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Retro-reflective markings for trucks and trailers

货车及挂车 车身反光标识

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Retro-reflective markings for trucks and trailers

1 Scope

This Standard specifies the requirements (including material requirements and attaching requirements), test methods, inspection rules, packaging, marking and storage of retro-reflective markings of carriage.

This Standard applies to trucks and trailers and is not applicable to vehicles that transport explosives and highly toxic chemicals on the road.

2 Normative references

The following documents contain the provisions which, through reference in this Standard, become the provisions of this Standard. For dated references, their subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 2423.17 Environmental testing for electric and electronic products - Part 2: Test method - Test Ka: Salt mist (GB/T 2423.17-2008, IEC 60068-2-11:1981, Basic environmental testing procedures - Part 2: Tests - Test Ka: Salt mist, IDT)

GB/T 3681 Plastics - Test method of exposure to weathering (GB/T 3681-2000, neq ISO 877:1994)

GB/T 3730.1 Motor vehicles and trailers - Types - Terms and definitions

GB/T 3978 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-signalling devices for motor vehicles and their trailers

GB 11564 Retro-reflector device for motor vehicles

GB/T 18833-2002 Retro-reflective sheeting for road traffic signs

3 Terms and definitions

For the purpose of this Standard, the terms and definitions defined in GB/T 3730.1, GB 11564 and GB/T 18833-2002 and the following apply.

3.1

retro-reflective markings of carriage

A combination of retro-reflective materials that are attached or affixed to the surface of carriage to enhance the recognizability of the vehicle.

3.2

luminance factor

A ratio of the luminance of the sample to the luminance of the ideal diffuser under the same illumination and viewing conditions.

4 Requirements

4.1 Material requirements

4.1.1 Classification

According to different materials of retro-reflective markings of carriage, it is divided into retro-reflector device type retro-reflective markings of carriage (hereinafter referred to as retro-reflector device type) and retro-reflective sheeting type retro-reflective markings of carriage (hereinafter referred to as retro-reflective sheeting type).

According to different coefficients of retroreflection, retro-reflective sheeting is classified into Class I and Class II.

4.1.2 Retro-reflector device type

Retro-reflector device consists of white and red units, and all the performances shall meet the requirements of Category IV A in GB 11564.

4.1.3 Retro-reflective sheeting type

4.1.3.1 Shape and appearance requirements

Retro-reflective sheeting consists of strips of white and red units.

The white unit of retro-reflective sheeting shall be printed, watermarked, laser-

Arbitrarily select 5 red units and 5 white units, wherein the coefficient of retroreflection *R*' of any one unit of the same color shall not be greater than 120 % of the average value of the coefficient of retroreflection of all the units of the same color, and shall not be less than 80 % of the average value of the coefficient of retroreflection of all the units.

4.1.3.4.3 Retroreflection in wet state

Under the condition that the observation angle is 12' and the entrance angle is -4°, the coefficient of retroreflection *R*' of retro-reflective sheeting in wet state shall not be less than 80 % of the values specified in Table 2.

4.1.3.5 Weather resistance

After the natural exposure test or the artificial climate accelerated aging test, the surface of retro-reflective sheeting shall have no obvious cracks, nicks, dents, bubbles, wrinkles, erosion, peeling, chalking or deformation, no shrinkage or expansion of more than 1 mm from either side, and no degumming from the edge of the bottom plate. Under the condition where the observation angle is 12' and the entrance angle is -4°, the coefficient of retroreflection *R*' shall not be less than 70 % of the corresponding value in Table 2, and the chromaticity coordinates shall still be within the range specified in Table 1.

When the results of the natural exposure test conflict with the results of the artificial climate accelerated aging test, the results of the natural exposure test shall prevail.

4.1.3.6 Adhesion performance

After the adhesion test, the 180° peel strength of retro-reflective sheeting backing shall not be less than 25 N.

4.1.3.7 Salt mist corrosion resistance

After the salt mist test, the retro-reflective sheeting shall not have signs of softening, bubbles, wrinkles, dissolution, discoloration or erosion. Under the condition where the observation angle is 12' and the entrance angle is -4°, the coefficient of retroreflection *R*' shall not be less than 70 % of the corresponding value in Table 2, and the 180° peel strength of the backing measured according to the method specified in 5.2.7 shall not be less than 20 N.

4.1.3.8 Solvent resistance

After the solvent resistance test, the surface of the retro-reflective sheeting shall not have signs of softening, wrinkles, bubbles, discoloration, cracking or surface edge dissolution. Under the condition where the observation angle is 12' and the entrance angle is -4°, the coefficient of retroreflection *R*' shall not

device for motor vehicles installed as required by GB 4785.

4.2.1.4 Different types or classes of retro-reflective markings of carriage may be installed or attached to the rear and sides of the carriage, but the rear retro-reflective markings of carriage and side retro-reflective markings of carriage shall be selected from the same type or class of retro-reflective markings of carriage.

4.2.1.5 When installing or attaching, the retro-reflective markings on the rear and side of carriage shall start with a white unit and end with a white unit.

4.2.1.6 After the vehicle is installed or attached with retro-reflective markings of carriage, it shall not affect the performance of other lighting and signalling devices of the vehicle.

4.2.1.7 After the vehicle is installed or attached with retro-reflective markings of carriage, it shall not drill or slot on the retro-reflective markings of carriage.

4.2.2 Installation and attaching requirements for rear retro-reflective markings of carriage

4.2.2.1 Basic requirements

Under the conditions allowed by the structure, the rear retro-reflective markings of carriage shall be vertical symmetrically distributed and reflect the width and contour of the rear of the vehicle as much as possible. The horizontal installation or attaching total length (excluding the spacing) shall not be less than 80 % of the width of the rear of the vehicle. After meeting the above requirements, the van truck shall use retro-reflective markings of carriage to outline the rear of the carriage. When the attaching area of other vehicles does not meet the specified requirements, the width of the rear of the vehicle shall be reflected first, and then the method of contouring shall be used to compensate.

The height of the retro-reflective markings of carriage from the ground is at least 380 mm.

4.2.2.2 Retro-reflective sheeting type

When Class I retro-reflective sheeting is used, the sum of its area and the area of rear retro-reflector device shall not be less than 0.1 m^2; when Class II retro-reflective sheeting is used, the sum of its area and the area of rear retro-reflector device shall not be less than 0.2 m^2.

The attaching is allowed to be interrupted, but the length of each continuous section shall not be less than 300 mm, and shall contain at least respectively one red and white unit of retro-reflective markings of carriage. The red and

side of the carriage to be blocked.

4.2.4 Supplementary requirements for installation and attaching of special purpose vehicles

For some special purpose vehicles, there is no continuous plane except for the carriage structure outside the cab. When the requirements of 4.2.2 are not met, the total length of the retro-reflective markings of carriage installed or attached at the rear of the vehicle may be less than 80 % of the width of the rear of the vehicle, but it shall be able to reflect the width of the rear of the vehicle; when the requirements of 4.2.3 are not met, the total length of the retro-reflective markings of carriage may be less than 50 % of the length of the vehicle, but it shall not less than 30 % of the length of the vehicle, and the opening interval is not limited.

The retro-reflective markings of carriage of such vehicles shall be attached to the guards or the fixing members of the carriage as much as possible.

4.2.5 Other installation and attaching requirements

As far as possible, select a flat carriage surface to attach the retro-reflective sheeting. Before attaching, clean the attaching position.

The retro-reflective sheeting shall be firmly and reliably attached to the surface of the carriage. It shall be coordinated with the appearance of the vehicle after attaching. When the structure allows, it shall be attached horizontally or vertically. When the retro-reflective sheeting cannot be directly attached to the surface of the carriage, the retro-reflective sheeting shall be attached first to the strip lining with certain rigidity, strength and anti-aging, and then firmly adhered or riveted to the carriage. The rivet holes for fixing strip lining must be waterproof and dustproof.

After attaching, the edge of the retro-reflective sheeting shall be waterproof and dustproof.

4.2.6 Attaching examples

Annex A gives the retro-reflective sheeting attaching styles of some typical vehicles. The installation or attaching of retro-reflector device may also refer to Annex A.

5 Test methods

5.1 Retro-reflector device type

The performance test of retro-reflector device is carried out in accordance with

18833-2002, where:

a) The light source adopts the standard A light source specified in GB/T 3978, and the vertical illuminance unevenness of the entire illuminated area of the sample shall not exceed 5 %.

b) The photodetector is an illuminometer that is corrected by the spectral optical efficiency curve.

c) The photodetector shall be able to move to ensure that the viewing angle varies within a certain range.

5.2.5.2 Test method

MEASURE the coefficient of retroreflection *R*' of retro-reflective sheeting in the 0° and 90° directions according to the illumination observation geometric conditions specified in Table 1 and the method specified in 7.4.1 of GB/T 18833-2002. Uniformly select at least 5 measurement areas or measurement points for each color unit, the average value of which is the coefficient of retroreflection *R*' in the 0° or 90° direction of the color unit.

5.2.5.3 Retroreflection uniformity test

According to the above-mentioned method, under the condition where the observation angle is 12' and the entrance angle is -4°, the coefficient of retroreflection *R*' of five red and white units is tested, and the average value of the coefficients of retroreflection of all the units of the same color is calculated.

5.2.5.4 Retroreflective test in wet state

Test according to the apparatus and method specified in 7.4.2 of GB/T 18833-2002.

5.2.6 Weather resistance test

5.2.6.1 Natural exposure test

According to GB/T 3681, install two test samples of red and white units on the exposure frame at least 1 m above the ground. The test samples face the south and the angle with the horizontal plane is 45°. The surface of the test samples shall not be blocked by other objects, and shall not accumulate water. The choice of exposure location is as close as possible to the actual use environment or to the most severe place of a certain climate type.

The natural exposure test is for 2 years. After the test samples begin to be exposed to the sun, carry out the surface inspection every month, and once every three months after one year, until the end. After the natural exposure test

contact with the outer surface of the round bar, RELEASE the sample, CHECK and RECORD the test results.

5.2.13 Water immersion test

IMMERSE respectively one test sample of red and white unit in water at 50 °C ± 5 °C for 24 h. The highest point of the upper surface of the retro-reflective surface shall be 20 mm below the water surface. Reverse the test samples by 180°, IMMERSE them for 24 h, TAKE OUT, CHECK and RECORD the test results.

5.2.14 Washing resistance test

5.2.14.1 Test sample

A 50 mm × 1000 mm red and white retro-reflective sheeting is attached to the middle of the paint surface of the steel plate. The dimension of the steel plate is 1200 mm × 500 mm × 2 mm, and the paint film thickness of the steel plate is 45 μm ~ 55 μm. After being placed in the environment specified in 5.2.1 for 24 h, carry out the test.

5.2.14.2 Test method

Wash the sample from any angle with a high-pressure water gun. The spray pressure of the water gun is 5 MPa, the spray distance is 1 m, and the spray duration is 10 min. The sample is checked after the test.

6 Inspection rules

6.1 Inspection classification

The inspection of retro-reflective markings of carriage is divided into type inspection and production consistency inspection.

The type inspection and production consistency inspection of retro-reflector device shall be carried out in accordance with the provisions of GB 11564. The type inspection and production consistency inspection of retro-reflective sheeting shall be carried out as follows.

6.2 Type inspection

6.2.1 Conditions for type inspection

Type inspection is carried out in the following cases:

- Trial production of the new design of the product;

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