SLOVENSKI STANDARD
SIST EN 15330-4:2023

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Podloge za športne dejavnosti - Umetne travnate podloge in iglane podloge, predvsem za zunanjo uporabo - 4. del: Specifikacija oblog za blaženje udarcev pri umetnih travnatih, iglanih ter tekstilnih podlogah

Surfaces for sports areas - Synthetic turf and needle-punched surfaces primarily designed for outdoor use - Part 4: Specification for shockpads used with synthetic turf, needle-punch and textile sports surfaces

Sportböden - Überwiegend für den Außenbereich hergestellte Kunststoffrasenflächen und Nadelfilze - Teil 4: Festlegungen für Elastikschichten, die in Kunststoffrasenflächen, Nadelfilzen und textilen Sportbelägen eingesetzt werden

Sols sportifs - Surfaces en gazon synthétique et surfaces en textile aiguilleté principalement destinées à l'usage en extérieur - Partie 4 : Spécifications relatives aux couches de souplesse utilisées avec les sols sportifs en gazon synthétique, en textile et en textile aiguilleté

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 15330-4:2022) has been prepared by Technical Committee CEN/TC 217 “Surfaces for Sports Areas”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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1 Scope

This document specifies minimum performance and durability requirements for shockpads used within synthetic turf and textile sports surfacing systems.

The document also specifies appropriate performance tolerance for production and on-site quality control procedures.

This document does not cover structural properties of shockpads. Where appropriate, compliance with other European or national standards and guidelines for these aspects should be followed.

NOTE 1 The sports performance characteristics of a sports surfacing system are provided by the combined characteristics of the playing surface, any infill within the playing surface and the shockpad. The selection of the correct combination of each is complex and the responsibility of the sports surface system designer. It is important to take this into account when considering the performance of a shockpad. A shockpad alone is not be expected to satisfy the performance requirements of the complete sports surfacing system as specified in EN 15330-1, E, etc.

NOTE 2 Some forms of innovative shockpad are designed to provide additional functions beyond aiding the provision of the required sports performance properties. Some of these additional functions can, by design, mean that full compliance with all requirements of this document is not appropriate.

NOTE 3 This document only refers to the shockpad. It makes no recommendations on sub-base constructions or the different synthetic turf for needle-punch textile sports surface designs.

NOTE 4 Annex E (informative) can be used in those countries where national guidance or regulations are not available. If such guidance or regulations are available, they supersede Annex E.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendment) applies.

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

EN 12616, *Surfaces for sports areas - Test methods for the determination of vertical water infiltration and horizontal water flow rates*

EN 13817, *Surfaces for sports areas - Procedure for accelerated ageing by exposure to hot air*

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

EN 12664, *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance*

CEN/TS 16717, *Surface for sports areas - Method of test for the determination of shock absorption, vertical deformation and energy restitution using the advanced artificial athlete*

EN 17324, *Surfaces for sports areas - Test method for the determination of the resistance to dynamic fatigue of shock pads and sports surfaces*

EN ISO 1183 (all parts), *Methods for determining the density of non-cellular plastics (ISO 1183 (all parts))*

EN ISO 527 (all parts), *Plastics - Determination of tensile properties (ISO 527 (all parts))*

EN ISO 845, *Cellular plastics and rubbers - Determination of apparent density (ISO 845)*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
shockpad
resilient underlayer placed beneath the synthetic turf or textile carpet and designed to aid the provision of the required sports performance

Note 1 to entry: The shockpad may either be produced as prefabricated resilient rolls or tiles, or be a mix of resilient granules and binder that is laid *in situ* to form a continuous underlayer.

3.2
sports surfacing system
all components of the playing surface that influence its sports performance or bio-mechanical characteristics of the product

Note 1 to entry: These typically comprise the playing surface (e.g. synthetic turf, synthetic surface, etc.), any infill laid within the playing surface and the shockpad. They can also include any supporting layers or components designed to contribute to the performance of the surface.

3.3
pre-fabricated shockpad
shockpad manufactured in a factory and normally comprising rolls or tiles that are transported to site laid on the base or floor of the sports area

3.4
in-situ shockpad (also known as elastic layer)
shockpad formed as a wet pour mix and normally incorporating a binder (e.g. polyurethane) and elastomeric granulate (e.g. rubber granulate) that is mixed and machine-laid on site on the base or floor of the sports area

3.5
product declaration
statement or datasheet provided by the shockpad manufacturer that describes the composition and expected performance of the shockpad for each of the properties detailed in this document

3.6
shock absorption absolute
outright difference in measurements of shock absorption expressed in units of percentage shock absorption

3.7
median
value that at most half of the population is less than the proposed median and at most half is greater than the proposed median

4 Laboratory conditions and specimen conditioning

4.1 Test floor

Shock absorption and deformation tests shall be made on a rigid concrete floor concrete comprising a rigid, non-vibrating, smooth, level and even concrete floor on which a peak force (Fmax) of (6,60 ± 0,25) kN is achieved.

The shockpad shall be attached to the concrete floor using (50 ± 5) mm wide double-sided adhesive tape. This shall be attached to the outer edges of the test specimen.

4.2 Test environments

As specified tests shall be carried out under the conditions detailed in Table 1.

Table 1 — Test conditions

Test environment	Test temperature	Use of load spreading plate	Test specimen condition	Clause
Standard laboratory conditions	(23 ± 2) °C	No	Dry	4.3.1
Standard laboratory conditions	(23 ± 2) °C	Yes	Dry	4.3.1
Standard laboratory conditions	(23 ± 2) °C	Yes	Wet	4.3.2
Following accelerated air ageing in accordance with EN 13817	(23 ± 2) °C	Yes	Dry	4.3.3
Test specimen at elevated temperature	(40 ± 2) °C	Yes	Dry	4.3.4
Test specimen at sub-ambient temperature	(5 ± 2) °C	Yes	Dry	4.3.5
Frozen test specimen	(−5 ± 2) °C	Yes	Frozen	4.3.6

NOTE The load spreading plate is designed to partly replicate the lateral impact dissipation provided by the synthetic turf or textile sports surface that is laid over the shockpad.

4.3 Procedure for test specimen conditioning

4.3.1 Standard laboratory conditions

Unless otherwise specified tests shall be undertaken under standard laboratory tests conditions of (23 ± 2) °C. The test specimen shall be conditioned for a minimum of 3 h at the specified temperature prior to test.

NOTE As shockpads are generally not sensitive to humidity, it is not considered necessary to specify strict humidity conditions for the laboratory. Nevertheless, it is advisable for the humidity to be nominally 50 % RH.

4.3.2 Procedure for wet tests

Wet test conditions shall be produced by immersing the shockpad in water to a depth of at least 10 mm above the top of the shockpad. After a minimum of 30 min, remove the tests specimen from the water and place it on a free draining base to allow it to drain by gravity for (5 ± 2) min. Test the specimen for the appropriate property within a further (15 ± 2) min.

4.3.3 Procedure for accelerated air ageing

Following accelerated air ageing undertaken in accordance with EN 13817, the specimen shall be tested under standard laboratory conditions.

4.3.4 Procedure for tests at elevated (40 °C) temperature

Place the shockpad test specimen in an air circulating oven conforming to ISO 188, at a temperature of (47,5 ± 2,5) °C. After (120 ± 5) min, remove the tests specimen from the oven. Place the test specimen on the test floor and allow it to cool. Monitor its temperature using a digital temperature probe inserted into the test specimen. When the temperature probe reads (42 ± 0,5) °C, make a measure. Move the apparatus and repeat to obtain three results ensuring the temperature of the test specimen does not fall below 38 °C.

4.3.5 Procedure for tests at sub-ambient (5 °C) temperature

Place the shockpad test specimen in a conditioning cabinet at a temperature of −10 °C to 0 °C. After (120 ± 5) min, remove the tests specimen from the conditioning cabinet. Place the test specimen on the test floor and allow it to warm. Monitor its temperature using a temperature probe inserted into the test specimen. When the temperature gauge reads 5 °C, make a measure. Move the apparatus and repeat to obtain three results ensuring the temperature of the test specimen does not rise above 7 °C.

4.3.6 Procedure for tests under freezing (−5 °C) conditions

Immerse the shockpad in water to a depth of at least 10 mm above the top of the shockpad. After a minimum of one hour, remove the tests specimen from the water and place it on a free draining base to allow it to drain by gravity for (30 ± 2) min before placing the test specimen in a conditioning cabinet at a temperature of −8 °C to −12 °C. After (240 ± 5) min, remove the tests specimen from the conditioning cabinet. Place the test specimen on the test floor and allow it to warm. Monitor its temperature using a temperature probe inserted into the test specimen. When the temperature gauge reads −5°C ± 0,5 °C, make a measurement. Move the apparatus and repeat to obtain three results ensuring the temperature of the test specimen does not rise above −3 °C.

4.3.7 Test positions

Tests undertaken at (23 ± 2) °C shall be made in three test positions, each 200 mm apart and at least 100 mm from the sides of the test specimen.

For tests undertaken at non-ambient laboratory conditions one series of measurements shall be made at least 100 mm from the sides of the test specimen.

5 Load spreading plate

As a shockpad's performance can be influenced by the how an impact force is applied to it (e.g. an unrepresentative direct vertical loading can cause an excessive compression and loss of performance), certain tests (as specified in Clause 6) shall be made with and without a load spreading plate. The load spreading plate shall be as described in Table 2.

Table 2 — Properties of load spreading plate

Property	Unit	Test method	Properties
Material	-	-	Polypropylene composite [a]
Dimensions	mm	-	(500 ± 10) × (500 ± 10)
Thickness	mm	-	(1,0 ± 0,2)
Density	g/cm^3	EN ISO 1183 (all parts)	0,91 ± 0,05
Tensile properties:		EN ISO 527 (all parts)	
Strength at break	MPa		150 ± 10
Tensile strain	%		16 ± 3
E- modulus	GPa		3

[a] Curv™ C100A by Propex Fabrics, Germany (see https://composites.pfsfabrics.com/) is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by CEN of this product.

The plate shall be replaced whenever tests cannot be made on an area that has not been damaged in prior tests, or when the plate cannot lie flat on the test specimen due to buckling or bowing.

6 Performance requirements

6.1 Shock absorption

6.1.1 Test method

The shock absorption of the shockpad shall be measured in accordance with PD CEN/TS 16717. Tests shall be made under the conditions described in Table 1 and in the positions described in 4.3.7.

For the propose of this document, the requirement for the Test Specimen described in PD CEN/TS 16717:2015, Clause 5.1 does not apply.

6.1.2 Damage occurring as a result of the tests

30 (±5) minutes after each series of tests, the stressed areas of the test specimens shall be inspected by the naked eye. There shall be no permanent damage (tearing, delamination, etc).

6.1.3 Tests undertaken at standard laboratory conditions (23 °C)

When tested in accordance with the conditions described in 4.3.1, 4.3.2 and 4.3.3 the minimum mean values of shock absorption shall be as described in Table 3.

Table 3 — Minimum value of shock absorption from tests undertaken at 23 °C

Test condition	Minimum value of shock absorption	Maximum variation between three test positions
Test made without load spreading plate	≥ 20 %	≤ 5 % FR absolute
Test made with load spreading plate	≥ 30 %	≤ 5 % FR absolute

6.1.4 Tests on frozen test specimen

If the shockpad is intended to be used in regions where the ambient air temperature may go below 0C°, it shall also be tested in accordance with 4.3.6, and the value obtained reported.

6.1.5 Consistency in performance

The maximum variation in shock absorption values measured at the three test positions used for each test condition shall be 5 %.

6.1.6 Classification of shock absorption

For shockpads complying with the minimum requirements detailed in Table 3, the overall performance of the shockpad shall be classified in accordance with Table 4, using the lowest value measured in any of the test conditions used.

The classification shall either be based on tests (see Table 1) undertaken in accordance with 4.3.1 to 4.3.6 (column A) or tests undertaken in accordance with 4.3.1 to 4.3.5 (column B).

Table 4 — Classification of shock absorption performance

Shock absorption (%)	Classification	
	A	**B**
≤ 29	Class A (−5°C to 40 °C)	Class A (+5°C to 40 °C)
30 – 40	Class B (−5°C to 40 °C)	Class B (+5°C to 40 °C)
41 - 50	Class C (−5°C to 40 °C)	Class C (+5°C to 40 °C)
51 - 60	Class D (−5°C to 40 °C)	Class D (+5°C to 40 °C)
≥ 61	Class E (−5°C to 40 °C)	Class E (+5°C to 40 °C)

6.2 Vertical Deformation

6.2.1 Test method

The vertical deformation of the shockpad shall be measured and reported in accordance with CEN/TS 16717, under the conditions specified in Table 1. For the propose of this document, the requirement for the Test Specimen described in Clause 5.1 of PD CEN/TS 16717 does not apply.

Tests shall be made in the positions described in 4.3.7.

6.2.2 Requirements

The mean vertical deformation result shall be ± 2 mm of the value declared in the manufacturer's product declaration.

6.2.3 Consistency in performance

When tested in accordance with 4.3.1 and 4.3.2 the maximum variation between the three test positions at each test condition shall be 2 mm.