



SLOVENSKI STANDARD
SIST EN 966:1996
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Helmets for airborne sports

Luftsporthelme

Casques de sports aériens

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EUROPEAN STANDARD

EN 966

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Descriptors: sports, paragliders, ulm, helmets, specifications, design, safety devices, characteristics, tests, shock resistances, marking, utilization, information

English version

Helmets for airborne sports

Casques de sports aériens

Luftsporhelme

This European Standard was approved by CEN on 1996-03-07. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

	Page
Foreword	2
Introduction	3
1 Scope	3
2 Normative references	3
3 Definitions	4
4 Materials	5
5 Construction	5
6 Performance requirements	7
7 Tests	8
8 Marking	13
9 Information for users	14
Annex A (normative) Positioning of the helmet on the headform	19
Annex B (normative) Test area	20
Annex C (normative) Field of vision	22
Annex D (informative) Artificial ageing	25
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	26

Foreword

This European Standard 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publication of an identical text or by endorsement, at the latest by September 1996, and conflicting standards shall be withdrawn at the latest by September 1996.

This European Standard 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 information Annex ZA, which is an integral part of this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

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 needs to 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 tension at all times.

1 Scope

This European Standard specifies requirements and test methods for protective helmets used in paragliding, hang gliding and flying with ultra-light aeroplanes.

Helmets for airborne sports are indicated in this European Standard as follows:

- category HPG: Helmets for paragliding and hang gliding
- category UL: Helmets for flying with ultra-light aeroplanes

Requirements and the corresponding methods of test, where appropriate, are given for the following:

- construction including chin strap, fastening devices, field of vision, head mobility and eye protection;
- penetration resistance;
- shock absorbing properties;
- retention system properties;
- marking and information for users.

NOTE: The requirements cover both categories. Special requirements are contained in the relevant clauses.

This European Standard does not apply to other kinds of head protection used in airborne sports.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

	SIST EN 966:1996
EN 960	Headforms for use in the testing of protective helmets
ISO 4892-1 : 1994	Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance
ISO 4892-2 : 1994	Plastics — Methods of exposure to laboratory sources — Part 2: Xenon-arc sources
ISO 6487 : 1987	Road vehicles — Measurement techniques in impact tests — Instrumentation

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 Protective helmet

Helmet primarily intended to protect the wearer's head against impact. Some helmets may provide additional protection.

3.2 Shell

Material that provides the general outer form of the helmet.

3.3 Helmet type

Category of helmets which does not differ in such essential respects as:

- the trade name or mark, and
- the materials or dimensions of the shell, of the retention system or of the protective padding.

However, a 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 helmet which when subjected to the tests satisfies the requirements of this standard.

3.4 Padding

3.4.1 Protective padding

Material used to absorb impact energy.

3.4.2 Comfort padding

Liner material provided for the wearer's comfort.

3.4.3 Sizing padding

Liner material used for adjustment of the fit of the helmet to the wearer's head.

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 jaw to keep the helmet in position.

3.7 Headform

For definition, see EN 960.

3.8 Basic plane of the human head

Plane at the level of the external ear opening (external auditory meatus) and the lower edge of the eye sockets (orbits).

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3.9 Basic plane of a headform

Plane relative to the headform that represents the basic plane of the human head.

3.10 Reference plane

Construction plane parallel to the basic plane of the headform at a distance from it which is a function of the size of the headform.

3.11 Test area

Area of the headform in which impact tests may be conducted which represents the minimum protected area of the human head.

3.12 Chin cup

An accessory or part of the chin strap designed to fit on the point of the wearer's chin (menton) to locate the strap.

3.13 Visor

Transparent protective screen extending over both eyes and covering part of the face.

3.14 Goggles

Transparent protectors that enclose the eyes.

4 Materials

For those parts of the helmet coming into contact with the skin no material shall be used which is known to undergo appreciable alteration from contact with sweat or substances likely to be found in toiletries. Materials shall not be used which are known to cause skin disorders, including injuries from contact with cold surfaces which are related to the thermal conductivity of the material.

5 Construction

5.1 General

The helmet normally consists of a shell, either containing or providing the necessary means of absorbing impact energy, and either fitted with or providing means for retaining the helmet on the head in an accident.

The helmet shall be so designed and constructed as to be capable of withstanding normal handling and use within the limits of the instruction accompanying it.

The helmet shall be so designed that none of its parts nor any accessories fitted to or incorporated in it are likely to injure the user during normal use.

The construction of helmets of category HPG shall be so designed as to minimize the risk that the lines, risers or other straps of the paraglider might become entangled by the helmet including any of its parts or accessories.

NOTE: Helmets should

- have low weight;
- be easy to put on and take off;

- be usable together with spectacles;
- not significantly interfere with the ability of the user to receive acoustic ambient informations (not relevant for helmets category UL, which should be protected against noise and should enable radio communication).

5.2 Retention system

5.2.1 General

Means shall be provided for retaining the helmet on the wearer's head. All parts of the retention system shall be securely attached to the system or to the helmet.

5.2.2 Chin straps

Any chin strap shall be not less than 15 mm wide.

Chin straps may be fitted with means of enhancing comfort for the wearer.

If the chin strap includes a chin cup all the tests shall performed with the chin cup.

5.2.3 Fastening devices

Any chin strap shall be fitted with a device to adjust and maintain tension in the strap. The device should be capable of adjustment so it does not come on the jaw bone.

5.3 Finish

All edges shall be smooth and rounded. There shall be no rigid projections on the inside of the helmet. Any external projection shall not exceed 5 mm and shall be smoothly faired to the adjacent surface.

5.4 Field of vision

When tested in accordance with 7.4 there shall be no occlusion in the field of vision bounded by (see annex C, figures C.1, C.2 and C.3):

- 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 medianplane of the headform and the vertical plane forming an angle of not less than 105° with the median longitudinal vertical plane and whose edge is the straight line L-K.
- upwards: a dihedral angle defined by the reference plane of the headform and a plane forming an angle of not less than 25° in the case of helmets category HPG and 7° in the case of helmets category UL with the reference plane and whose edge is straight line L₁-L₂, the points L₁ and L₂ representing the eyes.
- downwards: a dihedral angle defined by the basic plane of the headform and a plane forming an angle of not less than 45° with the basic plane and whose edge is the straight line K₁-K₂.

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5.5 Head mobility

When the helmet is mounted on the appropriate headform as described in Annex A, then the rigid parts of the rear and, in particular, the shell shall not be within a horizontal cylinder as illustrated in Annex B, figure B.1, and defined as follows:

- Diameter 100 mm;
- Axis, situated at the intersection of the median plane of symmetry of the headform and of a plane parallel to and 110 mm below the reference plane.

5.6 Eye protection

The helmet shall be so designed and constructed that

- helmets category HPG can be used together with goggles;
- helmets category UL can be used together with goggles, except when the helmet is equipped with a visor.

6 Performance requirements

6.1 General

After the performance of one of the prescribed tests, the helmet shall not exhibit any breakage or deformation dangerous to the wearer.

6.2 Impact absorbing capacity within the test area

The helmet shall give protection to the user's forehead, back of the head, temples and crown of the head, when tested in accordance with 7.2.

6.2.1 Shock absorbing capacity

When tested in accordance with 7.2.3 the peak acceleration shall not, for each impact, exceed 250 g for the equivalent velocity to a drop height of 1 500 mm after conditioning in accordance with any of the procedures described in 7.2.2.

6.2.2 Resistance to penetration

When tested in accordance with 7.2.4, the head of the punch shall not come closer than 5 mm, measured vertically, to the headform, after conditioning in accordance with any of the procedures described in 7.2.2.

6.3 Retention system performance

6.3.1 Retention system strength

When tested by the method described in 7.3.1, the dynamic extension shall not exceed 35 mm and the residual extension shall not exceed 25 mm. For this purpose, extension includes slippage of the fastening device. Following the test the retention system shall still permit the helmet to be released from the headform by normal operation of the release system.

Damage to the retention system shall be accepted provided that the above requirements are met.

NOTE: In this test, slippage of the fastening device may be measured and recorded separately from other contributions to the extension, but this is for information only and is not a requirement.

6.3.2 Retention system effectiveness

When tested by the procedure described in 7.3.2 the helmet, selected to be of appropriate size, shall not come off the headform.

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°.

6.3.3 Release of the retention system

The retention system shall open with one hand when it is loaded with a load of 50 kg. The force for opening shall not exceed 30 N.

NOTE: It is recommended that the opening mechanism be marked with red or orange colour.

7 Tests

7.1 Sequence and number of samples to be tested

Total number submitted per helmet type: 11

Number of samples required per performance requirement are given in table 1.

Table 1: Sequence and number of samples

Performance test	Sequence of test	Number of samples tested
Retention system effectiveness	1st	2
Shock absorption test	2nd	10
Resistance to penetration	3rd	1
Retention system strength	4th	4

7.2 Determination of impact absorbing capacity

7.2.1 Test area

The test area is defined by the area above the line AA-C-F (see annex B, figure B.1), when the helmet is positioned as described in annex A. The test area is subdivided into five zones: front, two sides, crown and rear.

The crown zone shall be that part of the headform and helmet above a horizontal plane through a point on the central vertical axis 10 mm below the top of the headform. The other 4 zones cover the rest of the test area as follows:

- The front zone is defined as that subtended by an angle of 60° placed symmetrically about the plane of symmetry of the headform and measured from the central vertical axis.
- The rear zone is defined as that subtended by an angle of 90° placed symmetrically about the plane of symmetry of the headform and measured from the central vertical axis.
- Two side zones shall consist of the remaining two sections down to within 20 mm of the AA-C-F plane.

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7.2.2 Conditioning

7.2.2.1 High temperature conditioning

The helmet shall be exposed to a temperature of $(+ 50 \pm 2)$ °C for not less than 4 h and not more than 6 h.

7.2.2.2 Low temperature conditioning

The helmets shall be exposed to a temperature of (-20 ± 2) °C for not less than 4 h and not more than 6 h.

7.2.2.3 Ultraviolet-radiation conditioning and moisture conditioning

The outer surface of the helmet for airborne sports shall be exposed successively to:

- ultraviolet irradiation by a 125 W xenon-filled quartz lamp for 48 h at a range of 250 mm;
- spraying for 4 to 6 h with water at ambient temperature at the rate of 1 l/min.

NOTE: A method for artificial ageing is described in annex D. This method may be used as an alternative to the conditioning to 7.2.2.3.

7.2.3 Shock absorption test

7.2.3.1 Apparatus

7.2.3.1.1 Description

The test apparatus shall comprise:

- an anvil 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.

A suitable apparatus is shown in figure 1.

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7.2.3.1.2 Base

The base shall be monolithic and made of steel or concrete or a combination of these materials and have a mass of at least 500 kg and be mounted on a base of rubber of hardness Shore A.

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7.2.3.1.3 Anvils

A flat steel anvil having a circular impact face of (130 ± 3) mm diameter.

A kerbstone anvil (anvil simulating a kerbstone), steel anvil having two faces making an angle of 105°, each inclined at approximately 52,5° to the vertical and meeting along a striking edge with a radius of $(15 \pm 0,5)$ mm. The height shall be not less than 50 mm and the length not less than 125 mm.

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

7.2.3.1.4 Mobile system and guides