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Surfaces for sports areas - Indoor surfaces for multi-sports use - Specification

Sportböden - Sportböden für Hallen und Räume mehrfunktionale Sportnutzung und  
Mehrzwecknutzung - Anforderungen

Sols sportifs - Sols multi-sports intérieurs - Spécification

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English Version

## Surfaces for sports areas - Indoor surfaces for multi-sports use - Specification

Sols sportifs - Sols multi-sports intérieurs - Spécification

Sportböden - Mehrzweck-Sporthallenböden -  
Anforderungen

This European Standard was approved by CEN on 2 March 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This European Standard (EN 14904:2006) 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of an identical text or by endorsement, at the latest by October 2006, and conflicting national standards shall be withdrawn at the latest by October 2006.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 United Kingdom.

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## 1 Scope

This European Standard specifies requirements for surfaces for indoor facilities for multi-sports use. It also covers surface systems which include both their supporting and upper layers whether prefabricated, produced in situ or a combination of the two. It also provides for the evaluation of conformity of products to the requirements of this European Standard. This European Standard is not applicable to indoor tennis halls.

NOTE "Multi-sports" will be defined by appropriate national provisions.

## 2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 717-1, *Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method*

EN 717-2, *Wood-based panels - Determination of formaldehyde release - Part 2: Formaldehyde release by the gas analysis method*

EN 1516, *Surfaces for sports areas - Determination of resistance to indentation*

EN 1517, *Surfaces for sports areas - Determination of resistance to impact*

EN 1569, *Surfaces for sports areas - Determination of the behaviour under a rolling load*

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

EN 12673, *Water quality - Gas chromatographic determination of some selected chlorophenols in water*

EN 13036-4, *Road and airfield surface characteristics - Test methods - Part 4: Method for measurement of slip/skid resistance of a surface - The pendulum test*

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

EN 13238, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*

EN 13501-1, *Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests*

EN 13745, *Surfaces for sports areas - Determination of specular reflectance*

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

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

EN ISO 2813, *Paints and varnishes - Measurement of specular gloss of non-metallic paint films at 20°, 60° and 85° (ISO 2813:1994, including Technical Corrigendum 1:1997)*

EN ISO 5470-1, *Rubber- or plastics-coated fabrics - Determination of abrasion resistance - Part 1: Taber abrader (ISO 5470-1:1999)*

ISO 1957, *Machine-made textile floor coverings - Selection and cutting of specimens for physical tests*

ISO 11379, *Textile floor coverings - Laboratory cleaning procedure using spray extraction*

### 3 Terms and definitions

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

#### 3.1

##### **facilities for multi-sports use**

sports halls where more than one sport is played on the surface, e.g. handball, basketball, volleyball, five-a-side football, and which may also be used for physical education and other sporting activities

#### 3.2

##### **area-elastic sports floor**

sports floor, to which the application of a point force causes deflection over a relatively large area around the point of application of the force

#### 3.3

##### **point-elastic sports floor**

sports floor, to which the application of a point force causes deflection only at or close to the point of application of the force

#### 3.4

##### **combined-elastic sports floor**

area-elastic sports floor with a point-elastic top layer, to which the application of a point force causes both localized deflection and deflection over a wider area

#### 3.5

##### **mixed-elastic sports floor**

point-elastic sports floor with a synthetic area-stiffening component

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### 4 Requirements for safety in use

#### 4.1 General

Sports surfaces undergo a complex reaction when subjected to dynamic loading. The desired components of the interaction are deformation under load, the ability to absorb impact, and the energy restitution of the impact, i.e. the amount of energy returned to a sports-person from the surface on which he/she is performing. The ability of a surface to absorb an impact is an important safety feature of a sports surface. Values specified are, therefore, inevitably a compromise between these fundamental characteristics. Sports surfaces react differently under different temperatures and strain rates; they become harder at low temperatures and softer at high temperatures.

An important requirement for safety and sports performance is for there to be sufficient grip between the footwear of the athlete and the sports surface. Insufficient grip can result in the athlete slipping on the surface; too much grip can place unacceptable stress on joints and muscle ligaments.

Information on resistance to repeated impact of synthetic floors is given in Annex A.

#### 4.2 Friction

When tested by the method described in EN 13036-4 using CEN rubber under dry conditions at a temperature of  $(23 \pm 2) ^\circ\text{C}$ , the mean of the Pendulum Test Value shall be between 80 and 110 and no individual test result shall differ from the mean by more than four units.

### 4.3 Shock absorption

When tested by the method described in EN 14808, carrying out a minimum of four tests plus one test for every 500 m<sup>2</sup> of area, the mean force reduction shall be between 25 % and 75 % and no individual result shall differ from the mean by more than  $\pm 5$  units.

NOTE 1 These values are laboratory values. Measurements on site may be carried out at different temperatures and humidities depending on the ambient conditions of the sports hall, in which case the surface temperature and relative humidity should be recorded in the test report.

NOTE 2 Information on typical shock absorption and vertical deformation values for elastic floors is given in Annex B.

### 4.4 Vertical deformation

When tested by the method described in EN 14809, the vertical deformation shall not exceed 5,0 mm.

NOTE 1 These values are laboratory values. Measurements on site may be carried out at different temperatures and humidities depending on the ambient conditions of the sports hall, in which case the surface temperature and relative humidity should be recorded in the test report.

NOTE 2 Information on typical shock absorption and vertical deformation values for elastic floors is given in Annex B.

## 5 Technical requirements

### 5.1 Vertical ball behaviour

When tested by the method described in EN 12235 using a basketball, carrying out a minimum of four tests plus one test for every 500 m<sup>2</sup> of area, the mean relative rebound height shall be  $\geq 90$  % of the rebound height on concrete and no individual result shall differ from the mean by more than  $\pm 3$  units.

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### 5.2 Resistance to a rolling load

NOTE This property is important to ensure that the surface will not be damaged by equipment or seating that might be moved around on it.

When tested by the method described in EN 1569, the minimum resistance shall be 1 500 N, the maximum indentation shall be 0,5 mm under a 300 mm straight edge and no perceivable damage shall be observed after the test.

### 5.3 Resistance to wear

NOTE This property is important to ensure a reasonable expected lifetime in use, particularly for high usage areas (e.g. areas in front of goal on ball pitches) which are prone to loss of material by abrasion.

For synthetic surfaces, when tested by the method described in EN ISO 5470-1, using H18 wheels with a 1 kg load, the maximum loss in mass per 1 000 cycles shall be 1 000 mg.

For coatings and lacquers intended to be applied as part of scheduled maintenance, when tested by the method described in EN ISO 5470-1, using CS10 wheels with a 500 g load, the maximum loss in mass per 1 000 cycles shall be 80 mg.



## 5.4 Reaction to fire

### 5.4.1 Specimen preparation and conditioning

Preparation of test specimens shall be as defined in the appropriate fire test standard except that, in the case of textile sports floor coverings that contain fire retardants, where required, a washing and cleaning procedure similar to that used in practice shall be carried out to verify the durability of surface fire retardant treatments (see 5.4.3).

The specimens shall be tested on one of the two standard substrates specified for floorings in EN 13238, according to the intended end use.

The composition of the product, including the presence of any fire retardant additive (if applicable), shall be declared by the manufacturer prior to type testing.

### 5.4.2 Application rules

If the specimens are tested using an adhesive, the test result is valid for the tested sports floor covering with that adhesive, or the generic adhesive type, in end use conditions.

If the specimens are tested without using an adhesive, the test result is valid for the tested sports floor covering with and without using adhesives in end use conditions.

### 5.4.3 Durability aspects

Where required, textile sports floor coverings containing fire retardants shall be subjected to the laboratory spray extraction cleaning procedure according to ISO 11379 with the following modifications:

- Clean the test specimens three times, with an interval of  $2\text{ h} \pm 15\text{ min}$  between cycles, each cleaning cycle consisting of two strokes:
  - for the first stroke use the spray extraction machine with simultaneous spray and extraction;
  - for the second stroke operate the machine only as an extraction machine.
- Carry out the first cleaning cycle using the reference cleaning solution at ambient temperature ( $25\text{ °C} \pm 10\text{ °C}$ ) and the second and third cleaning cycle with water at ambient temperature without any addition of chemicals.

### 5.4.4 Classification

If a claim for reaction to fire performance is made, the sports floor covering shall be tested and classified according to the requirements of EN 13501-1 and the resulting class and subclass shall be declared.

If it is decided to make no claim for reaction to fire performance, i.e. it is decided to place a product or family of products on the market as Class  $F_{fl}$ , no testing is required for this product or family of products.

### 5.4.5 Product parameters influencing reaction to fire performance

The product parameters shown in Table 1 influence the reaction to fire performance of sports floor coverings and this table shall be followed if testing a range of products.

Table 1 — Product parameters influencing reaction to fire performance of indoor sports surfaces

| Parameters                           | Comments  |
|--------------------------------------|---|
| <b>Composition</b>                   | Each sports floor covering with different composition, build-up or surface layer shall be tested separately.  |
| <b>Thickness</b>                     | If a sports floor covering is produced with a range of different nominal thicknesses, this shall be considered when testing. At least the minimum and maximum thickness shall be tested (one individual indicative test each) and for the worst case a complete series of tests shall be carried out. The worst case determines the classification.   |
| <b>Mass per unit area or density</b> | If a sports floor covering is produced with a range of different nominal masses per unit area or densities, this shall be considered when testing. At least the minimum and maximum masses per unit area or densities shall be tested (one individual indicative test each) and for the worst case a complete series of tests shall be carried out. The worst case determines the classification. |
| <b>Surface structure</b>             | If a sports floor covering is produced with several different surface structures and it is assumed that this will influence the fire performance, this shall be considered when testing. Each surface structure shall be tested (one classification each). The worst case determines the classification.  |
| <b>Colour and design</b>             | Colour and design of a sports floor covering have no effect on the reaction to fire behaviour unless different colours and designs change the composition or other parameters as mentioned above.   |

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## 5.5 Formaldehyde emission

When formaldehyde-containing materials have been added to the product as a part of the production process, the product shall be tested and classified into one of two classes: E1 or E2, as specified in Table 2 and Table 3.

NOTE Products of Class E1 can be used without causing an indoor air concentration greater than  $0,1 \times 10^{-6}$  mg/kg (0,1 ppm) of formaldehyde.

The test requirement does not apply to sports floor coverings to which no formaldehyde-containing materials were added during production or post-production processing. These need not be classified, but may, without any testing, be declared as Class E1.

Table 2 — Formaldehyde Class E1

|   | Test method | Requirement                               |
|---|-------------|---|
| <b>Initial type testing<sup>a</sup></b> | EN 717-1    | Release $\leq 0,124 \text{ mg/m}^3$       |
| <b>Factory production control</b>       | EN 717-1    | Release $\leq 0,124 \text{ mg/m}^3$       |
|   | EN 717-2    | Release $\leq 3,5 \text{ mg/m}^2\text{h}$ |

<sup>a</sup> For established products, initial type testing may also be carried out on the basis of existing data with EN 717-2 testing, either from factory production control or from external inspection.

Table 3 — Formaldehyde Class E2

|                            | Test method | Requirement  |
|----------------------------|-------------|--|
| Initial type testing       | EN 717-1    | Release > 0,124 mg/m <sup>3</sup>                            |
|                            | EN 717-2    | Release > 3,5 mg/m <sup>2</sup> h to ≤ 8 mg/m <sup>2</sup> h |
| Factory production control | EN 717-1    | Release > 0,124 mg/m <sup>3</sup>                            |
|                            | EN 717-2    | Release > 3,5 mg/m <sup>2</sup> h to ≤ 8 mg/m <sup>2</sup> h |

## 5.6 Content of pentachlorophenol (PCP) <sup>1)</sup>

Sports floor coverings shall not contain pentachlorophenol or a derivative thereof as a component in the production process of the product or of its raw materials. In cases where verification is required, if the content is less than 0,1 % by mass by the method described in Annex C, this requirement shall be considered to be met.

## 5.7 Specular reflectance

Where required, the specular reflectance shall be measured using the method described in EN 13745, using an angle of 85°, and the mean value obtained shall be reported.

## 5.8 Specular gloss

When tested by the method described in EN ISO 2813 using an angle of incidence of 85°, the specular gloss shall be ≤ 30 % for matt surfaces and ≤ 45 % for lacquered surfaces.

## 5.9 Resistance to indentation

When tested by the method described in EN 1516, the mean residual indentation measured 5 min after removal of the load shall be reported and the mean residual indentation measured 24 h after removal of the load shall be ≤ 0,5 mm.

For area-elastic sports floors, test only the upper layer supported on a rigid structure.

## 5.10 Resistance to impact

After conditioning for 14 day at a temperature of (50 ± 1) °C and then testing by the method described in EN 1517 at a test temperature of (10 ± 1) °C using an indenter with a mass of 800 g, there shall be no perceivable cracking, splitting, delamination or permanent indentation of the test piece, except that for wooden sports floors the indentation shall not exceed 0,5 mm.

## 5.11 Degree of evenness

NOTE This requirement can only be measured on site, as it is a measure of the overall construction rather than a specific property of the surfacing element alone.

When tested by the method described in EN 13036-7 over the playing area, including safety zones and out-runs, the greatest distance between the straightedge and the sports surface shall not exceed 2 mm over a measuring distance of 0,3 m and shall not exceed 6 mm over a measuring distance of 3 m.

1) Attention is drawn to Commission Directive 1999/51/EC that covers restrictions on the marketing and use of certain dangerous substances including PCP and is reflected in national regulations.