BRITISH STANDARD

BS EN
15330-2:2008

Surfaces for sports areas — Synthetic turf and needle-punched surfaces primarily designed for outdoor use —

Part 2: Specification for needle-punched surfaces

ICS 97.220.10

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15330-2:2008. It partially supersedes BS 7044-4:1991. EN 15330-2:2008 is one of a package of standards being produced by CEN/TC 217. On publication of the entire package, BS 7044 will be withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/57, Surfaces for sports areas.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Sportböden - Überwiegend für den Außenbereich hergestellte Kunststoffrasenflächen und Nadelfilze - Teil 2: Festlegungen für Nadelfilze

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Foreword

This document (EN 15330-2:2008) has been prepared by Technical Committee 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of an identical text or by endorsement, at the latest by July 2008, and conflicting national standards shall be withdrawn at the latest by July 2008.

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.

EN 15330 consists of the following parts, under the general title *Surfaces for sports areas — Synthetic turf and needle-punched surfaces primarily designed for outdoor use*:

— *Part 1: Specification for synthetic turf*

— *Part 2: Specification for needle-punched surfaces*

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

1 Scope

This European Standard specifies performance and durability characteristics of needle-punched sports surfaces primarily used outdoors. Two categories of surfaces are covered, based on the principal sporting use of the surface, as follows:

— surfaces designed for multi-sports use; and

— surfaces designed primarily for tennis.

The requirements are intended to apply to surfaces used for community, educational and recreational sport. For professional and elite levels of competition, many sports governing bodies have published their own specifications; the requirements of the sports governing bodies might differ from those detailed in this European Standard and facility developers are advised to ensure that they select surfaces offering the correct levels of performance for the levels of competition to be played on the pitch or court.

This European Standard is based on type approval testing of products in the laboratory. Selected requirements may also be used on-site to assess the suitability of installed surfaces. Guidance on the testing of installations is given in Annex A.

2 Normative references

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.

EN 430, *Resilient floor coverings – Determination of mass per unit area*

EN 933-1, *Tests for geometrical properties of aggregates – Part 1: Determination of particle size distribution – Sieving method*

EN 1097-3, *Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids*

EN 1969, *Surfaces for sports areas – Determination of thickness of synthetic sports surfaces*

EN 12616, *Surfaces for sports areas – Determination of water infiltration rate*

EN 12230, *Surfaces for sports areas – Determination of tensile properties of synthetic sports surfaces*

EN 12235, *Surfaces for sports areas – Determination of vertical ball behaviour*

EN 12228, *Surfaces for sports areas – Determination of joint strength of synthetic surfaces*

EN 12229, *Surfaces for sports areas – Procedure for the preparation of synthetic turf and needle-punch test pieces*

EN 12234, *Surfaces for sports areas – Determination of ball roll behaviour*

EN 13036-7, *Road and airfield surface characteristics – Test methods – Part 7: Irregularity measurement of pavement courses: the straightedge test*

EN 13672, *Surfaces for sports areas – Determination of resistance to abrasion of non-filled synthetic turf*

EN 13744, *Surfaces for sports areas – Procedure for accelerated ageing by immersion in hot water*

EN 13865, *Surfaces for sports areas – Determination of angled ball behaviour – Tennis*

EN 14808, *Surfaces for sports areas – Determination of shock absorption*

EN 14809, *Surfaces for sports areas – Determination of vertical deformation*

EN 14836, *Synthetic surfaces for outdoor sports areas - Exposure to artificial weathering*

EN 14955, *Surfaces for sports areas – Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas*

EN 15301-1, *Surfaces for sports areas – Part 1: Determination of rotational resistance*

EN 20105-A02, *Textiles – Tests for colour fastness – Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993)*

EN ISO 5079, *Textiles – Fibres - Determination of breaking force and elongation at break of individual fibres (ISO 5079:1995)*

EN ISO 13934-1, *Textiles – Tensile properties of fabrics – Part 1: Determination of maximum force and elongation at maximum force using the strip method (ISO 13934-1:1999)*

ISO 1766, *Textile floor coverings — Determination of thickness of pile above the substrate*

ISO 8543*, Textile floor coverings — Methods for determination of mass*

ISO 11357-3, *Plastics – Differential scanning calorimetry (DSC) – Part 3: Determination of temperature and enthalpy of melting and crystallization*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
non-filled needle-punched surface
needle-punched or fibre bonded surface that does not contain any form of unbound particulate fill within the pile of the carpet

3.2
filled needle-punched surface
needle-punched or fibre bonded surface whose pile is either totally filled or partly filled with an unbound particulate material (typically sand)

3.3
surface for multi-sports
needle-punched or fibre bonded surface designed to be used for more than one sport

4 General

4.1 Resistance to artificial weathering

4.1.1 Colour fastness

When tested in accordance with EN 20105-A02 following artificial weathering in accordance with EN 14836, the change in colour of the weathered needle-punched surface compared to an unaged test specimen of the needle-punched surface shall be Grey Scale 4 or greater.

4.1.2 Tensile strength

When tested in accordance with EN ISO 5079, but at a laboratory temperature of (23 ± 2) °C following artificial weathering in accordance with EN 14836, the tensile strength of the fibres used to form the pile of the needle-punched surface shall be within 50 % of the tensile strength of the unaged yarn fibres.

4.2 Water permeability

When tested in accordance with EN 12616, the water infiltration rate of surfaces designed to be permeable shall be equal to or greater than 180 mm/h.

4.3 Joint strength

When tested in accordance with Method 2 of EN 12228, following immersion in hot water in accordance with EN 13744, the strength of bonded joints shall be equal to or greater than 25 N/100 mm.

4.4 Abrasion resistance

4.4.1 Non-filled surfaces

When tested in accordance with EN 13672, the percentage mass loss after 2 000 cycles shall be equal to or less than 2 %.

4.4.2 Filled surfaces

When tested in accordance with EN 13672, but modified so that each wheel is acting under a load of 250 g, the percentage mass loss after 2 000 cycles shall be equal to or less than 2 %.

4.5 Tensile properties of carpet

When tested in accordance with EN ISO 13934-1, the maximum force shall be greater than 7,5 N/mm.

5 Surfaces designed for multi-sports use

5.1 General

Needle-punched surfaces designed for multi-sports use shall conform to the requirements given in clause 4 and those in 5.2 to 5.6.

Test pieces shall be prepared in accordance with EN 12229 and with the manufacturer's instructions prior to testing.

Wet test pieces shall be prepared in accordance with the procedure given in Annex B.

5.2 Vertical ball rebound

NOTE See also Annex C.

5.2.1 General

The surface shall conform to the requirements given in 5.2.2, 5.2.3 or 5.2.4, as appropriate, depending on the sports to be played on the surface.

5.2.2 Football

When tested in accordance with EN 12235 using a football under both dry and wet conditions, the vertical ball rebound shall be between 45 % and 85 %.

5.2.3 Hockey

When tested in accordance with EN 12235 using a hockey ball under both dry and wet conditions, the vertical ball rebound shall be less than 90 %.

5.2.4 Tennis

When tested in accordance with EN 12235 using a tennis ball under both dry and wet conditions, the vertical ball rebound shall be greater than 80 %.

5.3 Ball roll and velocity change

When tested in accordance with EN 12234 using a hockey ball under both dry and wet conditions, the ball roll shall be between 5,0 m and 15,0 m.

When tested in accordance with EN 12234 using a football under both dry and wet conditions, the velocity change shall be between 0,10 m/s and 0,75 m/s.

5.4 Shock absorption

When tested in accordance with EN 14809 under both dry and wet conditions, the shock absorption shall be classified as in Table 1.

Table 1 — Classification of shock absorption for multi-sports surfaces

Force reduction (%)	Classification
<15	SANP 1
15 to 29	SANP 2
30 to 44	SANP 3
≥ 45	SANP 4
NOTE 1 If tennis is to be played, the shock absorption should typically be Class SANP 1.	
NOTE 2 For general sports training (non-contact) and physical education, the shock absorption should typically be Class SANP 2 or SANP 3.	
NOTE 3 If hockey is the priority sport or general sports training (contact) is to be undertaken, the shock absorption should typically be Class SANP 3 or SANP 4.	
NOTE 4 If football is to be played, the shock absorption should typically be Class SANP 4.	

5.5 Rotational Resistance

When tested in accordance with EN 15301-1, using the dimpled rubber test foot under both dry and wet conditions, the rotational resistance shall be between 25 Nm and 50 Nm.

5.6 Angled ball behaviour

The angled ball behaviour of multi-sports surfaces designed for tennis shall conform to 6.3.

6 Surfaces designed primarily for tennis

6.1 General

Needle-punched surfaces designed primarily for tennis shall conform to the requirements given in clause 4 and those in 6.2 to 6.5.

Test pieces shall be prepared in accordance with EN 12229 and the instructions of the manufacturer prior to testing.

Wet test pieces shall be prepared in accordance with the procedure given in Annex B.

6.2 Vertical ball rebound

NOTE See also Annex C.

When tested in accordance with EN 12235 using a tennis ball under both dry and wet conditions, the vertical ball rebound shall be greater than 80 %.

6.3 Angled ball behaviour

When tested in accordance with EN 13865 under dry conditions, the angled ball rebound of the surface shall be between 15 and 55 and the surface pace shall be classified as given in Table 2.

Table 2 — Classification based on angled ball behaviour

Angled ball rebound	Surface pace classification
≤ 29	Slow
30 to 34	Medium Slow
35 to 39	Medium
40 to 44	Medium Fast
≥ 45	Fast

6.4 Shock absorption

The shock absorption shall be measured in accordance with EN 14809 under both dry and wet conditions, and the results recorded and provided by the manufacturer or supplier (see clause 7).

6.5 Rotational resistance

When tested in accordance with EN 15301-1 using the smooth rubber test foot under both dry and wet conditions, the rotational resistance shall be between 25 Nm and 50 Nm.

7 Information to be provided by the manufacturer or supplier

NOTE See also Annex D.

The manufacturer or supplier shall supply at least the following information:

a) number and date of this European Standard, i.e. EN 15330-2:2008;

b) manufacturer's or supplier's identification;

c) complete identification of the surface, together with the supporting layers, and in-fill (see Annex E);

d) results of the tests relevant to the type of surface being supplied.

Annex A
(informative)

Site tests

A.1 General

The performance of a needle-punched surface is dependant on the components used to manufacture the surface, the way they are installed on site, the intensity of usage a surface is subjected to, and the levels of maintenance carried out. To ensure a surface is delivering the anticipated acceptable levels of performance it can be tested throughout its life. Such testing is typically undertaken following installation and then once every two or three years depending on the levels of usage and local regulations. The results obtained at the initial testing would normally be in accordance with the relevant sections of this Standard. Thereafter the degree of permitted change should be as agreed by the purchaser and manufacturer/supplier and/or any local regulations or competition rules.

Tests on site should be made under the prevailing meteorological conditions, but within an ambient temperature range of + 5 °C to + 35 °C. For fields or courts that are normally watered prior to use, tests should be carried out on wet test locations. For fields or courts that are used dry or wet, tests should be carried out under the meteorological conditions found at the time of test and these conditions should be reported.

A.2 Multi-sports pitches

Needle-punched multi-sports pitches should be tested in the positions shown in Figure A.1. The following tests should be carried out in each position, as appropriate:

a) vertical ball rebound (using a hockey ball and a football);

b) ball roll (using a hockey ball);

c) velocity change (using a football);

d) shock absorption;

e) rotational resistance; and

f) water permeability, where applicable.

An assessment of the surface regularity of the entire pitch should also be made (see Annex F).

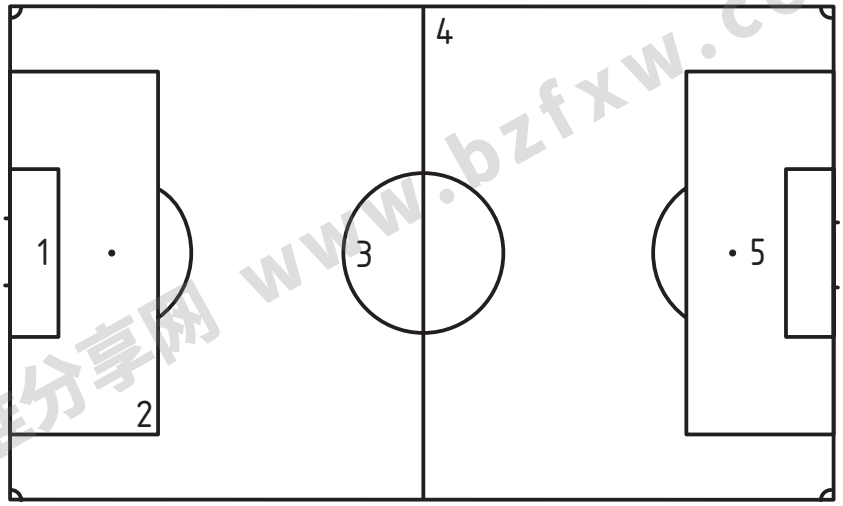

Figure A.1 — Test positions for full-size football pitches

A.3 Tennis courts

Needle-punched tennis courts should be tested in the positions shown in Figure A.2. The following tests should be carried out in each position:

a) vertical ball rebound;

b) angle ball behaviour;

c) shock absorption;

d) rotational resistance; and

e) water permeability, where applicable.

An assessment of the surface regularity of the entire court should also be made (see Annex F).

If blocks of multiple courts are being assessed, it is not normally necessary to test each court. Typically one court in three should be tested, that court being selected by agreement between all interested parties.

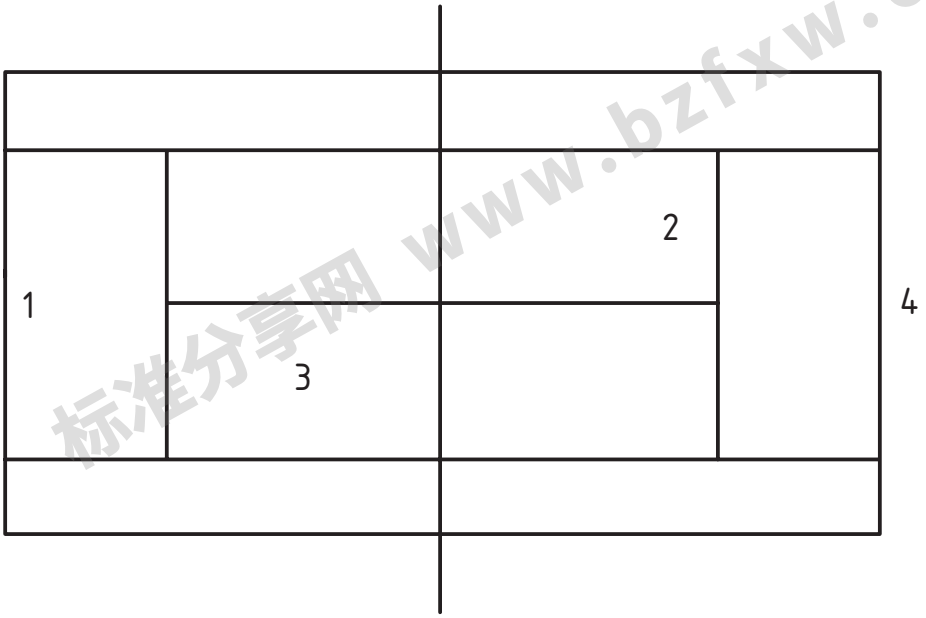

Figure A.2 — Test positions for tennis courts

Annex B
(normative)

Preparation of wet test pieces

Wet test pieces shall be prepared by evenly applying a volume of water that thoroughly soaks the test piece (if in doubt, this is should be equal to the volume of the test piece). Following wetting, the test piece shall be allowed to drain for 15 min and the test carried out immediately after.

Annex C
(informative)

Ball rebound

The method for determining vertical ball rebound as described in EN 12235, measures the rebound of a ball from the needle-punched surface and compares it to the rebound recorded by the same ball on concrete. This method is used as it helps to minimize the errors in results due to the inherent variations in balls, particularly footballs.

Expressing the result as a percentage of the rebound on concrete makes it quite difficult to visualise the actual rebound height from the needle-punched surface. The requirements have therefore been converted to absolute rebound heights and these are detailed in Table C.1. They are the height the ball bounces to when measured from the top of the needle-punched surface to the bottom of the ball.

Table C.1 — Rebound height

Ball type	Drop height (m)	Rebound on concrete (m)	Rebound as a percentage of the value on concrete (%)		Rebound (mm)	
			Min	max	min	Max
Hockey	2,00	0,575	-	90	-	518
Football	2,00	1,350	45	85	608	1 147
Tennis	2,54	1,400	80	-	1 120	-

Annex D
(normative)

Information to be supplied by the manufacturer or supplier regarding maintenance

The maintenance of a needle-punched surface is of vital importance if the pitch or court is to retain acceptable performance, remain consistent, permeable and long lasting. The manufacturer's guarantee will also usually be conditional on the recommended maintenance requirements being carried out with reasonable diligence. It is therefore essential that this vital aspect of the pitch's or courts management is not overlooked.

When offering/installing a pitch or court, the manufacturer or supplier shall provide full details of the levels of maintenance required by the surface and details of the specialist equipment required.

Annex E
(normative)

Product identification

So that the needle-punched surface together with the supporting layer(s) can be identified by third parties, appropriate characterization tests from Table E.1 shall be carried out together with a detailed visual description of the components used within the installation. Variations in these properties will occur through normal manufacturing procedures. A tolerance of ± 10% for each property is acceptable.

When carrying out the tests, condition test pieces for at least 3 h at a temperature of (23 ± 2) °C and carry out the tests within the same temperature range.

Table E.1 — Characterization tests for needle-punched surfaces

Characteristic	Test method
Mass per unit area of needle-punched surface	ISO 8543
Thickness of pile above the substrate	ISO 1766[1]
Mass per unit area of shock absorbing layers	EN 430
Tensile strength of shock absorbing layers	EN 12230
Thickness of shock absorbing layers	EN 1969
Shock absorption of shock absorbing layers	EN 14808
Particle size of infill materials	EN 933-1
Particle shape of infill materials	EN 14955
Bulk density of infill materials	EN 1097-3
Pile fibre identification by Differential Scanning Calorimetry	ISO 11357-3

[1] The test specimens should be tested with its base upper most to improve the repeatability of the test.

Annex F
(normative)

Surface regularity

When tested in accordance with EN 13036-7, the surface regularity of a pitch or court shall be as given in Table F.1.

Table F.1 — Surface regularity of a pitch or court

Straightedge length	Primary sports use		
	Hockey	Football	Tennis
3 m	≤ 6 mm	≤ 8 mm	≤ 6 mm
300 mm	≤ 2 mm	≤ 2 mm	≤ 2 mm
NOTE To meet the requirements in Table F.1 for the surface, the layer under the surface will also need to meet the requirements.			

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