BS EN 12228:2013

BSI Standards Publication

Surfaces for sports areas — Determination of joint strength of synthetic surfaces

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National foreword

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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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English Version

Surfaces for sports areas - Determination of joint strength of synthetic surfaces

Sols sportifs - Détermination de la résistance des joints

Sportböden - Bestimmung der Nahtfestigkeit von Kunststoffbelägen

This European Standard was approved by CEN on 11 July 2013.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Foreword

This document (EN 12228:2013) 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of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.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 12228:2002.

Compared with EN 12228:2002, the text has been clarified and editorial errors have been corrected.

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1 Scope

This European Standard specifies two test methods for the determination of joint strength of synthetic sports surfaces including synthetic turf. Method 1 describes a procedure for butt joints and overlapped adhesive joints in which a direct force is applied. Method 2 describes a procedure for reinforced butt joints in which a peel force is applied.

2 Normative references

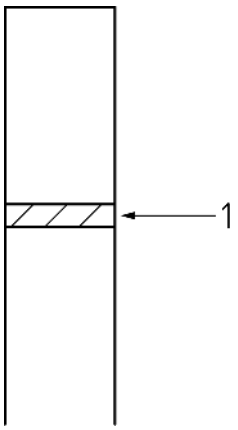
The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 7500-1:2004, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

3 Method 1 — Direct tension method

3.1 General

This method is suitable for testing all types of synthetic sports surfaces that incorporate sewn, chemically welded, hot melt bonded or mechanically bonded butt joints as the manner of joining adjacent lengths of synthetic sports surfacing (see Figure 1).



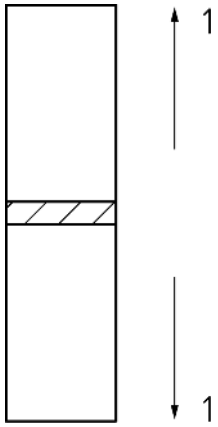
Key

1 chemical, hot melt adhesive/mechanical joint (including sewn seams)

Figure 1 — Butt joint

3.2 Principle

An increasing tensile force is applied perpendicular to the joint until it breaks and the maximum force applied is recorded (see Figure 2).



Key

1 tensile force

Figure 2 — Principle of test — Direct tension method

3.3 Apparatus

3.3.1 Tensile testing machine, conforming to class 1 of EN ISO 7500-1:2004.

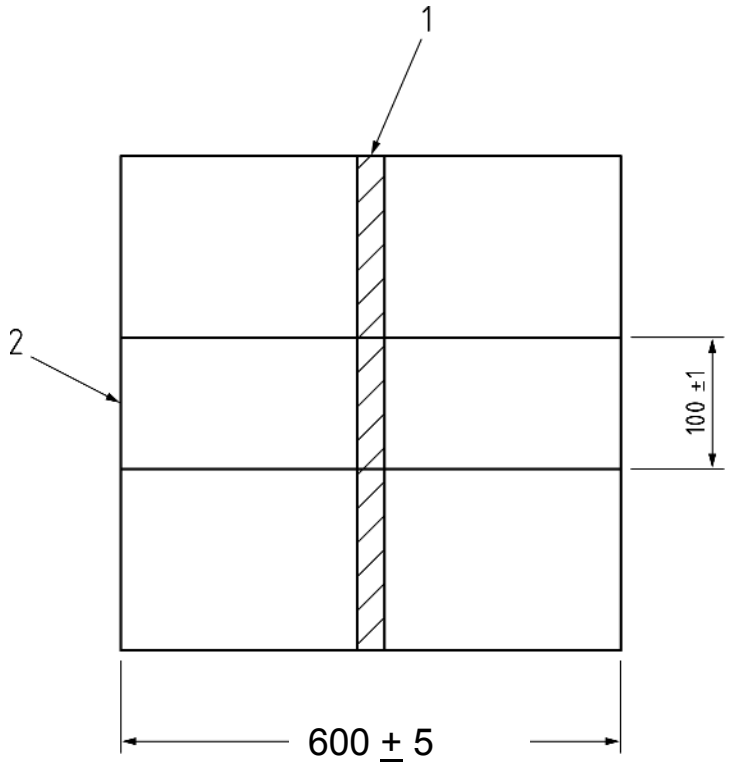
3.3.2 Jaws, which are sufficiently wide to hold the entire width of the test piece and with appropriate means to avoid slippage or damage.

3.4 Test piece

3.4.1 Stitched or welded joint not incorporating joining tape

Cut from a sample of surface five test pieces of minimum length 600 mm and width (100 ± 1) mm with the joint centrally located 200 mm across each test piece (see Figure 3).

Dimensions in millimetres



Key

1 joint

2 test piece

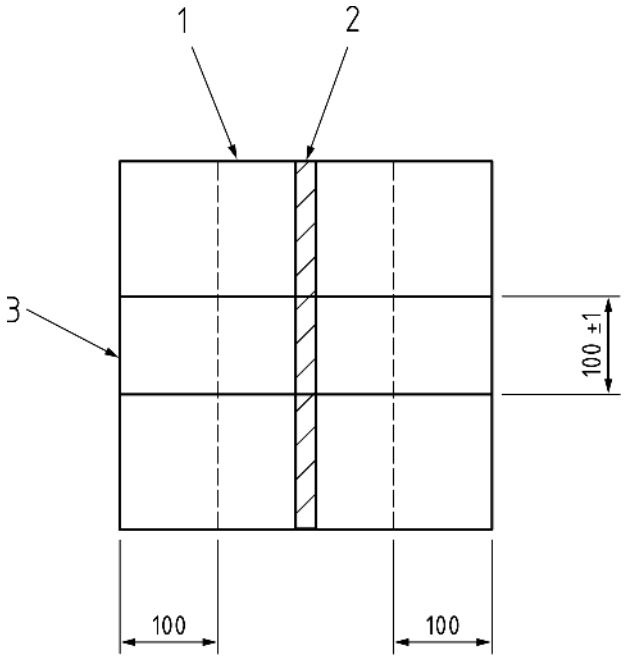
Figure 3 — Test piece layout stitched or welded joint

For any test piece containing a stitched joint, the stitching shall be tied off at the edge of the joint to prevent running.

3.4.2 Stitched or welded joints incorporating jointing tape

Cut from a sample of surface five test pieces, the length of which shall be the width of the backing material plus 100 mm each side of the backing material and width (100 ± 1) mm (see Figure 4).

Dimensions in millimetres



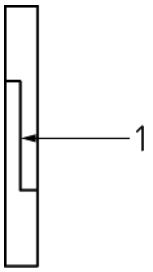
Key

1 backing material
2 joint
3 test piece

Figure 4 — Test piece layout for stitched or welded joint incorporating jointing tape

3.4.3 Overlapped adhesive joints

Cut from a sample of surface five test pieces, the length of which shall be the width of the overlapped joint plus 100 mm each side of the joint and width (100 ± 1) mm (see Figures 5 and 6).

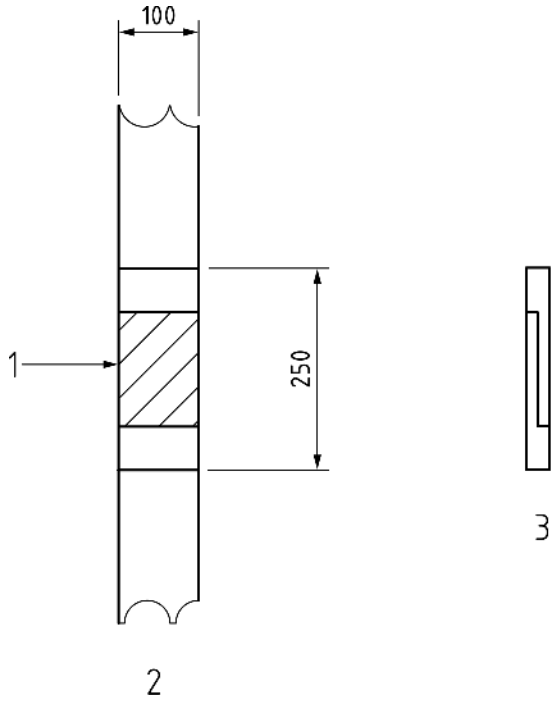


Key

1 adhesive

Figure 5 — Overlapped adhesive joint

Dimensions in millimetres



Key

1 overlapped adhesive joint

2 test piece

3 side elevation

Figure 6 — Test piece layout — Overlapped adhesive joint

3.5 Conditioning and test temperature

Condition the test pieces for a minimum of 3 h at the test temperature. Unless otherwise specified, the test temperature shall be (23 ± 2) °C.

Allow wet test pieces to dry to constant mass before conditioning. Allow frozen test pieces to thaw and dry (as above) before conditioning.

3.6 Procedure

Mount the test piece in the testing machine in axial alignment with the direction of pull. Set the moving jaw in motion at a speed of 100 mm/min and, preferably by means of an automatic recording system, note the force at break or the maximum force exerted.

Repeat the test on the remaining test pieces to obtain five sets of values.

If the strength of the joint is greater than the strength of the synthetic sports surface it is joining, report the strength of the synthetic sports surface and state in the test report that the strength of the joint is greater than that of the sports surface.

If, in the case of an overlapped adhesive joint, the separation takes place parallel to the glued surfaces, the result shall be calculated as a shear force.

3.7 Calculation and expression of results

Calculate the mean value of the force at break or the maximum force exerted for the five tests and express the result in Newtons per 100 mm, rounded to the nearest Newton.

For an overlapped adhesive joint where the separation takes place parallel to the glued surfaces, the shear force *S*, expressed in Newtons per square millimetre, shall be calculated from the following formula.

$$S = \frac{F}{A}$$

where

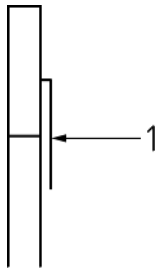
F is the force at break, in Newtons;

A is 100 mm × the width, in millimetres, of the overlapping joint.

4 Method 2 — Peel method

4.1 General

This method is suitable for all types of synthetic sports surface that incorporate a reinforced butt joint (see Figure 7).



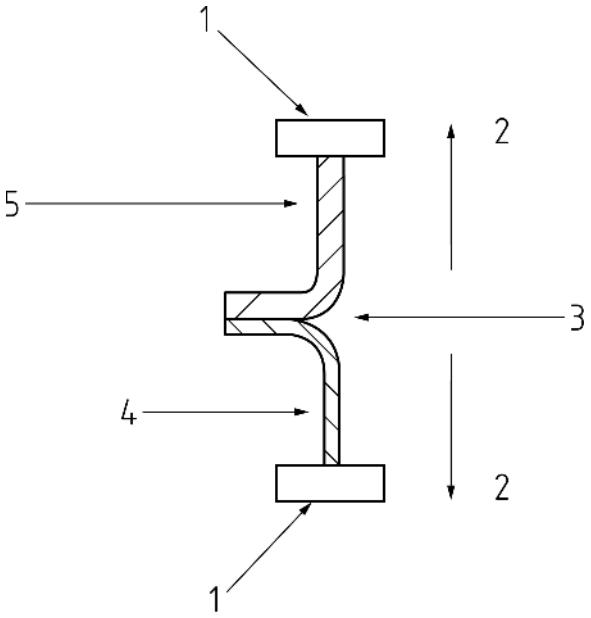
Key

1 backing material, e.g. shock-pad or seaming tape

Figure 7 — Reinforced butt joint

4.2 Principle

A peel force is applied to the joint and the average and maximum peel strength values measured (see Figure 8).



Key

1 tensile machine grip
2 tensile force
3 peel force
4 backing material
5 surfacing

Figure 8 — Principle of test — Peel method

4.3 Apparatus

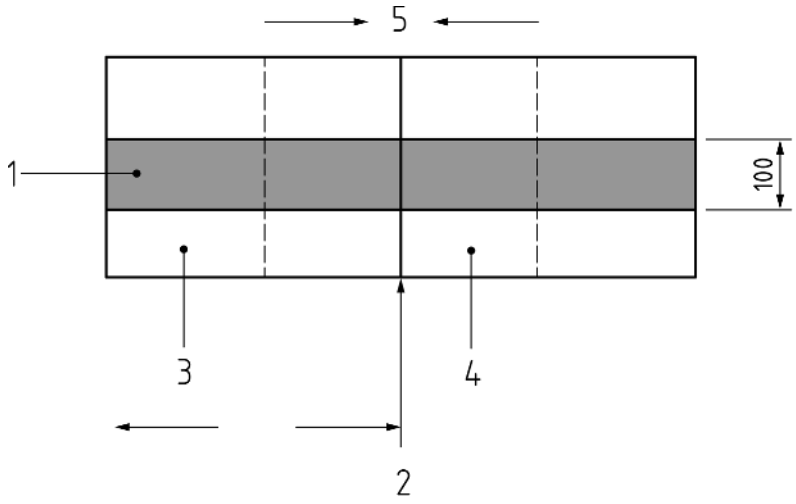
4.3.1 Apparatus, as described in 3.3.

4.3.2 Means of initiating the peel, e.g. hot iron or suitable solvent such as dichloromethane.

4.4 Test piece

Prepare 10 test pieces from five pieces of surface of minimum length 300 mm and width (100 ± 2) mm with the joint centrally located along each test piece (see Figure 9).

Dimensions in millimetres



Key

1 test piece
2 seam
3 surfacing
4 backing material and adhesive strip
5 direction of peel (surfacing pulled to separate from backing material)

Figure 9 — Test piece layout — Peel method, reinforced butt joint

Cut each piece of surface along the line of the joint forming two test pieces each measuring a minimum length 150 mm and width (100 ± 1) mm.

If possible, when preparing the joint, extend the backing material beyond the synthetic surfacing by 100 mm to 200 mm to help initiate the peel.

4.5 Conditioning and test temperature

Condition the test pieces as described in 3.5.

4.6 Procedure

For reinforced butt joints, peel the backing material from the synthetic surface for a distance of approximately 100 mm.

If a solvent is used, take care to ensure that the solvent does not work along the joint and affect the recorded peel strength.

If a solvent is used for initial separation remove it by storing the test piece in a ventilated oven at 60 °C for 2 h, followed by conditioning as described in 4.5.

A minimum recorded sample length of 100 mm is required for a valid measurement.

WARNING All solvents should be handled with extreme care in accordance with manufacturer's instructions.

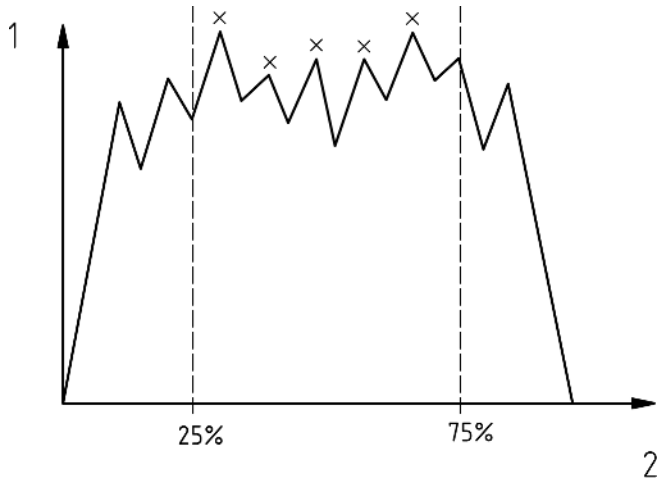
Clamp the test piece in the jaws of the testing apparatus. Set the moving jaw in motion at a speed of 100 mm/min, and, preferably by means of an automatic recording system, note the forces exerted on the test piece. Stop the test within 10 mm of the separation of the joint. If the force fluctuates by > 5 %, record a maximum of 10 peaks and calculate the average peak force.

If the backing material or synthetic surfacing consistently breaks during the test, indicating that the peel strength is higher than that of the material, record the breaking strength of the material, and indicate this in the test report. Report also any other types of failure.

Repeat the test on the remaining test pieces.

4.7 Calculation and expression of results

Calculate the average force between 25 % and 75 % of the peel length recorded during the test, by calculating the mean force of the peaks occurring during this portion of the test, as shown in Figure 10. When more than 10 peaks are recorded during the test, use only the 10 highest peaks to calculate the average peak force.



Key

1 force in N

2 length in mm

Figure 10 — Calculation of average force

Calculate the mean value for each test piece and express this result in Newtons per 100 mm. Calculate the mean of the individual results and express the overall result in Newtons per 100 mm, rounded to the nearest Newton.

5 Test report

The test report shall include the following information:

a) number of this European Standard, i.e. EN 12228:2013, Method 1 or 2;

b) complete identification of the surfacing tested, including type and manufacturer's reference;

c) description of the jointing process including the orientation of the seam with respect to the construction of the surface;

d) temperature of test and relative humidity, if required;

e) mean joint force;

f) individual test results if required;

g) type of failure for each test piece e.g. failure of stitching, failure at bond, between backing material and test piece, failure due to breaking of backing material.

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BSI Group Headquarters

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