BS EN 397:2012

BSI Standards Publication

Industrial safety helmets

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National foreword

This British Standard is the UK implementation of EN 397:2012. It supersedes BS EN 397:1995 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/6/1, Industrial safety helmets.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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EN 397

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English Version

Industrial safety helmets

Casques de protection pour l'industrie

Industrieschutzhelme

This European Standard was approved by CEN on 17 December 2011.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 397:2012) has been prepared by Technical Committee CEN/TC 158 "Head protection", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 397:1995.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

Annex D provides details of significant technical changes between this European Standard and the previous edition.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

5.2.3 Electrical properties

When tested by all three of the methods given in 6.10, the leakage current shall not exceed 1,2 mA.

NOTE 1 This requirement is intended to provide protection to the wearer against short term, accidental contact with live electrical conductors at voltages up to 440 V a.c.

NOTE 2 Test 1 is intended to simulate closely the in-use situation — that is, the leakage current to the wearer via a live conductor touching the shell.

NOTE 3 Test 2 is dependent upon the transverse resistance of the complete shell (thickness). This effectively precludes the use of a metal shell and of metal fasteners or ventilation holes passing through the shell.

NOTE 4 Test 3 is dependent only upon the surface resistance of the shell, and effectively precludes the use of shells which have a conductive surface (e.g. metal electro-plating). This test was deemed to be necessary in order to obviate the danger to the wearer should he try to remove a helmet whose shell was in contact with a live conductor.

Helmets claimed to meet this requirement (for all 3 tests) shall state this fact on the label attached to the helmet, in accordance with 7.2.2.

5.2.4 Lateral deformation

When tested by the method given in 6.11, the maximum lateral deformation of the helmet shall not exceed 40 mm, and the residual lateral deformation shall not exceed 15 mm.

Helmets claimed to meet this requirement shall state this fact on the label attached to the helmet, in accordance with 7.2.2.

5.2.5 Molten metal splash

When tested by the method given in 6.12, the helmet shell shall not:

a) be penetrated by the molten metal;

b) show any deformation, measured at right angles to the base plane of the helmet, greater than 10 mm;

c) burn with the emission of flame after a period of 5 s has elapsed after the pouring of molten metal has ceased.

Helmets claimed to meet this requirement shall state this fact on the label attached to the helmet, in accordance with 7.2.2.

6 Test requirements

6.1 Samples

Helmets shall be submitted for testing in the condition in which they are offered for sale, including any requisite holes in the shell and other means of attachment of any accessories specified by the helmet manufacturer.

No helmet that has been subjected to testing shall be offered for sale.

Lifting device

The lifting device serves to support and guide the tempering head through the opening in the bottom of the tempering chamber until the edges of the sample touch the bottom of the latter.

6.2.8.2 Procedure

The helmet shall be tempered for 60 min ± 2 min using the apparatus described.

6.3 Testing atmosphere

Helmets shall be tested in an atmosphere having a temperature of 22 °C ± 5 °C and a relative humidity of 55 % ± 30 %.

6.4 Headforms

6.4.1 Construction

Headforms used for the tests shall comply at least with the following requirements of EN 960:2006:

Materials — either 3.1.1 or 3.1.2;
Sizing — 2.2 and 3.2;
Marking — 3.3.1 d) and e).

6.4.2 Selection of size

Three sizes of headform are specified in this European Standard, size designations 525, 555 and 585 (equivalent to codes D, G and K, respectively, EN 960:1994).

Other than as specified in 6.5, helmets shall be tested on the headform of appropriate size (from size designations 525, 555 and 585), as selected by adjusting the headband/nape strap to the middle size of its adjustment range.

6.5 Measurement of clearance, distances and wearing height

Vertical and horizontal distances, internal vertical clearance and wearing height shall be measured with the helmet mounted in the wearing position successively on both the largest and smallest size of headform (from size designations 525, 555 and 585) appropriate to its adjustment range.

The helmet shall be maintained in position on each headform by the application of a force of 50 N acting along the vertical axis.

For the measurement of wearing height and horizontal distance, the headband shall be adjusted in the vertical plane to its highest position within the shell.

6.6 Shock absorption

6.6.1 Principle

Shock absorption is measured by the direct measurement of the maximum force transmitted to a rigidly mounted headform on which the helmet is fitted.

6.6.2 Apparatus

The base of the apparatus shall be monolithic and sufficiently large to offer full resistance to the effect of the blow. It shall have a mass of at least 500 kg and shall be suitably installed to obviate the return compression wave.

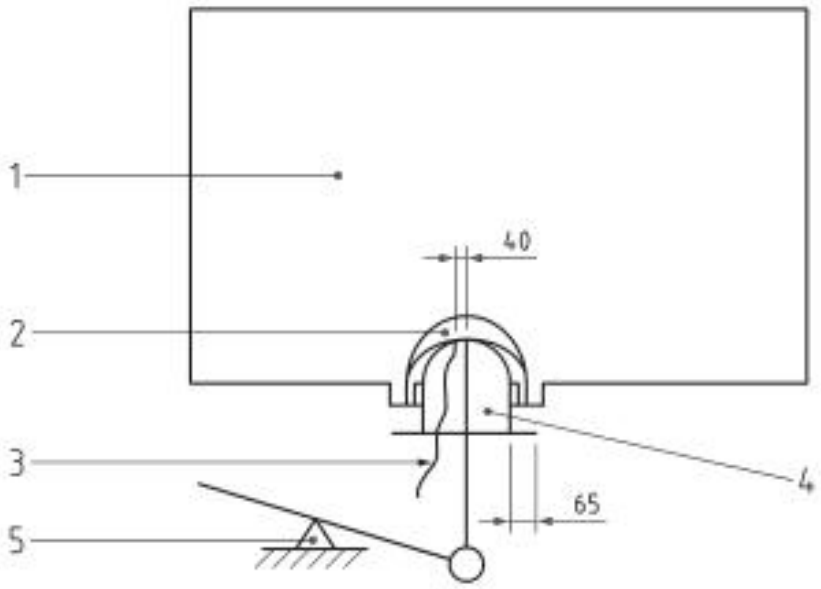
The headform shall be rigidly mounted in a vertical position on the base.

A striker, having a mass of $5{,}0\ ^{+0{,}1}_{0}$ kg and a hemispherical striking face of 50 mm ± 1 mm radius, shall be positioned above the headform so that its axis coincides with the vertical axis of the headform and so that it may be dropped in either free or guided fall. If guided fall is employed, the velocity of the striker, measured at a distance not exceeding 60 mm prior to impact, shall be within 0,5 % of that which would obtain for free fall.

The impact force shall be measured by a non-inertial force transducer firmly attached to the base. It shall be so positioned that its axis is co-axial with the path of the striker. The force transducer shall be able to withstand forces up to 40 kN without damage.

The measuring system, including the headform and its mounting, shall have a frequency response in accordance with channel frequency class (CFC) 600 of ISO 6487:2002.

Dimensions in millimetres



Key

1 tempering chamber

2 test sample

3 thermocouple

4 tempering head

5 lifting device

Figure 1 — Simplified arrangement of tempering apparatus

Dimensions in millimetres

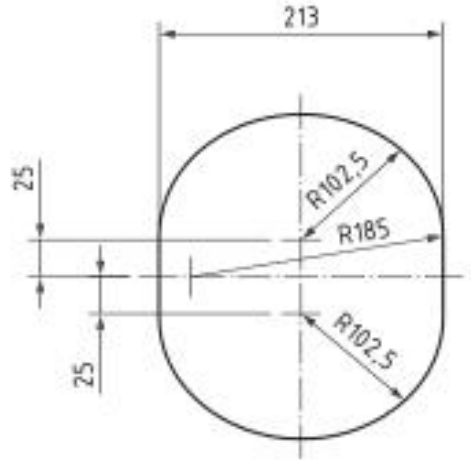


Figure 2 — Dimensions of opening in bottom of tempering chamber

6.6.3 Test procedure

Each of the requisite sample helmets specified in 6.1 shall be adjusted to its greatest possible wearing height and conditioned appropriately in accordance with 6.2.

Within 1 min of its removal from conditioning:

a) the sample shall be mounted on the appropriate headform (see 6.4.2) in the manner in which it is intended to be worn on the head, ensuring (minimal) clearance between the headband and the headform;

b) the striker shall be allowed to fall on to the centre of the crown of the helmet shell from a height of 1 000 mm ± 5 mm, measured from the point of impact on the helmet to the underside of the striker.

NOTE This corresponds to an impact energy of nominally 49 J.

A recording shall be made allowing the determination of the maximum force transmitted.

6.7 Resistance to penetration

6.7.1 Principle

A test striker is allowed to fall on to the helmet which is fitted to a rigidly mounted headform. Note is taken of whether or not contact is made between the striker and the headform or whether the contactable surface of the headform is visibly damaged.

6.7.2 Apparatus

The base of the apparatus shall be monolithic and sufficiently large to offer full resistance to the effect of the blow.

The headform shall be rigidly mounted in a vertical position on the base. The contactable surface of the headform shall be of a metal that will readily permit detection should contact by the striker occur, and that can be restored after contact, if necessary.

The striker has the following characteristics:

Mass:	$3{,}0\ ^{+0{,}05}_{0}$
Angle of point:	60° ± 0,5°
Radius of point:	0,5 mm ± 0,1 mm
Minimum height of cone:	40 mm
Hardness of tip:	between 50 and 45 Rockwell HRC

The striker shall be positioned above the headform so that its axis coincides with the vertical axis of the headform and so that it may be dropped in either free or guided fall. If guided fall is employed the velocity of the striker, measured at a distance not exceeding 60 mm prior to impact, shall be within 0,5 % of that which would obtain for free fall.

6.7.3 Test procedure

Each of the requisite sample helmets specified in 6.1 shall be adjusted to its greatest possible wearing height and conditioned appropriately in accordance with 6.2.

Within 1 min of its removal from conditioning:

a) the sample shall be mounted on the appropriate headform (see 6.4.2), ensuring (minimal) clearance between the headband and the headform;

b) the striker shall be allowed to fall on to the helmet shell from a height of 1 000 mm ± 5 mm, measured from the point of impact on the helmet shell to the point of the striker. The impact point shall be within a circle of radius 50 mm centred on the top of the helmet. The helmet shall be tilted on the headform as necessary;

c) each of the helmets as specified in 6.1 shall be impacted in a different position.

Note shall be taken of whether or not contact is made between the striker and the headform or whether the contactable surface of the headform is visibly damaged. If necessary, the contactable metal surface of the headform shall be restored prior to a subsequent test.

6.8 Resistance to flame

6.8.1 Principle

The helmet shell is exposed to a standard flame.

6.8.2 Apparatus

The burner shall be suitable for propane gas, with a 10 mm diameter bore, an adjustable air vent and an appropriate size of jet. The system shall incorporate a pressure control device, suitable manometer and a tap.

The gas used shall be propane having a minimum purity of 95 %.

6.8.3 Test procedure

The gas pressure shall be adjusted to 3 430 Pa ± 50 Pa (350 mm H_2O ± 5 mm H_2O).

The flame shall be adjusted by means of the air vent so that the blue cone is clearly defined, although turbulent, and is 45 mm ± 5 mm long.

The test shall be performed on the helmet used for the shock absorption test at 50 °C.

With the helmet upside down, and angled to bring horizontal the plane tangential to the test point, and with the burner pointing upwards at 45° to the vertical, the end of the flame shall be applied to the outside of the shell, at any suitable point between 50 mm and 100 mm from the crown, for a period of 10 s.

The shell shall be examined for flaming 5 s after removal of the flame.

6.9 Chin strap anchorage

6.9.1 Principle

The helmet is supported on a headform and a tensile force is applied to the chinstrap.

6.9.2 Apparatus

The apparatus consists of the appropriate headform (see 6.4.2), suitably supported, and an artificial jaw comprising two cylindrical rollers of diameter 12,5 mm ± 0,5 mm, with their longitudinal axes