
**Protective equipment for martial
arts —**

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

Équipement de protection pour les arts martiaux —

*Partie 6: Exigences et méthodes d'essai complémentaires pour
protecteurs de poitrine féminine*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 83, *Sports and other recreational facilities and equipment*, Subcommittee SC 6, *Martial arts*.

A list of all parts in the ISO 21924 series can be found on the ISO website.

Protective equipment for martial arts —

Part 6:

Additional requirements and test methods for breast protectors for females

1 Scope

This document 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

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 21924-1:2017, *Protective equipment for martial arts — Part 1: General requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21924-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

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 ISO 21924-1.

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 ISO 21924-1:2017, 4.3.

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.

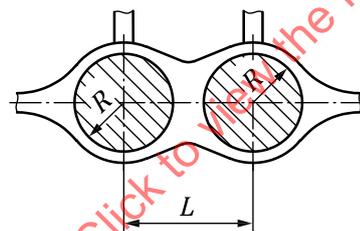


Figure 1 — Location and dimensions of the zone of protection of breast protectors

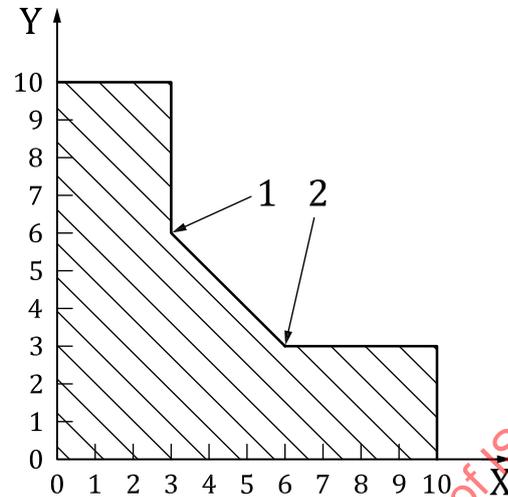
Table 1 — Zone of protection of breast protectors for females

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 document 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

- X relative deformation according to 5.6.2, in %
- Y force measured according to 5.6.1, in kN
- 1 6 kN and 30 % relative deformation
- 2 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 document 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 ISO 21924-1:2017, 5.1.

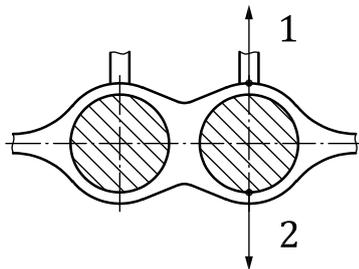
5.3 Conditioning

Conditioning is carried out in accordance with ISO 21924-1:2017, 5.2.

5.4 Restraint

Restraint testing shall be carried out as defined in ISO 21924-1:2017, 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 ISO 21924-1:2017, 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.

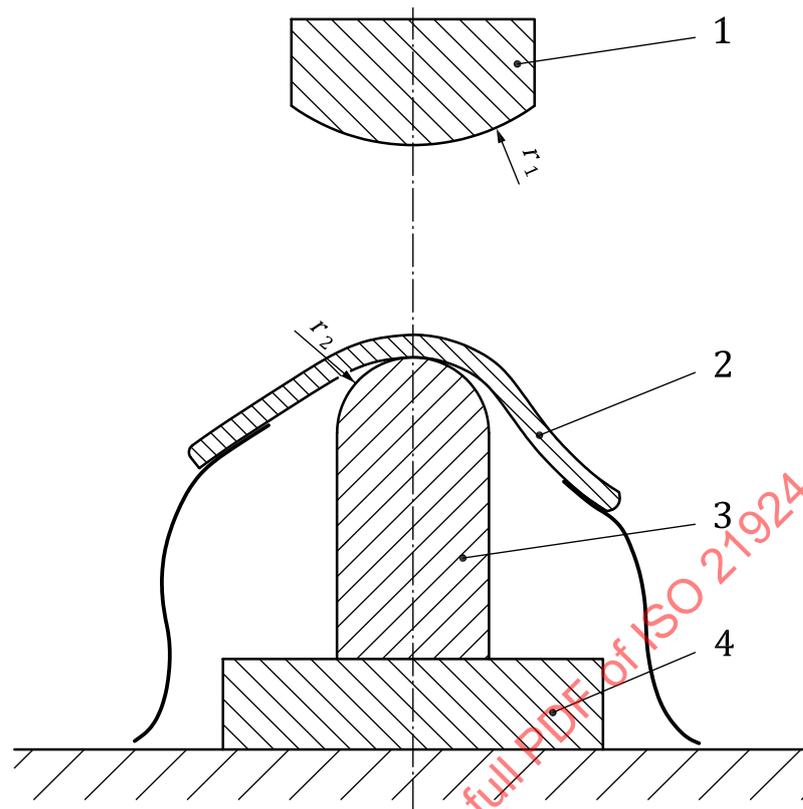
5.6 Impact performance

5.6.1 Force attenuation test

5.6.1.1 Apparatus

The principle of the test is shown in [Figure 4](#).

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**Key**

- 1 striker
- 2 breast protector
- 3 anvil
- 4 load cell
- r_1 (100 ± 2) mm
- r_2 (25 ± 1) mm

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.