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Incorporating Corrigendum No. 1

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Specification for head protectors for cricketers

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 18, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, to come into effect on 1 July 2014. It was prepared by Subcommittee PH/6/6, *Protective helmets for sport and leisure*, under the authority of Technical Committee PH/6, *Head protection*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7928:1998, which is to be withdrawn on 30 June 2014.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- the scope has been widened to cover head protectors for use against men's and junior sized cricket balls [C1] *Text deleted* [C1]; and
- a projectile test for facial impacts has been included.

Text introduced by or altered by Corrigendum No. 1 is indicated in the text by tags [C1] [C1]. Minor editorial corrections are not tagged.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Requirements in this standard are drafted in accordance with *The BSI guide to standardization – Section 2: Rules for the structure, drafting and presentation of British Standards*, subclause **11.3.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

With fast bowlers capable of bowling cricket balls at speeds of over 90 mph (140 km/h), head protectors for cricketers are an essential part of a cricket player's kit.

The intention of head and face protection is to reduce the frequency and severity of localized injuries to the head and that part of the face surrounded by the head protector. The protective function is such that the force from impacts against the head protector is distributed and dampened and the penetration of objects is counteracted.

The protection given by a head protector depends on the circumstances of the accident and wearing a helmet and faceguard cannot always prevent death or long-term disability. A proportion of the impact energy is absorbed by the head protector, thereby reducing the force of the blow sustained by the head or face. The structure of the head protector might be damaged when absorbing this energy and any helmet that sustains a severe blow needs to be replaced even if damage is not apparent.

The helmet shell impact attenuation drop test records the impact of a moving helmeted headform on a hemispherical (simulated cricket ball shaped) anvil. The facial contact projectile test records whether a practice cricket ball fired from a ball launching mechanism results in either faceguard or ball contact with a specified "no contact zone" of the face. The 15 J impact for the impact attenuation test, and the ball speeds of 23 m/s (for junior helmets tested against a ⟦C1⟩ junior sized ⟨C1⟧ ball) and 28 m/s (for adult helmets tested against ⟦C1⟩ a men's sized ⟨C1⟧ ball) for the facial contact test are used as they are theoretically equivalent to realistic cricket ball speeds faced by cricketers.

1 Scope

This British Standard specifies the requirements for the materials, construction, markings and information to be supplied for head protectors to be worn by cricketers in adult and junior cricket.

NOTE 1 It is important to stress that this Standard does not cover specific testing against a women's size ball [c1] *Text deleted* [c1].

NOTE 2 This British Standard does not consider head protectors for use in kwik cricket, incrediball, street cricket, etc. or any other variant of the game.

NOTE 3 Head protectors for cricketers can also be worn by close fielders and wicket-keepers. However, the testing protocol is designed for protection against batting related ball impacts, rather than those encountered in these fielding positions.

This British Standard specifies the methods to assess the impact attenuation properties during a drop test of the helmet and the protection provided against a ball or faceguard contacting a specified no contact zone of the face during a projectile test.

2 Normative references

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

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

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

3 Terms and definitions

For the purposes of this British Standard, in addition to the definitions given by BS EN 960:2006, the following terms and definitions apply.

3.1 chin strap
strap that passes under the cricketer's chin or lower jaw

3.2 faceguard
extension of, or an attachment to, the helmet intended to give protection to the face and ears against impacts

3.3 head protector
complete assembly of helmet and faceguard

3.4 helmet
headwear primarily intended to protect against a blow to the part of the cricketer's head that lies above the ears and eyes

3.5 peak
extension from the basic form of the helmet above the eyes

3.6 positioning index
dimension that defines the position in which the helmet is intended to be placed on the appropriate headform for testing

NOTE 1 The index is equal to the vertical distance measured in the vertical longitudinal plane between the basic plane of the headform and the edge of the shell above the eyes.

NOTE 2 This index should be furnished to any person who requests the information, with respect to a helmet identified by manufacturer, model designation and size.

3.7 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

3.8 shell
material that provides the general outer form of the helmet

3.9 size (of a helmet)
size of the head which the inner parts and retention system of the head protector are designed to fit

NOTE Several different sizes of helmet may be manufactured from one size of outer shell.

4 Materials

If the shell is made of any material that is known to be adversely affected by contact with hydrocarbons, cleaning fluids, paints, transfers or other extraneous additions, then the helmet shall carry an appropriate warning as specified in **9.4**.

For those parts of the head protector coming into contact with skin, the material used shall be known not to undergo appreciable alteration from contact with sweat or from substances likely to be found in toiletries. Materials that are known to cause skin disorders shall not be used.

5 Construction

5.1 Helmet

There shall be no sharp edge, roughness or projection on any part of the helmet, its accessories or attachment devices, which are in contact, or potential contact, with the wearer during use (including fitting, removal, cleaning, etc.), such as is likely to cause injury to the wearer.

NOTE 1 Any irregularity in the internal or external surface should blend into the surrounding surface in a curve, the radius of which is more than half the thickness of the shell at that point. This recommendation need not be applied to holes for fasteners, or to the edges of the shell or to a rigid projection or peak in accordance with the above.

NOTE 2 The helmet may be pierced by ventilation holes.

5.2 Faceguards

5.2.1 General

The faceguard shall be designed so that it:

a) has no sharp edges;

b) can be firmly fixed to the helmet for which it is designed and without the need for the consumer to modify the helmet or faceguard.

NOTE The faceguard should be designed so that it can be readily removed in case of an injury.

5.2.2 Attachment systems

The means of attaching the faceguard to the helmet shall be specified by the manufacturer of the faceguard [see **9.3**e)].

5.3 Retention system

Means shall be provided for retaining the head protector on the cricketer's head. All parts of the retention system shall be permanently attached to the system or to the head protector.

Any chin strap shall be between 15 mm wide and 26 mm wide and shall be able to maintain tension in the strap.

Any retention system shall not inhibit easy removal of the head protector in case of injury to the cricketer.

6 Performance

6.1 Impact attenuation

When the head protector is tested in accordance with Annex C, the peak acceleration shall not exceed 250 g_n.

NOTE The symbol g_n signifies a deceleration of 9.81 m/s^2.

6.2 Facial contact

When the head protector is tested in accordance with Annex D, facial contact (by the ball or the head protector) shall not occur in the zone described by Figure D.2.

No part of the helmet, peak or faceguard shall be completely dislodged or shall breakaway when the head protector is tested in accordance with Annex D.

7 Test report

NOTE A test report should be provided according to an agreement between the test laboratory and the customer.

As a minimum, a test report detailing a pass/fail for each head protector tested shall be provided.

8 Marking

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

a) the number and date of this British Standard [1)];

b) the name or trademark of the manufacturer;

[1)] Marking BS 7928:2013 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

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

d) the designation of the model;

e) the serial number of the head protector, or the manufacturer's identification of its production batch, and the year of manufacture;

f) the following words shall be used:

"IMPORTANT – FOR USE ONLY WHEN PLAYING CRICKET."

Depending upon the ball against which satisfactory performance was demonstrated (**6.2**), one of the following phrases shall be used:

"THIS HELMET AND FACEGUARD HAS BEEN TESTED FOR USE WITH A 4 ¾ OUNCE BALL ONLY"; or

"THIS HELMET AND FACEGUARD HAS BEEN TESTED FOR USE WITH A 5 ½ OUNCE BALL ONLY"; or

"THIS HELMET AND FACEGUARD HAS BEEN TESTED FOR USE WITH A 4 ¾ AND 5 ½ OUNCE BALL".

NOTE While no minimum font size is stated, this information should be prominent and easily legible.

9 Information to be supplied to the user

9.1 Outer packaging

Any box or outer wrapper in which the head protector is offered for sale shall carry the words:

"Your Head Protector can only protect you if it fits well. Try different sizes and choose the size which feels secure and comfortable on your head."

"IMPORTANT – FOR USE ONLY WHEN PLAYING CRICKET."

Depending upon the ball against which satisfactory performance was demonstrated (**6.2**), one of the following phrases shall be used:

"THIS HELMET AND FACEGUARD HAS BEEN TESTED FOR USE WITH A 4 ¾ OUNCE BALL ONLY"; or

"THIS HELMET AND FACEGUARD HAS BEEN TESTED FOR USE WITH A 5 ½ OUNCE BALL ONLY"; or

"THIS HELMET AND FACEGUARD HAS BEEN TESTED FOR USE WITH A 4 ¾ AND 5 ½ OUNCE BALL".

9.2 Information label

Every head protector shall bear on a single label attached to it the name and address of the manufacturer or importer and the following words:

"IMPORTANT – FOR YOUR SAFETY"

"CHOOSING YOUR HEAD PROTECTOR

Your head protector can only protect you if it fits well. Try different sizes and choose the size which feels secure and comfortable on your head.

Position any straps so that they do not cover your ears, and adjust straps and fastener to be both comfortable and firm."

"USING YOUR HEAD PROTECTOR

Only use your head protector when playing cricket. It is not designed for other sports or motor vehicle use.

Every time you use your head protector, check that nothing is badly worn, torn, cracked, or missing."

"ATTACHMENT OF FACEGUARD

For your protection, ensure that the faceguard is attached in accordance with the manufacturer's instructions."

"MAINTENANCE OF HEAD PROTECTOR

Keep your head protector away from chemicals, for example, detergents, petrol, glues and sticky labels.

Store it away from heat and sunlight. Chemicals, heat and sunlight can all reduce the strength of your head protector."

"REPLACING YOUR FACEGUARD ONLY

If a new faceguard is required, use only the original manufacturer's approved replacement faceguards, correctly fitted to their instructions."

"IF YOU NEED ADVICE

If you are ever in any doubt about your head protector, ask your local cricket equipment dealer for advice, or write to the head protector manufacturer or importer."

Words to the following effect shall be displayed on the information label:

REPLACING YOUR HEAD PROTECTOR

Get a new head protector:

a) after a severe impact from a cricket ball;

b) if you can see or feel any damage to any part of the head protector;

c) after a hard knock, or squashing it;

d) if it gets badly scratched;

e) after **[X]** years [2)];

f) if it doesn't fit you anymore.

You cannot always see when it is damaged.

9.3 Information label for the faceguard only

Every faceguard shall bear on a single label attached to it the name and address of the manufacturer or importer and words to the following effect:

a) the number and date of this British Standard;

b) the name or trademark of the manufacturer;

c) the models and size/size range of the helmet for which the faceguard is intended to fit;

d) the serial number of the faceguard or the manufacturer's identification of its production batch, and the year of manufacture;

e) the manufacturer's fitting instructions for the attachment of the faceguard to the head protector;

[2)] This information is to be supplied by the manufacturer.

f) examine faceguards for damage, for example broken welds or bent wires, and replace them as necessary;

g) the following words shall be included on the label:

"For use only with model(s) [**INSERT MODEL NUMBER(S) HERE**]".

9.4 Warning label

Every helmet that has a shell made of a material known to be adversely affected by contact with hydrocarbons, cleaning fluids, paints, transfers or other extraneous additions shall bear a warning label attached to the chin strap or to a suitable stud. The label shall consist of stiff card measuring at least 45 mm by 120 mm. The lettering shall be red on white background and shall consist of the following legend, in 24 point bold capitals:

"DO NOT PAINT OR APPLY SOLVENTS, GLUES OR STICKY LABELS"

No other inscription or mark shall be placed on the same side of the card as this warning.

*NOTE The requirements of **9.2** and **9.4** for two types of label may be achieved by a single label conforming to both sets of requirements.*

Annex A (normative) Number of samples and sequence of tests

A.1 Each head protector shall, unless otherwise directed by the manufacturer, be subject to all necessary non-destructive tests and examinations before being subjected to any destructive test. The suggested order should be:

a) helmet impact attenuation drop test, in accordance with Annex C;

b) facial contact projectile test, in accordance with Annex D.

A head protector that has been tested shall neither be offered for sale nor worn.

A.2 A minimum of six head protectors shall be supplied, including one head protector of each size offered for sale, evenly distributed across the size range. They shall be supplied for testing in the condition in which they are offered for sale.

NOTE 1 The test house may test the head protector at the size that is likely to give the poorest performance in that test.

NOTE 2 The submitting manufacturer may specify whether a previously untested new helmet be tested at each testing site or not.

A.3 Helmets incorporating systems for adjusting their size shall conform to each performance requirement when tested at the size which, in the opinion of the test house, is likely to give the poorest performance in that test.

Annex B (normative) Conditioning

B.1 Ambient temperature

[C1] Expose the head protector to a temperature of (20 ±5) °C for a period of not less than 4 h.

B.2 High temperature

Place the head protector in a conditioning enclosure with effective circulation so that it just touches the support on which it rests. Maintain the temperature in the enclosure at (50 ±2) °C for a period of not less than 4 h and not more than 24 h.

B.3 Artificial aging

Expose the crown of the head protector to ultraviolet irradiation by a 125 W xenon-filled quartz lamp for (48 ±2) h at a range of 250 mm.

B.4 Samples

Two or more head protectors shall be conditioned for each of the three conditions given in **B.1** to **B.3**. [C1]

B.5 Conditioning during testing

Except in the case of artificially aged head protectors, perform the first test within 1 min of removal of the head protector from the conditioning chamber. Further tests on the head protector may then be performed, but unless all testing is completed the head protector shall be returned to the conditioning chamber not later than 5 mins following removal. The head protector shall then be re-conditioned for at least 15 mins prior to subsequent testing. Artificially aged samples do not need re-conditioning but instead shall be held under ambient temperature conditions (20 ±5 °C) between tests. The 15 mins re-conditioning period is not required for ambient temperature and artificially aged conditioned head protectors if the laboratory environment is maintained at a temperature of (20 ±5 °C) throughout the period of testing.

Annex C (normative) Helmet shell impact attenuation drop test

C.1 Principle

This test assesses the risk that a cricket ball delivered by a bowler might cause injury when impacting the helmet of a cricketer. The helmet is dropped onto a cricket ball shaped hemispheric anvil from a height that creates an impact force comparable with a fast bowler's delivery. For each impact, the peak acceleration, in g_n, shall be recorded.

Every step of the test is replicated for both adult and junior head protectors.

C.2 Apparatus

Apparatus shall be in accordance with BS EN 13087-2:2012, **5.3.2** unless specified otherwise below.

C.2.1 *A base*, in accordance with BS EN 13087-2:2012, **5.3.2.1**.

C.2.2 *A steel anvil,* with a hemispherical striking face with a diameter of (73 ±1) mm.

C.2.3 *A guidance system,* in accordance with BS EN 13087-2:2012, **5.3.2.3**.

C.2.4 *Test headforms,* in accordance with BS EN 13087-2:2012, **5.3.2.5**.

C.2.5 *A tri-axial accelerometer*, in accordance with BS EN 13087-2:2012, **5.3.2.6.1**.

C.2.6 *Signal conditioning instrumentation*, in accordance with BS EN 13087-2:2012, **5.3.2.6.2**.

C.2.7 *A means to measure impact speed*, in accordance with BS EN 13087-2:2012, **5.3.2.4**.

C.3 Procedure

C.3.1 Sample preparation

C.3.1.1 Helmet test area

C.3.1.1.1 Take a headform in accordance with BS EN 960:2006, sizes 495, 535, 575, 605 or 625, as appropriate to the claimed size range of the head protector (see **A.2**).

C.3.1.1.2 Place the head protector on the headform.

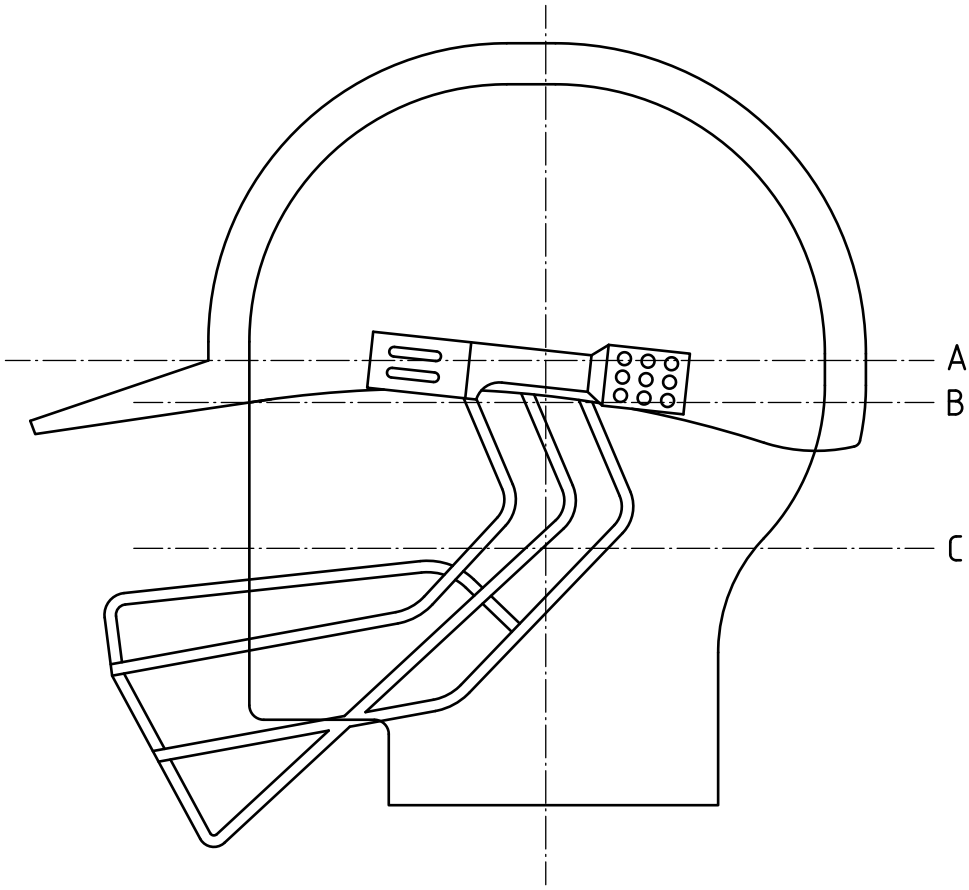
C.3.1.1.3 Apply a vertical load of (50 ±5) N on the crown of the helmet in order to stabilise the helmet on the headform.

C.3.1.1.4 Position the front edge of the helmet, using the manufacturer's positioning index if appropriate.

C.3.1.1.5 If the positioning index (**3.6**) is not specified, position the front edge of the helmet midway between the AA′ line on the headform and the reference plane.

C.3.1.1.6 Draw the AA′ line (in the AA′ plane) on the helmet in accordance with Figure C.1.

Figure C.1 **Definition of helmet test area**



Key

A AA′ plane
B Reference plane
C Basic plane

C.3.2 Testing

C.3.2.1 Position and secure the conditioned head protector on the appropriate test headform in accordance with Annex B.

C.3.2.2 Impact each head protector on four sites within the test area, including an impact in the:

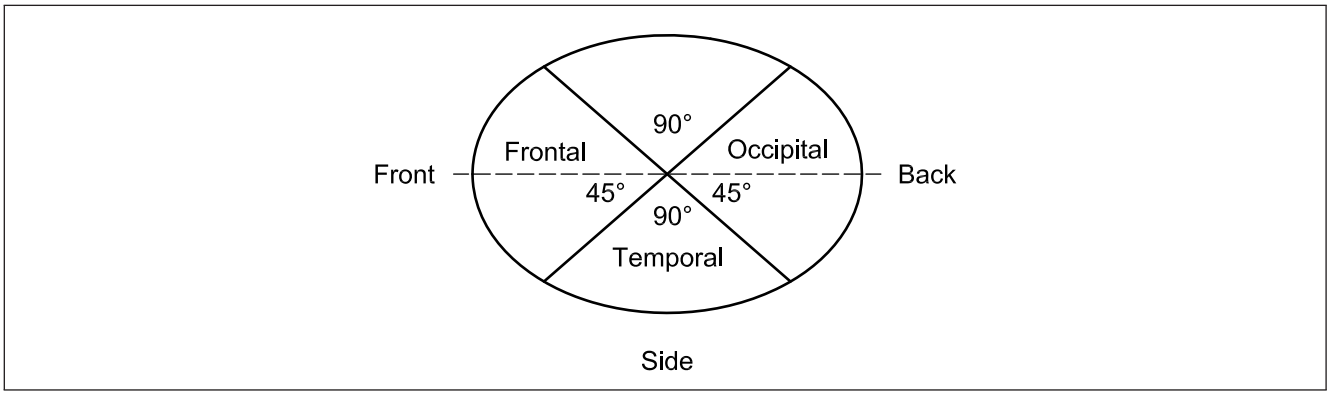
a) frontal region (Figure C.2);

b) occipital (“back”) region (Figure C.2) on the AA′ line;

c) temporal (“side”) region (Figure C.2);

d) an area of perceived weakness (e.g. ventilation features, retention anchorages or webbing supports).

Figure C.2 **Overhead view of helmet indicating areas for impact sites C.3.2.2a) to C.3.2.2c)**



C.3.2.3 Carry out one impact on each site for the helmet.

C.3.2.4 If the manufacturer specifies, or in circumstances where the testing house determines that a head protector has been damaged in a test which adversely affects further tests, then a further, appropriately conditioned, head protector shall be used.

C.3.2.5 In each series of tests on a model, conduct impacts on each perceived weak area [see **C.3.2.2**d)] that falls within the test area.

C.3.2.6 Ensure impact sites on each sample are no closer than 80 mm to each other, measured along the surface of the helmet. Position the impact site over the centre of the anvil.

C.3.2.7 Ensure the headform is never turned crown upwards such that its vertical axis comes below the horizontal plane, even if the test area allows for this.

C.3.2.8 In the event of there being no material at the impact site, ensure the adjacent material manages the energy of such impact.

C.3.2.9 Measure the velocity of the headform and head protector at a distance not exceeding 60 mm prior to impact to an accuracy of 2%. Use a drop height so that the impact velocity is in accordance to Table C.1.

Table C.1 **Impact velocity for each headform size**

Headform	**Impact velocity** m/s
495	$3.11^{+0.1}_{-0}$
535	$2.71^{+0.1}_{-0}$
575	$2.53^{+0.1}_{-0}$
605	$2.31^{+0.1}_{-0}$
625	$2.22^{+0.1}_{-0}$

C.4 Expression of results

C.4.1 The peak acceleration, in g_n, and pass or fail for each head protector tested.

Annex D (normative) Facial contact projectile test

D.1 Principle

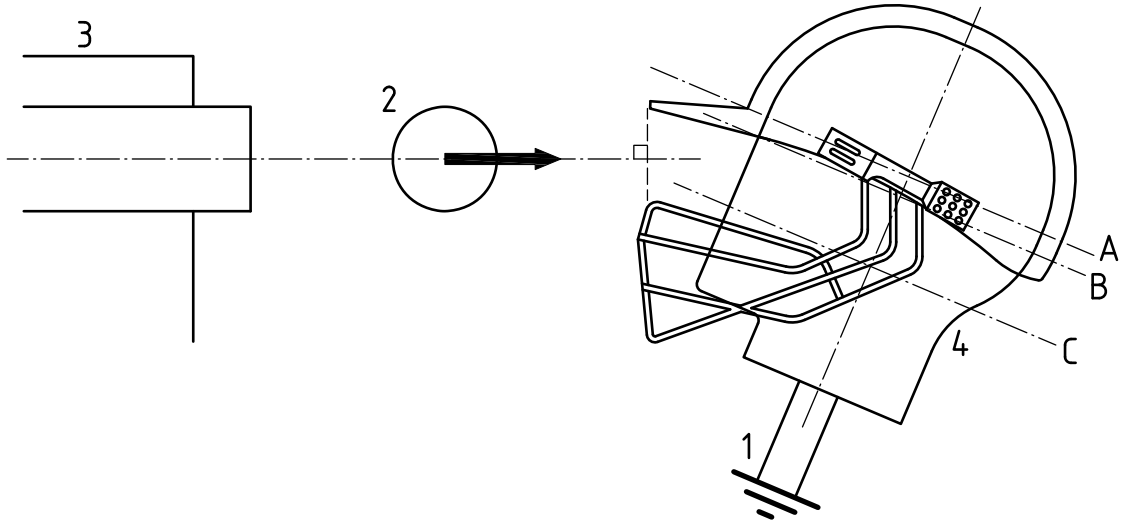
This test assesses the risk that a cricket ball delivered by a bowler might cause injury by either contacting the face or causing the faceguard to contact the face after impact. Appropriately sized balls are fired at specified areas of a designated no contact zone of the face and any contact of the ball or the faceguard with that region is noted.

Every step of the test is replicated for both adult and junior head protectors and the appropriate sized balls, as stated in **D.2.2**, shall be used.

D.2 Apparatus

NOTE The apparatus is shown in Figure D.1.

Figure D.1 **Projectile facial impact test apparatus**



Key

1	Headform mounting	A	AA' plane
2	Ball	B	Reference plane
3	Ball launching mechanism	C	Basic plane
4	Headform and head protector		

D.2.1 *A headform mounting,* permitting independent rotation of the headform in the vertical longitudinal plane and about the central vertical axis by the angle specified in Figure D.4.

NOTE The mass or stiffness of the base structure to which the mounting is attached is not required to meet any specification.

D.2.2 *A solid synthetic cricket training ball,* that has experienced no more than 20 impacts. The ball shall have a diameter of between [C1] 70 mm [C1] and 73 mm for adult helmets and of between [C1] 67 mm and 69 mm [C1] for junior helmets. The mass of the ball shall be between 140 g and 150 g for adult helmets and between [C1] 115 g and 122 g [C1] for junior helmets. The ball hardness (shore hardness A, "ShA") shall be [C1] 82 ShA to 92 ShA [C1] for adult helmets and [C1] 75 ShA to 85 ShA [C1] for junior helmets.

NOTE 1 The measurements and weights of the balls defined above relate to a five-and-a-half ounce ball for testing adult helmets and a four-and-three-quarter ounce ball for testing junior helmets.

NOTE 2 The ball surface may be smooth or dimpled but, if the latter, the dimples should be uniformly distributed and no bigger in diameter than 10 mm and no deeper than 1 mm.

D.2.3 *A ball launching mechanism*, with the ability to launch cricket balls at velocities up to (28 ±3) m/s. The ball launching mechanism shall be set up so that the impact location is no greater than 10 mm from the expected target location.

D.2.4 *A headform,* conforming to BS EN 960:2006, sizes 495, 535, 575, 605 or 625.

D.2.5 *A witness or contact indicator,* (e.g. developer spray) used to determine whether an impact has been made between the ball and the headform or the faceguard and the headform.

D.2.6 *Equipment to measure the velocity of the ball,* which shall be accurate to ±2%.

D.3 Conditioning

Condition the head protector in accordance with Annex B.

D.4 Procedure

D.4.1 Sample preparation

D.4.1.1 Faceguard adjustment

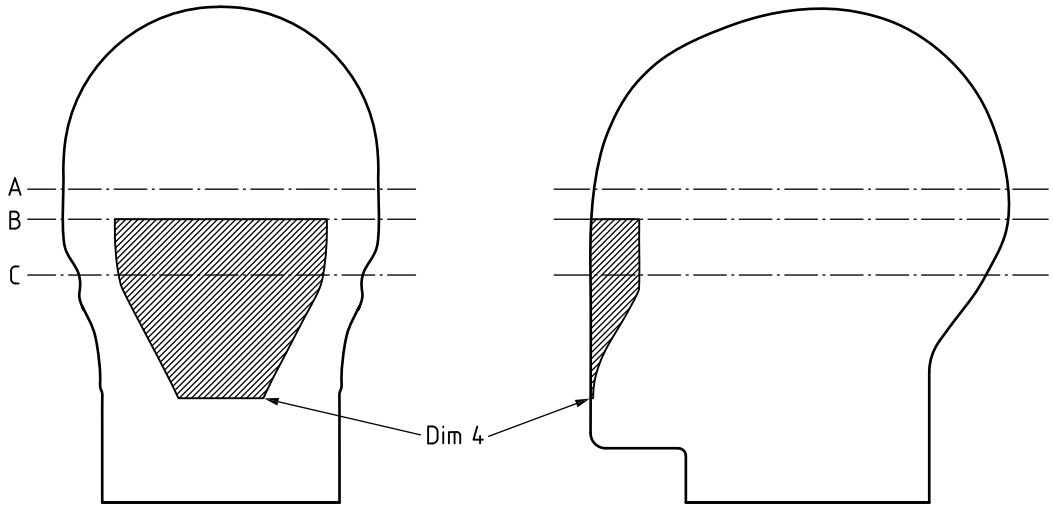
D.4.1.1.1 For the tests described by **D.4.2.7**a), **D.4.2.7**b) and **D.4.2.7**d), adjust the faceguard such that any gap between the faceguard and underside of the peak is as wide as possible or in a position that the testing house determines is most likely to fail.

D.4.1.1.2 For the tests described by **D.4.2.7**c) and **D.4.2.7**e), adjust the faceguard as close to the face as possible or in a position that the testing house determines is most likely to fail.

D.4.1.2 No contact zone

The no contact zone is defined in accordance with Figure D.2 and Table D.1.

Figure D.2 **Contact assessment zone**



Key

A	AA' plane	C	Basic plane
B	Reference plane		No contact zone

Table D.1 **Dimensions of the facial no contact zone for different sized head forms**

Headform	Dimension			
	1	2	3	4
Size designation	mm	mm	mm	mm
495	5	50	52	19
535	5	54	55	21
575	5	57	59	22
605	5	60	61	23
625	5	62	63	24

D.4.2 Testing

D.4.2.1 Apply the contact indicator (developer spray) over the no contact zone of the headform defined in Figure D.2 to a maximum thickness of 1 mm.

D.4.2.2 Condition and test the head protector in accordance with Annex B.

D.4.2.3 Place the head protector on an appropriate sized headform.

D.4.2.4 Position to the front edge of the helmet in accordance with **C.3.1.1.4** and **C.3.1.1.5**.

D.4.2.5 Adjust the headform base such that the centre line of the ball's path from the launching mechanism coincides with the centre of the point of impact.

D.4.2.6 Fire the ball launcher from a distance not more than 1.5 m (end of barrel to closest point of helmet).

D.4.2.7 Impact the head protector at five sites:

a) central: with the ball impacting in the vertical longitudinal plane in a direction normal to a line connecting the forward-most point of the helmet or its peak and the forward-most point of the faceguard, ⟦c1⟩ at a point that bisects the bottom-most part of the peak and the uppermost portion of the faceguard (Figure D.1) ⟨c1⟧;

b) central: with the ball impacting in the vertical longitudinal plane, parallel to the basic plane at a height midway between the lowermost point of the helmet or its peak and the uppermost point of the faceguard (Figure D.3);

c) central: with the ball impacting a point defined by the intersection of the vertical longitudinal plane and a horizontal plane parallel to the basic plane at 50% of the distance between the basic plane and the bottom of the chin (see Table D.2 for distances);

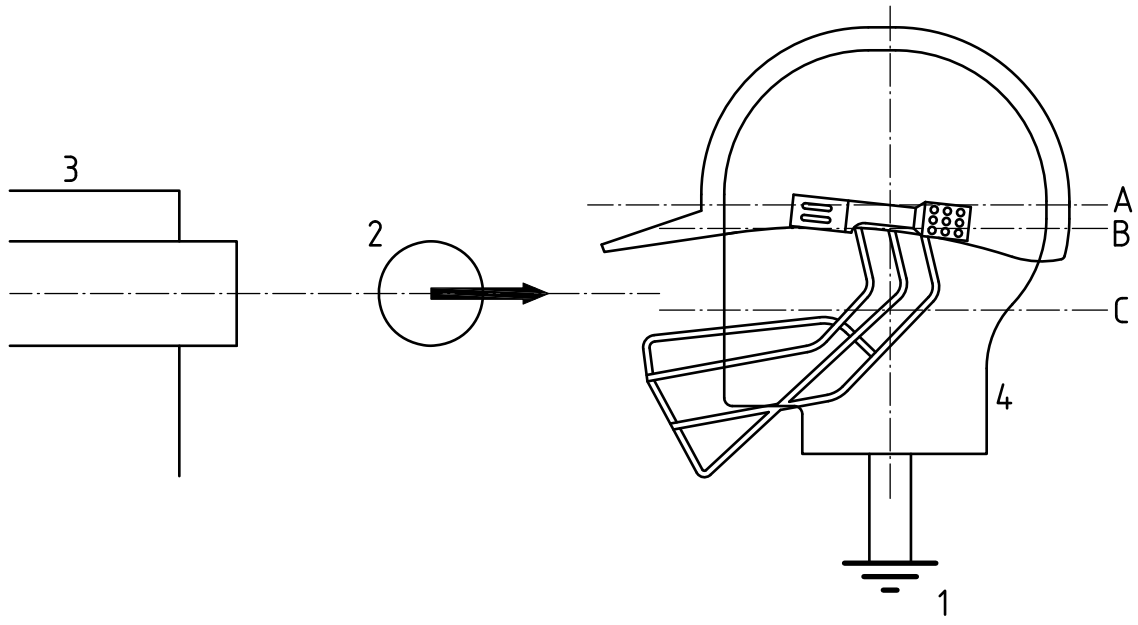
d) lateral: with the ball impacting in a plane at an angle of 30° (around the main vertical axis in either direction) to the vertical longitudinal plane at a height midway between the lowermost point of the helmet or its peak and the uppermost point of the faceguard (Figure D.4);

e) lateral: with the ball impacting a point defined by the intersection of a plane at an angle of 30° (around the main vertical axis in either direction) and a horizontal plane parallel to the basic plane at 50% of the distance between the basic plane and the bottom of the chin (see Table D.2 for distances).

Table D.2 **Distance from the basic plane to the point of impact for the faceguard tests**

Headform	Distance mm
495	35
535	37
575	40
605	42
625	43

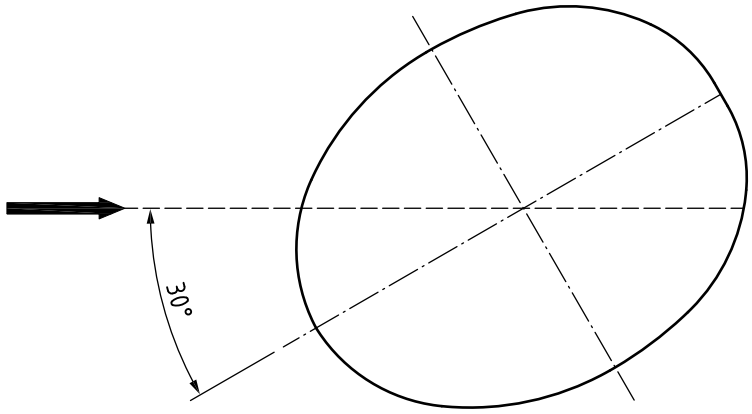
Figure D.3 **Projectile facial impact test apparatus alignment as described in D.4.2.7b)**



Key

1	Headform mounting	A	AA′ plane
2	Ball	B	Reference plane
3	Ball launching mechanism	C	Basic plane
4	Headform and head protector		

Figure D.4 **Rotation about vertical plane**



D.4.2.8 Discard the ball if there is any damage that alters its shape and thereby adversely effects its ability to penetrate.

D.4.2.9 Abort the test following failure of any single impact test (see **6.2**).

D.4.2.10 Subject each site to one impact: first, test site **D.4.2.7**a) and then the other sites (which may be tested in any order).

D.4.2.11 Measure the ball velocity at a distance not greater than 600 mm from the site of impact. [C1] The measured ball velocity shall be (28 ±3) m/s for the testing of adult helmets with a men's sized ball and (23 ±3) m/s for junior helmets with a junior sized ball. [C1]

D.4.2.12 After impact, inspect the faceguard, ball and head protector to determine whether ball or faceguard contact has been made with the no contact zone.

D.5 Expression of results

D.5.1 If there is one, the maximum size (mm) of the faceguard to peak gap at which the helmet was tested.

D.5.2 Pass or fail for each head protector tested.

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