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Sports mats - Part 4: Determination of shock absorption

Sportmatten - Teil 4: Bestimmung der Dämpfungseigenschaften

Tapis de sport - Partie 4 : Détermination des caractéristiques d'amortissement au choc

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ICS:

97.220.30 Oprema za dvoranske športe Indoor sports equipment

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EUROPEAN STANDARD

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English Version

Sports mats - Part 4: Determination of shock absorption

Tapis de sport - Partie 4 : Détermination des caractéristiques d'amortissement au choc

Sportmatten - Teil 4: Bestimmung der Dämpfungseigenschaften

This European Standard was approved by CEN on 12 April 2013.

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

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Foreword

This document (EN 12503-4:2013) has been prepared by Technical Committee CEN/TC 136 “Sports, playground and other recreational facilities and equipment”, 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of an identical text or by endorsement, at the latest by January 2014, and conflicting national standards shall be withdrawn at the latest by January 2014.

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 supersedes EN 12503-4:2001.

This standard EN 12503 "Sports mats" consists of:

— *Part 1: Gymnastic mats, safety requirements*

— *Part 2: Pole vault and high jump mats, safety requirements*

— *Part 3: Judo mats, safety requirements*

— *Part 4: Determination of shock absorption*

— *Part 5: Determination of the base friction*

— *Part 6: Determination of the top friction*

— *Part 7: Determination of static stiffness*

In relation to EN 12503-4:2001 the following main changes have been made:

a) Clause 5 "Test piece" has been amended.

b) The document has been editorially revised.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies a method of test for the determination of shock absorption characteristics of sports mats types 1 to 8 of EN 12503-1:2013, 9 to 11 of EN 12503-2:2001 and 12 of EN 12503-3:2001.

2 Normative references

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

EN 12390-3, *Testing hardened concrete — Part 3: Compressive strength of test specimens*

ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

3 Principle

A striker is dropped onto the top surface of the mat and the deceleration during the impact monitored. The deceleration profile is processed to yield specified shock absorption parameters.

4 Apparatus

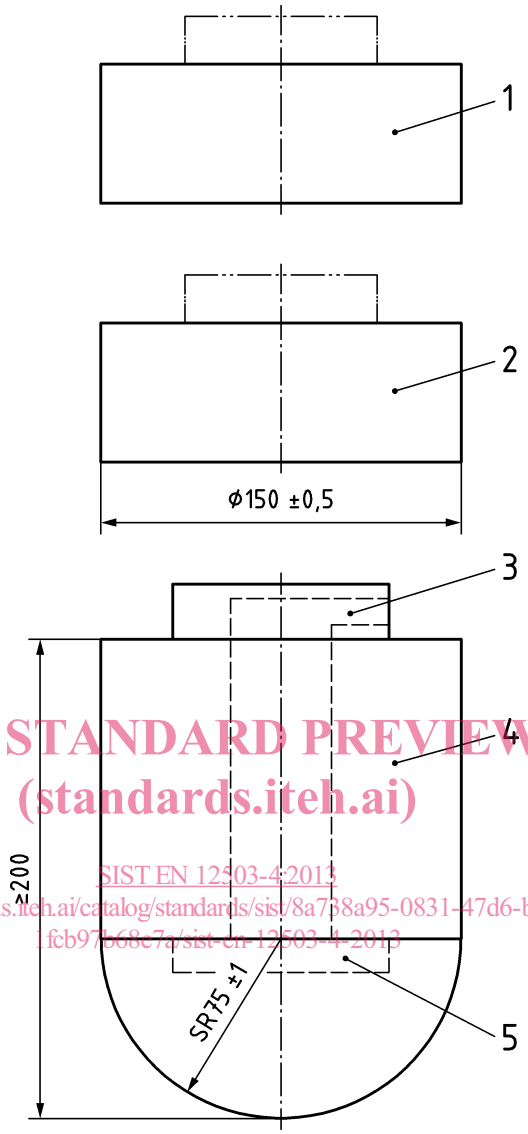
4.1 Indentors

Metal indentors in accordance with the essential dimensions and masses are given in Table 1 and Figure 1 and Figure 2.

Table 1 — Indentors

Type of mat	Diameter mm	Mass kg
1	150 ± 0,5	10 ± 0,1
2	150 ± 0,5	10 ± 0,1
3	150 ± 0,5	10 ± 0,1
4	150 ± 0,5	20 ± 0,2
5	150 ± 0,5	20 ± 0,2
6	150 ± 0,5	20 ± 0,2
7	150 ± 0,5	30 ± 0,3
8	150 ± 0,5	30 ± 0,3
9	150 ± 0,5	30 ± 0,3
10	150 ± 0,5	30 ± 0,3
11	150 ± 0,5	30 ± 0,3
12	43 ± 0,2 78 ± 0,2 116 ± 0,2	8 ± 0,05

Dimensions in millimetres

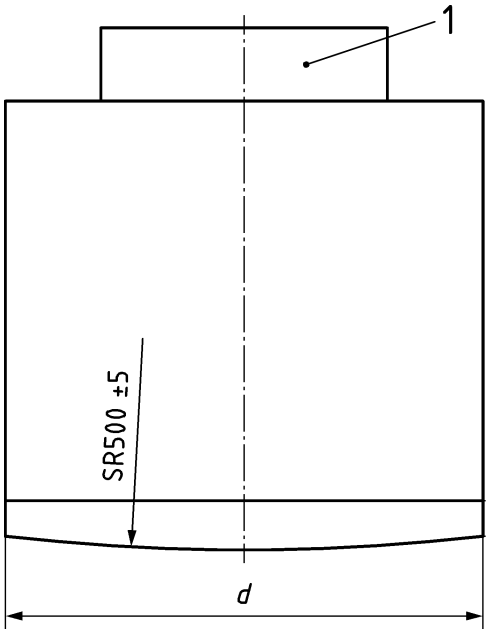


Key

1 additional mass (10 ± 0,1) kg
2 additional mass (10 ± 0,1) kg
3 cable port
4 mass (10 ± 0,1) kg
5 space for accelerometer
SR spherical radius

Figure 1 — Indentors for gymnastics mats

Dimensions in millimetres



Key

1 accelerometer
d diameter (see Table 1)
SR spherical radius

Figure 2 — Indentors for judo mats

4.2 Release mechanism

Means of releasing the striker permitting the indentor to fall smoothly, vertically.

4.3 Accelerometer

An accelerometer rigidly mounted on the indentor as indicated in Figure 1 and Figure 2.

4.4 Data capture and processing

Instrumentation to record, display and process the accelerometer signals to produce the required shock absorption parameters, having a channel frequency class, including the accelerometer, of 1 000 in accordance with ISO 6487 and sampling frequency of not less than 10 kHz.

4.5 Thickness measurement

Means of measuring the thickness of the mat to an accuracy of (± 5) mm (for types 9 to 11).

5 Test piece

5.1 The test piece is a whole mat laid on a smooth, solid concrete floor measuring at least 1 m × 1 m.

5.2 The laboratory test floor shall be fully supported concrete (i. e. not a suspended floor) with a minimum thickness of 100 mm. The compressive strength of the concrete shall be not less than 40 MPa when tested in accordance with EN 12390-3.

6 Conditioning and test temperature

Condition the test piece for a minimum of 24 h at (21 ± 3) °C immediately before the test and carry out the test at the same temperature.

7 Procedure

7.1 Procedure A (types 1 to 11)

Carry out tests on mats types 1 to 8 at the eight locations indicated in Figure 3.

Carry out tests on mats types 9 to 11 in the centre of the mat.

Dimensions in centimetres

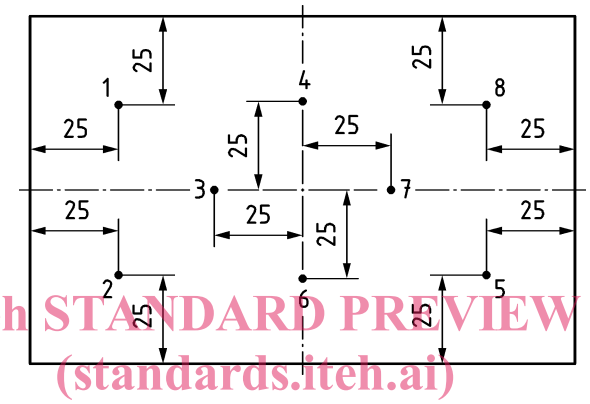


Figure 3 — Procedure A (types 1 to 11) – Test location and number of tests

The fall height shall be as detailed in Table 2.

Table 2 — Test fall heights

Type of mat	Fall height mm
1	150 ± 1,0
2	300 ± 1,0
3	400 ± 1,0
4	800 ± 1,0
5	800 ± 1,0
6	800 ± 1,0
7	800 ± 1,0
8	800 ± 1,0
9	1 200 ± 1,0
10	1 200 ± 1,0
11	1 200 ± 1,0