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Replacing GB 811-1998

Helmets for motorcyclists

摩托车乘员头盔

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Foreword

4.1.2 (except item d), 4.1.5, 4.1.6, 4.2 of Clause 4 and 7.1 of Clause 7 in this Standard are mandatory, and the rest are recommendatory.

Class-A helmet's indicators such as stiffness performance and stability of helmet fixture refer to ECE 22-2002 "Motorcycle protective helmets"; Class-B helmet's indicator collision energy absorption refer to Japanese standard - JIS T8133-1994 "Protective helmets for motorcycle and moped riders and passengers" and Chinese Taiwan standard CNS 3902-92 "Riding motorcycle helmets".

This Standard replaces GB 811-1998 "Helmets for motorcyclists".

Main changes between this Standard and GB 811-1998 are as follows:

- Added and modified some of the terms and definitions (Clause 2 of this Edition);

- Classified helmets by helmet performance (Clause 3 of this Edition);

- Added the requirements for helmet stiffness performance, requirements for helmet fixture stability; modified helmet projection, wearing device, goggle, protection area, vision, collision energy absorption, and penetrating performance (Clause 4 of this Edition);

- Specified test requirements for added items (Clause 5 of this Edition);

- Rewrote the inspection rules, and specified exit-factory inspection and type inspection (Clause 7 of 1998 Edition and Clause 6 of this Edition);

- Added marks of helmet classification (Clause 7 of this Edition).

This Standard was proposed by The Ministry of Public Security of the People's Republic of China.

The drafting organizations of this Standard: National Road Traffic Safety Product Quality Supervision and Inspection Center, Hebei Provincial Product Quality Supervision and Inspection Institute AND Shanghai Hehui Safety Products Manufacture Co., Ltd.

Main drafters of this Standard: Yu Chunjun, Qin Dongwei, Yang Youtao, Zheng Genchao and Xu Xiangrong.

This Standard replaces the following previous standards:

- GB 811-1989, GB 811-1998.

Helmets for motorcyclists

1 Scope

This Standard specifies the basic structure, categories and specifications, technical requirements, test methods, inspection rules and marks of helmets for motorcyclists (hereinafter referred to as the “Helmets”).

This Standard is applicable to the helmets for motorcyclists (including riders and passengers).

2 Terms and definitions

The following terms and definitions apply to this Standard.

2.1 Helmet

Device that is to reduce motorcyclist’s head injuries in a motorcycle accident.

2.2 Shell

Helmet’s outer layer structure, presenting the basic shape of the helmet.

2.3 Protective padding

Aptamer cushion that is to absorb impact energy.

2.4 Comfort padding

Padding that is to ensure comfort of wearing on the head.

2.5 Retention system

The part that is to ensure helmet firmly worn on the head.

2.6 Goggles

Eyes and face protection part that is to shelter the eyes and face without affecting observation.

2.7 Luminous transmittance

The ratio of luminous flux of visible light through goggles and incident flux.

- There shall be no external projection of which the length is 5 mm on the outer surface of helmet. However, parts that are easy to fall off shall not be included, not including the following ones: device of fixed glasses and device of fixed lens.

Note: The parts, which are easy to fall off refer to those parts that are easy to fall off when they are impacted, not including the parts that are easy to be dismounted by screwdrivers.

4.1.3 Protective padding

Protective padding shall meet the following technical requirements:

a) Use material that has cushioning performance, is able to absorb more collision energy, and is non-toxic and harmless to human body;

b) The shape and specifications are body-fitted; shall not shift during wearing;

c) It shall cover testing area with even thickness.

4.1.4 Comfort padding

Comfort padding shall meet the following technical requirements:

a) Use durable material that feels comfortable, is absorbent, breathable, non-toxic to the skin and harmless;

b) It shall ensure the comfort of helmet wearing.

4.1.5 Retention system

Parts of retention system shall be permanently connected to retention system or helmet, and comply with the following technical requirements:

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

b) If retention system has fastening device, e.g., double D ring and sliding stick, it shall remain enough allowance for adjustment during retention system adjustment, so as to prevent strap loosing;

c) Quick release device like retention button shall be easy to open. Meanwhile, it must prevent possible false operation. Putter, button or other components used for opening mechanism shall be red or orange, and shall be opened only during conscious operation. If retention system is designed to open by applying pressure on some parts, retention buttons

Note:	a refers to horizontal distance from central axis of headform to front part direction of headform; b refers to horizontal distance from central axis of headform to back part direction of headform; AC refers to horizontal distance from headform front part backward on AA plane; HD refers to horizontal distance from headform back part forward.

4.2.2 Helmet mass (including accessories)

Examine according to the methods specified in 5.3. Class-A shall not be greater than 1.6 kg; Class-B shall not be greater than 1.0 kg.

4.2.3 Visual field of helmet

Conduct the test according to the method specified in 5.4. Left and right horizontal visual field is not less than 105°, the upper-visual field is not less than 7° and the lower-visual field is not less than 45°.

4.2.4 Helmet goggles

Conduct the test according to the method specified in 5.5.1. If goggles were broken, there must be no fragments that are less than 60°.

Conduct the test according to the method specified in 5.5.2. Visible light transmittance of goggles is not less than 85%.

4.2.5 Stiffness (this test is only applicable to Class-A helmet)

Conduct the test according to the method specified in 5.6 and the following requirements:

a) Under 630N force, the difference between deformation along with testing axis and deformation of 30N, the initial load, is not greater than 40 mm;

b) When gradually unloading and recovering to 30N, the initial load, the difference between the measured deformation and deformation of 30N, the initial load, it not greater than 15 mm.

4.2.6 Fixture stability

Conduct the test according to the method specified in 5.7. The helmet cannot be separated from the headform.

4.2.7 Strength properties of helmet wearing

Conduct the test according to the method specified in 5.8. There must be no elongation of more than 25 mm, torn lace, connector falling off or buckle loosing.

4.2.8 Collision energy absorption of helmet

It shall be measured by acceleration transferred to the headform and its acting time. Conduct the test in the method specified in 5.9 and:

a) Class-A helmet shall meet the following technical requirements:

   1) Acceleration peak value is not greater than 300 g;
   2) The acting time of which the acceleration peak value exceeds 150 g should be less than 4 ms.

b) Class-B helmet shall meet the following technical requirements:

   1) Acceleration peak value is not greater than 400 g;
   2) The acting time of which the acceleration peak value exceeds 200 g should be less than 2 ms (except the situation when he acceleration peak value does not exceed 300 g);
   3) The acting time of which the acceleration peak value exceeds 150 g should be less than 4 ms.

Note: g=9.80665 m/s^2.

4.2.9 Penetration resistance performance of helmet

Conduct the test in the method specified in 5.10. Steel pricker cannot penetrate the helmet to touch the headform.

5 Test methods

5.1 Ambient conditions for laboratory

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

5.2 Helmet structure, specifications, protect range test

5.2.1 Test tools

Length measuring instrument of which the division value is 0.5 mm; leveler; protractor of which the division value is not greater than 0.1°; and testing headforms of small, medium and large sizes.

5.2.2 Test procedures

Use measuring instrument to detect the connector of shell's inner and outer surfaces, chin strap, and the highest open position of lens. Measure helmet's

specifications and protect range: put the helmet on the testing headform of corresponding specifications, and forehead edge of test specimen must be consistent with reference plane of standard headform. Load 5 kg on the top, measure helmet's protect range and mark testing section.

5.3 Helmet mass test

5.3.1 Test tools

Weighing equipment of which the division value is not greater than 0.01 kg.

5.3.2 Test procedures

Weigh and record helmet mass in kg, taking three significant figures.

5.4 Helmet visual field test

5.4.1 Test device

It is composed of angle ruler, headform and headform holder.

5.4.2 Test procedures

Put the helmet on the appropriate headform correctly according to requirements in 5.2.2. During the test, select the helmet that may bring the worst results.

a) Left and right visual field (horizontal field of view): two parts of dihedral angle and symmetry plane of headform are symmetrical, which are between reference plane and basic plane. The dihedral angle is composed of vertical plane of which the angle made of symmetry plane of headform and symmetry plane is not less than 105°. Its side is the straight line LK, shown in Figure 6 Visual field and Figure 7 Horizontal field of view;

The helmet sample which is treated by high temperature or low temperature shall complete the test at the first place within 5 min. In the test at the second place, it shall place the helmet sample back into holding cabinet. Retreat it for more than 20 min before conducting the test. The helmet sample which is treated by water immersion shall be dried for 20 min before it is used for the test.

Table 5 Helmet treatment before test

Item	Conditions	
	Temperature / °C	Time / h
High temperature	50±2	4~6
Low temperature	-20±2	4~6
Water immersion	23±5	4~24

5.9.3 Testing section and collision point

5.9.3.1 Testing section

Class-A: the section above AA' line in the Figure (shown in Figure 5 Protect section and testing section and Table 2 Headform protection type and testing range in different specifications).

Class-B: the section above the test line in the Figure (shown in Figure 5 Protect section and testing section and Table 2 Headform protection type and testing range in different specifications).

5.9.3.2 Collision point

a) Testing section of Class-A helmet is the section above AA' line in Figure 5. Select any 4 collision positions in the testing section. Conduct same impact 2 times in a row, of which use flat anvil for 2 positions and hemispherical anvil for the other 2 positions. The distance between two adjacent impact points is greater than 1/5 of the maximum circumference. Impact speed and times are shown in Table 6 Test conditions for helmet collision energy absorption performance;

b) Testing section of Class-B helmet is the section above the test line in Figure 5. Select any 3 collision positions in the testing section. The distance between two adjacent impact points is greater than 1/4 of the maximum circumference. Impact speed and times are shown in Table 6 Test conditions for helmet collision energy absorption performance.

Note: The tangent plane of impact point and anvil is a horizontal plane.

5.9.4 Test procedures

Helmet's quality inspection of normal batch products is divided into type inspection and exit-factory inspection. Inspection sequence, items, requirements and methods are shown in Table 8.

Table 8 Inspection sequence, items, requirements and methods

Inspection sequence	Inspection item	Requirement clauses	Test method clauses	Inspection type	
				Type inspection	Exit-factory inspection
1	Structure, specifications and protect range	4.1.2, 4.1.3, 4.1.5, 4.1.6, 4.2.1 and Table 1	5.2	√	√
2	Mass	4.2.2	5.3	√	√

Table 8 (continued)

Inspection sequence	Inspection item	Requirements clauses	Test method clauses	Inspection type	
				Type inspection	Exit-factory inspection
3	Visual field	4.2.3	5.4	√	√
4	Goggles	4.2.4	5.5	√	
5	Stiffness	4.2.5	5.6	√	
6	Fixtures stability	4.2.6	5.7	√	√
7	Strength of wearing device	4.2.7	5.8	√	√
8	Collision energy absorption [a]	4.2.8	5.9	√	
9	Penetration resistance	4.2.9	5.10	√	√
10	Mark contents	7.1	Visual inspection	√	√
[a] Inspect at least two items for high temperature, low temperature and water immersion.					

6.2 Type inspection

6.2.1 Conduct periodic inspection for products of normal batch production according to type inspection items specified in the Standard.

6.2.2 Sampling shall be carried out once a year for type inspection under conditions of stable production process.

6.2.3 It shall conduct type inspection for any of the following cases:

a) Type identification for new products or type identification for old products when transferrin plant;

b) In normal batch production, when there is significant changes in structure, material and technique that may affect product performance;

c) When production is resumed after six-month discontinuation;

d) When National quality supervision organizations make requests for type inspection.

6.2.4 Helmet sample inspection allocation: item 1 to item 7 in Table 8; full inspection for 6 helmet samples extracted from each batch in item 9; conducting item 9 after item 8 test.

6.3 Sampling plan of exit-factory inspection and determination rules of inspection

6.3.1 Each batch of products shall be inspected before leaving factory according to inspection items specified in the Standard.

6.3.2 Helmets of same structure, material (helmet shell uses same material), and specifications shall be of the same model. 2000 helmets of each model shall be one inspection batch (if it is insufficient, it shall be considered as one batch). Take 6 helmets as samples from each batch. Sampling shall be conducted at random among finished products.

6.4 Determination rules

6.4.1 For type inspection: if one single indicator of one performance is unqualified in helmet sample inspection, then this batch of products for inspection are determined as unqualified.

6.4.2 For exit-factory inspection: if penetration resistance performance is unqualified, then this batch of products are determined as unqualified. If other items fail, it shall allow to improve the products and submit for a second inspection. However, sampling quantity shall be twice the one of the first time. If the second inspection still fails, then this batch of products are determined as unqualified.

7 Marks

Each helmet shall have permanent marks:

a) Product's name;

References

[1] FMVSS (Federal Motor Vehicle Safety Standard) No. 218-2006 *Laboratory testing procedures for motorcycle helmets*

[2] ECE 22-2002 Motorcycle protective helmets

[3] AS 1698-2006 Traffic using protective helmets

[4] CNS 3902-1992 Riding motorcycle helmets

[5] JIST 8133-1994 Protective helmets for motorcycle and moped riders and passengers

[6] GB/T 10000-1988 Human dimensions of Chinese adults

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