BRITISH STANDARD

BS EN 13061:2009

Protective clothing — Shin guards for association football players — Requirements and test methods

ICS 13.340.50; 97 220.40

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 13061:2009. It supersedes BS EN 13061:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/3/11, Protective Equipment For Sports Players.

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.

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

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Schutzkleidung - Schienbeinschützer für Fußballspieler - Anforderungen und Prüfverfahren

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Foreword

This document (EN 13061:2009) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by March 2010, and conflicting national standards shall be withdrawn at the latest by March 2010.

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 13061:2001.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 89/686/EEC.

For relationship with EU Directive 89/686/EEC, see informative Annex ZA, which is an integral part of this document.

Annex A provides details of significant technical changes between this European Standard and the previous edition EN 13061:2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Association football by virtue of being a body contact sport presents a number of hazards which can cause injuries. Shin guards cannot always prevent serious injuries but are intended to significantly reduce the severity of laceration, contusion and puncture caused by impacts.

Shin guards intended for protection in association football can be used in other sports where appropriate, and where the rules of the sport permit. However, the protection provided in such other sports cannot be claimed to be adequate on the basis of conformance to this European Standard without supporting information concerning the sport in which the shin guards are to be used.

1 Scope

This European Standard specifies the general requirements for the ergonomics, innocuousness, sizing, coverage, performance, and cleaning of association football players' shin guards. Test methods are described and performance levels are defined. Requirements for the marking of shin guards and the information to be supplied with them are given.

2 Terms and definitions

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

2.1
contusion or bruise
injury usually caused by a blunt impact in which the skin is not broken. Underlying soft tissue is damaged by compression and by shearing forces. Fine blood vessels are damaged leading to bleeding, discoloration and swelling

2.2
laceration
irregular torn injury through the skin

2.3
puncture
wound in which a penetrating object makes a discrete hole through the skin which more or less closes after withdrawal of the object

2.4
association football
game of football in which the ball is not picked up or carried by field players, and in which the rules for tackling should limit the severity of body blows

2.5
internal ridges
raised area of the shell material which is directed towards the user's leg. A ridge is a linear feature that has a top width of less than 5 mm or an area feature with a top area of less than 25 mm^2

3 Requirements

3.1 General, including innocuousness

Shin guards for association football players shall meet a general requirement that they are safe to use and fit for their purpose, and the following specific requirements:

Construction materials or their derivates shall not harm those coming into contact with them.

NOTE Information on the identification and classification of such substances can be found in the Directive 67/548/EEC (classification, packaging and labelling of dangerous substances) [1] as well as in the Regulation (EC) no.1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) [2].

The manufacturer shall list in the information supplied by the manufacturer the substances used for the main components of the product.

There shall not be such hard or sharp edges, seams, buckles or other items on the surfaces of the product that can harm the user or other players during normal use, when tested according to 4.4.1.

If there are ridges that can be felt with the fingers on the inside of the shin guard, they shall be tested according to 4.4.2.

If there are ridges higher than 1 mm on the outer surface of the shin guard, they shall be tested according to 4.4.3. The shin guard does only perform this requirement, if the end points of the arc of the appropriate gauge touch the surface of the shin guard at all positions tested as described in 4.4.3.2 and in all orientations of the gauge.

3.2 Ergonomics

Shin guards for association football players shall be so designed that in the foreseeable conditions of use for which they are intended the user can perform the typical playing movements, e.g. running, jumping, flexing the foot, without being hindered. If restriction or severe discomfort is reported, the product fails. Test method, see 4.5.

3.3 Sizing

Shin guards for association football players shall be marked with their size. The size marking shall be the range of body height of players that the shin guard is designed to fit.

3.4 Restraint

Shin guards for association football players shall be designed so that they should remain in place during normal play and during impacts. The restraint system recommended by the manufacturer or his authorised representative established in the community shall be tested in accordance with 4.6. On release of the force, the displacement of the shin guard from its initial position shall be less than 15 mm or less than 15 % of the linear dimension of the test area measured in line with the force applied, if this is greater than 15 mm.

3.5 Stud impact resistance

Shin guards for association football players shall resist impacts by a metal stud 10 mm in diameter when tested according to 4.7.1 and 4.7.2. The inner surface of the shin guards tested shall not be pervasively torn or being perforated. No hard material shall shatter or give rise to potentially injurious fragments. When tested according to 4.7.2, the stud shall be stopped less than 25 mm below the zero line.

3.6 Blunt impact performance

When tested according to 4.8, the transmitted force of the three single impacts to the same point on three shin guards shall not exceed 2,0 kN in the central or lateral test areas.

4 Test methods

4.1 General

Confirm by reference to appropriate documentation, e.g. document of compliance, test reports, and by measurement, visual inspection and tactile examination of the shin guard, that it meets the requirements of 3.1.

Measuring instruments unless otherwise specified shall be accurate to ± 2 % of the pass/fail level of the characteristic being measured.

For each of the required sequences of measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of the final result shall be determined. The uncertainty of

measurement shall be expressed in the form ± X. It shall be used in determining whether a "Pass" performance has been achieved. If the final result minus X is below the pass level when the requirement that a certain value shall be exceeded, the sample shall be deemed to have failed.

NOTE It is anticipated that values of uncertainty of measurement will be usually between 2 % and 5 % of the measured value for force and length measurements.

4.2 Sampling and conditioning of the test samples

Sufficient pairs of new, unused shin guards shall be supplied to execute all the tests required by this Standard. At least one sample of each size to be placed on the market shall be included, complete with the labels and information supplied by the manufacturer that will be supplied with the product.

The construction of all sizes shall be checked to ensure that they are identical apart from areal dimensions, and that these are in the proportion to the sizes marked on the shin guards. If the construction of all sizes is identical, at least two sizes shall be subjected to mechanical testing. If differences in construction are apparent, all sizes shall be tested.

If a specific test cannot be executed because integrated straps, socks or accessories interfere with the testing procedure, these straps, socks or accessories shall be cut off. However, no parts of the test area shall be cut off.

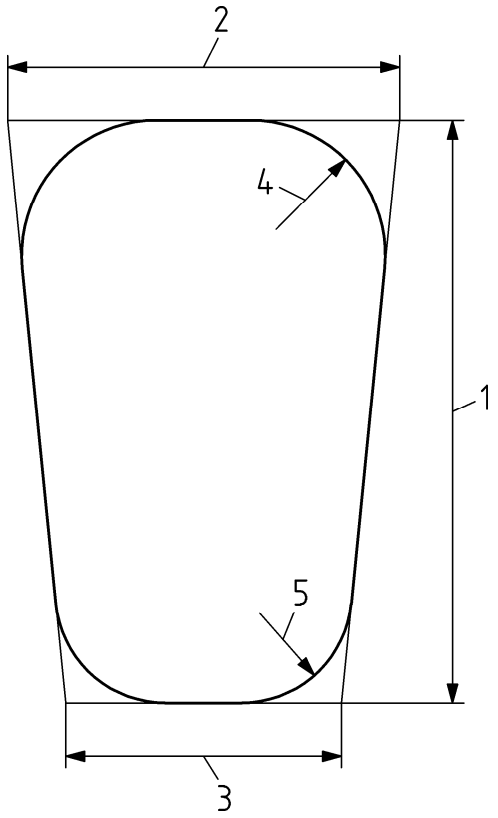
Before testing all shin guards shall be cleaned five times according to the manufacturer's instructions in the information supplied by the manufacturer.

Test specimens shall be conditioned at a temperature of (20 ± 2) °C and at a relative humidity of (65 ± 5) % for at least 48 h before testing and the tests shall be carried out in the same environment or within 10 min of removal from that environment.

4.3 Test area marking

The total test area is formed by a central test area and a lateral test area. The lateral test area is a border area of 15 mm constant width surrounding the central test area.

The total test area shall be marked on a shin guard in the following way: Mark the centre line and the top line of the test area on the surface of the shin guard according to the information given in the information supplied by the manufacturer. Cut a test area template from a dimensionally stable sheet material with the calculated dimensions given by Figure 1 and Table 1 with a limit deviation of ± 1 mm for all dimensions. Position the template on the shin guard, so that he midpoint of the top edge of the template coincides with the intersection of the top and centre lines drawn on the shin guard and that the midpoint of the bottom edge of the template lines up with the centre line drawn on the shin guard. Trace around the template onto the shin guard.



Key

1 height
2 width at the top
3 width at the distance 1 from the top of the protective area
4 radius of curvature of an upper corner
5 radius of curvature of a lower corner

Figure 1 — A plan diagram of the test area of a shin guard

Table 1 — Dimensions of the template for the total test area

	1	2	3	4	5
Dimension expressed as the percentage of the tallest wearer's height	9,5	6,4	4,5	2,2	0,9

The central test area shall be marked by using a second smaller template. This template shall be placed central on the total test area and its outline traced onto the shin guard.

4.4 Innocuousness

4.4.1 Edges, seams and buckles

The shin guards shall be examined visually and by hand to locate any hard or sharp edges, seams or buckles that might injure the user or another player during normal use. The shin guards meets the requirements of 3.1 if none of these structures are observed or felt. If such structures are detected, they shall be considered internal or external ridges according to 4.4.2 or 4.4.3 and shall be tested accordingly.

4.4.2 Internal ridges

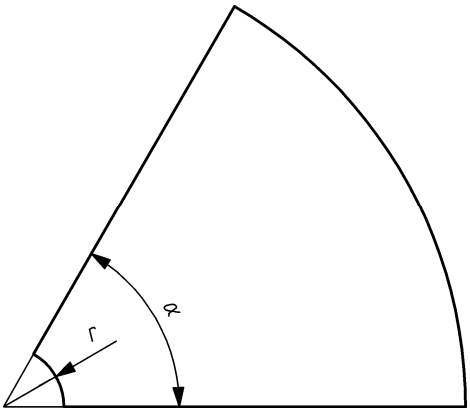
The shin guards shall be examined visually and by hand to locate any hard or sharp ridges on the inside. If such ridges can be detected inside the test area, they shall be considered potential weak points according to 3.6 and shall be tested in accordance with 4.8 and the specifications for the lateral test area given by Table 3. If hard or sharp ridges can be detected at various points on the shin guard, three different positions shall be tested which are found to be the most severe on manual inspection.

If hard or sharp internal ridges can be detected outside the test area but where they could contact the tibia, they shall be tested with the parameters given in Table 3 for the lateral test area.

4.4.3 External ridges

4.4.3.1 Apparatus

An appropriate gauge shall be used for testing the radius of curvature of external ridges. The radius gauge shall be made of metal (steel or aluminium) and shall not be more than 2 mm thick. The shape of a suitable radius gauge is shown in Figure 2. The dimensions are given in Table 2.



Key

α (60 ± 2)°
r radius of curvature of the gauge as specified in Table 2.

Figure 2 — Radius gauge for assessing external ridges

Table 2 — Dimensions of the radius gauges for testing external ridges

Height of ridges on the outer surface of the shin guard **mm**	**Radius *r* of the testing gauge** **mm**
< 1,4	(0,6 ± 0,1)
1,4 to 1,8	(0,8 ± 0,1)
> 1,8 to 2,2	(1,0 ± 0,1)
> 2,2 to 2,6	(1,2 ± 0,1)
> 2,6 to 3,4	(1,5 ± 0,15)
> 3,4	(2,0 ± 0,2)

4.4.3.2 Procedure

If hard or sharp ridges can be visually or manually detected on the outer surface of a shin guard, the following test shall be carried out on each of these ridges:

a) Measure the height of ridges greater than 1 mm. Choose the appropriate radius gauge indicated by Table 2. Place the gauge in the areas of minimum radius of curvature of the ridge to be tested. Check that both end points of the arc of the gauge touch the surface of the shin guard. Figure 3 illustrates this procedure and the pass and fail conditions.

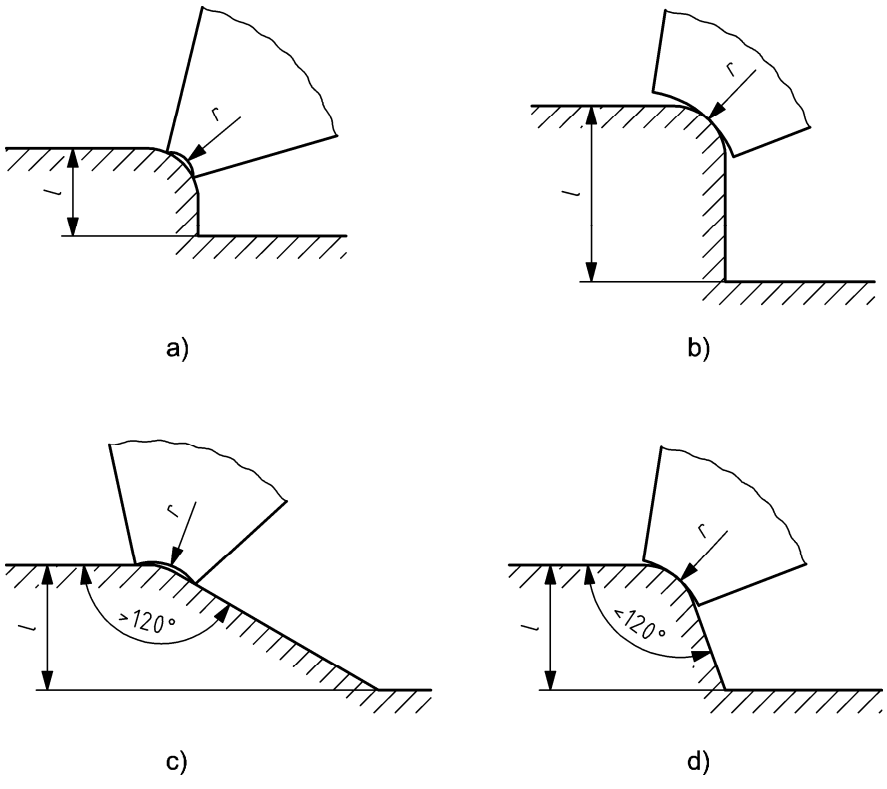
b) Pass and fail conditions:

Figure 3a) The radius of the arc of the appropriate gauge is smaller than the radius of the ridge, so that the gauge touches the surface of the shin guard with no other points of the arc than its end points. The shin guard performs the requirement.

Figure 3b) The radius of curvature of the ridge is the same like in figure 3a), however the height "l" of the ridge is higher. Therefore a gauge with a bigger radius of the arc shall be selected according to Table 2. The radius of the arc of this gauge is bigger than the radius of the ridge. Therefore it does not touch the surface of the shin guard with both end points of the arc at the same time. This shin guard does not perform the requirement.

Figure 3c) The angle of the ridge is bigger than 120°. The gauge touches the surface of the shin guard with both end points of the arc independent from the radius of the ridge. The shin guard performs the requirement.

Figure 3d) The height and the radius of curvature of the ridge is the same as in figure 3c) however the angle is smaller than 120°. The radius of curvature of the ridge is smaller than the radius of the arc of the appropriate gauge. The gauge cannot touch the surface of the shin guard with both end points of the arc at the sane time. The shin guard does not perform the requirement.



Key

a) pass condition
b) fail condition
c) pass condition
d) fail condition

l measured height of the ridge for choosing the correct gauge from Table 2
r radius of curvature of the gauge

Figure 3 — Diagram of the use of radius gauges on external ridges of a shin guard

The borders of hard and rigid elements of shin guards shall be considered to be hard ridges and shall be tested in the same way.

The results of the examination shall be included in the test report.

4.5 Ergonomics

The shin guards shall be put on by a subject of appropriate height and adjusted according to the manufacturer's instructions in the information supplied by the manufacturer. The subject shall report if the typical movements in playing association football, e.g. running, jumping, flexing the foot, can be carried out without restriction or severe discomfort.

The results shall be included in the test report.

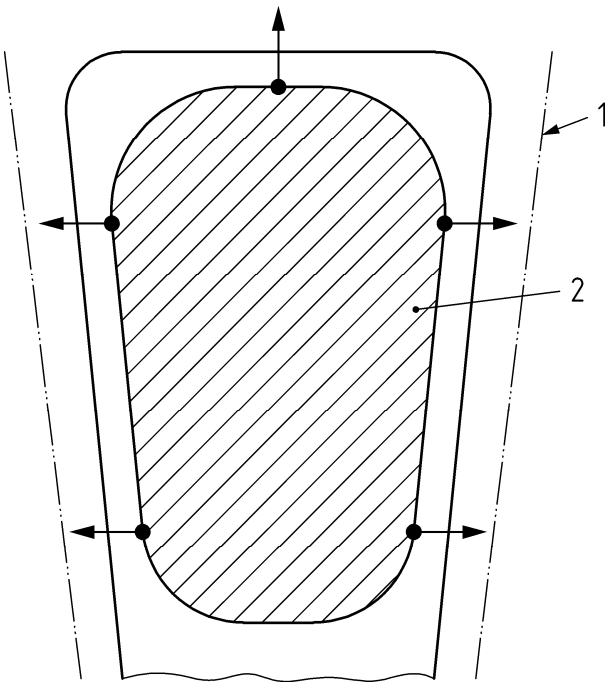
4.6 Restraint

The shin guard shall be attached to a dummy or to a model body part, or shall be put on by a subject. The dummy, the model body part, or subject shall have dimensions within those specified by the manufacturer for users of the shin guard. The shin guard shall be restrained and adjusted according to the manufacturer's instructions in the Information supplied by the manufacturer.

A spring balance, force gauge, or other suitable device shall be attached once in turn to each specified point on the shin guard, illustrated in Figure 4, and the test force of (15 ± 2) N shall be applied tangential to the surface of the shin guard at the point of attachment, or if this is impractical, parallel to the body surface or to the plane of the tangent to the body surface beneath the test point. The specified points for testing, and the directions in which forces are to be applied, are shown in Figure 4.

The force shall be maintained for at least 30 s and then released. The displacement of the shin guards when the force is removed, shall be measured with a measuring uncertainty of 5 % of the maximum permitted displacement, unless the movement is less than 75 % or greater than 150 % of the permitted maximum movement, when this fact may be recorded instead of a measurement. Between measurements, the position of the shin guard and the adjustment of the restraint systems shall be corrected.

The results shall be included in the test report.



Key

1 limits of displacement of the edges of the shin guard
2 test area marked on the shin guard.

Figure 4 — The points of attachment of clamps and the direction of the force to be applied in restraint testing

4.7 Stud impact

4.7.1 Stud impact – horizontal cone test

4.7.1.1 Apparatus

The principle of the apparatus is illustrated in Figure 5. The leg form cone shall be suspended horizontally and a shin guard attached to it shall be struck transversely by a metal stud protruding from a falling mass in the form of a block.

The apparatus shall consist of the following elements:

a) Leg form cones, (500 ± 25) mm long and (5 ± 0,05) kg in weight.

   The cones shall each be a part of the leg form described in section 4.8.1. Cones shall be available to test the different sizes of shin guards. Each cone shall be marked with a scale to indicate the position at which the top edge of the test area of a shin guard shall be placed. The scale shall represent the height of the tallest person the shin guard is designed to fit. The scale dimensions are shown in Figure 8.

b) Two rigid supports, fixed to the ends of the cone and pivoted (1 000 ± 50) mm above the long axis of the cone. Each support shall weigh (1 000 ± 100) g.

c) A falling block in a vertical guidance system that allows the terminal velocity of the block to be (5,4 ± 0,2) m/s (equivalent to 1,5 m free fall). The block shall weigh (1 000 ± 10) g.

d) A cylindrical steel stud (10 ± 0,5) mm in diameter projecting at least 16 mm from the surface of the block. The stud shall have an edge radius of (0,5 ± 0,05) mm.

e) The guidance system for the falling block shall be constructed so that when the block is at the level of the cone a horizontal force or (100 ± 5) N on the end of the stud does not result in more than 2 mm movement as illustrated in Figure 6. A force of (250 ± 10) N applied vertically to the stud, while the block movement is prevented, shall not deflect the stud more than 5° above the horizontal, see Figure 6.

f) An adjustment system to move the cone or the falling block guidance system, so that the stud can be presented to at least the middle 200 mm of the cone's length.

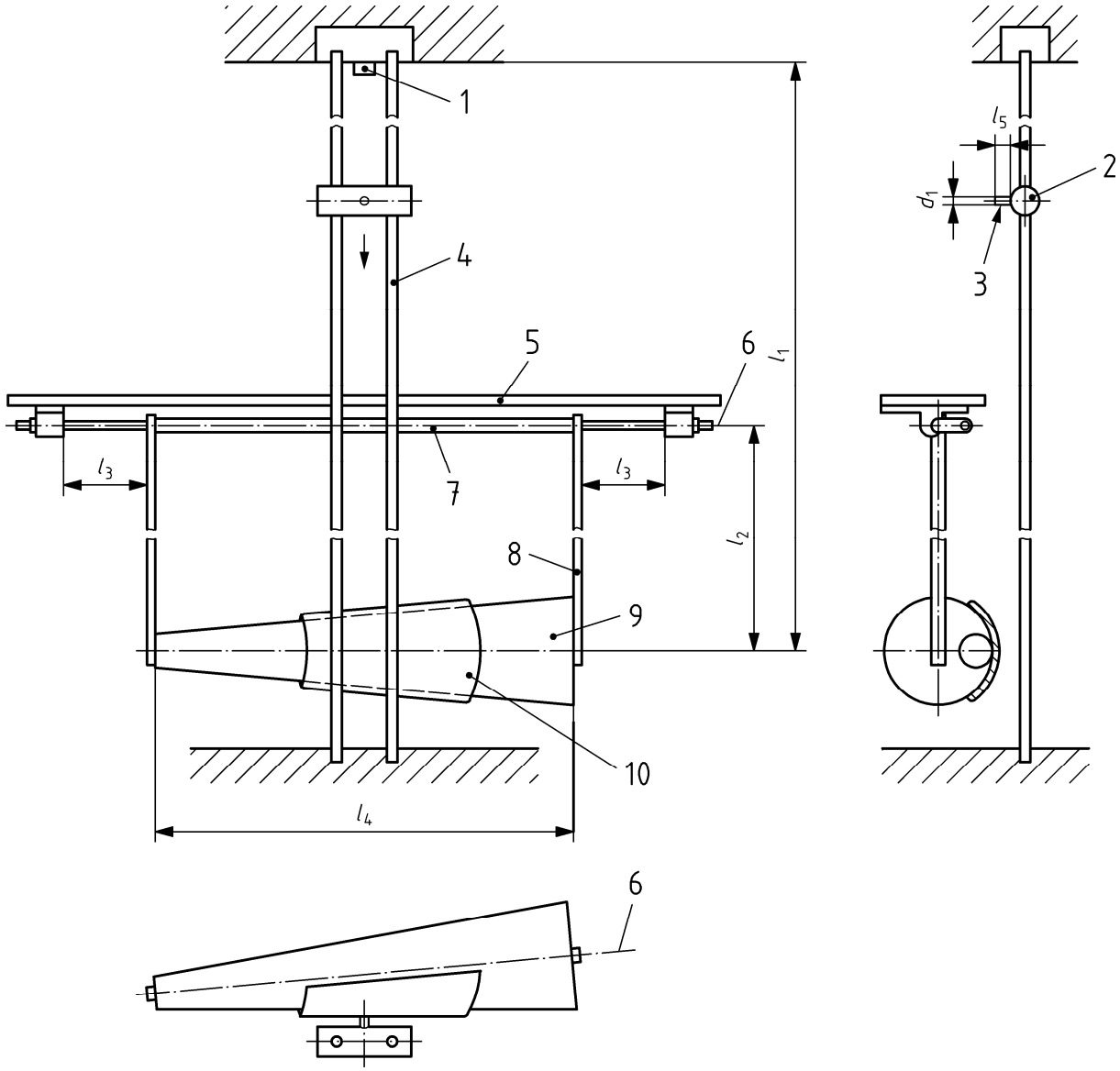
g) An adjustment system to move the cone or the falling block guidance system, so that the potential penetration depth of the stud can be adjusted to (16 ± 1) mm.

4.7.1.2 Procedure

The shin guard shall be firmly attached to the cone so that it does not move more than 15 mm during testing. The position for attachment shall be selected so that the top edge of the marked test area is coincident with the appropriate line of the scale on the cone. In order to present any selected point in the test area to the stud the shin guard may be displaced up to 50 mm above or below the scale line. The cone shall be adjusted, so that the stud will strike the point on the shin guard to be tested. This point shall be in the central 200 mm of the cone.

The cone shall be adjusted so, that the stud would be able to enter the shin guard by (16 ± 1) mm. The falling block shall be released from an appropriate height above the stud contact point on the shin guard.

At least three different positions within the test area on a shin guard shall be tested. The separation of test positions shall not be less than 50 mm. The positions to be tested shall be selected to include any apparently weak points within the test area. The shin guard shall be examined visually after the stud impact test for physical damage. All damage shall be noted and recorded in the test report.

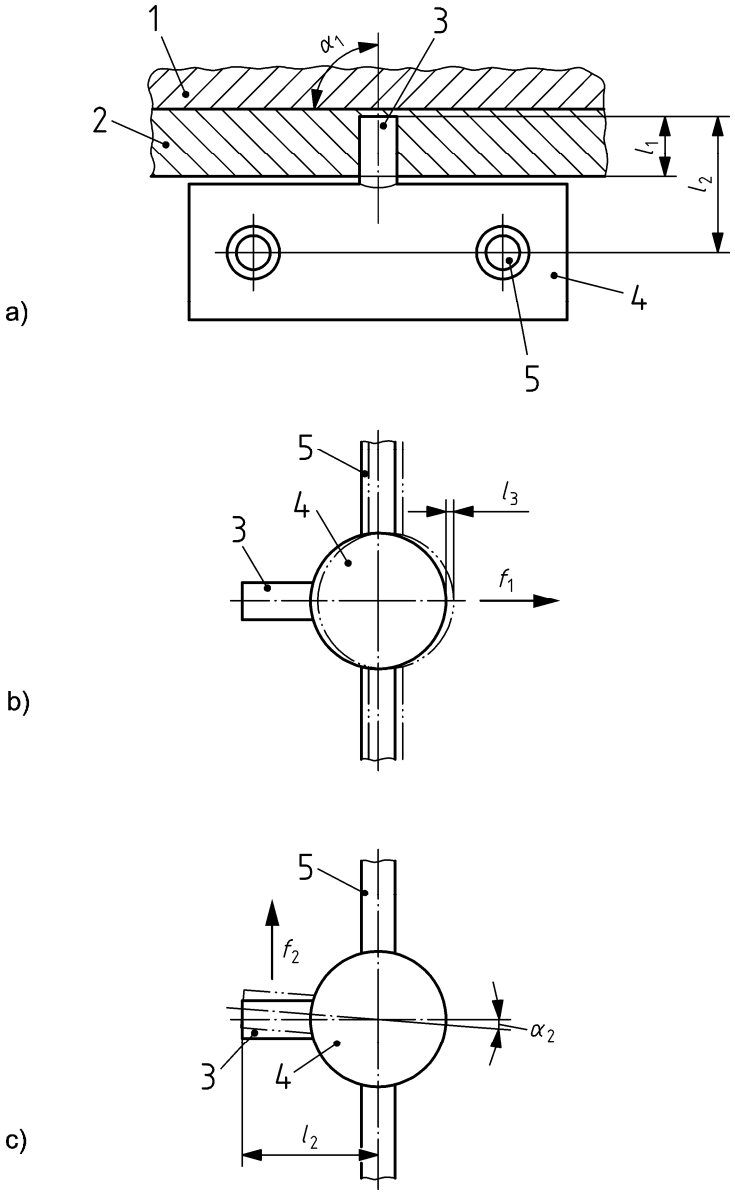


Key

1 release mechanism
2 falling block
3 stud
4 guidance system
5 pendulum support allowing forwards and backwards movements
6 pendulum axis of rotation
7 pendulum support allowing sideways movements
8 rigid supports for the leg form cone
9 leg form cone
10 shin guard

l_1 1,5 m nominal height
l_2 (1 000 ± 50) mm
l_3 > 100 mm
l_4 (500 ± 25) mm
l_5 > 16 mm
d_1 (10 ± 0,5) mm

Figure 5 — Diagram illustrating the principles of the design of a horizontal cone stud impact apparatus



Key

a) Orientation of the stud to the leg form cone
b) Horizontal displacement of the stud that is permitted
c) Angular displacement of the stud that is permitted

1 face of the leg form cone facing the falling block
2 shin guard attached to the cone
3 steel stud
4 falling block
5 guidance system rod

l_1 (16 ± 1) mm
l_2 (36 ± 4) mm
l_3 < 2 mm
α_1 (90 ± 2)°
α_2 < 5°
f_1 (100 ± 5) N
f_2 (250 ± 10) N

Figure 6 — Diagram illustrating the construction tolerances on the guidance and falling block system

4.7.2 Stud impact — vertically inclined cone test

4.7.2.1 Apparatus

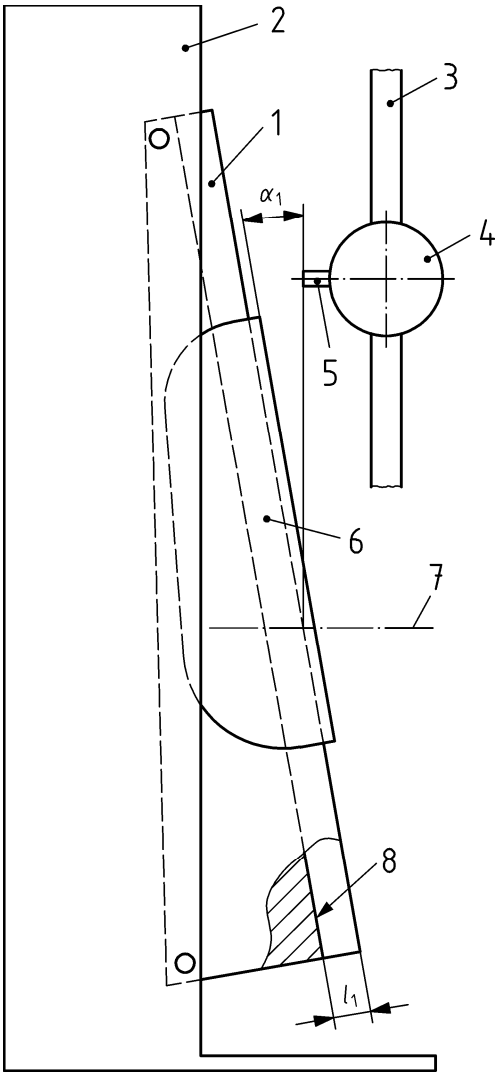
The principle of the apparatus is illustrated in Figure 7. The leg form cone is mounted with its upper surface which faces the stud at 10° to the vertical. The smaller diameter end is at the top. A stud attached to a falling block strikes a shin guard attached to the cone.

The apparatus shall consist of the following elements:

a) a cone having the dimensions of the leg form described in 4.8.1. A test cone may consist of a limited part of the full leg form provided a correctly positioned shin guard is fully supported by the cone. The cone shall have a slot (14 ± 1) mm wide, (25 ± 1) mm deep and (2 ± 0,1) mm outer radius down the centre of its surface facing the stud impact. The cone shall be rigidly mounted. The surface facing the stud impact shall be inclined at (10 ± 1)° to the vertical;

b) a falling block, stud and guidance system as specified in 4.7.1.1;

c) an adjustment system to allow the cone or guidance system to be moved so that the vertical position of the stud impact on the cone can be varied.



Key

1 leg form cone
2 support for the cone that permits backwards and forwards movement
3 guidance system
4 falling block
5 stud
6 shin guard
7 "Zero" line. The lower edge of the stud is about to enter the slot on the cone
8 slot in the face of the cone

l_1 (25 ± 1) mm
α_1 (10 ± 1)°

Figure 7 — Diagram illustrating the principles of the design of the vertical inclined cone stud impact apparatus

4.7.2.2 Procedure

The shin guard shall be firmly attached to the cone so that it does not move more than 5 mm during testing. The position for attachment shall be selected so that the top edge of the marked test area is coincident with the appropriate line of the scale on the cone.

At least three different positions within the test area on a single shin guard shall be tested. The separation of test positions shall not be less than 50 mm. The positions to be tested shall be selected to include any apparently weak points within the test area.

For each test position the height of the falling block relative to a fixed reference point shall be measured when the falling block is at a height at which the lower edge of the front of the stud is about to enter the slot on the cone. This is the height of the "zero" line.

The falling block shall be released from an appropriate height above the "zero" line to give an impact velocity of (5,4 ± 0,2) m/s. After the impact the falling block position relative to the "zero" line shall be measured up to the nearest 1 mm.

The shin guard shall be examined visually after the stud impact tests for physical damage.

All damage shall be noted and recorded in the test report with the values of the final falling block positions.

4.8 Blunt impact test

4.8.1 Apparatus

The apparatus is illustrated in Figure 9. A falling mass strikes a shin guard mounted on a horizontal leg form cone. The transmitted force below the shin guard shall be measured.

The apparatus shall consist of the following elements:

a) A guided falling mass of (1 000 ± 5) g with a striking face that has a form as illustrated in Figure 10. The striking face shall have a width of (14 ± 0,5) mm and a length of minimum 65 mm. The long edges of the striking face shall be rounded with a radius of (2 ± 0,1) mm. The striking face shall be oriented at (90 ± 2)° to the long axis of the leg form cone.

b) A vertical guidance system that allows the terminal velocity of the block to be measured and to be within ± 5 % of the required velocity. The centre of the striker shall hit the shin guard within 1 mm of the projected long axis of the anvil.

c) An anvil with a mass of (220 ± 40) g mounted on a stiff load cell or force transducer such as a piezoelectric load cell. The anvil shall be made of steel with a hardness of at least 55 HRC (Rockwell Hardness, Scale C). The anvil shall have a diameter of (15 ± 0,15) mm. The top surface of the anvil shall have a cylindrical curvature with a radius of (30 ± 4) mm. The long axis of the cylinder shall be parallel to the top surface of the leg form cone. The anvil shall be mounted on the load cell with a pre-load according to the load cell manufacturer's instructions, and the load cell shall be mounted on a block with a mass of at least 500 kg or shall be rigidly fixed to a massive floor. The anvil shall be surrounded by a conical leg form that is mounted directly on the block or on the massive floor and is not in contact with the anvil or the load cell. The top surface of the load cell shall be horizontal ± 1°.

d) A leg form cone that is made of metal, wood or hard plastic. It shall have the form and dimensions shown in Figure 8. The cone shall have holes so that it can be placed around the anvil in positions not more than 75 mm apart as illustrated in Figure 9 over the whole length required for testing shin guards of different sizes. The cone shall be marked with a scale to indicate the position at which the top edge of the test area of a shin guard shall be placed. The scale shall represent the height of the tallest person the shin guard is designed to fit. The scale dimensions are shown in Figure 8. The cone and its mounting to the block shall incorporate an adjustment system so that the top of the centre of the anvil shall be (0,75 ± 0,25) mm above the top horizontal centre line of the cone at each testing position.

e) A recording system that shows a continuous force with time, or has a peak force detection capability. The complete system shall be able to measure forces up to 10 kN with an accuracy of 0,01 kN between 0,5 and 5 kN. The load cell or force transducer shall have a lowest natural frequency above 15 kHz. The load cell or force transducer and the recording system shall have a sampling frequency of 5 kHz or above.

f) A system to hold the shin guard in place during testing. The system is shown in Figure 11. The system shall consist of two straps, each (15 ± 5) mm wide extending across the width of the shin guard which are attached to a rectangular frame of straps with an inner width of (22 ± 2) mm and an inner length of (50 ± 2) mm. The strap system shall be placed with a limit deviation of ± 5 mm symmetrically about the impact position as shown in Figure 12. Each strap shall have a tension in it of (15 ± 1,5) N.

4.8.2 Procedure

New untested shin guards shall be used for blunt impact testing after cleaning, conditioning and marking with the test area.

The shin guards shall be examined and at least three identical specimens shall be selected for blunt impact testing. At least three points in the central test area and at least three points in the lateral test area shall be marked on each of these three shin guards for testing. The positions marked shall be identical on these three shin guards with a tolerance of ± 3 mm.

The impact points shall be selected to include any apparently weak points within the test area. Such points may include the following:

— where the inner padding material is thinner than elsewhere, or is absent;

— where the inner padding includes a harder object or construction;

— where the outer shell material is thinner than elsewhere, or is absent;

— where the outer shell material has a significant change in thickness;

— where two or more separate plates of outer shell material meet;

— where straps attach;

— between reinforcing ribs of hard material;

— directly centred on a solid part of a reinforcing rib;

— on a reinforcing rib near to an end;

— depending on the individual construction of the shin guard other positions may appear to be weaker and shall be considered for testing.

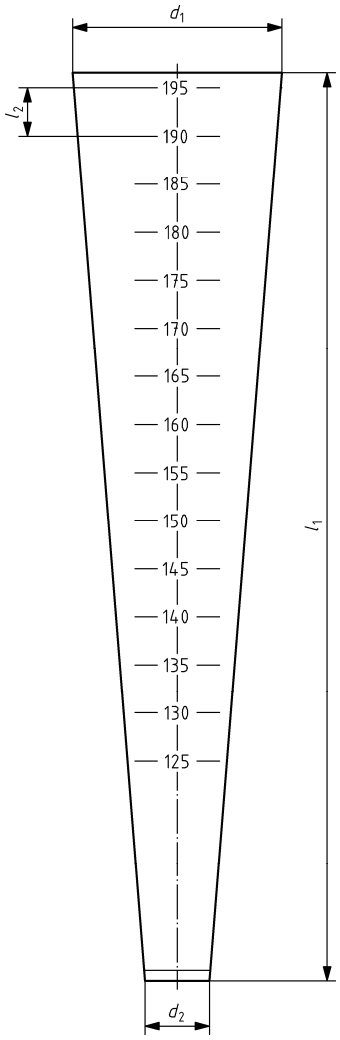
Sufficient shin guards shall be prepared for impact testing. At least three test points in both the central and the lateral test areas that have been identified in 4.4.2 or from consideration of the list above, shall be marked on three shin guards. If test points are less than 30 mm apart, additional shin guards shall be used to achieve this separation.

Before conducting impact tests the point on the cone equivalent to the height of the tallest person the shin guard is designed to fit shall be identified. The top edge of the total test area marked on the shin guard shall be aligned with this point. The shin guard shall then be moved the minimum necessary distance down the cone to position each test point successively over an anvil hole. The cone shall then be moved so that the anvil is in the appropriate hole. The other shin guard test specimens shall be set up on the cone and over the anvil in the same way.

The shin guard shall be secured in place by the strap system and the marked point for impact testing shall be adjusted to within 3 mm of the central axis of the anvil. Impacts shall be carried out at the velocities in accordance with Table 3. The peak transmitted force in each impact shall be recorded. The mean of the peak forces of the three impacts on the same test point on the three shin guards shall be calculated.

Table 3 — Impact velocity of the impactor

Test area	Impact velocity
central	(2,00 ± 0,05) m/s
lateral	(1,75 ± 0,05) m/s

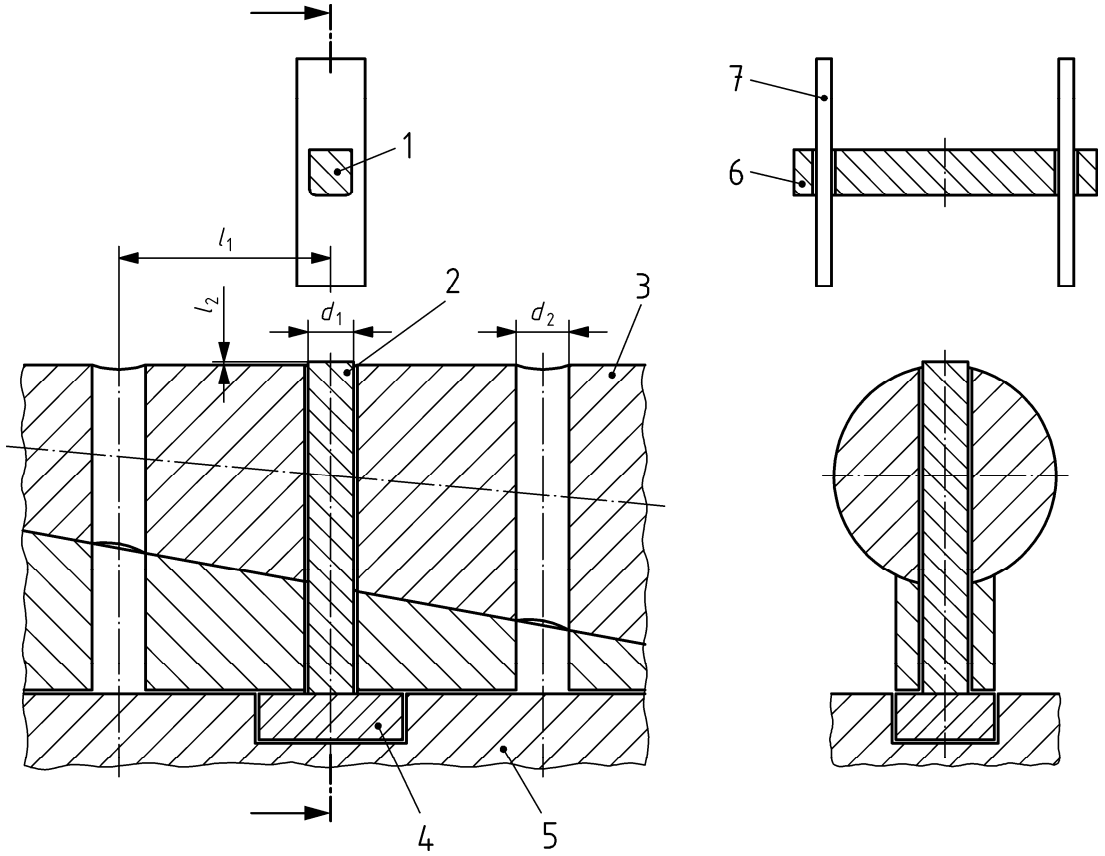


Key

d_1 (130 ± 1) mm
d_2 (40 ± 0,4) mm
l_1 (550 ± 5) mm
l_2 (30 ± 0,3) mm

NOTE The cone has a scale marked on it denoting the level at which the top line of the test area of a shin guard should be placed. The number on the scale is the height in centimetres of the largest person the shin guard is designed to fit.

Figure 8 — Dimensions of the leg form cone

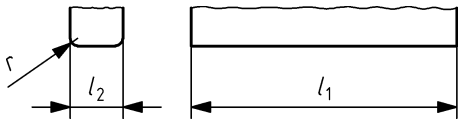


Key

1 cross section of impactor
2 anvil
3 leg form cone
4 load cell
5 massive block
6 side view of impactor
7 guidance system

d_1 (15 ± 0,15) mm
d_2 Clearance on d_1
l_1 < 75 mm
l_2 (0,75 ± 0,25) mm

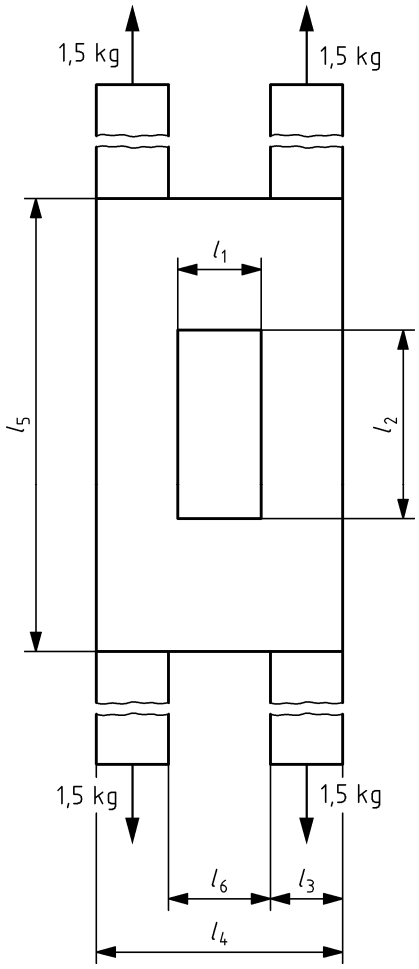
Figure 9 — Diagram of the vertical impact anvil design



Key

l_1 > 65 mm
l_2 (14 ± 0,5) mm
r (2 ± 0,1) mm

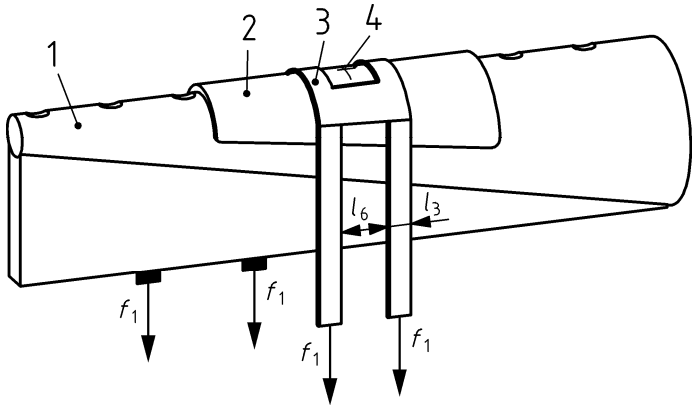
Figure 10 — View of the falling mass



Key

l_1 (22 ± 2) mm
l_2 (50 ± 2) mm
l_3 (15 ± 5) mm
l_4 (65 ± 5) mm
l_5 (120 ± 10) mm
l_6 (25 ± 2) mm

Figure 11 — Plan view of the strap system to hold the shin guard in place on the leg form



Key

1 leg form cone
2 shin guard
3 strap
4 impact point

l_6 (25 ± 2) mm
l_3 (15 ± 5) mm
f_1 (15 ± 1,5) N

Figure 12 — A shin guard held down by a strap system on the leg form cone

5 Marking

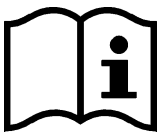
Shin guards for association football players shall be permanently and conspicuously marked with at least the following:

a) name or trademark of the manufacturer or his authorised representative established in the Community;

b) designation of the product type, commercial name or code that uniquely identifies the item;

c) size designation of the shin guard;

d) following pictogram, instructing the user to see the information supplied by the manufacturer;



e) number of this European Standard;

f) if relevant, an indication of whether the shin guard is for the left or for the right leg.

The following information should be given on the product whenever practical:

— type of use for which the shin guards are intended. Any type of use for which the shin guards are specifically not intended;

— hazards specific to association football against which some protection is given;

— hazards specific to association football against which protection is not given;

— textile and material types in the protector;

— international care label symbols (Negative labels are important).

6 Information supplied by the manufacturer

Shin guards for association football players shall be supplied with information and with instructions for fitting and use. These are an essential part of the protective equipment. They shall contain at least the following information in the official language(s) of the state or region in which they are placed on the market:

a) all information required in Clause 5;

b) complete address of the manufacturer and/or his authorized representative established in the community;

c) how to choose the correct size of shin guard and check their fit;

d) how to adjust the shin guards and fix them in place so that they remain in place in normal play;

e) a warning about any changes in environmental conditions, such as temperature, that would significantly reduce the performance of the shin guards;

f) a warning that no shin guard can offer full protection against injuries;

g) a warning about any contamination, alteration to the shin guard, or misuse that would dangerously reduce its performance. Specific warning about reducing the dimensions of the shin guard;

h) a list of the substances used for the main components of the product in order to inform about potentially allergenic components;

i) if appropriate, hazard labelling according to Directive 67/548/EEC

j) detailed instructions for caring for and cleaning the shin guards;

k) instructions concerning inspection and repair of the shin guards, and how to decide that they should be thrown away because they may no longer provide adequate protection, due to ageing or use.

Annex A
(informative)

Significant technical changes between this European Standard and the previous edition EN 13061:2001

Table A.1 — Significant technical changes

Clause / Paragraph / Table / Figure	Change
Contents list	The figures of this standard have been listed.
3.1 General, including innocuousness	The requirements for innocuousness have been re-worded.
4 Test methods	This clause has been restructured.
4.1 General	The test methods for general requirements have been enlarged.
4.2 Sampling and conditioning of the test samples	Sampling and conditioning have been merged in one clause.
4.4 Innocuousness	The test methods for innocuousness of edges, seams and buckles as well as internal ridges and external ridges have been addressed in detail.
4.4.3.2 External ridges/Procedure	Pass and fail conditions have been supplemented.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

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.

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	Essential Requirements (ERs) of Directive 89/686/EEC, Annex II	Qualifying remarks/Notes
3.2	1.1.1 Ergonomics	
3.2	1.1.2.1 Highest level of protection possible	
3.1,	1.2.1.2 Satisfactory surface condition of all PPE parts in contact with the user	
3.2	1.2.1.3 Maximum permissible user impediment	
3.4	1.3.1 Adaptation of PPE to user morphology	
3.5, 3.6	3.1.1 Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	
3.5, 3.6	3.3 Protection against physical injury (abrasion, perforation, cuts, bites)"	
5, 6	1.4 Information supplied by the manufacturer	
5, 6	2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	

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

Bibliography

[1] Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (as amended)

[2] REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency

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