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Protective helmets for bicycle users

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Safety Appliance Association (JSAA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS T 8134 : 1995** is replaced with this Standard.

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Protective helmets for bicycle users

1 Scope

This Japanese Industrial Standard specifies the protective helmets for bicycle users (hereafter referred to as “protective helmets”), which is put on when riding on a bicycle, for the purpose of protecting the users and infants riding together from the injury on their heads and mitigating the degree of injury.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS D 1050 *Road vehicles—Techniques of measurement in impact tests—Instrumentation*

JIS K 6253 *Rubber, vulcanized or thermoplastic—Determination of hardness*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

3.1 protective helmet

the helmet put on the user’s head for the purpose of absorbing impact energy to lessen the risk of users’ head injury, which consists of at least a shell, anti-concussion liner, supporting device and wearing device

3.2 shell

a part which forms the outline of protective helmet

It includes also a portion which is not necessarily rigid shell-shaped.

3.3 anti-concussion liner

a material attached along the inside of shell for the purpose of absorbing impact energy

3.4 supporting device

a device for keeping the protective helmet in an appropriate position on the head, which consists of all parts such as a chin strap, a chin strap mounting part, a chin strap length adjusting part and a chin strap fastener

3.5 attaching device

a collective designation of parts attached to the inside of shell, other than the anti-concussion liner and the supporting device

3.6 chin cup

the accessory formed by adjusting to the form of chin of a protective helmet user

3.7 base plane of head

a horizontal plane passing through the edges of external auditory pores (external auditory canals) and orbits (eye sockets)

3.8 base plane of headform

a plane on the headform which corresponds to the base plane of head (see figure A.1)

3.9 reference plane

a plane for drawing which is parallel to the base plane of headform and is specified at a certain distance apart from the base plane according to the size of the headform (see figure A.1)

3.10 vertical centre axis

a straight line which is so specified as to pass through the centre of the anteroposterior and lateral lines of the reference plane of headform, and is perpendicular to the base plane of headform (see figure A.1)

3.11 central sagittal plane

a vertical symmetric centre plane of the head, the headform or protective helmet to be put on which passes through the vertical centre axis

3.12 guidepost for wearing the protective helmet

a vertical distance between the lower end of anterior edge and the reference plane of the protective helmet at the time of wearing the protective helmet on headform

The distance shall be specified for each size and each type of protective helmets by the manufacturer (see Annex A).

3.13 infant riding together

a preschool child riding together in an auxiliary seat of bicycle

3.14 test range

the range subject to the shock absorption test shall be a range shown in figure 1 a) and figure 1 b) depending on whether the protective helmet is applicable to an infant aged under 6 or not

4 Performance

4.1 Shock absorption

The shock absorption is the protective function for frontal region, back region, temporal region and parietal region of head. When the protective helmet is tested as specified in 7.3, the impact acceleration at the gravity centre of headforms shall be $2\,940\text{ m/s}^2$ (300 G) or less. In addition, in the case where the impact acceleration of not less than $1\,470\text{ m/s}^2$ (150 G) is generated, its duration shall be 4 ms or less.

NOTE: Numerals G in parentheses following the standard values $2\,940\text{ m/s}^2$ and $1\,470\text{ m/s}^2$ of impact acceleration represent conventionally used gravity acceleration values.

4.2 Strength of supporting device

When the supporting device is tested for the strength as specified in 7.4, the maximum elongation shall be of 35 mm or less. In addition, the fastening device shall be easily detachable after the test.

4.3 Supporting capacity (roll off)

When tested for the supporting capacity (roll off) as specified in 7.5, the protective helmet shall not drop down from the headform under testing.

4.4 Visual field

The visual field shall, when tested as specified in 7.6, be 105° or over in every horizontal, upward and downward direction.

5 Construction

5.1 Construction in general

In general, the protective helmet consists of a shell, anti-concussion liner, attaching device and supporting device for protection of a wearer's head, and shall have durability sufficient to withstand normal handling. The parts of protective helmet (a visor, rivet, vent hole, size adjusting device, edge covering, fastening device, etc.) shall be so designed and manufactured as not to injure the wearer in normal use and shall satisfy the following matters.

- a) The outer surface of protective helmet shall be made of such materials as to minimize friction with road surface in case of falling, and means such as chamfering shall be taken for any protrusion or any bump on the surface of protective helmet.
- b) The shell made of hard materials shall not have a sharp corner on the end.
- c) Protrusions on the inside surface of the shell shall have no sharp edge. The hard protrusion shall, if any, be designed so that the impact energy applied to heads does not concentrate strongly on it, by using a pad, etc.
- d) The width of chin strap shall be 15 mm or over.
- e) The chin cup shall not be attached with the chin strap.
- f) The size-adjusting device shall not easily come off without any intent of wearers, or not move so as to cause the dimension change in use.
- g) Any snap and other hard protrusion (excluding a head of rivet) fixed on the shell shall not be excluded more than 5 mm outward from the outside surface of the shell. However, a device intended to make the protective helmet easily wearable, which is readily removable, may be allowable.
- h) The head of rivet on the outside surface of shell shall not be protrude more than 2 mm outward from the surface.
- i) A vent hole may be provided.

5.2 Accessories

The accessories shall be as follows.

- a) The protective helmet may be attached with a reflecting material, etc., by which lights such as head lights of automobiles can be easily recognized through reflecting during night.
- b) The accessories shall, when attached with the protective helmet, not impair the safety.

6 Materials

The protective helmet shall be made of such materials as to be little affected by exposures to sunlight, temperature and rain, etc. in normal use. The parts of protective helmet which come in contact with the wearer's skin shall be made of such materials that their functions do not significantly deteriorate by the influence of perspiration or cosmetics.

7 Test

7.1 Headform

The headform to be used for the test shall comply with the dimensional characteristics specified in Annex B and Annex C, and the requirements showed in table 1.

Table 1 Headform

Size of protective helmet mm	Type of protective headform	Mass of headform kg	Size of headform mm	Gravity centre of headform(positioned below the reference plane) mm
Less than 540	A	3.1 ± 0.10	500 ± 5	11.1
540 or over to and excluding 570	E	4.1 ± 0.12	540 ± 5	11.9
570 or over to and excluding 600	J	4.7 ± 0.14	570 ± 5	12.7
600 or over to and excluding 620	M	5.6 ± 0.16	600 ± 5	13.3
620 or over	O	6.1 ± 0.18	620 ± 5	13.7
NOTE 1 The headform to be used for the shock absorption test shall be made of low echoic magnesium alloy.				
NOTE 2 The specification of headform mass shall apply only to the headform to be used for shock absorption test.				
NOTE 3 The mass of headform includes mass of an accelerometer, ball socket and supporting arm.				
NOTE 4 A cutout may be provided to avoid interference with the support arm when a wire-guided drop device is used.				
NOTE 5 The gravity centre of headform (including the support arm when the wire-guided drop device is used) shall be at the position indicated in table 1 on the vertical central axis, and the accelerometer shall be mounted at the position of gravity centre.				

7.2 Pre-conditioning

7.2.1 Method of conditioning

Each pre-conditioning of a sample under test shall be as follows.

- a) **Conditioning at room temperatures** Place the protective helmet under the condition of $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ in temperature for 4 h or over.
- b) **Conditioning at high temperatures** Place the protective helmet under the condition of $50\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ in temperature for 4 h to 24 h.
- c) **Conditioning at low temperatures** Place the protective helmet under the condition of $-10\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ in temperature for 4 h to 24 h.
- d) **Conditioning by immersion** Immerse the protective helmet in water at $25\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for 4 h to 24 h.

7.2.2 Test after pre-conditioning

The tests after each pre-conditioning shall be as follows.

- a) **Tests after high temperature and low temperature pre-conditionings** Tests after high temperature and low temperature pre-conditionings shall generally start at room temperature within 2 min after the sample has been taken out from the pre-conditioning bath and finish within 5 min. If 5 min or over elapses after it has been taken out, every pre-conditioning shall be repeated for the sample at a rate of 3 min per minute of overtime, and then the test shall be carried out.
- b) **Tests after immersion conditioning** Test after pre-conditioning by immersion shall be carried out within 6 h after a lapse of at least 15 min since the sample has been taken out from the pre-conditioning apparatus, in consideration of a draining period.

7.3 Shock absorption test

7.3.1 Test method

For the shock absorption test, use the headform selected as shown in table 1 corresponding to the maximum size of the protective helmet (the maximally adjusted size for size-adjustable protective helmets), and carry out the test for each pre-conditioned sample as specified in 7.2.1 b) to d).

7.3.2 Range of test (Range of striking points)

The test range shall be as follows.

- a) When the protective helmet is put on the headform as specified in Annex A, the striking points shall be within the test range shown in figure 1 a) or figure 1 b) corresponding to the range of user's age of the protective helmet.

In addition, the striking points shall be four optional points within the test range apart from each other with 1/5 or over of the maximum circumference of the protective helmet.