BRITISH STANDARD

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13277-6:2003

Protective equipment for martial arts —

Part 6: Additional requirements and test methods for breast protectors for females

The European Standard EN 13277-6:2003 has the status of a British Standard

ICS 13.340.10

BSI
British Standards

National foreword

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The UK participation in its preparation was entrusted by Technical Committee PH/3, Protective clothing, to Subcommittee PH/3/11, Protective clothing for sports players, which has the responsibility to:

— aid enquirers to understand the text;

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Protective equipment for martial arts - Part 6: Additional requirements and test methods for breast protectors for females

Equipement de protection pour les arts martiaux - Partie 6: Exigences et méthodes d'essai complémentaires pour protecteurs de poitrine pour femme

Schutzausrüstung für den Kampfsport - Teil 6: Zusätzliche Anforderungen und Prüfverfahren für Brustschützer für Frauen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Contents

Foreword

This document (EN 13277-6:2003) 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 document 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of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

This standard is the sixth part of a series covering requirements for protective equipment used in martial arts. Part 1 deals with general requirements and test methods and the other parts deal with specific areas of the body.

Part 1: General requirements and test methods.
Part 2: Additional requirements and test methods for instep protectors, shin protectors and forearm protectors.
Part 3: Additional requirements and test methods for trunk protectors.
Part 4: Additional requirements and test methods for head protectors.
Part 5: Additional requirements and test methods for genital protectors and abdominal protectors.
Part 6: Additional requirements and test methods for breast protectors for females.

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.

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

1 Scope

This European Standard specifies additional requirements and test methods for breast protectors for females used in unarmed martial arts such as Taekwondo, Karate, Kick-Boxing and similar disciplines.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13277-1:2000, *Protective equipment for martial arts — Part 1: General requirements and test methods*.

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 13277-1:2000 and the following apply.

3.1
under bust girth
horizontal girth of the body immediately below the breasts measured as for the bust girth

4 Requirements

4.1 General

The general requirements for breast protectors for females shall be the same as those given in EN 13277-1.

Edges of hard material shall be

a) covered with soft padding material, or

b) so designed that they end parallel to the body surface.

Breast protectors for females shall be so designed that they adapt to the breast of the wearer.

4.2 Sizing

Breast protectors shall be sized against the wearer's under bust girth and the brassière cup size which is normally worn.

The size shall be marked on the protector. It shall be explained in the information supplied by the manufacturer.

4.3 Combinations

Breast protectors can be used in combination with other protectors used in martial arts.

If combined use is allowed, the requirements specified for the individual protector shall also apply. Possible combinations shall be indicated in the information supplied by the manufacturer. If combined use is not allowed by the manufacturer, this restriction shall be clearly indicated in the information supplied by the manufacturer.

4.4 Restraint

A restraint system shall be supplied by the manufacturer which enables the user to attach the breast protector without any assistance.

The restraint system shall meet the requirements defined in EN 13277-1:2000, 4.4.

4.5 Zone of protection

Location and dimensions of the zone of protection shall be as given in Figure 1 and Table 1.

In case of domed breast protector Figure 1 and Table 1 define the dimensions of a plane projection of the zone of protection.

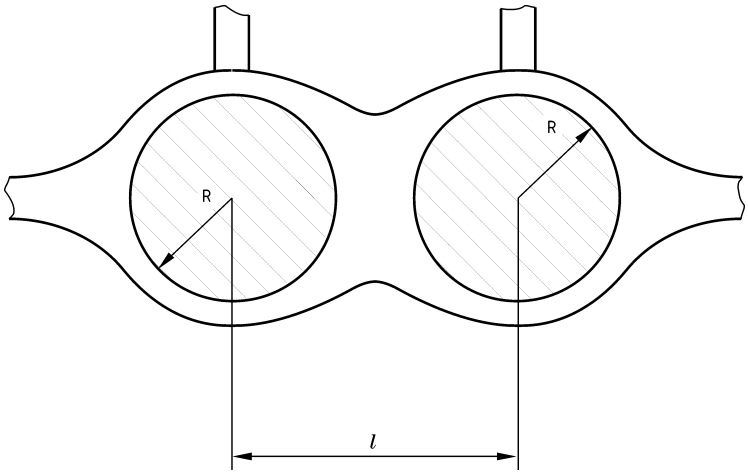


Figure 1 — Location and dimensions of the zone of protection of breast protectors

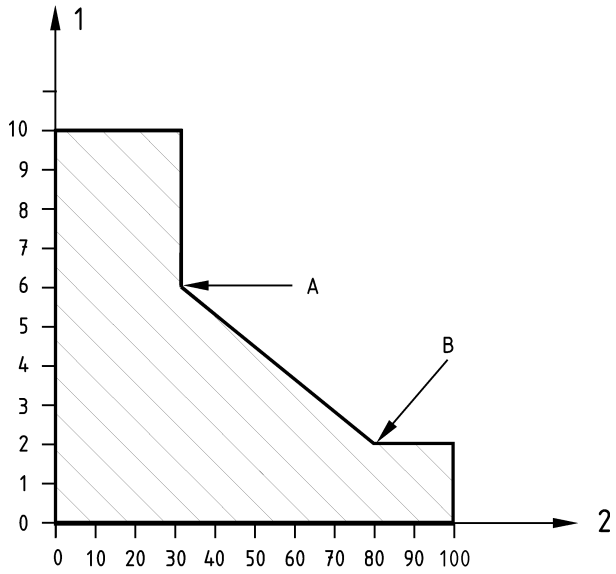
Table 1 — Zone of protection of breast protectors for females

Dimensions in centimetres

Wearer's under bust girth	Brassière cup	l	R min.
< 70	AA, A, B	14 ± 2	4,5
	C, D	15 ± 2	5,5
70 to 80	A, B	15 ± 2	5,0
	C, D	16 ± 2	6,0
> 80 to 90	A, B	16 ± 2	5,5
	C, D	17 ± 2	6,5
> 90 to 100	A, B	17 ± 2	6,0
	C, D	18 ± 2	7,0
	E to G	19 ± 2	8,0
> 100	A, B	19 ± 2	7,0
	C, D	20 ± 2	8,0
	E to H	21 ± 2	9,0

4.6 Impact performance

Breast protectors for females conform to this European Standard if the highest peak force recorded according to 5.6.1 and the highest relative deformation of all individual tests calculated according to 5.6.2 are within the hatched area shown in Figure 2.



Key

1 Force measured according to 5.6.1, in kN
2 Relative deformation according to 5.6.2, in %

A 6 kN and 30 % relative deformation
B 2 kN and 80 % relative deformation

Figure 2 — Diagram for evaluating the conformance with the impact performance requirements

5 Testing

5.1 General

If no specific test is specified, the requirements of this standard shall be tested by measurement, visual inspection, tactile examination etc.

For the tests new, unused protectors shall be used.

5.2 Sampling

Sampling shall be carried out in accordance with EN 13277-1:2000, 5.1.

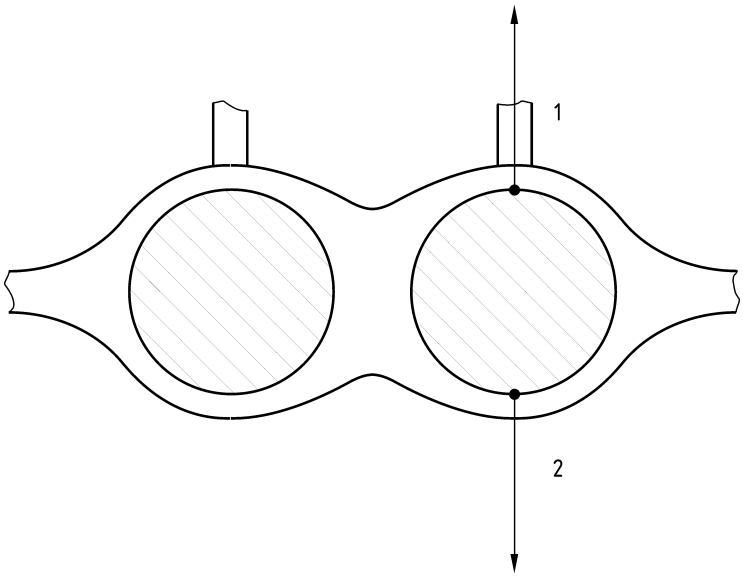
5.3 Conditioning

Conditioning is carried out in accordance with EN 13277-1:2000, 5.2.

5.4 Restraint

Restraint testing shall be carried out as defined in EN 13277-1:2000, 5.4. When testing the restraint, the protector 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 product.

A test force of (20 ± 1) N shall be applied as close as possible on the limits of the zone of protection as shown in Figure 3 vertically up and down.



Key
1 and 2 Order of the test directions

Figure 3 — Test directions at breast protectors

5.5 Zone of protection

When tested in accordance with EN 13277-1:2000, 5.5, the protector shall be placed in its natural unloaded shape on a flat surface. The gauge shall be placed flat onto the surface of the zone of protection. In case of an anatomically shaped protector, the gauge shall be positioned onto the back side or a gauge frame can be used.

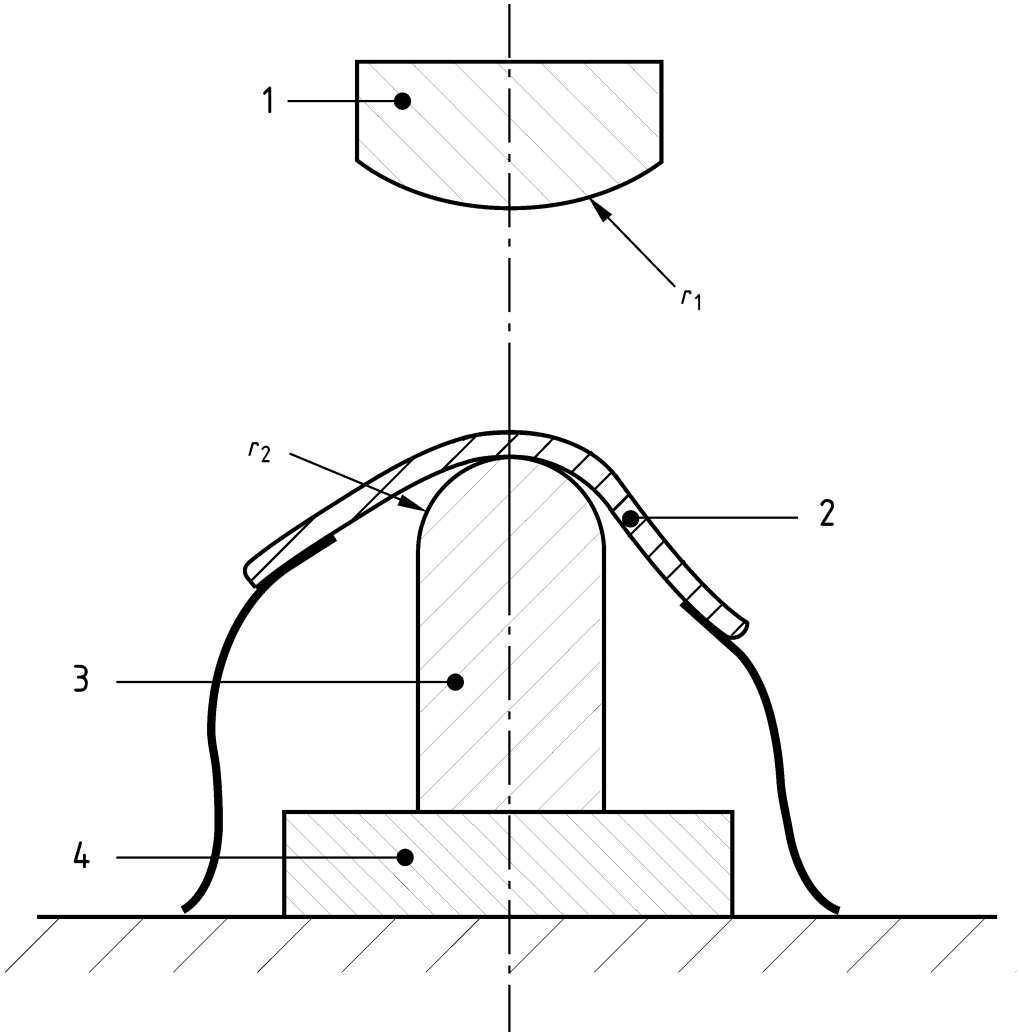
When the position of best coverage of the gauge is found, the outline of the gauge shall be marked on the protector. This outline shall be projected to the front surface of the protector.

5.6 Impact performance

5.6.1 Force attenuation test

5.6.1.1 Apparatus

The principle of the test is shown in Figure 4.



Key

1	Striker	r_1 = (100 ± 2) mm
2	Breast protector	r_2 = (25 ± 1) mm
3	Anvil	
4	Load cell	

Figure 4 — Principle of the force attenuation test

The anvil shall be out of steel and shall be cylindrical with a hemispherical surface facing the striker. The striker shall be able to fall free within the vertical axis of the anvil with an accuracy of ± 2 mm. The striker shall be guided in such a way, that it will always reach at least 95 % of the free fall velocity. A means of measuring the velocity of the striker at the point of impact shall be provided.

The sample shall be positioned on the top of the anvil and fixed by four connected straps exposing the impact site. Each strap shall be loaded with a force of 25 N.

To measure the maximum peak force an electronic measurement device with the following characteristics shall be used:

a) Measurement frequency: minimum 2 000 Hz

b) Accuracy class of the load cell: 0,2

c) Maximum load: 10 kN

5.6.1.2 Procedure

The breast protector to be tested shall be placed onto the anvil so that no parts of the protector except its restraint system or its outer edges shall be in contact to a horizontal support.

The straps shall press the sample down onto the anvil.

In total at least three test positions shall be selected within the zone of protection defined according to 4.5. The test positions shall be selected so as to find the weakest point in the zone of protection of the protector. In each part of the zone of protection at least one test position shall be selected.

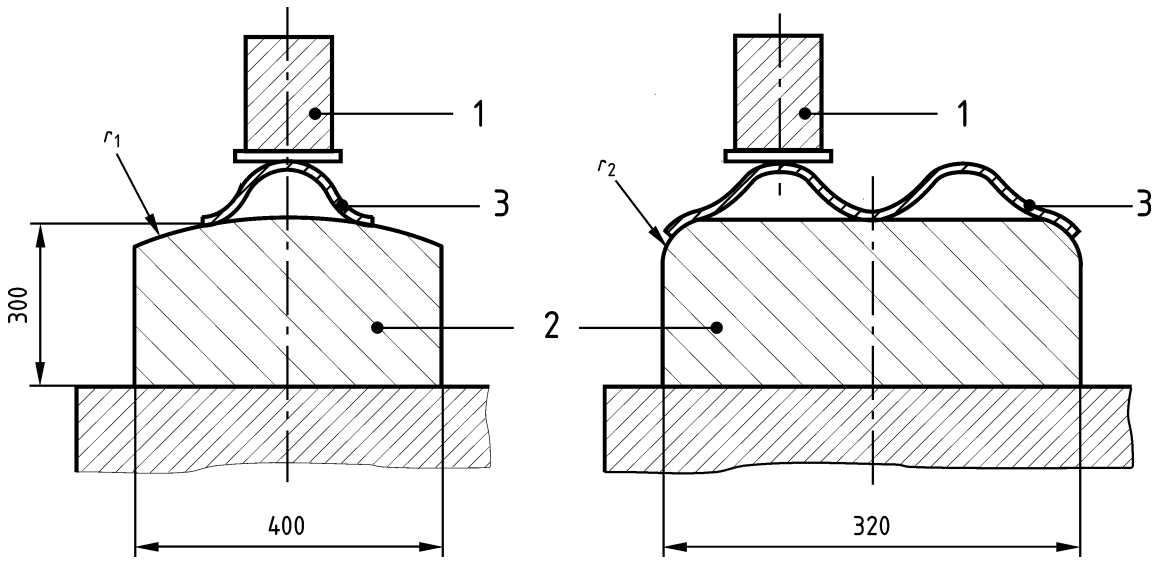
One impact with an energy of 2 J shall be executed onto each test position. No other position previously tested shall be within a circle of 80 mm around the position to be tested. If test positions are selected to be impacted less than 80 mm distant from each other, at least two protectors of the same type shall be selected for impact testing. Also no test positions shall be tested within a zone of protection which has previously been tested according to 5.6.2.

The maximum peak force of all impacts shall be recorded.

5.6.2 Deformation of the protector

5.6.2.1 Apparatus

The principle of the test is shown in Figure 5.



Key

1	Flat faced cross-head of a compression tester	$r_1 = (1\,500 \pm 50)$ mm
2	Support	$r_2 = (150 \pm 10)$ mm
3	Breast protector	

Figure 5 — Principle for testing the deformation of the protector

The cross-head shall be combined with a measuring device, which shall indicate the position of the cross-head with an accuracy of ± 0,5 mm. The pressure force shall be measured with an accuracy of ± 3 N. The increase of the

force with respect to the position of the cross-head shall be recorded with an interval of maximum 0,5 mm between two measurements.

The support shall be made of rigid material (e. g. steel).

5.6.2.2 Procedure

A complete breast protector shall be placed onto the support, so that the central point of the zone of protection shall line up with the top edge of the support with an accuracy of $\pm$ 2 mm. The support together with the breast protector placed on top shall be positioned below the cross-head, so that the face of the cross-head will contact the highest point within the zone of protection. The cross-head shall not touch any part of the breast protector outside the part of the zone of protection to be tested.

The breast protector shall be loaded with a pre-load of (80 $\pm$ 5) N and with this pre-load the zero line for the linear deformation of the protector shall be defined.

The cross-head shall move with a maximum speed of 10 mm/min. The increase of force with respect to the linear deformation of the protector shall be recorded.

The test shall be executed on at least two right and two left parts of the zone of protection.

The part of the zone of protection to be tested shall not have been previously tested according to 5.6.1 or 5.6.2. The test shall be stopped at a total force of 400 N.

The linear deformation at a test load of 300 N of each individual test shall be recorded. The relative deformation as a percentage shall be calculated as follows:

$$\text{Relative deformation} = \frac{(x_o - x_{vl}) - (x_o - x_m)}{x_o - x_{vl}} \times 100$$

where

x_o is the vertical distance between the support and the surface of the cross-head in starting position where the cross-head is not in contact with the breast protector

x_{vl} is the distance the cross-head moves from the starting position until pre-loading

x_m is the distance the cross-head moves from the starting position until test loading.

6 Marking

Marking shall be carried out in accordance with EN 13277-1:2000, clause 6.

7 Information supplied by the manufacturer

Requirements for the information supplied by the manufacturer shall be in accordance with EN 13277-1:2000, clause 7.

The manufacturer shall indicate the possible combinations of equipment and any restriction of the combined use, if relevant.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard 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 Directives 89/686/EEC.

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

The following clauses of this European Standard are likely to support requirements of Directive 89/686/EEC, Annex II.

EU-Directive 89/686/EEC, Annex II		Clause of this standard
1.1.1	Ergonomics	4.1
1.2.1	Absence of risks and other inherent nuisance factors	4.1
1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	4.1
1.3.1	Adaption of PPE to user morphology	4.2, 4.5, 5.5
1.4	Information supplied by the manufacture	7
2.1	PPE incorporating adjustment systems	4.4, 5.4
3.1.1	Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	4.6, 5.6

Compliance with the clauses of this European Standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

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