GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 43.040.20

CCS T 38

GB 19152-2025

Replacing GB 19152-2016, GB 5948-1998

Road illumination devices for motorcycles and mopeds

摩托车和轻便摩托车道路照明装置

Issued on: May 30, 2025 **Implemented on: January 01, 2026**

Issued by: State Administration for Market Regulation;
Standardization Administration of the People's Republic of China.

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Road illumination devices for motorcycles and mopeds

1 Scope

This document specifies the classification and type determination, technical requirements and inspection rules for road illumination devices for motorcycles and mopeds. It describes the corresponding test methods.

This document applies to road illumination devices such as low-beam headlights, high-beam headlights and adaptive high beam (ADB) used in L_1~L_5 motor vehicles.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

GB 18100, *Provisions for the installation of lighting and light-signaling devices for motorcycles and mopeds*

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

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

UN R128, *Uniform provisions concerning the approval of light emitting diode (LED) light sources for use in approved lamp units on power-driven vehicles and their trailers*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB 4785 and GB 18100 as well as the followings apply.

3.1 road illumination device

A unit or group of units used to illuminate the road and objects in the direction of the vehicle's travel to achieve one or more functions.

NOTE: Road illumination devices include low-beam headlights, high-beam headlights and adaptive high beam (ADB), as well as additional lighting units.

3.2 additional lighting unit

A component of road illumination devices, mainly providing cornering lighting for motorcycles.

NOTE: Additional lighting units usually consist of optical, mechanical and electrical components.

3.3 secondary driving-beam

A high beam that works together with the low beam to achieve the high beam lighting effect.

4 Determination of the level and type of road illumination devices

4.1 Headlight classification

4.1.1 For headlights emitting symmetrical low beam and/or high beam, the low beam level shall be BS, CS or DS, and the high beam level shall be BS, CS secondary driving-beam or DS secondary driving-beam. The use of A or B class high beam is also permitted.

4.1.2 For headlights emitting asymmetrical low beam and/or high beam, the low beam level shall be V or C, and the high beam level shall be A or B.

4.2 Determination of the same type of headlights

Devices that do not differ in the following main features are considered to be of the same type:

- Manufacturer;
- The number, type, lighting principle, and module structure of replaceable or non-replaceable light sources used;
- The number and structure of major optical components (e.g., reflectors, light distribution mirrors, light guides, etc.);
- External light distribution mirrors and coating materials;
- Class.

5 Technical requirements

5.1 General requirements

5.1.1 General provisions

The headlights shall be designed and manufactured so that they can meet the use requirements and comply with the provisions of this document under normal use conditions even if they are subject to vibration.

5.1.2 Beam adjustment device

Both low-beam and high-beam headlights shall be equipped with beam adjustment devices. When low-beam and high-beam headlights are combined to form a combination lamp, the adjustment device shall be capable of adjusting them separately, unless they cannot be adjusted separately due to a shared adjustment mechanism or an integral reflector. For symmetrical low-beam headlights, horizontal adjustment may be omitted if good horizontal aiming can be maintained after vertical adjustment.

If the above adjustments are achieved on the vehicle by other means, it is permitted not to install this device.

5.1.3 Beam switching device

For headlight systems designed to emit high beam and low beam alternately, or containing additional light sources and/or additional lighting units that produce bending lighting, any mechanical, electromechanical or other device used to switch the light beam in the headlight shall meet the following requirements:

a) Using common tools, users cannot change the shape and position of movable parts;

b) When using a mechanical device to switch between high and low beams, the vehicle shall be able to switch between low and high beams at any time. The mechanical device shall not stop in the middle or other uncertain positions;

c) For headlights emitting symmetrical low beams, except for additional light sources/additional lighting units providing cornering lighting, if a fault occurs, they shall automatically be in the low beam position, or their light distribution performance shall be such that the luminous intensity in Zone 1 is not greater than 1.2×10^3 cd, and the luminous intensity at point V-0.86D is not less than 2.4×10^3 cd by means of shutting down, reducing luminous intensity, tilting downward, and/or replacing functions;

d) For headlights emitting asymmetrical low beams, if a fault occurs, the luminous intensity above the H-H line shall meet the requirements of 5.7.3. In addition, for headlights designed to provide low beam and/or high beam lighting for bends, the

minimum luminous intensity at the 25 V point shall reach 2.5×10^3 cd.

5.1.4 Marking and reference center

5.1.4.1 Marking

5.1.4.1.1 For headlights using filament light sources, LED light sources and/or gas discharge light sources, the light source type and rated voltage shall be marked on the lamp body.

5.1.4.1.2 For headlights using LED modules, the rated voltage shall be marked on the lamp body.

5.1.4.1.3 There must be a marking on the lamp body to identify the headlight class.

5.1.4.1.4 Markings shall be as shown in Annex A.

5.1.4.2 Reference center

A reference center mark may be marked on the lens and shall comply with the requirements of Annex B.

5.2 Light color and chromaticity

The light color of headlights shall be white. Its chromaticity characteristics shall comply with the requirements of GB 4785.

5.3 Light source requirements

5.3.1 Replaceable light source

5.3.1.1 For replaceable light sources, they shall be able to be installed in the correct position even in darkness.

5.3.1.2 For filament light sources, gas discharge light sources and light-emitting diode (LED) light sources used in headlights, their types and photoelectric performance requirements shall comply with the provisions of UN R37, UN R99 and UN R128.

5.3.2 Non-replaceable light source

5.3.2.1 For light sources that can only be replaced as a whole with the headlight, filament light source or gas discharge light source design shall not be used.

5.3.2.2 For LED modules used in headlights, their design must comply with the following requirements:

a) Ensure that each LED module can only be installed in the correct position and can

6 Test methods

6.1 General requirements for test chambers and equipment

6.1.1 The test chamber shall be free of light leakage and shall not affect the transmission performance of the light beam and the accuracy of the instrument.

6.1.2 The light distribution screen shall facilitate inspection, adjustment and light beam aiming of the light cut-off line.

6.1.3 The ambient temperature of the test chamber shall be 23°C±5°C and the relative humidity shall be less than or equal to 80%.

6.1.4 It is permitted for the aiming screen to be located at a shorter distance in front of the headlight than the light receptor.

6.1.5 The illuminometer shall be a Class 1 illuminometer as specified in the national verification regulations. The accuracy of electrical instruments shall not be lower than Class 0.2.

6.1.6 The effective measuring area of the light receptor used for photometric performance shall be contained in a square with a side length of 65 mm. The surface shall be perpendicular to the measuring axis of the goniometer.

6.1.7 Photometric performance measurements shall be carried out in the spherical

coordinate test system shown in Figure 7. The photometric test distance shall be 25 m in front of the reference centre of the headlight.

6.1.8 In the diagrams and graphs of this document, the letter D indicates a point or line segment below the H-H line. The letter U indicates a point or line segment above the H-H line. The letter R indicates a point or line segment to the right of the V-V line. The letter L indicates a point or line segment to the left of the V-V line. The angular tolerance for each test point is 0.25°.

6.1.9 When using the goniophotometer method, the goniometer shall have a fixed horizontal axis of rotation and a perpendicular rotatable axis. The reference center shall coincide with the goniometer's rotation center during measurement. Other measurement methods are permitted, provided the measurement results satisfy the equivalent relationship.

6.2 Voltage during light distribution and chromaticity testing

6.2.1 Headlights equipped with filament bulb light sources, LED light sources or LED modules

6.2.1.1 For headlights equipped with filament light sources, the photometric test shall be conducted using the appropriate type and quantity of standard filament light sources with a rated voltage of 12 V. The test shall be conducted at the reference luminous flux at a reference voltage of 13.2 V as specified in UN R37. To protect the standard filament

light source, the luminous flux during measurement may differ from the reference luminous flux at a reference voltage of 13.2 V. In this case, the resulting luminous intensity value shall be corrected. The correction factor is the ratio of the reference luminous flux to the actual luminous flux. If the test results do not meet the requirements, a standard filament light source of the same type may be replaced and re-measured. For low beams using H9 or H9B filament light sources, the reference luminous flux at a reference voltage of 12.2 V or 13.2 V as specified in the relevant data sheets in UN R37 may be selected for photometric performance measurement.

6.2.1.2 When using a replaceable LED light source, measurements shall be made using a standard light source of the corresponding type specified in UN R128, applying a voltage of 13.2 V. Alternatively, the voltage specified by the manufacturer shall be used, with a tolerance of ±0.1 V. The resulting luminous intensity value shall be corrected. The correction factor is the ratio of the target luminous flux to the actual luminous flux value at the applied voltage.

6.2.1.3 When using non-replaceable LED modules, unless otherwise specified, the test voltage is 13.2 V. If driven by an electric light source controller, measurements shall be conducted at the voltage specified by the manufacturer. It is also permitted to use a power supply driver with specified parameters (period, frequency, waveform, peak value) in place of the electric light source controller for measurement.

6.2.1.4 For non-replaceable light sources operating directly from the power supply system of a motorcycle or moped, unless otherwise specified, all measurements shall be made at 13.2 V, or at the voltage specified by the manufacturer, with a tolerance of ±0.1 V. It is also permitted to require the manufacturer to provide a dedicated power supply and to apply the voltage specified by the manufacturer for measurement.

6.2.1.5 When the electric light source controller is part of the luminaire, the voltage specified by the manufacturer shall be applied to the luminaire input terminal.

6.2.1.6 When the electric light source controller is not part of the luminaire, the voltage specified by the manufacturer shall be applied to the input terminal of the electric light source controller. The manufacturer shall provide a dedicated electric light source controller for powering the light source and functions.

6.2.1.7 For the use of other special light sources, the test voltage (or current) specified by the manufacturer is permitted. If necessary, the manufacturer shall provide a dedicated power supply.

6.2.1.8 For replaceable light sources, if multiple light sources are available, testing using the product light source is permitted. The luminous flux of each light source must not deviate by more than 5% from the average luminous flux of all light sources. The test results must be corrected by the ratio of the average luminous flux to the target luminous flux. It is also permitted to test each position sequentially using a standard light source and sum the results for determination.

6.2.2 Headlights equipped with gas discharge light sources

6.2.2.1 The photometric test shall be carried out using standard gas discharge light sources of appropriate type and quantity with a rated voltage of 12 V and under the target luminous flux specified in UN R99.

6.2.2.2 To protect the standard gas discharge light source, the luminous flux during measurement may differ from the target luminous flux specified in UN R99. In this case, the resulting luminous intensity value shall be corrected. The correction factor is the ratio of the target luminous flux to the actual luminous flux under the applied voltage. If the test results do not meet the requirements, replace the standard gas discharge light source of the same type and re-measure.

6.2.2.3 Where the ballast is fully or partially integrated into the headlight, the amendments specified in 6.2.2.2 do not apply. The reference voltage required by UN R99 (13.2 V±0.1 V or 13.5 V±0.1 V) must be input across the ballast, or the manufacturer has other special provisions.

6.2.2.4 For headlights that have not been lit for 1 hour or longer, after 4 s of lighting, the HV point of headlights with only high beam function must reach at least 25% of the standard value. The 50 V point of the low beam function must reach at least 25% of the standard value. The power supply must be able to quickly increase to a high current pulse.

6.2.2.5 The light distribution test shall be carried out only after the headlights are stably lit.

6.3 Aiming during lighting tests

6.3.1 Low-beam aiming

6.3.1.1 Horizontal: For symmetrical low beams, the beam pattern shall be as symmetrical as possible about the V-V line. When high beam and low beam cannot be adjusted independently, the brightest area of the high beam can be aligned with the V-V line as a reference. For asymmetrical low beams, the angle of the cut-off line shall be on the V-V line.

6.3.1.2 Vertical direction: The horizontal part of the cut-off line shall be located 0.57° below the H-H line.

6.3.1.3 The cut-off line shall comply with the provisions of Annex F or Annex G. When visual collimation is problematic or the position is unclear, the mechanical method of F.4 or G.3 shall be used for collimation. The sharpness and linearity of the cut-off line shall be checked.

6.3.1.4 After aiming as described above, if the low beam does not meet the light distribution requirements, adjustments may be made within the range specified in F.3.2

or G.2.5. When aiming, it is permitted to partially obscure the light distribution mirror to ensure that the cut-off line is clearly visible.

6.3.2 High-beam aiming

For separately adjustable high beams, high beam aiming is required. The center of the maximum luminous intensity area of the high beam is located at the HV point. For high beams that cannot be adjusted separately, the low beam shall be used as the reference for aiming, that is, after aiming with the low beam, no further adjustments shall be made when measuring the high beam.

6.4 Headlights combined or mixed with front position lights

If the low beam of the headlights (excluding Class BS) is combined or mixed with the front position lights, during the low beam distribution test, if requested by the applicant, it is allowed to simultaneously light up the front position lights.

6.5 Adjustable reflector headlights

6.5.1 Implement the position of each headlight on the goniometer relative to the connection line between the center of the light source and the HV point on the light distribution screen. Afterwards, move the reflector to the initial positioning position and aim according to the provisions of 6.3.

6.5.2 Conduct a photometric performance test after aiming to determine whether the low beam meets the requirements of 5.7.2 or 5.7.3, and whether the high beam meets the requirements of 5.7.4.

6.5.3 Conduct additional tests according to the following regulations:

Move the mirror vertically by ± 2° (or, if the adjustment range of the mirror is less than 2° from its initial position, move it to the maximum adjustment position). Afterwards, use the test goniometer to re aim in the opposite direction. At this point, the headlights emitting symmetrical low beams are used to determine whether the luminous intensity values of the low beam HV point and V-0.86D point, as well as the high beam I_{max} and HV points, comply with the provisions of this document. The headlights emitting asymmetric low beams are used to determine whether the low beam B50L and 75R, as well as the high beam I_{max} and HV point luminous intensity values comply with the provisions of this document.

6.5.4 If the manufacturer does not specify the position of the reflector, the test shall be conducted according to the provisions of 6.5.1 and 6.5.2 at the average adjustment position of the reflector. Afterwards, move the mirror to the maximum adjustment position. Conduct additional tests according to the provisions of 6.5.3.

6.5.5 If the manufacturer specifies that the reflector has multiple usage positions, the

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