International Standard

ISO 10256-2

Second edition
2024-07

Protective equipment for use in ice hockey —

Part 2:
Head protectors for skaters

Équipements de protection destinés à être utilisés en hockey sur glace —

Partie 2: Protections de tête pour les patineurs

Reference number
ISO 10256-2:2024(en)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 83, *Sports and other recreational facilities and equipment*, Subcommittee SC 5, *Ice hockey equipment and facilities,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 158, *Head protection,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 10256-2:2016), which has been technically revised.

The main changes are as follows:

— Clause 1 has been simplified by removing the list of requirements and test methods;

— Clause 3 has been edited and re-ordered with new definitions added;

— Clause 4 has been re-ordered and re-numbered to be aligned with the clauses in ISO 10256-1:2024;

— in 4.6 tolerances have been added; the measurement methodology has been changed to align with EN 13087-6:2012 and the requirement has been changed to align with other European protector standards;

— samples are now given in Table 1; a sentence has been added in 5.1.2.1 to clarify that head protectors are to be tested without face or eye protectors;

— in 5.1.3, conditioning temperatures have been aligned with ISO 10256-1:2024, Clause 7;

— 5.2, 5.3 and 5.4 have been updated to include test procedures;

— apparatus for shock absorption testing has been moved to Annex A and A.7.3 has been edited to clarify the system verification procedure;

— Table 1 has been revised to include additional tests;

— Figure 6 has been redrawn to include tolerances.

A list of all parts in the ISO 10256 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Ice hockey is a high-speed, collision sport in which there is a risk of injury.

By playing this sport, participants accept the risk of serious injury, paralysis and/or death.

The intention of head protectors used in ice hockey is to reduce the frequency and severity of injuries to the head by distributing and dampening the force from impacts against the head protector and by counteracting penetration of objects.

Protective equipment for use in ice hockey —

Part 2:
Head protectors for skaters

1 Scope

This document specifies performance requirements and test methods for head protectors for use in ice hockey.

This document is applicable to head protectors worn by ice hockey players excluding goalkeepers and by referees.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 6487:2015, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

ISO 10256-1:2024, *Protective equipment for use in ice hockey — Part 1: General requirements*

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10256-1:2024 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
field of vision
extent of vision through the protector in the ‘as worn’ position

3.2
crack
condition in which there is a break in the *head protector* (3.5) through the full thickness of the material without complete separation of parts

3.3
fracturing
condition in which there is a complete separation of any part of the protector into pieces

3.4
retention system
system that secures the *head protector* (3.5) to the head by passing under the mandible in whole or in part when adjusted in accordance with manufacturer’s instructions

3.5
head protector
helmet
device intended to reduce the risk of head injury to ice hockey participants

3.6
central vertical axis
axis lying along the intersection of the median and mid-frontal planes

3.7
test line
line that defines the boundaries of the *test area* (3.9)

Note 1 to entry: See Figure 2.

3.8
helmet positioning index
HPI
vertical distance measured at the median plane, from the front edge of the *head protector* (3.5) to the reference plane, when the head protector is placed on the reference headform

3.9
test area
area on and above the *test line* (3.7) for prescribed and non-prescribed impact sites

Note 1 to entry: See Figure 2.

3.10
support assembly
drop assembly in the monorail system minus the headform, ball arm, ball clamp, ball clamp bolts and accelerometer

3.11
spherical impactor
device used to verify the drop assembly system accuracy

Note 1 to entry: See A.7.2.

3.12
model
category of protector with the same essential characteristics that can come in several sizes

Note 1 to entry: Essential characteristics include:

a) materials;

b) construction;

c) retention system;

d) protective padding.

4 Requirements

4.1 Ergonomics

ISO 10256-1:2024, 4.1 shall apply.

4.2 Innocuousness

4.2.1 Materials

ISO 10256-1:2024, 4.2.1 shall apply.

4.2.2 Design

ISO 10256-1:2024, 4.2.2 shall apply.

4.3 Markings and information

ISO 10256-1:2024, 4.3, Clauses 9 and 10, and Clauses 7 and 8 in this document shall apply.

4.4 Protected area

4.4.1 General

When tested in accordance with 5.5, the head protector shall cover the area above the line B-C-D-E-F-E'-D'-C'-B in Figure 3 (C'-D'-E' are not shown).

4.4.2 Ear aperture

When tested in accordance with 5.5.2, no ear aperture (opening) in the protected area shall have a linear dimension > 38 mm.

The distance to any other edge of the head protector shall be > 20 mm.

The ear aperture shall be surrounded by the outer covering of the head protector (shell).

4.4.3 Ventilation

Ventilation openings are permitted on the protector if they fulfil the penetration requirements in 4.5.

4.5 Penetration (test blade)

Except for the ear apertures, and when tested in accordance with 5.6, there shall be no contact with the bare headform by the test blade within the protected area.

NOTE See Figure 3 and Figure 5.

4.6 Field of vision

When tested in accordance with 5.7, under ambient conditions, the head protector shall provide a minimum field of vision without any obstruction and bordered by the following planes.

a) Upward – a plane tilted 25° +1°/−0° upwards from the reference plane, intersecting the surface of the headform at a point 31 mm to the left (L_1) and 31 mm to the right (L_2) of the median plane (see Figure 6).

b) Downward – a plane tilted 60° +1°/−0° downward from the basic plane intersecting the surface of the headform at a point 31 mm to the left (K_1) and 31 mm to the right (K_2) of the median plane (see Figure 6).

c) Temporal – a frontal plane intersecting the reference plane on the front surface of the headform at a point located 31 mm to the left (L_1) and 31 mm to the right (L_2) of the median plane (see Figure 6).

4.7 Shock absorbing capacity

When tested in accordance with 5.8:

a) no single impact shall have a peak acceleration > 275 g under all test conditions;

b) the outer covering (shell) shall remain intact, with no fracturing or cracks, under all test conditions;

c) any size-adjustment system for the head protector shall remain secured;

d) no part of the helmet shell, protective padding, retention system or fasteners of the head protector shall detach during the testing.

4.8 Retention system

4.8.1 Straps

The head protector shall be fitted with a retention system, allowing the head protector to be placed on or removed from the head, and consisting of a strap that passes under the mandible and fitted with a device to adjust and maintain tension in the system.

The strap that passes under the mandible shall be ≥ 13 mm wide and shall not include a chin cup.

4.8.2 Extensibility and strength

When tested in accordance with 5.9:

a) the displacement of the roller holder shall be ≤ 25 mm during the load range between 5 N and 110 N;

b) the release force shall be > 110 N and ≤ 300 N.

5 Test methods

5.1 General

5.1.1 Tolerances

Unless otherwise specified in this document, ISO 10256-1:2024, Clause 6 shall apply.

5.1.2 Sampling

5.1.2.1 Samples

Only new head protectors in every size and model shall be inspected and tested.

All testing of head protectors shall be conducted without attached face or eye protectors.

The HPI and the protector size range shall be provided by the manufacturer.

5.1.2.2 Quantity

The number of samples for inspection and testing of head protectors of a given size/model is provided in Table 1.

5.1.3 Conditioning temperatures

Protector samples shall be conditioned under ambient, low, and elevated temperature conditions in accordance with ISO 10256-1:2024, Clause 7.

5.1.4 Placing and adjusting head protectors

All head protectors shall be placed and adjusted on the largest headform for the protector size range in accordance with the manufacturer's instructions (HPI). If there is not any headform within the protector size range, then the closest smaller headform shall be used.

5.2 Ergonomics

The head protector shall be tested in accordance with ISO 10256-1:2024, 5.1.

5.3 Innocuousness

5.3.1 Materials

The head protector shall be tested in accordance with ISO 10256-1:2024, 5.2.1.

5.3.2 Design

The head protector shall be tested in accordance with ISO 10256-1:2024, 5.2.2.

5.4 Markings and information

ISO 10256-1:2024, 5.3 shall apply.

5.5 Protected area

5.5.1 Test apparatus

The apparatus shall consist of:

a) a full headform, in accordance with EN 960:2006 marked with the protected area in 4.4.1 and Figure 3;

b) a load of 50 N.

5.5.2 Procedure

The procedure shall be as follows:

a) Place and adjust the head protector in accordance with 5.1.4.

b) Apply the load of 50 N to the crown of the head protector to seat the head protector to the headform.

c) Ensure that the head protector covers the protected area of the headform when viewed perpendicular to the median and frontal planes.

d) Inspect the head protector to ensure that the ear aperture (opening) meets the requirement of 4.4.2.

5.6 Penetration

5.6.1 Test apparatus

The apparatus shall consist of:

a) a full headform, in accordance with EN 960:2006 and marked with the protected area in 4.4.1 and Figure 3;

b) a steel test blade, in accordance with Figure 5;

c) a load of 50 N.

5.6.2 Procedure

The procedure shall be as follows.

a) Place and adjust the head protector in accordance with 5.1.4.

b) Apply the load of 50 N to the crown of the head protector to seat the protector to the headform.

c) Using the end of the test blade, attempt to contact the bare headform within the protected area (see Figure 3), without force, through all openings of the protector (except the ear apertures).

5.7 Field of vision

When placed and adjusted in accordance with 5.1.4 and tested in accordance with EN 13087-6:2012, the head protector shall meet the field of vision requirements in 4.6.

5.8 Shock absorbing

5.8.1 Impact sites

5.8.1.1 General

There shall be six prescribed impact sites (see 5.8.1.2 and Figure 1) and two non-prescribed impact sites (see 5.8.1.3).

The impact direction shall be perpendicular to the headform surface at all impact sites.

5.8.1.2 Prescribed sites

Locate the six prescribed impact sites as follows.

a) Front – point on the median plane that is 50 mm above the anterior intersection with the reference plane.

b) Front boss – point 25 mm above the reference plane and 45° in a clockwise or counter-clockwise direction about the central vertical axis.

c) Side – point 25 mm above the reference plane on the mid-frontal plane on either side of the headform.

d) Rear boss – point on the reference plane and 135° in a clockwise or counter-clockwise direction about the central vertical axis.

e) Rear – point at the posterior intersection of the median and reference planes.

f) Crown – point where the central vertical axis meets the top of the headform.

5.8.1.3 Non-prescribed sites

Locate the two non-prescribed impact locations on the headform on or above the test line and at a distance of at least one-fifth of the circumference of the headform from any prior impact location on that head protector.

5.8.2 Marking non- prescribed impact sites on headform

Mark the non-prescribed impact sites on the headform as follows.

a) Draw a test line A-B-C-D-E-F-E'-D'-C'-B'-A on the headform as indicated in Figure 2 (E'-D'-C'-B' not shown).

b) Determine and mark an impact site (see 5.8.1.3) on the headform.

c) Place the head protector on the headform as specified by the manufacturer's HPI and mark the corresponding impact location on the head protector before performing the impact test.

d) Alternatively, the impact site may be determined and marked first on the head protector and then marked on the headform. If marking the head protector first, make sure the corresponding mark on the headform is on or above the test line.

e) The two non-prescribed impact sites shall be identified by:

— the arc distance along the reference plane from the anterior intersection of the median and reference planes (either clockwise or counter-clockwise);

— the perpendicular arc distance above that point on the reference plane.

5.8.3 Apparatus

The impact test apparatus shall be as described in Annex A.

5.8.4 Impact procedure

5.8.4.1 General

The impact procedure shall be as follows.

a) Position the headform on the carriage assembly.

b) Place and adjust the head protector on the headform before each impact in accordance with 5.1.4. Either side of the head protector shall be tested, not both.

c) Raise the carriage assembly to the appropriate height to yield the desired impact velocity (see Table 1) and then release the headform with the head protector to fall under gravity to strike the MEP located on the anvil.

d) After each impact test verify that all requirements of 4.7 are met.

e) Record the results (g_{max}) in tabular form complete with acceleration/time diagrams for each impact test and record the coordinates of the non-prescribed impact sites.

f) Repeat the test as required in accordance with the protocol provided in Table 1.

5.8.4.2 Time interval between impacts

Under all test conditions, subject each impact site to impacts in accordance with Table 1 with a time interval of not < 30 s and not > 60 s between each impact.

5.8.4.3 Velocity measurement

Using a timing gate located at a distance ≤ 30 mm before impact, measure and record the drop velocity of the headform/head protector assembly with an accuracy of ±2 %.

5.9 Retention system function

5.9.1 Apparatus

The test apparatus shall consist of:

a) a three-quarter headform, in accordance with EN 960:2006;

b) rollers, in accordance with Figure 4.

5.9.2 Placing and adjusting

Place and adjust the ambient conditioned head protector (number one) that has undergone a previous shock absorbing test on the three-quarter headform in accordance with 5.1.4.

Adjust the retention system so that there is a minimum of 25 mm of free strap outside the adjusting devices (see Figure 4).

5.9.3 Extensibility and releasing force

Determine the extensibility and releasing force as follows.

a) Place the retention system strap around a set of two rollers as shown in Figure 4.

b) Apply a pretension of 5 N for 60 s in the same direction as the central vertical axis.

c) Record the vertical position of the roller holder to the nearest 1 mm.

d) Displace the rollers at a rate of 100 mm/min up to a load of 110 N, and then record the vertical position of the roller holder.

e) To determine the amount of extensibility, subtract the measurement specified in item c) from the measurement specified in item d) (see 4.8.2). Record the amount of extensibility.

f) To check the releasing force of the retention system, continue to displace the rollers at 100 mm/min until the device releases, up to a maximum of 300 N. Record the releasing force.

6 Test report

In addition to the requirements of ISO 10256-1:2024, Clause 8, the test report shall include the data recorded using the methods detailed in Clause 5 and include a reference to this document, i.e. ISO 10256-2:2024.

7 Markings

In addition to the requirements of ISO 10256-1:2024, 4.3 and Clause 9, head protectors shall have the following markings:

a) the designation “Ice Hockey Head Protector” or “Ice Hockey Helmet”;

b) the head protector’s size or size range, quoted as the circumference (in centimetres) of the head that the head protector is intended to fit;

c) a permanent warning in a contrasting colour to the exterior of the protector informing the user of the limits of protection afforded by the head protector. The warning shall contain at minimum the following information:

   Ice hockey is a sport in which there is a risk of injury. Certified head protectors afford no protection from neck or spinal injuries. Severe head, brain, or spinal injuries, including paralysis or death, can occur despite using a certified head protector.

NOTE The precise wording of the warning is at the discretion of the party submitting the head protector for testing.

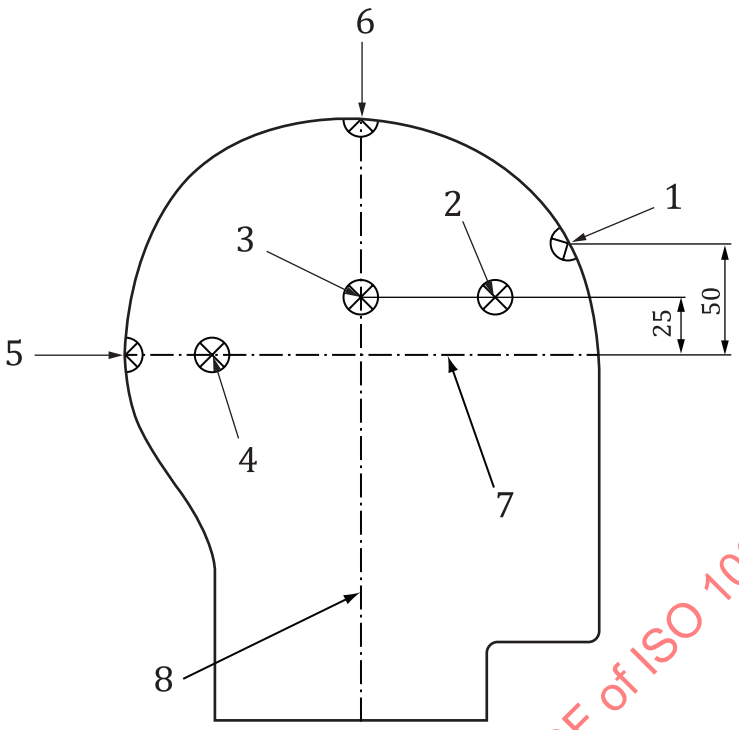
8 Information for users

In addition to the markings in Clause 7 of this document and ISO 10256-1:2024, Clause 10, head protectors shall include a reference to this document, i.e. ISO 10256-2:2024.

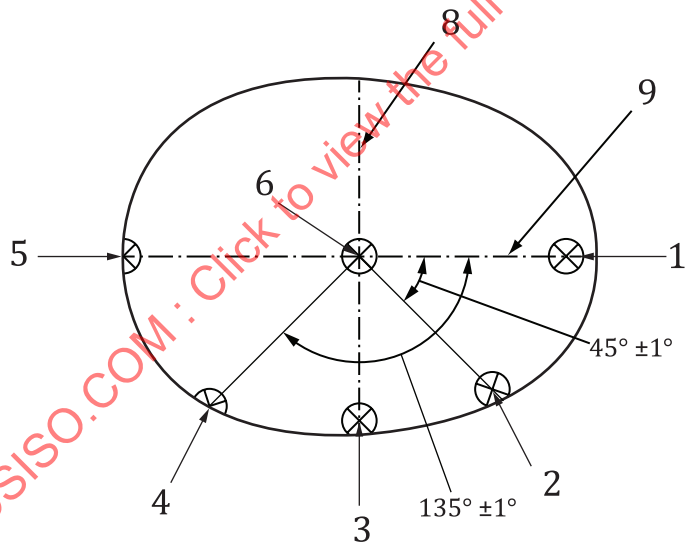
Table 1 — Protocol for testing head protectors

Sample No.	Test	Conditioning (see ISO 10256-1:2024, Clause 7)	Test location	Impacts per site	Impact velocity m/s	Referenced subclause
Any	Ergonomics, innocuousness and marking	Ambient	Entire head protector			4.1, 4.2. 4.3
Any	Protected area					4.4
Any	Penetration					4.5
Any	Field of vision					4.6
1	Shock absorption	Ambient	6 prescribed sites in any sequence (See Figure 1 and 5.8.1.2).	3	4,5 ± 0,09 (all impact tests)	4.7
2		Ambient	Non-prescribed 1 and non-prescribed 2, on or above the test line shown in Figure 2 and as defined in 5.8.1.3.	3		
3		Low	Impact site with the highest peak acceleration at ambient test conditions.	3		
4		Elevated	Impact site with the highest peak acceleration at ambient test conditions.	2		
1	Retention	Ambient	Retention system			4.8

Dimensions in millimetres



a) Side view



b) Top view

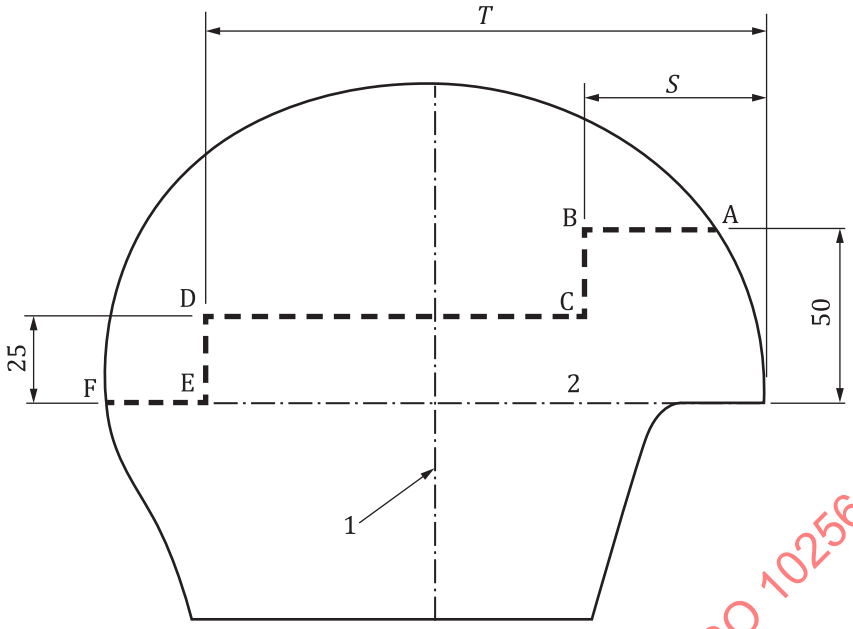
Key

1	front	6	crown
2	front boss (either side)	7	reference plane
3	side (either side)	8	mid-frontal plane
4	rear boss (either side)	9	median plane
5	rear		

NOTE Figure 1 arrows are only location markers and are not intended to be impact direction arrows.

Figure 1 — Prescribed impact sites

Dimensions in millimetres



Key

1 mid-frontal plane

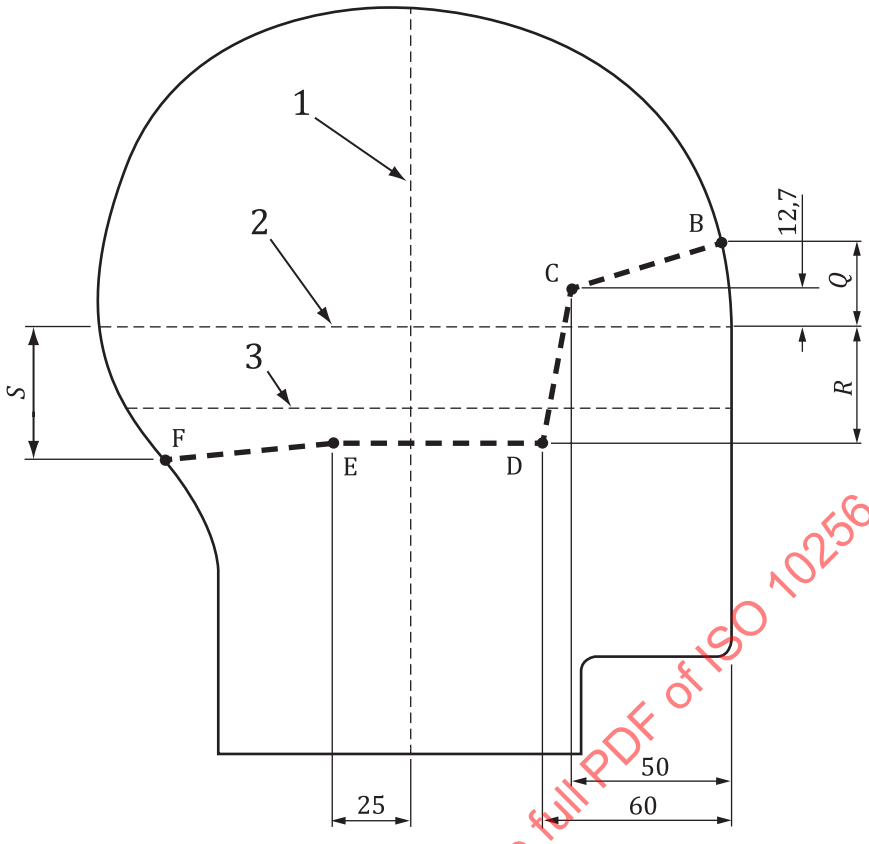
2 reference plane

NOTE Points A-B-C-D-E-F define the test line.

Headform circumference	Dimensions mm	
mm	*S*	*T*
495	19,5	137,0
535	20,5	146,5
575	20,5	155,0
605	23,5	161,0

Figure 2 — Test line

Dimensions in millimetres



Key

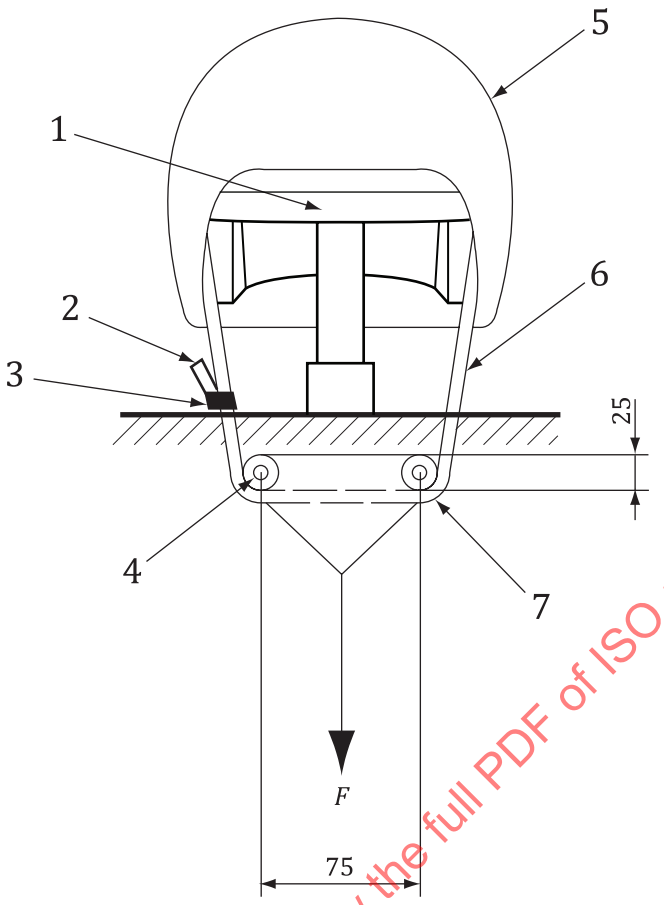
1 mid-frontal plane
2 reference plane
3 basic plane

NOTE Points B-C-D-E-F define the test line.

Headform circumference mm	Dimensions mm		
	Q	*R*	*S*
495	24	33,5	42,3
535	26	35,5	44
575	27	37,5	42,5
605	28	39	44

Figure 3 — Protected area

Dimensions in millimetres

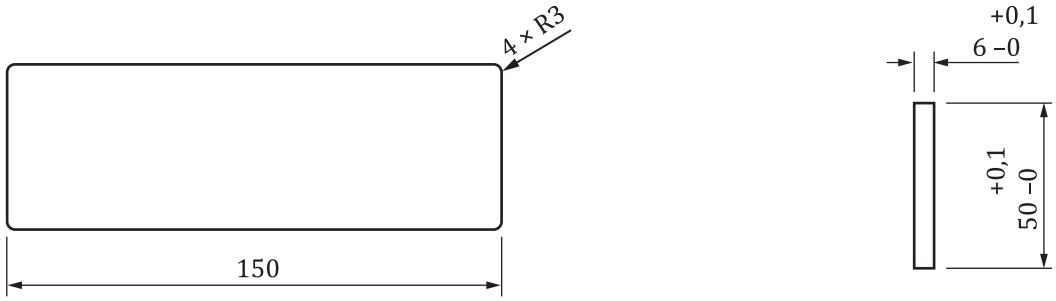


Key

1 headform
2 25 mm of free chin strap outside the adjustment device
3 adjustment device
4 rollers
5 test head protector
6 chin strap
7 length of roller 30 mm minimum
F force

Figure 4 — Retention system testing apparatus

Dimensions in millimetres



a) Front view **b) End view**

Key
R radius

NOTE Remove all sharp edges.

Figure 5 — Test blade (penetrator)