BS EN 1080:2013

BSI Standards Publication

Impact protection helmets for young children

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National foreword

This British Standard is the UK implementation of EN 1080:2013. It supersedes BS EN 1080:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/6/4, Pedal cyclists 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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English Version

Impact protection helmets for young children

Casques de protection contre les chocs pour les jeunes enfants

Stoßschutzhelme für Kleinkinder

This European Standard was approved by CEN on 7 December 2012.

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 CEN-CENELEC Management Centre or to any CEN member.

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Foreword

This document (EN 1080:2013) 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of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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 1080:1997.

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.

The significant technical changes that have been made since the previous version of this standard are described in Annex A.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, 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

This European Standard specifies requirements and test methods for helmets intended for use by young children while pursuing recreational activities in environments which have proven risks of head injuries in combination with risk of strangulation.

The helmet itself is not intended to be worn at play in the playground or while using playground equipment. Head protection in these areas is covered by standards for design of playground equipment and surfaces. Since there is a foreseeable risk of being trapped by the helmet, these helmets are equipped with a self-release mechanism to minimise the risk.

This standard does not replace other standards for head protection. Helmets according to this standard do offer shock absorption performance of the same value as i.e. helmets for pedal cyclists or skiers. However, they do not meet all other requirements which these helmets fulfil, for example strength of retention system or penetration for skiing helmets.

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.

The Technical Committee which has prepared this standard realises that it is of importance for the wearer's comfort and psychometric performance that a helmet is ventilated. At the time this European Standard was prepared, no method for measuring the ventilating capacity of a helmet was recognised. For that reason, no requirements concerning ventilation or heat transmission have been introduced.

1 Scope

This European Standard specifies requirements and test methods for helmets intended for use by young children while pursuing recreational activities in environments which have proven risks of head injuries in combination with risk of strangulation.

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

— construction including field of vision;

— shock absorbing properties;

— retention system properties, including chin strap, fastening devices and self-release system;

— marking and information.

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

EN 13087-1:2000, *Protective helmets — Test methods — Part 1: Conditions and conditioning*

EN 13087-2:2012, *Protective helmets — Test methods — Part 2: Shock absorption*

EN 13087-5:2012, *Protective helmets — Test methods — Part 5: Retention system strength*

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

3 Terms and definitions

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

3.1
protective helmet
item to be worn on the head and intended to absorb the energy of an impact thus reducing the risk of injury to the head

3.2
helmet type
category of helmets which does not differ in such essential respects as the materials or dimensions of the helmet shell, the construction of the helmet, the retention system or the protective padding

Note1 to entry: Helmet type may include a range of helmet sizes, provided that the helmet shell, including the protective padding, is the same.

3.3
padding

3.3.1
protective padding
material used to absorb impact energy

3.3.2
comfort padding
lining material provided for the wearer's comfort

3.3.3
sizing padding
lining material used for adjustment of the helmet size

3.4
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

3.5
chin-strap
part of the retention system consisting of a strap that passes under the wearer's jaw to keep the helmet in position

3.6
self-release system
mechanism which releases when loaded with a certain force

3.7
basic plane
for a given headform, horizontal plane located at a vertical distance ‘x’ below and parallel to the reference plane

Note1 to entry: This corresponds to the *basic plane* of the human head being the longitudinal plane which passes through the lower level of the eye orbits and the upper level of the external opening of the ear canals.

3.8
reference plane
for a given headform, when erect, horizontal plane located at a vertical distance ‘y’ measured down the central vertical axis from the centre of the crown

Note1 to entry: All horizontal datum levels are quoted relative to this plane.

3.9
test area
area of the helmet in which impact tests may be conducted which corresponds to the minimum protected area of the human head

4 Requirements

4.1 Materials

For those parts of the helmet coming into contact with the skin, the material used shall not be subject to any known appreciable alteration from contact with sweat or with substances likely to be found in toiletries.

Materials shall not be used which are known to cause skin disorders or other adverse effects on health. For a material not in general use, advice as to its suitability shall be sought before its introduction.

Examples for documents which can be presented as evidence of chemical innocuousness are given in the note.

NOTE The following list of documents is given for information and as examples of documents to be examined:

a) materials specifications;

b) safety data sheets relating to the materials;

c) information relating to the suitability of the materials for use with food, in medical devices, or other relevant applications;

d) information relating to toxicological, allergenic, carcinogenic, toxic to reproduction or mutagenic investigations on the materials;

e) information relating to ecotoxicological and other environmental investigations on the materials.

The examination shall determine whether the claim that the materials are suitable for use in the protective helmet is justified. Particular attention needs to be paid to the presence of plasticisers, unreacted components, heavy metals, impurities and the chemical identity of pigments and dyes.

All metallic materials which could come into prolonged contact with the skin (e.g. buckles, studs, fittings) shall have an emission of nickel of less than 0,5 µg/cm² per week. The method of test shall be according to EN 1811.

4.2 Construction

The helmet normally consists of a means of absorbing impact energy, a means of retaining the helmet on the head and a self-release system.

The helmet shall be so designed and shaped that in normal use the parts of it in contact or in potential contact with the user shall be free of roughness, sharp edges, projections and anything which could be harmful to the user.

Helmets should:

— have low weight;

— be ventilating;

— be easy to put on and take off;

— be usable with spectacles;

— not significantly interfere with the ability of the user to hear traffic noise.

4.3 Field of vision

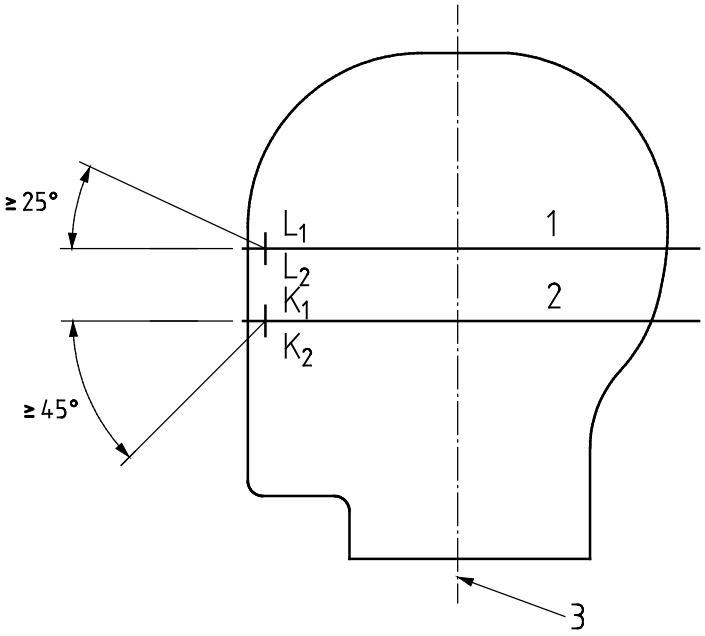
When tested according to 5.6, there shall be no occultation in the field of vision bounded by angles as follows (see Figure 1):

— horizontally: min 105° from the longitudinal vertical median plane to the left and right hand sides;

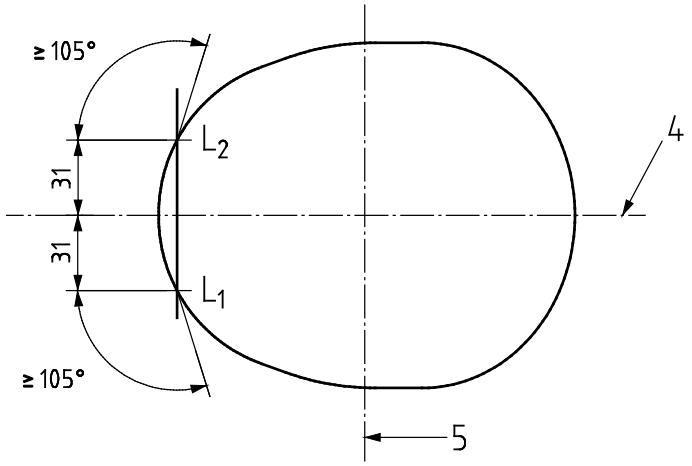
— upwards: min 25° from the reference plane;

— downwards: min 45° from the basic plane.

Linear dimensions in millimetres



a) Section of headform in longitudinal vertical plane



b) Section of headform in reference plane

Key

1 reference plane
2 basic plane
3 central vertical axis
4 vertical longitudinal plane
5 vertical transverse plane

L1 and L2 represent the centre of the eyes.
K1 and K2 represent the lower edge of the eye sockets (orbits).

Figure 1 — Field of vision

4.4 Shock absorbing capacity

The helmet shall give protection to the part of the user's head covered by the test area of the helmet as specified in 5.4.1.

When tested according to 5.3 and 5.4, the peak acceleration shall not, for each impact, exceed 250 g for the velocity of (5,42 + 0,1/-0) m/s on the flat anvil, and (4,57 + 0,1/-0) m/s on the kerbstone anvil.

NOTE These are theoretically equivalent to 1 497 mm and 1 064 mm drop heights respectively.

4.5 Retention system

4.5.1 General

Means shall be provided for retaining the helmet on the wearer's head. All parts of the retention system fastened to the helmet shall be securely attached. Securely attached means that when tested according to 5.5, no part of the retention system releases before the self-release system.

4.5.2 Chin strap

The chin strap shall not include a chin cup. Any chin strap shall be not less than 15 mm wide. The width of the chin strap shall be measured prior to testing and without any tension on the strap. Chin straps may be fitted with means of enhancing comfort.

4.5.3 Fastening device

Any retention system shall be fitted with a device to adjust and maintain tension in the system. The device shall be capable of adjustment so that the buckle can be positioned centrally below the jaw. This has to be assessed by fitting the helmet on the appropriate headform and by positioning it according to the manufacturer’s instructions or in the manner in which the helmet is intended to be worn on the head.

4.6 Self-release system

4.6.1 General

Self-release systems with adjustable opening force shall satisfy the requirements of 4.6.2 throughout the range of adjustment. The self-release system may be such that part of the retention system is not fastened to the helmet.

4.6.2 Release force

When tested according to 5.5, the self-release system shall open in all the tested helmets by a force exceeding 90 N but not exceeding 160 N.

4.6.3 Colour

To identify helmets with a self-release system all or some of the visible parts of the retention system shall in accordance with this standard be visibly and indelibly coloured green.

4.7 Durability

After being tested, the helmet shall not exhibit damage that could cause significant injury to the wearers head and neck (sharp edges, points).

5 Testing

5.1 Headforms

The headforms that are used shall comply with EN 960. The sizes in Table 1 shall be used except for determination of shock absorbing capacity and for the self-release system opening force for which the sizes 455, 495, 535, 575, 605, and 625 are available.

For determination of self-release system opening force, the headforms used shall comply with EN 960 at least down to the basic plane.

Table 1 — Sizes of headform

Size designation	Inside circumference of helmet mm
455	455
495 (A)	500
515 (C)	520
535 (E)	540
555 (G)	560
575 (J)	570
585 (K)	580
605 (M)	600
625 (O)	620
NOTE The code letters correspond to the size designation in EN 960.	

5.2 Inspection and determination of mass

Inspect the helmet to ascertain whether it fulfils the general requirements in 4.2.

Determine the mass of the helmet type (see 3.2) submitted for testing. Calculate and record the mean value in grams rounded off to the nearest 10 g for the sizes which the helmet type includes. The weight shall be specified in the marking of the helmet.

5.3 Number of samples and sequence of tests

Four helmets for each headform size that fits within the manufacturers claimed head size range, for each helmet type shall be submitted for testing. If there is no test headform applicable to the shell/protective padding size combination, the next smaller available test headform shall be used.

The sequence of tests performed on each helmet size are given in Table 2.

Table 2 — Sequence of test and tests per sample

Performance test		Sequence of test	Sample number
Shock absorbing capacity	(5.4)	1st	1, 2 and 3
Release force	(5.5)	2nd	1, 2 and 3

The fourth sample is reserved as a reference sample.

5.4 Determination of shock absorbing capacity

5.4.1 Test area

See Figure 2.

a) Take a headform of appropriate size and mark a point B. This point lies at the back of the headform on the vertical longitudinal plane, midway between the AA' and reference planes.

b) Place the helmet on the headform. Apply a vertical load of 50 N on the crown of the helmet in order to stabilise the helmet on the headform. Position the front edge of the helmet to meet the upwards field of vision specified in 4.3 or to the manufacturer's normal wearing position, if this is detailed by the manufacturer and results in greater than the specified upwards vision.

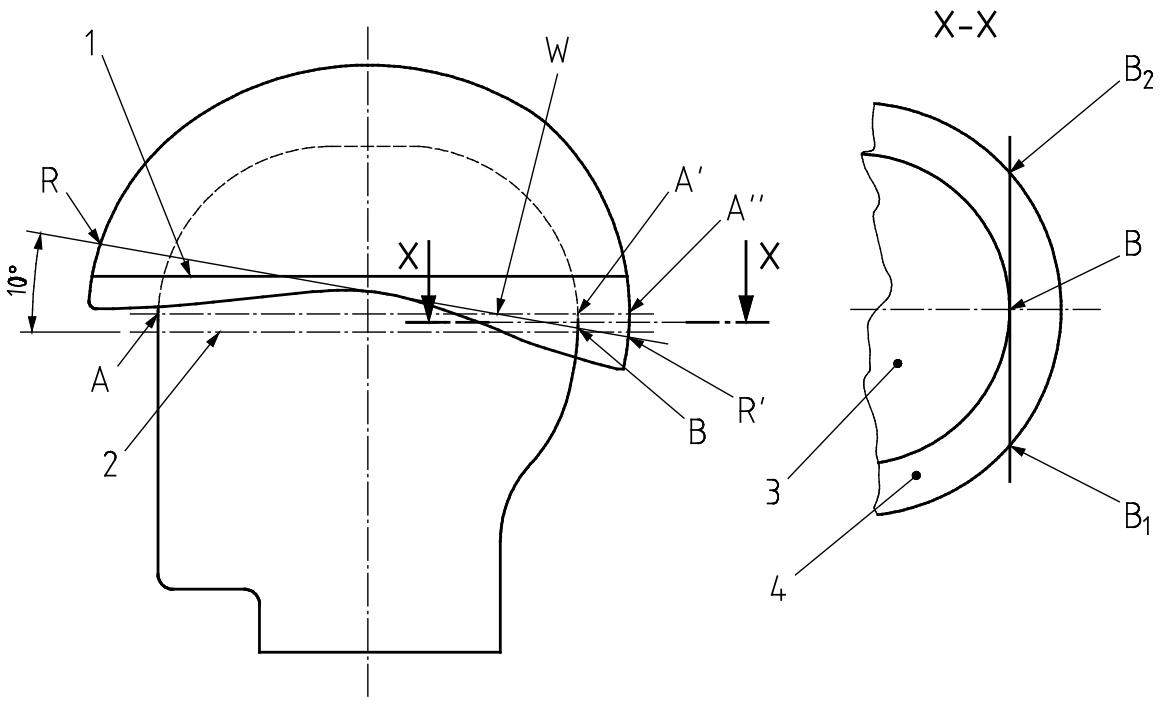
c) Draw the AA" line (in the AA' plane) on the helmet.

d) Draw a line on the helmet, parallel to and approximately 20 mm above the AA" line (Angular displacement datum).

e) Mark the helmet at points B_1 and B_2. These points are the sideways horizontal projection of point B onto the outer surface of the helmet.

f) Draw a line RR' on the helmet passing through B_1 and B_2, the line being angled 10° upwards towards the front of the helmet relative to the datum line drawn in d).

The area above the line RR' is the test area for impacts onto the flat anvil. The area above the line RWA" is test area for impacts on to the kerbstone anvil, point W being the intersection of the lines marked in accordance with c) and f) above.



Key

1 angular displacement datum
2 reference plane
3 headform
4 helmet

Figure 2 — Definition of test area

5.4.2 Conditioning

5.4.2.1 High temperature conditioning

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

5.4.2.2 Low temperature conditioning

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

5.4.2.3 Artificial ageing

The outer surface of the protective helmet shall be exposed successively to:

— ultraviolet irradiation by a 150 W xenon-filled quartz lamp for 48 h at a range of 250 mm;

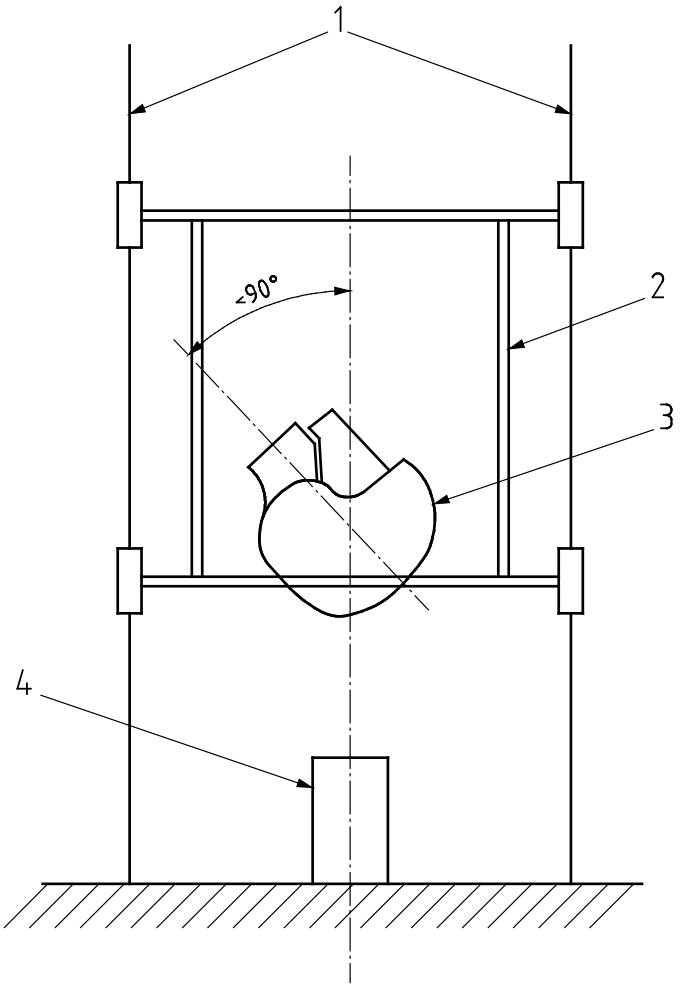
— spraying for 4 h to 6 h with water at ambient temperature at the rate of 1 l/min.

5.4.3 Apparatus

The apparatus shall be in accordance with EN 13087-2:2012, 5.3, falling headform method, except for anvils dimensions.

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

The steel kerbstone anvil 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 not less than 50 mm and the length should be (130 - 0/+3) mm.



Key

1 guides
2 support dolly
3 headform with helmet
4 anvil

Figure 3 — Principle of apparatus for determination of shock absorbing capacity

5.4.4 Procedure

On each sample, two impacts shall be performed following the sequence described in Table 3 for each test headform size.

Table 3 — Test parameters

Sample number	Conditioning	Anvil
1	High temperature	Kerbstone
	No reconditioning	Flat
2	Low temperature	Flat
	No reconditioning	Kerbstone
3	Artificial ageing	Kerbstone
	No reconditioning	Flat

Make the first impact within 1 min and all further impacts within 3 min from removal of the helmet from the conditioning chamber.

Use the kerbstone anvil without any restriction on its orientation. In each series of tests on a model, conduct impacts on each perceived weak area (i.e. ventilation features, retention anchorages or webbing supports) which fall within the test area.

The impact sites on each sample shall be separated by a minimum distance of 120 mm along the chord.

The impact site shall be centred over the centre of the anvil. The head form shall never be turned so that the vertical axis comes below the horizontal plane even if the test area allows. See Figure 3.

In the event of there being no helmet material in line with an anvil impact, then the adjacent material shall manage the energy of such an impact. In the case where anvil/head form contact can be made at the setting up stage for an impact, the result shall be deemed a failure, without conducting the test.

The velocity of the helmeted head form shall be measured at a distance not exceeding 60 mm prior to impact to an accuracy of 1 %.

5.5 Determination of self-release system opening force

5.5.1 Apparatus

The apparatus shall comply with EN 13087-5:2012, 5.2.2.

Figure 4 shows the principle.

5.5.2 Procedure

— Testing shall be performed in a testing atmosphere as specified in EN 13087-1:2000, 4.2.

— Take three helmets which have undergone the shock absorption test at least one hour earlier, each representing one of the three conditions as specified in Table 3. The helmet size chosen should represent the most onerous case, as specified in EN 13087-1.

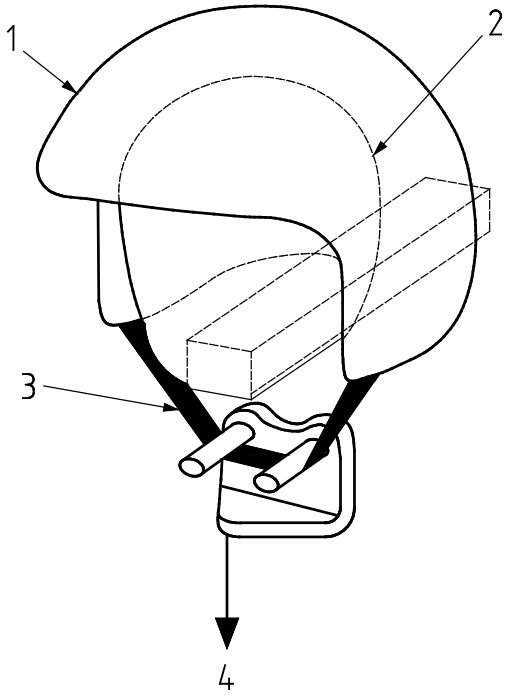
— Open and close the buckle five times by normal handling operation.

— Fit the helmet to the appropriate headform on the apparatus described in 5.5.1. Position the helmet according to manufacturer’s instructions or in the manner in which the helmet is intended to be worn on the head.

— Adjust the chin strap so that there is at least 25 mm free strap outside the adjusting devices, place the chin strap under the rollers and centre the buckle between the two rollers. Close the buckle.

— Apply the force gradually with a speed of (100 ± 10) mm/min until the self-release system opens. Record the release force.

— Perform the test once on each helmet.



Key

1 helmet
2 headform
3 chin strap
4 force

Figure 4 — Principle for testing of the self-release system

5.6 Determination of field of vision

Testing shall be performed in accordance with EN 13087-6.

One unconditioned and untested sample of each size of helmet shall be tested using each headform size that it is claimed to fit. Headforms for testing shall be selected according to 5.1.

5.7 Test report

The test report shall contain at least the following information:

a) identification details of the helmets tested including range of sizes;

b) results of the tests according to 5.2 to 5.6;

c) date of testing;

d) name of the test laboratory;

e) the number and date of this standard;

f) identification of the manufacturer.

6 Marking

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

a) number of this European Standard;

b) name or trademark of the manufacturer;

c) designation of the model;

d) designation – 'helmet for use by young children while pursuing activities in environments which have proven risks of head injuries in combination with risk of strangulation.'

e) size or size range of the helmet, quoted as the circumference (in centimetres) of the head which the helmet is intended to fit;

f) weight of the helmet (the average mass in grams determined according to 5.2);

g) year and quarter of manufacture;

h) following text:

WARNING — This helmet is fitted with self-release system designed to release under certain loading conditions in order to avoid possible strangulation/hanging. It may come off in a severe crash.

In addition, if the helmet has components made of material which are known to be adversely affected by contact with hydrocarbons, cleaning fluids, paints, transfers or other extraneous additions, the helmet shall carry an appropriate warning.

If there is a consumer sales packaging, the information specified in a), b), d) and h) of this clause shall also be given on that package. The text shall be of minimum font size 12.

7 Information supplied by the manufacturer

With every helmet, clear information in the language of the country of sale should be given as follows:

— that the helmet can only protect if it fits well and the buyer should try different sizes and choose the size which feels secure and comfortable on the head;

— that the helmet shall be adjusted to fit the user, e.g. the straps positioned so that they do not cover the ears, the buckle positioned away from the jawbone and the straps and buckle adjusted to be both comfortable and firm;

— how the helmet should be positioned on the head to ensure the intended protection is provided (e.g. that it should be placed so as to protect the forehead and not be pushed too far over the back of the head);

— that a helmet cannot always protect against injury and that it cannot substitute looking after the child;

— that a helmet subjected to a severe impact shall be discarded and destroyed;

— statement of the danger of modifying or removing any of the original component parts of the helmet other than as recommended by the manufacturer, and that helmets should not be adapted for the purpose of fitting accessories in a way not recommended by the manufacturer;

— that the helmet is intended for use by young children while pursuing activities in environments which have proven risks of head injuries in combination with risks of strangulation;

— that although the helmet is designed to release to avoid possible strangulation it is nevertheless recommended that the helmet is removed before climbing.

Annex A
(informative)

Major changes

This is an indicative list only. Several minor changes have been introduced into the standard. The following list highlights the major changes:

— The scope of the standard has been changed to: "This European Standard specifies requirements and test methods for helmets intended for use by young children while pursuing recreational activities in environments which have proven risks of head injuries in combination with risk of strangulation."

— Changes have been incorporated throughout the document, including pictures, in order to conform to the changes in EN 960.

— Further reference is made to nickel in 4.1 "Materials". Metallic materials which can come into prolonged contact with the skin shall have an emission of nickel of less than 0,5 µg/cm² per week.

— The position of the buckle during testing in 4.5.3 "Fastening device" has been clarified.

— The length of the kerbstone used in the impact test in 5.4.3 "Apparatus", has been changed from 125 mm to 130 mm.

— The distance between the impact sites in 5.4.4 "Procedure" has been decreased from 150 mm to 120 mm as the test area on small helmet sizes does not enable three impacts separated by 150 mm.

— As there could be different results when different testing apparatus are used, the speed with which the force is applied has been added to 5.5 "Determination of self-release system opening force".

— The two previous amendments have been incorporated into the standard.

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 Directive 89/686/EEC

Clause(s)/sub-clause(s) of this EN	EU - Directives 89/686/EEC, Annex II	Qualifying remarks/Notes
4.1	1.2.1.1. Suitable constituent materials	
4.2	1.2.1.2. Satisfactory surface condition of all PPE parts in contact with the user	
4.3	1.2.1.3. Maximum permissible user impediment	
4.5.1	1.3.1. Adaptation of PPE to user morphology	
4.5.2; 4.5.3; 4.7	1.2.1. Absence of risks and other ‘inherent' nuisance factors	
5.4.2.1; 5.4.2.2; 5.4.2.3	1.3.2. Lightness and design strength	
6; 7	1.4. Information supplied by the manufacturer	
6g	2.4. PPE subject to ageing	
4.6.2	2.5 PPE which may be caught up during use	
4.6.3; 6	2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	
4.4	3.1.1. Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

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