BRITISH STANDARD

BS EN 15613:2008

Knee and elbow protectors for indoor sports — Safety requirements and test methods

ICS 13.340.40; 13.340.50; 97.220.30

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15613:2008.

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.

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Protecteurs de genoux et de coudes pour les sports de salle - Exigences de sécurité et méthodes d'essai

Knie- und Ellbogenschützer für den Hallensport - Sicherheitstechnische Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 13 September 2008.

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Contents

Page

Foreword

This document (EN 15613:2008) 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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by month April 2009.

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 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, see informative Annex ZA, which is an integral part of this document.

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1 Scope

This European Standard specifies the requirements and test methods for ergonomics, sizing, adjust/restraint performance and impact performance of knee and elbow protectors used for indoor sports, e.g. volleyball and handball.

It applies for knee and elbow protectors to be used on smooth and level floors without mats.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 340:2003, *Protective clothing — General requirements*

ISO 7000:2004, *Graphical symbols for use on equipment — Index and synopsis*

3 Terms and definitions

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

3.1
knee protector
device worn on the knee that is intended to reduce the risk of injuries of the knee caused by impact and skin abrasion

3.2
elbow protector
device worn on the elbow that is intended to reduce the risk of injuries of the elbow caused by impact and skin abrasion

4 Classification

The classification of knee and elbow protectors shall be based on two weight ranges as follows:

a) Class A: Users of body mass up to 50 kg;

b) Class B: Users of body mass above 50 kg.

The different performance requirements are described in Clause 5.

5 Safety requirements

5.1 General

5.1.1 Knee and elbow protectors shall be so designed that in the foreseeable conditions of use for which they are intended the user can perform the typical movements without being hindered. See test method in 6.3.

5.1.2 Knee and elbow protectors shall be free of sharp edges, corners and burrs that might injure the user. See test method in 6.4.

5.2 Innocuousness

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

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

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].

5.3 Sizing

Knee and elbow protectors shall be indicated with a size according to the principles described in Clause 6 of EN 340:2003. See test method in 6.1.

5.4 Adjusting/restraint systems

5.4.1 If knee and elbow protectors have parts which can be adjusted by the user or which can be removed for the purpose of change they shall be so designed that they can be easily adjusted, assembled and removed without a tool. The width of the straps shall be at least 40 mm. Restraint devices shall be so designed that they do not constrict limbs, e.g. by rolling straps. See test method in 6.1.

5.4.2 Knee and elbow protectors shall remain in the areas they are designed to protect during all typical movements or during an impact.

When tested according to 6.5, the movement of the central point of a protector shall not be greater than specified in Table 1.

Table 1 — Maximum movements of knee and elbow protectors

Protector	Maximum movement	
	Class A mm	Class B mm
Elbow protector	40	50
Knee protector	50	60

5.5 Impact performance

When tested according to 6.6, all test results shall not exceed the values specified in Table 2.

Table 2 — Impact performance requirements of knee and elbow protectors

Protector	Class A		Class B		Max. peak force
	r	E	R	E	
	mm	J	Mm	J	kN
Elbow protector	12,5	1	17,5	1,5	4
Knee protector	25,0	2,5	35,0	4	6
r is the radius of curvature of the anvil E is the impact energy					

See test method in 6.6.

6 Test methods

6.1 General

If no specific methods are specified compliance with the requirements of this European Standard shall be examined by measurement, visual inspection and tactile examination.

For the tests new protectors shall be used.

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 European 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.

6.2 Sampling and conditioning of the test samples

Two pairs of protectors of each size manufactured shall be provided for testing.

Where only one size of a protector is manufactured 4 pairs of that protector shall be provided for testing.

The test samples shall be supplied to the test house with the information regarding the body dimensions of the intended user.

Before testing, all protectors shall be cleaned 3 times according to the information supplied by the manufacturer. This shall be recorded in the test report.

The test samples shall be conditioned for at least 24 h at an atmosphere with a temperature of (20 ± 2) °C and a relative humidity of (65 ± 5) %. Testing shall be carried out in the conditioning environment or within 10 min of removal from the environment.

6.3 Ergonomics

One knee protector and one elbow protector of each size shall be put on and adjusted by a subject of appropriate dimensions of the intended user according to the information supplied by the manufacturer. The subject shall report if the typical movements in playing indoor sports can be carried out without restriction or severe discomfort. The results shall be included in the test report.

6.4 Edges, seams and buckles

Inspect one knee protector and one elbow protector respectively of each size 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 results shall be included in the test report.

6.5 Restraint

The test shall be carried out for each size of the protector.

The protector shall be put on a subject or dummy of dimensions of the intended user according to the information supplied by the manufacturer respectively. Fasten the protector securely according to the manufacturer's instructions. Subjects shall not wear clothing under the protector for this test. The dummy used shall have an artificial skin of "chamois" leather at least 1 mm thick. The leather shall be stuck to the dummy so that it cannot slide on the dummy surface during the test. A reference point near the centre of the outside of the protector shall be marked.

The subject shall be required to grip a support with his/her hand or to stand still so that the limb under the protector does not move during the test. The dummy shall be fixed to a firm support. The limbs shall be maintained in a natural position during the test. Clamp a spring balance or similar device reading to at least 60 N in turn to the upper and lower edges of the protector. Apply the force given in Table 3 over a period of (20 ± 2) s and maintain for (20 ± 2) s in a direction parallel to the limb, directly down the limb and directly up the limb. Measure the maximum movement of the central point of the protector to an accuracy of ± 5 mm after the release of the force. Three tests shall be made in each direction. Re-position and adjust the protector as necessary between the tests. The largest movement recorded shall be used to determine the result of the whole test to be included in the test report.

Table 3 — Forces to be used in restraint testing

Kind of protector	Range of body mass	
	Class A N	Class B N
Elbow protectors	35	50
Knee protectors	35	50

6.6 Impact performance

6.6.1 General

The test shall be carried out for each size of the protector.

6.6.2 Test area

The test area shall be marked on the protector by using a template in accordance with Table 4.

Table 4 — Diameters of the test area template

Kind of protector	Range of body mass	
	Class A mm	Class B mm
Elbow protectors	60 ± 0,5	80 ± 0,5
Knee protectors	75 ± 0,5	90 ± 0,5

Templates shall be prepared from stiff but flexible material cut to the dimensions of the test areas given in Table 4.

The templates shall be centred on the points marked on the protectors of each size as follows:

For each size of the protector, it shall be put on by a subject of dimensions of the intended user according to the information supplied by the manufacturer. With their knee or elbow bent at an angle of 90° mark the centre of the protector with respect to the joint covered. The accuracy shall be ± 5 mm.

Place the template on the protector so that its centre coincides to the centre of the template. Draw a line on the protector around the template.

Mark the test area with an accuracy of ± 1,5 mm using the edge of the template.

6.6.3 Apparatus

Testing shall be carried out in an apparatus in which a guided mass falls onto a test specimen placed on an anvil. The centre of gravity of the falling mass shall be above the centre of the anvil.

The falling mass shall have a mass of (2,5 ± 0,025) kg and a striking face with dimensions of 40 mm × 40 mm. It shall be made of polished steel.

A means of measuring the velocity of the falling mass prior to impact shall be provided to enable the impact energy to be verified.

The surface of the anvil shall be hemispherical with a diameter given in Table 2. The anvil shall be made of polished steel and have a height of at least 200 mm.

The anvil shall be mounted directly onto a piezo-electrical load cell and the system shall be clamped or bolted to the massive base of a mass of at least 1 000 kg.

The anvil shall be mounted in such a way that during the impact test the total force between the anvil and the solid base of the apparatus passes through a quartz force transducer in line with its sensitive axis (is conducted through the sensitive axis of a load cell). The recording system shall show a continuous force with time, or shall have a peak force detection capability. The force transducer shall have a calibrated range of not less than 10 kN and a lower threshold of less than 1 kN. The output of the force transducer shall be processed by a charge amplifier and displayed and recorded on suitable instruments. Digital sampling systems shall have a minimum rate of 10 kHz. The complete system shall be able to measure forces up to 10 kN with an accuracy of 0,1 kN.

6.6.4 Procedure

Place the protector on the appropriate anvil and hold it down with a force of 5 N to 10 N.

NOTE A system of elastic straps has been found suitable.

Move the protector on the anvil so that each chosen test position is impacted. Test positions shall be at least 30 mm apart. Test positions shall include points within the marked test area that it is anticipated will be particularly weak. For the smallest and the biggest size make four impacts, two on the type of construction present

over the majority of the area of the protector and two in a weak area. The worst value shall be counted. If there are sizes in between, these have to be tested with at least two impacts in a weak area in construction. The results shall be included in the test report.

7 Marking

Knee and elbow protectors shall be durably and clearly marked with the following information:

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

b) designation of the protector, commercial name or code that uniquely identifies the protector;

c) size of the protector (body mass class and size);

d) information about the class according to Clause 4;

e) clear indication whether the protector is for left or right fitting, if appropriate;

f) international care label;

g) year of manufacture (date or code);

h) the expiry date if ageing significantly reduces the performance of the protector;

i) following pictogram according to ISO 7000:2004 - 1641, instructing the user to see the information supplied by the manufacturer.

8 Information supplied by the manufacturer

Knee and elbow protectors shall be provided with precise information in the official language(s) of the country or regions in which the product is to be placed on the market. At least the following information shall be given:

a) all the information specified in Clause 7;

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

c) instructions on how to select protectors of the correct performance level and an explanation of the performance levels;

d) instructions on how to choose the correct size of protector and check its fit;

e) details of the size of protectors and the body dimensions to which they relate;

f) instructions on how to adjust the protectors;

g) warning about any changes in environmental conditions, such as temperature, that would significantly reduce the performance of the protector;

h) warning that no protector can offer full protection against injuries;

i) warning about any contamination, alteration to the protector or misuse that would dangerously reduce the performance of the protector;

j) warning that the protector shall be inspected carefully before use. Signs of damage or weakness might reduce the performance of the protector;

k) list of the substances in the main components of the protectors;

l) instructions for caring for a cleaning of the protector;

m) instructions concerning the expected service life of the protector, inspections to carry out, repairs that may be made, and advise on when discard the protector because it might not longer perform adequately;

n) type of use for which the protector is intended;

o) type of use for which the protector is not intended;

p) hazards specific to the sport against which some protection is given;

q) hazards specific to the sport against which protection is not given.

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 on the approximation of the laws of the Member States relating to personal protective equipment.

Once this standard is cited in the Official Journal of the European Communities 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		Qualifying remarks/ Notes
5.1.1	1.1.1	Ergonomics	
5.1.2	1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	
5.4.1	1.2.1	Absence of risks and other ‘inherent' nuisance factors	
5.4.1	2.9	PPE incorporating components which can be adjusted or removed by the user	
5.4.2	1.3.1	Adaptation of PPE to user morphology	
7, 8	1.4	Information supplied by the manufacturer	
8 m)	2.4	PPE subject to ageing	
5.5	3.1.1	Impact caused by falling or projecting objects and collision 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] 67/548/EEC Council Directive of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

[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)

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