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Helmets for Motorcycle and Electric Bicycle Users

摩托车、电动自行车乘员头盔

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Helmets for Motorcycle and Electric Bicycle Users

1 Scope

This document specifies the product classification, requirements, inspection rules and marking, identification, product instruction manual, packaging, transportation and storage of helmets for motorcycle and electric bicycle users, and describes the test methods.

This document is applicable to the helmets worn by drivers and passengers of motorcycles and electric bicycles.

This document does not apply to the helmets worn by bikers, skateboarders and roller skating athletes, nor does it apply to occupational safety helmets.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in this 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 2410-2008 Determination of the Luminous Transmittance and Haze of Transparent Plastics

GB/T 18833 Retroreflective Sheeting for Traffic Control

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Helmet for Motorcycle and Electric Bicycle Users

Helmet for motorcycle and electric bicycle users refers to a device of reducing head injuries of motorcycle and electric bicycle occupants in accidents.

3.2 Shell

Shell refers to the outer structure of the helmet for motorcycle and electric bicycle users, which presents the basic shape of the helmet.

3.3 Protective Padding

Protective padding refers to a form-fitting padding that absorbs collision energy.

3.4 Comfort Padding

Comfort padding refers to a padding that guarantees comfortable fit on the head.

3.5 Retention System

Retention system refers to a component that ensures the helmet for motorcycle and electric bicycle users is securely worn on the head.

3.6 Goggles

Goggles refers to a component for eye and face protection that covers the eyes and face without affecting the observation.

3.7 Luminous Transmittance

Luminous transmittance refers to the ratio of the luminous flux of visible light through the goggles to the incident luminous flux.

3.8 Haze

Haze refers to the ratio of the scattered luminous flux that deviates from the direction of the incident light through the goggles to the transmitted luminous flux.

NOTE: it is expressed as a percentage, and only the scattered luminous flux deviated from the incident light direction by more than 2.5° is used for the calculation of the haze.

[source: GB/T 2410-2008, 3.1, modified]

3.9 Testing Headform

Testing headform refers to a head model that simulates the geometric shape and mechanical properties of human head during the inspection of the helmet for motorcycle and electric bicycle users.

3.10 Basic Plane

Basic plane refers to a plane passing through the centers of the left and right external ear holes and the infraorbital rim of the testing headform.

NOTE: see O-O′ plane in Figure 1.

x---the vertical distance from the basic plane to the reference plane;

y---the vertical distance from the reference plane to the top of the testing headform.

A-A′ is the lower edge plane of the protect section of Type A3 and Type B3 helmets, and also an auxiliary plane for other types of helmets to set the protect section.

Figure 2 -- Reference Plane

3.12 Vertical Median Plane

Vertical median plane refers to a longitudinal plane passing through the apex of the testing headform, perpendicular to the basic plane and dividing the testing headform into two symmetrical parts.

3.13 Protect Section

Protect section refers to the range of head protected by the helmet for motorcycle and electric bicycle users.

3.14 Testing Section

Testing section refers to an inspection area for the collision energy absorption performance and penetration resistance performance of the helmet for motorcycle and electric bicycle users.

4 Product Classification

4.1 Type

4.1.1 In accordance with the applicable objects, the helmets for motorcycle and electric bicycle users (hereinafter referred to as “helmets”) are divided into Type A and Type B. Type A is helmets for motorcycle riders, which is applicable to motorcycle riders and electric bicycle riders; Type B is helmets for electric bicycle riders, which is merely applicable to electric bicycle riders.

4.1.2 In accordance with the shape, the helmets are divided into Shape 1, Shape 2 and Shape 3. Shape 1 is full-helmet, Shape 2 is 3/4 half-helmet, and Shape 3 is 1/2 half-helmet, as it is shown in Figure 3. The type, shape and applicable objects of the helmets shall comply with the stipulations of Table 1.

5.1.2.2 The outer surface shall be a streamlined curved surface design and comply with the following requirements:

a) The surface shall be solid and smooth, with blunt edges;

b) In addition to the device for fixing the goggles, when there is a hard attached protrusion exceeding 5 mm, it shall pass the shear force test of the surface convex structure;

c) The helmet rivets shall be radial, and the protruding part shall not exceed 2 mm from the outer surface of the helmet;

d) The outer surface shall have reflective materials with a total area of not less than 3,200 mm^2 and a retro-reflection coefficient of not less than 70 cd/(lx • m^2), which are visible in the left, right and rear directions, and the vertical projected area of the reflective materials visible in each direction shall be not less than 640 mm^2.

5.1.2.3 The inner surface shall comply with the following requirements:

a) There shall be no sharp objects with a length exceeding 2 mm and a radius less than 1 mm;

b) When there are protrusions with a height exceeding 2 mm, the protrusions shall be covered with a protective padding;

c) There shall be no sharp edges.

5.1.3 Protective padding

The protective padding shall use materials with buffer performance, collision energy absorption performance, and non-toxic and harmless to the human body, and comply with the following requirements:

a) The shape, specifications and size shall be suitable for the head circumference, and not easy to shift after wearing;

b) The testing section specified in 5.2.1 shall be covered.

5.1.4 Comfort padding

The comfort padding shall use durable materials that feel comfortable, breathable, non-toxic and harmless to the skin, and comply with the following requirements:

a) The wearing comfort of the helmet shall be ensured;

b) For those configured with an adjustment device to adapt to the size of the head circumference, adopt the maximum adjustable head circumference size to determine the specifications of the helmet.

5.1.5 Retention system

The parts of the retention system shall be permanently attached to the retention system or the helmet, and comply with the following requirements:

a) If the retention system includes a chin strap, the width of the strap shall be not less than 20 mm;

b) If the retention system has fastening devices, such as: double D rings and sliding rods, when adjusting the retention system, a sufficient adjustment margin shall be reserved;

c) If quick-release devices, for example, wearing buckles, are used, the method of opening shall be simple and easy, and shall be able to prevent possible mis-operations. The push rod, button or other parts used for the opening mechanism shall be red or orange, and can only be opened when consciously operated;

d) If the locking device of the fixing strap is designed to be opened through the mode of applying pressure to a certain part, then, when tested in accordance with the method of 6.2.2, the locking device cannot be opened;

e) After all the locking devices are tested in accordance with 6.10, without using any tools, they shall be opened within 30 s.

5.1.6 Goggles

The goggles shall be made of materials that comply with the light transmission performance and impact strength performance, and satisfy the following requirements:

a) Open the lens to the highest position, in accordance with Figure 4, the angle between the MN line at the opening position of the goggles and the horizontal line shall be not less than 5°;

b) During the opening and closing of the goggles, the positioning function under the action of non-artificial external force can be maintained.

penetrate the helmet and come into contact with the testing headform.

6 Test Methods

6.1 Environmental Conditions of the Laboratory

Temperature: 21 °C ± 5 °C; relative humidity: 40% ~ 80%.

6.2 Specifications, Structure and Test of Protect Section

6.2.1 Test tools

Length measuring instrument with an accuracy of not greater than 0.1 mm and a measuring range of 0 mm ~ 150 mm; angle measuring instrument with an accuracy of not greater than 0.1° and a measuring range of 0° ~ 180°; spirit level and the testing headform specified in Table 2.

6.2.2 Test procedures

Visually inspect the appearance and structural composition of the helmet.

Use the length measuring instrument to detect the protrusions on the inner and outer surfaces of the shell.

Take the reflective material with the same texture as that applied on the surface of the shell, through the mode of collage or cutting, make 3 specimens with a size of not less than 50 mm × 50 mm. In accordance with the method of GB/T 18833, under the conditions of an observation angle of 0.2° and an incident angle of –4°, test its retro-reflection coefficient; take the arithmetic mean of 3 test results as the final test result. In accordance with the vertical projection diagram of the reflective material in the left, right and rear directions of the helmet provided by the manufacturer, measure and calculate the vertical projected area of the reflective material in each direction.

Under the condition that 150 N ± 5 N tension is applied to tighten the strap, use a length measuring instrument to measure the width of the chin strap.

For the strap locking device that is opened by pressing, use a hard ball with a diameter of 100 mm ± 5 mm and a force of 100 N ± 5 N to press the part, check whether the locking device can be opened. If due to the structural limitations of the retention system, the hard ball cannot touch the pressing part of the buckle, it shall be deemed as cannot be opened.

Use the angle measuring instrument to detect the highest open position of the lens.

Put the helmet on the testing headform of the corresponding specification, add a 5 kg ± 0.2 kg sandbag on the top of the helmet, adjust the helmet, so that the symmetrical plane of the helmet is consistent with the symmetrical plane of the testing headform, and the forehead edge satisfies the requirements of the upper field of view; measure the protect section of the helmet, mark the testing section, and check the shape, size and specification.

6.6 Shear Force Test of Surface Convex Structure

6.6.1 Test equipment

6.6.1.1 Equipment composition

The equipment is composed of carrier, horizontal guiding device, pulley, drop hammer, headform support, lever structure with a hinge, and loading device, etc., as it is shown in Figure 11.

6.6.1.2 Carrier

The carrier is installed on the horizontal guiding device, with fixtures for replaceable mounting cutters and sandpapers.

During the shear force test, a steel cutter with a height of 6 mm and a width of 25 mm is fixedly installed on the carrier. The edge chamfering radius of the cutter is 1 mm ± 0.1 mm, and the surface of the cutter is carburized and hardened with a depth of 0.5 mm.

During the friction force test, a piece of Grade 80 aluminum oxide-coated sandpaper with a length of $300^{+3.0}_{0}$ mm is fixed on the carrier. There is a smooth area with a length of 80 mm ± 1 mm not covered with the sandpaper on the surface of the carrier near the end of the drop hammer in front of the sandpaper, and the surface of this area is 0.5 mm ± 0.1 mm higher than the surface of the carrier covered with the sandpaper.

The total mass of the carrier and its attachments is $5.0^{\ 0}_{-0.2}$ kg.

6.6.1.3 Horizontal guiding device

The horizontal guiding device, which is used to guide and support the loading platform, is composed of two parallel guide rails. The carrier can freely slide on the guide rails.

6.6.1.4 Pulley with wire rope or belt

The radius of the pulley is at least 60 mm, and its function is to convert the wire rope or belt from the horizontal direction to the vertical direction. The horizontal end of the wire rope or belt is fixed on the carrier, and the vertical end is fixed on the drop hammer.

6.6.1.5 Drop hammer

The mass of the drop hammer is $15^{+0.5}_{0}$ kg, the height of free drop is $500^{+0.5}_{0}$ mm, and there is a margin of at least 400 mm stroke.

6.6.1.6 Support of testing headform

The position and angle of the testing headform can be adjusted, so that any point on the outer surface of the helmet can be in contact with the upper surface of the carrier, and a force can be

6---hinged lever structure;

7---pulley;

8---wire rope or belt;

9---release device;

10---drop hammer.

Figure 11 -- Shear Force and Surface Friction Force Test Equipment of Surface Convex Structure of Helmet

6.6.2 Test procedures

6.6.2.1 Helmet installation

After putting the helmet on the corresponding testing headform in accordance with the method of 6.2.2, adjust the helmet backward, so that the front edge of the helmet moves 25 mm on the symmetrical plane; if the helmet has an adjustable strap, tighten the strap as much as possible. Adjust the testing headform support, so that the selected test point on the helmet is in contact with the upper surface of the horizontal carrier.

For the helmets equipped with accessories, the test shall be carried out with and without accessories installed. The helmets equipped with goggles shall be tested with the goggles in a closed state.

6.6.2.2 Selection of test point

All convex structures on the outer surface of the shell that exceed the height of the outer surface by more than 5 mm, except for the device for fixing the goggles, shall be tested.

Each test point shall be tested once.

NOTE: in this test, helmet rims and the top and bottom edges of the goggles are not considered as convex structures.

6.6.2.3 Shear force test

On the carrier, install a cutter. Adjust the position of the helmet, so that the selected convex structure is located 50 mm in front of the edge of the cutter on the carrier. After applying a force of $400^{+10.0}_{0}$ N, release the drop hammer from a height of $500^{+0.5}_{0}$ mm, check the shearing of the convex structure by the cutter edge.

6.7 Surface Friction Force Test

6.7.1 Test equipment

Same as 6.6.1.

6.7.2 Test procedures

6.7.2.1 Helmet installation

Same as 6.6.2.1.

6.7.2.2 Selection of test point

Select an area on the outer surface of the helmet that is relatively rough and has a high frictional resistance.

Each test point shall be tested once.

6.7.2.3 Friction force test

Install a sandpaper on the carrier. Adjust the position of the helmet, so that the selected test point is in contact with the carrier. The contact point is located at the center of the smooth area of the carrier in front of the sandpaper. After applying a force of $400^{+10.0}_{0}$ N perpendicular to the surface of the carrier to the helmet, release the drop hammer from a height of $500^{+0.5}_{0}$ mm and check the sliding of the carrier. After each test, the sandpaper shall be replaced.

6.8 Rigidity Performance Test

6.8.1 Place the helmet between two parallel plates and apply the load on the longitudinal axis (L-L′ in Figure 12) or the transverse axis (T-T′ in Figure 12). The initial load is 30 N, after maintaining for 2 min, measure the distance between the two parallel plates. Then, at a moving speed of not less than 20 mm/min, increase the load by 100 N, wait for 2 min. Repeat this process, until the applied load is 630 N. After maintaining for 2 min, measure the distance between the two parallel plates. Finally, at a moving speed of not less than 20 mm/min, reduce the load acting on the two parallel plates to 30 N, and measure the distance between the two parallel plates.

6.8.2 When the longitudinal axis and transverse axis are tested, two different helmets shall be used.

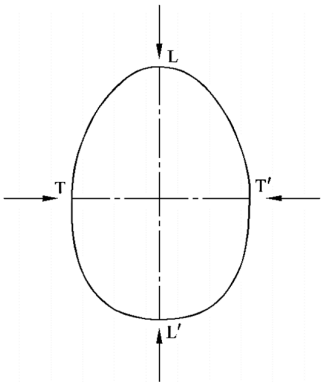

Figure 12 -- Rigidity Test

Each helmet shall be accompanied by a product instruction manual in Chinese, which shall at least explain the following contents:

a) Remind the buyers to choose a qualified helmet that fits their own head size;

b) During use, the strap must be fastened;

c) Description of the applicable conditions of use for the helmet (such as: Type B helmets are limited to electric bicycle users, and children under the age of 12 should choose light-weight helmets, etc.);

d) Stop using the helmet if there is a major collision accident;

e) Properly store it and do not use corrosive solvents to scrub the outer surface of the helmet;

f) Recommend the service life.

8.3 Packaging, Transportation and Storage

8.3.1 The content of marking specified in 8.1.1 shall be displayed on the product packaging box.

8.3.2 The product packaging box shall indicate the requirements of preventing collisions, direct exposure to sunlight, moisture and corrosion of organic chemicals during transportation and storage.

9 Requirements for Implementation Transition Period

For Type A helmets produced or imported before the date of implementation of this document, the requirements of this document shall be satisfied from the 7th month since the date of implementation of this document.

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