BS EN 13781:2012

BSI Standards Publication

Protective helmets for drivers and passengers of snowmobiles and bobsleighs

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National foreword

This British Standard is the UK implementation of EN 13781:2012. It supersedes BS EN 13781:2002, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/6/6, Protective helmets for sport and leisure.

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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English Version

Protective helmets for drivers and passengers of snowmobiles and bobsleighs

Casques de protection pour conducteurs et passagers de motoneiges et bobsleighs

Schutzhelme für Fahrer und Mitfahrer von Schneemobilen und Bobs

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

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Foreword

This document (EN 13781:2012) 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of an identical text or by endorsement, at the latest by August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.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 13781:2001.

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 B 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.

Introduction

The intention of helmets is to reduce the risk of injury to the skull and part of the head surrounded by the helmet.

The protection given by a helmet depends on the circumstances of the accident and wearing a helmet cannot always prevent death or long-term disability.

A proportion of the energy of an impact is absorbed by the helmet, thereby reducing the force of the blow sustained by the head. The structure of the helmet may be damaged in absorbing this energy and any helmet that sustains a severe blow should be replaced even if damage is not apparent.

To achieve the performance of which it is capable, and to ensure stability on the head, a helmet should be as closely fitting as possible consistent with comfort. In use it is essential that the helmet is securely fastened, with any chin strap under proper tension at all times.

1 Scope

This European Standard specifies requirements and test methods for protective helmets for drivers and passengers of snowmobiles and bobsleighs.

Additional requirements for eye protectors and face shields are specified in EN 13178.

2 Normative references

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

EN 352-1, *Hearing protectors — General requirements — Part 1: Ear muffs*

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

EN 13087-6:2012, *Protective helmets — Test methods — Part 6: Field of vision*

EN 13178, *Personal eye-protection — Eye protectors for snowmobile users*

ISO 6487, *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
protective helmet for user of snowmobile and of bobsleigh (abbreviated to "helmet" below)
helmet primarily intended to protect the wearer's head against impact, which may provide additional protection such as protection against cold and noise

3.2
shell
hard part of the helmet that gives it its general shape

3.3
protective padding
material used to absorb impact energy

3.4
comfort padding
material provided for the wearer's comfort

3.5
retention system
complete assembly by means of which the helmet is maintained in position on the head, including any devices for adjustment of the system or to enhance the wearer's comfort

3.6
chin strap
part of the retention system consisting of a strap that passes under the wearer's jaws to keep the helmet in position

3.7
chin cup
accessory of the chin strap that fits round the point of the wearer's chin

3.8
peak
extension of the shell above the eyes

3.9
lower face cover
detachable part of the helmet covering the lower part of the face

3.10
chin guard
integral part of the helmet covering the lower part of the face and designed to protect against impact

3.11
neck curtain
part of the helmet attached to the lower edge designed to protect against adverse weather conditions, dirt and small stones

3.12
visor
transparent protective screen integral with the helmet extending over the eyes and covering part of the face

3.13
eye protectors
tansparent protectors that enclose and cover the eyes

3.14
face shield
protective device extending over the eyes and covering part of the face

3.15
basic plane of the human head
plane at the level of the opening of the external auditory mastus (external ear opening) and the lower edge of the orbits (lower edge of the eye sockets)

3.16
basic plane of the headform
plane which corresponds to the basic plane of the human head

3.17
reference plane
construction plane parallel to the headform at a distance from it which is a function of the size of the headforms

3.18
central vertical axis
line relative to a human head or headform or helmet that lies in the plane of symmetry, and that is normal to the basic plane at a point equidistant from the front and back of the headform or (for helmets) of headform that simulates the head that the helmet is intended to fit

3.19
longitudinal vertical median plane
vertical plane of symmetry of a human head or headform or of a helmet as it is intended to be worn on the head

[Equivalent to EN 960:2006, 2.8 “vertical longitudinal plane”.]

3.20
central transverse vertical median plane
plane at right angles to the longitudinal vertical median plane and passing through the central vertical axis

[Equivalent to EN 960:2006, 2.9 “vertical transverse plane”.]

3.21
size (of a helmet)
size of a reference headform defined in EN 960:2006

3.22
protective helmet type
category of protective helmets which do not differ in such essential respects as the trade name or mark, or the materials or dimensions of the shell, of the retention system or of the protective padding

Note 1 to entry: A protective helmet type may include a range of helmet sizes, provided that the thickness of the protective padding in each size in the range is at least equal to that in the protective helmet which when subjected to the tests satisfied the requirements of this European Standard.

3.23
snowmobile
off-road vehicle moved on the snow by a track driven by a gasoline engine and which is steered by turning front skies

3.24
bobsleigh
sports equipment without any inside or outside driving power, for using in downhill gliding in ice channels

4 Requirements

4.1 Construction

4.1.1 The basic construction of the helmet shall be in the form of a shell, containing means of absorbing impact energy, and a retention system. The helmet usually has also connection systems for accessories.

4.1.2 The helmet may be fitted with accessories such as a communication system, hearing protectors, eye protectors, face shield or a lower face cover. It may also have a detachable peak.

4.1.3 The design of the helmet shall be such that the temperature in the space between the head and the helmet does not rise or decrease inordinately. Ventilation holes or other means may be provided in the shell.

4.1.4 The outer surface of the shell shall be perfectly smooth. Above the reference plane, the shape shall be in the form of a continuous convex curve, except where shaping is provided for functional purposes. Below the reference plane, irregularities in the curve shall be smoothly faired. The shell shall not incorporate an integral peak but may incorporate an integral lower face cover.

4.1.5 There shall be no permanently fixed external projections greater than 5 mm above the outer surface of the shell. Any external projections other than press-fasteners shall be smooth and adequately faired. Rivet heads shall be radiused and shall not project more than 2 mm above the outer surfaces of the shell.

4.1.6 There shall be no inward-facing sharp edges on the inside of the helmet.

4.1.7 The integrated components of the helmet which are intended to protect the head of the user shall be assembled such that they shall not become easily detached or move when tested in accordance with 5.1.

4.1.8 Where means for attaching eye protectors are not provided, the profile at the front edge shall not prevent the wearing of goggles.

Testing shall be in accordance with 5.1.

4.2 Compatibility with additional devices

No component or device may be fitted to or incorporated in the protective helmet unless it is designed in such a way that it will not cause injury. When the component or device is fitted to or incorporated in the helmet, the helmet shall still comply with the requirements of this European Standard.

4.3 Protected area

The shell shall cover all areas above plane AA′ in Figure 1, and shall extend downwards at least as far as the lines CDEF on both sides of the headform.

4.4 Retention system

4.4.1 The helmet shall be held in place on the wearer's head by means of a retention system which is secured under the lower jaw. All parts of the retention system shall be permanently attached to the system or to the helmet. Testing shall be in accordance with 5.1.

4.4.2 If the retention system includes a chin strap the strap shall be no less than 20 mm wide under a load of (150 ± 5) N applied in accordance with 5.6.2. The chin strap shall not include a chin cup.

4.4.3 The device to open the retention system shall not be capable of opening other than as a result of a deliberate act. In the case of a press-fastener opening device, the press-fastener shall be recessed, the surface to which the pressure is applied shall be fitted with a fairing about its whole periphery so that opening does not occur when the surface is pressed with a sphere of 100 mm diameter. Testing shall be in accordance with 5.1.

4.4.4 If a retention system includes a quick-release mechanism, then the method of release of this mechanism shall be self-evident. Any levers, tabs, buttons or other components which need to be operated to release the mechanism shall be coloured red, those parts of the rest of the system which are visible when closed shall not be similarly coloured, and the mode of operation shall be permanently indicated. Testing in accordance with 5.1.

4.4.5 The retention of the helmet on the head by the retention system shall be verified in accordance with 5.6. When a helmet type includes a range of sizes, the helmet subjected to the test shall be that presenting the least favourable conditions (such as the thickest padding).

4.5 Materials

4.5.1 The characteristics of the materials used in the manufacture of helmets shall be known not to undergo appreciable alteration under the influence of ageing or of the circumstances of use to which the helmet is normally subjected, such as exposure to sun, extremes of temperature and rain.

For those parts of the helmet coming into contact with the skin, the materials used shall be known not to undergo appreciable alteration through the effect of perspiration or of toilet preparations. The manufacturer shall not use materials known to cause skin troubles. The suitability of a proposed new material shall be established by the manufacturer.

4.5.2 After the performance of one of the prescribed tests, the protective helmet shall not break or deform in a way which is dangerous to the wearer.

4.6 Field of vision

A helmet size shall be selected from among the existing sizes of a helmet type which is likely to yield the least favourable result. The helmet shall be placed on the appropriate size of headform according to the procedure specified in EN 13087-6:2012, 5.4.

There shall be no occultation in the field of vision given in Figure 2.

a) horizontally: two segments of dihedral angles symmetrical in relation to the median longitudinal vertical plane of the headform and situated between the reference and the basic planes.

   Each of these dihedral angles is defined by the longitudinal vertical median plane of the headform and the vertical plane forming an angle of no less than 105° with the median longitudinal vertical plane and whose edge is the straightline L K;

b) upwards: a dihedral angle defined by the reference plane of the headform and a plane forming an angle of no less than 7° with the reference plane and whose edge is the straight line L_1, L_2 the points L_1 and L_2 representing the eyes;

c) downwards: a dihedral angle defined by the basic plane of the headform and a plane forming an angle of no less than 45° with the basic plane and whose edge is the straight line K_1 K_2.

4.7 Face shields

4.7.1 The helmet, fitted with the face shield being tested, shall be placed on a test headform of appropriate size, selected from those listed in Table 3.

4.7.2 When the face shield is in the raised position, the angle between the secant MN shown in Figure 3 and the horizontal shall be at least 5°, with the point M situated below the horizontal plane passing through point N.

4.8 Face-shields and eye protectors

Face-shields and eye protectors used with the helmet shall fulfil the requirements of EN 13178.

4.9 Energy absorption efficiency

The absorption efficiency shall be considered sufficient where the resultant acceleration measured at the centre of gravity of the headform at no time exceeds 275 g and the Head Injury Criterion does not exceed 2400, when tested in accordance with 5.4.

4.10 Mass

The mass of the helmet should be as light as possible, and the mass given by the manufacturer shall be verified.

4.11 Conspicuity marking (optional)

4.11.1 General

The helmet may be provided with reflective materials, which contribute to the conspicuity of the user both during the daytime and at night from the front, from the rear, from the right and from the left. These reflective materials shall not be removable from the helmet and shall fulfil the requirements of 4.11.2 to 4.11.4.

4.11.2 Geometry

The total surface area and shape of the reflective part used shall be such that in each direction, corresponding to one of the areas defined in the figure below, visibility is ensured by a surface area of at least 18 cm^2 of simple shape and measured by application on a plane.

In each surface area of minimum 18 cm^2 it shall be possible to mark:

— either: a circle of 40 mm diameter;

— or: a rectangle at least 12,5 cm^2 in surface area and at least 20 mm in width.

Each of these surfaces shall be situated as near as possible to the point of contact with the shell of a vertical plane parallel (to the point of contact with the shell of a vertical plane parallel) to the longitudinal vertical plane of symmetry, to the right and to the left, and as near as possible to the point of contact with the shell of a vertical plane perpendicular to the longitudinal plane of symmetry, to the front and rear.

4.11.3 Colorimetric test

Each of the retroreflective areas shall emit white light when it is illuminated with a standard illuminant A, with an observation angle of 1/3° and an illumination angle $\beta_1 = \beta_2 = 0°$ (or $\beta_1 = \pm 5°$, $\beta_2 = 0°$); in other words: the trichromatic coordinates “x” and “y” of the reflected light shall lie within the zone specified below:

White:

limit towards blue	$x \geq 0{,}310$
limit towards yellow	$x \leq 0{,}500$
limit towards green	$y \leq 0{,}150 + 0{,}640\ x$
limit towards green	$y \leq 0{,}440$
limit towards purple	$y \geq 0{,}050 + 0{,}750\ x$
limit towards red	$y \geq 0{,}382$

4.11.4 Photometric test

The minimum value of the luminous intensity coefficient of a surface area of 18 cm^2 of material when revolved shall not be less than the values specified in the table below, expressed in millicandelas per lux.

Table 1 — Angles of divergence and illumination

Angle of divergence	Angle of illumination		
	0°	20°	40°
20′	100	60	25

4.12 Noise (optional)

If the manufacturer claims noise protection, the helmet shall fulfil the requirements of EN 352-1.

5 Testing

5.1 General inspection

The samples are inspected visually.

5.2 Sampling and use of samples

Table 2 — Sampling and conditioning of helmets

	Number of helmets to be conditioned			Total
Test	Ambient temperature and hygrometry conditioning	Low-temperature conditioning	Ultra-violet conditioning	
Impact absorption (Flat anvil) (Kerbstone)	 1 1	 1 1	 1 1	 6
Retention system	1			1

The laboratory shall select the helmets to be tested so that the whole size range is covered. The total amount of the samples shall not exceed 12.

5.3 Types of conditioning

5.3.1 Solvent conditioning

Prior to any type of further conditioning for mechanical tests, each helmet shall be subjected to solvent conditioning.

Take a cotton cloth approximately 150 mm square and a quantity approximately 25 ml of a solvent consisting of test liquid (70 % octane and 30 % toluene). Using the cloth soaked in the solvent, apply the solvent to all those regions of the outside surface of the helmet shell within 50 mm of the chin strap fixings, and keep these regions wet within the solvent for (7,5 ± 2,5) s. Repeat the procedure on the remainder of the external surface including any chin guard, keeping these regions wet for (12,5 ± 2,5) s. Do not carry out any further conditioning or testing during the following 30 min.

5.3.2 Ambient temperature and hygrometry conditioning

The helmet shall be exposed to a temperature of (25 ± 5) °C and a relative humidity of (65 ± 5) % for at least 4 h.

5.3.3 Low temperature conditioning

The helmet shall be exposed to a temperature of (- 40 ± 2) °C for no less than 4 h and no more than 6 h.

5.3.4 Ultraviolet radiation conditioning

The outer surface of the protective helmet shall be exposed to ultraviolet irradiation by a 125 W xenon-filled quartz lamp for 48 h at a range of 25 cm evenly over the exterior surface of the sample (e.g. by rotation).

NOTE An alternative test method for artificial ageing is described in EN 967.

5.4 Impact absorption test

5.4.1 Description of test

5.4.1.1 Principle

Impact absorption capacity is determined by recording against time the acceleration imparted to a headform fitted with the helmet, when dropped in guided free fall at a specific impact velocity upon a fixed flat steel anvil or steel anvil simulating a kerbstone.

5.4.1.2 Marking of points of impact

Before conditioning, mark the points of impact selected in accordance with those shown by Figure 4.

5.4.1.3 Positioning of the helmet

5.4.1.3.1 The helmet shall be positioned on a headform of appropriate size selected from Table 3.

Helmets of sizes not listed in Table 3 shall be tested with the next smallest headform listed. Helmets of size 60 or greater shall be tested with the headform size designation “605”. However, at the request of the manufacturer and by agreement with the test house responsible for the tests, helmets of size 62 or larger may be tested with the headform size designation “625”.

The helmet is then tipped towards the rear so that the front edge of the helmet in the median plane is displaced by 25 mm; the retention system is then adjusted under the chin of the headform. If the system includes an adjustable chin strap, the strap is tightened as much as possible.

5.4.1.3.2 The test headform shall be so positioned that the designated point on the helmet is vertically above the centre of the anvil. The plane tangential to the point of impact shall be horizontal.

5.4.1.4 Test

The impact shall be carried out within 45 s. All subsequent impacts shall be completed no more than 5 min after taking the sample out of the conditioning container.

The drop height shall be such that the unit constituted by the headform and helmet falls on the test anvil at a velocity which immediately before impact, is equal to:

(6,0 ± 0,1) m/s for the anvil specified in 5.4.2.3.1.

(6,0 ± 0,15) m/s for the anvil specified in 5.4.2.3.2.

5.4.1.5 Measurements

The velocity of the moving mass is measured between 1 cm and 6 cm before impact to an accuracy of 1 %. The acceleration against time at the centre of gravity of the headform is measured and recorded as prescribed in 5.4.2.5.

5.4.2 Apparatus (see Figure 5)

5.4.2.1 Description

The test apparatus shall comprise:

— two anvils rigidly fixed to a base;

— a free fall guidance system;

— a mobile system supporting the helmeted headform;

— a metal headform fitted with a tridirectional accelerometer and a measuring assembly;

— a system by which the point of impact can be brought into correspondence with the centre of the anvil.

5.4.2.2 Base

The base shall be made of steel or concrete or a combination of these materials and have a mass of (500 ± 50) kg.

It shall be so constructed that there is no significant deformation of the surface under the test load.

No part of the base or anvil shall have a resonance frequency liable to affect the measurements.

5.4.2.3 Anvils

5.4.2.3.1 The flat steel anvil shall have a circular impact face of (130 ± 3) mm in diameter.

5.4.2.3.2 The steel anvil simulating a kerbstone shall have two faces each inclined at (52,5 ± 2,5)° to the vertical and meeting along a striking edge with a radius of (15 ± 0,5) mm. The height shall be no less than 50 mm and the length no less than 125 mm.

5.4.2.4 Mobile system and guides

The mobile system supporting the headform shall be such that its characteristics do not affect the measurement of acceleration at the centre of gravity of the headform. It shall also be such that any point in the area ACDEF in Figure 1 can be positioned vertically above the centre of the anvil.

In the case of a guided fall, the velocity of the falling body, measured at a distance of no more than 60 mm before impact, shall be within 5 % of the velocity which would be reached in free fall.

The guides shall be such that the impact velocity is no less than 95 % of the theoretical velocity.

5.4.2.5 Accelerometer and measuring assembly

The accelerometer shall be capable of withstanding an acceleration of at least 2 000 g without damage. Its maximum mass shall be 50 g.

The measuring system, including the drop assembly, shall have a frequency response in accordance with channel frequency class (CFC) 1000 of ISO 6487.

The Head Injury Criterion (HIC) shall be calculated as the maximum (depending from t_1 and t_2) of the equation

$$HIC = \left[1/(t_2 - t_1) \int_{t_1}^{t_2} a(t)\,dt \right]^{2,5} (t_2 - t_1)$$

where a is the resultant acceleration as a multiple of g and t_1 and t_2 are any two points in time (s) during the impact.

5.4.3 Headforms

The headforms used shall comply with EN 960:2006. The sizes in Table 3 shall be used, except for determination of shock absorbing capacity, for which only size designations 495, 535, 575, 605 and 625 shall be used.

NOTE Table 3 gives the EN 960:1994 equivalent letter codes to the EN 960:2006 size designations for headforms with similar nominal dimensions. These are as given in EN 960:2006, Annex C. The EN 960:2006 size designation approximates to the circumference of the headform at the reference plane, in mm.

For determination of retention system strength and ease of release the headforms used shall comply with EN 960:2006 at least down from the basic plane.

Table 3 — Sizes of headforms

Size designation (EN 960:1994 equivalent)	**Inside circumference of helmet, mm**
495 (A)	500
515 (C)	520
535 (E)	540
555 (G)	560
575 (J)	570
585 (K)	580
605 (M)	600
625 (O)	620

5.4.4 Selection of points of impact

5.4.4.1 Each test shall be carried out first with the flat anvil and then with the kerbstone anvil on the same helmet at two neighbouring but separate points. The distance between the two points shall be (15 ± 6) mm except for the two points X and X1 in Figure 4 for which the distance shall be (60 ± 5) mm.

5.4.4.2 Four points of impact are defined for each type of helmet:

— in the frontal area, B and B1, situated in the vertical longitudinal plane of symmetry of the helmet and above point B;

— in the lateral area X and X1. 60 mm apart, at an angle of 45 ° rearwards and upwards.

5.4.4.3 The test sequence shall conform to Table 4.

Table 4 — Test sequence

Conditioning	Anvil	Points of impact
Atmosphere	Flat then kerbstone	B and B1 X and X1
Low temperature	Flat then kerbstone	B and B1 X and X1
Radiation	Flat then kerbstone	B and B1 X and X1

5.5 Dynamic test of the retention system

5.5.1 The helmet shall be positioned in accordance with 5.4.1.3.1. See Figure 6.

5.5.2 In this position the helmet shall be held by the shell at the penetration point of the vertical axis passing through the centre of gravity of the headform. The headform is equipped with a load-bearing device aligned with the vertical axis passing through the centre of gravity of the headform and with a device to measure the vertical displacement of the point of application of the force. A guide and arrest device for the falling mass shall then be attached below the headform. The mass of the headform equipped in this way shall be (15 ± 0,5) kg; this produces pre-loading on the retention system for determining the position from which the vertical displacement of the point of application of the force shall be measured. See Figure 6.

5.5.3 The falling mass of (10 ± 0,1) kg shall then be released and shall drop in a guided free fall from a height of (750 ± 5) mm.

5.5.4 During this test the dynamic displacement of the point of application of the force shall not exceed 35 mm.

5.5.5 After 2 min, the residual displacement of the point of application of the force, at a mass of (15 ± 0,5) kg shall not exceed 25 mm.

5.5.6 Damage to the retention system is permissible provided that it is still possible to take the helmet easily off the headform and that the requirements specified in 5.5.4 and 5.5.5 are met.

5.6 Retention test

5.6.1 The helmet, previously conditioned at ambient temperature and humidity shall be placed on and secured to the appropriate headform, in accordance with the requirements of 5.4.1.3.1.

5.6.2 A device to guide and release a falling mass (the total mass being (3 ± 0,1) kg is hooked on to the rear part of the shell in the median vertical plane of the helmet, as shown in Figure 7.

5.6.3 The falling mass of (10 ± 0,01) kg is then released and drops in a guided free fall from a height of (0,50 ± 0,01) m. The guiding devices shall be such as to ensure that the impact speed is no less than 95 % of the theoretical speed.

5.6.4 After the test the angle between the reference line situated on the crown of the helmet and the reference plane of the headform shall not exceed 30°.

5.7 Noise (optional)

If the manufacturer claims noise protection, the helmet shall be in accordance with EN 352-1.

6 Marking

Each helmet shall be permanently marked in such a way that the following information is easily legible by the user and is likely to remain legible throughout the life of the helmet:

a) the name or identification mark of the manufacturer;

b) the number of this European Standard;

c) the year and quarter of manufacture;

d) the model of helmet (manufacturer's designation).

The following markings shall be shown both on the shell and on the internal padding:

1) the mass of the helmet to the nearest 50 g;

2) the size or size range of the helmet, quoted as the circumference (in cm) of the head which the helmet is intended to fit.

7 Information supplied by the manufacturer

7.1 Label

Every helmet shall bear a clearly visible label with the following inscriptions in the national language(s), of the country in which it is offered for sale:

> “For adequate protection, this helmet shall fit closely and be securely attached. Any helmet that has sustained a violent impact should be replaced.”

> “This helmet shall only be used with eye protectors in accordance with EN 13178.”

Additionally where hydrocarbons, cleaning fluids, paints, transfers or other extraneous additions adversely affect the shell material, the above-mentioned label shall carry the following additional wording:

> 'Warning - Do not apply paint, stickers, petrol or other solvents to this helmet'.

7.2 Instructions for use

Instructions for use shall be provided with each helmet in the language or languages of the country in which it is offered for sale. The instructions for use shall supply information on:

— name and address of manufacturer;

— maintenance, care and cleaning of the helmet and eye protectors, if applicable;

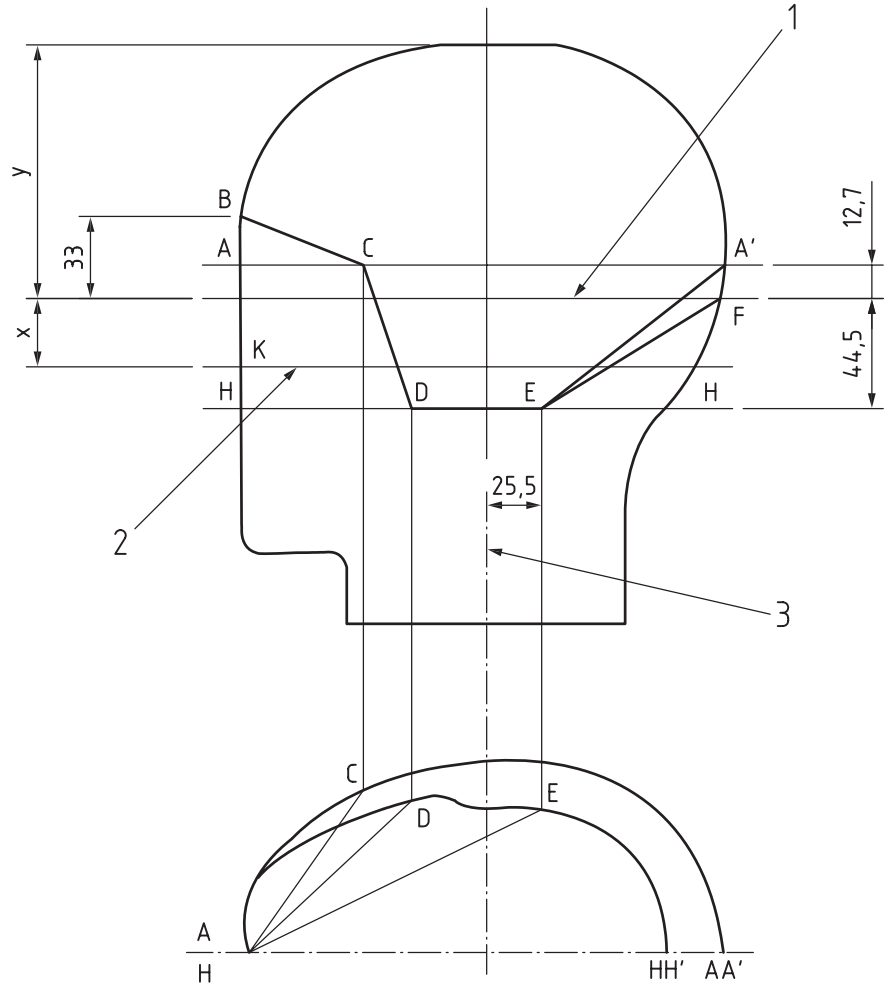
— the method of attaching/loosening and positioning of the retention system;

— the significance of replacing used parts with correct parts;

— attachment and replacement of visor components and accessories;

— the significance of the markings specified in Clause 6.

Dimensions in millimetres



Key

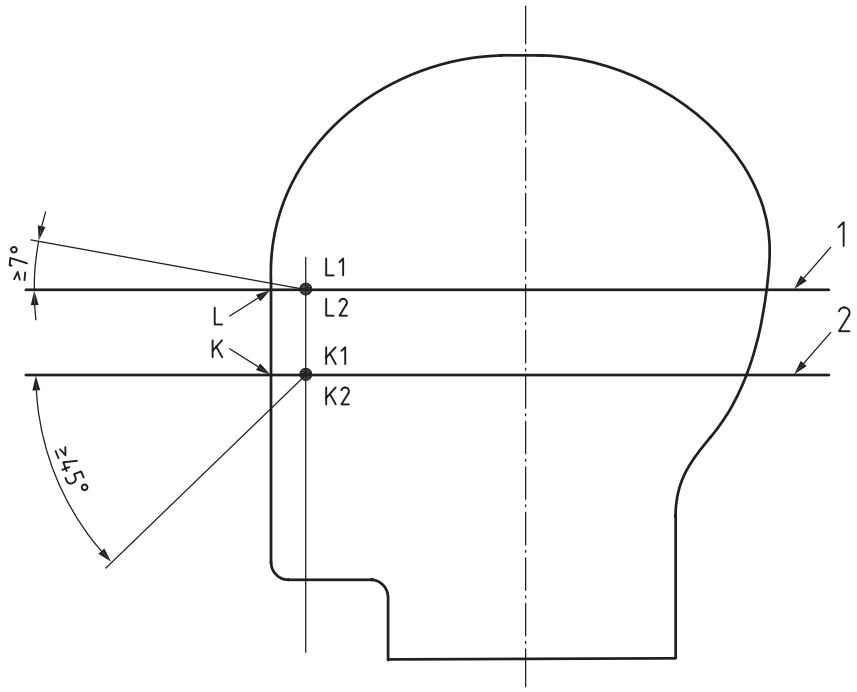
1 reference plane

2 basic plane

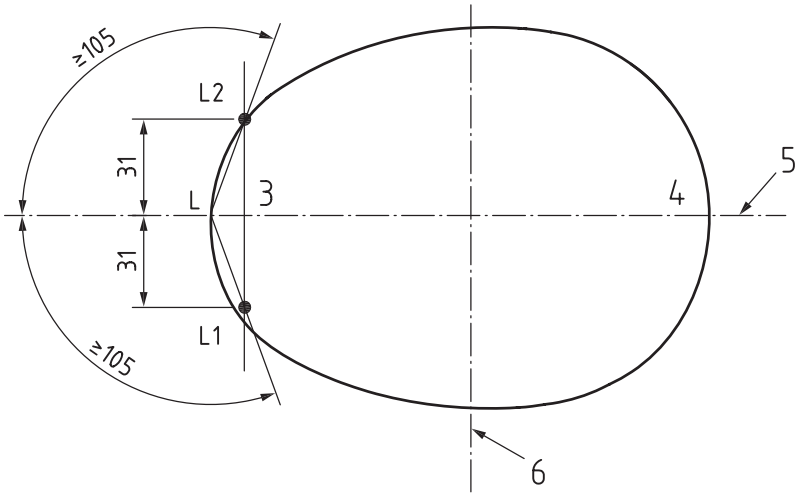
3 central vertical axis

Figure 1 — Extent of coverage

Dimensions in millimetres



a)

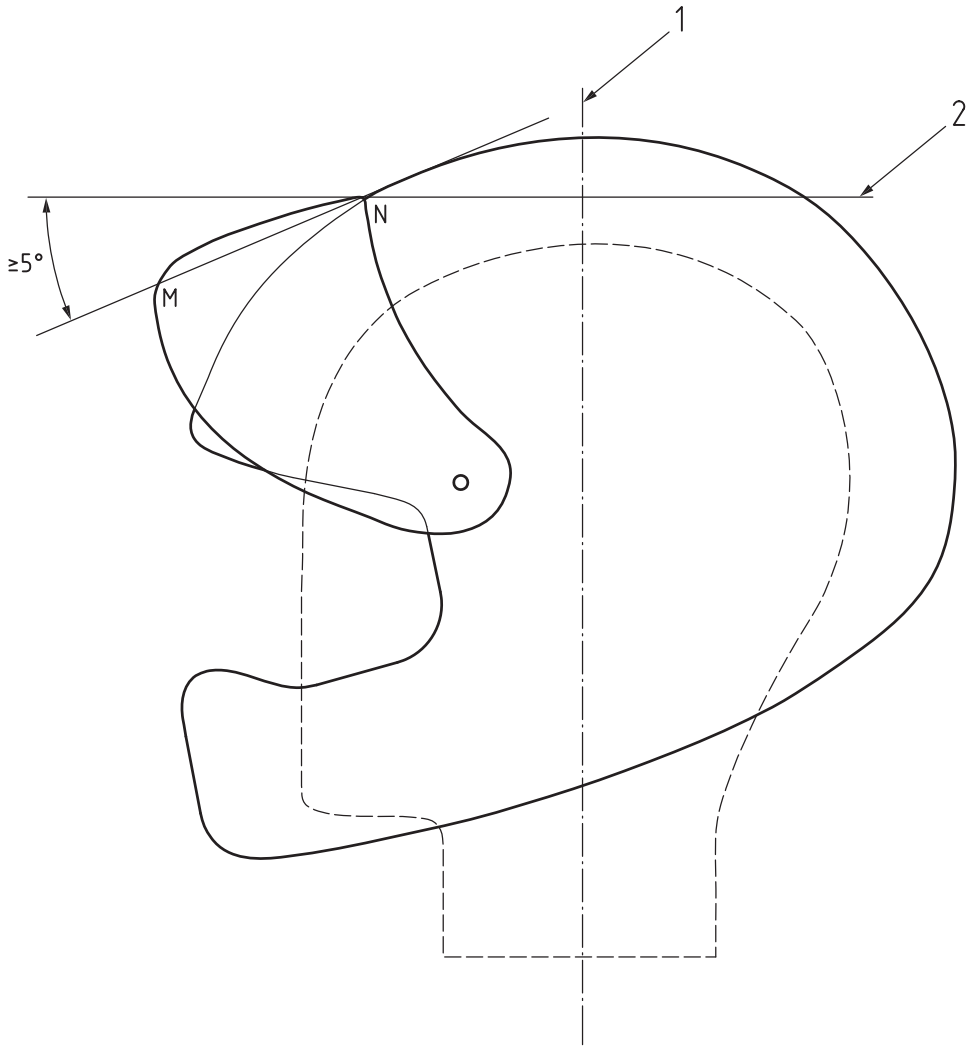


b)

Key

1 reference plane
2 basic plane
3 front
4 back
5 longitudinal vertical median plane
6 central transverse vertical plane

Figure 2 — Field of vision



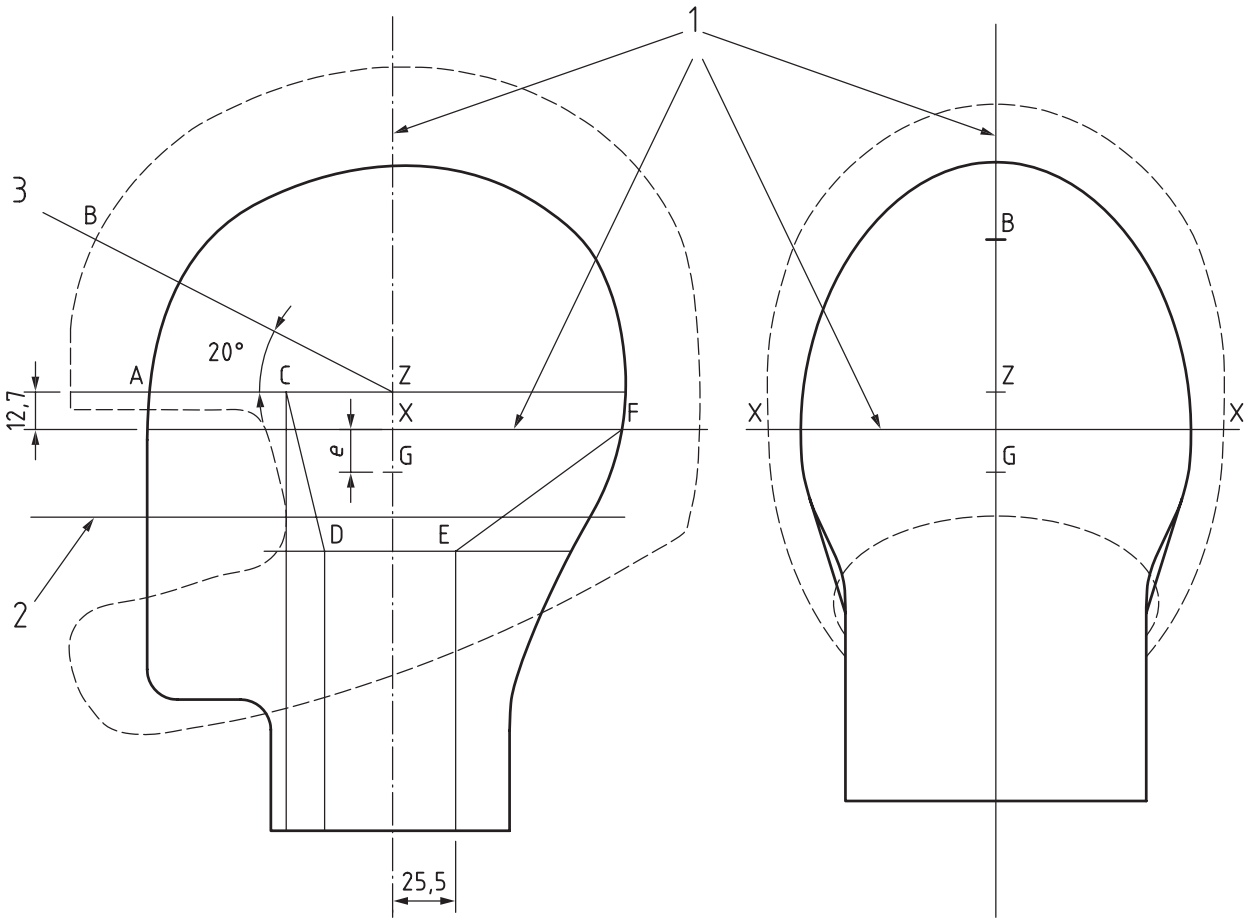
Key

1 central vertical axis

2 longitudinal vertical median plane

Figure 3 — Angle of opening of the visor

Dimensions in millimetres



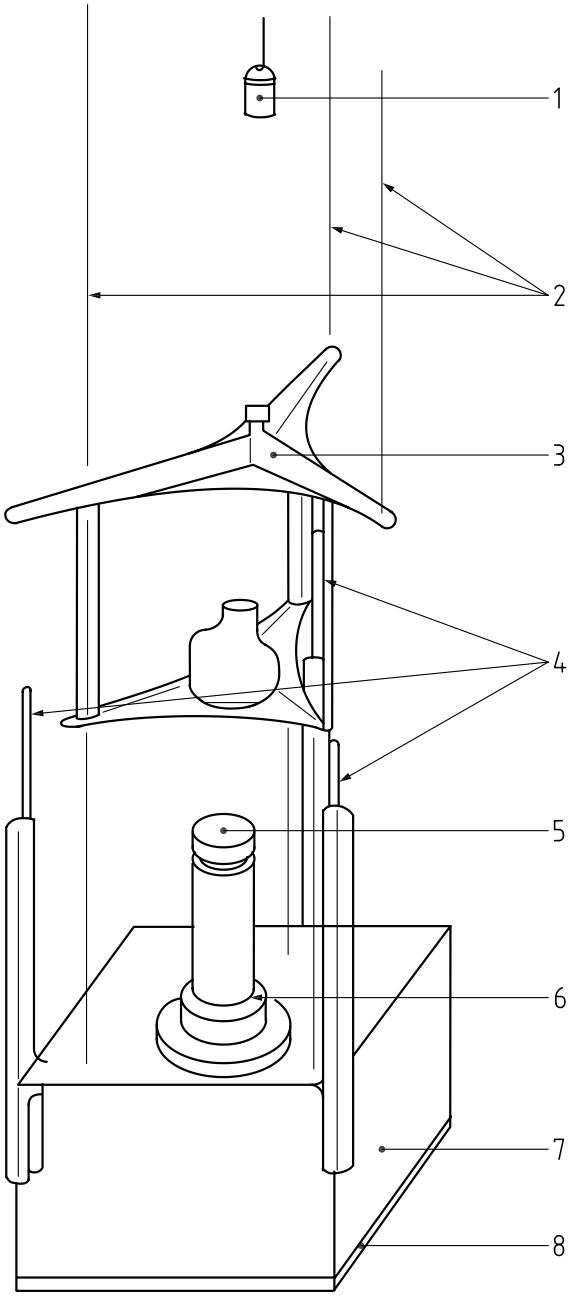
Key

1 reference axes

2 basic plane

3 impact point

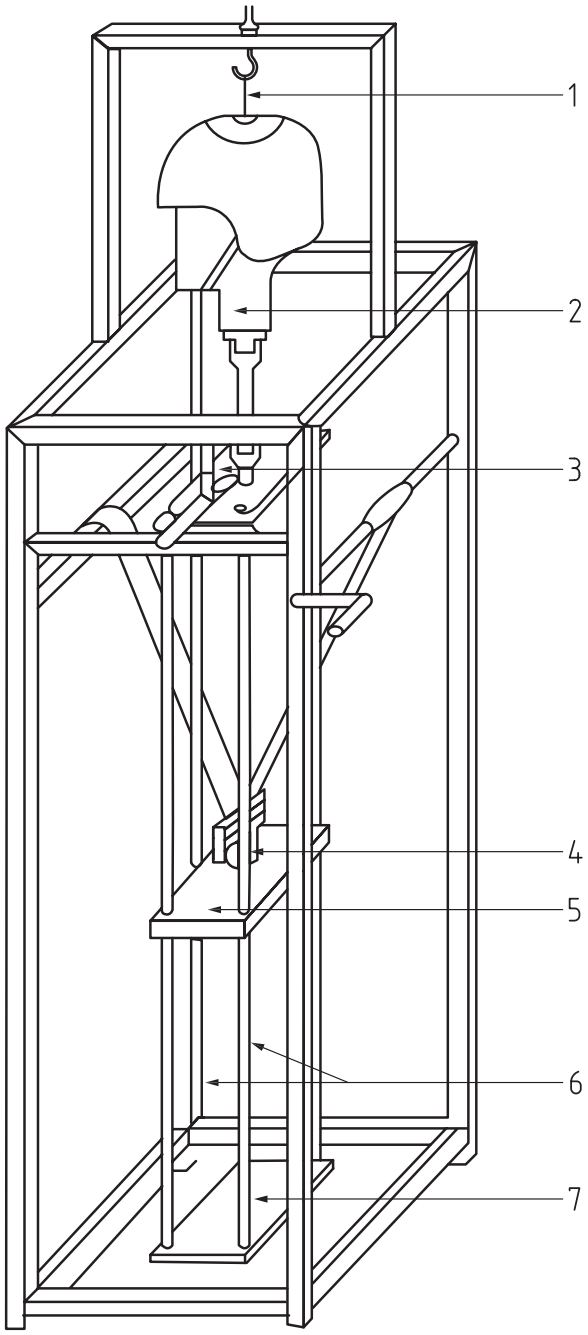
Figure 4 — Points of impact



Key

1 electromagnetic dropper
2 guide cables
3 headform support dolly
4 dolly dampers
5 anvil
6 plate magnet
7 steel or concrete base
8 rubber slab

Figure 5 — Apparatus for shock absorption

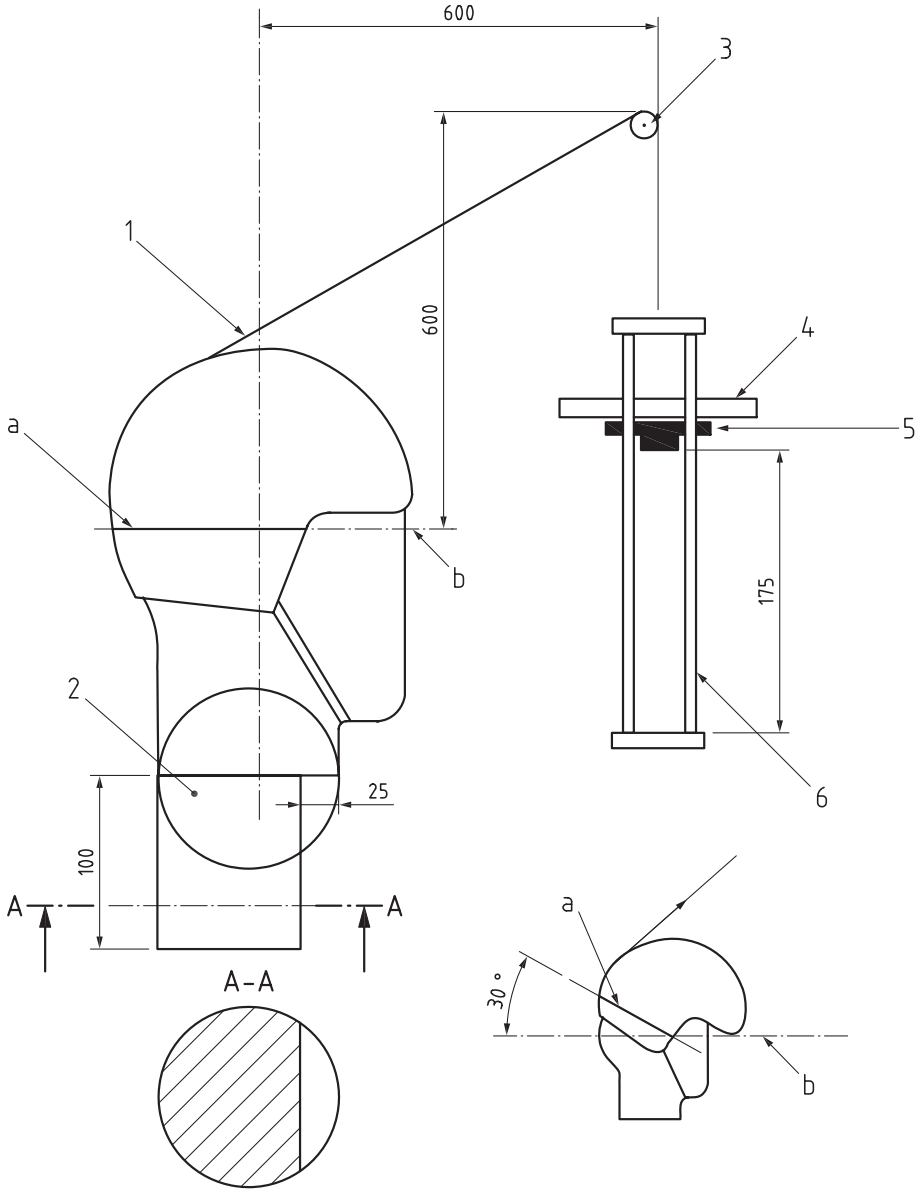


Key

1 fixed helmet support
2 headform
3 displacement recorder
4 drop release
5 drop mass
6 guides
7 anvil

Figure 6 — Apparatus for retention system strength

Dimensions in millimetres



Key

1 twisted steel wire

2 base

3 pulley, diameter 100 mm

4 frame

5 drop mass

6 guiding system

After testing:

a reference line on helmet

b reference plane

Figure 7 — Apparatus for retention system effectiveness

Annex A
(normative)

Test results – Uncertainty of measurement

For each of the required measurements performed in accordance with this European Standard, a corresponding estimate of the uncertainty of measurement shall be evaluated. This estimate of uncertainty shall be applied and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

Annex B
(informative)

Significant technical changes between this European Standard and EN 13781:2001

The significant changes with respect to the first edition of EN 13781 are as listed below.

Table B.1 — Significant changes between this European Standard and EN 13781:2001

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.
Clause 3	Definitions 3.19 and 3.20 have been adapted.
5.4.1.3.1	Code letters have been changed in size designations
5.4.3	The paragraphs before Table 3 have been updated and now reflect size designations instead of code letters, with an additional explanatory note.
Table 3	Code letters have been extended to size designations and between brackets EN 960:1994 equivalent code letters. An explanatory note has been added before the table.
Annex ZA	Has been updated.
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
(informative)

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	4.3, 4.4.2, 4.4.5	
1.2.1.3 Maximum permissible user impediment	4.6	
1.3.2 Lightness and design strength	5.3	
1.4 Information supplied by the manufacturer	6, 7	
2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	6	
3.1.1 Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	4.9	
3.5 Protection against the harmful effects of noise	4.12	

Bibliography

[1] EN 967, *Head protectors for ice hockey players*

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