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BRITISH STANDARD 2001 : 1956

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PROTECTIVE HELMETS

For Motor Cyclists

BRITISH STANDARDS INSTITUTION

BRITISH STANDARD SPECIFICATION

PROTECTIVE HELMETS
FOR MOTOR CYCLISTS

B.S. 2001 : 1956

Price 3/- net

BRITISH STANDARDS INSTITUTION

INCORPORATED BY ROYAL CHARTER

BRITISH STANDARDS HOUSE, 2 PARK ST., LONDON, W.1

TELEGRAMS: STANDARDS, AUDLEY, LONDON TELEPHONE: MAYFAIR 9000

THIS BRITISH STANDARD, having been approved by the Personal Safety Equipment Standards Committee and endorsed by the Chairman of the General Council, was published under the authority of the General Council on 25th October, 1956.

First published, July, 1953

First revision, October, 1956.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 2500, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook, price 12s. 6d.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work on this standard:—
Committee reference PSM/10 Draft for comment CW(PSM) 5764

CO-OPERATING ORGANIZATIONS

The Personal Safety Equipment Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:—

Association of British Chemical Manufacturers
British Chemical Plant Manufacturers Association
British Iron and Steel Federation
British Ironfounders Association
British Leather Manufacturers Research Association
British Red Cross Society
Combustion Engineering Association
Cotton Board
Federation of British Rubber and Allied Manufacturers Associations
Federation of Civil Engineering Contractors
Glass Manufacturers Federation
Industrial Welfare Society
Institute of British Foundrymen
Institute of Welding
Institution of Civil Engineers
Institution of Engineering Inspection
Institution of Mechanical Engineers
Institution of Production Engineers
Institution of Structural Engineers
Medical Research Council
National Federation of Building Trades Employers
National Paint Federation
Royal Society for the Prevention of Accidents
Shipbuilding Employers Federation
Trades Union Congress
Individual manufacturers

The following organizations were directly represented on the committee entrusted with the preparation of this British Standard:—

Aluminium Development Association
Aluminium Industry Council
Auto Cycle Union
Automobile Association
British Cellular Rubber Manufacturers Association
British Felt Hat Manufacturers Federation
British Medical Association
British Plastics Federation
D.S.I.R.—Road Research Laboratory
D.S.I.R.—Joint Fire Research Organization of the D.S.I.R. and Fire Offices Committee
Ellis Research and Testing Laboratories
Federation of British Rubber and Allied Manufacturers Associations
Ministry of Supply
Ministry of Transport and Civil Aviation
Royal Automobile Club
War Office
Manufacturers of Helmets and Materials

BRITISH STANDARD SPECIFICATION FOR PROTECTIVE HELMETS FOR MOTOR CYCLISTS

FOREWORD

This British Standard was first issued in 1953 by the Personal Safety Equipment Standards Committee at the original suggestion of the Auto-Cycle Union and of the Ministry of Transport.

The standard specifies requirements for protective helmets for everyday use by motor cyclists. The present revision applies knowledge obtained from experience and from research carried out since the standard was first issued. Considerable experience has been gained in the use of protective helmets by road users and of crash helmets in competitive events, as well as in the testing of protective helmets and crash helmets by the Institution's testing authority. A detailed study of the mechanics of head protection, and research into the effects of accidents, have been carried out by the Road Research Laboratory of the Department of Scientific and Industrial Research. It appears from these studies that the application to the head itself, whether protected or not, of a force in excess of 5000 lb (2270 kg), even for only a few milli-seconds, is likely to result in fatal concussion.

The helmets specified in this present standard are not intended for high speed competitive events but are intended to give a reasonable measure of protection to the ordinary motor cyclist on the roads.

It is emphasized that the protection given cannot be complete and that the wearing of a helmet may not prevent injury or death in severe accidents. The attention of users should be drawn to the fact that helmets are, of necessity, so constructed that the energy of a severe blow is absorbed in the partial destruction of the shell and/or protective padding material although damage may not be visible to the eye: any helmet which suffers such an impact should therefore be discarded and replaced by a new one.

The basic requirements for protection are that the helmet shall have an outer shell which is separated from the wearer's head by a layer of protective padding material or by other means of energy absorption and that it shall be smooth and free from rigid external projections which, in a crash, might cause dangerously violent movement of the wearer's head. The shell shall be made of a material which retains its properties after exposure to moisture.

Wearers of helmets that are provided with a draw-lace adjustment should be made aware that a helmet of this type gives the intended protection only when the draw-lace is knotted tightly enough to hold the helmet in place in the event of a crash. Wearers of helmets that do not permit adjustment should be reminded that helmets must be a good fit.

The tests specified in this standard necessitate a routine sampling procedure, which will be decided by the Director of the British Standards Institution.

SPECIFICATION

SCOPE

1. This British Standard specifies requirements for helmets for everyday use for motor cyclists on the roads.

Manufacturing requirements are specified for the construction, weight and finish of helmets and for the materials to be used for the shell and harness.

Performance tests are required to prove the following:—

- Shock absorption properties of the complete helmet under various conditions of temperature and humidity.
- Strength of the helmet and its resistance to penetration.
- Flexibility of the peak.
- Strength of the harness and of its attachment.

DEFINITIONS

2. For the purpose of this British Standard the following definitions shall apply:—

- Cradle.* The headband and those internal parts of the helmet in contact with the head.
- Harness.* The cradle together with the chin strap and ear flaps, if any.
- Draw-lace.* A cord used for making adjustments to the fit of the cradle on the wearer's head.
- Protective padding material.* Material whose principal object is to absorb the kinetic energy of the head during an impact.
- Cushioning material.* Soft material used to ensure a comfortable fit of the helmet on the head.

CONSTRUCTION

3. *a. General.* The helmet shall consist of a hard smooth shell lined with protective padding material, or fitted with other means of energy absorption, and shall be strongly attached to a strap designed to fasten under the wearer's chin. The assembled helmet shall have a smooth external surface without either reinforcing ridges or rigid external projections.

Seams in the covering material and grommets for ventilation holes shall not project more than $\frac{1}{8}$ in. (3.2 mm) above the surface of the helmet.

Goggle clips, when fitted, shall be located at the rear of the helmet and shall not project more than $\frac{1}{2}$ in. (12.7 mm) above the surface.

b. Chin strap. The chin strap may be provided with ear flaps; these may be detachable, separate or made in one piece continuing round the back of the neck.

See Aell-4

See Aell-2
No. 5

c. Pliable peak. *See Amendment 2.* It is strongly recommended that the helmet be worn with a pliable peak which may be detachable and which shall be large enough to cover the eyes should it be forced down over the wearer's face in a frontal impact.

d. Height of helmet. The vertical dimension from the lower edge of the headband to the outside of the crown of the shell, measured at the normal position of the ears, shall be not less than $4\frac{1}{2}$ in. (114.3 mm).

e. Head clearance. When the helmet is fitted normally on the wearer's head, the distance between the head and the inside of the shell at its highest point shall be between $\frac{3}{4}$ in. and $1\frac{1}{4}$ in. (19.1 mm and 31.8 mm). If the shell is completely lined with protective padding material, the distance between the head and the padding material, at the position below the highest point of the shell, shall not be less than $\frac{1}{4}$ in. (6.4 mm) for comfort.

These clearances may be obtained either by incorporating in the harness a cradle (made of webbing strips, woven cloth or similar material) to fit over the head, or by an arrangement of strips or segments of cushioning material (similar to that used round the headband) cemented to the inside surface of the protective padding material.

f. Extent and form of protective material. The helmet shall be constructed in such a manner that equal protection is given to the head all the way round. In a helmet lined with protective padding material, for example, this material shall extend upwards with uniform thickness all round the helmet for a distance of at least 4 in. (101.6 mm) from within $1\frac{1}{4}$ in. (31.8 mm) of the lower edge of the headband. The distance of 4 in. (101.6 mm) shall be measured on the inside surface of the shell. No gap in the protective padding material shall be of greater width than $\frac{1}{4}$ in. (6.4 mm) and no part of the protective padding material shall be readily detachable.

g. Headband. The headband shall be well cushioned from the shell by means of cellular rubber or other suitable material. Attention is drawn to the necessity of protecting some of the materials which may be used for this purpose against the effect of oil or grease from the wearer's hair.

WEIGHT

See Amendment 2. The complete helmet, as offered for sale, shall not weigh more than 24 oz (680 g).

In cases of dispute, the helmet shall be reweighed after conditioning for 3 hours in an atmosphere maintained at a temperature of between 67.6°F and 68.4°F (19.8°C and 20.2°C) and at a relative humidity of between 63 and 67 per cent.

MATERIALS

5. a. *Effects of temperature.* None of the materials used shall be adversely affected by prolonged exposure to any temperature in the range 32°F to

120°F (0°C to 49°C), as indicated by the tests carried out under the conditions described in Clause 8.

b. Shell. The shell of the helmet shall be made of materials which are hard, non-brittle and durable and which retain their properties after exposure to various conditions of temperature and humidity.

c. Harness. The headband shall consist of sweat-resistant material. The manufacturer shall ensure that the materials used for the harness are not of a kind known to cause skin diseases. In the case of a material not in general use for headbands, advice as to its suitability should be sought from a competent authority.

When webbing is used it shall not be inferior in quality to material No. 4, specified in B.S. 1667 (incorporated in B.S. 1664/68 : 1950, 'Woven cloth webbing'). *See Amendment No 3.*

FINISH

6. All edges shall be smooth and rounded and there shall be no metallic parts or other rigid projections on the inside of the helmet which could injure the wearer's head in the event of a crash. Any external projections permitted by Sub-clause 3 a shall be soft, smooth and adequately faired to other surfaces.

SAMPLING

7. Samples of helmets for testing shall be made by taking at random sets of three helmets of the same size as those offered for sale. The scheme of sampling for each type of helmet shall be as decided by the Director of the B.S.I., and may be varied from time to time. No helmet which has been subjected to any test described in this standard shall be offered for sale.

CONDITIONING FOR TEST

See Amendment 2. Helmets which do not permit adjustment shall be tested as offered for sale. Helmets which permit adjustment shall be placed on the appropriate size of headform in the upright position and loaded for a period of three minutes by means of a bag of lead shot weighing 25 lb (11.3 kg). Where the protective padding material does not extend all over the inner surface of the shell, the clearance between the top of the headform and the inside of the shell shall be adjusted to between $\frac{3}{4}$ in. and $\frac{1}{2}$ in. (19.1 mm and 22.2 mm). Where the helmet is completely lined with protective padding material, however, the clearance between the top of the headform and the inside of the protective padding material shall be adjusted to between $\frac{1}{4}$ in. and $\frac{3}{8}$ in. (6.4 mm and 9.5 mm).

One helmet of each set shall be placed in an oven, as described in Appendix E, the temperature of which is thermostatically controlled between 115°F and 125°F (46°C and 52°C), for a continuous period of at least 2 hours. The helmet shall then be subjected, with an exposure delay