BS EN 16027:2011

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Protective clothing — Gloves with protective effect for association football goal keepers

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National foreword

This British Standard is the UK implementation of EN 16027:2011. 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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Protective clothing - Gloves with protective effect for association football goal keepers

Vêtements de protection - Gants à effet protecteur pour gardiens de but de football

Schutzkleidung - Handschuhe mit Schutzwirkung für Fußballtorwarte

This European Standard was approved by CEN on 29 October 2011.

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Foreword

This document (EN 16027:2011) 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of an identical text or by endorsement, at the latest by June 2012, and conflicting national standards shall be withdrawn at the latest by June 2012.

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(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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Introduction

Whilst many types of gloves for goal keepers are only designed to facilitate catching the ball and provide cushioning from minor contusions, gloves can also be designed to provide additional protection to the hands and particularly the fingers. These are intended to reduce the risk of fractures, by restricting the flexing under impact of joints beyond their natural range of movement.

1 Scope

This European Standard applies to gloves for goal keepers for association football (in the following text just “gloves for goal keepers") with stabilizing and/or stiffening elements (e.g. splint, brace), which due to their construction, provide a protective effect against injuries of the hand or parts of it, such as torn capsules, broken fingers, sprained fingers and wrists.

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 420:2003+A1:2009, *Protective gloves — General requirements and test methods*

EN 10270-1 *Steel wire for mechanical springs — Part 1: Patented cold drawn unalloyed steel wi*re

EN 13906-2, *Cylindrical helical springs made from round wire and bar — Calculation and design — Part 2: Extension springs*

3 Terms and definitions

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

3.1
glove for goal keepers
protective equipment worn on the hand which restricts movement of the fingers further than the normal range of the joints by use of additional safety features such as (but not restricted to) splints, braces or other stiffening elements

3.2
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

[EN 13061:2009, 2.4]

4 Requirements

4.1 General

Gloves for goal keepers shall be safe and suitable for their purpose when used in accordance with the manufacturers instructions. They shall be free of hard or sharp edges or corners, buckles or other objects on the inside and the surface of the product which may be dangerous for the user or others during normal or foreseeable use when tested in accordance with 5.3.

4.2 Innocuousness

Manufacturers of products complying with this standard should consider the health and protection of the user, the environment and the supply chain. Materials used should not, during foreseeable conditions of normal use, release or degrade to release substances generally known to be hazardous.

The manufacturer should 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].

4.3 Ergonomics

Gloves for goalkeepers shall be designed in such a way that the user can perform the typical movements required by the foreseeable conditions of use without restrictions, closure systems which ensure correct fitting and placement of the glove shall be adjustable and suitable to ensure restraint of the item whilst in use without constriction of the joint between the hand and arm.

Testing shall be in accordance with 5.3.

4.4 Stiffness

Gloves for goalkeepers shall be designed and manufactured with suitable stabilising and stiffening elements such that they support the fingers when they are stressed by a load or impact inverse to the natural flex direction of the fingers without endangering the hand, wrist or arm of the user. Testing shall be in accordance with 5.4, and the force measured shall be within the limits specified in Table 1.

4.5 Restraint system

Gloves for goalkeepers shall be easily fitted and adjusted by the user using a suitable restraint system. They shall fit firmly to the hand of the intended size, shall not release from the hand during use, and shall remain in the location they are designed to protect during all typical movements or impact. When tested in accordance with 5.5, the maximum displacement shall be less than 20 mm.

4.6 Impact strength

Gloves for goal keepers with stabilizing and stiffening elements (e.g. splint, brace) shall be resistant against mechanical impacts. Stabilizing and stiffening elements shall not break or splinter, when tested according to 5.6.

4.7 Sizing

Gloves shall be available in a range of sizes suitable for the varying hand size of the intended user. The manufacturer shall indicate the intended size for which the glove is designed.

The size of the glove with protective effect shall be defined according to EN 420:2003+A1:2009, 5.1.2, Table 3.

5 Test methods

5.1 General

Where no specific testing procedure is given, compliance with the requirements of this standard shall be established by measurement, visual and physical examination. For testing, new unused samples shall be used.

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

For each of the required sequences of measurement 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 and there is the requirement that a certain value shall be exceeded then the sample shall be deemed to have failed.

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

5.2 Sampling and conditioning

Two pairs of unused gloves for goal keepers of each size distributed to the market shall be provided for testing.

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

5.3 Ergonomics

At least two sizes of gloves, one sample each, shall be used. Each sample shall be put on and adjusted by a subject of appropriate dimensions of the intended user according to the information supplied by the manufacturer. Check by visual and/or tactile inspection that the glove is free of hard or sharp edges or corners, seams and buckles and that the restraint system does not constrict the user in use.

For testing the typical movements, a subject shall catch and fist a ball according to the rules of association football. The subject shall report any restrictions or severe discomfort when executing typical moves.

The size of the gloves with protective effect shall be tested according to EN 420:2003+A1:2009, 6.1.3.

5.4 Stiffness

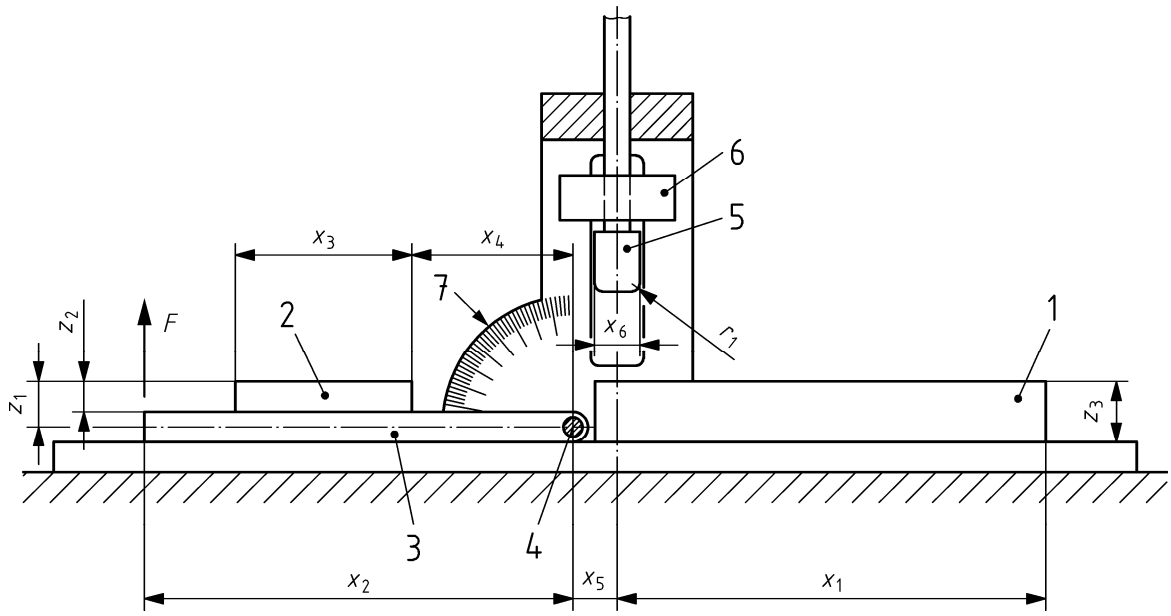
5.4.1 Apparatus

The apparatus is illustrated in Figure 1.

The apparatus comprises a palm support on which to place the palm of the glove to be tested and a finger support on which to place all fingers of the glove except the thumb. The finger support is attached to a pivot table lever. A scale enables measurement of the pivot angle of the lever with an accuracy of ± 1°. The surfaces of the palm support and of the finger support are on same level with accuracy of ± 0,2 mm. The pivot axis of the lever is (18 ± 0,2) mm below the upper surface of the finger support. The apparatus further comprises a holding bar to press down the glove to the palm support. The surface of this bar facing the glove is plane with a radius of (3 ± 0,1) mm on both long edges of the bar. The total width of the bar shall be 15 mm and the length minimum 200 mm. The long axis of the bar shall be parallel to the pivot axis with an accuracy of ± 0,5°. The horizontal distance of long axis of the bar to the pivot axis shall be (17,5 ± 0,2) mm. A guiding system shall be provided to keep the holding bar in horizontal orientation with an accuracy of ± 1°. The holding bar shall be weight loaded so that it shall be pressed down to the gloves upper surface with a force according to Table 1.

A force to pivot the lever shall be applied radial to the pivot axis with a distance of (170 ± 5) mm. The force shall be measured by a strain gauge or other appropriate instrumentation with an accuracy of ± 0,5 N.

To replace the fingers of the hand, the fingers of the gloves except the thumb shall be filled with extension springs according to EN 13906-2 with the following specifications: De=15 mm, d=1,5 mm, spring steel according to EN 10270-1, any grade, length min. 200 mm.

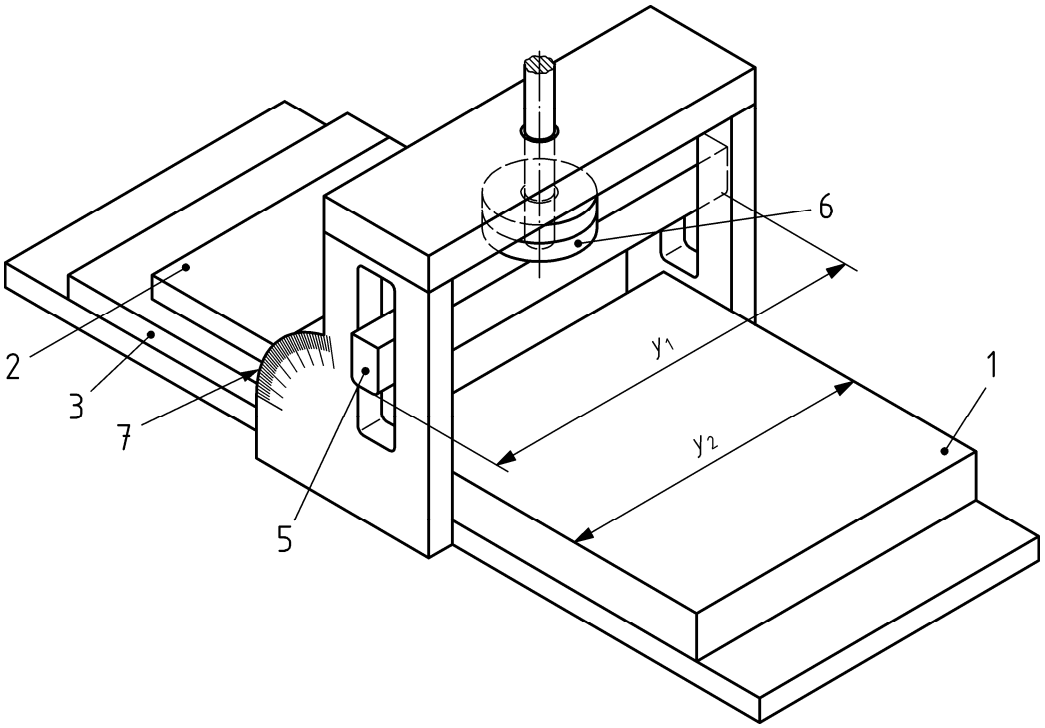


Key

1 palm support
2 finger support
3 pivotable lever
4 pivot axis
5 holding bar
6 weight
7 scale

x_1 min. 170 mm
x_2 170 mm ± 5 mm
x_3 70 mm ± 0,2 mm
x_4 see Table 1
x_5 17,5 ± 0,2 mm
x_6 15 ± 0,1 mm
z_1 18 ± 0,2 mm
z_2 12 ± 0,2 mm
r_1 3 ± 0,2 mm

Figure 1 — Apparatus for testing the stiffness of fingers of gloves

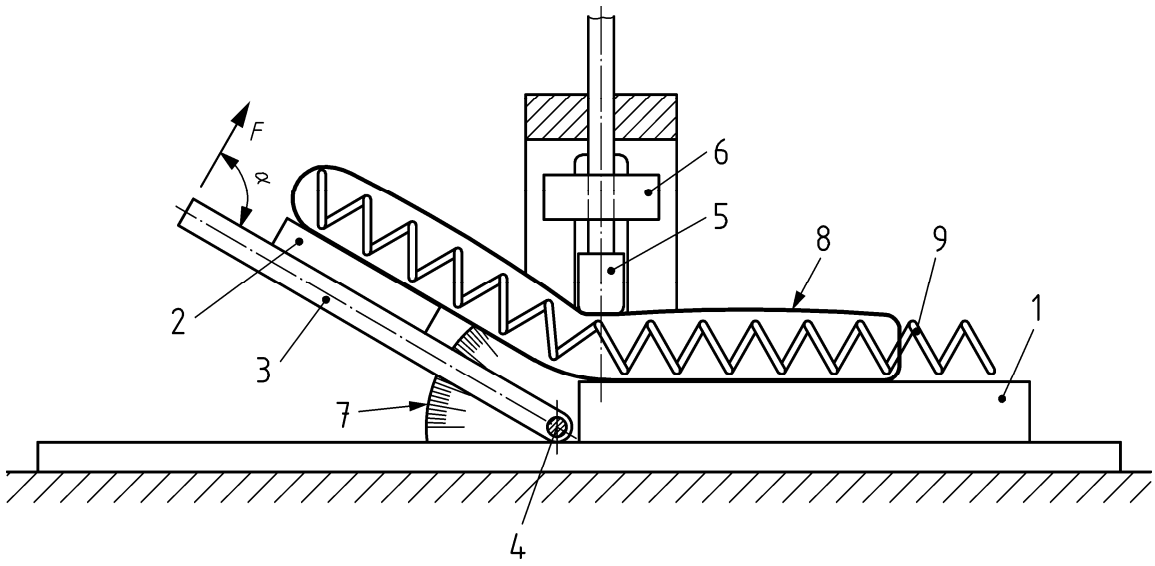


Key

1 palm support
2 finger support
3 pivotable lever
5 holding bar
6 weight
7 scale

y_1 min. 200 mm
y_2 min. 160 mm

Figure 2 — Perspective view of the apparatus for stiffness testing



Key

1 palm support
2 finger support
3 pivot table lever
4 pivot axis
5 holding bar
6 weight
7 scale
8 glove
9 tension spring
α 90° ± 5°

Figure 3 — Principle of stiffness testing

5.4.2 Procedure

With the hand of a test person of appropriate size inside the glove the position of all finger base joints (except thumb) shall be marked on the upper surface of the glove. A reference line square to the long axis of the fingers which represent the best mean approach to the positions of the marks showing the joint position shall be drawn onto the upper surface. One tension spring shall be inserted to all fingers except the thumb as far as possible.

The glove shall be positioned onto the apparatus with the palm positioned on the palm support and the fingers positioned onto the finger support, so that the line marking the average position of the finger base joints will be in line with the front edge of the holding bar.

Fix the glove in this position by the holding bar loaded with a weight as defined by Table 1.

Attach the spring gauge or other appropriate measuring device to measure the force needed to lift the lever. Lift the lever to an angle of 30° no faster than within 5 seconds. Measure the force to hold the lever in this position in rest.

If the construction of all sizes is identical, at least two sizes shall be subjected to mechanical testing. If differences in construction are apparent, samples of all differing sizes shall be tested. Two samples of each test size shall be tested.

Table 1 — Stiffness test conditions according to the size of the goal keepers gloves

Glove size	**< 7**	**≥ 7**
x_4[a]	40 ± 0,2 mm	50 ± 0,2 mm
Weight of holding bar	6 ± 0,1 kg	8 ± 0,1 kg
Min. force at 30°	15 N	25 N
Max. force at 30°	40 N	60 N
[a] For x_4 see Figure 1.		

5.5 Restraint

If the design of all sizes is identical, at least two sizes shall be subjected to testing.

The glove shall be put on by a subject of appropriate size of the intended user according to the information supplied by the manufacturer. Fasten the glove securely according to the manufacturer's instructions. A reference line (see 5.4.2) square to the long axis of the fingers, which best represents the mean approach to the positions of the marks showing the joint position shall be drawn onto the upper surface.

The subject shall sit or stand with the trunk in a vertical position, the rear side of the upper arm pressed against a vertical support or wall and the forearm with the glove to be tested oriented approximately horizontal. A mark shall be drawn onto the skin of the forearm within 1 cm from the end of the glove (see Figure 4 a). The hand and finger joints shall be maintained in a stretched position during the test.

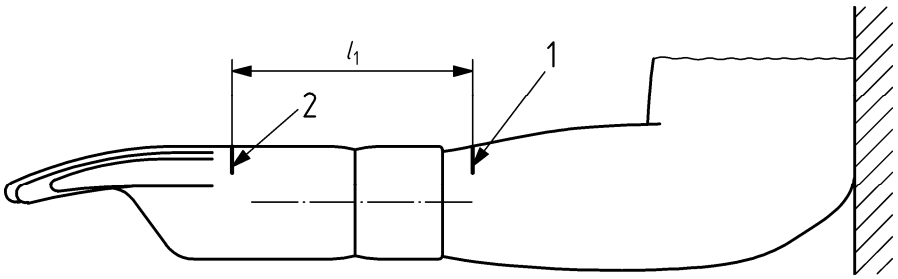
The distance between the reference line and the mark on the forearm shall be measured.

Clamp a spring balance or similar device with a measuring range of at least 30 N to the fingertip of the middle finger of the glove. Apply the force of (15 ± 1,5) N and maintain for (10 ± 1) s in a direction parallel to the forearm axis. Then release the tear force. Measure the distance between the reference line and the mark on the forearm with an accuracy of ± 2 mm within 5 seconds after release of the applied force (see Figure 4b).

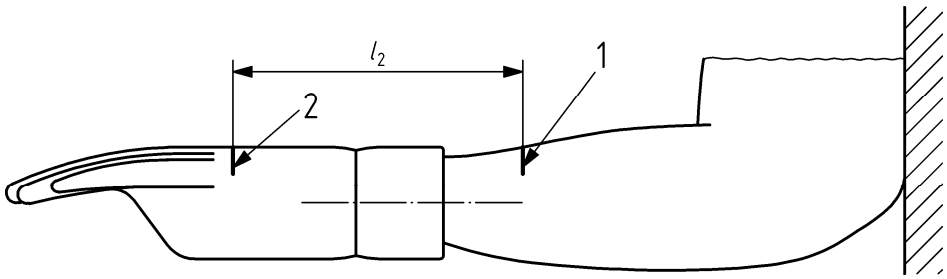
Three tests shall be made. Reposition and adjust the glove as necessary between the tests. The largest displacement ($l_2 - l_1$) recorded shall be used to determine the result of the whole test to be included in the test report.

If the construction of all sizes is identical, at least two sizes shall be subjected to mechanical testing. If differences in construction are apparent, samples of all differing sizes shall be tested. Two samples of each test size shall be tested.

Dimensions in mm



a) Before application of the force



b) After application of the force

Key

1 mark on the forearm
2 reference line
l_1 distance between mark and reference line before force application
l_2 distance between mark and reference line after force application

Figure 4 — Maximum displacement of the glove for goal keepers

5.6 Impact strength

5.6.1 Apparatus

The apparatus shall consist of:

1) pendulum test rig or a free fall guided striker test rig,

2) the striker shall be cylindrical with a radius of (15 ± 1) mm and a minimum length of 125 mm,

3) rigid steel anvil tube with a minimum length of 200 mm and a diameter of (48 ± 2) mm.

5.6.2 Procedure

The apparatus shall be adjusted so that the impact energy is in accordance to Table 2.

Table 2 — Impact energy for testing of gloves with protective effect for football goal keepers

Kind of protector size	Impact energy J
≥ 7	45 ± 1
< 7	25 ± 1

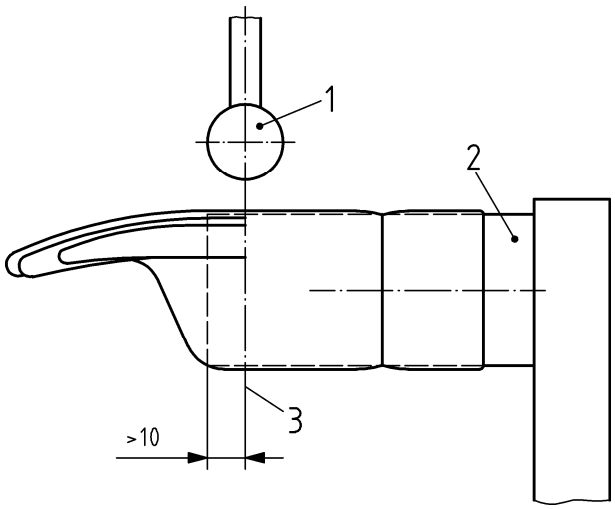
The construction of all sizes of glove shall be checked to ensure that they are identical apart from areal dimensions, and that these are in the proportion to the sizes marked on the gloves. If the construction of all sizes is identical, at least two sizes shall be subjected to mechanical testing. If differences in construction are apparent samples of all differing sizes shall be tested. Two samples of each test size shall be tested. One impact shall be performed.

Two different test directions shall be carried out on one sample:

NOTE If necessary, the test sample may be fixed to the steel anvil tube with an additional fixation strap at the wrist.

a) Back of the glove: The impact shall be positioned in the area of the protective elements of the base joint (reference line), see Figure 5.

Dimensions in mm

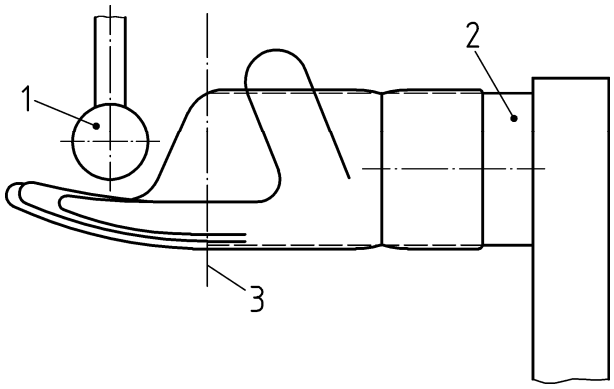


Key

1 striking surface of the striker
2 steel anvil tube
3 reference line

Figure 5 — Test of the exterior of the glove

b) Palm side of the glove: The end of the steel anvil tube shall be in line with the reference line. The position of impact shall be chosen in the area of the second finger joint in such a way that all four fingers will be hit, see Figure 6.



Key

1 striking surface of the pendulum
2 steel anvil tube
3 reference line and end of tube

Figure 6 — Test of the palm side of the glove

6 Marking

Gloves for goal keepers shall be permanently marked with the following information:

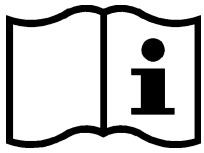
a) name and trademark of the manufacturer or his authorized representative in the European Union;

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

c) size designation;

d) number of this European Standard, EN 16027;

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



f) international care labels and symbols.

7 Information supplied by the manufacturer

Gloves for goal keepers with protective effect shall be supplied with information by the manufacturer. This information shall be precise and comprehensive and in the official language(s) of the country or region in which the equipment is to be placed on the market. At least the following information and instructions shall be given:

a) all the information specified in Clause 6;

b) name and address of the manufacturer and/or his authorized representative established in the European Union;

c) instructions on how to choose the correct size of the glove and check its fit;

d) instructions on how to adjust the gloves for goal keepers;

e) any changes in environmental conditions, such as temperature, that would significantly reduce the performance of the gloves;

f) warning that no protective glove can offer full protection against injuries;

g) warning about any contamination, alteration to the protective glove or misuse that would dangerously reduce the performance of the protective glove;

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

i) instructions concerning inspection of the gloves and how to decide whether they should be thrown away because they may no longer provide adequate protection due to ageing or use;

j) instructions for caring for and cleaning the protective glove;

k) hazards specific to goal keepers against which some protection is given;

l) hazards specific to goal keepers against which protection is not given.

Annex A
(informative)

Environmental Aspects

Environmental Considerations

Every product affects the environment in the course of its life cycle from raw material acquisition, production, distribution and use, to disposal. The environmental impacts are consequences of the consumption of energy and resources and the generation of waste as well as the emission of substances into air, water, and soil. The magnitude of the environmental impacts during the various life cycle changes depend on a number of choices made in the design of the product. These relate to aspects such as choice of materials, production methods, and the possibility of maintenance and recycling. Manufacturers and distributors of gloves for goal keepers should consider the environmental impact of their product, for example by:

— avoiding the use of environmentally harmful substances;

— selecting the best available technology and techniques to reduce consumption of energy and materials;

— considering use of recycled materials for product and packaging;

— encouraging responsible end of life disposal by the user including guidance on separation and identification of any recyclable components and packaging;

— using materials, components, and manufacturing facilities, who have declared and documented environmental policies.

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 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		Qualifying remarks/ Notes
4.2	1.2.1.1	Suitable constituent materials	
4.1, 5.3	1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	
4.3, 5.3	1.2.1.3	Maximum permissible user impediment	
4.4, 5.4	1.2.1	Absence of risks and other 'inherent' nuisance factors	
4.3, 4.5, 4.7, 5.3, 5.5	1.3.1	Adaptation of PPE to user morphology	
6, 7	1.4	Information supplied by the manufacturer	
4.6, 5.4, 5.6	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)

[3] EN 340, *Protective clothing — General requirements*

[4] EN 13061:2009, *Protective clothing — Shin guards for association football players — Requirements and test methods*

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