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DRAFT PROPOSAL:
GLOBAL TECHNICAL REGULATION (gtr)

LIGHTING AND LIGHT-SIGNALLING DEVICES FOR ROAD VEHICLE:
INSTALLATION PROVISIONS FOR VEHICLES OTHER THAN MOTORCYCLES

Transmitted by the expert from Canada

Note: This is a working document prepared by the expert from Canada for the fifty-fourth GRE session and the seventh informal session on the development of a gtr on the installation of lighting and light-signalling devices on motor vehicles, intended to be held in Geneva on 4 and 5 April 2005. The text contains the results of GRE discussions during all former meetings as well as several comments received following the sixth informal session held in Bonn. The modifications to the text of Revision 3 to TRANS/WP.29/GRE/2001/6, the text to be adopted and items still under discussion are marked in **bold** characters.

Note: This document is distributed to the Experts on Lighting and Light-Signalling only.

**DRAFT GLOBAL TECHNICAL REGULATION ON
LIGHTING AND LIGHT-SIGNALLING DEVICES FOR ROAD VEHICLE:
INSTALLATION PROVISIONS FOR VEHICLES OTHER THAN MOTORCYCLES**

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1. SCOPE AND PURPOSE

This global technical regulation (**gtr**) specifies requirements for the location, geometric visibility, **electric connection** and operation of lighting and light-signalling devices installed on **new** road vehicles.

The purpose of this regulation is to ensure the effectiveness, visibility (both in daylight and darkness or other condition of reduced visibility) and functioning of lighting and light-signalling devices in order to reduce the safety hazards caused by (a) inadequate illumination of the roadway or glare caused by vehicle lighting devices; and (b) confusion and diversion of the driver's attention from the driving task caused by miscomprehension of information from the vehicle's light-signalling devices as they relate to presence, identification and/or behaviour of the vehicle on the road.

2. APPLICATION

This regulation applies to road vehicles category 1 and 2 and their trailers 1/. This regulation does not apply to installation of additional lighting and light-signalling devices on special vehicles, **including but not limited to, police, medical and other emergency or public service vehicles**.

3. DEFINITIONS

For the purpose of this regulation:

3.1. "Contracting Party" means a country or a regional economic integration organization, as prescribed by the AGREEMENT CONCERNING THE ESTABLISHING OF GLOBAL TECHNICAL REGULATIONS FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED AND/OR BE USED ON WHEELED VEHICLES done at Geneva on 25 June 1998, that has adopted this regulation, and in whose jurisdiction the vehicle would be registered.

3.2. Vehicle characteristics

3.2.1. "Transverse plane" means a vertical plane perpendicular to the median longitudinal plane of the vehicle.

3.2.2. "Unladen vehicle" means a vehicle at its "Unladen Vehicle Mass" 1/.

3.2.3. "Structural length" 1/.

3.2.4. "Structural width" 1/.

1/ per "Special Resolution No. 1. (S.R.1)".

- 3.2.5. "Operating tell-tale" means a visual or auditory **signal** indicating that a device has been switched on and is operating correctly or not.
- 3.2.6. "**Failure tell-tale**" means a **visual or auditory signal indicating that a device is not operating correctly. Operating tell-tale or circuit-closed tell-tale may be used to indicate failure of a device.**
- 3.2.7. "Circuit-closed tell-tale" means a **visual** indicating that a device has been switched on, but not indicating whether it is operating correctly or not.
- 3.2.8. "Ground" means a substantially horizontal surface on which the vehicle stands.
- 3.2.9. "Movable components" means those vehicle body **components, including but not limited to, doors, bonnet (hood), boot (trunk lid), rear hatch, tailgate, retractable spoiler, bus storage compartment door and other exterior access panels, or other vehicle parts that can change position(s)** by tilting, rotating or sliding without the use of tools. **Forward-tilting truck cabs are not moveable components.**
- 3.2.10. "Normal position of use of a movable component" means the position(s) of a movable component **when the vehicle is moving.**

[paras. 3.2.11. and 3.2.12. deleted - expressions regarding "condition of the vehicle" not used in the document]

- 3.2.11. "Front" means that part of the vehicle between the transverse vertical plane tangent to the extreme front-end including all original equipment components and the transverse vertical plane passing through the centre of the foremost axle.
- 3.2.12. "Rear" means that part of the vehicle between the transverse vertical plane tangent to the extreme rear-end including all original equipment components and the transverse vertical plane passing through the centre of the rearmost axle.
- 3.2.13. "**Extreme outer edge**" means the **plane parallel to the median longitudinal plane of the vehicle and touching the vehicle's lateral outer edge, disregarding the projection of:**
- **tyres near their point of contact with the ground, and of connections for tyre pressure gauges;**
 - **any anti-skid devices mounted on the wheels;**
 - **rear-view mirrors;**
 - **headlamp cleaners;**
 - **side direction-indicator lamps, end-outline marker lamps, front and rear position lamps, parking lamps, retro-reflectors and side-marker lamps;**
 - **customs seals affixed to the vehicle, and of devices for securing and protecting such seals;**
 - **running boards;**
 - **door handles.**

3.3. LIGHTING AND LIGHT SIGNALLING DEVICES CHARACTERISTICS

3.3.1. "Device" means an element or an assembly of elements used to perform one or more functions.

3.3.2. "Function"

3.3.2.1. "Lighting function" means the light emitted by a device to illuminate the road and objects in the direction of vehicle movement, as defined in paragraph 3.4.;

3.3.2.2. "Light-signalling function" means the light emitted or reflected by a device to give to other road users visual information on the presence and/or the change of movement of the vehicle, as defined in paragraph 3.5.

3.3.3. "Lamp" means a device designed to illuminate the road or to emit a light signal to other road users. **Rear registration plate illuminating device and retro-reflectors are also. Light emitting or reflective registration plates are not lamps.**

3.3.4. **Light source (see Annex 4)**

3.3.4.1. "Light source" means one or more elements for visible radiation, which may be assembled with one or more transparent envelopes and with a base for mechanical and electrical connection.

A light source may also be constituted by the extreme outlet of a light-guide, as part of a distributed lighting or light-signalling system not having a built-in outer lens;

3.3.4.2. "Replaceable light source" means a light source which is designed to be inserted in and removed from the holder of it's the lighting device without tool;

3.3.4.3. "Non-replaceable light source" means a light source which can only be replaced by replacement of the device to which this light source is fixed;

in case of a light source module: a light source which can only be replaced by replacement of the light source module to which this light source is fixed;

3.3.4.4. "Light source module" means an optical part of a device which is specific to that device, is containing one or more non-replaceable light sources, and is only removable from its device with the use of tool(s);

3.3.4.5. "Filament light source" (filament lamp) means a light source where the element for visible radiation is one or more heated filaments producing thermal radiation;

- 3.3.4.6. "**Gas-discharge light source**" means a light source where the element for visible radiation is a discharge arc producing electro-luminescence / fluorescence;
- 3.3.4.7. "**Light-emitting diode**" (LED) means a light source where the element for visible radiation is one or more solid state junctions producing injection-luminescence / fluorescence;
- 3.3.4.8. "**Electronic light source control gear**" means one or more components between supply and light source to control voltage and/ or electrical current of the light source;
- 3.3.4.9. "**Ballast**" means an electronic light source control gear between supply and light source to stabilise the electrical current of a gas-discharge light source;
- 3.3.4.10. "**Ignitor**" means an electronic light source control gear to start the arc of a gas-discharge light source.
- 3.3.5. "**Objective luminous flux**" means a design value of the luminous flux of a replaceable light source. To be achieved, within the specified tolerances, when the replaceable light source is energised by the power supply at the specified test voltage, as indicated in the data sheet of the light source.
- 3.3.6. "**Independent lamps**" means devices having separate illuminating surfaces 2/, separate light sources and separate lamp bodies.
- 3.3.7. "**Grouped lamps**" means devices having separate illuminating surfaces 2/ and separate light sources, but a common lamp body.
- 3.3.8. "**Combined lamps**" means devices having separate illuminating surfaces, 2/ but a common light source and a common lamp body.
- 3.3.9. "**Reciprocally incorporated lamps**" means devices having separate light sources or a single light source operating under different conditions (for example, optical, mechanical, electrical differences), totally or partially common illuminating surfaces 2/ and a common lamp body.
- 3.3.10. "**Concealable lamp**" means a lamp capable of being partly or completely hidden, when not in use. This result may be achieved by means of a movable cover, by displacement of the lamp or by any other suitable mean. The term "retractable" is used more particularly to describe a concealable lamp the displacement of which enables it to be inserted within the bodywork.

2/ In the case of lighting devices for the rear registration plate and the side direction indicators, replace by "light-emitting surface" in the absence of an illuminating surface.

3.3.11. "Light emitting surface" of a lighting device light-signalling device or a retro-reflector means all or part of the exterior surface of the transparent material as defined by the manufacturer of the device (see annex 1).

3.3.12. "Illuminating surface" (see Annex 1).

3.3.12.1. "Illuminating surface of a lighting device" (paragraphs 3.4.1. to 3.4.5.) means the orthogonal projection of the full aperture of the reflector, or in the case of headlamps with an ellipsoidal reflector of the "projection lens" on a transverse plane. If the lighting device has no reflector, the definition of paragraph 3.3.12.2. shall be applied. If the light-emitting surface of the lamp extends over part only of the full aperture of the reflector, then the projection of that part only is taken into account.

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

3.3.12.2. "Illuminating surface of a light-signalling device other than a retro-reflector" (paragraphs 3.5.1. to 3.5.13. and 3.5.15. to 3.5.18.) means the orthogonal projection of the lamp in a plane perpendicular to its axis of reference and in contact with the exterior light-emitting surface of the lamp, this projection being bounded by the edges of screens situated in this plane, each allowing only 98 per cent of the total luminous intensity of the light to persist in the direction of the axis of reference.

To determine the lower, upper and lateral limits of the illuminating surface, only screens with horizontal or vertical edges shall be used.

3.3.12.3. "Illuminating surface of a retro-reflector" (paragraph 3.5.14.) means the orthogonal projection of a retro-reflector in a plane perpendicular to its axis of reference and delimited by planes contiguous to the outermost parts of the retro-reflector's optical system and parallel to that axis. For the purposes of determining the lower, upper and lateral edges of the device, only horizontal and vertical planes shall be considered.

3.3.13. "Apparent surface for a defined direction of observation **means the** orthogonal projection of either:

- the boundary of the illuminating surface projected on the exterior surface of the lens (a-b), or
- the light-emitting surface (c-d),

in a plane perpendicular to the direction of observation and tangential to the most exterior point of the lens (see Annex 1 to this regulation).

3.3.14. "Axis of reference (reference axis)" means the characteristic axis of the lamp determined by the manufacturer (of the lamp) for use as the direction of reference

($H=0^\circ$, $V=0^\circ$) for angles of field for photometric measurements and for installing the lamp on the vehicle.

- 3.3.15. "Centre of reference" means the intersection of the axis of reference with the exterior light-emitting **surface**.
- 3.3.16. "Angles of geometric visibility" means the angles, which determine the field of the minimum solid angle in which the apparent surface of the lamp must be visible. That field of the solid angle is determined by the segments of the sphere, the centre of which coincides with the centre of reference of the lamp, and the equator is parallel with the ground. These segments are determined in relation to the axis of reference. The horizontal angles β (beta) correspond to the longitude and the vertical angles α (alpha) to the latitude. (see **Annex 3**)
- 3.3.17. The following shall be deemed to be:
- 3.3.17.1. "A single lamp" means a device or part of a device having one lighting or light-signalling function, one or more light source(s) and one apparent surface in the direction of the reference axis, which may be a continuous surface or composed of two or more distinct parts, or any assembly of two independent lamps as defined by applicable regulations of **the Contracting Party**.
- 3.3.17.2. "Two lamps (an even number of lamps)", means a single light-emitting surface in the shape of a band or strip if such band or strip is placed symmetrically in relation to the median longitudinal plane of the vehicle, extends on both sides to within at least 400 mm of the adjacent extreme outer edge of the vehicle, and is not less than 0.8 m long; the illumination of such surface shall be provided by not less than two light sources placed as close as possible to its ends; the light-emitting surface may be constituted by a number of juxtaposed elements on condition that the projections of the several individual light-emitting surfaces on a transverse plane occupy not less than 60 per cent of the area of the smallest **quadrilateral** circumscribing the projections of the said individual light-emitting surfaces.

3.4. LIGHTING DEVICES

- 3.4.1. "Driving beam (main-beam, high-beam) headlamp" means a lamp used to illuminate the road **a long distance ahead of the vehicle in the absence of oncoming or preceding traffic**.
- 3.4.2. "Passing beam (dipped-beam, low-beam) headlamp" means a lamp used to illuminate the road **a short distance ahead of the vehicle in the absence of oncoming or preceding traffic**.

[avoids discussion of glare, which cannot be objectively defined]

- 3.4.3. "Front fog lamp" means a lamp used to improve the illumination of the road ahead of the vehicle in case of fog or any **other** similar condition of reduced visibility.

- 3.4.4. "Cornering lamp" means a lamp used to provide supplementary illumination of that part of the road which is located near to the forward corner of the vehicle at the side towards which the vehicle is going to turn.
- 3.4.5. "Reversing lamp" means a lamp used to illuminate the road to the rear of the vehicle and to warn pedestrians and other road-users that the vehicle is reversing or is about to reverse.
- 3.5. LIGHT SIGNALLING DEVICES
- 3.5.5. "Direction indicator lamp" means a lamp used to indicate to other road-users that the driver intends to change direction to the right or to the left.
- 3.5.6. "Hazard warning signal" means the simultaneous operation of all of a vehicle's direction indicator lamps to show that the vehicle temporarily constitutes a special danger to other road-users.
- 3.5.7. "Stop lamp" means a lamp used to indicate to other road-users to the rear of the vehicle that the service brake is applied and/or longitudinal movement of the vehicle is intentionally retarded.
- 3.5.8. "Rear registration plate illuminating device" means a device used to illuminate the space reserved for the rear registration plate; such a device may consist of several optical components.
- 3.5.9. "Front position lamp" means a lamp used to indicate the presence and the width of the vehicle when viewed from the front.
- 3.5.10. "Rear position lamp (tail lamp)" means a lamp used to indicate the presence and width of the vehicle when viewed from the rear.
- 3.5.11. "Rear fog lamp" means a lamp used to improve the visibility of a vehicle from the rear in case of dense fog.
- 3.5.12. "Parking lamp" means a lamp, which is used to draw attention to the presence of a stationary vehicle.
- 3.5.13. "End-outline marker lamp (clearance lamp)" means a lamp fitted near to the extreme outer edge and as close as possible to the top of the vehicle and used to indicate clearly the vehicle's overall width. This lamp is intended, for certain vehicles and trailers, to complement the vehicles' front and rear position lamps.
- 3.5.14. "Retro-reflector" means a device used to indicate the presence of a vehicle by the reflection of light emanating from a light source not connected to the vehicle, the observer being situated near the source.

For the purposes of this regulation the following are not considered as retro-reflectors:

- 3.5.14.1. retro-reflecting registration plates;
- 3.5.14.2. the retro-reflecting signals mentioned in the ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road);
- 3.5.14.3. other retro-reflecting plates, **conspicuity treatment** and signals which must be used to comply with national requirements for use as regards certain categories of vehicles or certain methods of operation.
- 3.5.15. "Side-marker lamp" means a lamp used to indicate the presence of the vehicle when viewed from the side.
- 3.5.16. "Daytime running lamp" means a lamp facing in a forward direction used to make the vehicle more easily visible when driving during daytime.
- 3.5.17. "Identification lamp (ID lamp)" means a device fitted at the top and about the centreline of a vehicle to draw particular attention to its bulk. **It is** intended for certain vehicles and trailers, to complement the vehicle's front and rear position and end outline marker lamps.
- 3.5.18. "Conspicuity treatment" means a system of retro-reflective devices providing information regarding presence, width, length and bulk of a certain type of vehicles under condition of low or no ambient light.

4. GENERAL SPECIFICATIONS

- 4.1. **Lighting and light signalling devices listed in paragraph 5., shall conform and shall be marked in conformity** with the applicable regulations of the **Contracting Party**.
- 4.2. **Installation of lamps not listed in paragraph 5. is prohibited except on special vehicles, including but not limited to, police, medical and other emergency or public service vehicles.**
- 4.3. **The lighting and light-signalling devices shall be so fitted that under normal conditions of use of the vehicle 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.**
- 4.4. All lighting (road illumination) devices, except reversing and cornering lamps, shall **allow for adjustment of their orientation in accordance with** the instructions

provided with the vehicle by the vehicle manufacturer without the use of special tools other than those provided with the vehicle by the vehicle **manufacturer**.

- 4.5. For all light-signalling devices, including those mounted on the side panels, the reference axis of the lamp when fitted to the vehicle must be parallel to the ground; in addition it must 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 light-signalling devices. In each direction, a tolerance of $\pm 3^\circ$ shall be allowed. In addition, any specific instructions, laid down by the lamp manufacturer with regard to fitting of the light-signalling device on a vehicle, must be complied with.
- 4.6. In the absence of specific instructions, the height and orientation of the lamps shall be verified with the unladen vehicle **placed on a level ground and with the movable components in their normal position of use**.
- 4.7. In the absence of specific instructions, lamps of the same function, installed on the vehicle in an even number shall:
- 4.7.1. 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);
- 4.7.2. be symmetrical to one another in relation to the median longitudinal plane, this requirement **does not apply** to the interior structure of the lamp;
- 4.7.3. satisfy the same colorimetric requirements; and
- 4.7.4. have substantially identical photometric characteristics.
- 4.8. On vehicles whose external shape is asymmetrical, the **requirements in paragraph 4.7.1. and 4.7.2.** shall be satisfied so far as possible.
- 4.9. Grouped, combined or reciprocally incorporated lamps
- 4.9.1. Subject to paragraphs 4.9.2. and 4.9.3., lamps may be grouped, combined or reciprocally incorporated with one another provided that all **requirements of** this regulation, as well as requirements regarding presence and colour of the function prescribed by the **Contracting Party** are fulfilled.
- 4.9.2. **Where stop lamps and direction indicator lamps are grouped, 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.**
- 4.9.3. **Where the apparent surface of a single lamp is composed of two or more distinct parts, it shall satisfy one of the following requirements:**

4.9.3.1. The total area of the projection of the distinct parts on a plane tangent to the exterior surface of the transparent material and perpendicular to the reference axis shall occupy not less than 60 per cent of the smallest quadrilateral circumscribing the said projection, or

4.9.3.2. The distance between two adjacent/tangential distinct parts shall not exceed 15 mm when measured perpendicularly to the reference axis.

4.10. Measurements (see Annex 3)

4.10.1. In height:

"H1" – the maximum height above the ground shall be measured from the highest point of the apparent surface, in the direction of the reference axis; and

"H2" – the minimum height from the lowest point of the apparent surface, in the direction of the reference axis.

In the case of passing beam headlamp,

"H2" is measured from the lowest point of the effective outlet of the optical system (e.g. reflector, lens, projection lens) independent of its utilization.

4.10.2. In width:

"E" – the maximum distance of the lamp from the adjacent extreme outer edge of the vehicle shall be measured 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.

4.10.3. In length:

"K" – the maximum distance between the lamp and the transverse plane which marks the forward or rearward boundary of the vehicle's structural length 1/ shall be measured from that edge of the apparent surface in the direction of the reference axis which is the closest, respectively, to the front-end or rear-end of the vehicle.

4.10.4. Distance between two lamps:

"D" – unless otherwise specified in this document, the distance between two lamps, which face in the same direction, shall be measured between those edges of the two apparent surfaces of these two lamps in the direction of the reference axis, which are the closest to each other.

4.10.5. Where the position, as regards maximum or minimum height, width, length, or distance between lamps, clearly meets the requirements of the regulation, the exact edges of any apparent surface need not be determined.

4.11. No red light, which could give rise to confusion shall be emitted from a lamp in a forward direction and no white light which could give rise to confusion, other than from the reversing lamp, shall be emitted from a lamp 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:

4.11.1. For the visibility of red light towards the front of a vehicle, with the exception of red rearmost side-marker lamps, there must 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 2.

4.11.2. For the visibility of white light towards the rear, there must be no direct visibility of a light-emitting surface of a white lamp if viewed by an observer moving within Zone 2 as specified in Annex 2.

4.12. Electrical connections

4.12.1. The electrical connections must be such that the front and rear position lamps, the side-marker lamps, the rear registration plate illuminating device and the end-outline marker lamps and the identification lamps, if they exist, can only be switched on and off simultaneously either automatically or by means of a manual control. This condition does not apply when using front and rear position lamps, as well as side-marker lamps when combined or reciprocally incorporated with said lamps, as parking lamps, and when side-marker lamps are permitted to flash.

4.12.2. The electrical connections must be such that the lighting function for driving beam, passing beam or the front fog lamp cannot be switched on unless the front and rear position lamps, the side-marker lamps, the rear registration plate illuminating device and the end-outline marker lamps and the identification lamps, if they exist, are also switched on.

This requirement shall not apply, however, to the driving or passing beams when they are flashed momentarily.

4.12.3. Unless otherwise specified in this regulation, lighting and light-signalling devices shall be steady burning when activated.

4.13. Tell-tale

Where a "circuit-closed" tell-tale is prescribed by this regulation, it may be replaced by an "operating" tell-tale.

4.14. Concealable lamps

- 4.14.1. Lamps shall not be concealable with the exception of the driving beam headlamps, the passing beam headlamps and the front fog lamps, which may be concealed when they are not in use.
- 4.14.2. 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.
- 4.14.3. It must 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 driving beam and passing beam headlamps, the control referred to above is required only to activate the passing beam headlamps.
- 4.14.4. It must 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 shall light up only when they have reached their position of use.
- 4.14.5. When the concealment device has a temperature of $-30\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ the headlamps must be capable of reaching the position of use within three seconds of initial operation of the control.

4.15. Number of lamps

When installed on a vehicle, the number of lamps and retro-reflective devices described by this regulation shall be equal to the number specified in paragraph 5. below.

- 4.16. With the exception of retro-reflectors, a lamp is deemed **to be installed on the vehicle if it can be operated after the installation of the required light source. A lamp is deemed not to be installed on the vehicle if additional steps, other than light source installation, are necessary to make the lamp operational.**
- 4.17. Lighting devices installed on, or covered by, movable components:
- 4.17.1. Rear position lamps, all mandatory retro-reflectors, and all direction indicators except side direction indicators must not be installed on movable components unless at all fixed positions of the movable components the lamps on the movable components meet all the location and geometric visibility requirements for those lamps, or a device meeting all requirements for those lamps is installed.
- 4.17.2. There must not be any movable component, with or without a light-signalling device installed on it, which in any fixed position hides more than 50 per cent of the apparent surface of front and rear position lamps, front and rear direction indicator

lamps, side-marker lamps or any retro-reflector when viewed in the reference axis of this specific device. If this is not practicable:

- 4.17.2.1. an alternative device meeting all requirements for those lamps shall be installed; or in case of position lamps, direction indicator lamps or mandatory side-marker lamps:
- 4.17.2.2. a clear 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 by means provided by the manufacturer with the vehicle.
- 4.17.3. No road illumination device (driving beam headlamp, passing beam headlamp, front fog lamp, etc) shall be mounted on movable component whose movement causes the beam pattern of the device to move upwards, unless the device mounted on such movable component will be automatically switched off while the movable component is moved out of its normal position of use specified for a **moving vehicle**.
- 4.17.4. When a lamp is installed on a movable component and the movable component is in the normal position(s) of use, the lamp must always return to the position(s) specified by the manufacturer in accordance with this regulation. In the case of passing 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.
- 4.18. Lamps shall **allow light source replacement in accordance with the** instructions provided with the vehicle by the vehicle manufacturer without the use of special tools other than those provided with the vehicle by the vehicle manufacturer. This requirement is not applicable to devices equipped with a non-replaceable light source or gas discharge light source.
- 4.19. **In case of a failure, a light-signalling function can be automatically substituted, provided that this temporary** substituting function is similar in colour, main intensity and position to the function that has ceased to operate and provided that the substituting device remains operational in its original safety function. During substitution, a tell-tale shall indicate occurrence of a temporary replacement and need for repair.
- 4.20. Geometric visibility
 - 4.20.1. There must be no obstacle on the inside of the angles of geometric visibility, as described in paragraph 3.3.16., 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 present when the lamp was photometrically tested.
 - 4.20.2. If measurements are taken closer to the lamp, the direction of observation must be shifted parallel to achieve the same accuracy.

- 4.20.3.** If, when the lamp is installed, any part of the apparent surface of the lamp is hidden by any further parts of the vehicle, the part of the lamp not hidden by obstacles must still conform to the photometric values prescribed for the device.
- 4.20.4.** When the vertical angle of geometric visibility below the horizontal may be reduced to 5° (lamp at less than 750 mm above the ground) the photometric field of measurements of the installed device may be reduced to 5° below the horizontal.
- 4.21. Based on a determination by each Contracting Party, the colours of the light emitted or reflected by the lighting and light signalling devices are the following:**
- | | | | |
|-----------------|--|---|---|
| 4.21.1. | driving beam headlamp: | | white |
| 4.21.2. | passing beam headlamp: | | white |
| 4.21.3. | front fog lamp: | | (a) white or selective yellow - ???.
(b) white - elsewhere. |
| 4.21.4. | reversing lamp: | | white |
| 4.21.5. | direction indicator lamp
and hazard warning signal: | front
rear | Amber
(a) amber or red - US and Canada.
(b) amber - elsewhere. |
| 4.21.6. | additional side direction indicator | | amber |
| 4.21.7. | stop lamp: | | red |
| 4.21.8. | rear registration plate illuminating
device: | | white |
| 4.21.9. | front position lamp: | | (a) white or amber - US and Canada.
(b) white - elsewhere. |
| 4.21.10. | rear position lamp: | | red |
| 4.21.11. | rear fog lamp: | | red |
| 4.21.12. | parking lamp: | towards front
towards the rear | white
red or amber |
| 4.21.13. | end-outline marker lamp: | front
rear | (a) amber - US and Canada.
(b) white - elsewhere.
red |
| 4.21.14. | rear retro-reflector: | | red |

- 4.21.16. front retro-reflector: white or same as incident light
- 4.21.17. side retro-reflector:
- | | | |
|--|--------------|---|
| | front | amber |
| | intermediate | amber |
| | rearmost | (a) red - US and Canada.
(b) amber or red - elsewhere. |
- 4.21.18. side-marker lamp:
- | | | |
|--|--------------|---|
| | front | amber |
| | intermediate | amber |
| | rearmost | (a) red - US and Canada.
(b) amber or red - elsewhere. |
- 4.21.19. daytime running lamp: (a) amber to white - US and Canada.
(b) white - elsewhere.
- 4.21.20. identification lamps:
- | | | |
|--|-------|-------|
| | front | amber |
| | rear | red |
- 4.21.21. cornering lamp: white
- 4.22. Based on a determination by each Contracting Party, the requirements for presence of the lighting and light signalling devices are the following:
- 4.22.1. driving beam headlamp: Mandatory on motor vehicles.
Prohibited on trailers.
- 4.22.2. passing beam headlamp: Mandatory on motor vehicles.
Prohibited on trailers.
- 4.22.3. front fog lamp: Optional on motor vehicles.
Prohibited on trailers.
- 4.22.4. reversing lamp: Mandatory on motor vehicles.
Optional on trailers.
- 4.22.5. direction indicator lamp and hazard warning signal:
- | | | |
|--|-------|--|
| | front | Motor vehicles:
Mandatory |
| | | Trailers:
(a) Optional - ??????????
(b) Mandatory - ?????????? |
| | side | Motor vehicles:
(a) Optional - US and Canada.
(b) Mandatory - elsewhere.
Trailers:
Optional. |
| | rear | Mandatory. |

- 4.22.6. additional side direction indicator on category 2 motor vehicles and trailers exceeding 8,000 kg in gross vehicle mass; except truck-tractors**
- (a) **Mandatory - Japan.**
(b) **Optional - elsewhere.**
- 4.22.7.1. stop lamp:**
4.22.7.2. center stop lamp:
- Mandatory on all vehicles.**
Mandatory on all category 1 vehicles and on category 2 vehicles with gross vehicle mass of less than 4550 kg and structural width of less than 2030 mm.
Optional on other vehicles.
- 4.22.8. rear registration plate illuminating device:**
- Mandatory.**
- 4.22.9. front position lamp:**
- Motor vehicles:**
Mandatory.
Trailers:
(a) **Optional - US and Canada.**
(b) **Mandatory on trailers over 1,500 mm in structural width and**
Optional on other trailers - elsewhere.
- 4.22.10. rear position lamp:**
- Mandatory.**
- 4.22.11. rear fog lamp:**
- Optional - US and Canada.**
Mandatory - elsewhere.
- 4.22.12. parking lamp on category 1 vehicles with structural length less than 6,000 mm and structural width less than 2030 mm:**
- Optional.**
Prohibited on all other vehicles.
- 4.22.13. end-outline marker lamp:**
- Mandatory - on vehicle over 2030 mm in structural width, except in the case of rear end outline marker lamps on incomplete vehicles**
Optional - on vehicles between 1800 mm and 2030 mm in structural width and in the case of rear end outline marker lamps on incomplete vehicles
Prohibited - on other vehicles

- 4.22.14.1. rear retro-reflector non-triangular:**
- (a) Mandatory on motor vehicles and trailers - US and Canada**
 - (b) Mandatory on motor vehicles only - elsewhere.**
- 4.22.14.2. rear retro-reflector triangular (per Annex 5):**
- (a) Optional on trailers - US and Canada.**
 - (b) Mandatory on trailers;**
If triangular rear retro-reflectors are mandatory, additional non-triangular rear retro-reflectors are allowed, provided that they are grouped together with the other rear light-signalling devices;
and
Prohibited - on other vehicles - elsewhere.
- 4.22.16. front retro-reflector:**
- (a) Optional - US and Canada.**
 - (b) Mandatory on trailers and on motor vehicles having all forward facing lamps with reflectors concealable and**
Optional on other motor vehicles - elsewhere.
- 4.22.17. side retro-reflector:**
- (a) Mandatory on all vehicles - US and Canada**
 - (b) Mandatory on all vehicles with structural length of more than 6000 mm and**
Optional on all vehicles with structural length of 6000 mm or less - elsewhere.
- 4.22.18. side-marker lamp:**
- a) Mandatory on all vehicles - US and Canada**
 - b) Mandatory on all vehicles with structural length of more than 6000 mm and**
Optional on all vehicles with structural length of 6000 mm or less - elsewhere.
- 4.22.19. daytime running lamp:**
- (a) Mandatory on motor vehicles - Canada**
 - (b) Optional on motor vehicles - elsewhere**
 - (c) Prohibited - Japan**

- 4.22.20. identification lamps:** (a) **Mandatory on vehicles over 2030 mm in structural width except Optional on truck tractors - US and Canada.**
(b) **Optional - elsewhere.**
- 4.22.21. cornering lamp:** **Optional - on motor vehicles.**
Prohibited - on trailers.

5. INDIVIDUAL SPECIFICATIONS

5.1. DRIVING BEAM HEADLAMP

5.1.1. Number

Two or four

5.1.2. Arrangement:

5.1.2.1. No point on the apparent surface in the direction of the reference axis of the driving beam headlamp shall be further outboard than the point, which is closest to the adjacent extreme outer edge of the vehicle, on the apparent surface in the direction of reference axis of the passing beam headlamp.

5.1.2.2. Driving beam headlamps shall be fitted in such a way that the light emitted **is not illuminating the** driver either directly or indirectly through the rear-view mirrors and/or other reflecting surfaces of the vehicle.

5.1.3. Position

5.1.3.1. In width: subject the provisions in paragraph 5.1.2.1. and

5.1.3.2. In height: no individual specifications.

5.1.3.3. In length: no individual specifications.

5.1.4. Geometric visibility

5.1.4.1. The visibility of the illuminating surface, including its visibility in areas which do not appear to be illuminated in the direction of observation considered, must 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.

- 5.1.4.2.** 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.
- 5.1.5.** Orientation
- Towards the front.
- 5.1.6.** Electrical connections
- 5.1.6.1.** If there are two pairs of the driving beam headlamps they may be switched on **either simultaneously or** in pairs. For changing over from the passing to the driving beam at least one pair of driving beam headlamps shall be switched on. For changing over from the driving beam to the passing beam all driving beam headlamps shall be switched off **simultaneously.**
- 5.1.6.2.** **The passing beam headlamps** may remain switched on at the same time as the **driving beam headlamps.**
- 5.1.6.3.** Where four concealable headlamps are fitted their raised position must prevent the simultaneous operation of any additional headlamps fitted, if these are intended to provide light signals consisting of intermittent illumination at short intervals in daylight.
- 5.1.6.4.** **Each vehicle subject to this regulation must be equipped with a manual on/off switch for the driving beam headlamps.**
- 5.1.6.5.** **If, in addition to the manual switch, driving beam headlamps operate automatically, the automatic operation must be set manually by the driver each time after manual deactivation of driving beam headlamps and after the deactivation of the propulsion system.**
- 5.1.7.** Tell-tale
- Circuit-closed tell-tale mandatory.
- 5.1.8.** Other provisions
- 5.1.8.1.** **No more than one** driving beam headlamp and/or its beam pattern **on each side of the vehicle may rotate not more than 20 degrees along the vertical axis in** the direction of vehicle travel.
- 5.1.8.2.** Where a vehicle is fitted with four concealable driving beam headlamps the installation of two more headlamps shall be allowed only for the purpose of providing light-signalling, consisting of intermittent illumination, at short intervals in the daylight.

5.1.8.3. The aggregate maximum intensity of all driving beam headlamps **which can be switched on simultaneously shall not exceed 225,000 cd at any point in the beam pattern when measured at 12.0 V, based on documentation supplied by the vehicle manufacturer.**

5.2. PASSING BEAM HEADLAMP

5.2.1. Number

Two.

5.2.2. Arrangement

Passing beam headlamps shall be fitted in such a way that the light **emitted is not illuminating the** driver either directly or indirectly through the rear-view mirrors and/or other reflecting surfaces of the vehicle.

5.2.3. Position

5.2.3.1. In width:

E less than or equal to 400 mm;

5.2.3.2. In height:

H2 more than or equal to 500 mm; and

H1 less than or equal to 1,200 mm.

[**Motor vehicles equipped with passing beam headlamps with light sources having an objective luminous flux exceeding 2,000 lumen each:**

H1 less than or equal to 950 mm.]

5.2.3.3. In length:

at the front of the vehicle.

5.2.4. Geometric visibility

Horizontal angles:

β_1 equal to 45° and

β_2 equal to 10°.

Vertical angles:

α_1 equal to 15° and
 α_2 equal to 10° ,

5.2.5. Orientation

5.2.5.1. Towards the front.

5.2.5.2. **Each vehicle shall be equipped with the means to ensure that the vertical inclination of the passing beam headlamp beam pattern can be maintained in accordance with the instructions provided with the vehicle by the vehicle manufacturer without the use of special tools other than those provided with the vehicle by the vehicle manufacturer and according to the requirements of the Contracting Party.**

5.2.6. Electrical connections

5.2.6.1. The control for changing over to the passing beam must switch off all driving beam headlamps simultaneously.

5.2.6.2. The passing beams may remain switched on at the same time **as the driving beams.**

5.2.6.3. Passing beam headlamps equipped with gas-discharge light sources shall remain switched on during the driving beam operation.

5.2.6.4. Passing-beam headlamps may be switched on or off automatically. **However, it shall always be possible to manually override the automatic operation.**

5.2.7. Tell-tale

Tell-tale optional.

5.2.8. Other provisions

5.2.8.1. The requirements of paragraph 4.6.2. shall not apply to passing beam headlamps.

5.2.8.2. Passing beam headlamp and/or its beam pattern **may rotate not more than 20 degrees along the vertical axis in** the direction of vehicle travel.

5.2.8.3. **Passing beam headlamps with a light sources having combined objective luminous flux, which exceeds 2,000 lumens shall only be installed in conjunction with the installation of headlamp cleaning device(s) and automatic level maintenance.**

5.2.8.4. Mechanical headlamp cleaning devices (wipers) shall not be installed on headlamps with plastic lenses.

5.3. FRONT FOG LAMP

5.3.1. Number

Two.

5.3.2. Arrangement

5.3.2.1. No point on the apparent surface in the direction of the reference axis may be higher than the highest point on the apparent surface in the direction of the reference axis of the passing beam headlamp.

5.3.2.2 **Front fog lamps shall be fitted in such a way that the light emitted is not illuminating the driver either directly or indirectly through the rear-view mirrors and/or other reflecting surfaces of the vehicle.**

[moved from former paragraph 5.3.4.3.]

5.3.3. Position

5.3.3.1. In width:

E less than or equal to 400 mm

5.3.3.2. In height:

H1 more than or equal to 250 mm

H2 less than or equal to 800 mm

5.3.3.3. In length:

at the front of the **vehicle**.

5.3.4. Geometric visibility

Horizontal angles:

β_1 equal to 45°

β_2 equal to 10°

Vertical angles:

α_1 equal to 5°

α_2 equal to 5°

5.3.5. Orientation

Towards the front.

Each vehicle shall be equipped with the means to ensure that the vertical inclination of the front fog lamp beam pattern can be maintained in accordance with the instructions provided with the vehicle by the vehicle manufacturer without the use of special tools other than those provided with the vehicle by the vehicle manufacturer and according to the requirements of the Contracting Party.

5.3.6. Electrical connections

Shall be such that:

5.3.6.1. The front fog lamps may be switched on and off independently of driving and/or passing beam headlamps.

5.3.6.2. **The front fog lamps may continue to operate until the position lamps are switched off, and the front fog lamps shall then remain off until deliberately switched on again.**

5.3.6.3. **Each vehicle subject to this regulation must be equipped with a manual on/off switch for the front fog lamps.**

5.3.6.4. **If, in addition to the manual switch, front fog lamps operate automatically, the automatic operation must be manually activated by the driver each time after manual deactivation of front fog lamps and the deactivation of the propulsion system.**

5.3.7. Tell-tale

Circuit-closed tell-tale **mandatory.**

5.3.8. Other provisions

None.

5.4. REVERSING LAMP

5.4.1. Number

5.4.1.1. **motor vehicles of category 1-1 and on all other vehicles with an structural length not exceeding 6,000 mm**

**One device mandatory and
second device optional**

5.4.1.2. Other vehicles with an structural length exceeding 6,000 mm, except vehicles of category 1-1

Two devices mandatory and additional two devices optional.

5.4.2. Arrangement

No special requirement.

5.4.3. Position

5.4.3.1. In width:

no special requirement.

5.4.3.2. In height:

H1 more than or equal to 250 mm

H2 less than or equal to 1,200 mm

5.4.3.3. In length:

at the **rear** of the vehicle.

However, if installed, the additional pair of reversing lamps shall be fitted one on each side of the vehicle or on the rear of the vehicle.

5.4.4. Geometric visibility

5.4.4.1. Horizontal angles:

If one lamp:

$\beta 1$ equal to 45°

$\beta 2$ equal to 45°

If two lamps:

$\beta 1$ equal to 45°

$\beta 2$ equal to 30°

Vertical angles:

$\alpha 1$ equal to 15°

$\alpha 2$ equal to 5°

5.4.4.2. In case of additional two reversing **lamps**:

Horizontal angles:

if only one lamp

β_1 equal to 45°

β_2 equal to 45°

if two lamps

β_1 equal to 45°

β_2 equal to 10°

Vertical angles:

α_1 equal to 5°

α_2 equal to 5°

5.4.5. Orientation

Rearwards.

In case of the two optional devices mentioned in paragraph 5.4.2.2., if fitted on the side of the vehicle the above mentioned requirements of paragraph 5.4.5.2. shall not be applied. However, the reference axis of these devices shall be orientated sideward $10^\circ \pm 5^\circ$ horizontally towards the rear in relation to the median longitudinal plane of the vehicle.

5.4.6. Electrical connection

5.4.6.1. Electrical connections shall be such that the lamp(s) can **illuminate automatically** only if the reverse gear is engaged and if the device **that activates the propulsion system of the vehicle is in a position, which makes it possible for the vehicle to operate.** It shall not **illuminate or remain illuminated** if either of the above conditions is not satisfied.

5.4.6.2. Moreover, the electrical connections of the two optional devices mentioned in paragraph 5.4.2.2. shall be such that these devices cannot illuminate unless the lamps referred to in paragraph 4.12.1. are switched on.

5.4.6.3. It is allowed to switch on the devices fitted on the side of the vehicle, for slow manoeuvres in forward motion. For such purposes, the devices shall be activated and deactivated manually by a separate control and may remain illuminated even when reverse gear is disengaged. However, if the forward speed of the vehicle exceeds 10 km/h the devices shall be switched off

automatically and shall remain switched off until deliberately switched on again.

[What are these devices?]

5.4.7. Tell-tale

Tell-tale optional.

5.5. DIRECTION INDICATOR LAMP AND HAZARD WARNING SIGNAL

5.5.1. Number

**two front direction indicator lamps;
two side direction indicator lamps;
two rear direction indicator lamps;
two additional rear direction indicator lamps allowed on other than category 1-1 vehicles.**

5.5.2. Arrangement

5.5.2.1. Where lamps combining the functions of front direction indicator lamps and side direction indicator lamps are fitted, in addition two side direction indicator lamps may be installed to meet the visibility requirements of paragraph 5.5.5.

5.5.2.2. If the distance between the edge of the apparent surface in the direction of the reference **axis of the** direction indicator lamp and that of the apparent surface in the direction of the reference axis of the passing-beam headlamp, **daytime running lamp** and/or the front fog lamp is less than **40 mm** the photometric output of the direction indicator must be increased according to the regulation **of the Contracting Party**.

5.5.2.3. **If the distance between the centre of reference of the direction indicator lamp and the edge of the apparent surface in the direction of the reference axis of the passing-beam headlamp, daytime running lamp and/or the front fog lamp is less than 100 mm the photometric output of the direction indicator must be increased according to the regulation of the Contracting Party.**

5.5.3. Position

5.5.3.1. In width (front and all rear):

E less than or equal to 400 mm

D more than or equal to 600 mm

vehicles less than 1,300 mm in structural width

D more than or equal to 400 mm

5.5.3.2. In height (all):

H2 more than or equal to 350 mm

H1 less than or equal to 1,500 mm

If the structure of the vehicle does not permit the upper limit to be respected, and if the optional lamps are not installed,

H1 less than or equal to 2,100 mm.

If optional rear direction indicator lamps are installed, they shall be placed at a height compatible with the applicable requirements of paragraph 5.5.4.1. 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 direction indicator lamps.

5.5.3.3. In length:

Front direction indicator lamps:

at the front.

Side direction indicator lamps:

K less than or equal to **2,500 mm**

For trailers with drawbars, as an alternative

K less than or equal to 400 mm excluding drawbar (see figure xxx)

Rear direction indicator lamps:

at the rear.

5.5.4. Geometric visibility

5.5.4.1. Horizontal angles:

Front direction indicators:

$\beta 1$ equal to 80°

$\beta 1$ equal to 45° when direction indicator is supplemented by flashing front side-marker lamp of the same colour.

$\beta 2$ equal to 45°

Rear direction indicator:

Motor vehicles:

β_1 equal to 80°

β_1 equal to 45° when direction indicator is supplemented by flashing rear **side-marker lamp of the same colour.**

β_2 equal to 45°

Trailer:

β_1 equal to 80°

β_2 equal to 45°

Side direction indicator:

β_3 equal to 60°

η equal to 5°

(angles β_3 and η are measured from the plane tangent to the lens of the side turn signal lamp and parallel to the longitudinal plane of the vehicle)

5.5.4.2. Vertical angles:

α_1 equal to 15° (5° if H1 of the optional direction indicator lamps is more than 2,100 mm)

α_2 equal to 15° (5° if H1 is less than 750mm)

side direction indicator lamps:

α_1 equal to 30° (**15° for vehicles of less than 6,000 mm in structural length**)

α_2 equal to 15° (**5° if H1 is less than 750mm**)

5.5.4.3. For the direction indicator to be considered visible throughout the angles of geometric visibility one of the following shall be met:

The minimum luminous intensity within the above angles must not be less than 0.3 cd;

or

Throughout the angles of geometric visibility, with the outward angle up to 45° , the lamp must provide an unobstructed view of the apparent surface of at least 12.5 cm^2 , except for the side direction **indicator**. The apparent surface of any retro-reflector shall be excluded.

5.5.5. Orientation

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

5.5.6. Electrical connections

5.5.6.1. Direction indicator lamps shall switch on independently of the other lamps.

5.5.6.2. **It shall be possible to switch the direction indicator lamps on and off manually. The automatic switching of direction indicator lamps is permissible only for their deactivation.**

5.5.6.3. 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 **and at the same frequency.**

5.5.6.4. **When the direction indicator lamps must be supplemented per paragraph 5.5.5.1. by flashing side-marker lamps of the same colour, these side-marker lamps shall flash at the same frequency and in phase with the direction indicator lamps on the same side of the vehicle.**

5.5.6.5. All direction indicator lamps may also flash simultaneously in association with vehicle alarm systems and/or immobilisers to draw attention to the vehicle and/or during the arming and disarming of the vehicle's alarm system.

5.5.6.6. Hazard warning signal

5.5.6.6.1. **The hazard warning** signal shall be operated by means of a separate, manual control enabling all direction indicators on both sides of the vehicle to flash in accordance with the requirements of paragraph 5.5.7.3. above.

5.5.6.6.2. **The hazard warning signal may be activated automatically in the event of the vehicle being involved in a collision. In such case it shall only be turned off manually.**

[final wording for allowance for automatic activation of the hazard warning signal in case of immediate danger may be changed once such provision is adopted by GRE for Regulation No. 48]

5.5.6.6.3. As specified in paragraph 5.5.9., if a power-driven vehicle is equipped to draw a trailer the hazard warning signal control shall also **enable all direction indicator on the trailer.** The hazard warning signal shall be able to function even if the **device that activates the propulsion system of the vehicle is in a position, which makes it impossible for the vehicle to operate.**

5.5.7. Tell-tale

5.5.7.1. Operating tell-tale mandatory for front and rear direction indicator lamps. 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 the front or rear direction indicator lamps, is either extinguished, or remains alight without flashing, or shows a marked change of frequency. If it is auditory only, it shall be clearly audible and shall show a marked change of frequency, at least in the event of the malfunction of any of the front or rear direction indicator lamps.

5.5.7.2. If a motor vehicle is equipped to draw a trailer, it must be fitted with a special visual operating 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.

5.5.7.3. For the optional pair of rear direction indicator lamps on trailers, operating tell-tale shall not be mandatory.

5.5.7.4. For the **hazard warning signal an operating tell-tale mandatory**. Flashing warning light, which can operate in conjunction with the tell-tale(s) **for direction indicators**.

5.5.8. Other provisions

5.5.8.1. The direction indicator shall emit light at a steady rate of 90 ± 30 flashes per minute. **The duration of each flash and the interval between two successive flashes shall be constant. Minimum duration of each flash shall be 0.2 seconds.**

5.5.8.2. 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.

5.5.8.3. 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 direction indicator lamps of the trailer.

5.5.8.4. In case of failure, other than short-circuit, of one direction indicator lamp, the others must continue to flash, but the frequency in this condition may be different from that prescribed.

5.5.8.5. Rear direction indicator lamps must not be reciprocally incorporated with stop lamps.

5.6. MIDDLE-SIDE DIRECTION INDICATOR

5.6.1. Number

two.

5.6.2. Arrangement

one on each side of the vehicle.

5.6.3. Position

5.6.3.1. In width:

no requirement

5.6.3.2. In height:

H2 more than or equal to 350 mm

H1 less than or equal to 2,300 mm

5.6.3.3. In length

Motor vehicle: within 2,500 mm rearward of the cab's rear end

Trailer: within 4500mm from the front end including a drawbar.

5.6.4. Geometric visibility (see figure 1-1 and 1-2)

5.6.4.1. The middle-side direction indicator shall be visible from any point on the vertical plane 1,000 mm outwards of the vehicle's outermost point and parallel to the median longitudinal plane of the vehicle, and between a height of 1,000 mm and 1,600 mm from the ground and between the vertical line 1,000 mm forward of the installation position of the middle-side direction indicator and the other vertical line equidistant with the vehicle's rear end from the installation position of the middle-side direction indicator (see Figure 1-1).

5.6.4.2. For the middle-side direction indicator to be considered visible throughout the angles of geometric visibility one of the following shall be met:

The minimum luminous intensity within the above angles must not be less than 3 cd;

or

The apparent surface of the middle-side direction indicator shall be at least 40 cm² as projected onto the vehicle's median longitudinal plane, onto the second plane intersecting with the median longitudinal plane at 45 degrees from forward, and onto the third plane intersecting with the median longitudinal plane at 45 degrees from rearward (see Figure 1-2).

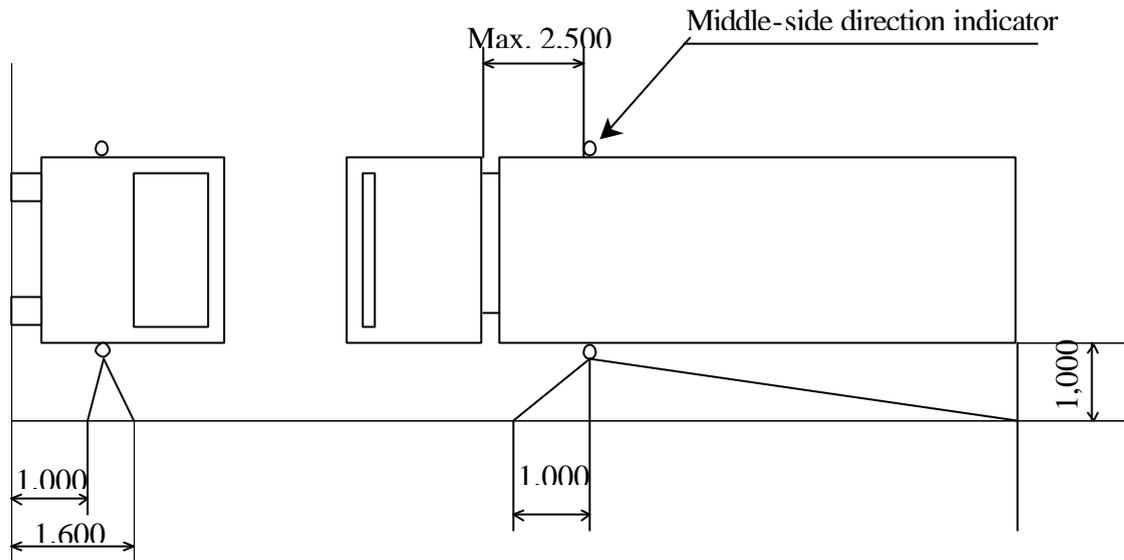


Figure 1-1

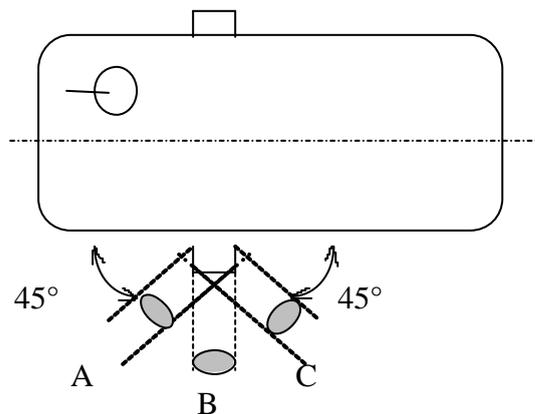


Figure 1-2

5.6.5. **Orientation**

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

5.6.6. **Electrical connections**

Middle-side direction indicator lamps shall function simultaneously with the other direction indicator lamps per paragraph 5.5.7.

5.6.7. **Tell-tale**

Per paragraph 5.5.8.

5.6.8. Other provisions

No special requirements.

5.7. STOP LAMP AND CENTRE STOP LAMP

5.7.1. Number

Per paragraph 5.7.2.

5.7.2. Arrangement

5.7.2.1. two stop lamps:

All vehicles

5.7.2.2. in addition one centre stop lamp:

Vehicles of categories 1 and 2, except for vehicles of category 2 with gross vehicle mass more than 4,550 kg and whose structural width is more than 2,030 mm.

Optional on other vehicles.

Only, when the median longitudinal plane of the vehicle is not located on a fixed body panel but separates one or two movable **components** of the vehicle (e.g. doors), and lacks sufficient **surface** to install a single centre stop lamp on the median longitudinal plane above or below such movable **components**, either:

centre stop lamp composed of two devices may be installed, one on each movable **component**, or

one centre stop lamp may be installed offset to the left or to the right of the median longitudinal plane.

5.7.2.3. two optional stop lamps:

on other motor vehicles and trailers if centre stop lamp is not installed

5.7.3. Position

5.7.3.1. In width:

For each lamp of the pair of stop lamps:

E less than or equal to 400 mm;

For centre stop lamp:

the centre of reference shall be situated on the median longitudinal plane of the vehicle.

However, in the case where a centre stop lamp composed of two devices is installed, according to paragraph 5.7.3., they shall be positioned **within 50 mm** of the median longitudinal plane, one on each side of this plane.

In the cases where one centre stop lamp offset from the median longitudinal plane is permitted according to paragraph 5.7.2., this offset shall not exceed 150 mm from the median longitudinal plane to the centre of reference of the lamp.

5.7.3.2. In height:

5.7.3.2.1. For the pair of stop lamps:

H2 more than or equal to 350 mm (380 mm to the optical centre of the lamp);

H1 less than or equal to 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 the vertical distance as large as the shape of the bodywork makes it possible, but not less than 600 mm above the mandatory lamps).

5.7.3.2.2. For centre stop lamp the horizontal plane tangential to the lower edge of the apparent surface shall be:

not 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

H2 more than or equal to 850 mm.

However, the horizontal plane tangential to the lower edge of the apparent surface of centre stop lamp shall be above the horizontal plane tangential to the upper edge of the apparent surface of the symmetrical pair of stop lamps.

5.7.3.3. In length:

For a pair of stop lamps:

at the rear of the vehicle.

For centre stop lamp:

no special requirement.

5.7.4. Geometric visibility

Horizontal angles:

For a pair of stop lamps:

β_1 equal to 45°

β_2 equal to 45°

For centre stop lamp:

10° to the left and to the right of the longitudinal axis of the vehicle;

Vertical angles:

For the pair of stop lamps:

α_1 equal to 15° (5° if H1 of the optional stop lamps is more than 2,100 mm)

α_2 equal to 15° (5° if H1 is less than 750 mm)

For centre stop lamp:

α_1 equal to 10°

α_2 equal to 5°

5.7.5. Orientation

Towards the rear of the vehicle.

5.7.6. Electrical connections

5.7.6.1. All stop lamps must light up simultaneously when either the service brake or endurance brake (e.g. retarder) is activated and when a complete or partial braking system is activated for the purpose of generating vehicle speed retardation with or without a direct action of the driver. They must switch off automatically once the above conditions ceased to exist.

[this paragraph is under revision by GRE and GRRF – emergency braking; it may be changed based on the outcome of this work.]

5.7.6.2. Stop lamps must operate only automatically **in accordance with paragraph 5.7.7.1.**

5.7.6.3. The stop lamps need not function if the device **that activates the propulsion system of the vehicle** is in a position, which makes it impossible for the **vehicle to operate.**

5.7.7. Tell-tale

Failure tell-tale mandatory;

5.7.8. Other provisions

5.7.8.1. The centre stop lamp may be installed outside or inside the vehicle.

5.7.8.2. In the case where it is installed inside the vehicle:

the light emitted shall not cause discomfort glare to the driver through the rear-view mirrors and/or other surfaces of the vehicle (i.e. rear window); and

the photometric requirements of the centre stop lamp must be met with the glazing behind which the lamp is to be installed.

5.7.8.3. **A centre stop lamp shall be independent of any other lamp defined in this regulation.**

5.7.8.4. **Any stop lamp must not be reciprocally incorporated with rear direction indicator lamp.**

5.8. REAR REGISTRATION PLATE ILLUMINATING DEVICE

5.8.1. Number

Such that the device illuminates the site of the registration plate.

5.8.2. Arrangement

Such that the device illuminates the site of the registration plate.

The device shall be located above or on the side(s) of the site of the registration plate.

5.8.3. Position

5.8.3.1. In width:

such that the device illuminates the site of the registration plate.

5.8.3.2. In height:

such that the device illuminates the site of the registration plate.

5.8.3.3. In length:

such that the device illuminates the site of the registration plate.

5.8.4. Geometric visibility

Such that the device illuminates the site of the registration plate.

5.8.5. Orientation

Such that the device illuminates the site of the registration plate.

5.8.6. Electrical connections

In accordance with paragraph 4.12.1.

5.8.7. Tell-tale

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

5.8.8. Other provisions

When the rear registration plate illuminating device is combined with the rear position lamp, reciprocally incorporated in the stop lamp, direction indicator or in the rear fog lamp, the photometric characteristics of the rear registration plate illuminating device may be modified during the illumination of the stop lamp or the rear fog lamp.

5.9. FRONT POSITION LAMP

5.9.1. Number

Two.

5.9.2. Arrangement

No special requirement.

5.9.3. Position

5.9.3.1. In width:

as close as practicable to the adjacent extreme edge of the **vehicle**.

This condition is only met when:

motor vehicles:

E less than or equal to 400 mm.

Except for vehicle category 1-1 and category 2 with GVW not exceeding 3,500 kg.

D more than or equal to 600 mm may be reduced to 400 mm when the structural width of the vehicle is less than or equal to 1,300 mm.

trailers:

E less than or equal to 150 mm.

5.9.3.2. In height:

H2 more than or equal to 350 mm (380 mm from the optical centre of the lamp).

H1 less than or equal to 1,500 mm (2,100 mm if the shape of the bodywork makes it impossible to keep within 1,500 mm).

5.9.3.3. In length:

no individual specification.

5.9.3.4. 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 must be used to verify compliance with the positioning requirements (paragraphs 5.9.4.1. to 5.9.4.3.).

5.9.4. Geometric visibility

5.9.4.1. Horizontal angles:

β 1 equal to 80° (45° if side marker lamps are present)

β 2 equal to 45° (5° for trailers)

Vertical angles:

α 1 equal to 15°

α 2 equal to 15° (5° if H1 less than 750 mm)

- 5.9.4.2.** For the front position lamp to be considered visible throughout the angles of geometric visibility the following shall be met:

The minimum luminous intensity within the above angles must not be less than 0.05 cd;

or

The lamp must provide an unobstructed view of the projected apparent surface of at least 12.5 cm².

The illuminating surface area of any retro-reflector that does not transmit light shall be excluded.

- 5.9.5.** Orientation

Forwards.

- 5.9.6.** Electrical connections

In accordance with paragraph 4.12.1.

- 5.9.7.** Tell-tale

Circuit-closed tell-tale mandatory. **Is not required if the instrument panel lighting can only be turned on simultaneously with the front position lamps.**

- 5.9.8.** Other provisions

If one or more infrared radiation generator(s) is (are) installed inside the front position lamp, it (they) is (are) allowed to be activated only when the headlamp is switched on and the vehicle is in forward motion. In the event that the front position lamp or the headlamp on the same side fails, the infrared radiation generator(s) shall be automatically switched off.

- 5.10.** REAR POSITION LAMP

- 5.10.1.** Number

Two.

Two optional rear position lamps on vehicles other than:

- category 1-1 vehicles;
- category 2 vehicles with GVW under 3,500 kg; or
- vehicles on which end-outline marker lamps are installed.

5.10.2. Arrangement

No special requirement.

5.10.3. Position

5.10.3.1. In width:

5.10.3.1.1. mandatory rear position lamps;

as close as practicable to the adjacent extreme edge of the **vehicle**.

This condition is only met when:

E less than or equal to 400 mm

Except for vehicle category 1-1 and category 2 with GVW not exceeding 3,500 kg.

D more than or equal to 600 mm may be reduced to 400 mm when the structural width of the vehicle is less than or equal to 1,300 mm.

5.10.3.1.2. optional rear position lamps;

D more than or equal to 600 mm.

5.10.3.2. In height:

H2 more than or equal to 350 mm.

H1 less than or equal to 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 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.

5.10.3.3. In length:

at the rear of the vehicle.

5.10.4. Geometric visibility

5.10.4.1. Horizontal angles:

β_1 equal to 80° (**45° if side marker lamps are present**)

β_2 equal to 45°

Vertical angles:

α_1 equal to 15° (5° if H1 of the optional rear position lamps more than 2,100 mm)

α_2 equal to 15° (5° if H1 less than 750 mm)

- 5.10.4.2.** For the rear position lamp to be considered visible throughout the angles of geometric visibility the following shall be met:

The minimum luminous intensity within the above angles must not be less than 0.05 cd;

or

The lamp must provide an unobstructed view of the projected apparent surface of at least 12.5 cm^2 .

The illuminating surface area of any retro-reflector that does not transmit light shall be excluded.

- 5.10.5.** Orientation

Rearwards.

- 5.10.6.** Electrical connections

In accordance with paragraph 4.12.1.

- 5.10.7.** Tell-tale

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

- 5.10.8.** Other provisions

Rear position lamp shall not be combined with a rear end outline marker lamp.

- 5.11.** REAR FOG LAMP

- 5.11.1.** Number

One or two.

- 5.11.2.** Arrangement

No special requirement.

5.11.3. Position

5.11.3.1. In width:

two lamps:

no specific requirements

one lamp:

it must 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.

5.11.3.2. In height:

H2 more than or equal to 250 mm.

H1 less than or equal to 1,000 mm.

5.11.3.3. In length:

at the rear of the vehicle.

5.11.4. Geometric visibility

Horizontal angles:

β_1 equal to 25°

β_2 equal to 25°

Vertical angles:

α_1 equal to 5°

α_2 equal to 5°

5.11.5. Orientation

Rearwards.

5.11.6. Electrical connections

5.11.6.1. Rear fog lamps may be switched on and off automatically. However, it must be possible to override the automatic switch and to switch rear fog lamps on and off manually;

Rear fog lamp(s) shall not switch on unless the driving beams, passing beams or front fog lamps are lit;

- 5.11.6.2.** The rear fog lamp(s) may be switched off independently of any other lamp;
- 5.11.6.3.** **If not switched off, the rear fog lamp(s) may continue to operate until the position lamps are switched off. The rear fog lamp(s) shall then remain off until deliberately switched on again.**
- 5.11.6.4.** Except as provided in paragraphs 5.11.7.1. and 5.11.7.3., the operation of the rear fog lamp(s) shall not be affected by switching on or off any other lamps.

5.11.7. Tell-tale

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

5.11.8. Other provisions

In all cases, the distance between the rear fog lamp and each stop-lamp must be greater than 100 mm.

5.12. PARKING LAMP

5.12.1. Number

According to the arrangement.

5.12.2. Arrangement

Four lamps: two lamps at the front and two lamps at the rear,
or
Two lamps: one lamp on each side.

5.12.3. Position

5.12.3.1. In width:

E less than or equal to 400 mm.
If there are two lamps, they shall be on the sides of the vehicle.

5.12.3.2. In height:

no special requirement.

5.12.3.3. In length:

no special requirement.

5.12.4. Geometric visibility

Horizontal angles:

For lamps mounted on the front and rear of the vehicle:

β_1 equal to 45°

For lamps mounted on the side of the vehicle:

45° outwards - forwards and rearwards

Vertical angles:

α_1 equal to 15°

α_2 equal to 15° (5° if H1 less than 750 mm)

5.12.5. Orientation

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

5.12.6. Electrical connections

The connection must allow the parking lamp(s) on the same side of the vehicle to be lit independently of any other lamps. The parking lamp(s) must be able to function even if the device **that** activates the propulsion system of the vehicle is in a position, which makes it impossible for the vehicle to operate.

The parking lamps may be operated automatically.

5.12.7. Tell-tale

Circuit-closed tell-tale optional. If there is one, it must not be the same as the tell-tale for the front and rear position lamps.

5.12.8. Other provisions

The functioning of this lamp may also be performed by simultaneously switching on the front and rear position lamps on the same side of the vehicle.

5.13. END-OUTLINE MARKER LAMP

5.13.1. Number

Two or four towards the front; at least one pair of the front end outline marker lamps must meet the requirements of paragraphs 5.13.3 to 5.13.8 and

two or four towards the rear; at least one pair of the rear end outline marker lamps must meet the requirements of paragraphs 5.13.3 to 5.13.8.

5.13.2. Arrangement

No special requirement.

5.13.3. Position

5.13.3.1. In width:

Front:

as close as practicable to the adjacent extreme outer edge of the vehicle.

This condition is deemed to have been met when:

Motor vehicles:

E less than or equal to 400 mm

Trailers:

E less than or equal 100 mm

Rear:

as close as practicable to the adjacent extreme outer edge of the vehicle.

This condition is deemed to have been met when:

E less than or equal to 100 mm

5.13.3.2. 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 must 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 (all vehicles):

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.

5.13.3.3. In length:

no special requirement.

5.13.4. Geometric visibility

Horizontal angles:

$\beta 1$ equal to 80°

$\beta 2$ equal to 45°

Vertical angles:

$\alpha 1$ equal to 10° (**5° if H1 of the end outline marker lamp is more than 2,100 mm**)

$\alpha 2$ equal to 20°

5.13.5. Orientation

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

5.13.6. Electrical connections

In accordance with paragraph 4.12.1.

5.13.7. 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.

5.13.8. Other provisions

Provided that all other requirements are met, the lamp visible from the front and the lamp visible from the rear on the same side of the vehicle may be combined in one device.

Rear end outline marker lamp shall not be combined or reciprocally incorporated with a rear position lamp.

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.

5.14. REAR RETRO-REFLECTOR

5.14.1. Number

Two.

5.14.2. Arrangement

In case of the triangular rear retro-reflector, the apex of the triangle shall be directed upwards.

For other retro-reflectors there are no special provisions.

5.14.3. Position

5.14.3.1. In width:

as close as practicable to the adjacent extreme edge of the vehicle.

This condition is deemed to have been met when:

Motor vehicles:

E less than or equal to 400 mm.

Trailers:

E less than or equal to 150 mm (400 mm if the shape of the bodywork makes it impossible to keep within 150 mm).

D more than or equal to 600 mm (400 mm if the structural width of the vehicle is less than 1,300 mm).

5.14.3.2. In height:

H2 more than or equal to 350 mm (250 mm if the shape of the bodywork makes it impossible to keep at or above 350 mm)

[EC suggests compromise-300mm-US measures to the optical centre of the lamp, ECE to the "bottom" of the lens. Otherwise - cost benefits to be provided by USA to justify 350mm minimum height].

H1 less than or equal to 900 mm (1,500 mm if the shape of the bodywork makes it impossible to keep within 900 mm).

5.14.3.3. In length:

at the rear of the vehicle.

5.14.4. Geometric visibility

Horizontal angles:

β_1 equal to 30°

β_2 equal to 30°

Vertical angles:

α_1 equal to 15°

α_2 equal to 15° (5° H1 less than 750 mm)

5.14.5. Orientation

Rearwards.

5.14.6. Other provisions

5.14.6.1. **In case of triangular retro-reflector, no other lamp shall be placed inside the triangle.**

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

5.14.6.3. Additional retro-reflecting devices and materials are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.

5.16. FRONT RETRO-REFLECTOR

5.16.1. Number

Two.

5.16.2. Arrangement

No special requirement.

5.16.3. Position

5.16.3.1. In width:

as close as practicable to the adjacent extreme edge of the **vehicle**.

This condition is deemed to have been met when:

motor vehicle:

E less than or equal to 400 mm.

trailer:

E less than or equal to 150 mm.

5.16.3.2. In height:

H2 more than or equal to 250 mm.

H1 less than or equal to 900 mm (1,500 mm if the shape of the bodywork makes it impossible to keep within 900 mm).

5.16.3.3. In length:

at the front of the vehicle.

5.16.4. Geometric visibility

Horizontal angles:

β_1 equal to 30°

β_2 equal to 30°

In the case of trailers:

β_2 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 5.16.4.1.), which shall, in conjunction with the mandatory retro-reflectors, give the necessary visibility angle.

Vertical angles:

α_1 equal to 10°

α_2 equal to 10° (5° H1 less than 750 mm)

5.16.5. Orientation

Towards the front.

5.16.6. Other provisions

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

5.16.6.2. Additional retro-reflecting devices and materials are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.

5.17. SIDE RETRO-REFLECTOR, NON-TRIANGULAR

5.17.1. Number

If required vehicles less than 6,000 mm in structural length:

Two on each side of the vehicle.

Vehicles 6,000 mm or more in structural length:

Such that the requirements for longitudinal positioning are complied with.

5.17.2. Arrangement

no special requirement.

5.17.3. Position

5.17.3.1. In width:

no special requirement.

5.17.3.2. In height:

H2 more than or equal to 350 vs 250 mm

[or 300 mm per EC suggestion]

H1 less than or equal to 900 mm (1,500 mm if the shape of the bodywork makes it impossible to keep within 900 mm).

5.17.3.3. In length:

K less than or equal to 400 mm from the front (600 mm if the shape of the bodywork makes it impossible to keep within 400 mm); in the case of trailers, account shall be taken of the length of the drawbar for the measurement of this distance.

K less than or equal to 400 mm from the rear.

D_n less than or equal to 3,000 mm (If the structure of the vehicle makes it impossible to comply with such a requirement, this distance may be increased to 4,000 mm)

5.17.4. Geometric visibility

Horizontal angles:

β_1 equal to 45°

β_2 equal to 45°

Vertical angles:

α_1 equal to 10°

α_2 equal to 10° (5° if H1 less than 750 mm)

5.17.5. Orientation

Towards the side.

5.17.6. Other provisions

5.17.6.1. The illuminating surface of the side retro-reflector may have parts in common with the apparent surface of any other side lamp.

5.17.6.2. Additional retro-reflecting devices and materials are permitted provided they do not impair the effectiveness of the mandatory lighting and light-signalling devices.

5.18. SIDE-MARKER LAMPS

5.18.1. Number

Two on each side, if required.

On vehicles 6,000 mm or more in structural length such that the requirements of **paragraph 5.18.4.3. are met. The length of trailers shall be calculated including the drawbar.**

5.18.2. Arrangement

no individual specifications.

5.18.3. Position

5.18.3.1. In width:

no individual specifications.

5.18.3.2. In height:

H2 more than or equal to 250 vs 350 mm

[or 300 mm per EC suggestion]

H1 less than or equal to 1,500 mm (2,100 mm if the shape of the bodywork makes it impossible to keep within 1,500 mm).

5.18.3.3. In length:

Foremost side-marker lamp:

K less than or equal to 400 mm (600 mm if the shape of the bodywork makes it impossible to keep within 400 mm).

on trailers equipped with a drawbar:

K more than or equal to 1,000 mm from the front of the drawbar and less than or equal to 1,500 mm from the front of the drawbar.

Rearmost side marker lamp:

K less than or equal to 400 mm.

vehicles over 6,000 mm long

D_n less than or equal to 3,000 mm (If the structure of the vehicle makes it impossible to comply with such a requirement, this distance may be increased to 4,000 mm).

5.18.4. Geometric visibility

Horizontal angles:

β_1 equal to 45°

β_2 equal to 45°

β_2 for the forward side marker lamps and for the rearward side marker lamp and both β_1 and β_2 angles for the intermediate side marker lamps may be reduced to 30° .

Vertical angles:

α_1 equal to 10°

α_2 equal to 10° (5° if H1 less than 750 mm)

5.18.5. Orientation

Only towards the side.

5.18.6. Electrical connections

5.18.6.1. **In accordance with paragraph 4.12.1.**

5.18.6.2. The side-marker lamps of the same colour as direction indicator lamps shall be wired to flash per paragraph 5.5.7.4.

5.18.6.3. The side-marker lamps may **be wired to** flash simultaneously in association with vehicle alarm system and/or immobiliser to draw attention to the vehicle and/or during the arming and disarming of the vehicle's alarm system.

5.18.7. 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.

5.18.8. Other provisions

When a **side-marker** lamp is combined with **another** lighting or light signalling device the **side marker lamp need not meet the applicable photometric requirements when the another lighting or light signalling device is illuminated**

5.19. DAYTIME RUNNING LAMP

Trailers:
Prohibited.

5.19.1. Number

Two.

5.19.2. Arrangement

No special requirement.

5.19.3. Position

5.19.3.1. In width:

E less than or equal to 400 mm

D more than or equal to 600 mm (400 mm where the structural width of the vehicle is less than 1,300 mm)

5.19.3.2. In height:

H2 more than or equal to 350 vs 250 mm

H1 less than or equal to 950 mm – may be higher if another, regulated lighting or light signalling device accomplishes daytime running light function.

5.19.3.3. In length:

at the front of the vehicle.

5.19.4. Geometric visibility

Horizontal angles:

β_1 equal to 20°

β_2 equal to 20°

Vertical angles:

α_1 equal to 10°

α_2 equal to 10°

5.19.5. Orientation

Towards the front.

5.19.6. Electrical connections

5.19.6.1. If installed, the daytime running lamps shall be switched ON automatically each time the device **that activates the propulsion system of the vehicle is in a position, which makes it possible for the vehicle to operate**, unless the automatic transmission control is in the park or neutral position, the parking brake is applied, or the propulsion system is **activated** but the vehicle was not set in motion for the first time.

5.19.6.2. **Based on a determination by each Contracting Party, means may be required such that the daytime running lamps can be manually** switched OFF for the remainder of the trip or for a specified time or distance.

5.19.6.3. The daytime running lamps shall switch off automatically when the headlamps are switched on, except when the latter are used to give intermittent luminous warnings at short intervals.

5.19.7. Tell-tale

Based on a determination by each Contracting Party, the circuit-closed tell-tale may be mandatory if a vehicle is not equipped with a device automatically activating all lamps required for operation of a vehicle at diminished ambient lighting condition.

5.20. IDENTIFICATION LAMPS (Front and Rear)

5.20.1. Number

three facing forward

three facing rearward

5.20.2. Arrangement

As specified in paragraph 5.20.3.1.

5.20.3. Position

5.20.3.1. In width:

The lamps shall form a three-lamp group with lamp centres spaced evenly and horizontally with distance of 150 mm to 300 mm between **optical centres of** each two **adjacent** lamps. This group shall be mounted horizontally **with the optical center of the middle lamp positioned within 50 mm of** the median longitudinal plane of **the vehicle**.

5.20.3.2. In height:

as high as practicable

The rear identification lamps may be located lower if the door header is narrower than 25 mm, however, H2 shall be more than or equal to 350 mm.

5.20.3.3. In length:

no specific requirement.

5.20.4. Geometric visibility

Horizontal angles:

β_1 equal to 45°

β_2 equal to 45°

Vertical angles:

α_1 equal to 20°

α_2 equal to 20°

5.20.5. Orientation

front facing forward and rear facing rearward.

5.20.6. Electrical connections

In accordance with paragraph 4.12.1.

5.20.7. Tell-tale

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

5.21. CORNERING LAMP

5.21.1. Number

Two.

5.21.2. Arrangement

No special requirement.

5.21.3. Position

5.21.3.1. In width:

E less than or equal to 400 mm

5.21.3.2. In length:

K less than or equal to 1,000 mm **from the front of the vehicle**

5.21.3.3. In height:

H2 more than or equal to 250 mm

H1 less than or equal to 900 mm

No point on the apparent surface in the direction of the reference axis must be higher than the highest point on the apparent surface in the direction of the reference axis of the passing-beam headlamp.

5.21.4. Geometric visibility

Horizontal angles:

30° to 60° outwards.

Vertical angles:

α_1 equal to 10°

α_2 equal to 10°

5.21.5. Orientation

Towards the front side.

5.21.6. Electrical connections

The cornering lamps must be so connected that they cannot be on unless the driving-beam headlamps or the passing-beam headlamps are on the same time. **The cornering lamp on one side of the vehicle shall be activated 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. They shall switch off automatically when the steering wheel returns to its normal position for straight driving and/or when the direction indicators are switched off.**

5.21.7. Tell-tale

None.

5.21.8. Other provisions

5.21.8.1. The cornering lamps shall not be activated at the vehicle speed above 40 km/h.

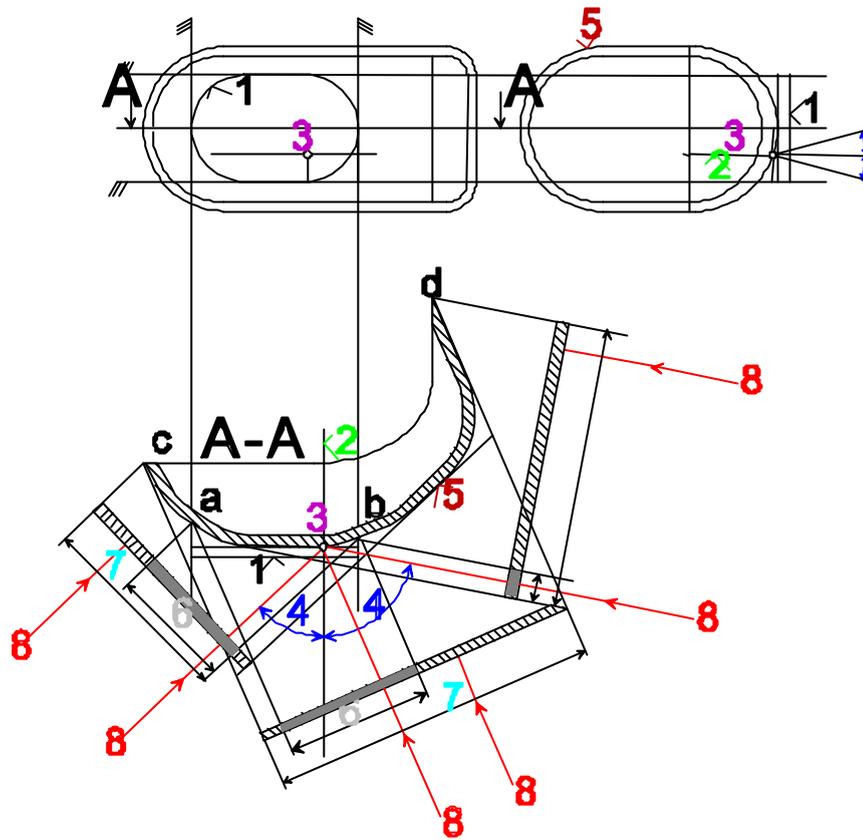
**5.21.8.2. The vertical inclination shall be specified by the manufacturer.
For height see paragraph 5.21.3.3. above.**

5.22. CONSPICUITY TREATMENT

Based on a determination by each Contracting Party, specific conspicuity treatment (line marking, contour marking etc.) may be required.

Annex 1

LAMP SURFACES, AXIS AND CENTRE OF REFERENCE,



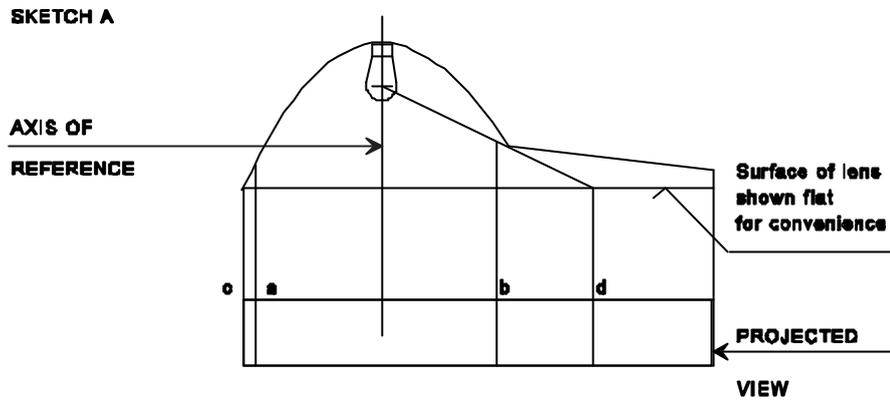
AND ANGLES OF GEOMETRIC VISIBILITY

KEY

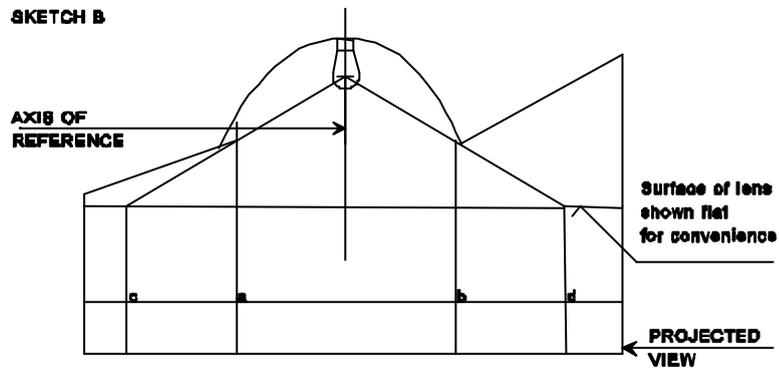
1. Illuminating surface
2. Axis of reference
3. Centre of reference
4. Angle of geometric visibility
5. Light-emitting surface
6. Apparent surface based on illuminating surface
7. Apparent surface based on light-emitting surface
8. Direction of visibility

Note: Notwithstanding the drawing, the apparent surface is to be considered as tangent to the light-emitting surface.

ILLUMINATING SURFACE IN COMPARISON WITH LIGHT-EMITTING SURFACE
(See paragraphs 3.3.12. and 3.3.13. of this regulation)



	Illuminating surface	Light-emitting surface
Edges are	a and b	c and d



	Illuminating surface	Light-emitting surface
Edges are	a and b	c and d

Annex 2

**VISIBILITY OF A LAMP OTHER THAN WHITE TO THE FRONT
AND VISIBILITY OF LAMP OTHER THAN RED TO THE REAR**

(See paragraphs 4.11.1. and 4.11.2. of this regulation)

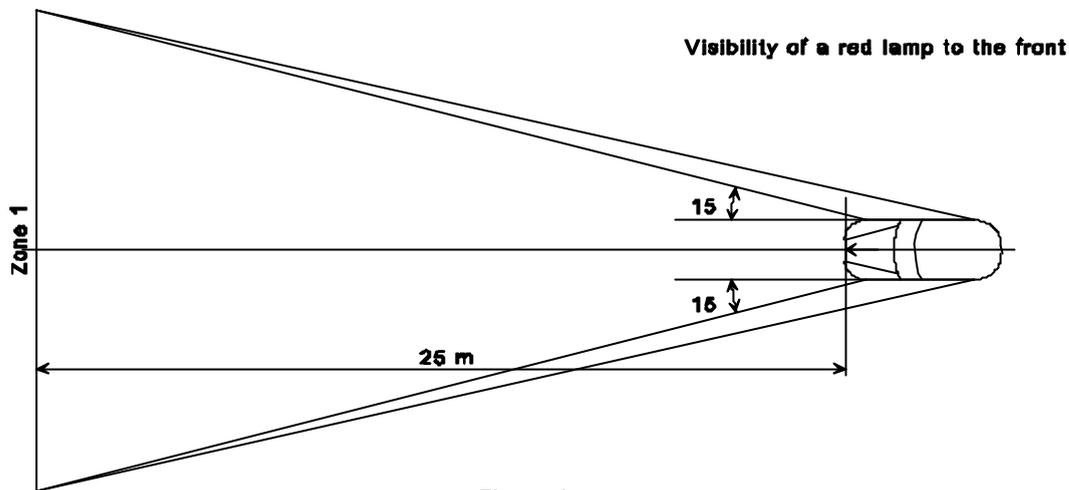


Figure 1

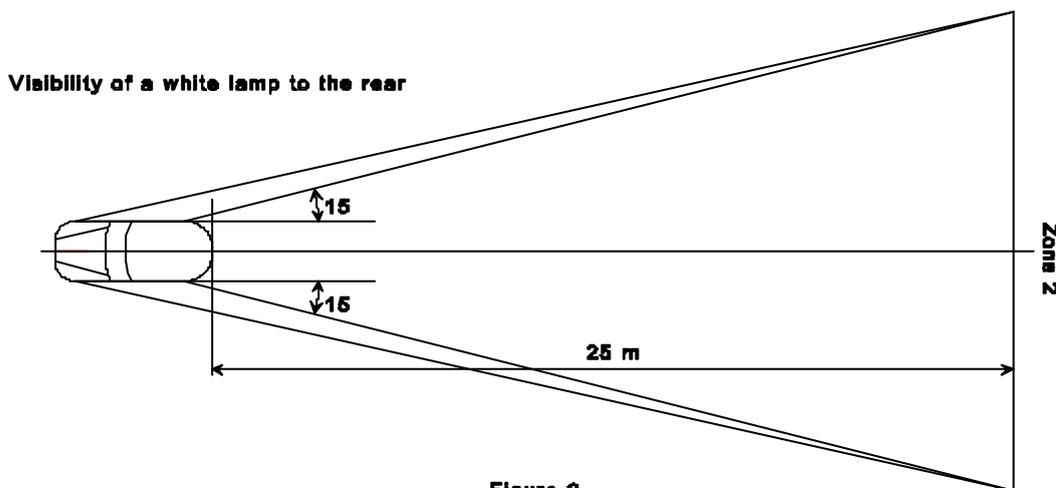


Figure 2

In their respective planes, the zones 1 and 2 explored by the eye of the observer are bounded;

In height: by two horizontal planes 1 m and 2.2 m respectively above the ground,

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 structural width; if there are several points of contact, the foremost shall correspond to the forward plane and the rearmost to the rearward plane.

Annex 3

IDENTIFICATION OF SYMBOLS REGARDING MEASUREMENTS AND ANGLES OF
GEOMETRIC VISIBILITY DESCRIBED IN THIS REGULATION

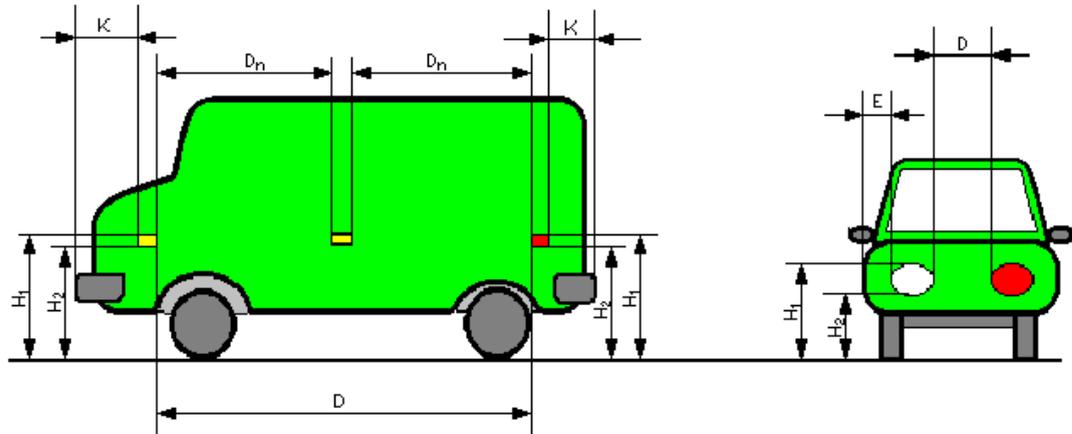


Figure 1. Identification of symbols regarding measurements described in this regulation

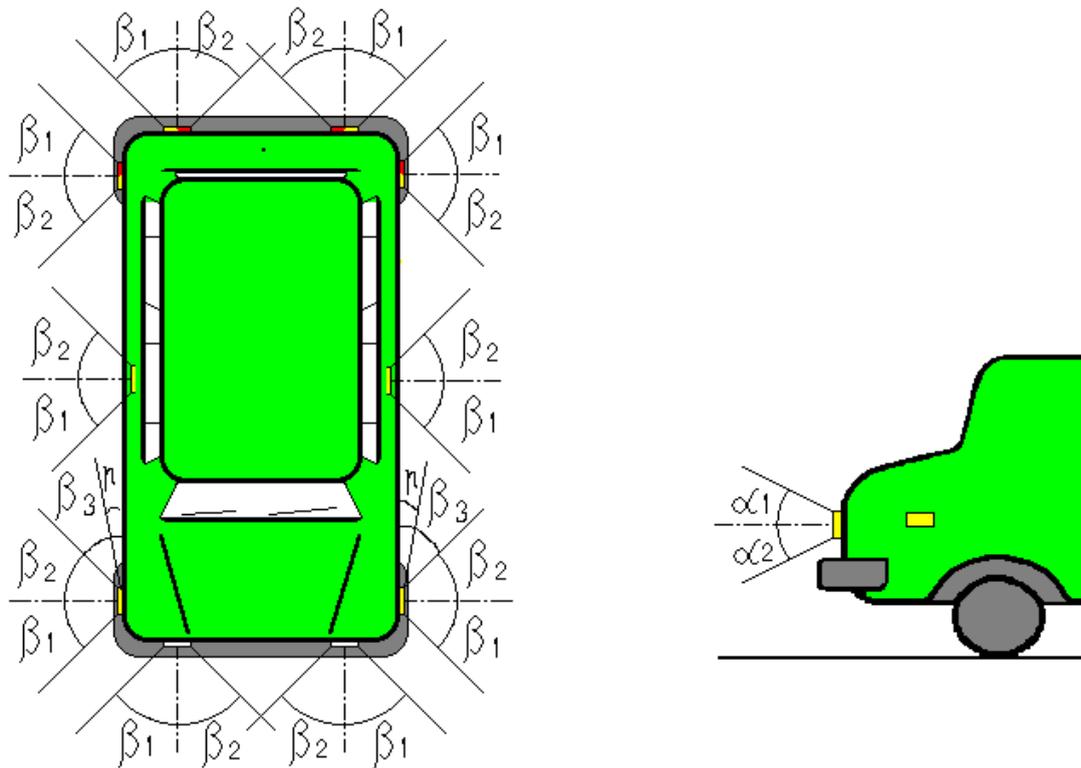
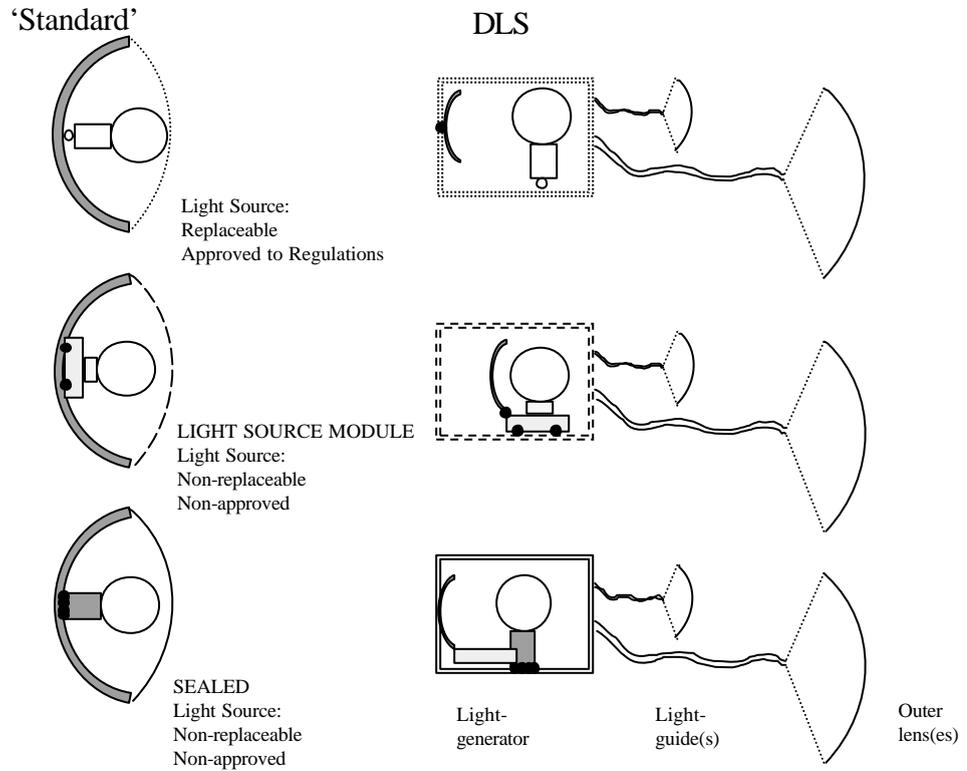


Figure 2. Identification of symbols regarding angles of geometric visibility described in this regulation

Annex 4

EXAMPLES OF LIGHT SOURCE OPTIONS

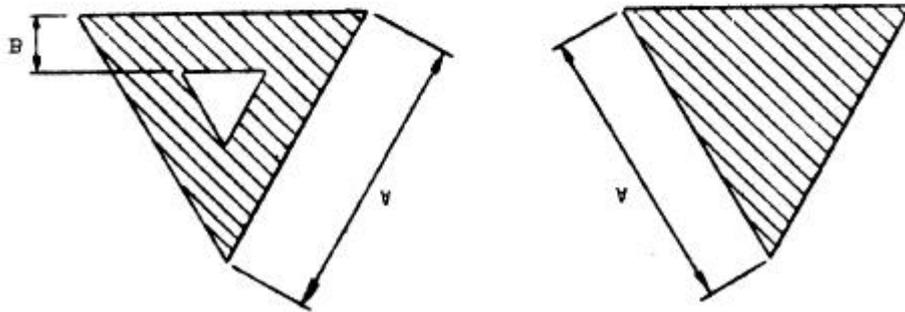
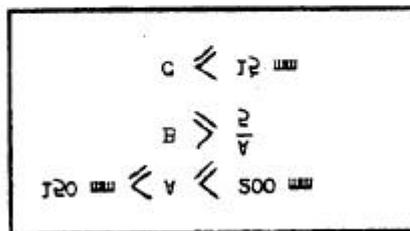
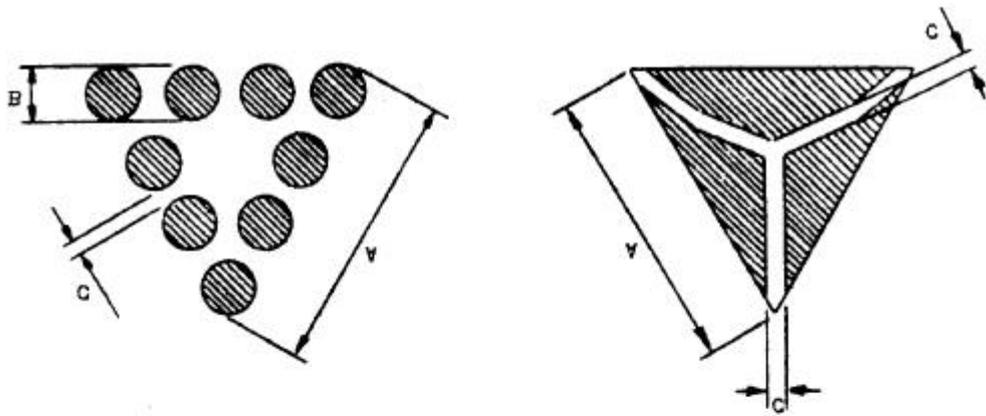


Annex 5

SHAPE AND DIMENSIONS OF TRIANGULAR RETRO-REFLECTOR

- 2.1. The illuminating surfaces of a triangular retro-reflector must have the shape of an equilateral triangle. If the word "TOP" is inscribed in one corner, the apex of that corner must be directed upwards.**
- 2.2. The illuminating surface may or may not have at its centre a triangular, non-retro-reflecting area, with sides parallel to those of the outer triangle.**
- 2.3. The illuminating surface may or may not be continuous. In any case, the shortest distance between two adjacent retro-reflecting optical units must not exceed 15 mm.**
- 2.4. The illuminating surface of a retro-reflecting device shall be considered to be continuous if the edges of the illuminating surfaces of adjacent separate optical units are parallel and if the said optical units are evenly distributed over the whole solid surface of the triangle.**
- 2.5. If the illuminated surface is not continuous, the number of separate retro-reflecting optical units including the corner units shall not be less than four on each side of the triangle.**
- 2.6. The outside edges of the illuminating surfaces of triangular retro-reflector shall be between 150 and 200 mm long. In the case of devices of hollow-triangle type, the width of the sides, measured at right angles to the latter, shall be equal to at least 20 per cent of the effective length between the extremities of the illuminating surface.**

EXAMPLES OF TRIANGULAR RETRO-REFLECTORS



Note: These sketches are for illustration purpose only.
