

Sports mats —

Part 5: Determination of the base friction

The European Standard EN 12503-5:2001 has the status of a British Standard

ICS 97.220.30

National foreword

This British Standard is the official English language version of EN 12503-5:2001. Together with BS EN 12503-1:2001, BS EN 12503-2:2001, BS EN 12503-3:2001, BS EN 12503-4:2001, BS EN 12503-6:2001 and BS EN 12503-7:2001, it supersedes BS 1892-2.10:1990 which will be withdrawn on 15 August 2001.

The UK participation in its preparation was entrusted to Technical Committee SW/14, Gymnasium and sports equipment, 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.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This British Standard, having been prepared under the direction of the Consumer Products and Services Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 June 2001

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 6, an inside back cover and a back cover.

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Amendments issued since publication

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English version

Sports mats - Part 5: Determination of the base friction

Tapis de sport - Partie 5: Détermination des caractéristiques antidérapantes de la base

Sportmatten - Teil 5: Bestimmung der Reibungseigenschaften der Unterseite

This European Standard was approved by CEN on 21 January 2001.

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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.



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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 136 "Sports, playground and other recreational 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 October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

This standard EN 12503 "Sports mats" consists of:

Part 1:

Gymnastic mats, safety requirements

Part 2:

Pole vault and high jump mats, safety requirement

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

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.

1 Scope

This European Standard specifies a method for determining the anti-slip characteristics of the base of sports mats types 1 to 8 of EN 12503-1:2001 or type 12 of EN 12503-3:2001.

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 12503-1:2001

Sports mats – Part 1: Gymnastic mats, safety requirements

EN 12503-3:2001

Sports mats – Part 3: Judo mats, safety requirements

3 Principle

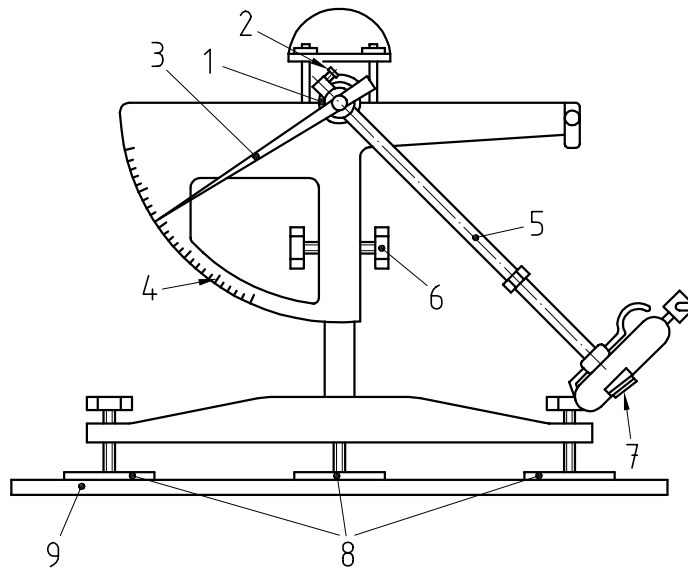
The mass of the mat is determined together with the slip resistance characteristics of the base of the mat. This is measured by an aluminium foot (slider) attached to the arm of a pendulum, which is allowed to slide over the base for a set distance and the energy absorbed by friction measured.

4 Apparatus

4.1 Friction tester

4.1.1 The friction tester shall be in accordance with figure 1 and comprise of the following:

- a) a spring loaded slider of the mass, size and shape specified in 4.1.3 mounted on the end of a pendulum (see 4.1.2) so that the sliding edge is approximately 510 mm from the axis of suspension;
- b) means for setting the column of the instrument vertical;
- c) means for raising and lowering the axis of suspension of the pendulum so that the slider can
 - 1) swing clear of the surface of the test piece, and
 - 2) be set to slide over a fixed length of surface of 126,0 mm. This length should be as near as is visually possible but in any case within ± 1 mm;
- d) means for holding and releasing the pendulum;
- e) a pointer balanced about the axis of suspension, indicating the position of the pendulum throughout its forward swing and moving over the circular scale drawn as specified in 4.2. The mass of the pointer shall be not more than 85 g and the friction in the pointer mechanism shall be adjustable so that, with the pendulum swinging freely from a horizontal position, the outward tip of a 300 mm long pointer may be brought to rest on the forward swing of the pendulum at a point 10 mm below the horizontal.



Key

- | | |
|--------------------|--|
| 1 Clutch | 6 Raise/lower mechanism |
| 2 Adjustment screw | 7 Slider |
| 3 Pointer | 8 Adjustable feet |
| 4 Scale | 9 Wooden plate (approximately 10 mm thick) |
| 5 Pendulum | |

Figure 1 - Apparatus for determination of slip resistance

4.1.2 The mass of the pendulum including the slider shall be $(1,50 \pm 0,03)$ kg, the centre of gravity lying on the axis of the arm at a distance of (410 ± 5) mm from the centre of suspension.

4.1.3 The slider shall consist of an aluminium block 76 mm wide, 24 mm deep and 6 mm thick held on a rigid base with a total mass (aluminium plus mounting plate) of (50 ± 5) g which is mounted on an axis set at an angle of approximately 26° with the horizontal when the pendulum is at the lowest point of its swing, so that only the rear edge of the slider contacts the test surface, and the slider can turn about its axis without obstruction to follow unevenness of the surface perpendicular to the plane of the pendulum swing.

The working edges of the unconditioned slider shall be square and clean cut, and free from contamination (abrasive or oil etc.).

The slider shall be conditioned by mounting it onto the pendulum and carrying out 10 swings onto 400 grade wet and dry paper.

The slider shall be spring loaded against the test surface and the nominal static force F_s on the slider shall be $(22,2 \pm 0,5)$ N in its median position; the change in the static force on the slider shall be not greater than 0,2 N per millimetre deflection of the slider.

4.2 Calibration of the friction tester

The scale of the instrument when used for this test shall be the unit α drawn up by means of the following equation:

$$\alpha = \frac{F_p \times a_1 \times a_2}{F_s \times a_3 \times l} \times 100$$

where:

α is a measure of the coefficient of friction (times 100), expressed by a value without dimension;

F_p is the force exerted by the pendulum, in N;

a_1 is the distance of the effective centre of gravity of the pendulum from the centre of oscillation, in mm;

a_2 is the vertical distance of the edge of the scale below the zero of the scale, which shall be 10 mm below the horizontal when the arm is released to swing freely from the horizontal, in mm;

F_s is the nominal static force on the slider, in N, as defined in 4.1.3;

a_3 is the sliding distance, in mm;

l is the length of the pointer, in mm.

4.3 Scales for weighing the test pieces, measuring to an accuracy of ± 10 g.

5 Test piece

The test piece shall comprise of the whole mat.

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 Secure the test piece with its base surface uppermost. Arrange the tester in position over the test piece and level the apparatus precisely by means of the adjustable feet. Locate the friction tester in such a position that the slider can traverse the surface at approximately the middle of the mat.

7.2 Raise the pendulum mechanism until it can swing freely above the surface of the test piece. Lock the pendulum into the horizontal position and rotate the pendulum. If the pointer is not horizontal, turn the adjustment screw until it is. Release the pendulum and note the position on the scale at which the pointer comes to rest.

Repeat this at least three times. If this reading is not zero, adjust the clutch at the picot point, until when operated a reading of zero is consistently obtained.

7.3 With the pendulum hanging freely, lower the pendulum until it touches the surface of the test piece. Lock the mechanism. Raise the slide by lifting the handle, move the pendulum to the right, lower the slider until it touches the surface of the specimen and note the point of contact. Raise the slide again, move the pendulum to the left and note the point at which the slider just leaves the surface. With the aid of a ruler laid on the surface of the test piece, alongside the projected path of the slider, adjust the height of the pendulum mechanism until the length of the contact path of the slider is (126 ± 1) mm. After setting this distance lock the pendulum mechanism securely at this height and re-check the slider's path length carefully, before making a test.

7.4 Lock the pendulum into the horizontal position and rotate the pointer to its rest position against the adjustment screw on the pendulum arm. Release the pendulum and allow the slider to execute a single traverse of the test piece. Without delay, make seven further swings of the pendulum, re-setting the pendulum and pointer after each swing. Note the readings indicated by the pointer for the last five swings.

Always catch the pendulum as it begins its return swing. When returning the pendulum to its horizontal position, always raise the slider with the handle to prevent contact between the slider and the test piece.

7.5 Repeat the procedure given in 7.1 to 7.4 to obtain readings in four directions by rotating the apparatus through 90° between each set of readings.

7.6 Determine the weight of the test piece.

8 Expression of results

Calculate the mean values for the five swings in each orientation.

Determine the lowest mean value of the four orientations.

Calculate the frictional value using the following formula:

$$\beta = \frac{\alpha L \times m}{100}$$

where:

β is the frictional value

αL is the lowest mean slip resistance value

m is the mass of 1 m² mat in kg

Determine the lowest frictional value from the three test specimens.

9 Test report

The test report shall contain the following information:

- a) a reference to this European Standard, EN 12503-5;
- b) a complete identification of the product tested, including type, source and manufacturer's reference numbers;
- c) the frictional value;
- d) any deviations from the standard which may have affected the results.

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