

BS EN 12235:2013



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Surfaces for sports areas — Determination of vertical ball behaviour

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National foreword

This British Standard is the UK implementation of EN 12235:2013. It supersedes BS EN 12235:2004 which is withdrawn.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.

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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 European Standard was approved by CEN on 11 July 2013.

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Foreword

This document (EN 12235:2013) 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of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.

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.

This document supersedes EN 12235:2004.

Compared with EN 12235:2004, the text has been clarified and editorial errors have been corrected.

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1 Scope

This European Standard specifies a method for determining 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 needle-punch 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 (m) ^d	Rebound height from concrete ^{c, d} (m)	K_1 ^a (s)	Additional requirements
Basketball	1,80 ± 0,01	1,050 ± 0,025	0,025	Use a men's nylon wound basketball. Conform to FIBA requirements
Association football ^b	2,00 ± 0,01	1,350 ± 0,05	0,025	Conform to FIFA requirements
Tennis ball	2,54 ± 0,01	1,400 ± 0,025	0,005	Conform to ITF requirements
Hockey ball	2,00 ± 0,01	0,640 ± 0,025	0,038	Conform to FIH requirements

^a K_1 is an empirically determined correction factor.

^b The precision of the test using footballs is ± 10 % absolute.

^c 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.

^d 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 1,0 m 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.

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 ageing 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 ± 5) % at the test temperature. Unless otherwise specified, condition and test the test pieces at a temperature of (23 ± 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.

8 Expression of results

Calculate the relative percentage rebound height, for the sports surface from the following formula:

$$R\% = \frac{R_s}{R_c} \times 100$$

where

$R\%$ is the relative percentage rebound height;

R_s is the rebound height from the sports surface, in metres;

R_c is the rebound height from concrete, in metres.

9 Test report

The test report shall include the following information:

- a) reference to this European Standard, i.e. EN 12235:2013;
- b) complete description of the surface tested, including the manufacturer's reference, type of supporting layers and method of attachment;
- c) conditions under which the test was carried out, i.e. either under laboratory conditions with details of conditioning, or on site, in ambient conditions;
- d) the temperature and moisture condition at which the test was carried out, if applicable;

- e) description of the type of the ball used in the test and the height from which it was dropped;
- f) relative percentage rebound height;
- g) absolute rebound height;
- h) date of the test.

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