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Photometric characteristics of power-driven vehicle front fog lamps

机动车用前雾灯配光性能

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Photometric characteristics of power-driven vehicle front fog lamps

1 Scope

This standard specifies the photometric performance, test methods, inspection rules, for the front fog lamps for motor vehicles.

This standard applies to various types of front fog lamps, which are used in categories L3, L4, L5, M, N motor vehicles.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB 4599 Motor vehicle headlamps equipped with filament lamps

GB 4785 Prescription for installation of the external lighting and light-signaling devices for motor vehicles and their trailers

GB 15766.1 Lamps for road vehicles - Dimensional, electrical and luminous requirements

IEC 60061 Lamp caps and holders together with gauges for the control of interchangeability and safety

ECE R37 Uniform provisions concerning the approval of filament lamps for use in approved lamp units of power-driven vehicles and of their trailers

ECE R99 Uniform provisions concerning the approval of gas-discharge light sources for use in approved gas discharge lamp units of power-driven vehicles

3 Terms and definitions

Terms and definitions, which are defined in GB 4599, GB 4785 and GB 15766.1, apply to this document.

have inseparable mirrors. For this type of assembly, it shall meet the requirements of 5.9.2.3 or 5.9.3.3.

5.2 Chromaticity requirements

The light color of the front fog lamps shall be white or yellow; its chromaticity characteristics shall comply with the provisions of GB 4785.

5.3 Requirements for the stability test of photometric performance of front fog lamps

The front fog lamps shall meet the requirements of Appendix A.

5.4 "Requirements for front fog lamps of plastic light-distribution mirror - Requirements for light-distribution mirror or material specimen and whole lamp test"

5.4.1 If the light-distribution mirror of the front fog lamp is made of plastic material, it shall also meet the requirements of Appendix B.

5.4.2 The light-transmitting parts of the plastic material, in the front fog lamps, shall be subjected to the UV radiation resistance test, according to B.2.7.

5.4.3 For light sources with low UV radiation, which meet the following requirements, the tests specified in 5.4.2 may be exempted:

a) Low UV radiation light source of ECE R99 and GB 15766.1;

b) The light sources of Appendix C;

c) The light source, whose UV radiation is shielded by measures, such as filters.

5.5 Light source requirements for front fog lamps

5.5.1 Requirements for front fog lamps with replaceable light sources

5.5.1.1 The type of lamp holder of light source shall conform to the data sheet of the lamp, which is corresponding to the light source category, in GB 15766.1 and IEC 60061.

5.5.1.2 The light source shall be easily installed to the front fog lamps.

5.5.1.3 The light source can only be installed in the correct position.

5.5.2 Requirements for front fog lamps using LED modules and light source generators

5.5.2.1 LED modules and light source generators shall only be installed in correct

positions.

5.5.2.2 Different light source modules are not interchangeable, in the same lamp unit.

5.5.2.3 The LED module or light source generator shall be anti-vibration.

5.5.3 Light source requirements for grade-B front fog lamps

5.5.3.1 It shall be equipped with a filament bulb, which meets the requirements of GB 15766.1 or ECE R37:

a) The reference luminous flux of the filament bulb does not exceed 2000 lm;

b) It is allowed for the use of any filament lamps, which are not restricted in GB 15766.1 or ECE R37, as well as its subsequent series of amendments.

5.5.3.2 If the filament bulb is not replaceable, it shall also comply with the provisions of 5.5.3.1.

5.5.4 Replaceable/non-replaceable light source requirements for grade-F3 front fog lamps

5.5.4.1 One or more light sources, which complies with GB 15766.1, ECE R37 or ECE R99.

5.5.4.2 AND/OR one or more LED modules, which shall meet the requirements of Appendix C. Its compliance shall be determined by testing.

5.5.4.3 AND/OR light source generator, which shall meet the requirements of Appendix C. Its compliance shall be determined by testing.

5.6 Sharpness and linearity requirements for cut-off lines

When there is an objection to the sighting, for the grade-F3 front fog lamps, it shall be tested for the sharpness and linearity of the cut-off line, in accordance with the provisions of Appendix D.

5.7 Electromagnetic compatibility requirements

Front fog lamps and their ballasts OR electric light source controllers shall comply with electromagnetic compatibility requirements. The consistency of electromagnetic compatibility requirements is related to the specific vehicle type.

5.8 Other requirements

5.8.1 The front fog lamp can use an additional system, to control the light intensity; OR when mixed with another function, the additional system can also be used to control the light intensity.

6.4.1.1.1 There shall be at least one complete set of front fog lamps; the standard bulbs can be provided by the manufacturer or the applicant. For the case where the filament bulb directly uses the vehicle voltage: The front fog lamp test shall use the colorless standard filament bulb in GB 15766.1 or R37 Regulation. The test voltage shall use the voltage specified to the reference luminous flux, which is obtained at 13.2 V, on the data page of GB 15766.1 or Regulation No. R37.

6.4.1.1.2 For lamps that use electric light source controllers, as part of the front fog lamp system, the voltage of the input terminals of the lamps shall be as specified by the manufacturer or the applicant.

6.4.1.1.3 For lamps that use an electric light source controller, which is not part of the front fog lamp system, the voltage published by the manufacturer or the applicant shall apply to the input terminal of the electric light source controller. The manufacturer or applicant shall provide the electric light source controller for the luminaire.

6.4.1.2 For front fog lamps using gas discharge light sources

A standard gas discharge light source, which meets the requirements of GB 15766.1 or ECE R99 Regulations AND has undergone 15 cycles of aging in accordance with G.4 of GB 15766.1 or Article 4 of Annex 4 of ECE R99 Regulation, shall be used.

When the front fog lamp is tested, for the 12 V system, the terminal voltage of the ballast terminal or the integrated rectifier and the light source shall be kept at 13.2 V, OR at the vehicle voltage (±0.1 V) as stated by the manufacturer or the applicant.

The luminous flux of the gas discharge light source may be different from that described in GB 15766.1 or ECE R99 Regulation; in this case, the luminous intensity value shall be appropriately corrected.

6.4.1.3 For front fog lamps with non-replaceable light sources

For all front fog lamps, which are equipped with non-replaceable light sources, the voltage shall be 6.3 V, 13.2 V or 28.0 V, OR according to the vehicle voltage, which is described by the manufacturer or the applicant. The manufacturer or applicant shall provide a specific power source. The test voltage shall be applied to the input terminals of the luminaire.

6.4.1.4 For front fog lamps using LED modules

If not otherwise specified, the test voltage of the front fog lamps, which are equipped with LED modules, shall be the corresponding 6.3 V, 13.2 V or 28.0 V. The LED module, which is controlled by the electric light source controller, shall be measured according to the input voltage, which is specified by the manufacturer or the applicant; OR by the operating device and power supply that replaces the electric light source controller. The corresponding input parameters (such as duty cycle, frequency, pulse shape, peak voltage) shall be stated in the submission.

Among them, judge whether the LED module meets the requirements of 5.5.2.1, by testing whether the line 3 and line 4 in Table 2 meet the requirements.

6.4.2 Sighting method of grade-F3 front fog lamp

6.4.2.1 The sighting screen for visual calibration, as shown in Figure 3, shall be placed 10 m or 25 m in front of the front fog lamps.

6.4.2.2 According to the provisions of D.2, the light and dark cut-off line of the front fog lamps shall be adjusted to a position 1° below the H line.

6.4.2.3 When there is a problem with visual sighting or the position of the cut-off line is ambiguous, the following tests shall be completed:

a) Adjust according to D.3; confirm the quality of the cut-off line according to D.4;

b) Use the instrument method, which is specified in D.5, for sighting.

6.4.2.4 In the case where the specified photometric performance cannot be satisfied, the cut-off line of light and dark is allowed to re-sight, within the range of not more than ±0.5° in the vertical direction and/or not more than ±2° in the horizontal direction.

6.5 Chromaticity inspection of front fog lamp

The inspection of chromaticity of the light, which is emitted by the front fog lamps, shall be white or optional yellow, as selected by the manufacturer or the applicant. Selective yellow light can be obtained, by the natural color of the light source, OR by changing the color of the front fog light lens, OR by other methods. The chromaticity of the front fog lamps shall be measured, at the voltage specified in 6.3.2 or 6.4.1.

7 Inspection rules

7.1 Type inspection

7.1.1 Materials provided by the front fog lamp manufacturer or applicant

7.1.1.1 There are 3 sets of detailed drawings; the type of front fog lamps are clearly identifiable and there shall be a front view of the front fog lamps; the details of the optical components shall be drawn in detail, if any, including the cross section; the position for certification mark shall be left on the drawings.

If the headlamp is equipped with an adjustable reflector, it shall indicate the installation position of the front fog lamp, as relative to the ground, AND the installation position of the longitudinal symmetry plane of the vehicle, as long as the front fog lamp can only be used in this position.

7.1.1.2 For the plastic material test for plastic optic lenses, it shall provide:

fog lamp system, the description of the electric light source controller (if any) and/or the voltage and tolerance shall be indicated in the technical description.

7.1.3.4 If the front fog lamp is equipped with LED modules or a distributed lighting system (DLS), the technical description shall also include the part number assigned by the light source manufacturer or applicant, a dimensional drawing and basic electronic and optical data, a description of whether the light source meets the UV radiation requirements of C.4.6, a test report corresponding to 5.5.2 and the target luminous flux.

7.1.3.5 If a distributed lighting system (DLS) is used, that is, the beam of the front fog lamps is provided by this component. The technical description shall also include a description of the light guide, the corresponding optical components, the information sufficient to identify the light source generator. The information description shall include the part number, which is assigned by the light source generator manufacturer or applicant, a dimensional drawing, the basic electronic and optical data, a test report corresponding to 5.5.2.

7.1.3.6 If the front fog lamp uses a gas discharge light source, it shall provide:

a) A rectifier that allows the whole or part of it to be integrated with the front fog lamps. And the rectifier is not integrated with the light source.

b) If the non-replaceable light source, which is used by the distributed lighting system (DLS), is not approved by R99, two sets of systems shall be submitted simultaneously for each type, which shall include light source generators and rectifiers, if applicable.

7.1.3.7 For the light sources required by a), b), c) of 5.4.3, if it cannot provide proof, such as UV protective glass filter to shield the UV radiation of the discharge light source, for the plastic parts, THEN, it shall provide the following:

One sample shall be submitted for each relevant material. The sample shall have a similar geometry to the front fog lamp or distributed lighting system (DLS) being tested. And each material sample shall have the same appearance and finish, as the front fog lamps, which are submitted for certification, if any.

7.1.3.8 For front fog lamps, which are certified according to 7.1.3.7 and/or 5.5.2, the plastic internal optical parts shall be tested for UV resistance:

For the material of the internal optical parts, if any, it shall submit a material test report for resistance to UV radiation.

7.1.3.9 There shall be two samples for each type of front fog lamp: one is installed on the left side of the vehicle AND the other installed on the right side of the vehicle, or a pair of matching front fog lamps.

7.13.10 If any, an electric light source controller.

7.1.3.11 If any, a variable light intensity controller or generator to provide the same signal.

7.1.3.12 For the grade-F3 front fog lamps with asymmetrical light type AND cannot be mixed with left and right, there shall be left and right marks on the lamps.

7.1.4 Type test of front fog lamps

7.1.4.1 The front fog lamps shall comply with the provisions of 5.1, 5.5, 5.7, 5.8.

7.1.4.2 Carry out the test according to the provisions of Chapter 6; each sample lamp shall meet the provisions of 5.2 and 5.9; it shall also meet the provisions of 5.6 for the grade-F3 front fog lamps.

7.1.4.3 The photometric stability of the front fog lamps shall also meet the requirements of 5.3.

7.1.4.4 For front fog lamps, which use plastic photometric mirrors, they shall also comply with the provisions of 5.4.

7.2 Production consistency inspection

7.2.1 For products that have passed the type inspection, the sample lamps randomly selected from batches of products are used to determine the consistency of their production; those with obvious defects will not be considered.

7.2.2 The randomly selected sample lamps shall meet the requirements of 5.1, 5.5, 5.7, 5.8.

7.2.3 The test shall be carried out according to the provisions of Chapter 6. It shall meet the provisions of 5.2 and Appendix E.

If the photometric test results do not meet the requirements, the front fog light axis shall be adjusted, which has a left and right deviation of not more than 0.5° and an up and down deviation of not more than 0.2°; its photometric shall meet all photometric requirements.

If the photometric requirements are still not met, the cut-off line is allowed to re-sight, within the range of ±0.5° in the vertical direction and/or ±2° in the horizontal direction. After re-sighting, it shall meet all photometric requirements.

Within the tolerance range, if the reproduced light pattern of cut-off line of light and dark cannot reach the required position, by vertical dimming, THEN, the instrument sighting method in Appendix D shall be used; the quality of the cut-off line shall be evaluated for a sample.

7.2.4 The heating change of the light and dark cut-off line shall comply with the provisions of A.3.3.

Appendix A

(Normative)

Stability test of photometric performance of front fog lamps (full lamp test of front fog lamps)

A.1 Preparations for the front fog lamp test

According to the testing requirements of photometric, as far as the entire front fog lamp is concerned, the D area (E_{max}) point and the HV point are used to test the stability of the photometric of the front fog lamp in use. The so-called "whole front fog lamp" refers to: the lamp and its surrounding accessories that affect the heat dissipation performance of the bulb and lamp body parts.

Testing shall use the following methods:

a) In a dry and unventilated atmosphere, the surrounding temperature is 23 °C ± 5 °C; the test sample is installed on a bracket, which can replace the correct installation on the vehicle;

b) For the replaceable light source: When using the batch filament bulb light source, it shall be aged for at least 1 h; when using the batch-produced gas discharge light source, it shall be aged for at least 15 h; when using the batch-produced LED module, it shall be aged for at least 48 h, meanwhile it shall be cooled to ambient temperature before testing. It shall use the LED modules provided by the manufacturer or the applicant.

The test equipment shall be the same as that used in the type inspection of headlamps.

Test samples shall not be removed from the test equipment or readjusted, during testing. It shall use the light source types, such as front fog lamps.

A.2 Stability test of photometric performance

A.2.1 Requirements for clean front fog lamps

A.2.1.1 The front fog lamps shall be lit for 12 hours, in the following manner.

A.2.1.1.1 For certification of a front fog lamp's lighting function, the corresponding filament is lit at the specified time [1)];

A.2.1.1.2 For more than one lighting function (such as with one or more high beams and/or one front fog lamp): the lights shall be lit according to the following cycles, until

[1)] When the front fog lamp to be tested includes a signal lamp, the latter is lit during the test, except for the DRL. If it is a turn signal, light it in a flashing pattern; the ratio of on/off time is about 1:1.

the specified time [1]:

a) The front fog lamp filament is lit for 15 min;

b) All filament bulbs are lit for 5 min.

If the manufacturer or the applicant declares that only one lighting function is to be used at the same time (for example, only the low beam is on OR only the high beam is on, OR only the front fog lamps are on [1], THEN, the test shall be carried out under this condition,, to turn on the front fog lamps for half of the time specified in A.2.1, then turn on a certain other lighting function for half of the time specified in A.2.1.

A.2.1.1.3 For front fog lamps, which have low beam and one or more lighting functions (one of which is front fog lamps)

A.2.1.1.3.1 The front fog lamps are lit, according to the following cycle, until the specified time:

a) The front fog lamp filament is lit for 15 min;

b) All filament bulbs are lit for 5 min.

A.2.1.1.3.2 If the manufacturer or the applicant declares that, the front fog lamps are only used with the low beam at the same time OR only the front fog lamps can be used [2], THEN, the test shall be carried out according to this condition, to turn on the low beam for half of the time as specified in A.2.1 [3], then turn on the front fog lamp for half of the time as specified in A.2.1, in turn. When the low beam is turned on for half the specified time, the high beam is turned on, at a cycle of 15 min off and 5 min on.

A.2.1.1.3.3 If the manufacturer or the applicant declares that, the front fog lamps can only be illuminated simultaneously with the low beam or high beam [2] at the same time, OR only the front fog lamps [2] can be used, THEN, the test shall be carried out according to this condition: turn on the low beam for one-third of the time specified in A.2.1 [2]; turn on the high beam for one-third of the time specified in 1.1; turn on the front fog lamp for one-third of the time specified in A.2.1.

A.2.1.2 Test voltage

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

a) For the replaceable filament bulb light source, that directly uses the vehicle voltage system: the test shall be measured at the corresponding 6.3 V, 13.2 V or 28.0 V, unless the manufacturer or applicant specifies that the test sample can use

[2] When the headlamp is flashing, two or more filament bulbs can be lit at the same time, which does not belong to the so-called simultaneously lit filament bulbs.

[3] When the headlamp to be tested contains a signal lamp, the latter is lit during the test. If it is a turn signal, light it in a flashing pattern; the ratio of on/off time is about 1:1.

vertical position change of the cut-off line is in accordance with the provisions of A.3).

Taking into account the error factor in the photometric testing, if the difference, between the photometric performance of the front fog lamp and the value measured before the test, is 10%, it is considered acceptable.

A.2.2 Contaminated front fog lamps

After the front fog lamp is tested in accordance with the above A.2.1, it shall be prepared in accordance with the following A.2.2.1; then it is illuminated for 1 h, in accordance with A.2.1.1; then it is inspected in accordance with A.2.1.3.

A.2.2.1 Preparation of front fog lamps

A.2.2.1.1 Test mixture

A.2.2.1.1.1 For front fog lamps with glass lens

- The composition (mass ratio) of the test mixture, which is coated on the front fog lamp lens, is as follows:

- 9 parts of silica sand, which has a particle size ranging from 0 μm to 100 μm;

- 1 part of vegetable charcoal powder, which has a particle size ranging from 0 μm to 100 μm;

- 0.2 part of NaCMC [4)];

- An appropriate amount of distilled water (the conductivity of which is less than 1 mS/m);

- The validity period of the test mixture shall not exceed 14 days.

A.2.2.1.1.2 For the front fog lamps with plastic lenses

- The composition (mass ratio) of the test mixture, which is coated on the front fog lamp lens, is as follows:

- 9 parts of silica sand, which has a particle size ranging from 0 μm to 100 μm;

- 1 part of vegetable charcoal powder, which has a particle size ranging from 0 μm to 100 μm;

- 0.2 part of NaCMC [4)];

[4)] NaCMC means sodium carboxymethyl cellulose, usually expressed as CMC. The NaCMC used in the test mixture has a degree of substitution (DS) of 0.6 ~ 0.7; its 2% solution viscosity is 200 cp ~ 300 cp, at 20 °C.

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