beam headlamps shall be determined under the following loading conditions:
 - 2.3.1.1. Vehicle unladen and one person in the driver's seat;
 - 2.3.1.2. Driver, plus a load so distributed as to give the maximum technically permissible load on the rear axle or axles, or the maximum permissible mass of the vehicle, whichever occurs first, without exceeding a front axle load calculated as the sum of the front axle load of the unladen vehicle plus 25 per cent of the maximum permissible payload on the front axle. Conversely, the front axle is so considered when the load platform is at the front.

⁽¹⁾ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2 — www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

-
- 2.4. Vehicles in category N without a load surface:
 - 2.4.1. Drawing vehicles for semi-trailers:
 - 2.4.1.1. Unladen vehicle without a load on the coupling attachment and one person in the driver's seat;
 - 2.4.1.2. One person in the driver's seat: technically permissible load on the coupling attachment in the position of the attachment corresponding to the highest load on the rear axle.
 - 2.4.2. Drawing vehicles for trailers:
 - 2.4.2.1. Vehicle unladen and one person in the driver's seat;
 - 2.4.2.2. One person in the driver's seat, all the other places in the driving cabin being occupied.
-

ANNEX 6

MEASUREMENT OF THE VARIATION OF DIPPED-BEAM INCLINATION AS A FUNCTION OF LOAD

1. SCOPE

This annex specifies a method for measuring variations in motor vehicle dipped-beam inclination, in relation to its initial inclination, caused by changes in vehicle attitude due to loading.

2. DEFINITIONS

2.1. Initial inclination

2.1.1. Stated initial inclination

The value of the dipped-beam initial inclination specified by the motor vehicle manufacturer serving as a reference value for the calculation of permissible variations.

2.1.2. Measured initial inclination

The mean value of dipped-beam inclination or vehicle inclination measured with the vehicle in condition No 1, as defined in Annex 5, for the category of vehicle under test. It serves as a reference value for the assessment of variations in beam inclination as the load varies.

2.2. Dipped-beam inclination

It may be defined as follows:

Either as the angle, expressed in milliradians, between the direction of the beam towards a characteristic point on the horizontal part of the cut-off in the luminous distribution of the headlamp and the horizontal plane,

Or by the tangent of that angle, expressed in percentage inclination, since the angles are small (for these small angles, 1 per cent is equal to 10 mrad).

If the inclination is expressed in percentage inclination, it can be calculated by means of the following formula:

$$\frac{(h_1 - h_2)}{L} \times 100$$

where:

h_1 is the height above the ground, in millimetres, of the abovementioned characteristic point, measured on a vertical screen perpendicular to the vehicle longitudinal median plane, placed at a horizontal distance L

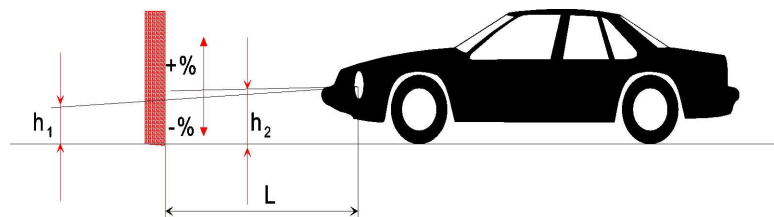
h_2 is the height above the ground, in millimetres, of the centre of reference (which is taken to be the nominal origin of the characteristic point chosen in h_1)

L is the distance, in millimetres, from the screen to the centre of reference.

Negative values denote downward inclination (see Figure 1).

Positive values denote upward inclination.

Figure 1

Dipped-beam downward inclination of a category M₁ vehicle*Notes:*

1. This drawing represents a category M₁ vehicle, but the principle shown applies equally to vehicles of other categories.
 2. Where the vehicle does not incorporate a headlamp levelling system, the variation in dipped-beam inclination is identical with the variation in the inclination of the vehicle itself.
3. MEASUREMENT CONDITIONS
- 3.1. If a visual inspection of the dipped-beam pattern on the screen or a photometric method is used, measurement shall be carried out in a dark environment (for example, a dark room) of sufficient area to allow the vehicle and the screen to be placed as shown in Figure 1. Headlamp centres of reference shall be at a distance from the screen of at least 10 m.
 - 3.2. The ground on which measurements are made shall be as flat and horizontal as possible, so that the reproducibility of measurements of dipped-beam inclination can be assured with an accuracy of $\pm 0,5$ mrad ($\pm 0,05$ per cent inclination).
 - 3.3. If a screen is used, its marking, position and orientation in relation to the ground and to the median longitudinal plane of the vehicle, shall be such that the reproducibility of the measurement of the dipped-beam inclination can be assured with an accuracy of $\pm 0,5$ mrad ($\pm 0,05$ per cent inclination).
 - 3.4. During measurements, the ambient temperature shall be between 10 and 30 °C.
4. VEHICLE PREPARATION
- 4.1. Measurements shall be carried out on a vehicle which has travelled a distance of between 1 000 km and 10 000 km, preferably 5 000 km.
 - 4.2. Tyres shall be inflated to the full-load pressure specified by the vehicle manufacturer. The vehicle shall be fully replenished (fuel, water, oil) and equipped with all the accessories and tools specified by the manufacturer. Full fuel replenishment means that the fuel tank shall be filled to not less than 90 per cent of its capacity.
 - 4.3. The vehicle shall have the parking brake released and the gearbox in neutral.
 - 4.4. The vehicle shall be conditioned for at least 8 h at the temperature specified in paragraph 3.4 above.
 - 4.5. If a photometric or visual method is used, headlamps with a well- defined dipped-beam cut-off should preferably be installed on the vehicle under test in order to facilitate the measurements. Other means are allowed to obtain a more precise reading (for example, removal of the headlamp lens).
5. TEST PROCEDURE
- 5.1. General

The variations in either dipped-beam or vehicle inclination, depending on the method chosen, shall be measured separately for each side of the vehicle. The results obtained from both left and right headlamps under all the load conditions specified in Annex 5, shall be within the limits set out in paragraph 5.5 below. The load shall be applied gradually without subjecting the vehicle to excessive shocks.

 - 5.1.1. Where an AFS is fitted, the measurements shall be carried out with the AFS in its neutral state.

5.2. Determination of the measured initial inclination

The vehicle shall be prepared as specified in paragraph 4 above and laden as specified in Annex 5 (first loading condition of the respective vehicle category). Before each measurement, the vehicle shall be rocked as specified in paragraph 5.4 below. Measurements shall be made three times.

5.2.1. If none of the three measured results differ by more than 2 mrad (0,2 per cent inclination) from the arithmetic mean of the results, that mean shall constitute the final result.

5.2.2. If any measurement differs from the arithmetic mean of the results by more than 2 mrad (0,2 per cent inclination), a further series of 10 measurements shall be made, the arithmetic mean of which shall constitute the final result.

5.3. Measurement methods

Any method may be used to measure variations of inclination provided that the readings are accurate to within $\pm 0,2$ mrad ($\pm 0,02$ per cent inclination).

5.4. Treatment of vehicle in each loading condition

The vehicle suspension and any other part likely to affect dipped-beam inclination shall be activated according to the methods described below.

However, the technical authorities and manufacturers may jointly propose other methods (either experimental or based upon calculations), especially when the test poses particular problems, provided such calculations are clearly valid.

5.4.1. M_1 category vehicles with conventional suspension

With the vehicle standing on the measuring site and, if necessary, with the wheels resting on floating platforms (which shall be used if their absence would lead to restriction of the suspension movement likely to affect the results of measurements), rock the vehicle continuously for at least three complete cycles, for each cycle, first the rear and then the front end of the vehicle is pushed down.

The rocking sequence shall end with the completion of a cycle. Before making the measurements, the vehicle shall be allowed to come to rest spontaneously. Instead of using floating platforms, the same effect can be achieved by moving the vehicle backwards and forwards for at least a complete wheel revolution.

5.4.2. M_2 , M_3 and N category vehicles with conventional suspension

5.4.2.1. If the treatment method for category M_1 vehicles described in paragraph 5.4.1 is not possible, the method described in paragraphs 5.4.2.2 or 5.4.2.3 may be used.

5.4.2.2. With the vehicle standing on the measuring site and the wheels on the ground, rock the vehicle by temporarily varying the load.

5.4.2.3. With the vehicle standing on the measuring site and the wheels on the ground, activate the vehicle suspension and all other parts which may affect the dipped-beam inclination by using a vibration rig. This can be a vibrating platform on which the wheels rest.

5.4.3. Vehicles with non-conventional suspension, where the engine has to be running.

Before making any measurement wait until the vehicle has assumed its final attitude with the engine running.

5.5. Measurements

The variation of the inclination of the dipped-beam shall be assessed for each of the different loading conditions in relation to the measured initial inclination determined in accordance with paragraph 5.2 above.

If the vehicle is fitted with a manual headlamp-levelling system, the latter shall be adjusted to the positions specified by the manufacturer for given loading conditions (according to Annex 5).

5.5.1. To begin with, a single measurement shall be made in each loading condition. Requirements have been met if, for all the loading conditions, the variation in inclination is within the calculated limits (for example, within the difference between the stated initial inclination and the lower and upper limits specified for approval) with a safety margin of 4 mrad (0,4 per cent inclination).

5.5.2. If the result(s) of any measurement(s) does (do) not lie within the safety margin indicated in paragraph 5.5.1 or exceed(s) the limit values, a further three measurements shall be made in the loading conditions corresponding to this (these) result(s) as specified in paragraph 5.5.3.

5.5.3. For each of the above loading conditions:

5.5.3.1. If none of the three measured results differs by more than 2 mrad (0,2 per cent inclination) from the arithmetic mean of the results, that mean shall constitute the final result.

5.5.3.2. If any measurement differs from the arithmetic mean of the results by more than 2 mrad (0,2 per cent inclination), a further series of 10 measurements shall be made, the arithmetic mean of which shall constitute the final result.

5.5.3.3. If a vehicle is fitted with an automatic headlamp-levelling system which has an inherent hysteresis loop, average results at the top and bottom of the hysteresis loop shall be taken as significant values.

All these measurements shall be made in accordance with paragraphs 5.5.3.1 and 5.5.3.2.

5.5.4. Requirements have been met, if, under all loading conditions, the variation between the measured initial inclination determined in accordance with paragraph 5.2 and the inclination measured under each loading condition is less than the values calculated in paragraph 5.5.1 (without safety margin).

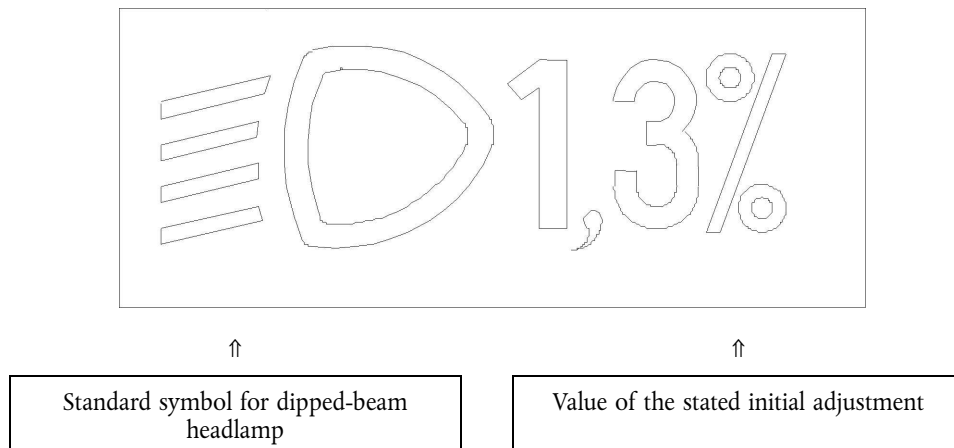
5.5.5. If only one of the calculated upper or lower limits of variation is exceeded, the manufacturer shall be permitted to choose a different value for the stated initial inclination, within the limits specified for approval.

ANNEX 7

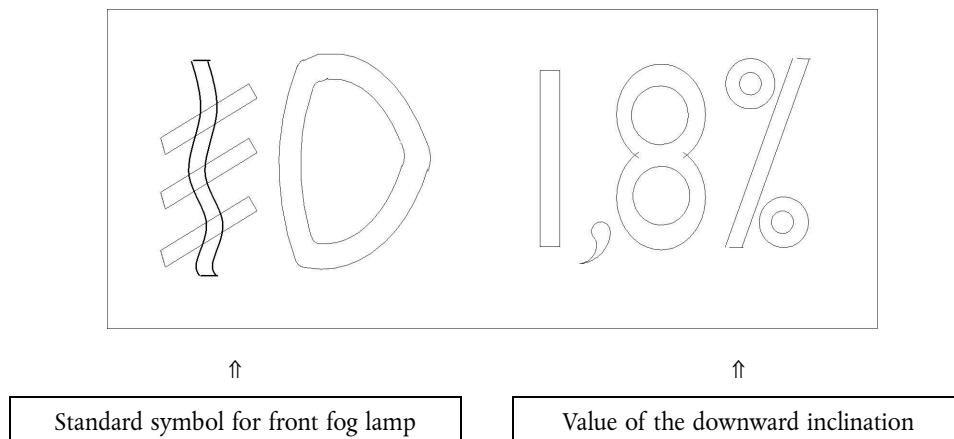
INDICATION OF THE DOWNWARD INCLINATION OF THE DIPPED-BEAM HEADLAMPS CUT-OFF REFERRED TO IN PARAGRAPH 6.2.6.1.1 AND DOWNWARD INCLINATION OF THE FRONT FOG LAMP CUT-OFF REFERRED TO IN PARAGRAPH 6.3.6.1.2 OF THIS REGULATION

Example 1

The size of the symbol and characters is left to the discretion of the manufacturer.

*Example 2*

The size of the symbol and characters is left to the discretion of the manufacturer.



ANNEX 8

THE CONTROLS FOR THE HEADLAMP-LEVELLING DEVICES REFERRED TO IN PARAGRAPH 6.2.6.2.2 OF THIS REGULATION

1. SPECIFICATIONS

1.1. Downward inclination of the dipped-beam shall in all cases be produced in one of the following ways:

- (a) by moving a control downwards or to the left;
- (b) by rotating a control in a counter clockwise direction;
- (c) by depressing a button (push-pull control).

If several buttons are used to adjust the beam, the button which gives the greatest downward inclination shall be installed to the left or below the button(s) for other dipped-beam positions.

A rotary control which is installed edge-on, or with only the edge visible, should follow the operating principles of control of types (a) or (c).

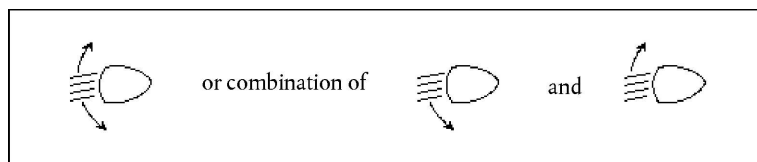
1.1.1. This control shall carry symbols indicating clearly the movements corresponding to the downward and upward inclination of the dipped-beam.

1.2. The '0' position corresponds to the initial inclination according to paragraph 6.2.6.1.1 of this Regulation.

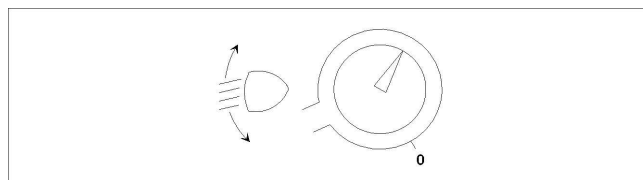
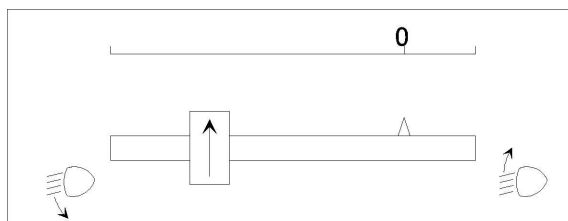
1.3. The '0' position which, according to paragraph 6.2.6.2.2 of this Regulation has to be a 'stop position', need not necessarily be at the end of the scale.

1.4. The marks used on control shall be explained in the owner's handbook.

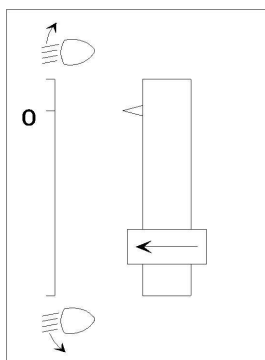
1.5. Only the following symbols may be used to identify the controls:



Symbols employing five lines instead of four may also be used

Example 1*Example 2*

Example 3



ANNEX 9

CONTROL OF CONFORMITY OF PRODUCTION

1. TESTS

1.1. Position of lamps

The position of lamps, as defined in paragraph 2.7 of this Regulation, in width, in height and in length shall be checked in accordance with the general requirements set out in paragraphs 2.8 to 2.10, 2.14 and 5.4 of this Regulation.

The values measured for the distances shall be such that the individual specifications applicable to each lamp are fulfilled.

1.2. Visibility of lamps

1.2.1. The angles of geometric visibility shall be checked in accordance with paragraph 2.13 of this Regulation.

The values measured for the angles shall be such that the individual specifications applicable to each lamp are fulfilled except that the limits of the angles may have an allowance corresponding to the $\pm 3^\circ$ variation permitted in paragraph 5.3 for the mounting of the light-signalling devices.

1.2.2. The visibility of red light towards the front and of white light towards the rear shall be checked in accordance with paragraph 5.10 of this Regulation.

1.3. Alignment of dipped-beam headlamps and class 'F3' front fog lamps towards the front

1.3.1. Initial downward inclination

The initial downward inclination of the cut-off of the dipped-beam and the class 'F3' front fog lamps shall be set to the plated figure as required and shown in Annex 7.

Alternatively the manufacturer shall set the initial aim to a figure that is different from the plated figure where it can be shown to be representative of the type approved when tested in accordance with the procedures contained in Annex 6 and in particular paragraph 4.1.

1.3.2. Variation of inclination with load

The variation of the dipped-beam downward inclination as a function of the loading conditions specified within this section shall remain within the range:

0,2 per cent to 2,8 per cent for headlamp mounting height $h < 0,8$;

0,2 per cent to 2,8 per cent for headlamp mounting height $0,8 \leq h \leq 1,0$; or

0,7 per cent to 3,3 per cent (according to the aiming range chosen by the manufacturer at the approval);

0,7 per cent to 3,3 per cent for headlamp mounting height $1,0 < h \leq 1,2$ m;

1,2 per cent to 3,8 per cent for headlamp mounting height $h > 1,2$ m.

In the case of a class 'F3' front fog lamp with (a) light source(s) having a total objective luminous flux which exceeds 2 000 lumens, the variation of the downward inclination as a function of the loading conditions specified within this section shall remain within the range:

0,7 per cent to 3,3 per cent for front fog lamp mounting height $h \leq 0,8$;

1,2 per cent to 3,8 per cent for front fog lamp mounting height $h > 0,8$ m.

The states of loading to be used shall be as follows, as indicated in Annex 5 of this Regulation, for every system adjusted accordingly.

1.3.2.1. Vehicles in category M_1 :

Paragraph 2.1.1.1.

Paragraph 2.1.1.6 taking into account

Paragraph 2.1.2.

1.3.2.2. Vehicles in category M₂ and M₃:

Paragraph 2.2.1.

Paragraph 2.2.2.

1.3.2.3. Vehicles in category N with load surfaces:

Paragraph 2.3.1.1.

Paragraph 2.3.1.2.

1.3.2.4. Vehicles in category N without load surfaces:

1.3.2.4.1. Drawing vehicles for semi-trailers:

Paragraph 2.4.1.1.

Paragraph 2.4.1.2.

1.3.2.4.2. Drawing vehicles for trailers:

Paragraph 2.4.2.1.

Paragraph 2.4.2.2.

1.4. Electrical connections and tell-tales

The electrical connections shall be checked by switching on every lamp supplied by the electrical system of the vehicle.

The lamps and tell-tales shall function in accordance with the provisions set out in paragraphs 5.11 to 5.14 of this Regulation and with the individual specifications applicable to each lamp.

1.5. Light intensities

1.5.1. Main-beam headlamps

The aggregate maximum intensity of the main beam headlamps shall be checked by the procedure described in paragraph 6.1.9.2 of this Regulation. The value obtained shall be such that the requirement in paragraph 6.1.9.1 of this Regulation is fulfilled.

1.6. The presence, number, colour, arrangement and, where applicable, the category of lamps shall be checked by visual inspection of the lamps and their markings.

These shall be such that the requirements set out in paragraphs 5.15 and 5.16 as well as in the individual specifications applicable to each lamp are fulfilled.

ANNEX 10

RESERVED

ANNEX 11

VISIBILITY OF CONSPICUITY MARKINGS TO THE REAR, FRONT AND SIDE OF A VEHICLE

(See paragraph 6.21.5 of this Regulation)

Figure 1a

Rear

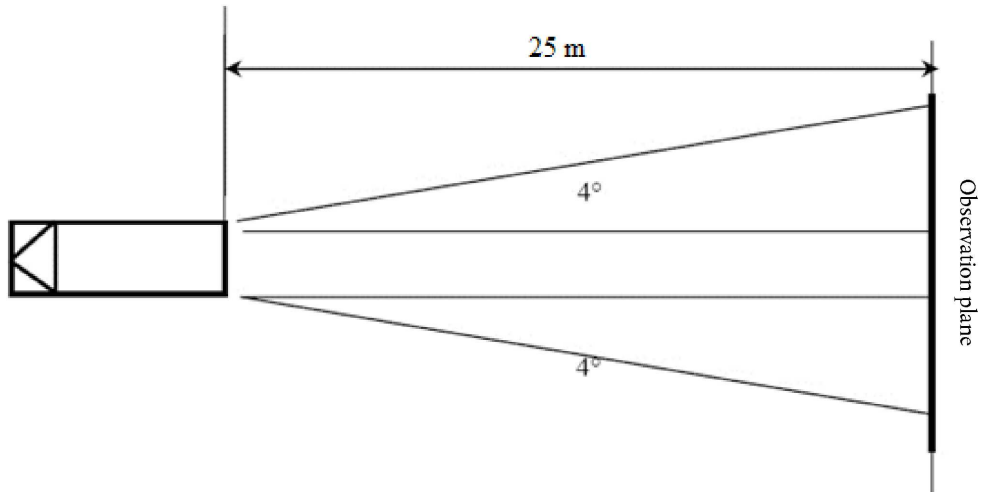


Figure 1b

Front (trailers only)

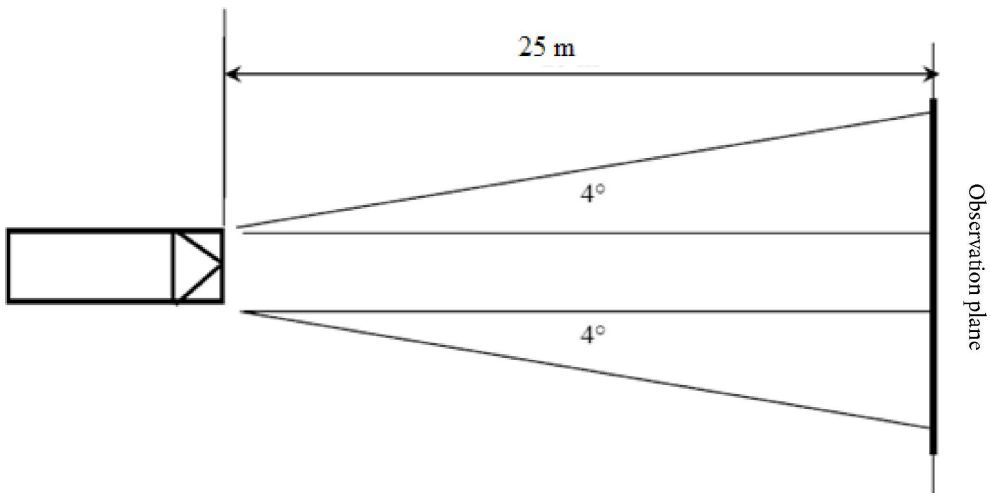
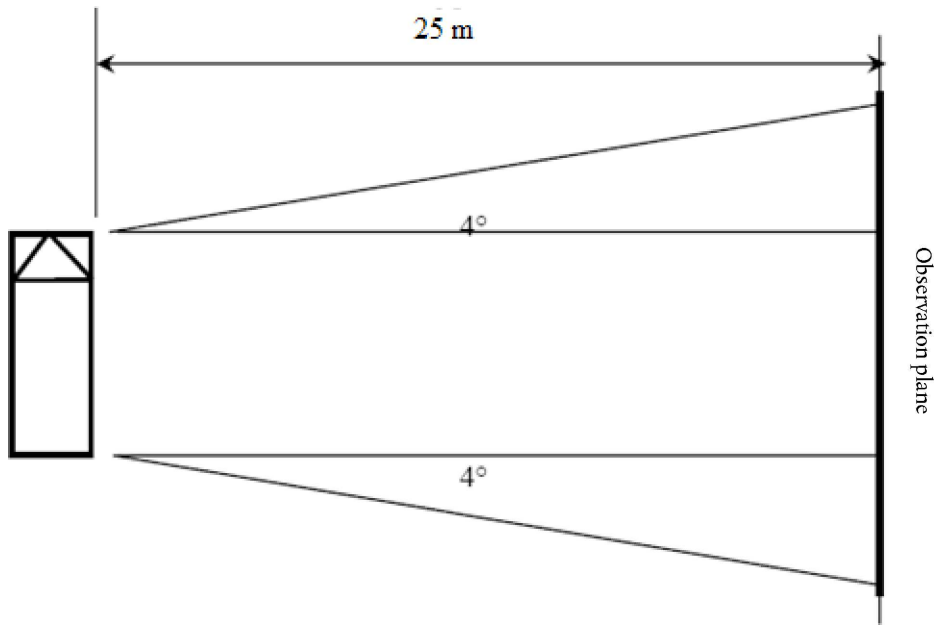


Figure 2

Side



—

ANNEX 12

TEST DRIVE

1. Test drive specifications for the automatic control of the main-beam headlamps
 - 1.1. The test drive shall be carried out in clear atmosphere ⁽¹⁾ and with clean head-lamps
 - 1.2. The test course shall comprise test sections with traffic conditions, at speed corresponding to the relevant type of road, as described in Table 1 below:

Table 1

Test Section	Traffic conditions	Road type		
		Urban areas	Multi-lane road, e.g. motorway	Country road
	Speed	50 ± 10 km/h	100 ± 20 km/h	80 ± 20 km/h
	Average percentage of the full test course length	10 per cent	20 per cent	70 per cent
A	Single oncoming vehicle or single preceding vehicle in a frequency so that the main beam will switch ON and OFF.		X	X
B	Combined oncoming and preceding traffic situations, in a frequency so that the main beam will switch ON and OFF.		X	X
C	Active and passive overtaking manoeuvres, in a frequency so that the main beam will switch ON and OFF.		X	X
D	Oncoming bicycle, as described in paragraph 6.1.9.3.1.2.			X
E	Combined oncoming and preceding traffic situations	X		

- 1.3. Urban areas shall comprise roads with and without illumination.
- 1.4. Country roads shall comprise sections having two lanes and sections having four or more lanes and shall include junctions, hills and/or slopes, dips and winding roads.
- 1.5. Multi-lane roads (e.g. motorways) and country roads shall comprise sections having straight level parts with a length of more than 600 m. Additionally they shall comprise sections having curves to the left and to the right.
- 1.6. Dense traffic situations shall be taken into account.

⁽¹⁾ Good visibility (meteorological optical range MOR > 2 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp 1. 9. 1/1. 9. 11, Geneva 1996).

2. Test drive specifications for adaptive main-beam headlamps
 - 2.1. The test drive shall be carried out in clear atmosphere ⁽²⁾ and with clean head-lamps.
 - 2.2. The test course shall comprise test sections with traffic conditions, at speed corresponding to the relevant type of road, as described in Table 2 below:

Table 2

Test Section	Traffic conditions	Road type		
		Urban areas	Multi-lane road, e.g. motorway	Country road
		Speed	50 ± 10 km/h	100 ± 20 km/h
	Average percentage of the full test course length	10 per cent	20 per cent	70 per cent
A	Single oncoming vehicle or single preceding vehicle in a frequency so that the adaptive main beam will react to demonstrate the adaptation process.		X	X
B	Combined oncoming and preceding traffic situations. in a frequency so that the adaptive main beam will react to demonstrate the adaptation process.		X	X
C	Active and passive overtaking manoeuvres, in a frequency so that the adaptive main beam will react to demonstrate the adaptation process.		X	X
D	Oncoming bicycle, as described in paragraph 6.22.9.3.1.2.			X
E	Combined oncoming and preceding traffic situations	X		

- 2.3. Urban areas shall comprise roads with and without illumination.
- 2.4. Country roads shall comprise sections having two lanes and sections having four or more lanes and shall include junctions, hills and/or slopes, dips and winding roads.
- 2.5. Multi-lane roads (e.g. motorways) and country roads shall comprise sections having straight level parts with a length of more than 600 m. Additionally they shall comprise of sections having curves to the left and to the right.
- 2.6. Dense traffic situations shall be taken into account
- 2.7. For the test sections A and B in the table above the engineers conducting the tests shall evaluate and record the acceptability of the performance of the adaptation process in relation to oncoming and preceding road users. This means that the test engineers shall be seated in the vehicle being tested and additionally be seated in the oncoming and preceding vehicles.

⁽²⁾ Good visibility (meteorological optical range MOR > 2 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp 1. 9. 1/1. 9. 11, Geneva 1996)

ANNEX 13

AUTOMATIC SWITCHING CONDITIONS DIPPED-BEAM HEADLAMPS

Automatic switching conditions dipped-beam headlamps ⁽¹⁾		
Ambient light outside the vehicle ⁽²⁾	Dipped-beam headlamps	Response time
less than 1 000 lux	ON	no more than 2 seconds
between 1 000 lux and 7 000 lux	at manufacturer's discretion	at manufacturer's discretion
more than 7 000 lux	OFF	more than 5 seconds, but no more than 300 seconds

⁽¹⁾ Compliance with these conditions shall be demonstrated by the applicant, by simulation or other means of verification accepted by the Type Approval Authority.

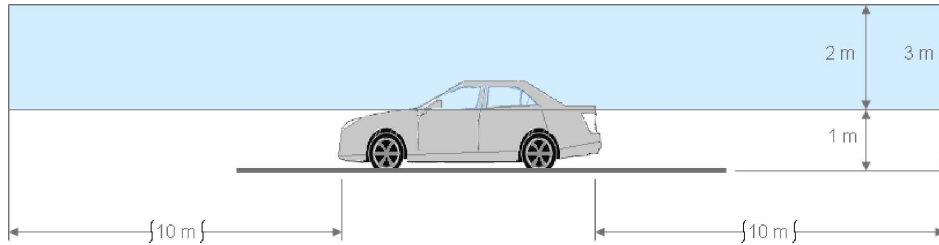
⁽²⁾ The illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the Type Approval Authority.

ANNEX 14

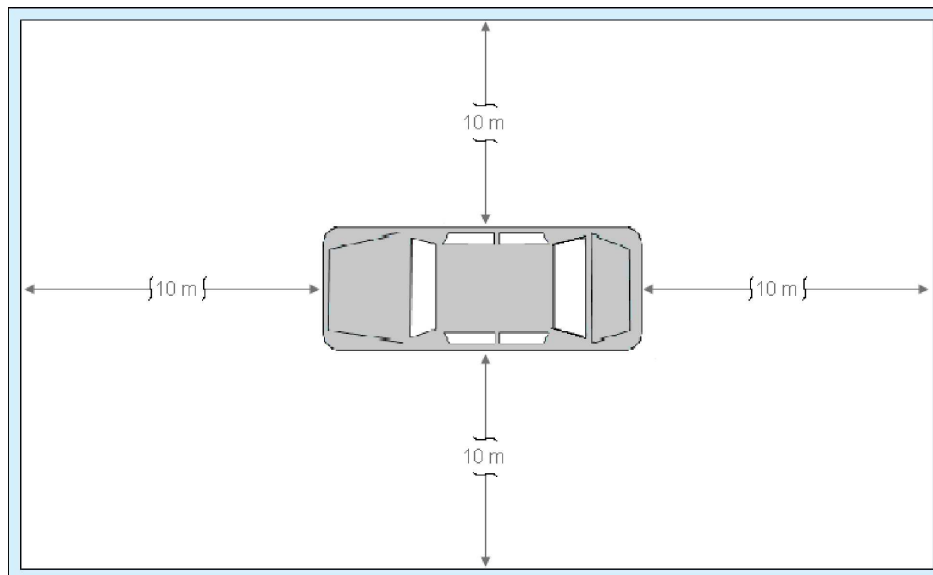
OBSERVING AREA TOWARDS THE APPARENT SURFACE OF MANOEUVRING AND COURTESY LAMPS

Zones of observation

This drawing shows the zone from one side, the other zones are from the front, the rear and from the other side of the vehicle

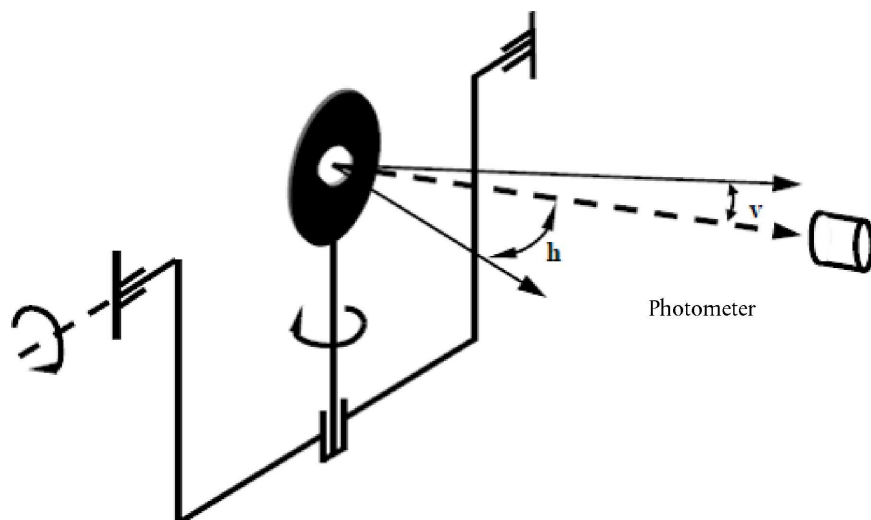


Boundaries of the zones



ANNEX 15

GONIO(PHOTO)METER SYSTEM USED FOR THE PHOTOMETRIC MEASUREMENTS AS DEFINED IN PARAGRAPH 2.34 OF THIS REGULATION



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