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Retro-reflective devices and markings for motor vehicles

机动车回复反射装置

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1 Scope

China's mandatory national standard for retro-reflective devices and markings on motor vehicles. Retro-reflection is the property of returning light towards its source rather than scattering it, which is why a reflector lights up for the driver whose headlamps strike it and for nobody else - and it works with no power, no wiring and no maintenance, which is why it remains the last line of conspicuity on every vehicle. The standard covers both the discrete reflex reflectors and the retro-reflective tape applied in strips along the sides and rear of large vehicles. The tape is the part that has saved most lives: an unlit trailer crossing a road at night is invisible to an approaching driver until the headlamps reach it, and outlining its body in retro-reflective material turns it into a recognisable shape at a distance. The

standard specifies the photometric and colorimetric requirements, the durability, and the test methods.

This document stipulates the requirements, test methods, judgment of the same type, inspection rules, equipment and installation requirements for the retro-reflective devices and markings for motor vehicles. This document is applicable to the design, production, inspection and installation of retro-reflectors, retro-reflective markings of carriage, rear marking plate for vehicles and their trailers, and warning triangles for motor vehicles installed, pasted or equipped on motor vehicles.

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 2423.1 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests A: Cold

GB/T 2423.2 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Tests B: Dry Heat

GB/T 2423.17 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Ka: Salt Mist

GB/T 3681.2-2021 Plastics - Methods of Exposure to Solar Radiation - Part 2: Direct Weathering and Exposure behind Window Glass

GB/T 3978-2008 Standard Illuminants and Geometric Conditions

GB/T 3979 Methods for the Measurement of Object Color

GB 4785 Prescription for Installation of the External Lighting and Light-signaling Devices for Motor Vehicles and Their Trailers

GB/T 8427 Textiles - Tests for Color Fastness - Color Fastness to Artificial Light: Xenon Arc Fading Lamp Test

GB/T 10485 Road Vehicles - Lighting and Light-signaling Devices - Environmental Endurance

GB/T 16422.2 Plastics - Methods of Exposure to Laboratory Light Sources - Part 2: Xenon-arc Lamps After carrying out the solvent resistance test in accordance with the method specified in 5.7, there shall be no obvious change or deformation in the retro-reflective area of the retro-reflective device, and there shall be no adhesion between

the triangles and their protective devices. The nighttime color of the retro-reflector re-tested in accordance with the method specified in

5.4.1 shall comply with the requirements of 4.1.4.1; the daytime color of other retro-reflective devices re-tested in accordance with the method specified in

5.4.2 shall comply with the requirements of 4.1.4.2. Re-test the luminosity properties in accordance with the method specified in 5.3.5, and the coefficient of luminous intensity of the triangles shall not be less than 80% of the value specified in Table 4. Other retro-reflective devices shall comply with the requirements of 4.1.3.

4.1.7 Temperature resistance After carrying out the temperature resistance performance test in accordance with the method specified in 5.8, the retro-reflective area of the retro-reflector shall have no obvious cracks, deformation and other defects; the retro-reflective sheeting and fluorescent materials shall have no wrinkles, bubbles, peeling and other defects; the protective devices for the triangles shall be easy to open and not stick or tear. After the high-temperature resistance test, the retro-reflector shall be tested for luminosity properties in accordance with the method specified in 5.3.1, and shall comply with the requirements of 4.1.3; other retro-reflective devices shall be re-tested for luminosity properties in accordance with the method specified in 5.3.5; the coefficient of luminous intensity of the triangles shall not be less than 80% of the value specified in Table 4; other retro-reflective devices shall comply with the requirements of 4.1.3.

4.2.1 Retro-reflector

4.2.1.1 Structure The structure of the retro-reflector shall comply with the following requirements:

- a) The retro-reflector has a stable structure and its constituent parts are not easy to disassemble;
- b) The retro-reflecting optical units of the retro-reflector cannot be replaced, but for Class III A or Class III B retro-reflectors whose retro-reflective area is composed of independent retro-reflecting optical units, each independent retro-reflecting optical unit is allowed to be replaced with a Class I A retro-reflector;
- c) The inner surface of the retro-reflecting optical unit cannot be in direct contact;
- d) When it is composed of an optical unit and a color filter, the required color of the color filter shall not be obtained by painting.

4.2.1.2 Wear resistance of mirror back The mirror back of the retro-reflector is open or detachable, and the mirror back test of the retro-reflecting optical unit shall be carried out in accordance with the method specified in 5.11.2. After the test, the luminosity properties re-tested in accordance with the method specified in

5.3.5 shall not be lower than 60% of those before the test.

4.2.2 Material of retro-reflective marking

4.2.2.1 Retro-reflective sheeting for the markings of carriage

4.2.2.1.1 Markings The retro-reflective area of the white unit of Class A retro-reflective marking shall be marked with the manufacturer's logo and material grade, etc. by printing or molding; the retro-reflective area of Class B retro-reflective marking shall be marked with the manufacturer's logo, etc. by printing or molding; the distance between adjacent markings shall be no more than 500 mm. The applied markings shall be easily identifiable, and printed markings shall be on the inner surface of the facing.

4.2.2.1.2 Washdown resistance After carrying out the washdown resistance test in accordance with the method specified in 5.11.3, the retro-reflective sheeting for the markings of carriage shall not manifest damage, color falling-off, wrinkles, as well as edge warps and peeling off, etc.

4.2.2.1.3 Bending resistance After carrying out the bending resistance test in accordance with the method specified in 5.11.4, the retro-reflective sheeting for the markings of carriage shall not manifest any traces of cracks, peeling or interlayer detachment. force shall not be greater than 40 mm, and the displacement after the external force is removed shall not be greater than 5 mm.

4.2.3.3.2 Rear marking plate for heavy vehicles and long vehicles When conducting the robustness test in accordance with the method specified in 5.11.6.2, the displacement of the rear marking plate for heavy vehicles and long vehicles in the loaded state shall not be greater than 1/20 of the distance between two supports, and the displacement after the load is removed shall not be greater than 1/5 of the loaded state.

4.2.4 Triangles

4.2.4.1 Composition and structure The triangles shall be composed of retro-reflective area, bracket and protective device. Each constituent part shall comply with the following provisions:

- a) Each constituent part is not easy to disassemble;
- b) The fluorescent area and the reflective area of the retro-reflective area are concentric equilateral triangles, and the discontinuous area of the retro-reflecting optical unit is red;
- c) When unfolded, the bracket can support the retro-reflective area at a certain height from the ground, the distance between the support surface and the bottom edge of the triangles is not greater than 300 mm, and the included angle between the axis of reference of the retro-reflective area and the ground plane is not greater than 5°;
- d) When folded and placed in the protective device, the retro-reflective area, bracket and movable components cannot be disassembled;
- e) The protective device can prevent the triangles from being corroded.

4.2.4.2 Shape visibility When carrying out the shape visibility test in accordance with the method specified in 5.11.7, the shape of the triangles shall be clearly identifiable.