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**Podloge za športne dejavnosti - Ugotavljanje obnašanja žoge pri navpičnem odboju**

Surfaces for sports areas - Determination of vertical ball behaviour

Sportböden - Bestimmung der Ballreflexion

Sols sportifs - Détermination du comportement en rebond vertical de la balle/du ballon

**Ta slovenski standard je istoveten z: FprEN 12235**

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English Version

## Surfaces for sports areas - Determination of vertical ball behaviour

Sols sportifs - Détermination du comportement en rebond  
vertical de la balle/du ballon

Sportböden - Bestimmung der Ballreflexion

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 217.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This document (FprEN 12235:2013) has been prepared by Technical Committee CEN/TC 217 “Surfaces for sports areas”, the secretariat of which is held by BSI.

This document is currently submitted to the Formal Vote.

This document will supersede EN 12235:2004.

**FprEN 12235:2013 (E)****1 Scope**

This European Standard specifies a method for determination of the rebound height of a ball from a surface, when dropped vertically.

**2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12229, *Surfaces for sports areas — Procedure for the preparation of synthetic turf and textile test pieces*

**3 Principle**

A ball is allowed to fall vertically onto a surface and the height to which it rebounds is measured and calculated as the percentage rebound height.

**4 Apparatus**

**4.1 Ball**, conforming to the regulations of the governing body of the relevant sport and with any additional requirements given in Table 1.

NOTE These requirements have been found to be acceptable in use, and it has not been found necessary to specify additional requirements such as circumference or mass of the ball.

Table 1 — Properties of balls

| Type of ball         | Drop height<br>(m) | Rebound height from<br>concrete<br>(m) | $K_1$<br>(s) | Additional<br>requirements  |
|----------------------|--------------------|--|--------------|---|
| Basketball           | $1,80 \pm 0,01$    | $1,050 \pm 0,025$                      | 0,025        | Use a men's nylon wound basketball. Conforming to FIBA requirements |
| Association football | $2,00 \pm 0,01$    | $1,350 \pm 0,05$                       | 0,025        | Conform to FIFA requirements  |
| Tennis ball          | $2,54 \pm 0,01$    | $1,400 \pm 0,025$                      | 0,005        | - Conform to ITF requirements                                       |
| Hockey ball          | $2,00 \pm 0,01$    | $0,640 \pm 0,025$                      | 0,038        | Conform to FIH requirements   |

NOTE 1  $K_1$  is an empirically determined correction factor.

NOTE 2 The precision of the test using footballs is  $\pm 10$  % absolute.

NOTE 3 The rebound height from concrete is measured as described in 7.1 to determine if the ball is suitable for tests on the test piece.

NOTE 4 The drop height and rebound height should always be measured from the bottom of the ball.

**4.2 Ball release device**, which operates smoothly without imparting any impulse or spin to the ball and which allows the ball to be dropped vertically from the specified height.

NOTE Examples of suitable devices include vacuum and mechanical arrangements or an electromagnetic release device with a very small thin metal plate attached to the test ball.

**4.3 Acoustic recording apparatus**, comprising a microphone and timing device, activated acoustically, and giving a reading accurate to within 1 ms.

NOTE The device is activated by the sound from the first bounce of the ball and deactivated by the sound from the second bounce, the time between these events being denoted  $T$ , in seconds.

## 5 Sports surface for testing

The test may be carried out on site, on indoor or outdoor sports surfaces, or on a test piece assembled for test purposes.

If a test piece is to be used, prepare this from a representative sample of the sports surface, in combination with the supporting layers used with the surface in service. Assemble the surface and supporting layers in accordance with the method recommended by the manufacturer so that the test piece is of minimum size 1,0m x 1,0 m or larger on the manufacturers recommendation. Test pieces shall be prepared in accordance with EN 12229.

NOTE 1 For certain constructions, such as unbound bases and area-elastic floors, a larger specimen might be necessary to be representative.

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For certain constructions, such as area-elastic and combined elastic floors, no mass (including test operatives) greater than 10 kg should be within a 1 m radius of the test location.

NOTE 2 Smaller samples can be tested when the surface flooring has undergone special conditioning such as aging on the Lisport and a 1,0 m x 1,0 m sample size is not possible.

**6 Conditioning**

Condition the test pieces for a minimum of 3 h at the test temperature, except when the material is known to be very sensitive to humidity, in which case condition them for a minimum of 88 h at a relative humidity of  $(50 \pm 5)$  % at the test temperature. Unless otherwise specified, condition and test the test pieces at a temperature of  $(23 \pm 2)$  °C.

For tests on site, condition the ball for a minimum of 1 h at the prevailing temperature and humidity.

**7 Procedure****7.1 Determination of the rebound height of the ball from concrete**

Set the ball release device at the appropriate drop height for the ball, as given in Table 1. Drop the ball onto a stable concrete test surface of minimum size 1,0 m x 1,0 m or larger and minimum thickness 0,05 m, ensuring that the ball does not hit the surface within 100 mm of the edge of the surface.

If a concrete test surface is not available an appropriate floor with a rigid substrate may be used. A suspended floor structure is not suitable.

Record from the timing device the time,  $T$ , in seconds, between the first and second bounces of the ball. Calculate the height,  $H$ , in metres to which the ball rebounds using the following formula:

$$H = 1,23(T - K_1)^2$$

where

$T$  is the time in seconds, between the first and the second bounces of the ball;

$K_1$  is the correction factor, in seconds, given in Table 1.

Repeat the procedure to obtain a total of five readings all within a 1,0 m radius. Calculate and record the mean of the five values of  $H$  as the rebound height of the ball from concrete. If the rebound height differs from the value given in Table 1, either discard the ball and repeat the procedure using another ball(s) until the value is met, or, if applicable, adjust the ball inflation pressure and repeat the procedure until the value is met.

**7.2 Determination of the rebound height of the sports surface**

For tests in the laboratory, repeat the procedure given in 7.1, overlying the concrete test surface with the sports surface.

For tests on site, repeat the procedure given in 7.1 replacing the concrete test surface with the sports surface.

For tests under wet conditions, prepare the test area using the procedure specified in the relevant product specification.

When making measurements on site, record the temperature and whether the surface was dry or wet.