

Protective equipment for martial arts —

Part 2: Additional requirements and test methods for instep protectors, shin protectors and forearm protectors

The European Standard EN 13277-2:2000 has the status of a
British Standard

ICS 13.340.10; 97.220.30

National foreword

This British Standard is the official English language version of EN 13277-2:2000.

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

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 11 and a back cover.

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Protective equipment for martial arts - Part 2: Additional requirements and test methods for instep protectors, shin protectors and forearm protectors

Équipement de protection pour les arts martiaux - Partie 2:
Exigences et méthodes d'essai complémentaires relatives
aux protège-cou-de-pieds, aux protège-tibias et aux
protège-avant-bras

Schutzausrüstung für den Kampfsport - Teil 2: Zusätzliche
Anforderungen und Prüfverfahren für Spansschützer,
Schienbeinschützer und Unterarmschützer

This European Standard was approved by CEN on 5 August 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

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Foreword

This European Standard 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 February 2001, and conflicting national standards shall be withdrawn at the latest by February 2001.

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 Directive(s).

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

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

It is one of a series covering requirements and test methods for protective equipment used in martial arts.

1 Scope

This European Standard specifies additional requirements and test methods for instep protectors, shin protectors and forearm protectors used in unarmed martial arts such as taekwondo, karate, kick-boxing and similar disciplines.

For general requirements and test methods for protective equipment for martial arts see EN 13277-1.

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 apply:

4 Requirements

4.1 Sizing

The manufacturer shall indicate in centimetres the range of the wearer's height for which this protector is designed.

4.2 Combinations

Instep protectors, shin protectors and forearm protectors can be used in combination or together with other protectors for martial arts.

In the case of combined use, the requirements specified for the individual protectors are also to apply.

Possible combinations shall be indicated in the information supplied by the manufacturer.

If combined use is not permitted by the manufacturer, this restriction shall be indicated in the information supplied by the manufacturer.

4.3 Restraint

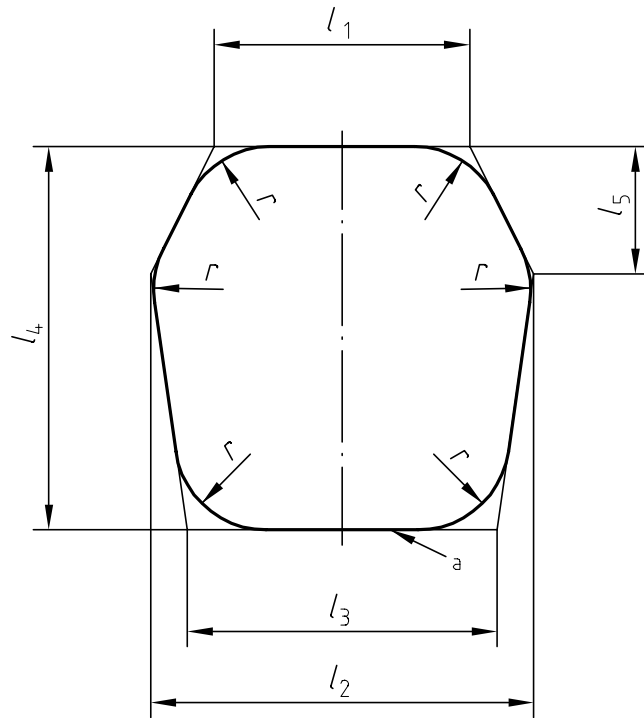
A restraint system shall be supplied by the manufacturer which enables the user to attach instep protectors, shin protectors and forearm protectors without any assistance.

If an instep protector is inseparately connected to a shin protector, secure attachment of the instep protector shall be provided by attaching the instep protector and the shin protectors.

4.4 Zone of protection

4.4.1 Instep protectors

Dimensions of the zone of protection see Figure 1 and Table 1.



Key

^a edge of the instep protector which is turned to the toes

Figure 1 - Location of the zone of protection of instep protectors

Table 1 - Zone of protection of instep protectors

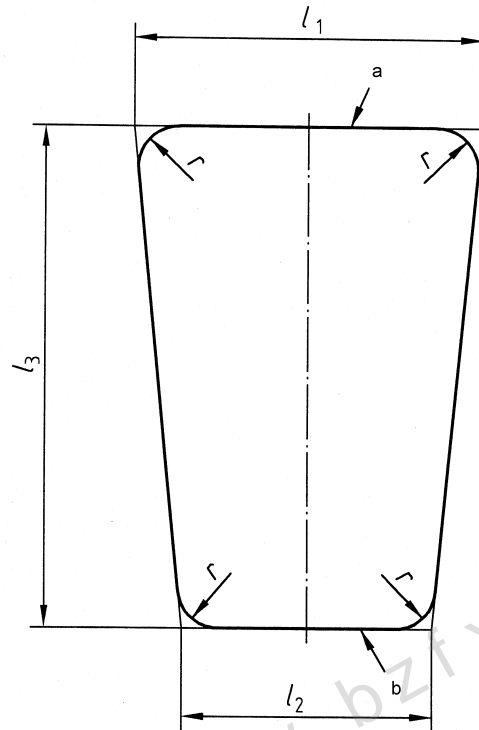
Dimensions in millimetres

Wearer's height	l_1	l_2	l_3	l_4	l_5	r
	min.	min.	min.	min.		max.
< 1 340	60	80	70	80	l_5 is corresponding with a third of l_4	25
from 1 340 to 1 520	65	90	75	90		
from 1 520 to 1 700	70	105	85	105		
from 1 700 to 1 880	80	120	100	120		
> 1 880	90	130	110	130		

4.4.2 Shin protectors

Zone of protection see Figure 2.

The dimensions of the zone of protection are specified in Table 2.



Key

- a top
- b bottom

Figure 2 - Location of the zone of protection of shin protectors and forearm protectors

Table 2 - Zone of protection of shin protectors

Dimensions in millimetres

Wearer's height	l_1	l_2	l_3	r
	min.	min.	min.	max.
< 1 340	120	85	180	15
from 1 340 to 1 520	140	100	200	17
from 1 520 to 1 700	160	115	230	19
from 1 700 to 1 880	180	130	270	21
> 1 880	200	150	300	23

4.4.3 Forearm protectors

Zone of protection see Figure 2.

The dimensions of the zone of protection are specified in Table 3.

Table 3 - Dimensions of the zone of protection of forearm protectors

Dimensions in millimetres

Wearer's height	l_1 min.	l_2 min.	l_3 min.	r max.
< 1 340	90	60	140	11
from 1 340 to 1 520	105	70	160	13
from 1 520 to 1 700	120	85	180	15
from 1 700 to 1 880	140	100	200	17
> 1 880	160	115	230	19

4.5 Impact performance

Instep protectors, shin protectors and forearm protectors comply with this standard if the worst result after testing in accordance with 5.5 meets the requirements of Table 4.

Table 4 defines the kinetic energy of a striker (see EN 13277-1 : 2000, 5.6) and the maximum peak force measured in accordance with 5.5 shall be less than that shown in Table 4.

Table 4 also lists the minimum number of different positions within the zone of protection to be tested. Before testing those positions shall preferably be selected, where the worst test results are assumed to be likely.

Table 4 - Impact performance requirements

Protector	Minimum number of positions to be tested	Impact energy of the striker J	Peak force kN max.
Instep protectors	2	3	2
Shin protectors	3	3	2
Forearm protectors	3	3	2

5 Testing

5.1 Sampling

See EN 13277-1 : 2000, 5.1

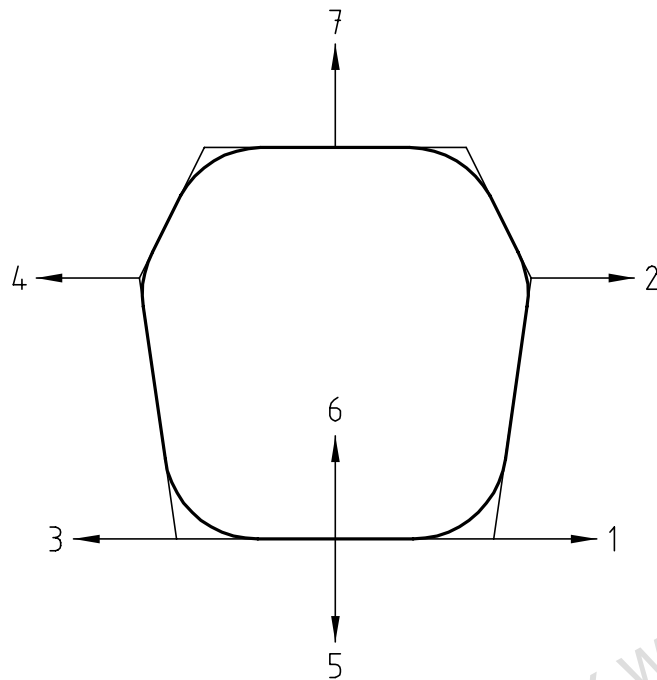
5.2 Conditioning

See EN 13277-1 : 2000, 5.2

5.3 Restraint

Restraint testing shall be carried out as defined in EN 13277-1:2000, 5.4. When testing the restraint the protector(s) shall be attached to the appropriate part of the body of a test person of an appropriate height.

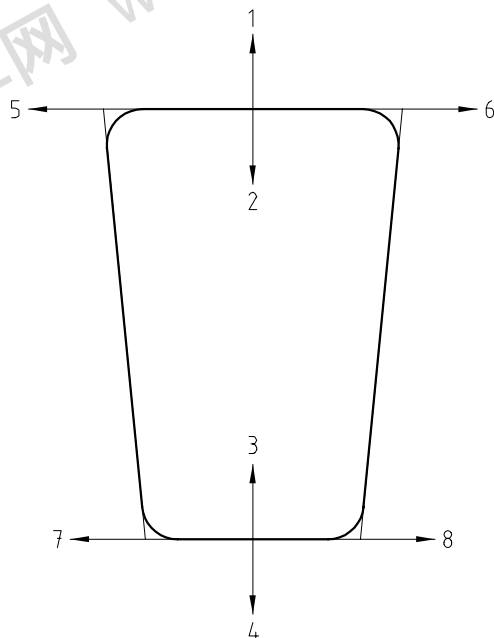
A test force of 20 N shall be applied at the edge of the zone of protection, in the directions and in the order shown in Figures 3 and 4, tangential to the surface of the body of the test person.



Key

1 to 7 Directions and order of the tests

Figure 3 - Restraint test of instep protectors



Key

1 to 8 Directions and order of the tests

Figure 4 - Restraint test of shin protectors and forearm protectors

The instep protector or the shin protector shall be attached to the foot or lower leg of a test person in accordance with the information supplied by the manufacturer.

The forearm protector shall be attached to the forearm of a test person in accordance with the information supplied by the manufacturer.

If a shin protector and an instep protector are inseparably connected, both shall be attached in accordance with the information supplied by the manufacturer.

The test person shall move their foot and leg to such a position, that it will be possible to test all directions as shown in Figures 3 and 4.

5.4 Zone of protection

When testing in accordance with EN 13277-1 :2000, 5.5, the protector shall be attached to a test person of an appropriate height in accordance with the information supplied by the manufacturer.

The gauge shall be placed onto the surface of the zone of protection.

When the position of best coverage of the gauge is found, the outline of the gauge shall be marked on the protector.

For testing instep protectors the test person shall stretch his foot as much as possible.

5.5 Impact performance

5.5.1 Apparatus

The principle of impact testing is shown in Figure 5.

A horizontal rigid half cylinder at least 150 mm in length and (90 ± 5) mm in diameter made out of steel, aluminium, wood or rigid plastic shall be used as a support for the sample. The anvil shall be a 25 mm diameter steel cylinder, 50 mm in length with a 12,5 mm radius of the top surface, mounted on a load cell. The anvil shall be positioned in a central hole in the horizontal cylindrical support. The top edge of the anvil shall be level with the cylindrical support. Two straps, each (20 ± 5) mm in width and with their center lines 100 mm from each other shall be loaded with 50 N each shall be provided to fix the sample to the cylindrical support. If the test positions are less than 50 mm distant from the upper or lower edge of the zone of protection the sample may be fixed with only one strap and loaded with a force at 50 N.

The striker shall be able to fall freely in the vertical axis of the anvil with a tolerance 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.

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

- Measurement frequency: min. 2 000 Hz;
- Accuracy class of the load cell: 0,2;
- Maximum load: 10 kN.

5.5.2 Procedure

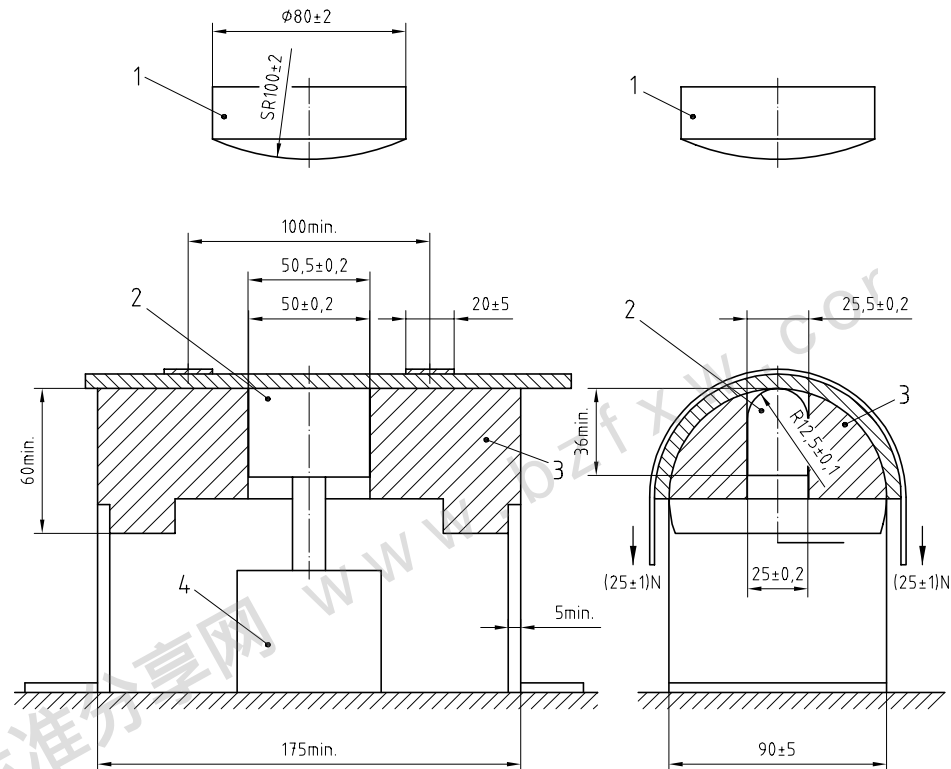
The shin protector, instep protector or forearm protector shall be placed onto the cylindrical support, so that the test position to be tested shall be above the centre of the anvil and shall be fixed by the straps.

The protector shall be moved on the supporting cylinder in order to reach every test position to be tested. The test positions shall be not closer than 20 mm to the limit of the zone of protection.

The test positions shall be so selected to find the weakest positions at the protector. Three impacts of the same energy level shall be executed on each test position with an interval of (60 ± 10) s.

No other position previously tested shall be within a circle of 80 mm around the position to be tested. If 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.

Dimensions in millimetres



Key

- 1 Striker
- 2 Anvil
- 3 Support
- 4 Load cell

Figure 5 - Principle of impact testing of shin protectors, instep protectors and forearm protectors

6 Marking

See clause 6 in EN 13277-1 : 2000.

7 Information supplied by the manufacturer

See clause 7 in EN 13277-1 : 2000.

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 Directive 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 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 Design principles	4.1 to 4.5
1.1.1 Ergonomics	clause 4
1.1.2.1 Highest level of protection possible	4.5, 4.6
1.1.2.2 Classes of protection appropriate to different levels of risk	4.5, 4.6
1.2 Innocuousness of PPE	4.2
1.2.1 Absence of risks and other nuisance factors	clause 4
1.2.1.1 Suitable constituent material	4.2
1.2.1.2 Satisfactory surface condition of all PPE parts in contact with the user	4.2, 4.3
1.2.1.3 Maximum permissible user impediment	4.1
1.3 Comfort and efficiency	4.1 to 4.3
1.3.1 Adaptation of PPE to users morphology	4.1, 4.3, 4.4
1.3.2 Lightness and strength	4.3, 4.6, clause 7
1.3.3 Compatibility of different classes or types of PPE designed for simultaneous use	other parts of standard
1.4 Information supplied by the manufacturer	clauses 6 and 7
2.1 PPE incorporating adjustment systems	4.3
2.2 PPE enclosing the parts of the body to be protected	4.2
2.4 PPE subject to ageing	clause 7
2.9 PPE incorporating components which can be adjusted or removed by user	4.2

2.12 PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety	clause 6
3.1 Protection against mechanical impact	4.4, 4.5
3.1.1 Impact caused by falling or projecting objects and collision of parts of the body with an obstacle	4.4, 4.5
3.3 Protection against physical injury	4.5, 4.6

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

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