30-2 Gas-discharge Headlamps :Effective date from 2017/1/1

Refer to: R98 01-S2, R113 00-S10

30-2.1 Effective date and Scope:

30-2.1.1 Effective date from 2017/1/1, the new variants category symbols M, N ,L3 and L5 used of gas-discharge headlamps and distributed lighting systems of gas-discharge light sources, shall comply with this regulation and shall be use bulbs that is conform with ”Filament lamps” of this Direction. Category symbols M, N ,L3 and L5 confirmed to “30-1 Gas-discharge Headlamps” regard as conform to this regulation.

30-2.1.2 The applicants applying for low volume safety approval could exempt from regulation of “gas-discharge headlamps” except large passenger vehicle and child-only vehicle.

30-2.1.3 Applying for vehicle-by-vehicle low volume safety approval, the vehicle could exempt from regulation of “gas-discharge headlamps”.

30-2.2 Gas-discharge Headlamps shall according to suitable variants and range of principle are as below：

30-2.2.1 Trade name

30-2.2.2 The characteristics of the optical system ，however，if bulbs or filter’s color is change that it doesn’t mean to change the variants.

30-2.2.3 The inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation

30-2.2.4 The kind of beam produced (passing beam or driving beam or both)

30-2.2.5 The materials constituting the lenses and coating, if any.

30-2.3 General rule

30-2.3.1 The test voltage applied to the terminals of the ballast(s) or at the terminals of the light source in case the ballast is integrated with the light source, is either 13.2 V ± 0.1V for 12V systems or otherwise specified by the mark on headlamp unit.

30-2.3.2 Only one gas-discharge light source is permitted for each passing beam headlamp. A maximum of two additional light sources are permitted as follows:

30-2.3.2.1 One additional light source according to Regulation ”bulbs” or one or more additional LED module(s) may be used inside the passing beam headlamp to contribute to bend lighting.

30-2.3.2.2 One additional light source according to Regulation ”bulbs”, and/or one or more LED module(s) inside the passing beam headlamp, may be used for the purposes of generating infrared radiation. It/they shall only be activated at the same time as the gas-discharge light source. In the event that the gas-discharge light source fails, this additional light source and/or LED module(s) shall be automatically switched off. The test voltage for the measurement with this additional light source and/or LED module(s)

shall be the same as in paragraph 30-2.3.1.

30-2.3.2.3 In the event of failure of an additional light source or LED module, the headlamp shall continue to fulfil the requirements of the passing beam.

30-2.3.3 On headlamps designed to provide alternately a driving beam and a passing beam or a passing beam and/or a driving beam designed to become a bend lighting, any mechanical, electro-mechanical or other device incorporated in the headlamp for these purposes must be so constructed that:

30-2.3.3.1 the device is robust enough to withstand 50,000 operations under normal conditions of use. In order to verify compliance with this requirement, the Technical Service responsible for approval tests may:

(a) require the applicant to supply the equipment necessary to perform the test;

(b) forego the test if the headlamp presented by the applicant is accompanied by a test report, issued by a Technical Service responsible for approval tests for headlamps of the same construction (assembly), confirming compliance with this requirement.

30-2.3.3.2 In the case of failure, the luminous intensity of the headlamp above the line H-H shall not exceed the values of a passing beam according to paragraph 30-2.4.4.; in addition, on headlamps designed to provide a passing and/or a driving beam to become a bend lighting, a luminous intensity of at least 2500 cd shall be fulfilled in test point 25 V (VV line, 1.72D).

30-2.3.4 The headlamp (if equipped with LED modules) and the LED module(s) themselves shall comply with the relevant requirements specified in paragraph 8 of this Regulation.

30-2.3.5 For Class E: The headlamp shall be equipped with (a) gas-discharge light source(s) and/or (an) LED module(s) approved according to ”Filament lamps” of “Directions”.

30-2.3.5.1 In the case of replaceable gas-discharge light sources the lamp holder shall conform to the dimensional characteristics as given on the data sheet of IEC Publication 60061-2, relevant to the category of gas-discharge light source used. The gas-discharge light source shall fit easily into the headlamp.

30-2.3.5.2 For Class E, the headlamp and ballast system shall not generate radiated or power line disturbances to cause a malfunction of other electric/electronic systems of the vehicle.

30-2.3.5.3 For Class E shall comply with paragraph 30-2.10.

30-2.3.5.4 In the case of (an) LED module(s) the following requirements apply:

30-2.3.5.4.1 The electronic light source control gear(s), if applicable, shall be considered as being part of the headlamp; they may also be part of the LED module(s);

30-2.3.5.4.2 The headlamp and the LED module(s) themselves shall comply with the relevant requirements specified in paragraph 30-2.8. to this Regulation. The compliance with the requirements shall be tested.

30-2.3.5.4.3 The total objective luminous flux of all LED modules producing the passing beam shall be measured as described in

paragraph 10.5. The following minimum limit shall apply:

	Headlamps Class E
Passing beam minimum	2000 lumen

30-2.4 Photometric test

30-2.4.1 Specifications of measuring screen and distribution of cut-off

30-2.4.1.1 The luminous intensity produced by the headlamp shall be measured at 25 m distance by means of a photoelectric cell having a useful area comprised within a square of 65 mm side. The point HV is the centre-point of the coordinate system with a vertical polar axis. Line h is the horizontal through HV (see Figure 1, Figure 2 and Figure 3). (Dimensions are in cm on a flat vertical screen at 25m. The HH and VV lines are the intersections with this screen of the horizontal and vertical planes passing through the axis of reference of the passing beam as declared by the applicant. Angle HVH2-HH-15 degrees.)

30-2.4.1.2 The dimensions determining the position of the arc inside the standard gas-discharge light source shall comply with the requirements of regulation “bulbs” specified in the “Directions for the Safety Type Approval and Conformity of Production of Motor Vehicle Components”.

30-2.4.1.3 The luminous intensity distribution of the passing beam headlamp shall incorporate a "cut-off", which enables the headlamp to be adjusted correctly for the photometric measurements and for the aiming on the vehicle.

30-2.4.1.3.1 The "cut-off" shall provide:

（a）a straight "horizontal part" towards the left;

（b）a raised "elbow – shoulder" part towards the left. In each case the "elbow – shoulder" part shall have a sharp edge.

30-2.4.1.3.2 The headlamp shall be visually aimed by means of the "cut-off" (see figure 4 below) as follows:

The aiming shall be carried out using a flat vertical screen set up at a distance of 10 m or 25 m (see figure 1) forward of the headlamp and at right angles to the H-V axis as shown to this Regulation. The screen shall be sufficiently wide to allow examination and adjustment of the "cut-off" of the passing beam over at least 5 degrees on either side of the V-V line.

30-2.4.1.3.2.1 for vertical adjustment: the horizontal part of the "cut-off" is moved upward from below line B and adjusted to its nominal position one per cent (0.57 degrees) below the H-H line;

30-2.4.1.3.2.2 for horizontal adjustment: the "elbow–shoulder" part of the "cut-off" shall be moved:

□a□ above the line 0.2° D its "shoulder" shall not exceed the line A to the left and

□b□ on the line 0.2° D or below its "shoulder" should cross the line A and

□c□ the kink of the "elbow" is basically located within +/- 0.5 degrees to the left or right of the V-V line; (Figure 4)

30-2.4.1.3.3 Where a headlamp so aimed does not meet the requirements set out in paragraphs30-2.4.4, 30-2.6.2.6. and 30-2.6.3, its alignment may be changed, provided that the axis of the beam is not displaced:

Horizontally from line A by more than: 0.5° to the left or 0.75° to the right, for right hand traffic or ; 0.5° to the right or 0.75° to the left, for left hand traffic and vertically not more than 0.25° up or down from line B.

30-2.4.1.3.4 If, however, vertical adjustment cannot be performed repeatedly to the required position within the tolerances described in paragraph 30-2.4.1.3.3. above, the instrumental method of paragraph 30-2.9. shall be applied to test compliance with the required minimum quality of the "cut-off" and to perform the vertical and horizontal adjustment of the beam.

30-2.4.1.4 The passing beam of headlamp shall be so aimed that the horizontal part of the “cut-off” is situated on the screen 25 cm below the line HH. The kink of the elbow of the cut-off shall be on the VV line. Where a headlamp so aimed does not meet the requirements of illumination for driving beam and passing beam, its alignment may be changed, provided that the axis of the beam is not displaced laterally by more than 0.5° (=22cm) to the right or left and vertically not more than 0.2° (=8.7cm) up or down.

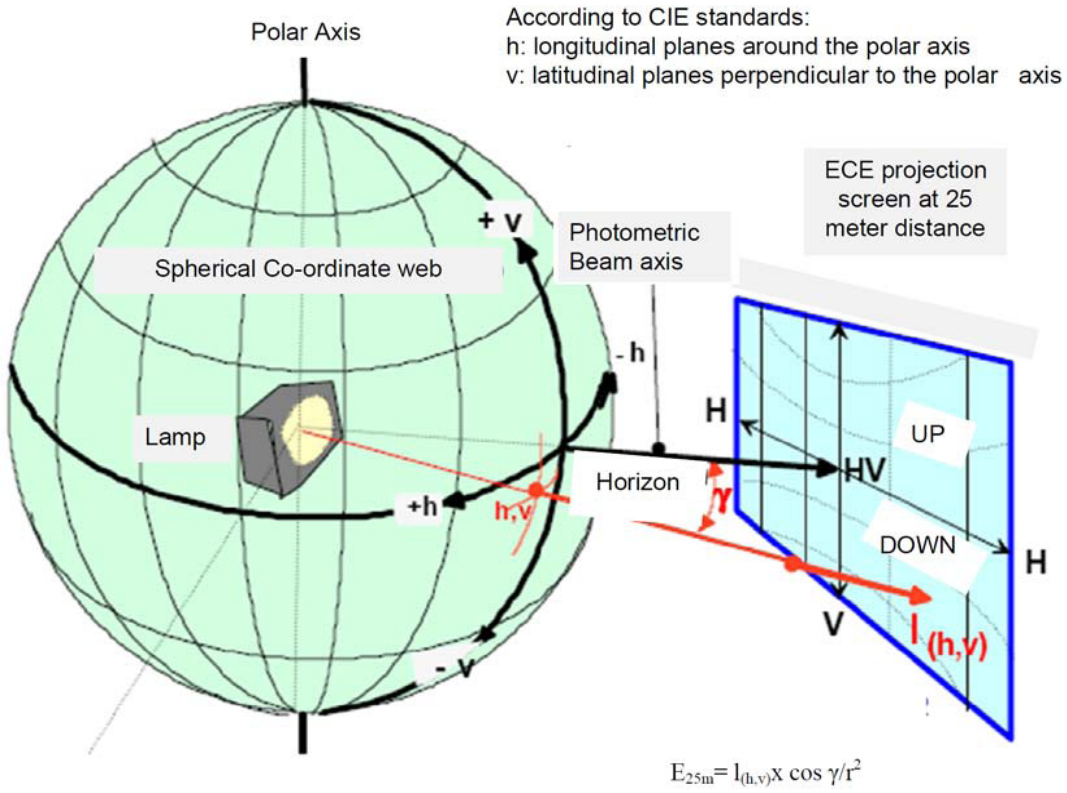
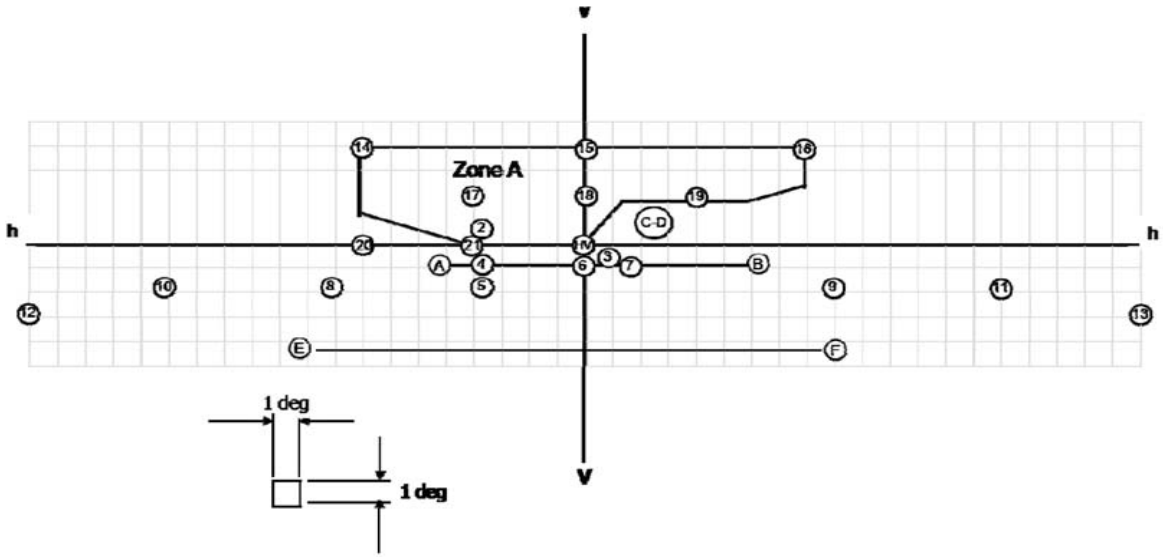


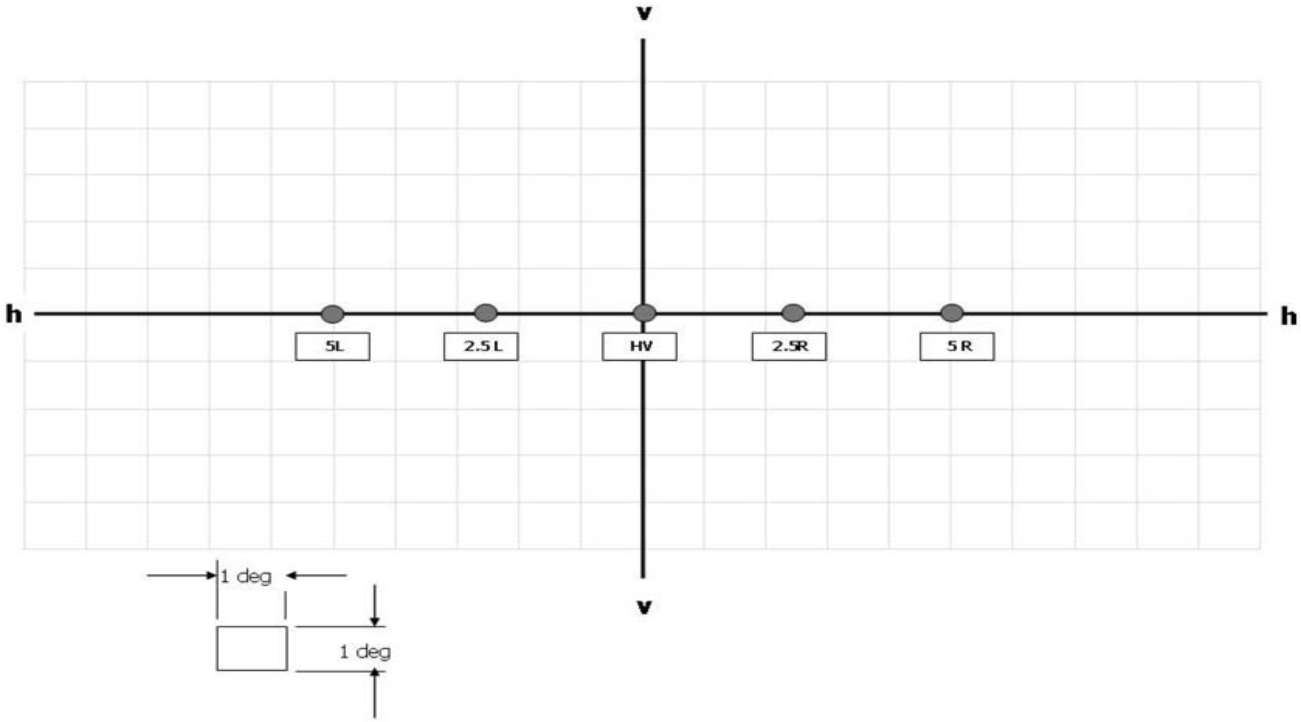
Figure 1.Measuring screen 1



h-h = horizontal plane , v-v = vertical plane passing through the optical axis of the headlamp

The test point locations for left-hand traffic are mirrored about the VV line

Figure 2.Measuring screen 2



h-h = horizontal plane , v-v = vertical plane passing through the optical axis of the headlamp"

Figure 3.Measuring points for illumination values

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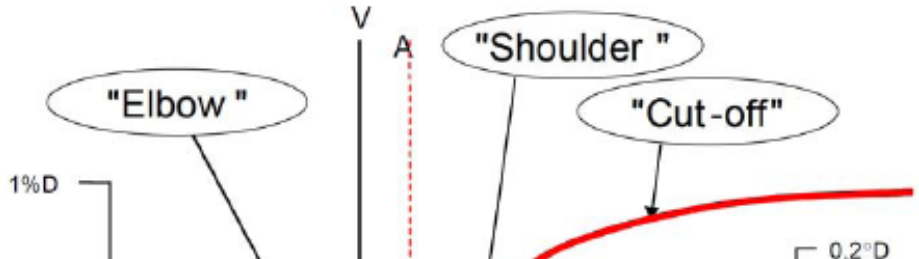


Figure 4:

30-2.4.2 Four seconds after ignition of a headlamp, equipped with a gas discharge light source with the ballast not integrated with the light source, and that has not been operated for 30 minutes or more:

30-2.4.2.1 At least 37500 cd shall be attained at point HV, for a headlamp producing driving beam only.

30-2.4.2.2 At least 6250 cd shall be attained at point 50V for headlamps producing passing beam only or alternately passing and driving beam functions.

30-2.4.2.3 In either case the power supply shall be sufficient to secure the required rise of the high current pulse.

30-2.4.3 The screen illuminance values emitted by a driving beam and a passing beam shall be measured by means of a photo-receptor, the effective area of which shall be contained within a square of 65 mm side.

30-2.4.4 After more than 10 minutes after ignition, the luminous intensities produced by passing beam on measuring screen 2 (Figure 2) shall meet the requirements of Table 1.

Table 1.The requirement of illumination produced on the screen by a passing beam of gas-discharge headlamp

Points or segments	Designation**	Luminous Intensity (cd)	Horizontal Angle (Degree	Vertical Angle (Degrees)

	Any point in zone A (bounded by the following coordinates in degrees)			s)	
8L 1U	8L 4U	8R 4U	8R 2U	6R 1.5U	1.5R 1.5U	V-V H-H	4L H-H	Max 625	Min		
1	HV							625		0	0
2	B 50 L							350		3.43L	0.57U
3	75 R								12,500	1.15R	0.57D
4	50 L							18,480		3.43L	0.86D
5	25 L 1							18,800		3.43L	1.72D
6	50 V								7,500	0	0.86D
7	50 R								12,500	1.72R	0.86D
8	25 L2								2,500	9L	1.72D
9	25 R1								2,500	9R	1.72D
10	25 L3								1,250	15L	1.72D
11	25 R2								1,250	15R	1.72D
12	15 L								625	20L	2.86D
13	15 R								625	20R	2.86D
14									*	8L	4U
15									*	0	4U
16									*	8R	4U
17									*	4L	2U
18									*	0	2U
19									*	4R	2U
20									65	8L	0
21									125	4L	0
A to B	Segment I								3,750	5.15L to 5.15R	0.86D
C - D								1,750		2.5R	1U
E to F	Segment III and under							12,500		9.37L to 8.53R	4.29D
	E max R							43,800		Right of	Above

The official directions are written in Chinese, this English edition is for your reference only.

Points or segments	Designation**	Luminous Intensity (cd)	Horizontal Angle (Degree	Vertical Angle (Degrees)
				VV line	1.72 D
	E max L	31,300		Left of VV line	

Note：

Letter L means that the point or segment is located on the left of VV line.

Letter R means that the point or segment is located on the right of VV line.

Letter U means that the point or segment is located above HH line.

Letter D means that the point or segment is located below HH line.

The illumination values at points 14 through 19 shall be such that：

14+15+16 ≥ 190cd

and 17+18 +19 ≥ 375 cd

30-2.4.4.1 The requirements in paragraph 30-2.3.2.2. above shall also apply to headlamps designed to provide bend lighting and/or that include the additional light source or LED module(s) referred to in paragraph 30-2.4.4. In the case of a headlamp designed to provide bend lighting its alignment may be changed, provided that the axis of the beam is not displaced vertically by more than 0.2°.

30-2.4.5 Provisions concerning driving beams:

30-2.4.5.1 In the case of a headlamp designed to provide a driving beam and a passing beam, measurement of the illumination produced on the screen by the driving beam shall be taken with the same headlamp alignment as for measurement of passing beam above.

30-2.4.5.2 In the case of a headlamp providing a driving beam only, it shall be so adjusted that the area of maximum illumination is centered on the point (HV) of intersection of lines HH and VV.

30-2.4.5.3 Referring to Figure 3, and the table below, the luminous intensity distribution of the driving beam shall meet the following

requirements：

Test point	Angular coordinates Degrees	Required luminous intensity cd
		Min
H-5L	0.0 , 5.0 L	6,250
H-2.5L	0.0 , 2.5 L	25,000
H-2.5R	0.0 , 2.5 R	25,000
H-5R	0.0 , 5.0 R	6,250

30-2.4.5.3.1 The point of intersection (HV) of lines HH and VV shall be situated within the isolux representing 80 % of the maximum luminous intensity. This maximum value (IM) shall not be less than 43,800 cd.

30-2.4.5.3.2 The maximum value (IM) shall in no circumstances exceed 215,000 cd.

30-2.4.5.4 The reference mark (I'M) of the maximum luminous intensity, shall be obtained by the ratio:

I'M = IM/4,300

This value shall be rounded off to the value 7.5 - 10 - 12.5 - 17.5 - 20 - 25 - 27.5 - 30 - 37.5 - 40 - 45 - 50.

30-2.4.6 Provisions concerning movable reflectors: With the lamp fixed according to all the positions, the headlamp must meet the photometric requirements of driving beam and passing beam, or both. Additional tests are made after the reflector has been tilted vertically upwards by the angle (the maximum vertical angles above and below the nominal position(s) which the aiming device can achieve) or 2 degrees, whichever is smaller, by means of the headlamp-aiming devices. The headlamp is then re-aimed downwards by means of the goniometer, and the photometric specifications must be met at the following points：

Passing beam ：HV and 75R (75L respectively)

Driving beam ：IM and point HV (percentage of IM).

If the aiming devices do not allow a continuous movement, the position nearest to 2 degrees is chosen.

The reflector is brought back to its nominal angular position, and the goniometer is set back to its position of origin. The reflector is tilted vertically downwards by the angle (the maximum vertical angles above and below the nominal position(s) which the aiming device can achieve) or 2 degrees, whichever is smaller, by means of the headlamp aiming device. The headlamp is then re-aimed upwards by means of the goniometer, and points as above are checked.

30-2.4.7 If bend lighting is obtained by following ways as below that shall not only testing in the following situations but also comply with

paragraph 30-2.4.4

30-2.4.7.1 swivelling the passing beam or moving horizontally the kink of the elbow of the cut-off, the measurements shall be carried out after the complete headlamp assembly has been reaimed horizontally, e. g. by means of a goniometer;

30-2.4.7.2 moving one or more optical parts of the headlamp without moving horizontally the kink of the elbow of the cut-off, measurements shall be carried out with these parts being in their extreme operating position;

30-2.4.7.3 means of one additional light source or one or more LED module(s) without moving horizontally the kink of the elbow of the cut-off, measurements shall be carried out with this light source or LED module(s) activated.

30-2.5 Trichromatic coordinates: In the case of gas-discharge headlamp, the light emitted shall be white as definition in “The installation of lighting and light-signalling devices”.

30-2.6 Test for stability of photometric performance: The test shall be carried out in a dry and still atmosphere at an ambient temperature of 23 ± 5°C, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

30-2.6.1 Clean headlamp

30-2.6.1.1 Test procedure: The headlamps shall be operated for 12 hours.

30-2.6.1.1.1 When the tested headlamp is grouped and/or reciprocally incorporated with signaling lamps, the signaling lamps shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one. Should two or more light sources be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of the light sources simultaneously.

30-2.6.1.1.2 In the case where only one lighting function (driving or passing beam), is to be tested, the corresponding light source is lit for the prescribed time.

30-2.6.1.1.3 In the case of a reciprocally incorporated passing beam and driving beam or in the case of a reciprocally incorporated front fog lamp and driving beam headlamp:

30-2.6.1.1.3.1 If the applicant declares that the headlamp is to be used with a single light source lit at a time, the test shall be carried out in accordance with this condition, activating each specified function successively for half the time specified above.

30-2.6.1.1.3.2 In all other cases, the headlamp shall be subjected to the following cycle until the time specified is reached:
15 minutes, passing beam lit
5 minutes, all functions lit;

30-2.6.1.1.4 In the case of grouped lighting functions, all the individual functions shall be lit simultaneously for the time specified for individual lighting functions (a), also taking into account the use of reciprocally incorporated lighting functions (b),

according to the manufacturer's specifications.

30-2.6.1.1.5 In the case of a passing beam designed to provide bend lighting with the addition of a light source, this light source shall be switched on for 1 minute, and switched off for 9 minutes during the activation of the passing beam only.

30-2.6.1.1.6 In the case that the driving beam uses several light sources, if the applicant declares that a part of the driving beam (one of these additional light sources) will be used exclusively for short time signals (flash to pass), the test shall be carried out without this part of the driving beam.

30-2.6.1.1.7 Test voltage：

The voltage shall be applied to the terminals of the test sample as follows:

30-2.6.1.1.7.1 In case of replaceable filament light source(s) operated directly under vehicle voltage system conditions: the test shall be performed at 6.3 V, 13.2 V or 28.0 V as applicable except if the applicant specifies that the test sample may be used at a different voltage. In this case, the test shall be carried out with the filament light source operated at the highest voltage that can be used.

30-2.6.1.1.7.2 In case of replaceable gas discharge light source(s): The test voltage for the electronic light source control-gear or the light source in case the ballast is integrated with the light source, is 13. 2 +/-0.1 volts for 12 V vehicle voltage system, or otherwise specified in the application for approval.

30-2.6.1.1.7.3 In the case of non-replaceable light source operated directly under vehicle voltage system conditions: All measurements on lighting units equipped with nonreplaceable light sources (filament light sources and/ or others) shall be made at 6.3 V, 13.2 V or 28.0 V or at other voltages according to the vehicle voltage system as specified by the applicant respectively.

30-2.6.1.1.7.4 In the case of light sources, replaceable or non-replaceable, being operated independently from vehicle supply voltage and fully controlled by the system, or, in the case of light sources supplied by a supply and operating device, the test voltages as specified above shall be applied to the input terminals of that device. The test laboratory may require from the manufacturer the supply and operating device or a special power supply needed to supply the light source(s).

30-2.6.1.1.7.5 LED module(s) shall be measured at 6.75 V, 13.2 V or 28.0 V respectively, if not otherwise specified within this Regulation. LED module(s) operated by an electronic light source control gear shall be measured as specified by the applicant

30-2.6.1.1.7.6 Where signalling lamps are grouped, combined or reciprocally incorporated into the test sample and operating at voltages other than the nominal rated voltages of 6 V, 12 V or 24 V respectively, the voltage shall be adjusted as declared by the manufacturer for the correct photometric functioning of that lamp.

30-2.6.1.2 Test results:

30-2.6.1.2.1 Visual inspection： It shall be inspected visually, no distortion, deformation, cracking or change in color of either the headlamp lens or the external lens, if any, shall be noticeable.

30-2.6.1.2.2 Photometric test： A 10 % discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

30-2.6.1.2.2.1 Passing beam: 50 R - B 50 L - HV

30-2.6.1.2.2.2 Driving beam: Point of Emax.

30-2.6.2 Dirty headlamp: After being tested as specified in paragraph 30-2.6.1, the headlamp shall be operated for one hour as described paragraph 30-2.6.1, after being prepared as: The test mixture shall be uniformly applied to the entire light emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20% of the values measured for each following point:

30-2.6.2.1 Point Emax in passing beam/driving beam and in driving beam only,

30-2.6.2.2 50 R and 50 V for a passing lamp only.

30-2.6.3 Test for change in vertical position of the cut-off line under the influence of heat

30-2.6.3.1 The headlamp tested in accordance with paragraph 30-2.6.1 (Clean headlamp) and 30-2.6.2 (Dirty headlamp) shall be subjected to the test without being moved from or readjusted in relation to its test fixture.

30-2.6.3.2 Using a mass production gas-discharge light source which has been aged for at least 15 hours, the headlamp shall be operated on passing beam function. The position of the cut-off line in its horizontal part, between VV and the vertical line passing through point B50L, shall be verified 3 minutes (r3) and 60 minutes (r60) respectively after operation.

30-2.6.3.3 Test result expressed in milliradians (mrad) shall be considered as acceptable when the absolute value Δ rI = $|r3 - r60|$ recorded on the headlamp is not more than 1.0 mrad.

30-2.6.3.4 However, if this value is more than 1.0 mrad but not more than 1.5 mrad, a second headlamp shall be tested as described in paragraph 30-2.6.3.2, after being subjected three consecutive times to the cycle as described below：

Operation of the passing beam for one hour;

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values delta rI measured on the first sample and delta rII measured on the second sample is not more than 1.0 mrad.

30-2.7 Requirements for lamps incorporating lenses of plastic material -Testing of lenses or material samples and of complete.

Fourteen lenses shall be supplied, numbered and tested pursuant to the Table 2. Two samples of complete lamps shall be supplied, numbered and tested in accordance with the Table 3. The test method and the standards for respective test item are indicated below：

Table 2.Tests on plastic material (lenses or samples)

Sample No. / Tests	Lenses or samples of material										Lenses			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Limited photometry											○	○	○	
Temperature change											○	○	○	
Limited photometry											○	○	○	
Transmission measurement	○	○	○	○	○	○	○	○	○					
Diffusion measurement	○	○	○				○	○	○					
Atmospheric agents	○	○	○											
Transmission measurement	○	○	○											
Chemical agents	○	○	○											
Diffusion measurements	○	○	○											
Resistance to detergents and hydrocarbons				○	○	○								
Transmission measurement				○	○	○								
Deterioration							○	○	○					

Transmission measurement							○	○	○					
Diffusion measurement							○	○	○					
Adherence														○
Resistance to light source radiations										○				

Remark：The samples of material at least 60 mm x 80 mm in size shall have a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 x 15mm.

Table 3 Tests on complete headlamps

Sample No.	Complete headlamp	
Tests	1	2
Resistance to mechanical deterioration	○	
Test of adherence of coating		○

30-2.7.1 Resistance to temperature changes

30-2.7.1.1 Before the test, the samples shall be kept at 23 ± 5°C and 60% ~ 75% RH (RH = relative humidity) for at least four hours. Then three new samples (lenses) shall be subject to five cycles of temperature and humidity change in accordance with the following program：

3 hours at 40 ± 2°C and 85% ~95% RH,

1 hours at 23 ± 5°C and 60% ~75% RH,

15 hours at -30 ± 2°C,

1 hours at 23 ± 5°C and 60% ~75% RH,

3 hours at 80 ± 2°C,

1 hours at 23 ± 5°C and 60% ~75% RH.

30-2.7.1.2 Photometric measurements shall be carried out on the samples before and after the test. These measurements shall be made by using a standard lamp, at the following points：

For the passing beam of a passing lamp or a passing/driving lamp: B50L and 50R,

For the driving beam of a driving lamp or a passing/driving lamp: point of maximum photometric value Emax

30-2.7.1.3 The variation between the photometric values measured on each sample before and after the test shall not exceed 10% including the tolerances of the photometric procedure.

30-2.7.2 Resistance to atmospheric and chemical agents

The definition of the following readings are indicated in the table：

Reading	With Sample	With central part of DD (diaphragm baffle)	Quantity represented
T1	No	No	Incident flux in initial reading
T2	Yes (before test)	No	Flux transmitted by the new material in a field of 24°C
T3	Yes (after test)	No	Flux transmitted by the tested material in a field of 24°C
T4	Yes (before test)	Yes	Flux diffused by the new material
T5	Yes (after test)	Yes	Flux diffused by the tested material

30-2.7.2.1 Three samples shall be exposed to an energetic illumination of 1200 W/m^2 ± 200 W/m^2 for a period such that the luminous energy that they receive is equal to 4500 MJ/m^2 ± 200 MJ/m^2. Within the enclosure, the temperature measured on the black panel placed on a level with the sample shall be 50 °C ± 5°C. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min. The samples shall be sprayed with distilled water at a temperature of 23 °C ± 5°C in accordance with the following cycle：

Spraying：5 minutes,

Drying：25 minutes

30-2.7.2.2 After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches,

chipping and deformation, and the mean variation (∆tm) in transmission ∆t = (T2-T3)/T2 measured on the three samples shall not exceed 0.020.

30-2.7.2.3 Soak a piece of cotton cloth until saturation with the test mixture (The test mixture shall be composed of 61.5% n-heptane, 12.5% toluene, 7.5% ethyl tetrachloride, 12.5% trichloroethylene and 6% xylene (volume%).), and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm^2. At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution-detergents at 23 °C ± 5°C. Afterward the samples shall be carefully rinsed with distilled water at 23 °C ± 5°C and then wiped off with a soft cloth.

30-2.7.2.4 After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion ∆d = (T5-T4)/T2, whose mean variation (∆dm) measured on the three samples shall not exceed 0.020.

30-2.7.2.5 Flat samples of each light transmitting plastic component of the headlamp are exposed to the light of the gas-discharge light source. The parameters such as the angles and distances of these samples shall be the same as in the headlamp. After 1,500 hours of continuous exposure, the colorimetric specifications of the transmitted light must be met with a new standard gas-discharge light source, and the surface of the samples shall be free of cracks, scratches, scalings and deformation.

30-2.7.3 Resistance to detergents and hydrocarbons

30-2.7.3.1 The outer face of three samples shall be heated to 50 °C ± 5°C and then immersed for five minutes in a mixture maintained at 23 °C ± 5°C and composed of 99% distilled water and 1% of alkylaryl sulphonate. At the end of the test, the samples shall be dried in a test chamber at 50 °C ± 5°C. The surface of the samples shall be cleaned with a moist cloth

30-2.7.3.2 The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70% n-heptane and 30% toluene (volume percent), and then shall be dried in the open air.

30-2.7.3.3 After the above two tests have been performed successively, the mean value (Δt_m) of the variation in transmission $\Delta t = (T_2-T_3)/T_2$ measured on the three samples shall not exceed 0.010.

30-2.7.4 Resistance to mechanical deterioration

30-2.7.4.1 The spray gun used with test mixture of silica sand shall be equipped with a nozzle 1.3 mm in diameter allowing a liquid flow rate of 0.24+/-0.02 1/minute at an operating pressure of 6.0 bars -0, +0.5 bar, at a distance of 380 mm+/-10 mm from the nozzle. The jet shall be sprayed almost perpendicular to the surface to be tested. The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method, is such that: ∆d = (T5-T4)/T2 = 0.025 ± 0.0025.

30-2.7.4.2 After this test, the variations in transmission: $\Delta t = (T_2-T_3)/T_2$ and in diffusion: $\Delta d = (T_5-T_4)/T_2$ shall be measured. The mean value of the three samples shall be such that: $\Delta t_m \leq 0.100$, $\Delta d_m \leq 0.050$.

30-2.7.5 Test of adherence of coatings, if any

30-2.7.5.1 The lens with coating shall be conducted by the test of the adherence of coating, if any.

30-2.7.5.2 A surface of 20 mm x 20 mm in area of the coating of a lens shall be cut a razor blade into a grid of squares approximately 2 mm x 2 mm. An adhesive tape with a force adhesion of 2 N/cm ± 20%, at least 25mm wide, shall be pressed for at least 5 minutes to the surface. Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1.5 m/s +/- 0.2 m/s.

30-2.7.5.3 There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15% of the gridded surface.

30-2.7.6 Tests of the complete headlamp

30-2.7.6.1 Resistance to mechanical deterioration (the lens of lamp sample No. 1 shall be subjected to the test)

30-2.7.6.1.1 The lens of lamp sample No. 1 shall be subjected to the test described in paragraph 30-2.7.4.1.

30-2.7.6.1.2 After the test, the results of photometric measurements carried out on the lamp in accordance with this Regulation shall not exceed by more than 30% the maximum values prescribed at points B 50 L and HV and not be more than 10% below the minimum values prescribed at point 75 R.

30-2.7.6.2 Test of adherence of coating (the sample of complete headlamp No. 2 shall be tested). The lens of lamp sample No. 2 shall be subjected to the test and meet the results described in paragraph 30-2.7.5.

30-2.8 Requirement for LED modules and headlamps including LED modules

30-2.8.1 General specifications

30-2.8.1.1 Each LED module sample submitted shall conform to the relevant specifications of this Regulation when tested with the supplied electronic light source control-gear(s), if any.

30-2.8.1.2 LED module(s) shall be so designed as to be and to remain in good working order when in normal use. They shall moreover exhibit no fault in design or manufacture.

30-2.8.1.3 LED module(s) shall be tamperproof.

30-2.8.1.4 The design of removable LED module(s) shall be such that:

30-2.8.1.4.1 when the LED module is removed and replaced with another module provided by the applicant and bearing the same light source module identification code, the photometric specifications of the headlamp shall be met;

30-2.8.1.4.2 LED modules with different light source module identification codes within the same lamp housing, shall not be interchangeable.

30-2.8.1.5 Electronic light source control gear(s) may be part of the LED module(s)."

30-2.8.2 Manufacture

30-2.8.2.1 The LED(s) on the LED module shall be equipped with suitable fixation elements.

30-2.8.2.2 The fixation elements shall be strong and firmly secured to the LED(s) and the LED module.

30-2.8.3 Test conditions

30-2.8.3.1 Application: all samples shall be tested as specified in paragraph 30-2.8.4. below;

30-2.8.3.2 Operation conditions:

30-2.8.3.2.1 LED module operating conditions: All samples shall be tested under the conditions as specified in paragraphs 30-2.3.1 of this Regulation. If not specified differently in this annex LED modules shall be tested inside the headlamp as submitted by the manufacturer.

30-2.8.3.2.2 Ambient temperature: For the measurement of electrical and photometric characteristics, the headlamp shall be operated in dry and still atmosphere at an ambient temperature of 23 °C ± 5 °C.

30-2.8.3.2.3 Ageing: Upon the request of the applicant the LED module shall be operated for 15 h and cooled down to ambient temperature before starting the tests as specified in this Regulation.

30-2.8.4 Specific requirements and tests

30-2.8.4.1 UV-radiation: The UV-radiation of a LED module shall be such that:

$$k_{UV} = \frac{\int_{\lambda=250\,nm}^{400\,nm} E_e(\lambda)\,S(\lambda)\,d\lambda}{k_m \int_{\lambda=380\,nm}^{780\,nm} E_e(\lambda)\,V(\lambda)\,d\lambda} \leq 10^{-5}\ W/lm$$

where:

S(λ)(unit: 1) is the spectral weighting function;

km = 683 lm/W is the maximum value of the luminous efficacy of radiation.

This value shall be calculated using intervals of one nanometer.

The UV-radiation shall be weighted according to the values as indicated in the Table UV below:（Table 4）

30-2.9 Instrumental verification of the “cut-off “ for passing beam headlamps

30-2.9.1 General:

In the case where paragraph 30-2.4.1.3.4 of this Regulation applies, the quality of the "cut-off" shall be tested according to the requirements set out in paragraph 30-2.9.2. below and the instrumental vertical and horizontal adjustment of the beam shall be performed according to the requirements set out in paragraph 3. below.

Before carrying out the measurement of the quality of "cut-off" and the instrumental aiming procedure, a visual pre-aim in accordance with paragraphs 30-2.4.1.3.2.1 and 30-2.4.1.3.2.2 of this Regulation is required.

30-2.9.2 Measurement of the quality of the “cut-off”:

To determine the minimum sharpness, measurements shall be performed by vertically scanning through the horizontal part of the "cut-off" in angular steps of 0.05° at either a measurement distance of:

(a) 10 m with a detector having a diameter of approximately 10 mm or

(b) 25 m with a detector having a diameter of approximately 30 mm.

The measuring distance at which the test was carried out shall be recorded in item 9. of the communication form.

To determine the maximum sharpness, measurements shall be performed by vertically scanning through the horizontal part of the "cut-off" in angular steps of 0.05° exclusively at a measurement distance of 25 m and with a detector having a diameter of approximately 30 mm.

The "cut-off" quality shall be considered acceptable if the requirements of paragraph 30-2.9.2.1.to 30-2.9.2.3. below comply with at least one set of measurements.

30-2.9.2.1 Not more than one "cut-off" shall be visible.

30-2.9.2.2 Sharpness of "cut-off": The sharpness factor G is determined by scanning vertically through the horizontal part of the "cut-off" at 2.5° from the V-V where: $G = (\log E\beta - \log E(\beta + 0.1°))$ where β = the vertical position in degrees.

The value of G shall not be less than 0.13 (minimum sharpness) and not greater than 0.40 (maximum sharpness).

30-2.9.2.3 Linearity: The part of the horizontal "cut-off" that serves for vertical adjustment shall be horizontal between 1.5° and 3.5° from the V-V line (see figure 5 below)

(a) The inflection points of the "cut-off" gradient at the vertical lines at 1.5°, 2.5° and 3.5° shall be determined by the equation: $(d2 (\log E) / d\beta 2 = 0)$.

(b) The maximum vertical distance between the inflection points determined shall not exceed 0.2 °.

30-2.9.3 Vertical and horizontal adjustment: If the "cut-off" complies with the quality requirements of paragraph 30-2.9.2, the beam adjustment may be performed instrumentally.（Figure 5）

30-2.9.3.1 Vertical adjustment: Moving upward from below the line B (see figure 6 below), a vertical scan is carried out through the

horizontal part of the "cut-off" at 2.5° from V-V. The inflection point (where d2 (log E) / dv2 = 0) is determined and positioned on the line B situated one per cent below H-H.

30-2.9.3.2 Horizontal adjustment: The applicant shall specify one of the following horizontal aim methods:

(a) The "0.2 D line" method (see figure 6 below). A single horizontal line at 0.2° D shall be scanned from 5° left to 5° right after the lamp has been aimed vertically. The maximum gradient "G" determined using the formula G = (log Eβ – log E(β + 0.1°)) where β is the horizontal position in degrees, shall not be less than 0.08.

The inflection point found on the 0.2 D line shall be positioned on the line A. (Figure 6)

(b) The "3 line" method (see figure 7 below) Three vertical lines shall be scanned from 2° D to 2° U at 1°R, 2°R, and 3°R after the lamp has been aimed vertically. The respective maximum gradients "G" determined using the formula:

G = (log Eβ – log E(β + 0.1°))

where β is the vertical position in degrees, shall not be less than 0.08. The inflection points found on the three lines shall be used to derive a straight line.

The intersection of this line and the line B found while performing vertical aim shall be placed on the V line. (Figure 7)

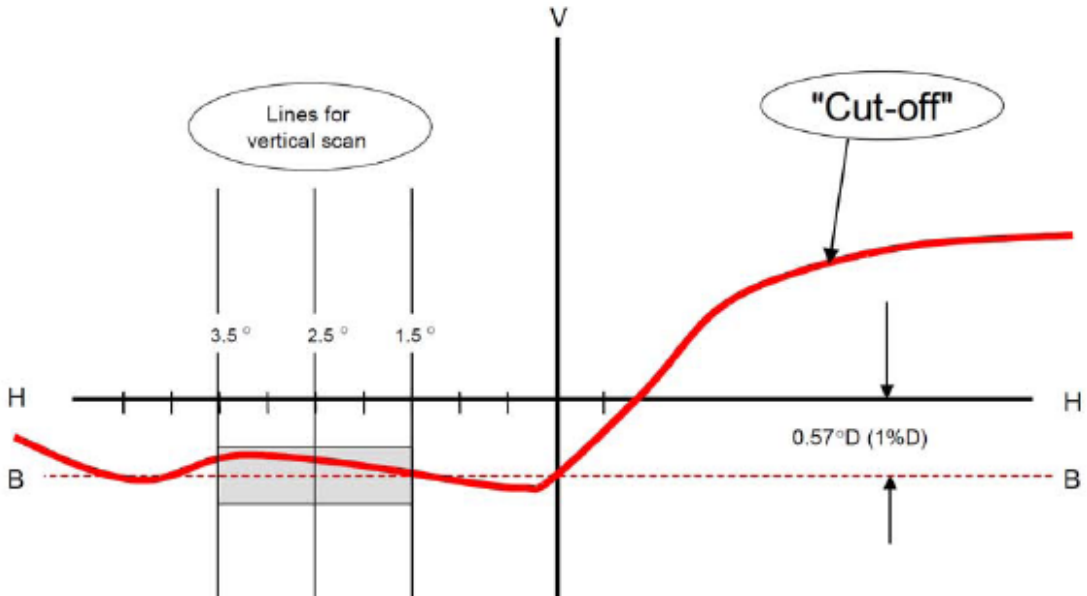
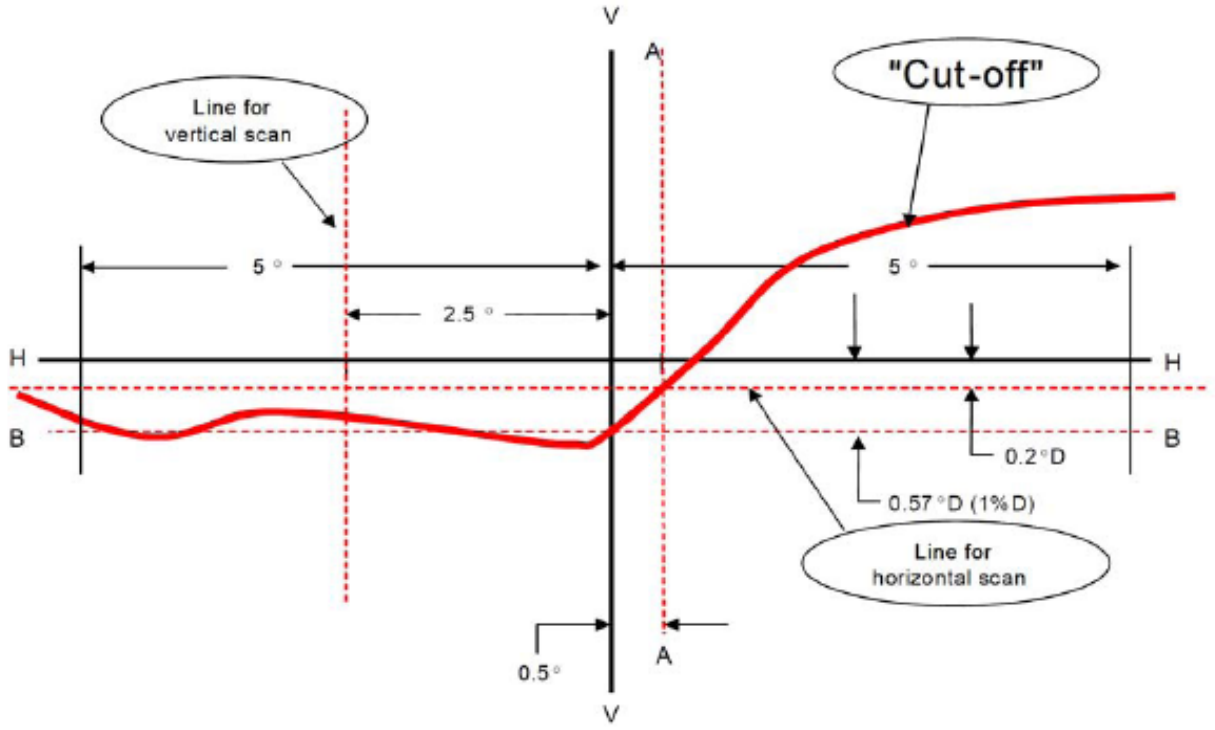


Figure 5: Measurement of "cut-off" quality



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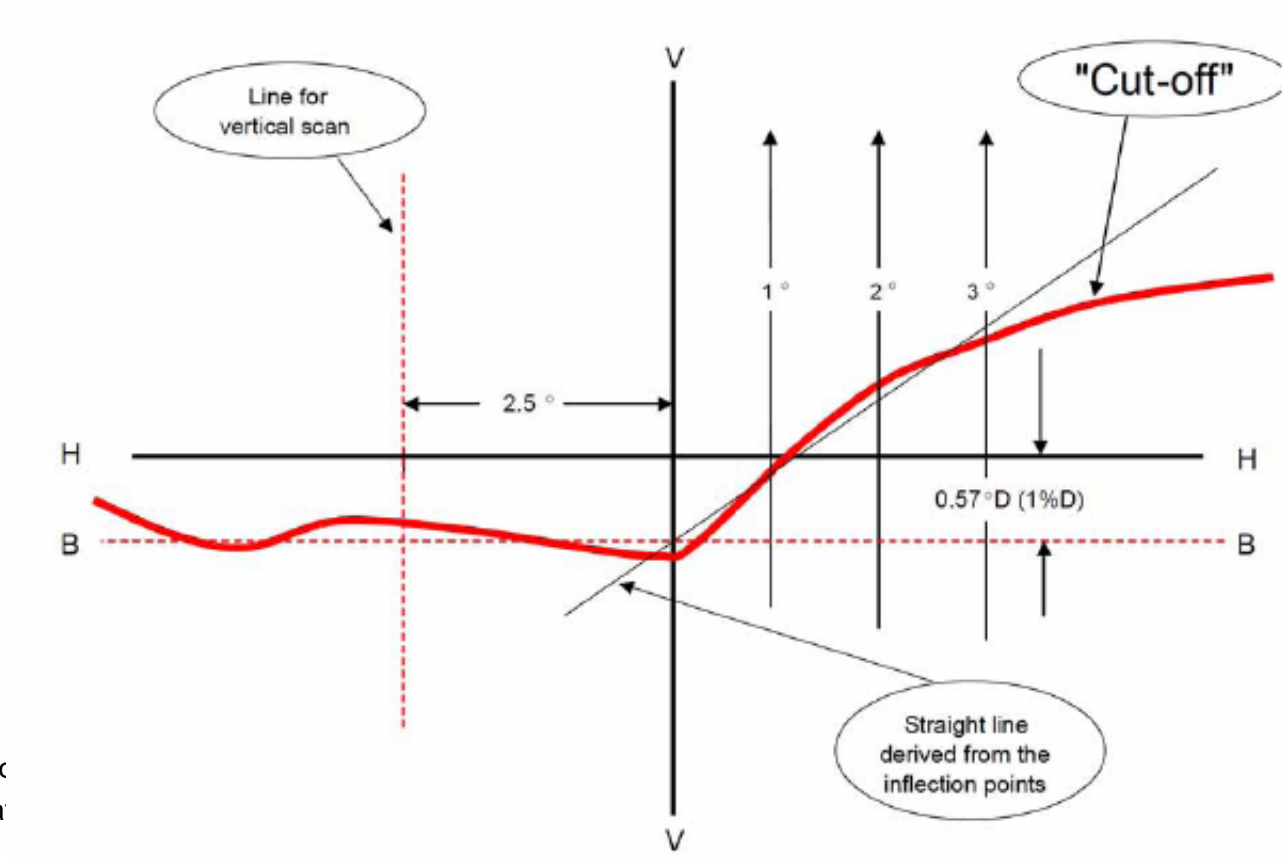
The official directions are written

Note: The scales are different for vertical and horizontal lines.



30-2.10 In the case o

30-2.10.1 Illumina

30-2.10.1.1 m in front of the unit and at r

Note: The scales are different for vertical and horizontal lines.

30-2.10.1.2 The dimensions determining the position of the are inside the standard gas discharge light source are shown in the relevant data sheet of ”Filament lamps” of “Directions”.

30-2.10.1.3 Four seconds after ignition of a headlamp which has not been operated for 30 minutes or more, 60 lux at least must be

reached at point HV of a driving beam and 6 lux at point 2 (0.86D-V) of a passing beam for headlamps incorporating driving beam and passing beam functions, or 6 lux at point point 2 (0.86D-V) for headlamps having only a passing beam function. The power supply shall be sufficient to secure the quick rise of the high current pulse.

30-2.10.1.4 For Class E headlamp (gas-discharge headlamp for motorcycles)(Table 5):

Table 5

Test point/ line/ zone	Position in B-beta grid in angular degrees		Required illumination in Lux at 25 m	
	Vertical beta **/	Horizontal beta **/	Minimum	Maximum
1	0.86 D	3.5 R	4	20
2	0.86 D	0	8	-
3	0.86 D	3.5 L	4	20
4	0.50 U	1.50 L and 1.50 R	-	1.08
6	2.00 D	15 L and 15 R	2	-
7	4.00 D	20 L and 20 R	1	-
8	0	0	-	1.92
Line 11	2.00 D	9 L to 9 R	3	-
Line 12	7.00 U	10 L to 10 R	-	1.08
Line 13	10.00 U	10 L to 10 R	-	1.08
Line 14	10 U to 90 U	0	-	1.08
15 */	4.00 U	8.0 L	0.1 */	1.08
16 */	4.00 U	0	0.1 */	1.08
17 */	4.00 U	8.0 R	0.1 */	1.08
18 */	2.00 U	4.0 L	0.2 */	1.08
19 */	2.00 U	0	0.2 */	1.08
20 */	2.00 U	4.0 R	0.2 */	1.08
21 */	0	8.0 L and 8.0 R	0.1 */	-
22 */	0	4.0 L and 4.0 R	0.2 */	1.08
Zone 1	1U/8L-4U/8L-4U/8R-1U/8R-0/4R-0/1R-0.6U/0-0/1L-0/4L-1U/8L		-	1.08
Zone 2	>4U to <10 U	10 L to 10 R	-	1.08
Zone 3	10 U to 90 U	10 L to 10 R	-	1.08

Notes:
"D" means under the H-H line.
"U" means above the H-H line.
"R" means right of the V-V line.
"L" means left of the V-V line.
*/ During measurement of these points, the front position lamp approved to Regulation No. 50, if combined, grouped, or reciprocally incorporated, shall be switched on.
**/ A 0.25 degrees photometry tolerance is allowed independently at each test point, unless indicated otherwise.

30-2.10.1.5 The illumination produced on the screen by the driving beam shall meet the following requirements：

30-2.10.1.5.1 In the case of a headlamp unit designed to provide a driving beam and a passing beam, measurements of the illumination produced on the screen by the driving beam shall be taken with the same unit alignment and voltage as for measurements under paragraph 30-2.10.1.4. In the case of a headlamp providing a driving beam only, it shall be so aimed that the area of maximum illumination is centered on the point of intersection HV.

30-2.10.1.5.2 The point of intersection (HV) of lines H-H and V-V shall be situated within the isolux 80 per cent of maximum illumination. This maximum value (EM) shall not be less than 70 lux for Class E headlamps. The maximum value shall in no circumstances exceed 180 lux in the case of Class E headlamps

30-2.10.1.5.3 In the case of a Class E headlamp, the intensities shall conform to the tables 6. Table 6-1 applies in the case where a primary driving beam is being produced with a single light source. Table 6-2 applies in the case where the driving beam is being produced by a secondary driving beam headlamp operated with a harmonized passing beam headlamp or a primary driving beam headlamp.

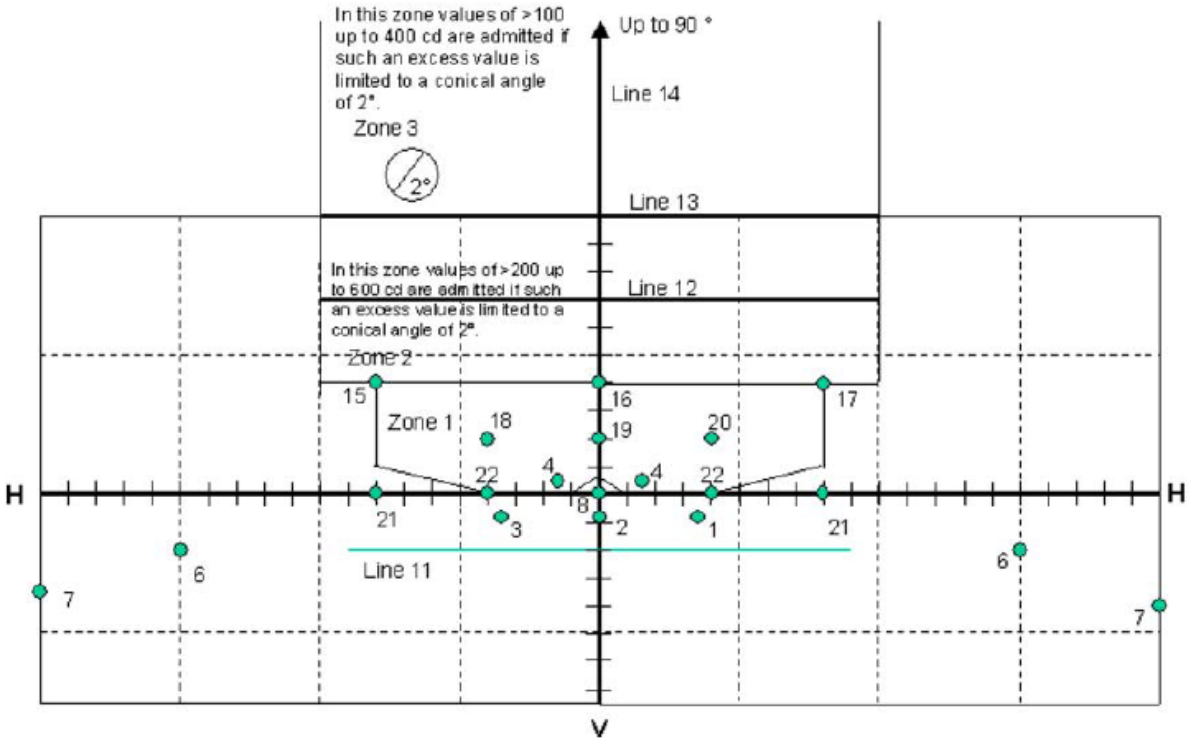
30-2.10.1.6 In the case of headlamps with an adjustable reflector, additional tests shall be made after the reflector has been moved vertically +/- 2 degrees or at least into the maximum position, if less than 2 degrees, from its initial position by means of the headlamp adjusting device. The whole headlamp shall then be re-positioned (for example by means of the goniometer) by moving it through the same number of degrees in the opposite direction to the movement of the reflector. The following measurements shall be made and the points shall be within the required limits:

Passing beam: points HV and 0.86 D-V

Driving beam: IM and point HV (percentage of IM).

30-2.10.1.7 Above shall be measured by means of a photoreceptor, the effective area of which shall be contained within a square of 65 mm side.

30-2.10.2 The light emitted shall be white defined in “The installation of lighting and light-signaling devices” of “Directions”.



Note: The luminous intensity of zones 2 and 3 above are not applied to Class E.

Figure 8. Dimensions in mm with screen at 25 m distance

Table6-1 Primary high beam headlamp

(Refer to figure 9. for details of test point positions)

Test point number	Test point location	Required illumination in lux

		Class E	
		MIN.	MAX
1	H-V(1)	(1)	---
2	H-3R&3L	30	---
3	H-6R&6L	10	---
4	H-9R&9L	6	---
5	H-12R&12L	2	---
6	2U-V	3	---
7	4D-V	---	(2)
	MIN luminous intensity of the maximu	70	---
	MAX luminous intensity	---	180.0

(1) Intensity at H-V shall be equal to or greater than 80 per cent of the maximum intensity in the beam pattern.

(2) Intensity at 4D-V shall be equal to or less than 30 per cent of the maximum intensity in the beam pattern.

Table6-2 Secondary high beam headlamp operated with a harmonized passing beam headlamp or a primary driving beam headlamp (Refer to figure 10. for details of test point positions)

Test point number	Test point location	Required illumination in lux	
		Class E	
		MIN.	MAX.
1	H-V(1)	(1)	---
2	H-3R&3L	30	---
3	H-6R&6L	10	---
6	2U-V	3	---

7	4D-V	---	(2)
	MIN luminous intensity of the maximum	70	---
	MAX luminous intensity	---	180.0

(1) Intensity at H-V shall be equal to or greater than 80 per cent of the maximum intensity in the beam pattern.

(2) Intensity at 4D-V shall be equal to or less than 30 per cent of the maximum intensity in the beam pattern.

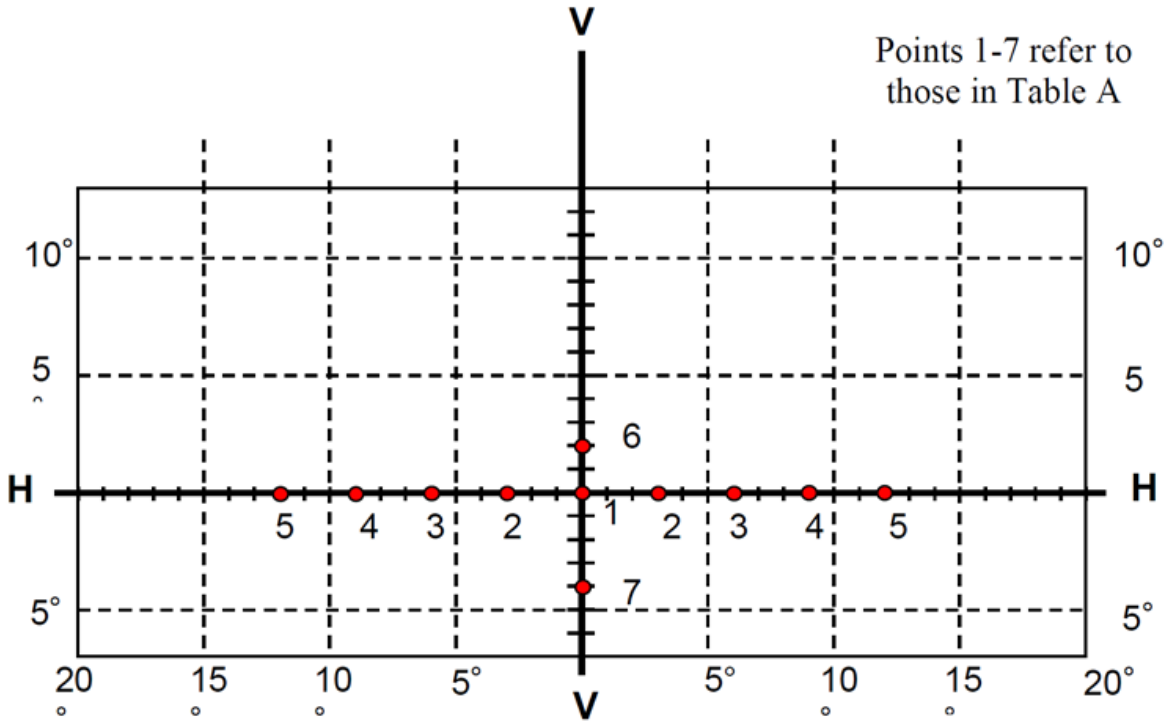


Figure 9: Primary driving beam

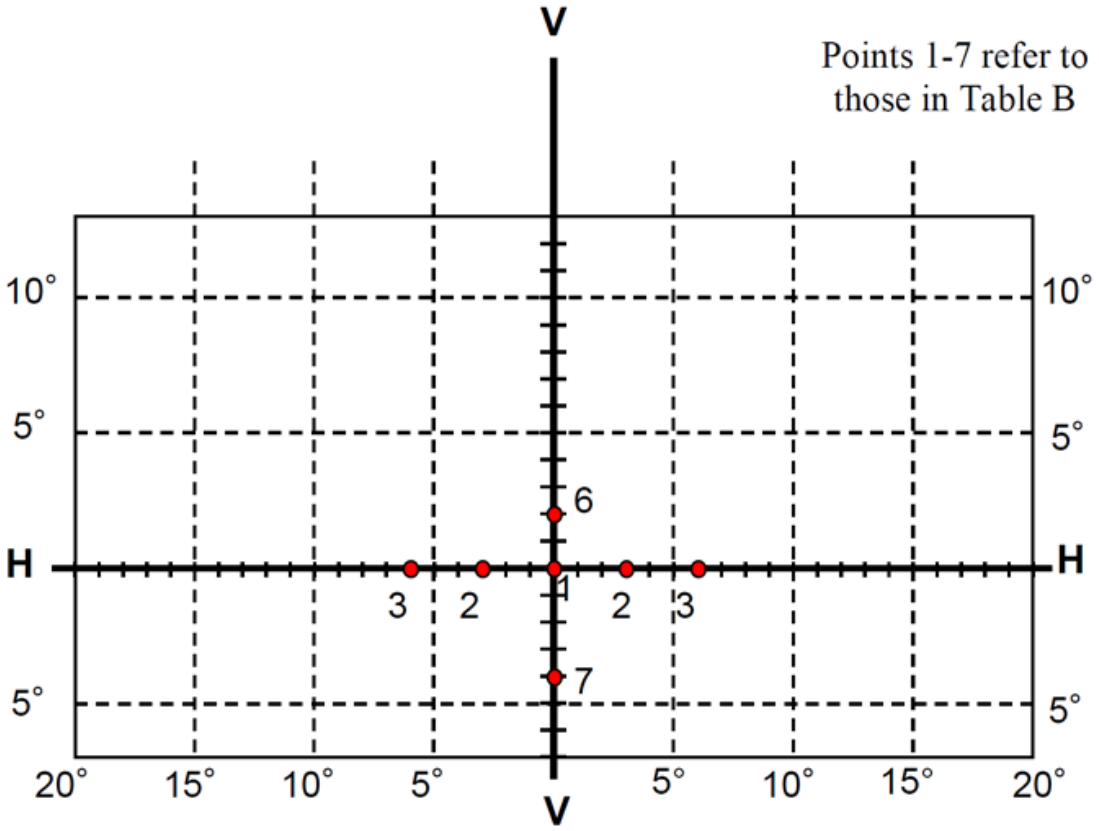


Figure 10: Secondary driving beam

30-2.10.3 Test for stability of photometric performance: The test shall be carried out in a dry and still atmosphere at an ambient temperature of 23 ± 5□C. The complete headlamp is mounted on a base representing the correct installation on the vehicle.

30-2.10.3.1 Clean headlamp: The headlamp shall be operated for 12 hours as described in paragraph 30-2.10.3.1.1. and checked as prescribed in paragraph 30-2.10.3.1.2.

30-2.10.3.1.1 Test procedure:

30-2.10.3.1.1.1 In the case where only one lighting function (driving or passing beam) is to be tested, the corresponding filament and/or LED module(s) is (are) lit for the prescribed time of 12 hours.

30-2.10.3.1.1.2 In the case of a reciprocal incorporated passing beam and driving beam or in the case of a headlamp with a

passing beam and a front fog lamp:

30-2.10.3.1.1.2.1 The headlamp shall be subjected to the following cycle until the time specified is reached - i.e. 12 hours:

15 minutes, passing filament lit

5 minutes, all filaments lit

30-2.10.3.1.1.2.2 If the applicant declares that the headlamp is to be used with a single filament lit at a time, the test shall be carried out in accordance with this condition, activating each specified function successively for half the time specified- i.e.6 hours.

30-2.10.3.1.1.3 In the case of a headlamp with a front fog lamp and one or more driving beams：

30-2.10.3.1.1.3.1 The headlamp shall be subjected to the following cycle until the time specified is reached - i.e. 12 hours:

15 minutes – front fog lamp lit

5 minutes – all filaments and/or all LED modules lit.

30-2.10.3.1.1.3.2 The applicant declares that the headlamp is to be used with only the front fog lamp lit or only the driving beam(s) lit at a time, the test shall be carried out in accordance with this condition, activating successively the front fog lamp half of the time and the driving beam(s) (simultaneously) for half the time specified (i.e. 6 hours).

30-2.10.3.1.1.4 In the case of a headlamp with a passing beam, one or more driving beams and a front fog lamp：

30-2.10.3.1.1.4.1 The headlamp shall be subjected to the following cycle until the time specified is reached - i.e. 12 hours:

15 minutes – passing beam filament lit

5 minutes – all filaments lit

30-2.10.3.1.1.4.2 If the applicant declares that the headlamp is to be used with only the passing beam lit or only the driving beam(s) lit at a time, the test shall be carried out in accordance with this condition, activating successively the passing beam half of the time and the driving beam(s) for half the time specified (i.e. 6 hours), while the front fog lamp is subjected to a cycle of 15 minutes off and 5 minutes lit for half of the time and during the operation of the driving beam;

30-2.10.3.1.1.4.3 If the applicant declares that the headlamp is to be used with only the passing beam lit or only the front fog lamp lit at a time, the test shall be carried out in accordance with this condition, activating successively the passing beam half of the time and the front fog lamp for half of the time specified (i.e. 6 hours), while the driving beam(s) is (are) subjected to a cycle of 15 minutes off and 5 minutes lit for half of the time and during the operation of the passing beam；

30-2.10.3.1.1.4.4 If the applicant declares that the headlamp is to be used with only the passing beam lit or only the driving beam(s) lit

or only the front fog lamp lit at a time, the test shall be carried out in accordance with this condition, activating successively the passing beam one third of the time (i.e. 4 hours), the driving beam(s) one third of the time (i.e. 4 hours) and the front fog lamp for one third of the time specified (i.e. 4 hours).

30-2.10.3.1.2 Test voltage：The voltage applied at the terminals of the ballast(s) or at the terminals of the light source in case the ballast is (are) integrated with the light source, is either 13.5 +/- 0.1 Volts for 12 V network system, or otherwise specified in the application for approval. If there are reciprocally incorporated filament lamps, the voltage producing the reference flux shall be used.

30-2.10.3.1.3 Test results：

30-2.10.3.1.3.1 Visual inspection：No distortion, deformation, cracking or change in color of either the headlamp lens or the external lens, if any, shall be noticeable.

30-2.10.3.1.3.2 Photometric test：To comply with the requirements of this Regulation, the photometric values shall be verified in the following points and a 10% discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure. Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the "cut-off" line is covered in paragraph 2. of this annex).

For Class E headlamp:

Passing beam: 0.86D/3.5R - 0.86D/3.5L - 0.50U/1.5L and 1.5R - HV.

Driving beam: Point of Emax

30-2.10.3.2 Dirty headlamp test:

After being tested as specified in paragraph 30-2.10.3.1, the headlamp shall be operated for one hour as described paragraph 30-2.10.3.1.1, after being prepared as: The test mixture shall be uniformly applied to the entire light emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20% of the values measured for each following point:

30-2.10.3.2.1 Point of Emax in driving beam, photometric distribution for a driving/passing lamp, Point of Emax in driving beam, photometric distribution for a driving lamp only.

30-2.10.3.2.2 Passing beam only: 0.50U/1.5L and 1.5R and 0.86D/V.

30-2.10.3.3 Test for change in vertical position of the cut-off line under the influence of heat (applicable to passing beam only)

30-2.10.3.3.1 Test procedure:

30-2.10.3.3.1.1 The headlamp tested in accordance with 30-2.10.3.1, shall be subjected to the test, without being moved

and readjusted its position.

30-2.10.3.3.1.2 Using a mass production headlamp which has been aged for at least 15 hour, the headlamp shall be operated on passing beam without being dismounted from or readjusted in relation to its test fixture. The position of the cut-off line shall be verified 3 minutes (r3) and 60 minutes (r60) respectively after operation. Between the vertical lines passing through point 3.5 L and 3.5 R

30-2.10.3.3.2 Test results:

30-2.10.3.3.2.1 The result in milliradians (mrad) shall be considered as acceptable for a passing lamp, only when the absolute value Δ rI = | r3 - r60 | recorded on the headlamp is not more than 1.0 mrad (Δ rI $\leqq$ 1.0 mrad).

30-2.10.3.3.2.2 However, if this value is more than 1.0 mrad but not more than 1.5 mrad (1.0 mrad <Δ rI $\leqq$ 1.5 mrad) a second headlamp shall be tested as described in paragraph 30-2.10.3.3.1. after being subjected three consecutive times to the cycle as described below, in order to stabilize the position of mechanical parts of the headlamp on a base representative of the correct installation on the vehicle:

Operation of the passing beam for one hour,

Period of rest for one hour.

The headlamp shall be considered as acceptable if the mean value of the absolute values delta rI measured on the first sample and Δ rII measured on the second sample is not more than 1.0 mrad.

30-2.10.4 Requirements for lamps incorporating lenses of plastic material -Testing of lens or material samples and of complete.

Fourteen samples of headlamp lenses shall be supplied, numbered and carried out the test pursuant to table 7. Two samples of complete headlamp shall be supplied, numbered and undergone the test in accordance with table 8. The test method and the standards for respective test item are indicated below：

30-2.10.4.1 Resistance to temperature changes

30-2.10.4.1.1 Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at 40 degrees C +/- 2 degrees C and 85-95 per cent RH;

1 hour at 23 degrees C +/- 5 degrees C and 60-75 per cent RH;

15 hours at -30 degrees C +/- 2 degrees C;

1 hour at 23 degrees C +/- 5 degrees C and 60-75 per cent RH;

3 hours at 80 degrees C +/- 2 degrees C;

1 hour at 23 degrees C +/- 5 degrees C and 60-75 per cent RH;

30-2.10.4.1.2 Photometric measurements shall be carried out on the samples before and after the test. These measurements shall be made using a standard lamp , as present in the headlamp at the following points：

30-2.10.4.1.2.1 For the passing beam of a passing lamp or a passing/driving lamp: 0.86D/3.5R, 0.86D/3.5L, 0.50U/1.5L and 1.5R.

30-2.10.4.1.2.2 Point of maximum photometric value for the driving beam of a driving lamp or a passing/driving lamp.

30-2.10.4.1.3 The variation between the photometric values measured on each sample before and after the test shall not exceed 10% including the tolerances of the photometric procedure.

30-2.10.4.2 Resistance to atmospheric and chemical agents

The following readings shall be taken：

Readings	With Sample	With central part of DD (diaphragm baffle)	Quantity represented
T1	No	No	Incident flux in initial reading
T2	Yes (before test)	No	Flux transmitted by the new material in a field of 24°C
T3	Yes (after test)	No	Flux transmitted by the tested material in a field of 24°C
T4	Yes (before test)	Yes	Flux diffused by the new material
T5	Yes (after test)	Yes	Flux diffused by the tested material

30-2.10.4.2.1 Three samples shall be exposed to an energetic illumination of 1200 W/m^2 ± 200 W/m^2 for a period such that the luminous energy that they receive is equal to 4500 MJ/m^2 ± 200 MJ/m^2. Within the enclosure, the temperature measured on the black panel placed on a level with the sample shall be 50 °C ± 5°C. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min. The samples shall be sprayed with distilled water at a temperature of 23 °C ± 5°C in accordance with the following cycle：

Spraying：5 minutes,

Drying：25 minutes

30-2.10.4.2.2 After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation (Δtm) in transmission $\Delta t = (T2-T3)/T2$ measured on the three samples shall not exceed 0.020.

30-2.10.4.2.3 Soak a piece of cotton cloth until saturation with the test mixture, and, within 10 seconds, apply it for 10 minutes to the outer face of the sample after being carried out the test in paragraph 30-2.10.4.2.1, at a pressure of 50 N/cm^2. At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution-detergents at 23 °C ± 5°C. Afterward the samples shall be carefully rinsed with distilled water at 23 °C ± 5°C and then wiped off with a soft cloth.

30-2.10.4.2.4 After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion $\Delta d = (T_5-T_4)/T_2$, whose mean variation (Δd_m) measured on the three samples shall not exceed 0.020.

30-2.10.4.3 Resistance to detergents and hydrocarbons

30-2.10.4.3.1 The outer face of three samples shall be heated to 50 °C ± 5°C and then immersed for five minutes in a mixture maintained at 23 °C ± 5°C and composed of 99% distilled water and 1% of alkylaryl sulphonate. At the end of the test, the samples shall be dried in a test chamber at 50 °C ± 5°C. The surface of the samples shall be cleaned with a moist cloth.

30-2.10.4.3.2 The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70% n-heptane and 30% toluene (volume percent), and then shall be dried in the open air.

30-2.10.4.3.3 After the above two tests have been performed successively, the mean variation (Δtm) in transmission $\Delta t = (T2-T3)/T2$ measured on the three samples shall not exceed 0.010.

30-2.10.4.4 Resistance to mechanical deterioration

30-2.10.4.4.1 The spray gun used with test mixture of silica sand shall be equipped with a nozzle 1.3 mm in diameter allowing a liquid flow rate of 0.24+/-0.02 1/minute at an operating pressure of 6.0 bars -0, +0.5 bar, at a distance of 380 mm+/-10 mm from the nozzle. The jet shall be sprayed almost perpendicular to the surface to be tested. The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method, is such that: $\Delta d = (T5-T4)/T2 = 0.025 \pm 0.0025$.

30-2.10.4.4.2 After this test, the variations in transmission: $\Delta t = (T2-T3)/T2$ and in diffusion: $\Delta d = (T5-T4)/T2$ shall be measured. The mean value of the three samples shall be such that: $\Delta t_m \leq 0.100$, $\Delta d_m \leq 0.050$.

30-2.10.4.5 Test of adherence of coatings, if any

30-2.10.4.5.1 A surface of 20 mm x 20 mm in area of the coating of a lens shall be cut a razor blade into a grid of squares approximately 2 mm x 2 mm. An adhesive tape with a force adhesion of 2 N/cm ± 20%, at least 25mm wide, shall be pressed for at least 5 minutes to the surface. Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1.5 m/s +/- 0.2 m/s.

30-2.10.4.5.2 There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15% of the gridded surface.

30-2.10.4.6 Resistance to light source radiations for Class E:

30-2.10.4.6.1 The following test shall be done: Flat samples of each light transmitting plastic component of the headlamp are exposed to the light of the gas-discharge light source. The parameters such as angles and distances of these samples shall be the same as in the headlamp. These samples shall have the same colour and surface treatment, if any, as the parts of the headlamp.

30-2.10.4.6.2 After 1,500 hours of continuous exposure, the colorimetric specifications of the transmitted light must be met with a new standard gas-discharge light source, and the surfaces of the samples shall be free of cracks, scratches, scalings or deformation.

30-2.10.4.7 Tests of the complete headlamp

30-2.10.4.7.1 Resistance to mechanical deterioration (the lens of lamp sample No. 1 shall be subjected to the test)

30-2.10.4.7.1.1 The lens of lamp sample No. 1 shall be subjected to the test described in paragraph 30-2.10.4.4.

30-2.10.4.7.1.2 After the test, the results of photometric measurements carried out on the lamp in accordance with this Regulation shall not exceed by more than 30% the maximum values prescribed at points B 50 L (excluding the symmetrical headlamp) point 75 R、category of B symmetrical headlamp point 50L and 50R，The category of C and D symmetrical headlamp point 0.86D/3.5R，0.86D/3.5L not be more than 10% below the minimum values.

30-2.10.4.7.2 Test of adherence of coating, if any (The lens of lamp sample No. 2 shall be subjected to the test): The lens of lamp sample No. 2 shall be subjected to the test and meet the results described in paragraph 30-2.10.4.5.

30-2.10.5 The LED module(s) shall be in the configuration as described in the technical specification as defined. Optical elements (secondary optics) shall be removed by the Technical Service at the request of the applicant by the use of tools. This procedure and the conditions during the measurements as described below shall be described in the test report.

30-2.10.5.1 Three LED modules of each type shall be submitted by the applicant with the light source control gear, if applicable, and sufficient instructions.

30-2.10.5.1.1 Suitable thermal management (e.g. heat sink) may be provided, to simulate similar thermal conditions as in the corresponding headlamp application.

30-2.10.5.1.2 Before the test each LED module shall be aged at least for 48 hours under the same conditions as in the corresponding headlamp application.

30-2.10.5.1.3 In the case of use of an integrating sphere, the sphere shall have a minimum diameter of one meter, and at least ten times the maximum dimension of the LED module, whichever is the largest. The flux measurements can also be performed by integration using a goniophotometer. The prescriptions in the CIE - Publication 84 - 1989, regarding the room temperature, positioning, etc., shall be taken into consideration.

30-2.10.5.1.4 The LED module shall be burned in for approximately one hour in the closed sphere or goniophotometer.

30-2.10.5.1.5 The flux shall be measured after stability has occurred.

30-2.10.5.1.6 The average of the measurements of the three samples of each type of LED module shall be deemed to be its objective luminous flux.

Table 7. Tests on plastic material (lenses or samples)

Samples	Lenses or samples of material										Lenses			
Tests	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Limited photometry											○	○	○	
Temperature change											○	○	○	
Limited photometry											○	○	○	
Transmission measurement	○	○	○	○	○	○		○	○	○				
Diffusion measurement	○	○	○					○	○	○				
Atmospheric agents	○	○	○											
Transmission measurement	○	○	○											
Chemical agents	○	○	○											

Diffusion measurement	○	○	○											
Detergents				○	○	○								
Hydrovarbons				○	○	○								
Transmission measurement				○	○	○								
Deterioration								○	○	○				
Transmission measurement								○	○	○				
Diffusion measurement								○	○	○				
Adherence														○
Resistance to light source radiations							○							

Remark：

The samples of material at least 60 mm x 80 mm in size shall have a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 x 15mm.

Table 8. Tests on complete headlamps

Sample No. / Tests	Complete headlamp	
	1	2
Resistance to mechanical deterioration	○	
Test of adherence of coating		○