

Outlook on possible results of the editorial work on Regulation No. 48 following the proposed introduction of new definitions (GRE-78-21-Rev.1)

Notes:

TF-HS has identified a need for some new definitions (switch on, switch OFF, activate, deactivate), which, if introduced, would require some clarification of current wording in ECE R48, in general. The attached document gives an outlook on possible result of such editorial work.

The proposed modifications to the current text of the regulation can be identified using the track changes tool (especially color highlights and strikethrough characters for deleted text - to differentiate from recent ECE R48 modifications, also indicated in the current document).

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.
- 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 vehicle¹). 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.

¹ This does not apply to dedicated objects that may be added to the exterior of the headlamp.

- 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-switched ON** 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.
- ~~5.7.2. Where the apparent surface of a single lamp is composed of two or more distinct parts, it shall satisfy the following requirements:~~
- 5.7.2. Single lamps
- ~~5.7.2.1. 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 the distance between two adjacent/tangential distinct parts~~

~~shall not exceed 15 mm when measured perpendicularly to the reference axis. This requirement shall not apply to a retro-reflector.~~

5.7.2.1. Single lamps as defined in paragraph 2.16.1., subparagraph (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. Or, in the case of interdependent lamps, the distance between adjacent apparent surfaces in the direction of the reference axis does not exceed 75 mm when measured perpendicularly to the reference axis.~~

5.7.2.2. Single lamps as defined in paragraph 2.16.1., subparagraph (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., subparagraph (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 being switched ON or OFF;~~ 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);

Comment [PL1]: Operation?

- 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
 - ~~5.11.1.3. When light signalling system operates according to 6.2.7.6.2.~~
 - 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-ON unless the lamps referred to in paragraph 5.11. are also switched on-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 switched ON againre-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 °C to +50 °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 lamps² 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. |

² 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 ³
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. ⁴
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

³ Also known as white or colourless retro-reflector.

⁴ 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.

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-switched ON**, 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.

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-switched ON**, 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-switched ON** 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 switched ON** 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.

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.

Comment [PL2]: A priori, not relevant to modify to switch ON

Comment [PL3]: Modified by TF-HS → see TF-HS draft proposal

6.1.7.2. The control of the main-beam headlamps may be automatic regarding their ~~switching ON and OFF 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 deactivate~~ the automatic control of the main-beam headlamps.

Moreover, the ~~switching OFF~~ of the main-beam headlamps and ~~the deactivation~~ 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 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 ONon~~. For changing over from the main-beam to the dipped-beam all main-beam headlamps shall be ~~switched off OFF~~ simultaneously.

6.1.7.5. The dipped-beams may remain ~~switched ONon~~ 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 ONon~~ 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 switching ON and OFF and deactivation~~ of the main-beam headlamps:

Comment [PL4]: To be confirmed, not perfectly clear

Comment [PL5]: A priori, not relevant to modify to switch ON

Comment [PL6]: To be confirmed, for all subsequent paragraphs

6.1.9.3.1. The sensor system used to control the automatic activation—and deactivationswitching ON and OFF 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-trailers 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 7000 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) vehicles⁵ 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.

⁵ 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. 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.

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.

$h > 1.0$

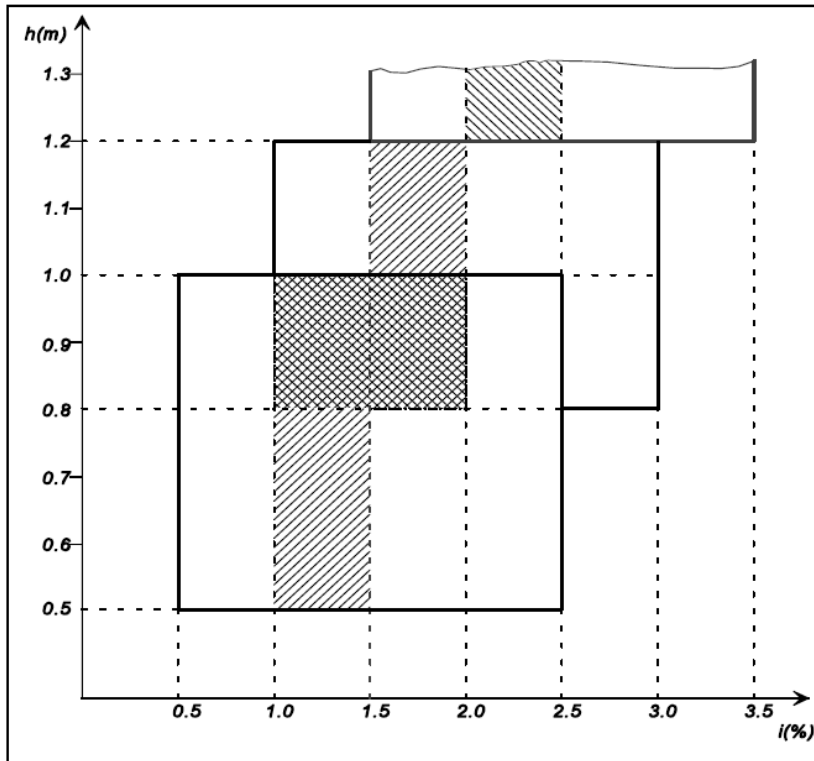
Limits: between -1.0 per cent and -3.0 per cent

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.

Continuously 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 ~~on~~OFF** all main-beam headlamps simultaneously.
- 6.2.7.2. The dipped-beam may remain **switched ~~on~~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~~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 ~~switched~~ ON** 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. If daytime running lamps are present and operate according to paragraph 6.19., either~~
- ~~6.2.7.6.1. 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; or~~
- ~~6.2.7.6.2. Daytime running lamps operate in conjunction with the lamps listed in paragraph 5.11. where, as a minimum requirement, at least the rear position lamps shall be activated; or~~
- ~~6.2.7.6.3. Distinctive means are provided to inform the driver that the headlamps, position lamps and if so equipped end-outline marker lamps and side marker lamps are not illuminated. Such means are:~~
- ~~6.2.7.6.3.1. Two distinctly different levels of instrument panel illumination intensity are provided during night and day, indicating to the driver that the dipped-beam headlamps shall be switched ON; or~~
- ~~6.2.7.6.3.2. Non-illuminated indicators and identification of hand controls that are required by Regulation No. 121 to be illuminated when the headlamps are activated; or~~

Comment [PL7]: Cf. draft proposal TF HS

Comment [PL8]: Cf. draft proposal TF HS

~~6.2.7.6.3.3. A tell-tale visual, auditory or both, shall be activated only in reduced ambient lighting conditions as defined in Annex 13 to inform the driver that the dipped-beam headlamps should be switched ON. Once the tell-tale is activated, it shall only be extinguished when the dipped beam headlamps have been switched on or 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.~~

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.)

Comment [PL9]: Cf. draft proposal TF-HS

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.

Comment [PL10]: Editorial work / Tell-tale not included in the definition/ not concerned by this modification

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 lumen shall only be installed in conjunction with the installation of headlamp cleaning device(s) according to Regulation No. 45.⁶

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.

~~(a) — With LED module(s) producing the principal dipped beam, or~~

~~(b) — With a light source 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.

⁶ Contracting Parties to the respective regulations can still prohibit the use of mechanical cleaning systems when headlamps with plastic lenses, marked "PL", are installed.

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-switched~~ ON 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.
- 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.
- not For all other categories except N₃G (off-road)⁷ vehicles: 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,

⁷ 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

$\beta = 45^\circ$ 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.⁸

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.¹³

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.

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.

⁸ 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.

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.

Comment [PL11]: Switched ON? But what about switch used, but no light emitted, because mutually incorporated?

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~~ be switched ON 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~~ switch ON or remain ~~lit~~ ON 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~~ be switched ON 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~~ switched ON and ~~deactivated~~ OFF manually by a separate ~~switch~~ control;

(b) If so ~~activated~~ switched ON, they may remain ~~illuminated~~ ON after reverse gear is disengaged;

(c) They shall be automatically ~~switched off~~ OFF if the forward speed of the vehicle exceeds 10 km/h, regardless of the position of the separate ~~switch~~ control; in this case they shall remain ~~switched off~~ OFF until deliberately being ~~switched on~~ ON again.

6.4.8. Tell-tale

Comment [PL12]: To be discussed by TF, whether OK or not / ask trucks manufacturers?

- 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

~~———— A maximum of three optional category 5 or one optional category 6 device per side on vehicles of type M₂, M₃, N₂ and N₃ exceeding 9 m in length.~~

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, ~~O₃ and O₄~~ 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) M₂, M₃, N₂, and N₃ of above 6 m and up to including 9 m in length one additional category 5 device is optional;
- (b) M₂, M₃, N₂, and N₃ exceeding 9 m in length three additional category 5 devices distributed as evenly as practicable along each side are mandatory;
- (c) O₃ and O₄ 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 M₁ and N₁ 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 ~~or~~ 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 M₁ and N₁ 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)

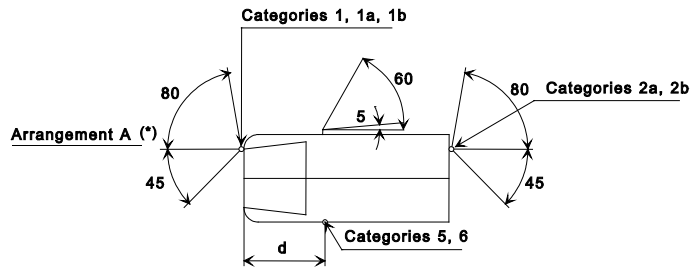
Vertical angles: 15° above and below the horizontal for direction indicator lamps of categories 1, 1a, 1b, 2a, 2b and 5.

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°.

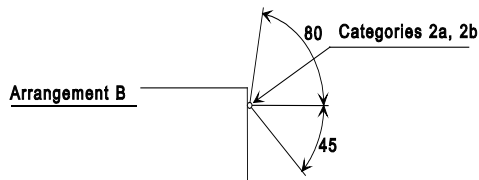
30° above and 5° below the horizontal for direction indicator lamps of category 6.

Figure (see paragraph 6.5.)



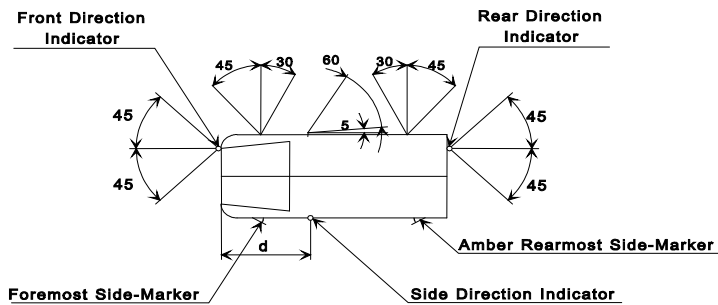
(*) The value of 5° given for dead angle of visibility to the rear of the side direction-indicator is an upper limit $d \leq 1.80$ m (for M_1 and N_1 category vehicles $d \leq 2.50$ m).

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 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.

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 ~~6.4.2.~~ 6.2.2. of Regulation No. 6 or another suitable way¹³.

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.

6.6. Hazard warning signal

Comment [PL13]: Tell-tale not covered by new definition; OK as such?

- 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.
- 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-switched ON~~ automatically in the event of a vehicle being involved in a collision or after the ~~de-activation of the emergency stop signal has been switched OFF~~, as specified in paragraph 6.23. below. In such cases, it may be ~~turned-switched "off" OFF~~ manually.

In addition, the hazard warning signal may be ~~switched on 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 "on"~~ until it is manually or automatically ~~switched OFF "off"~~.
 - 6.6.7.3. 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.
- 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-upbe switched ON** 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 switching ON of the stop lamp or the rear fog lamp.

Comment [PL14]: Operation?

- 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~~ OFF during the entire period (both ON and OFF cycle) of ~~activation~~ operation 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 ~~turned on~~ switched ON simultaneously with the front position lamps.

~~This requirement does not apply when light signalling system operates according to paragraph 6.2.7.6.2.~~

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~~ switch ON only when the headlamp on the same side of the vehicle is ~~switched on~~ 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 operation 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.

~~This requirement does not apply when light signalling system operates according to paragraph 6.2.7.6.2.~~

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.:

$\alpha = 5^\circ$ upwards and 5° downwards;

$\beta = 25^\circ$ 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 switched ON;
- 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 control 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.

Comment [PL15]: To be checked, whether it should be "switched ON"

- 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 M₁ and N₁ 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 ~~fit~~ switched ON 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-switched OFF~~ 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 ~~fit 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, R₁, R₂, RM₁ or RM₂ Categories (visible from the rear):

Comment [PL16]: To be confirmed if OK

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.

~~Optional:~~ a 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.

~~Both optional and mandatory (as applicable) lamps to~~ 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 ~~and~~ 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 visible from the front, as specified in paragraph 6.13.4.2., as close as practicable to the rear. However, the distance between the additional lamps and the rear of the vehicle shall not exceed 400 mm.~~

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 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.

- 6.14.4.2. 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 1200 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 M₁ and N₁ 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.

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 M₁ 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 M₁ category of vehicles.

In addition, on M₁ and N₁ 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 ~~makes 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 M₁ 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 M₁ and N₁ 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.

~~For all other categories of vehicles: no individual specification.~~

On M₂, M₃, N₂, N₃, O₃ and O₄ 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 switch ON** of the rear fog lamp or stop lamp.

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

Comment [PL17]: Operation?

- 6.19. Day-time running lamp (Regulation No. 87)^a
- 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~~ 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

^a — The Contracting Parties not applying Regulation No. 87 may prohibit the presence of DRL (as specified in paragraph 5.22.) on the basis of national regulations.

lamps or headlamps are switched ON, except when the latter are used to give intermittent luminous warnings at short intervals.¹⁰

- 6.19.7.4. The lamps referred to in paragraph 5.11. may be switched ON when the daytime running lamps are switched ON, ~~except if daytime running lamps are operating according to paragraph 6.2.7.6.2., where at least the rear position lamps shall be activated.~~
- 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-operation~~ 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-operation~~ 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

Comment [PL18]: Cf. text by TF-HS

Comment [PL19]: To be checked following work of TF HS, if text modified (German proposal)

¹⁰ 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.

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-switched ON~~ 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 ~~position~~ or direction-indicator ~~position~~ operation. ~~In this case, the cornering lamps shall be switched OFF when the reversing lamp is switched OFF.~~
If so ~~activated-switched ON~~, 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-switched ON~~ 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. ~~However, if the exterior surfaces of the bodywork are fully constituted fully of flexible material, requirements of paragraph 6.21. shall be met~~ 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:

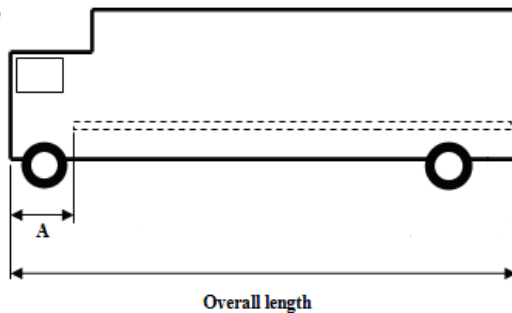
- (a) Retro-reflector size minimum 25 cm²;
- (b) One retro-reflector mounted not more than 600 mm from the front end of the vehicle;
- (c) Additional retro-reflectors spaced not more than 600 mm apart;
- (d) The distance between the last retro-reflector and the start of the conspicuity marking shall 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:

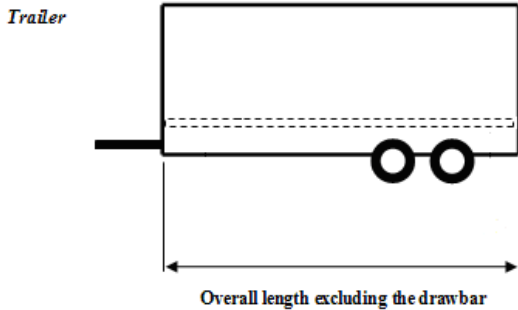
6.21.4.2.2.1. For motor vehicles, length of vehicle, or in the case of tractors for semi-trailers, if fitted, the length of the cab; however, when using the alternative marking mode per paragraph 6.21.4.2.1.1., the distance beginning within 2,400 mm from the front end of vehicle to its rear end.

Motor vehicle



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.

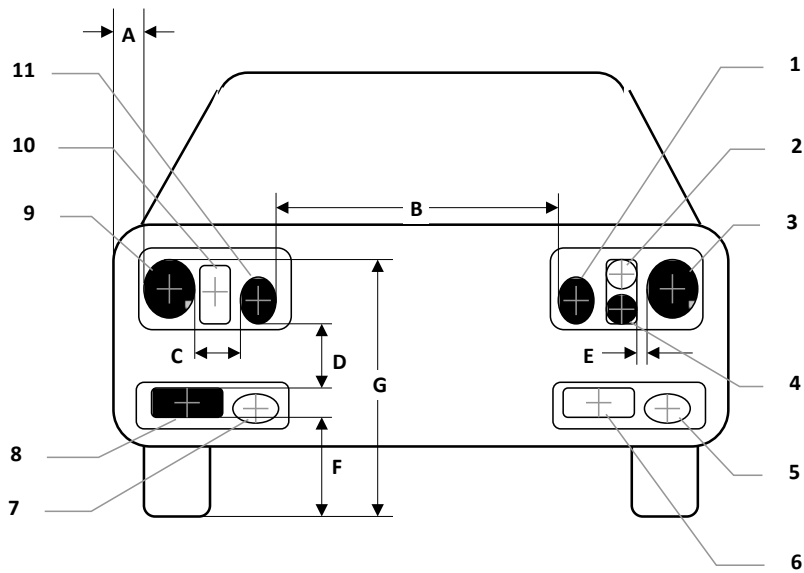
All dimensions refer to the nearest edge of the apparent surface(s) observed in the direction of the reference axis, of the lighting unit(s).
- 6.22.4.1.1. Two symmetrically placed lighting units shall be positioned at a height in compliance with the requirements of the relevant paragraphs 6.1.4. and 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 mm¹¹ 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.

¹¹ In case of additional "two symmetrically placed lighting units" the horizontal distance may be 200 mm (C in the figure).

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



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:

$$A \leq 400$$

$$B \geq 600, \text{ or, } \geq 400 \text{ if vehicle overall width } < 1,300 \text{ mm, however}$$

no requirement for category M₁ and N₁ vehicles

- 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 manufacturers 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-switched ON~~ 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 ~~activatedswitched ON~~. For changing over from the main-beam to the dipped-beam all lighting units for the main-beam shall be ~~de-activatedswitched OFF~~ 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-OFFdeactivate~~ the automatic control.

Moreover, the ~~switching OFF~~ of the main-beam headlamps and ~~the deactivation~~ 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 day-light.

Comment [PL20]: A priori, not relevant to modify to switch ON?

- 6.22.7.2. Passing-beam lighting:
- (a) The control for changing over to the dipped-beam shall **switch off OFF** all main-beam headlamps or **de-activateswitch OFF** all AFS lighting units for the main-beam simultaneously;
 - (b) The dipped-beam may remain **switched on 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 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 conditions¹² 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.
 - 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).

Comment [PL21]: Seems coherent of new definitions

Comment [PL22]: Seems coherent of new definitions

¹² 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.

- 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/operating** 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 motion¹³ 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 ON and off 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

Comment [PL23]: Tell-tale not covered by new definition; seems ok like this

Comment [PL24]: Tell-tale not covered by new definition; seems ok like this

¹³ 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).

- 6.22.9.1. An AFS shall be permitted only in conjunction with the installation of headlamp cleaning device(s) according to Regulation No. 45¹⁴ 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.
- 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.

¹⁴ Contracting Parties to the respective Regulations can still prohibit the use of mechanical cleaning systems when headlamps with plastic lenses, marked 'PL', are installed.

- 6.22.9.2.4. 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 ± 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-switched ON and OFF-deactivated~~ automatically.
- 6.23.7.3.1. The emergency stop signal shall be ~~activated-switched ON~~ 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-switched OFF~~ 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-switched ON~~ 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-switched ON~~ as courtesy lamp function. They may also be ~~activated-switched ON~~ 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-switched ON and OFF deactivated~~ automatically.
- 6.25.7.4. The rear-end collision alert signal shall not be ~~activated-switched ON~~ 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-switched ON~~ under the following conditions:

V_r	Activation switch ON
$V_r > 30 \text{ km/h}$	$TTC \leq 1.4$
$V_r \leq 30 \text{ km/h}$	$TTC \leq 1.4 / 30 \times V_r$

" V_r (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 switch ON~~ 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

Comment [PL25]: Seems OK (vs. switched ON)

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-switched ON~~ unless the main-beam headlamps or the dipped-beam headlamps are ~~switched ON~~ at the same time.

The manoeuvring lamp(s) shall be ~~activated-switched ON~~ 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 operating~~

The manoeuvring lamps shall be automatically ~~switched off-OFF~~ if the forward speed of the vehicle exceeds 10 km/h and they shall remain ~~switched-off-OFF~~ until ~~the switch-ON 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.

Comment [PL26]: To be discussed whether change is appropriate