BS EN 812:2012

BSI Standards Publication

Industrial bump caps

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National foreword

This British Standard is the UK implementation of EN 812:2012. It supersedes BS EN 812:1998 which is withdrawn.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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Industrial bump caps

Casquettes anti-heurt pour l'industrie

Industrie-Anstoßkappen

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

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Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 812:2012) has been prepared by Technical Committee CEN/TC “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of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.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 812:1997.

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 C 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.

1 Scope

This European Standard specifies physical and performance requirements, methods of test and marking requirements for industrial bump caps.

Industrial bump caps are intended to provide protection to the wearer against the effects of striking his head against hard, stationary objects with sufficient severity to cause laceration or other superficial injuries. They are not intended to provide protection against the effects of falling or thrown objects, or moving or suspended loads.

NOTE An industrial bump cap should not be confused with an industrial safety helmet, as specified in EN 397.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 960:2006, *Headforms for use in the testing of protective helmets*

ISO 6487:2002, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
industrial bump cap
headgear, hereinafter referred to as a “bump cap”, intended to protect the wearer’s head against injury caused by striking the head against hard, stationary objects

NOTE It may consist of the items defined in 3.2, 3.3, 3.4, 3.5 and 3.6.

3.2
shell
hard, smoothly finished material that may provide the general outer form of the bump cap

NOTE It may be fitted with external coverings, which may provide a means of maintaining the bump cap on the head.

3.3
harness

3.3.1
assembly
complete assembly that may provide a means:

a) of maintaining the bump cap in position on the head;

b) of absorbing kinetic energy during an impact.

NOTE A harness may include the items defined in 3.3.2, 3.3.3, 3.3.4 and 3.3.5.

3.3.2
headband
part of the harness, if fitted, completely or partly surrounding the head above the eyes at approximately the largest horizontal circumference of the head

NOTE The headband may include a nape strap.

3.3.3
nape strap
adjustable or self-adjusting strap that fits behind the head below the plane of the headband

NOTE A nape strap may be an integral part of the headband, and may be elasticated.

3.3.4
cradle
assembly of parts of the harness, if fitted, in contact with the head, excluding the headband and nape strap, if fitted

NOTE The cradle may be either fixed or adjustable.

3.3.5
comfort band or sweatband
accessory to cover at least the inner front surface of the headband, if fitted, to improve wearer comfort

3.4
ventilation holes
holes provided in the shell, and/or external coverings, which can allow circulation of air inside the bump cap

3.5
chin strap
strap which fits under the chin to help secure the bump cap on the head

3.6
chin strap anchorages
means by which the material of the chin strap is attached to the bump cap

NOTE This includes, for example:

- the component(s) fitted to the ends of the chin strap material for this purpose;
- that part of the bump cap shell or of the headband where the chin strap is attached.

3.7
bump cap accessories
any additional parts for special purposes

NOTE Examples of accessories are chin strap, neck protector, nape strap, external coverings.

3.8
wearing height
vertical distance from the lower edge of the headband, if fitted, (or from the lower edge of the bump cap if there is no headband) to the highest point of the headform on which the bump cap is mounted, measured either at the front (midway between the sides of the headform) and at the side (midway between the front and back of the headform) whichever gives the greater distance

4 Physical requirements

4.1 Materials and construction

The bump cap may consist of a smooth shell, which may be enclosed by an outer covering. The bump cap shall incorporate means to absorb the energy of an impact.

NOTE Recommendations for materials and construction of bump caps are given in Annex A.

For those parts of the bump cap that come into contact with the skin, materials which are known to be likely to cause skin irritation or any adverse effect on health shall not be used.

There shall be no sharp edge, roughness or projection on any part of the bump cap which is in contact, or potential contact, with the wearer when the bump cap is worn, such as is likely to cause injury to the wearer.

Any part of the bump cap which can be adjusted, or removed by the wearer for the purpose of replacement, shall be so designed and manufactured as to facilitate adjustment, removal and attachment without the use of tools.

Any adjustment system incorporated within the bump cap shall be so designed and manufactured as not to become incorrectly adjusted without the wearer's knowledge under the foreseeable conditions of use.

4.2 Cradle

If the bump cap is fitted with a cradle incorporating textile tapes, their individual widths shall be not less than 15 mm, and the total of the widths of the tapes radiating from their intersection shall be not less than 72 mm.

NOTE Further reference to textile tapes is made in Annex A.

4.3 Comfort band or sweatband

If a sweatband is provided, it shall cover the inner front surface of the headband, if fitted, for a length of not less than 100 mm each side of the centre of the forehead. The length shall be measured with a flexible measure along a line (10 ± 1) mm above the lower edge of the headband. It shall have a width not less than that of the headband over the length which it covers.

NOTE Recommendations regarding characteristics of the sweatband, if fitted, are given in Annex A.

4.4 Retention

Means shall be provided to secure the bump cap on the wearer's head. Any one of the following is deemed to satisfy this requirement:

a) external coverings to the shell which incorporate an elasticated rear section, passing below the plane of the headband;

b) a nape strap;

c) a chin strap or means of attaching one.

4.5 Headband/nape strap

The length of the headband or the nape strap, if fitted, shall be adjustable in increments of not more than 5 mm.

4.6 Chin strap

Unless specific provision is made for the bump cap to be retained on the head by other means, the bump cap or the harness shall be fitted with a chin strap or with means of attaching one. Any chin strap supplied with the bump cap shall be not less than 10 mm wide when un-tensioned and shall be attached either to the shell or to the headband, if fitted.

4.7 Ventilation

If the bump cap is provided with holes for ventilation purposes, the total area of such holes shall be not less than 150 mm^2 and not more than 450 mm^2.

NOTE 1 Means of closing the ventilation holes may be provided.

NOTE 2 If such means are provided, the holes should be opened to the maximum extent when the above measurement is performed.

NOTE 3 Recommendations regarding design for ventilation are given in Annex A.

4.8 Accessories

For the fixing of bump cap accessories, specified in the information accompanying the bump cap in accordance with 7.2.3, the required fixing devices, or appropriate holes in the bump cap, shall be provided by the bump cap manufacturer.

5 Performance requirements

5.1 Mandatory requirements

5.1.1 Impact protection

When a bump cap is tested by the method given in 6.5, the force transmitted to the headform shall not exceed 15,0 kN. This requirement shall be satisfied by bump caps treated in accordance with the appropriate conditioning processes given in 6.2, as specified by the list of tests given in 6.1.

5.1.2 Resistance to penetration

When a bump cap is tested by the method given in 6.6, the point of the striker shall not contact the surface of the headform. This requirement shall be satisfied by bump caps treated in accordance with the appropriate conditioning processes given in 6.2, as specified by the list of tests given in 6.1.

5.1.3 Chin strap anchorages

When a bump cap is fitted with chin strap anchorages, these shall be tested in accordance with 6.7. The artificial jaw shall be released at a force of not less than 150 N and not more than 250 N, due to failure only of the anchorages.

5.2 Optional requirements

5.2.1 Very low temperature (–20 °C or –30 °C)

When tested for impact protection by the method given in 6.5, the requirement of 5.1.1 shall be satisfied by one bump cap which has been conditioned in accordance with 6.2.

When tested for resistance to penetration by the method given in 6.6, the requirement of 5.1.2 shall be satisfied by a second bump cap, which has been conditioned in accordance with 6.2.

Bump caps claimed to meet these requirements shall state this fact on the label attached to the bump cap, in accordance with 7.2.2.

5.2.2 Resistance to flame

When tested by the method given in 6.8, the materials of the shell and/or external coverings shall not burn with the emission of flame when a period of 5 s has elapsed after removal of the flame.

Bump caps claimed to meet this requirement shall state this fact on the label attached to the bump cap, in accordance with 7.2.2.

5.2.3 Electrical properties

When tested by all three of the methods given in 6.9, 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 only 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 bump cap whose shell was in contact with a live conductor.

Bump caps claimed to meet this requirement for all three tests shall state this fact on the label attached to the bump cap, in accordance with 7.2.2.

6 Test requirements

6.1 Samples

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

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

The minimum number of samples and conditions required for one set of tests is as follows.

Mandatory tests:

— 1 bump cap for impact protection test at –10 °C;

— 1 bump cap for impact protection test, following water immersion;

— 1 bump cap for impact protection test at +50 °C;

— 1 bump cap for impact protection test, following artificial ageing;

— 1 bump cap for resistance to penetration test at –10 °C;

— 1 bump cap for resistance to penetration test, following water immersion;

— 1 bump cap for resistance to penetration test at +50 °C, then for chin strap anchorages test (if fitted);

— 1 bump cap for resistance to penetration test, following artificial ageing.

Optional tests:

— 2 bump caps, one each for impact protection and resistance to penetration tests, following exposure to very low temperature (–20 °C or –30 °C, as appropriate);

— 1 bump cap for each of the three electrical properties tests;

— 1 bump cap for flame resistance test.

6.2 Conditioning for testing

6.2.1 Temperature conditioning cabinet

The temperature conditioning cabinet shall be sufficiently large to ensure that the bump caps can be positioned so that they do not touch one another or the sides of the cabinet. It shall be fitted with a fan to provide effective air circulation. These requirements apply to cabinets used for temperature conditioning at +50 °C, +20 °C, –10 °C, –20 °C, –30 °C.

6.2.2 Low temperature

The bump cap shall be exposed to a temperature of (–10 ± 2) °C for between 4 h and 24 h.

6.2.3 High temperature

The bump cap shall be exposed to a temperature of (50 ± 2) °C for between 4 h and 24 h.

6.2.4 Water immersion

The bump cap shall be totally immersed in water at (20 ± 2) °C for between 4 h and 24 h.

6.2.5 Artificial ageing

NOTE An alternative conditioning method is given in Annex B.

6.2.5.1 Apparatus

A fused silica envelope high pressure xenon lamp, of 450 W nominal power, operated in accordance with the lamp manufacturer's instructions.

NOTE Suitable lamp references are XBO–450W/4 and CSX–450W/4.

A means to support the bump caps, so that they are exposed to the radiation and do not touch one another or the sides of the cabinet.

6.2.5.2 Procedure

The bump cap shall be secured so that the vertical axis through the crown of the bump cap (as worn) is perpendicular to the axis of the lamp and the distance between the crown of the bump cap and the axis of the lamp is (150 ± 5) mm.

The sample shall be exposed to the radiation for (400 ± 4) h. It shall then be removed and allowed to return to laboratory ambient conditions.

6.2.6 Very low temperature

The bump cap shall be maintained at a temperature of (–20 ± 2) °C or (–30 ± 2) °C, as appropriate, for between 4 h and 24 h.

6.3 Testing atmosphere

Bump caps shall be tested in an atmosphere having a temperature of (22 ± 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).

The profile below the reference line may be varied to suit the method of mounting.

6.4.2 Selection of size

Three sizes of headform from the range in EN 960:2006 are specified in this European Standard, size designations 525, 555 and 585 (equivalent to codes D, G and K, respectively, EN 960:1994).

Bump caps with adjustable harnesses shall be tested on the most appropriate size headform (from size designations 525, 555 and 585) as selected by adjusting the harness to the middle size of the adjustment range.

Bump caps with non-adjustable harnesses shall be tested on the most appropriate size of headform (from size designations 525, 555 and 585).

6.5 Impact protection

6.5.1 Principle

Impact protection is measured by the direct measurement of the maximum force transmitted to a rigidly mounted headform on which the bump cap is fitted.

6.5.2 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.

A striker, having a mass of $5{,}0\ ^{+0{,}1}_{-0}$ kg and a flat striking face of (100 ± 2) mm diameter, shall be positioned above the headform so that its axis coincides with the central vertical axis of the headform, and so that it can 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 be obtained for free fall.

The impact force shall be measured by a non-inertial force transducer firmly attached between the base and the headform and 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 headform(s) shall be rigidly mounted in two orientations, such that the vertical axis, which passes through the centres of the striker and the force transducer, also passes through a point in the headform (defined by the intersection of its central vertical axis with the AA' plane), when the central vertical axis of the headform is inclined backwards at angles of 30° and 60° respectively.

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.

6.5.3 Procedure

Each of the requisite sample bump caps specified in 6.1 shall be adjusted to its greatest possible wearing height (if applicable) and conditioned appropriately in accordance with 6.2.

Position the headform such that its central vertical axis is inclined backwards at an angle of 30°.

Within 1 min of its removal from conditioning:

a) mount the sample on the headform, front upwards, in the manner in which it is intended to be worn on the head, ensuring (minimal) clearance between the headband, if fitted, and the headform;

b) allow the striker to fall on to the bump cap from a height of (250 ± 5) mm, measured from the point of impact on the bump cap to the underside of the striker.

NOTE This corresponds to an impact energy of nominally 12,5 J.

Make a recording allowing the determination of the maximum force transmitted.

c) Reverse the bump cap on the headform and repeat test b) on the back of the bump cap.

Reposition the headform such that its central vertical axis is inclined backwards at an angle of 60°. In the case of samples initially conditioned in accordance with 6.2.3, 6.2.4, 6.2.5 or 6.2.6, place the sample back into the conditioning chamber for at least 1 h. Within 1 min of the removal of such samples from conditioning, and for all other samples, repeat tests a) to c).

6.6 Resistance to penetration

6.6.1 Principle

A test striker is allowed to fall on to a rigidly mounted headform, on which the bump cap is fitted. Note is taken of whether or not contact is made between the striker and the headform.

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.

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: 500^{+10}_{0} g;

— angle of point: (60 ± 0,5)°;

— radius of point: (0,5 ± 0,1) mm;

— minimum height of cone: 40 mm;

— hardness of tip: between 50 and 45 Rockwell C.

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 be obtained for free fall.

6.6.3 Procedure

Adjust each of the requisite sample bump caps specified in 6.1 to its greatest possible wearing height (if applicable) and condition appropriately in accordance with 6.2.

Within 1 min of its removal from conditioning:

a) mount the sample on the headform, ensuring (minimal) clearance between the headband, if fitted, and the headform;

b) allow the striker to fall on to the bump cap from a height of (500 ± 5) mm, measured from the point of impact on the bump cap to the point of the striker. The impact point shall be within a circle of radius 50 mm centred on the top of the bump cap.

Take note of whether or not contact is made between the striker and the headform. If necessary, restore the contactable metal surface of the headform prior to a subsequent test.

6.7 Chin strap anchorages

6.7.1 Principle

The bump cap is supported on a headform and a tensile force is applied to a chin strap.

6.7.2 Apparatus

The apparatus consists of the appropriate headform (see 6.4.2), suitably supported, and an artificial jaw comprising 2 cylindrical rollers of diameter (12,5 ± 0,5) mm, with their longitudinal axes separated by (75 ± 2) mm. A means of applying a known variable force to the artificial jaw is also required.

NOTE The chin strap is either the chin strap normally supplied by the bump cap manufacturer for use with the bump cap or a suitable slave chin strap if the bump cap manufacturer does not normally supply one.

6.7.3 Procedure

The test shall be performed on the bump cap used for the resistance to penetration test at 50 °C.

Mount the bump cap on the headform and pass the chin strap around the artificial jaw.

Apply a tensile force of 150 N to the artificial jaw. Increase this force at a rate of (20 ± 2) N/min until the artificial jaw is released, due to failure only of the anchorage(s).

Record the maximum force measured during the test and take note of whether the anchorage(s) failed.

6.8 Resistance to flame

6.8.1 Principle

The outer surface of the bump cap 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

Adjust the gas pressure to (3 430 ± 50) Pa.

NOTE This is equal to (350 ± 5) mm water.

Adjust the flame by means of the air vent so that the blue cone is clearly defined, although turbulent, and is (45 ± 5) mm long.

With the bump cap 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, apply the end of the flame to the outside of the bump cap, at any suitable point between 50 mm and 100 mm from the crown, for a period of 10 s. Examine the shell for flaming, 5 s after the removal of the flame.

6.9 Electrical properties

6.9.1 Test 1

The leakage current between the outside and inside of the bump cap and chin strap (as supplied by the bump cap manufacturer) is measured at a specified voltage, when the bump cap is mounted on a metal headform.

Immerse the sample bump cap and chin strap completely in fresh tap water at room temperature for a period of (15 ± 2) min. Then remove the bump cap from the water and allow to drain not longer than 20 min.

Mount the sample bump cap crown uppermost on an appropriate sized aluminium headform, with the chin strap firmly secured.

Apply an alternating test voltage at nominally 50 Hz or 60 Hz between the aluminium headform and a suitably insulated hand-held metal probe of 4 mm diameter and with a hemispherical radiused end.

Apply the probe at any point on the external surface of the bump cap shell situated at, or above, its lower edge. Repeat the test in order to investigate a number of test points.

At each test point increase the voltage to (1 200 ± 25) V (a.c.), and maintain at this value for 15 s. Record the leakage current at this voltage together with any evidence of breakdown.

6.9.2 Test 2

The leakage current between the inside and the outside of the bump cap shell is measured at a specified voltage.

Before the test, place the bump cap shell for (24 ± 0,5) h in a (3 ± 0,2) g/l solution of sodium chloride at a temperature of (20 ± 2) °C. Then remove the bump cap shell, wipe and place upside down in a container of appropriate size. Fill the container and the bump cap shell with the sodium chloride solution, up to 10 mm below the lower edge of the shell.

Apply an alternating test voltage at nominally 50 Hz or 60 Hz between an electrode immersed in the solution inside the bump cap shell and another electrode in the container, outside of the bump cap shell.

Increase the voltage to (1 200 ± 25) V (a.c.) and maintain at this value for 15 s. Record the leakage current at this voltage, together with any evidence of breakdown.

NOTE The orientation of the bump cap shell in the sodium chloride solution for the test should be adjusted where necessary in order to accommodate shells whose lower edge is not straight.

6.9.3 Test 3

The leakage current between any two points on the surface of the bump cap shell is measured at a specified voltage.

Ensure that the shell of the bump cap is dry before the test.

Apply an alternating test voltage at nominally 50 Hz or 60 Hz between two suitably insulated hand-held metal probes of 4 mm diameter and with hemispherical radiused ends.

Apply the probes at any two points on the surface of the bump cap shell (inside and/or outside) located not closer than 20 mm to each other. Repeat the test in order to investigate a number of pairs of test points.

At each test point, increase the voltage to (1 200 ± 25) V (a.c.) and maintain at this value for 15 s. Record the leakage current at this voltage, together with any evidence of breakdown.

7 Marking and information

7.1 Markings on the bump cap

Every bump cap claimed to comply with the requirements of this European Standard shall carry durable marking giving the following information:

a) number of this European Standard;

b) name or identification mark of the manufacturer;

c) year and quarter of manufacture;

d) type of bump cap (manufacturer’s designation); this shall be marked on both the shell and the harness, if fitted;

e) size or size range (in cm); this shall be marked on both the shell and the harness, if fitted.

The size of such text shall be no less than 8-point.

7.2 Additional information to be supplied by the manufacturer

7.2.1 A durable label shall be attached to each bump cap giving the following information, provided precisely and comprehensively in the language of the country of sale.

“WARNING! THIS IS NOT AN INDUSTRIAL SAFETY HELMET.”

“This bump cap does not provide protection against the effects of falling or thrown objects, or moving suspended loads. It should not be used instead of an industrial safety helmet as specified in EN 397.”

“This bump cap is made to absorb the energy of a blow by partial destruction or damage to the shell and the harness, if fitted, and even though such damage may not be readily apparent, any bump cap subjected to severe impact should be replaced.”

“For adequate protection this bump cap must fit or be adjusted to the size of the user’s head.”

“The attention of users is also drawn to the danger of modifying or removing any of the original component parts of the bump cap, other than as recommended by the bump cap manufacturer. Bump caps should not be adapted for the purpose of fitting attachments in any way not recommended by the bump cap manufacturer.”

“Do not apply paint, solvents, adhesives or self-adhesive labels, except in accordance with instructions from the bump cap manufacturer.”

The size of such text shall be no less than 8-point.

7.2.2 Each bump cap shall carry moulded or impressed marking or shall carry a durable self-adhesive label stating the optional requirements complied with. The markings are given in Table 1.

Table 1 — Optional requirements

Optional requirement	Marking/label
Very low temperature	–20 °C or –30 °C, as appropriate
Resistant to flame	F
Electrical properties	440 V (a.c.)

The size of such text shall be no less than 8-point.

7.2.3 The following information, provided precisely and comprehensibly in the language of the country of sale, shall accompany each bump cap:

a) the name and address of the manufacturer;

b) instructions or recommendations regarding storage, use, cleaning, maintenance, servicing and disinfection. Substances recommended for cleaning, maintenance or disinfection shall have no adverse effect on the bump cap and shall be not known to be likely to have any adverse effect upon the wearer, when applied in accordance with the manufacturer’s instructions;

c) details of suitable accessories and appropriate spare parts;

d) the significance of the markings given in accordance with 7.1 and guidance regarding the limits of use of the bump cap, corresponding to the respective risks;

e) relevant information regarding the obsolescence deadline or period of obsolescence of the bump cap and its component parts;

f) relevant information regarding details of the type of packaging suitable for transportation of the bump cap.

The size of such text shall be no less than 8-point.

Annex A
(informative)

Recommendations for materials and construction

The materials used should be of durable quality, i.e. their characteristics should not undergo appreciable alteration under the influence of ageing or of circumstances of use to which the bump cap is normally subjected (exposure to sun, rain, cold, dust, vibrations, contact with the skin, effects of sweat or of products applied to the skin or hair).

Bump caps should be as light as possible without prejudicing design strength and efficiency.

Whilst not mandatory in this European Standard, the provision of a sweatband is recommended, in order to improve wearer comfort. The materials of the sweatband should satisfy the following characteristics:

Thickness: 0,8 mm minimum;

pH value: 3,5 minimum;

Washable material content: 6 % maximum;

and, if made from leather:

Proportion dichloromethane extractable materials: 4 % to 12 %.

For optimum comfort the cradle, if fitted, should be made from textile tapes. This material also affords optimum accommodation of the shape of the wearers' heads, and is more acceptable with regard to perspiration and irritation.

The design of the bump cap should provide for maximal adjustment of the harness within the shell, in order to optimize wearer comfort.

Any devices fitted to the bump cap should be so designed that they are unlikely to cause any injury to the wearer in the event of an accident. In particular, there should be no metallic or other rigid projections on the inside of the bump cap such as might cause injury.

No part of the bump cap should have sharp protruding edges.

Where stitching is used to secure the harness to the shell, it should be protected against abrasion.

Where ventilation holes are provided, it should be noted that ventilation may be improved when fresh air is able to enter the bump cap around its lower edge and to exit via holes in the shell located in the upper one third of the shell.

The design of the bump cap should be such as not to interfere with the wearing of other items of personal protective equipment.

Any chin strap fitted to the bump cap should not come in contact with the ears.

Annex B
(informative)

Alternative method for artificial ageing

The bump cap submitted to artificial ageing should be exposed to the radiation of a xenon arc lamp. The radiant energy of the lamp should be filtered to provide a spectral power distribution that closely approximates that of terrestrial daylight.

The bump cap should be fixed on a cylindrical holder concentric to the lamp and which rotates at a speed of 1 rev/min to 5 rev/min around its axis.

Each bump cap which will subsequently be tested for impact protection or for penetration should be orientated so that the area of test is directed towards the lamp. The plane tangential to the shell at this point should be normal to a radius of the cylindrical holder.

The radiant energy incident in the plane of the test areas should be either measured or calculated from information provided by the manufacturer of the test apparatus. The exposure interval should be adjusted so that the exposed samples receive a total energy of 1 GJ/m^2 over the wavelength range 280 nm to 800 nm.

The samples should be sprayed with distilled or demineralised water (having a conductivity below 5 μS/cm) intermittently with a cycle of 18 min of spraying and 102 min without spraying. During the latter periods, the measured relative humidity should be (50 ± 5) %.

The temperature within the test chamber should be measured with a black standard thermometer placed at the same distance from the lamp as the exposed test areas of the bump caps. The temperature should be maintained at (70 ± 3) °C be in accordance with EN ISO 4892-1, EN ISO 4892-2 and EN ISO 4892-3.

NOTE 1 Not all available test apparatus, otherwise meeting the requirements of EN ISO 4892-1, EN ISO 4892-2 and EN ISO 4892-3, will incorporate sample holder frames of diameter sufficient to accommodate complete bump caps.

NOTE 2 The position of the water sprays may require adjustment in order to avoid interference with the test samples.

NOTE 3 The energy output of the xenon arcs should be capable of being reduced below normal operational levels, so as to maintain acceptable intensities in the sample surface plane required by this procedure.

Annex C
(informative)

Significant technical changes between this European Standard and EN 812:1997

The significant changes with respect to the first edition of EN 812 are as listed below.

Table C.1 — Significant changes between this European Standard and EN 812:1997

Clause/paragraph/table/figure	Change
Clause 2	The normative references in Clause 2 and in the text have been updated. EN 960 has been dated throughout the text.
6.4.1, 1st paragraph	Cross references have been updated.
6.4.2	Code letters have been extended to size designations and between brackets EN 960:1994 equivalent code letters.
Annex ZA	Has been updated.
Bibliography	Has been added according to references in Annex B.
NOTE The technical changes referred include the significant technical changes from the EN revised but is not an exhaustive list of all modifications from the previous version.	

Annex ZA
(normative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC Personal Protective Equipment

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC Personal Protective Equipment.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and the EU Directives

EU Directive 89/686/ECC, Annex II	Clauses of this European Standard	Qualifying remarks/Notes
1.2.1 Absence of risks and other inherent nuisance factors	4.6, 5.1.3, 5.2.2, 5.2.3	
1.3.1 Adaptation to users morphology	4.5	
1.3.2 Lightness and design strength	5.1.1, 5.1.2, 5.2.1	
1.4 Information supplied by the manufacturer	7	
2.2 PPE enclosing the parts of the body to be protected	4.2, 4.3	
2.4 PPE subject to ageing	7.2.3 e)	
2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	7	
3.1.1 Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	5.1.1, 5.1.2	

Bibliography

[1] EN 397, *Industrial safety helmets*

[2] EN ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance (ISO 4892-1:1999)*

[3] EN ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps (ISO 4892-2:2006)*

[4] EN ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps (ISO 4892-3:2006)*

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