BRITISH STANDARD

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14837:2006

Surfaces for sports areas — Determination of slip resistance

The European Standard EN 14837:2006 has the status of a British Standard

ICS 97.150; 97.220.10

BSI
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National foreword

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Sols sportifs - Détermination de la glissance

Sportböden - Bestimmung der Rutschfestigkeit

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Foreword

This document (EN 14837:2006) has been prepared by CEN /TC 217, "Surfaces for sports areas", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

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1 Scope

This European Standard specifies a method for the determination of the slip resistance of a sports surface in relation to a studded or smooth soled sports shoe.

2 Normative reference

The following referenced documents are indispensable for the application 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 4662, *Rubber – Determination of rebound resilience of vulcanizates.*

3 Terms and definitions

For the purposes of this document, the following term and definition applies.

3.1
slip resistance
calculated value from the reduction of the height of rise of a pendulum as a result of the friction between the profile and sports surface using correction factors

4 Principle

A free falling weight covered with a rubber or plastic shoe profile (studded or smooth) rotates around a horizontal axis (pendulum). During its circular course, the profile is dragged over the sports surface and is slowed down by the friction between the shoe profile and the test surface.

5 Apparatus

5.1 Slip resistance tester (see Figure 1), comprising:

— pendulum, having a length (axis to shoe profile) of 340 mm ± 3 mm;

— falling weight, having a mass of 1 600 g ± 50 g (including pendulum arm, metal profile holder and shoe profile);

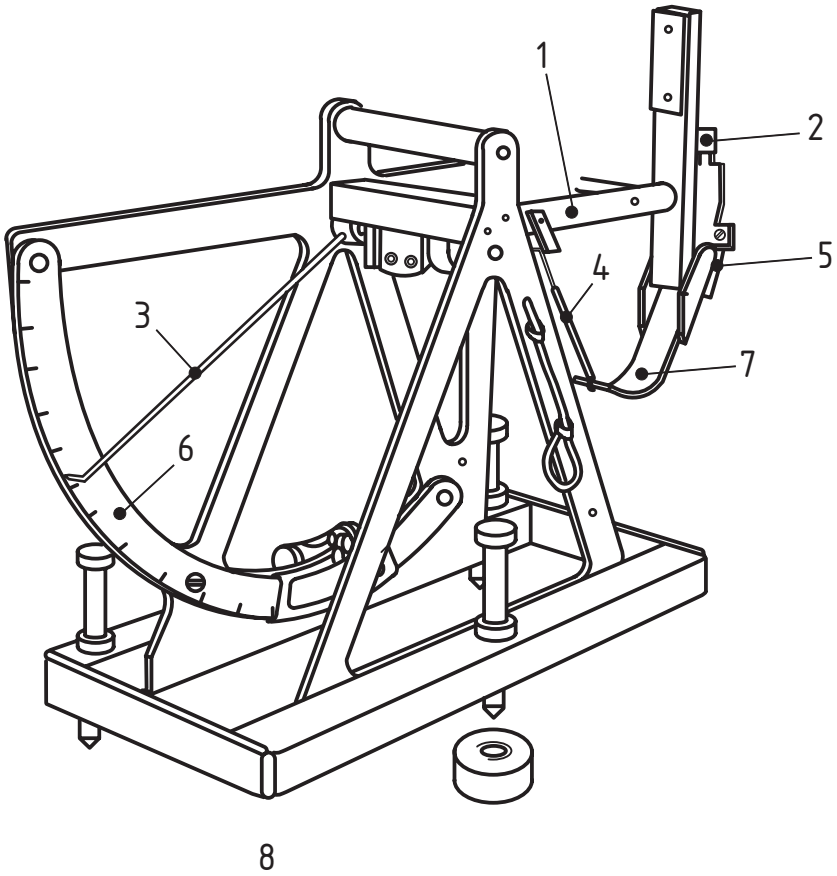
— profile holder, with a sharp pointer to adjust the pressure on the profile;

— spring, having a K-value of 0,8 N/mm ± 0,05 N/mm, to adjust the pressure of the shoe profile on the test piece;

— frame equipped with a device to hold the pendulum horizontal prior to the start of the test and to release the pendulum at the start of the test;

— scale, with a pointer that records the maximum value achieved.

On the lower part of the frame there shall be three grooves, A1 and A2 for use when adjusting the pendulum and B (see Figure 2), at which the pendulum stops when calibrated using the calibration surface. There shall be a further groove, C (see Figure 3), on the lower part of the pendulum.



Key

1	Pendulum	5	Shoe profile
2	Groove C	6	Scale
3	Needle	7	Metal profile holder
4	Spring	8	Test piece

Figure 1 — Slip resistance tester

NOTE The apparatus specified is commonly known as the Leroux slip resistance tester.

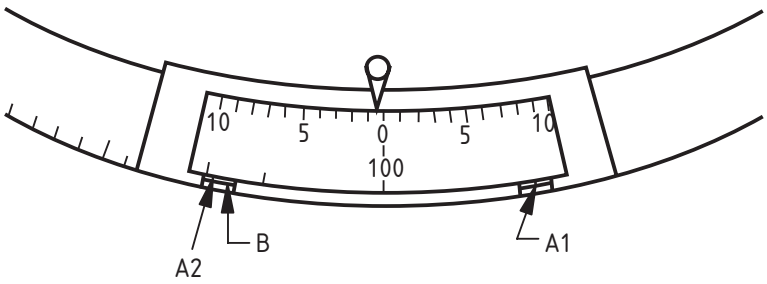
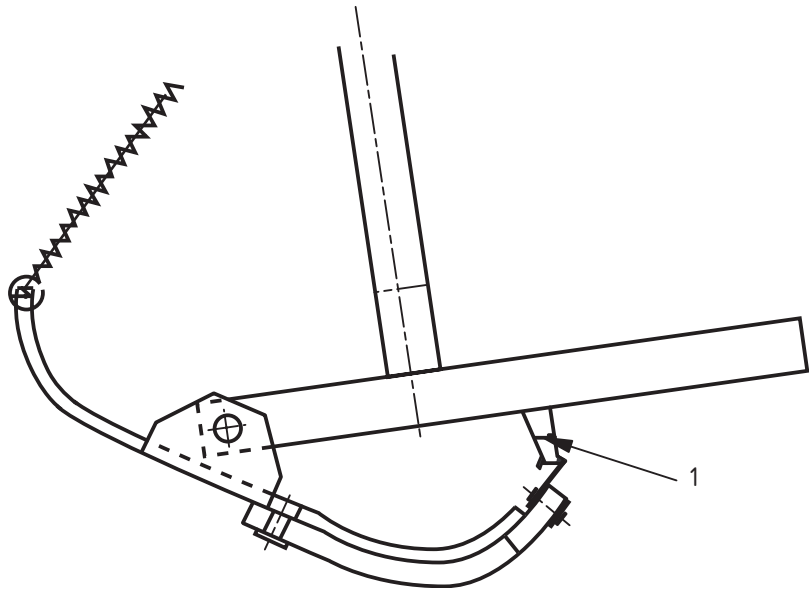


Figure 2 — Location of grooves A1, A2 and B



Key
1 Groove C

Figure 3 — Location of groove C

5.2 Test soles

5.2.1 *Smooth standard shoe profile*, made of rubber, with properties and dimensions as given in Table 1.

Table 1 — Dimensions and properties of smooth standard sole profile

Property		Value
Shore A hardness		58° ± 3°
Width		30 mm ± 2 mm
Length		120 mm ± 5 mm
Thickness		9,5 mm + 0,5 mm/-1,5 mm
Resilience of rubber [a] (± 3 %) when tested in accordance with ISO 4662 at temperatures of:	0 ºC	16 %
	10 ºC	22 %
	20 ºC	32 %
	30 ºC	35 %
	40 ºC	37 %

[a] Commonly referred to as the Lüpke resilience.

5.2.2 *Multi-studded rubber profile*, made of neoprene rubber, with properties and dimensions as given in Table 2, distributed as shown in Figure 4.

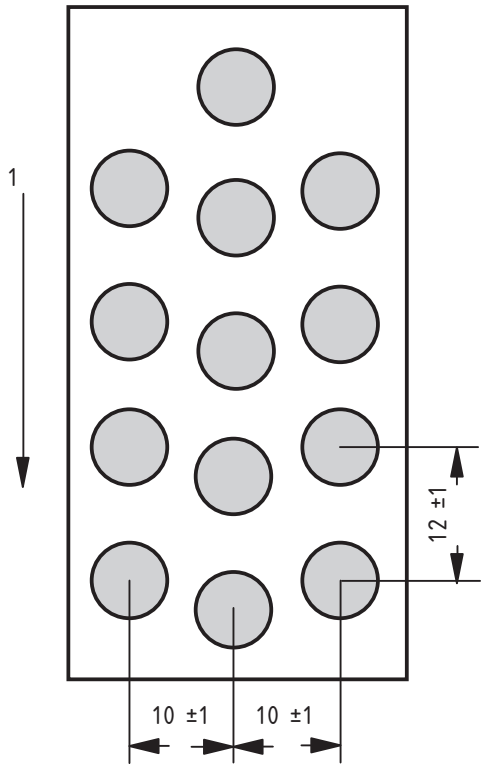
NOTE This type of profile is generally used on non-filled and sand filled/dressed synthetic turfs.

Table 2 — Dimensions and properties of multi-studded rubber profile

Property		Value
Width of sole		30 mm ± 2 mm
Length of sole		120 mm ± 5 mm
Number of studs fitted to sole (equally divided)		13 ± 2
Resilience of rubber [a] (± 3 %) when tested in accordance with ISO 4662 at temperatures of:	0 ºC	17 %
	10 ºC	20 %
	20 ºC	23 %
	30 ºC	27 %
	40 ºC	29 %
Shore A hardness of studs		90° ± 5°
K-value of studs		95 N/mm ± 5 N/mm
Height of studs		7 mm ± 1 mm
Diameter of studs (upper side)		7 mm ± 2 mm
Diameter of studs (underside)		11 mm ± 2 mm

[a] Commonly referred to as the Lüpke resilience.

Dimensions in millimetres



Key

1 Direction of movement

Figure 4 — Layout of multi-studded profile

5.2.3 *Studded shoe profile.* The mounting plate shall be curved and of a similar profile to the shoe assembly to which it is attached. Mounted to the plate shall be six plastic studs with properties as given in Table 3. The studs shall have dimensions as given in Figure 5 and shall be distributed as shown in Figure 6.

NOTE This type of profile is generally used on football turf.

Table 3 —Properties of studded shoe profiles

Property	Value
Width of sole	30 mm ± 2 mm
Length of sole	120 mm ± 5 mm
Shore A hardness of studs	95° ± 5°

Dimensions in millimetres

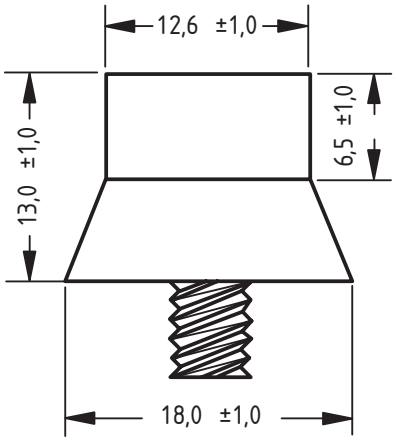
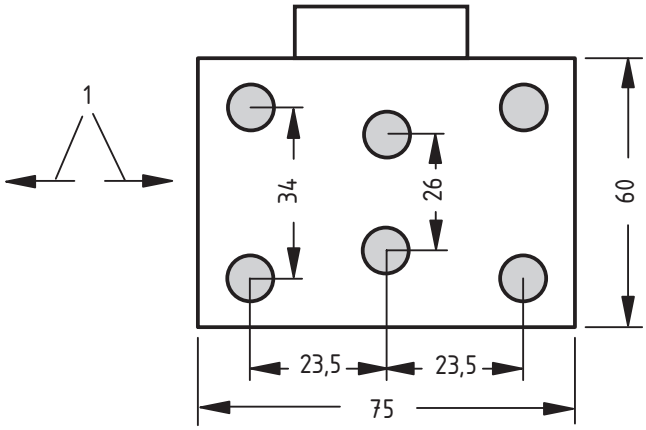


Figure 5 — Stud profile

Dimensions in millimetres



Key

1 Direction of movement

Figure 6 — Layout of studded shoe profile

5.2.4 *Calibration surface*, steel profile, of minimum dimensions 300 mm long x 30 mm wide, as shown in Figure 7.

Dimensions in millimetres

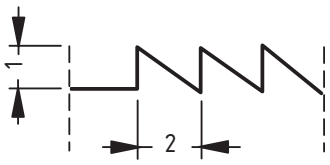


Figure 7 — Calibration surface

6 Test piece

The dimensions of the test piece taken from the sports surface shall be a minimum of 300 mm long x 300 mm wide in combination with the supporting layers to be used in service.

7 Procedure

7.1 Conditioning

Condition the test piece and test sole at (50 ± 5) % relative humidity and (23 ± 2) ºC for a minimum of 3 h. If the material is known to be sensitive to humidity, condition for a minimum of 72 h. Carry out the test under laboratory conditions, or on site at ambient temperature and humidity. Record the climatic conditions.

7.2 Calibration of the apparatus

Install the smooth standard shoe profile (5.2.1) in the metal profile holder. Place the apparatus on the calibration surface (5.2.4) and adjust it so that it is level, checked using a spirit level. Lower or lift the pendulum until it touches the calibration surface with the needle lifter on the pendulum straight and opposite grooves A1 and A2 (see Figure 2).

Position the pendulum horizontally on the point of support. Release the pendulum.

Finalize the calibration by adjusting the tension of the spring on the pendulum such that the pendulum stops with the needle lifter opposite groove B when the pendulum is released for the fifth time.

7.3 Measurement

Place the test piece where the measurement is to be carried out and anchor it at the edges. Place the apparatus on the test piece and adjust it so that it is level, checked using a spirit level. Mount the relevant test sole as specified in 5.2 on the metal profile holder. Position the pendulum vertically. Lower the apparatus onto the test piece with the screws until the pendulum has been put under such a pressure that the sharp side on the back of the metal profile holder is opposite groove C (see Figure 3) on the lower part of the pendulum (this is at a force of 40 N ± 0,5 N). Place the pendulum horizontally on the point of support. Place the needle opposite the value 100 on the scale. Release the pendulum. With the movement of the pendulum the needle will be lifted and will come to rest opposite a value on the scale. Record this value.

Repeat the measurement five times on different parts of the test piece and calculate the mean scale value.

8 Calculation and expression of results

Calculate the slip resistance using the following equation:

$$S = \frac{v - r}{100}$$

where

S is the slip resistance

v is the mean scale value

r is the reduction value given in Table 4

Table 4 — Reduction values

Mean scale value	Reduction value
0 to 99,0	20
99,1 to 99,2	16
99,3 to 99,4	12
99,5 to 99,6	8
99,7 to 99,8	4
≥99,9	0

9 Test report

The test report shall include the following information:

a) reference to this European Standard, i.e. EN 14837:2006;

b) description of the test surface;

c) conditions under which the test was carried out, i.e. details of conditioning, whether under laboratory conditions or on site, the climatic conditions;

d) test results;

e) additional relevant observations, such as any wetting procedure to which the test surface was subjected;

f) date of the test report.

Bibliography

[1] EN 12229, *Surfaces for sports areas – Procedure for the preparation of synthetic turf and textile test pieces.*

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