

31 Direction indicator

Refer to: R6 01-S24 ,01-S25, R50 00-16

31.1 Effective date and Scope:

- 31.1.1 Effective date from 2006/7/1, new types of direction indicator using in vehicles of category symbols M, N and O, and from 2008/7/1, all types of direction indicator using in vehicles of category symbols M, N and O, shall comply with this regulation and shall be use bulbs that is conform with “Filament lamps” of this Direction (according to paragraph 31.1.4, it shall exclude paragraph 31.2.3).
- 31.1.2 Effective date from 2009/1/1, new types of direction indicator using in vehicles of category symbols L1 and L3, and from 2011/1/1, all types of direction indicator using in vehicles of category symbols L1, L2, L3 and L5, shall comply with this regulation and shall be use bulbs that is conform with “Filament lamps” of this regulation (according to paragraph 31.1.4, it shall exclude paragraph 31.2.3).
- 31.1.3 Effective date from 2014/1/1, the category symbols M, N and O, it should apply for the direction indicators of category 1, 1a, 1b, 2a, 2b, 5 and 6, and direction indicator lamps of categories 3 and 4 which were approved before 2014/1/1 are still valid.
- 31.1.4 Effective date from 2017/1/1, new types of direction indicator using in vehicles symbols M, N, O and L, and from 2019/1/1, existing types of direction indicator using in vehicles of category symbols M, N, O and L, shall comply with 31.2.3 in addition, except the applicants applying for low volume safety approval and applying for vehicle-by-vehicle low volume.
- 31.1.5 For the vehicles imported by authorities, organizations, institutes or individuals for self-use only may be exempt from regulation of “direction indicator”.
- 31.1.6 For the low volume type safety approval, maximum 20% deviation of the levels of intensity standard of this test is allowed, and if the light source is LED, it can omit the failure conditions test.

31.2 Categories of direction indicators

Means it conforms to category of 31.2.3 Specifications marked below;

- 31.2.1 Vehicles of category symbols M, N, O and L(applicable to category 1 and category 2 only)
 - Category 1: For use at a distance not less than 40 mm from the dipped-beam headlamp and/or the front fog lamp;
 - Category 1a: For use at a distance greater than 20 mm but less than 40 mm from the dipped beam headlamp and/or the front fog lamp;
 - Category 1b: For use at a distance less than or equal to 20 mm from the dipped-beam headlamp and/or the front fog lamp.
 - Category 2a: Direction indicators with steady of intensity for the rear of the vehicle.
 - Category 2b: Direction indicators with variable of intensity for the rear of the vehicle.
 - Category 3: Front-side direction indicators for use on a vehicle equipped with this category of direction indicator only.
 - Category 4: Front-side direction indicators for use on a vehicle also equipped with category 2a or 2b direction indicators.

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Category 5 and 6: Supplementary side direction indicators for use on a vehicle also equipped with category 1/1a/1b and 2a/2b direction indicators.

31.2.2 Vehicles of category symbols L1 and L3

Category 11, 11a, 11b, 11c: Direction indicators for the front of the vehicle.

Category 11: For use at a distance not less than 75 mm from the passing beam headlamp.

Category 11a: For use at a distance not less than 40 mm from the passing beam headlamp.

Category 11b: For use at a distance not less than 20 mm from the passing beam headlamp.

Category 11c: For use at a distance less than 20 mm from the passing beam headlamp.

Category 12: Direction indicators for the rear of the vehicle.

31.2.3 Specifications marked

31.2.3.1 Vehicles of category symbols M, N, O and L apply to 31.4.5.1, means the marks shall be clearly legible on the outside of the marking material and shall be indelible to include below:

31.2.3.1.1 Brand (or marking), type of replaceable light sources(or MD(or MODULE) the light source module specific identification code).

31.2.3.1.2 In case of lamps with an electronic light source control gear or a variable intensity control and/or non-replaceable light sources and/or light source module(s), bear the marking of the rated voltage or range of voltage and rated wattage.

31.2.3.1.3 The light source module must to mark Brand (or marking), MD(or MODULE) the light source module specific identification code, rated voltage (or ranged voltage)and rated wattage. However this provision does not apply to the LED is non-replaceable.

31.2.3.1.4 An electronic light source control gear or a variable intensity control being part of the lamp but not included into the lamp body shall bear the name of the manufacturer and its identification number.

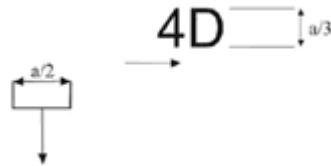
31.2.3.1.5 One or more of the numbers: 1, 1a, 1b, 2a, 2b, 5 or 6, according to whether the device belongs to one or more categories 1, 1a, 1b, 2a, 2b, 5 or 6, in one or more of category.

31.2.3.1.6 On devices which cannot be mounted on either side of the vehicle indiscriminately, a horizontal arrow showing in which position the device is to be mounted (the arrow shall be directed outwards from the vehicle in the case of devices of categories 1, 1a, 1b, 2a and 2b and towards the front of the vehicle in the case of devices of categories 3, 4, 5 and 6). In addition, for devices of category 6 an indication "R" or "L" shall in this case be shown on the device, indicating the right or left side of the vehicle.

31.2.3.1.7 On devices which may be used as part of an assembly of two lamps, the additional letter "D" to the right side of the symbol mentioned in paragraph 31.2.3.1.5 (figure as below , "a" is at least 5 mm).

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31.2.3.1.8 On devices with reduced light distribution in conformity to paragraph 31.4.4 to this Regulation a vertical arrow starting from a horizontal segment and directed downwards.



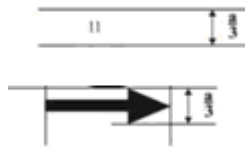
31.2.3.2 Vehicles of category symbols L apply to 31.4.5.2, means the marks shall be clearly legible on the outside of the marking material and shall be indelible to include below:

31.2.3.2.1 Brand (or marking), type of replaceable light sources(or MD(or MODULE) the light source module specific identification code).

31.2.3.2.2 In case of lamps with an non-replaceable light sources or light source module(s), bear the marking of the rated voltage or range of voltage and rated wattage.

31.2.3.2.3 In the general case of a direction indicator: a number indicating the category 11, 11a, 11b, 11c or 12 numbers etc.

31.2.3.2.4 In the case of a direction indicator, which does on one side not attain the minimum luminous intensity prescribed up to an angle of $H = 80$ deg. according to paragraph 31.5.2.2.5.: a horizontal arrow, the tip of which is oriented to the side where the minimum luminous intensity according to paragraph 31.5.2.2.5. is complied with up to an angle of at least 80 deg (figure as below , “a” is at least 5 mm).



31.3 Direction indicator shall according to suitable variants and range of principle :

31.3.1 The same brand.

31.3.2 The same characteristics of the optical system (levels of intensity, light distribution angles, category of light source, light source module etc.).

31.3.3 The same category of the direction indicators.

31.3.4 The same variable intensity control, however , if bulbs or filter's color is change that it doesn't mean to change the variants, if any.

31.3.5 The sequential activation of light sources, if any.

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31.4 Photometric measurements

- 31.4.1 The measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the light is comprised between 10' and 1 degree;
- 31.4.2 The intensity requirement for a particular direction of observation shall be deemed to be satisfied if that requirement is met in a direction deviating by not more than 15' from the direction of observation.
- 31.4.3 Figure 1 is the standard light distribution in space for direction indicator lamps of categories 1, 1a, 1b, 2a, 2b, and direction indicators on vehicles of category symbols L1 and L3. Figure 2 is for direction indicators of category 6.
- 31.4.4 In the case where a device is intended to be installed with its H plane at a mounting height less than 750 mm above the ground, the photometric intensity is verified only up to an angle of 5 degrees downwards.

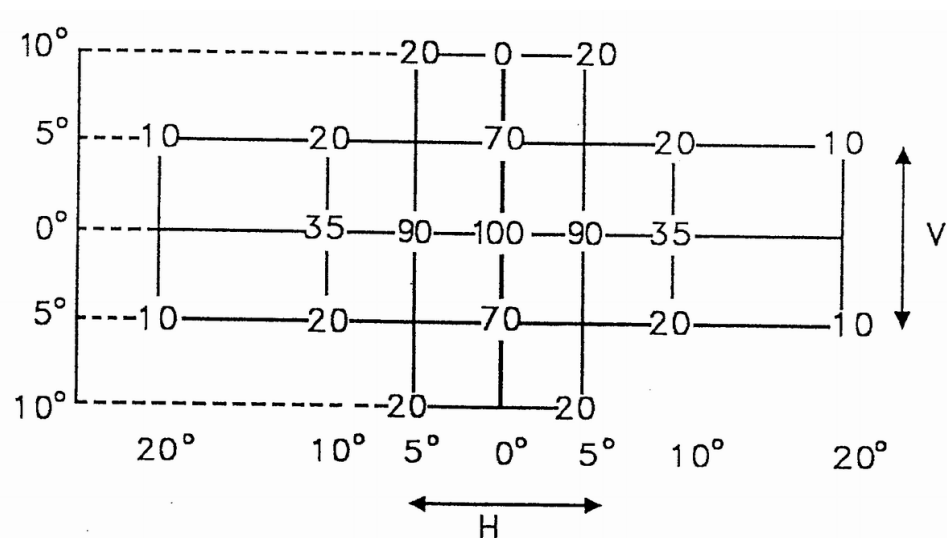


Figure 1. Table of standard light distribution in space for direction indicator lamps of categories 1,1a, 1b, 2a, 2b, 3, 4 (towards the front), and direction indicators on vehicles of category symbols L1 and L3

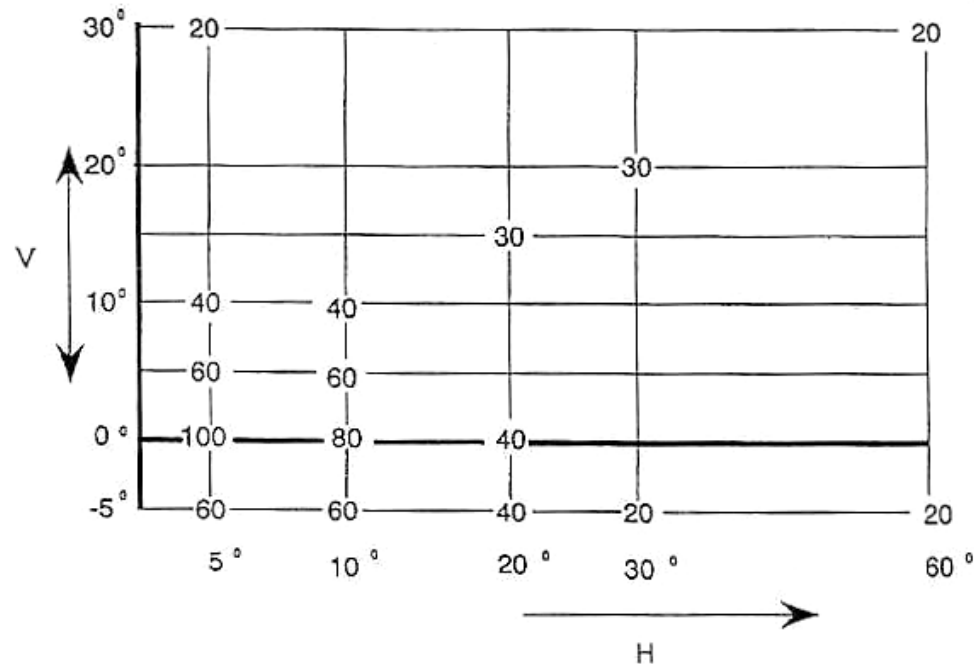


Figure 2. For direction indicators of category 6

31.4.5 Measuring condition for each test:

31.4.5.1 Vehicles of category symbols M, N, O and L (applicable to category 1 and category 2 only) :

31.4.5.1.1 Test voltage :

31.4.5.1.1.1 For non-replaceable light sources (filament lamps and other): All measurements on lamps equipped with non-replaceable light sources (filament lamps and other) shall be made at 6.75 V, 13.5 V or 28.0 V respectively.

31.4.5.1.1.2 For replaceable light source: In the case of a lamp with replaceable light source, if not supplied by an electronic light source control gear or a variable intensity control, with an uncoloured or coloured standard light source of the category prescribed for the device; supplied with the voltage:

- In the case of filament lamp(s), it is necessary to produce the reference luminous flux required for that category of filament lamp;
- In the case of LED light source(s) of 6.75 V, 13.5 V or 28.0 V; the luminous flux value produced shall be corrected. The correction factor is the ratio between the objective luminous flux and the mean value of the

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luminous flux found at the voltage applied.

(c) When equipped with light source(s) at 6.75 V, 13.5 V or 28.0 V, the luminous intensity values produced shall be corrected. For filament lamps the correction factor is the ratio between the reference luminous flux and the mean value of the luminous flux found at the voltage applied (6.75 V, 13.5 V or 28.0 V).

For LED light sources the correction factor is the ratio between the objective luminous flux and the mean value of the luminous flux found at the voltage applied (6.75 V, 13.5 V or 28.0 V).

The actual luminous fluxes of light source used shall not deviate more than 5 per cent from the mean value. Alternatively and in case of filament lamps only, a standard filament lamp may be used in turn, in each of the individual positions, operated at its reference flux, the individual measurements in each position being added together.

31.4.5.1.1.3 In the case of a system that uses an electronic light source control gear or a variable intensity control, being part of the lamp 5/ applying at the input terminals of the lamp the voltage declared by the manufacturer or, if not indicated, 6.75 V, 13.5 V or 28.0 V respectively.

31.4.5.1.1.4 In the case of a system that uses an electronic light source control gear or a variable intensity control, not being part of the lamp with the voltage declared by the manufacturer applied to the input terminals of the lamp.

31.4.5.1.1.5 In general the intensities shall be measured with the light source(s) continuously alight. However, depending on the construction of the device, for example, the use of light emitting diodes (LED), or the need to take precautions to avoid overheating, it is allowed to measure the lamps in flashing mode. (This must be achieved by switching with a frequency of $f = 1.5 \pm 0.5$ Hz with the pulse width greater than 0.3 s, measured at 95 per cent peak light intensity.) the luminous intensities are measured after one minute and 30 minutes.

In the case of replaceable filament lamps, the filament lamps shall be operated at reference luminous flux during on time.

In the case of LED light sources all measurements shall be made at 6.75 V, 13.5 V or 28.0 V; the luminous flux value produced during on time shall be corrected. The correction factor is the ratio between the objective luminous flux and the value of the luminous flux during on time found at the voltage applied.

In all other cases the voltage as required in paragraph 31.4.5.1.1.2 shall be switched with a rise time and fall time shorter than 0.01 s; no overshoot is allowed.

In the case of measurements taken in flashing mode the reported luminous intensity shall be represented by the maximum intensity.

31.4.5.1.2 However in the case of a direction indicator operated by a variable intensity control to obtain variable luminous intensity,

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photometric measurements shall be performed according to the applicant's description.

31.4.5.1.3 The test laboratory shall require from the manufacturer the light source control gear or a variable intensity control needed to supply the light source and the applicable functions.

31.4.5.1.4 The limits of the apparent surface in the direction of the reference axis of a light signaling device shall be determined. However, in the case of category 5 and 6 direction indicators, the limits of the light emitting surface shall be determined.

31.4.5.2 Vehicles of category symbols L only :

31.4.5.2.1 Test voltage :

31.4.5.2.1.1 All measurements, photometric and colorimetric shall be carried out with an uncoloured or coloured standard light source of the category prescribed for the device, supplied with the voltage as below;

(a) In the case of filament lamps, that is necessary to produce the reference luminous flux required for that category of filament lamp.

(b) In the case of LED light sources of 6.75 V or 13.5 V; the luminous flux value produced shall be corrected. The correction factor is the ratio between the objective luminous flux and the mean value of the luminous flux found at the voltage applied.

(c) When equipped with light sources at 6.75 V or 13.5 V, the luminous intensity values produced shall be corrected. For filament lamps the correction factor is the ratio between the reference luminous flux and the mean value of the luminous flux found at the voltage applied (6.75 V, 13.5 V or 28.0 V). For LED light sources the correction factor is the ratio between the objective luminous flux and the mean value of the luminous flux found at the voltage applied (6.75 V or 13.5 V). The actual luminous fluxes of each light sources used shall not deviate more than +/- 5 per cent from the mean value. Alternatively and in case of filament lamps only, a standard filament lamp may be used in turn, in each of the individual positions, operated at its reference flux, the individual measurements in each position being added together.

31.4.5.2.1.2 In the case of a lamp equipped with non-replaceable light sources (filament lamps and other), at 6.75 V, 13.5 V or 28.0 V respectively;

31.4.5.2.1.3 In the case of a system that uses an electronic light source control gear being part of the lamp³ applying at the input terminals of the lamp the voltage declared by the manufacturer or, if not indicated, 6.75 V, 13.5 V or 28.0 V, respectively;

31.4.5.2.1.4 In the case of a system that uses an electronic light source control gear not being part of the lamp, the voltage declared by the manufacturer shall be applied to the input terminals of the lamp.

31.4.5.2.2 The test laboratory shall require from the manufacturer the light source control gear needed to supply the light source

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and the applicable functions.

31.4.5.2.3 The limits of the apparent surface in the direction of the reference axis of a light signalling device shall be determined.

31.4.6 In the case of light source modules, it shall be checked that:

31.4.6.1 The design of the light source module(s) shall be such as:

31.4.6.1.1 That each light source module can only be fitted in no other position than the designated and correct one and can only be removed with the use of tool(s);

31.4.6.1.2 If there are more than one light source module used in the housing for a device, light source modules having different characteristics can not be interchanged within the same lamp housing.

31.4.6.2 The light source module(s) shall be tamperproof.

31.4.6.3 A light source module shall be so designed that regardless of the use of tool(s), it shall not be mechanically interchangeable with any replaceable approved light source.

31.5 Requirements

31.5.1 Vehicles of category symbols M, N, O and L (applicable to category 1 and category 2 only) :

31.5.1.1 Angles required of for light distribution in space of these categories of direction indicators:

31.5.1.1.1 In all cases, the minimum vertical angles of light distribution in space of direction indicator lamps are 15° above and 15° below the horizontal except:

- (a) Direction indicator lamps intended to be installed with the H plane of the lamp at a mounting height of less than 750 mm above the ground, for which they are 15 deg. above and 5 deg. below the horizontal;
- (b) Optional direction indicator lamps intended to be installed with the H plane of the lamp at a mounting height of more than 2100 mm above the ground, for which they are 5 deg. above and 15 deg. below the horizontal;
- (c) Direction indicator lamps of Category 6, for which they are 30 degrees above and 5 degrees below the horizontal.

31.5.1.1.2 Minimum horizontal angles of light distribution in space is shown on the following diagrams, H plane: "horizontal plane going through the reference centre of the lamp":

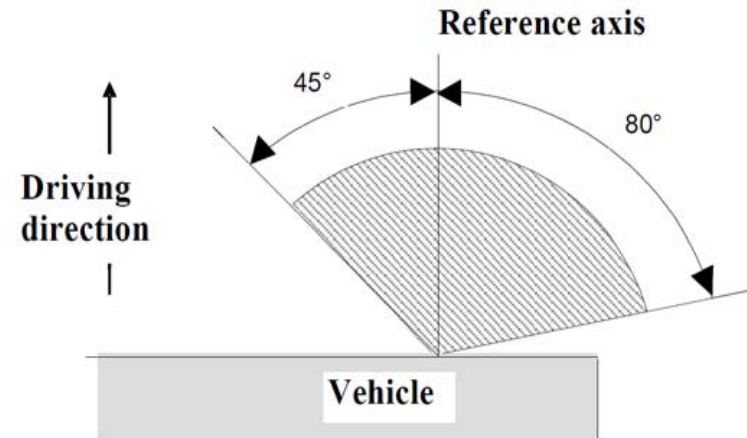


Figure 3. Categories 1, 1a and 1b direction indicators for the front of the vehicle
On and above the H plane for all lamps under the H plane for lamps intended for M2, M3, N2 or N3 category of vehicles

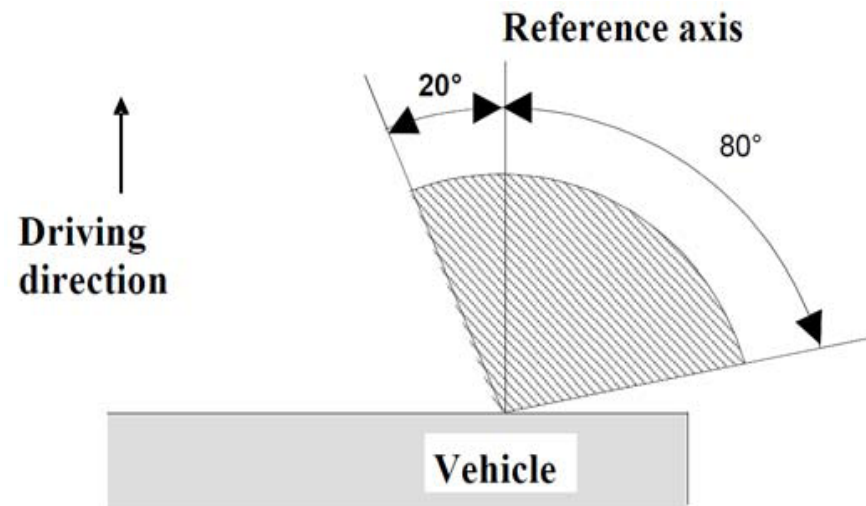


Figure 3-1. Categories 1, 1a and 1b direction indicators for the front of the vehicle
Under the H plane for M1 and N1 category of vehicles

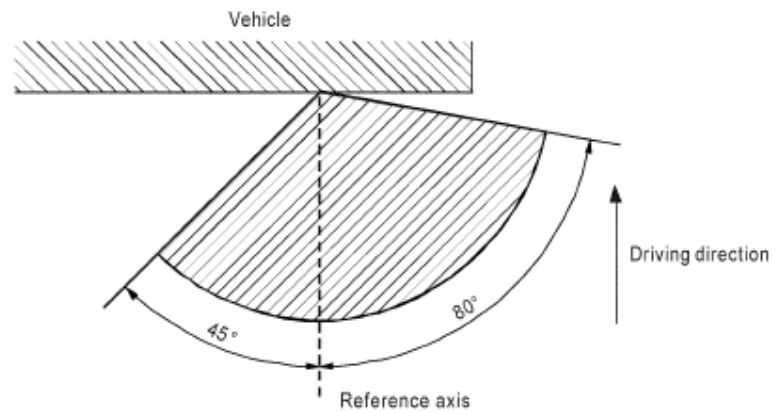


Figure 4. Categories 2a and 2b direction indicators for the rear of the vehicle

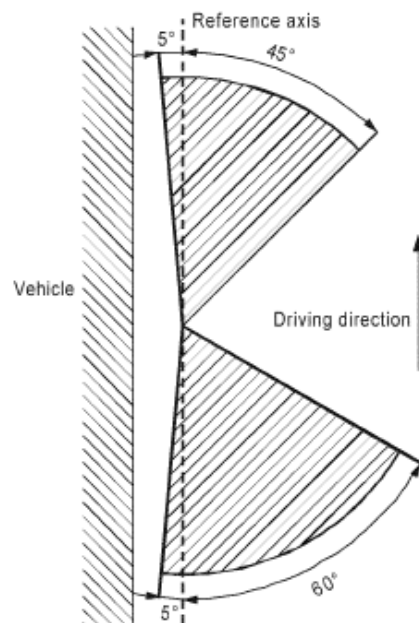


Figure 5. Category 3 Front-side direction indicators

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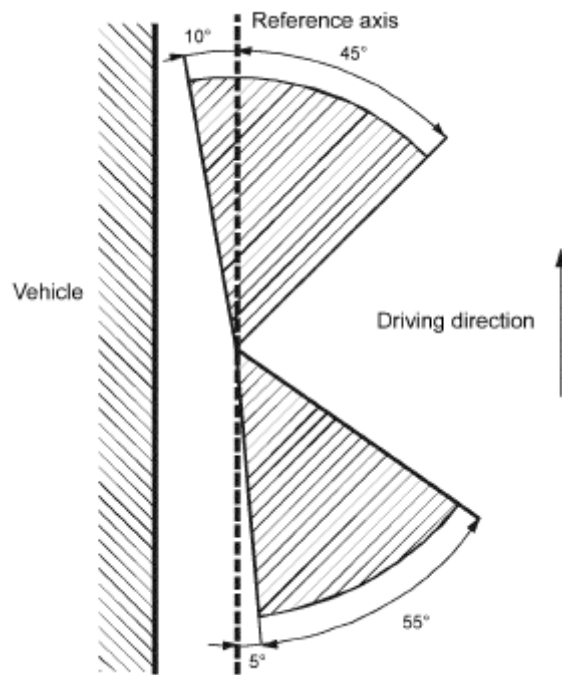


Figure 6. Category 4 Front-side direction indicators for use on a vehicle also equipped with category 2a or 2b direction indicators

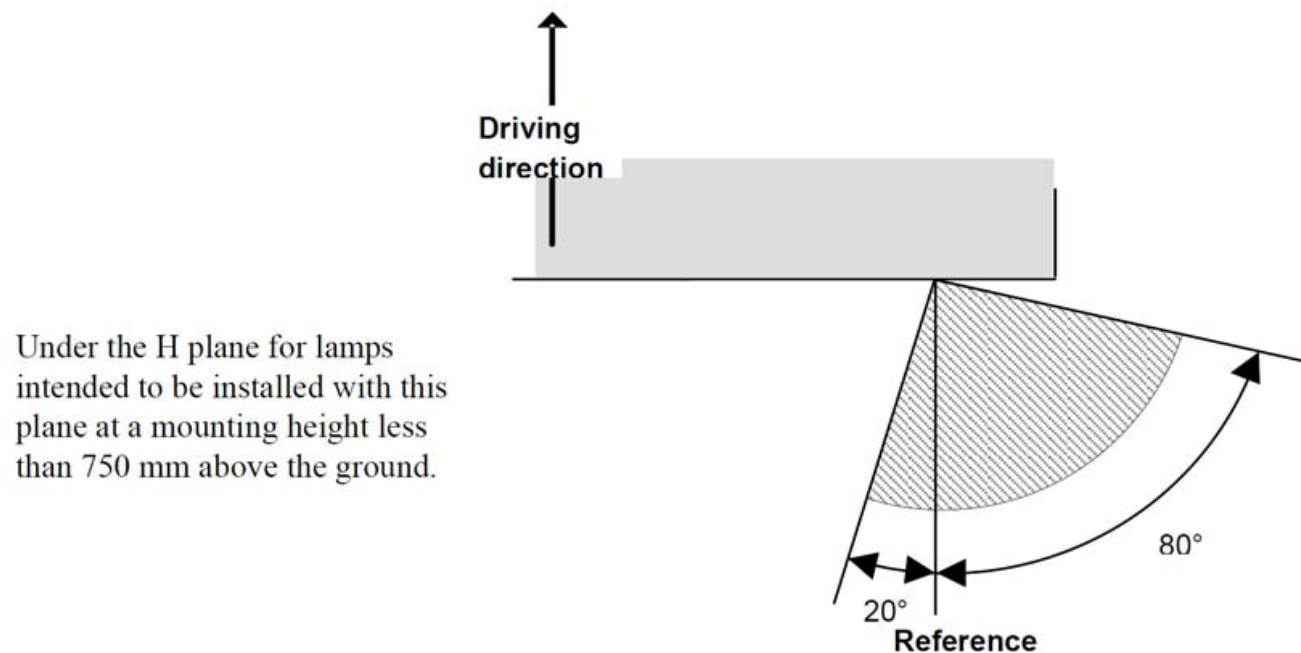


Figure 7. Categories 5 and 6: Supplementary side direction indicators for use on a vehicle also equipped with categories 1, 1a or 1b and 2a or 2b direction indicators

31.5.1.2 The intensity of light emitted by direction indicator of various categories (Unit : cd-candle light)

Table 1. The intensity of light emitted by direction indicator of various categories

Direction indicator category	Minimum of intensities cd	Maximum values cd when used as		
		Single lamp*	Lamp (single) marked with "D" *	Total for the assembly of two lamps*
1	175	1000	500	---
1a	250	1200	600	---
1b	400	1200	600	---
2a (steady)	50	500	250	---
2b (variable)	50	1000	500	---

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3	Towards the front	175	700	500	1000
	Towards the rear	50	200	140	280
4	Towards the front	175	700	500	1000
	Towards the rear	0.6	200	140	280
5		0.6	280	140	---
6		50	280	140	---

Note: The direction indicators of the luminous intensities shall not exceed the maximum intensity for an assembly of two or more lamps, other for type 3 and type 4 the total value of maximum intensity for an assembly of two or more lamps is given by multiplying by 1.4 the value prescribed for a single lamp. When an assembly of two or more lamps having the same function is deemed to be, for the purpose of installation on a vehicle, a "single lamp", this assembly shall comply with the minimum intensity required when one lamp has failed, and all the lamps together shall not exceed the admissible maximum intensity (last column of the table).

In the case of a single lamp containing more than one light source: the lamp shall comply with the minimum intensity required when any one light source has failed. However, for lamps designed for only two light sources, 50 per cent of the minimum intensity in the axis of reference of the lamp shall be considered sufficient, provided that a note in the communication form states that the lamp is only for use on a vehicle fitted with an operating tell-tale which indicates when any one of these two light sources has failed. When all light sources are illuminated the maximum intensity specified for a single lamp may be exceeded provided that the single lamp is not marked "D" and the maximum intensity. All light sources which are connected in series are considered to be one light source.

31.5.1.2.1 For an assembly of two or more direction indicator lamps the total intensity shall not exceed the maximum value.

31.5.1.2.2 When an assembly of two lamps marked "D" having the same function is deemed to be a single lamp it shall comply with the requirements for:

- (a) maximum intensity if all lamps together are lit;
- (b) minimum intensity if one lamp has failed.

31.5.1.2.3 In case of failure of a single lamp, or of an interdependent lamp system of the categories 1, 1a, 1b, 2a and 2b, containing more than one light source the following provisions shall apply:

- 31.5.1.2.3.1 A group of light sources, wired so that the failure of any one of them causes all of them to stop emitting light, shall be considered to be one light source.
- 31.5.1.2.3.2 A signal for activation of the tell-tale prescribed in paragraph 6.5.8. of Regulation No.48 shall be produced if:
- (a) any one light source has failed, or
 - (b) in the case of a lamp designed for only two filament light sources, the intensity in the axis of reference is less than 50 per cent of the minimum intensity, or
 - (c) as a consequence of a failure of one or more light sources, the intensity in one of the following directions as indicated in Annex 4 to this Regulation is less than the minimum intensity required:
 - (i) $H = 0$ degrees, $V = 0$ degrees
 - (ii) $H = 20$ degrees to the outside of the vehicle, $V = +5$ degrees
 - (iii) $H = 10$ degrees to the inside of the vehicle, $V = 0$ degrees.
- 31.5.1.3 Outside the reference axis, within the angular fields specified in the arrangement diagrams, the intensity of the light emitted by each supplied must:
- 31.5.1.3.1 In each direction corresponding to the points in the relevant table of luminous-intensity distribution reproduced in Figure 1 or Figure 2, be not less than the minimum specified in Table 1 above multiplied by the percentage specified in the said Figure 1 or Figure 2 for the direction in question;
 - 31.5.1.3.2 For categories 4 and 5 direction indicators, to the rear, a minimum value of 0.6 cd is required throughout the fields specified in Figure 6 and Figure 7.
 - 31.5.1.3.3 In no direction within the area from which the indicator lamp is visible, exceed the maximum specified in Table 1 above.
 - 31.5.1.3.4 Through out the field defined in the diagrams, the intensity of the light emitted must be not less than 0.7 cd for devices of category 1b, not less than 0.3 cd for devices of categories 1, 1a, 2a, 3 and 4 (towards the front) .
- 31.5.1.4 The intensities shall be measured with the light source(s) continuously alight.
- 31.5.1.5 Trichromatic coordinates: However, for lamps equipped with non-replaceable light sources (filament lamps and other), the colorimetric characteristics should be verified with the light sources present in the lamp, in accordance with paragraph 31.4.5. The colour of the light emitted inside the field of the light distribution grid shall be orange (amber) defined in “The installation of lighting and light-signaling devices” of this “Directions”. Outside this field, no sharp variation of colour shall be observed. These requirements shall also apply within the range of variable luminous intensity produced in Figure 1 and Figure 2. These requirements shall also apply within the range of variable luminous intensity produced by direction

indicators of category 2b."

- 31.5.1.6 In case of failure of the variable intensity control of a direction indicator of category 2b emitting more than the maximum value of category 2a, requirements of steady luminous intensity of category 2a shall be fulfilled automatically.
- 31.5.1.7 Ffln the case of devices of category 2b the time that elapses between energising the light source(s) and the light output measured on the reference axis to reach 90 per cent of the value measured in accordance with paragraph 31.4.5 above shall be measured for the extreme levels of luminous intensity produced by the direction indicator. The time measured to obtain the lowest luminous intensity shall not exceed the time measured to obtain the highest luminous intensity."
- 31.5.1.8 The variable intensity control shall not generate signals which cause luminous intensities as below
- 31.5.1.8.1 outside the range specified in paragraph 31.5.1.2 above and
 - 31.5.1.8.2 exceeding the category 2a maximum specified in paragraph 31.5.1.2.:
 - (a) for systems depending only on daytime and night time conditions
 - (b) for other systems: under reference conditions as demonstrated by the manufacturer.
- 31.5.1.9 In the case of replaceable light source (s):
- 31.5.1.9.1 Any category or categories of light source (s) approved according to "29 Filament lamps" of "Directions" may be used, provided that no restriction on the use is made in "29 Filament lamps" of "Directions" and its series of amendments in force at the time of application for type approval.
 - 31.5.1.9.2 The design of the device shall be such that the light source can be fixed in any other position but the correct one.
 - 31.5.1.9.3 The light source holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of light source used, applies.
- 31.5.1.10 For direction indicator lamps of categories 1, 1a, 1b, 2a or 2b the flash may be produced by sequential activation of their light sources if the following conditions are met:
- (a) each light source, after its activation, shall remain lit until the end of the ON cycle;
 - (b) the sequence of activation of the light sources shall proceed in a uniform progressive manner from inboard towards the outboard edge of the apparent surface;
 - (c) it shall be one continuous line with no repeating alternation in the vertical direction (e.g. no waves).
 - (d) the variation shall finish no more than 200 ms after the beginning of the ON cycle;
 - (e) for the orthogonal projection in the direction of the axis of reference of a rectangle, circumscribing the apparent surface of the direction indicator shall have its longer sides parallel to the H-plane, the ratio of the horizontal to the vertical sides shall not be less than 1.7.
- Compliance to the conditions mentioned above shall be verified in flashing mode.
- 31.5.1.11 An interdependent lamp system shall meet the requirements when all its interdependent□lamps are operated together. However, if the interdependent lamp system providing the rear direction indicator□function is partly mounted on the fixed component and partly mounted on a movable□ component, the interdependent lamp(s) specified by the Applicant shall meet the□geometric visibility, colorimetric and photometric requirement, at all fixed positions of□the movable component(s). This does not apply to interdependent direction indicator□lamp(s) intended for fitting on vehicle(s) where, to fulfil or complete the geometric□visibility angle, additional lamps are activated when the movable component is in any□fixed open position, provided that these additional lamps satisfy all the position,□photometric and colorimetric requirements applicable to the

direction indicator lamps installed on the movable component.

31.5.2 Vehicles of category symbols L

31.5.2.1 Angles for spatial light distribution

$V = \pm 15^\circ$.

The horizontal angles of light distribution in space are shown on the following diagrams:

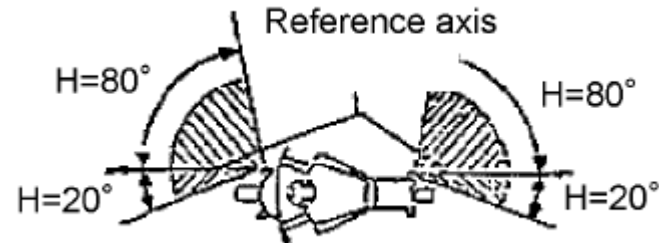


Figure 8. Angles for spatial light distribution of the direction indicators on vehicles of category symbols L1 and L3

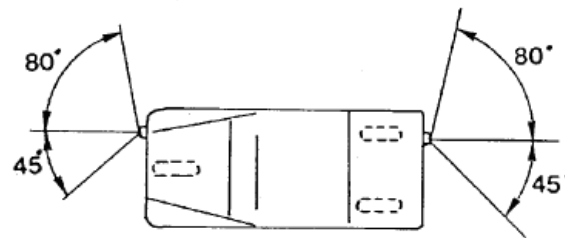


Figure 9. Angles for spatial light distribution of the direction indicators on vehicles of category symbols L2 and L5

31.5.2.2 Intensity of light emitted (Unit : cd-candle light)

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31.5.2.2.1 Maximum values of front direction indicator lamps

31.5.2.2.1.1 For devices of categories 11 and 11a, the intensity of the the light emitted outside the zone defined by the measuring points ± 10 degrees H and ± 10 degrees V (10 degrees field) shall not exceed the following values:

Direction indicator of category	Maximum values in cd outside the 10 degrees-field	
	Single lamp	Single lamp containing more than one light source
11	400	560
11a	400	560

Between the boundaries of the 10 degrees-field (± 10 degrees H and ± 10 degrees V) and the 5 degrees-field (± 5 degrees H and ± 5 degrees V), the maximum admissible values of the intensities are linearly increased up to the values as defined in paragraphs 31.5.2.2.2;

31.5.2.2.1.2 For devices of categories 11b and 11c, the intensity of the light emitted outside the zone defined by the measuring points ± 15 degrees H and ± 15 degrees V (15 degrees field) shall not exceed the following values:

Direction indicator of category	Maximum values in cd outside the 15 degrees-field	
	Single lamp	Single lamp containing more than one light source
11b	250	350
11c	400	560

Between the boundaries of the 15 degrees-field (± 15 degrees H and ± 15 degrees V) and the 5 degrees-field (± 5 degrees H and ± 5 degrees V), the maximum values are increased linearly up to the values as defined in paragraphs 31.5.2.2.2.

31.5.2.2.2 In the reference axis, the intensity of the emitted light of each of the two devices shall be at least equal to the minimum values and not exceed the maximum values of Table 4. In no direction, the maximum values indicated shall be

exceeded. (Unit : cd)

Table 2 Intensity of light emitted by the direction indicators on vehicles of category symbols L

Categories	Minimum values	Maximum values
11	90	700*
11a	175	700*
11b	250	800*
11c	400	860*
12	50	350

31.5.2.2.3 In the case of a single lamp containing more than one light source :

31.5.2.2.3.1 The lamp shall comply with the minimum intensity required when any one light source has failed.

31.5.2.2.3.2 when all light sources are illuminated, the maximum intensity for an assembly of two lamps is given by multiplying by 1.4.

31.5.2.2.3.3 All light sources which are connected in series are considered to be one light source.

31.5.2.2.4 Outside of the reference axis and within the angle fields defined in the diagrams, the intensity of the light emitted shall, in each direction corresponding to the points in the light distribution reproduced in Figure 1, be not less than the product of the minima specified in Table 4 above and of the percentage specified in the said Figure 1 for the direction in question.

31.5.2.2.5 Throughout the fields defined in Figure 8 and Figure 9, the intensity of the light emitted shall be not less than 0.3 cd for direction indicators;

31.5.2.2.6 Trichromatic coordinates:

Color of Amber light:

Limit towards green: $y \leq x - 0.120$

Limit towards red: $y \geq 0.390$

Limit towards white: $y \geq 0.790 - 0.670x$

31.5.2.2.7 In the case of replaceable light source:

31.5.2.2.7.1 Any category or categories of filament lamp(s) approved according to "29 Filament lamps" of "VSTD" may be used, provided that no restriction on the use is made in "29 Filament lamps" of "VSTD" and its series of amendments in force at the time of application for type approval.

- 31.5.2.2.7.2 The design of the device shall be such that the filament lamp can be fixed in no other position but the correct one.
- 31.5.2.2.7.3 The light source holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of light source used, applies.
- 31.5.2.2.8 In the case of replaceable filament lamp(s):
 - 31.5.2.2.8.1 Any category or categories of filament lamp(s) approved according to “29 Filament lamps” of “Directions” may be used, provided that no restriction on the use is made in “29 Filament lamps” of “Directions” and its series of amendments in force at the time of application for type approval.
 - 31.5.2.2.8.2 The design of the device shall be such that the filament lamp can be fixed in no other position but the correct one.
 - 31.5.2.2.8.3 The filament lamp holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of filament lamp used, applies.