NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 45321-2025

Measuring methods for the electrical and photometric parameters of filament light sources for motor vehicles

机动车用灯丝光源光电参数测量方法

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1 Scope

GB/T 45321-2025 specifies how the electrical and photometric parameters of filament light sources for motor vehicles are measured. Filament lamps are still fitted in enormous numbers to vehicles in and from China, and their type approval turns on numbers, luminous flux, luminous intensity in stated directions, the position and dimensions of the filament relative to the reference plane, the power at the test voltage, which are only comparable if the measurement conditions are fixed to a degree most people underestimate: the ageing

of the lamp before measurement, the supply stability, the burning position, the stabilisation time and the temperature all move the result. The standard fixes them and describes the apparatus, the measurement procedures and the calculation and expression of results for each parameter, together with the measurement uncertainty. For a lamp maker, a headlamp manufacturer or a photometric laboratory working to Chinese requirements, this is the method behind the type approval numbers.

This document specifies the measurement principles, instruments and equipment, measurement conditions, measurement steps, data processing, and test reports of the electric and photometric parameters, total flux, and chromaticity coordinates of filament light sources for power-driven vehicles. This document is applicable to filament light sources used for power-driven vehicle road lighting and light signal devices and systems (hereinafter referred to as the "light sources"). Filament light sources used for other road vehicles may take this as a reference.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 2900.65 Electrotechnical Terminology - Lighting

GB/T 26178 The Measurement of Luminous Flux

GB/T 43081-2023 Lamps and Light Sources for Road Vehicles - Dimensional, Electrical and Luminous Requirements JJG 247-2008 Standard Incandescent Lamp for Total Luminous Flux

3 Terms and Definitions

The terms and definitions defined in GB/T 2900.65 and GB/T 26178, and the following are applicable to this document.

3.1 filament light sources A type of light sources, in which, the only element that generates and emits light when powered is one or multiple filaments.

3.2 test voltage

b) The grade index is not lower than 0.01% and the rated power is not lower than 1 W.

5.2 Total Flux

5.2.1 Integrating sphere The integrating sphere shall comply with the following

requirements.

a) Diameter of the integrating sphere. while taking into account the photoelectric responsivity, the size of the integrating sphere shall be large enough to avoid relatively large errors caused by uneven distribution of the integrating sphere response due to the accessories inside the integrating sphere and the light source under test. The diameter of the integrating sphere is not less than

b) Accessories and coating of the integrating sphere. all accessories inside the sphere will affect the measurement results. Accessories (such as screens, wires and light source brackets, etc.) shall be as small and as few as possible. The inside of the sphere and the surface of its accessories shall be coated with a white coating, which has good chemical stability and neutral spectral diffuse reflection characteristics, and a reflectivity of not less than 85%.

c) Layout of light source and screen. usually the center of the light source filament is placed at the center of the sphere, and the center of the screen is on the line connecting the center of the sphere and the center of the detector window, at a distance of 2/3 of the radius of the sphere from the center of the sphere, and the surface of the screen is perpendicular to the line. The function of the screen is to prevent the light of the light source from directly irradiating the detector. On this premise, the screen shall be as small as possible.

d) Auxiliary light source. the integrating sphere is equipped with an auxiliary light source to perform absorption measurements. The auxiliary light source emits radiation that covers the entire visible light wavelength range. The auxiliary light source also has a screen to prevent its direct light from irradiating the detector or the light source under test.

5.2.2 Photometer The photometer shall comply with the following requirements.

a) The detector of the photometer has stable performance, high sensitivity, good linearity and fast response. The spectral sensitivity of the combination of the correction light filter and the integrating sphere conforms to the spectral luminous efficiency function V(lambda) of the CIE photopic standard photometric observer;

b) The grade of the photometer is not lower than Grade 1, and the number of significant digits read is not less than 4.

5.2.3 Spectroradiometer The spectroradiometer shall comply with the following requirements.

a) The spectral wavelength range covers at least 380 nm ~ 780 nm;

b) The wavelength error is within

0.2 nm;

c) The non-linear error of the instrument is within 1% (A light source);

d) The bandwidth (full width at half maximum) and scanning interval are not greater than 5 nm;

5.3 Chromaticity Coordinates

5.3.1 Spectroradiometer The spectroradiometer shall comply with the requirements of 5.2.3.

5.3.2 Standard lamp Standard lamps shall comply with the requirements of 5.2.4.

5.4 Instrument and Equipment Traceability The standard lamps and instruments shall be verified or calibrated by a metrology institution and used within their validity period.

6 Measurement Conditions

6.1 Working Environment The measurement of light sources shall be carried out in an environment with a temperature of 23 C 5 C and a humidity of less than 80%. Temperature control equipment (such as. air conditioners, heaters, etc.) shall not be placed in a location that allows airflow and radiant heat to be directly transmitted to the thermometer or photometer.

6.2 Ageing Before measurement, use the test voltage to continuously ignite for 1 h to age the light source. For dual-filament light sources, each filament shall be respectively aged. For light sources for which multiple test voltages are specified, the highest test voltage value shall be used. During ageing, the light source reference axis and the filament are in a horizontal state. For a dual-filament light source equipped with a light distribution screen, the light distribution screen shall be located below the low-beam filament. If the light source has an axial filament, the longer filament support shall be located above the filament.

6.3 Ignition Location and Direction When measuring the total flux, the light source shall be located at the center of the integrating sphere, and its direction is.

a) The reference axis and the filament are in a horizontal state, and the filament axis is parallel to the screen;

b) For light sources with transverse filaments (the filament axis is perpendicular to the reference axis), the top of the glass bulb faces the screen;

c) For light sources with axial filaments (the filament axis is parallel to the reference axis), the longer filament support shall be located above the filament;

d) For light sources with a light distribution screen and emitting asymmetric light, the light distribution screen shall be located below the low-beam filament and the side of the light distribution screen edge with an inclined angle faces the screen. Examples of the ignition directions of different types of light sources within the sphere are provided in Appendix A.

6.4 Stabilization Stabilization means that the parameters of the light source do not significantly change within a certain period of time. During stabilization and measurement,