BRITISH STANDARD

BS 7188:1998
Incorporating Amendment No. 1

Impact absorbing playground surfacing — Performance requirements and test methods

ICS 97.200.40

BSI British Standards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee SW/65, Children's playground equipment, upon which the following bodies were represented:

Association of Play Industries
BSI Testing
Co-opted experts
Consumer Policy Committee of BSI
Department for Culture, Media and Sport
Health and Safety Executive
Institute of Leisure and Amenity Management
Institute of Sport and Recreation Management
Landscape Institute
Local Government Association
National Playing Fields Association
RAPRA Technology Ltd
Royal College of Paediatrics and Child Health
Royal Society for the Prevention of Accidents
Safety Assessment Federation Ltd
Timber Research and Development Association

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Contents

Foreword

This British Standard has been prepared by Technical Committee SW/65 and is a revision of BS 7188:1989, *Methods of test for impact absorbing playground surfaces*, which was withdrawn on 31 December 1998.

This standard was first published in 1989 as a series of test methods for impact absorbing playground surfacing, at which time it introduced the term "critical height" as a means of describing the effectiveness of surfaces in absorbing the impact of a headfirst fall. "Critical height" was the distance through which a standard headform could be dropped on to the surface before it experienced a severity index of 1 000 (a parameter originating from head injury studies available at that time).

The European Committee for Standardization (CEN) accepted the general principle of measuring the effectiveness of playground surfacing in this way and adapted the procedure to take account of more recent research into means of measuring the potential for head injury and other anthropometric data on children's head size and mass. The result of these discussions was the approval in August 1997 of EN 1177, *Impact absorbing playground surfacing — Safety requirements and test methods.*

The test method described in BS EN 1177 uses the term "critical fall height", the distance through which a standard headform could be dropped on to the surface before it experiences a head injury criterion (HIC) value of 1 000 (HIC being a refinement of the original severity index concept, which measures maximum severity experienced over any period during the impact event).

Specifiers and purchasers of impact absorbing playground surfacing may continue, therefore, to express their requirements in the familiar terms of the critical height needed for any given situation by using BS EN 1177. However, because the headform used to create the impact and the mathematical basis by which the severity of the event is assessed are both different from the original British Standard method, there is no simple relationship between values obtained for critical height by these two methods. Specifiers should be careful to ensure, therefore, that test reports and certificates describing surfacing products now refer, as appropriate, to BS EN 1177 or BS 7188:1998.

The test method for critical height is intended to be universally applicable to all types of impact absorbing surfacing, from loose-fill particulate materials to prefabricated rubber tiles.

The first edition of BS 7188 also contained test procedures for measuring other properties (resistance to abrasive wear, slip resistance, resistance to indentation and ease of ignition) which were primarily relevant to moulded tiles, mats and cast in-situ rubber surfaces. These four other test methods have been retained in this new edition of BS 7188, but may in time also be superseded by equivalent CEN test methods for these properties.

The recommended performance limits for surfacing products when tested to these methods were previously set out in Amendment No. 2 to BS 5696-3, *Play equipment intended for permanent installation outdoors — Part 3: Code of practice for installation and maintenance.* For the convenience of users, this new edition of BS 7188 now incorporates these limits as requirements within each respective clause. BS 5696-3 was withdrawn on 31 December 1998.

It is assumed in the drafting of this British Standard that the execution of its provision is entrusted to appropriately qualified and experienced people.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 11 and a back cover.

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Introduction

In addition to the critical fall height now assessed by BS EN 1177, this standard provides methods of test and recommended performance limits for resistance to abrasive wear, slip resistance, resistance to indentation and ease of ignition. The full range of information able to be provided by BS EN 1177 and BS 7188 will provide the designer and operator of children's playgrounds with the necessary detailed information to enable the most appropriate surfaces to be provided.

1 Scope

This standard specifies performance requirements for impact absorbing playground surfacing and describes the relevant methods of test, in addition to and using different criteria from those given in BS EN 1177. It covers the following:

a) the ability of the surface to resist abrasive wear;

b) the slip resistance of the material;

c) the ability of the material to resist indentation by point loading and to recover from sustained loading;

d) the response of the material to a particular source of ignition.

NOTE It does not give an indication of what contribution the product would make to an established fire or its response to a longer ignition source.

This standard is to be used in conjunction with BS EN 1177.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 812-114:1989, *Testing aggregates — Part 114: Method for determination of the polished-stone value.*

BS 903-A2:1995, *Physical testing of rubber — Method for determination of tensile stress-strain properties.*

BS 907, *Specification for dial gauges for linear measurement.*

BS 2782-5:1995, *Methods of testing plastics — Method 540B: Methods of exposure to laboratory light sources (xenon arc lamp, enclosed carbon arc lamp, open-flame carbon arc lamp, fluorescent tube lamps).*

BS 4790:1987, *Method for determination of the effects of a small source of ignition on textile floor coverings (hot metal nut method).*

BS EN 1177:1998, *Impact absorbing playground surfacing — Safety requirements and test methods.*

BS EN 20105-A02:1995, *Textiles — Test for colour fastness — Part A02: Grey scale for assessing change in colour (including half-steps).*

BS EN ISO 5470:1999, *Rubber or plastics coated fabrics — Determination of abrasion resistance — Taber abrader.*

BS ISO 188:1998, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat-resistance tests.*

BS ISO 5893:2002, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification.*

ISO 1926:1979, *Cellular plastics — Determination of tensile properties of rigid materials.*

3 Terms and definitions

For the purposes of this British Standard, the definitions given in BS EN 1177:1998 and the following apply.

3.1
slip resistance
force which resists the relative movement of a shod foot, when in contact with a floor surface

3.2
wear index
numerical expression of the resistance to wear, in terms of the rate of loss in mass by a specimen in the test procedure described

3.3
wear ratio (ρ)
numerical expression of the ratio of the wear index at the beginning of the test procedure to that at the end of the test

3.4
afterglow
persistence of glowing of a material, under specified test conditions, after cessation of flaming or, if no flaming occurs, after removal of the ignition source

4 Resistance to abrasive wear

4.1 Performance requirements

When tested by the method described in **4.2**, **4.3**, **4.4**, **4.5**, **4.6** and **4.7**, moulded tiles, mats and cast in-situ rubber surfaces shall exhibit the following performance:

a) wear index:

— for each of the four specimens tested, the wear index shall be less than 1.0;

b) wear ratio:

— for each of the four specimens tested, the wear ratio (ρ) shall be not less than 1.0 and not more than 3.0.

4.2 Principle

Samples of the material, some of which have been subjected to an accelerated ageing process, are abraded in a consistent manner. The loss of material is compared to the original mass of the sample to calculate the wear index. The wear index is compared over time to calculate the wear ratio.

4.3 Apparatus

4.3.1 *Rotary platform abrasion machine*, with twin abrasion heads as specified in ISO 5470. The abrading wheels shall be H 18, freshly refaced in accordance with the manufacturer's instructions. The wheels shall bear down on the surface of the sample under a load of 4.90 N per wheel. The apparatus shall be fitted with a suction device to remove loose material from the abraded area of the specimen, continuously throughout the test.

4.3.2 *Air circulating oven,* conforming to ISO 188, clause **4**.

4.4 Test specimens

Four test specimens shall be tested, each representative of the material under test. The dimensions of the test specimens shall be either 100 mm ± 5 mm square, or in the form of a disc, 100 mm ± 5 mm in diameter, whichever is more convenient. The thickness of the test specimen shall be uniform and not more than 10 mm. Impact absorbing surfaces are frequently formed from products which may be substantially thicker than 10 mm. In such cases, the thickness of the test specimen shall be reduced to 10 mm ± 1 mm by uniformly cutting or machining the underside of the material to achieve the required thickness. Any process used for reducing the thickness of the specimen shall not involve any significant heat build-up of the specimen, nor alter the use-surface of the specimen in any way. The two faces of the prepared specimen shall be parallel.

A hole 7 mm ± 0.5 mm in diameter shall be drilled or punched through the exact centre of each test specimen, in order to enable it to be secured to the rotary platform of the test apparatus.

4.5 Conditioning

4.5.1 Test one of the specimens without subjecting it to any accelerated ageing procedure. Subject the remaining three specimens to periods of ageing as follows.

a) Place one specimen in an air circulating oven (**4.3.2**) for 14 days at 70 °C ± 2 °C.

b) Immerse one specimen in distilled or deionized water for 14 days at a temperature of 70 °C ± 2 °C, then remove and dry with an absorbent fabric.

c) Subject one specimen to artificial weathering in accordance with BS 2782:Method 540B, with its wearing surface exposed. Use a xenon arc light source with a black panel temperature throughout the test of 45 °C ± 5 °C and water spray operation for 10 min during every 60 min. Continue exposure to twice standard No 7, i.e. expose two blue wool grade 7 standards exposed consecutively until each has faded to grade 4 on the geometric grey scale.

On removal from the weathering apparatus, dry the sample with an absorbent fabric.

4.5.2 After completion of the various ageing programmes described in **4.5.1**, condition each of the specimens for a minimum of 24 h at 23 °C ± 2 °C immediately before carrying out the following test at the same temperature.

4.6 Procedure

4.6.1 Carefully brush the specimen to remove any loose material and weigh the specimen to the nearest 0.01 g.

4.6.2 Position the specimen, with its use-surface uppermost, on the rotary platform of the abrader and secure it with the central retaining nut and washer. Lower the abradant wheels on to the surface of the specimen. Position the vacuum extraction device so that the nozzle is 2 mm to 4 mm from the surface of the specimen and start the abrader and vacuum extractor.

4.6.3 After 1 000 revolutions, stop the abrader and remove the specimen. Carefully brush any loose material from the surface and reweigh the specimen to the nearest 0.01 g.

4.6.4 Record any loss in mass and change in colour appearance of the abraded section of the specimen, e.g. by reference to the grey scale for assessing change in colour as described in BS EN 20105-A02:1995 or to the Eyre Methuen *Handbook of colour* [1].

4.6.5 Reface the abradant wheels in accordance with the procedure recommended by their manufacturer.

4.6.6 Repeat stages **4.6.2**, **4.6.3**, **4.6.4** and **4.6.5** four more times until the specimen has been subjected to a total of 5 000 revolutions.

4.7 Calculation of results

For each of the four test specimens, calculate the following.

a) the loss in mass (m), in grams, for each increment of 1 000 revolutions;

b) the wear index, in grams per 1 000 revolutions, which shall be the greatest loss in mass recorded in any of the five incremental stages of the test;

c) the wear ratio (ρ) given by the equation:

$$\rho = \frac{m_1}{m_2}$$

where

m_1 is the loss in mass after the first 1 000 revolutions, in grams (g);

m_2 is the loss in mass between 4 000 and 5 000 revolutions, in grams (g).

4.8 Report

The test report shall state the following:

a) the number and date of this British Standard, i.e. BS 7188:1998;

b) the date of the test;

c) the name and/or reference of the product under test;

d) the manufacturer or supplier;

e) the normal manufactured thickness of the surfacing, in millimetres;

f) the overall thickness of each test specimen and the thickness of each layer;

g) the conditioning to which each specimen was subjected;

h) the wear index for each specimen;

i) the wear ratio (ρ) for each specimen;

j) the extent and nature of any change in colour or appearance recorded at any time during the test.

5 Slip resistance

5.1 Performance requirements

When tested by the method described in **5.2**, **5.3**, **5.4**, **5.5** and **5.6**, moulded tiles, mats and cast in-situ rubber surfaces shall exhibit the following performance.

The minimum slip resistance measured on any specimen, in any direction of test, under either wet or dry conditions, shall be not less than 40.

5.2 Principle

Measurement of the slip resistance between a rubber slider and the material under test.

5.3 Apparatus

5.3.1 *Dynamic friction tester*, conforming to the design of the Transport and Road Research Laboratory Portable Skid-resistance Tester (see Figure 1). This apparatus and its calibration shall be in accordance with BS 812-114:1989, **5.2.**

Where the tester is to be set up on a surface that is not rigid, the bearing area of each foot shall be increased, by the use of suitably shaped spreader plates, to at least 7 500 mm^2.

NOTE As a routine check of the extent of wear on the rubber slider, it has been found useful to measure the slip resistance of clean, dry plate-glass. If a value less than 120 is obtained in these circumstances, the slider should be discarded.

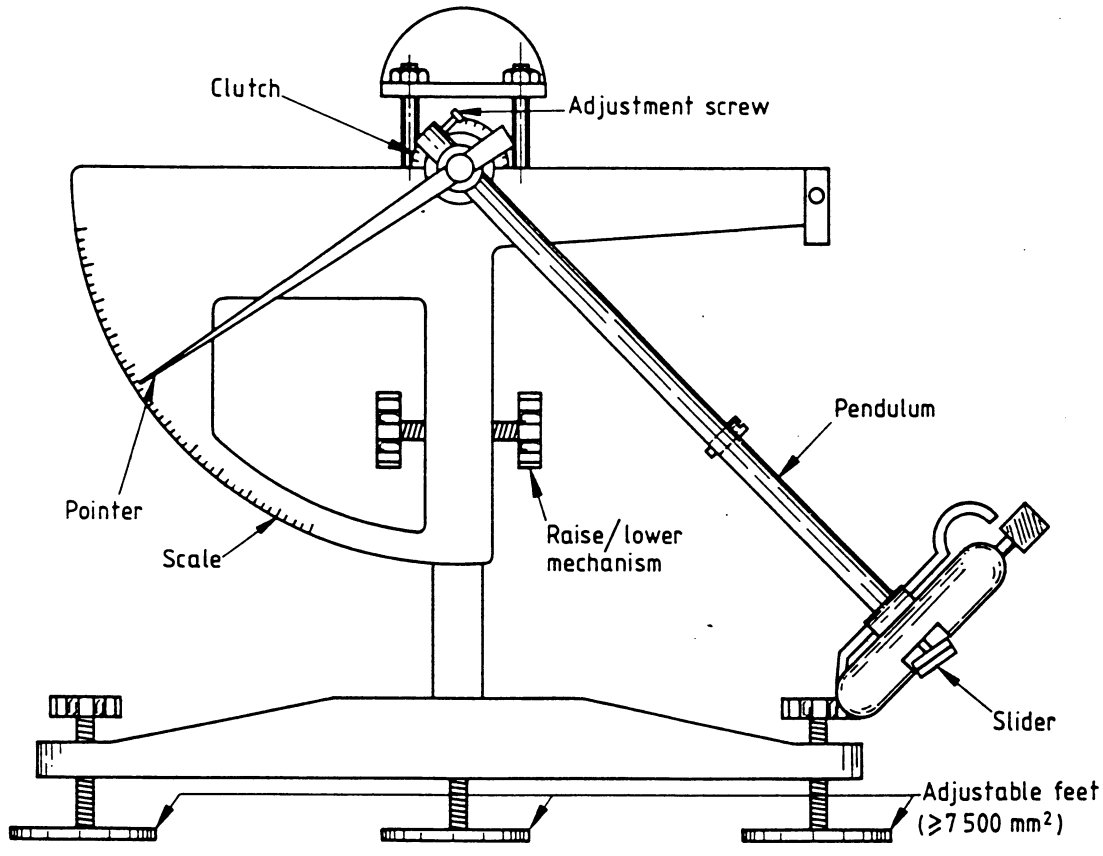

Figure 1 — Apparatus for determination of slip resistance

5.4 Test specimens

Three test specimens shall be tested, each representative of the material under test, of dimensions not less than 300 mm × 300 mm, and of the thickness at which the material is normally laid. In the case of moulded rubber products, the test specimens shall be complete tiles, slabs or blocks if these are at least 300 mm × 300 mm. The samples shall be retained firmly in place during the test in a manner which does not distort the surface in any way.

When testing moulded tiles or blocks which are individually smaller than 300 mm × 300 mm, the test specimens shall be prepared from a number of such items, laid edge to edge or interlocked in the manner in which they are intended to be installed, to make up a test area of not less than 300 mm × 300 mm. In such cases, a perimeter framework shall be provided in which to retain the specimens. This shall be sufficiently rigid to prevent the individual tiles or blocks from separating during the test.

5.5 Procedure

5.5.1 Condition the test specimen for a minimum of 3 h at 23 °C ± 2 °C immediately before the test and carry out the test at the same temperature.

5.5.2 Arrange the tester in position over the specimen, with its wearing surface uppermost and level the apparatus precisely by means of the adjustable feet. Locate the specimen securely in such a position that the slider can traverse the surface centrally, in accordance with **5.5.4**.

NOTE See Figure 1 for details of test apparatus.

5.5.3 Raise the pendulum mechanism until it can swing freely above the surface of the specimen. Lock the pendulum into the horizontal position and rotate the pointer to rest against the adjustment screw on the pendulum arm. If the pointer is not horizontal, turn the adjustment screw until it is. Release the pendulum and note the position on the scale at which the pointer comes to rest. Repeat this at least three times. If this reading is not zero, adjust the clutch at the pivot point and continue to operate the apparatus until a reading of zero is consistently obtained.

5.5.4 With the pendulum hanging freely, lower the pendulum until it touches the surface of the specimen. Lock the mechanism. Raise the slider by lifting the handle, move the pendulum to the right, lower the slider until it touches the surface of the specimen and note the point of contact. Raise the slider again, move the pendulum to the left and note the point at which the slider just leaves the surface. With the aid of a ruler laid on the surface of the specimen, alongside the projected path of the slider, adjust the height of the pendulum mechanism until the length of the contact path of the slider is 125.5 mm ± 1.5 mm. After setting this distance lock the pendulum mechanism securely at this height and re-check the slider's path length carefully, before making a test.

5.5.5 Lock the pendulum into the horizontal position and rotate the pointer to its rest position against the adjustment screw on the pendulum arm. Release the pendulum and allow the slider to execute a single traverse of the specimen, but do not record the reading. Without delay, make four further swings of the pendulum and note the reading indicated by the pointer in each case, re-setting the pendulum and pointer after each swing.

NOTE Always catch the pendulum as it begins its return swing. When returning the pendulum to its horizontal position, always raise the slider with the handle to prevent contact between the slider and the specimen.

5.5.6 With the use-surface uppermost, rotate the specimen through 180° and repeat the procedure given in **5.5.2**, **5.5.3**, **5.5.4** and **5.5.5**. Test the surface tested in other directions if it has any form of directional pattern to obtain the minimum value for slip resistance.

5.5.7 Apply distilled or de-ionized water at a temperature of 23 °C ± 2 °C to thoroughly cover the test area and repeat the procedure given in **5.5.5** and **5.5.6**

5.5.8 Repeat the procedure given in **5.5.2**, **5.5.3**, **5.5.4** and **5.5.5** for each of the three test specimens.

5.6 Calculation of result

Calculate the mean value for the four swings in each orientation under both wet and dry conditions, for each specimen. Determine the lowest of the mean values obtained in any orientation, under each condition.

5.7 Report

The test report shall state the following:

a) the number and date of this British Standard, i.e. BS 7188:1998;

b) the date of the test;

c) the name and/or reference of the product under test;

d) the manufacturer or supplier;

e) the nominal thickness of the surfacing, in millimetres;

f) the minimum slip resistance, determined in accordance with **5.6**, under both wet and dry conditions.

6 Resistance to indentation

6.1 Performance requirements

When tested by the method described in **6.2**, **6.3**, **6.4**, **6.5** and **6.6**, moulded tiles, mats and cast in-situ rubber surfaces shall exhibit the following performance:

a) for each of the three specimens tested, the residual indentation (r), after 24 h recovery, shall be not more than 5.0 mm;

b) after removal of the load and after allowing 24 h recovery, none of the three specimens tested shall exhibit any cracking, splitting or perforation around the point at which the load was applied.

6.2 Principle

Measurement of the depth of penetration of an indentor under a test load and the indentation of the material after the removal of the test load.

6.3 Apparatus

6.3.1 *Cylindrical steel indentor*, with a flat contact surface of diameter 11.3 mm ± 0.03 mm (100 mm^2 in area), capable of exerting an initial load of 3 N ± 0.03 N and a test load of 500 N ± 5 N, perpendicularly to the unloaded test surface throughout the test. The test load shall be capable of being applied gradually, without shock.

6.3.2 *Steel plate*, at least 300 mm × 300 mm × 10 mm.

6.3.3 *Dial gauge*, conforming to BS 907 and having a scale interval of 0.01 mm.

6.4 Test specimens

Three test specimens shall be tested, each representative of the impact absorbing surfacing under test, of dimensions not less than 300 mm × 300 mm, and of the thickness at which the material is normally installed.

Means shall be provided whereby the specimens are retained firmly in place during the test in a manner which does not distort the surface in any way.

6.5 Procedure

6.5.1 Condition the test specimens for a minimum of 3 h at 23 °C ± 2 °C immediately before the test and carry out the following test at the same temperature.

6.5.2 Measure and record the initial thickness at the centre of a test specimen to the nearest 0.01 mm.

6.5.3 Place the specimen on the steel plate (**6.3.2**).

6.5.4 Arrange the indentor in position over the specimen which has its use-surface uppermost, and ensure that the cylindrical impressor is vertical and the surface of the specimen is horizontal.

6.5.5 Place the indentor in contact with the centre of the test specimen and arrange the dial gauge (**6.3.3**) to record its depth of penetration into the specimen throughout the test. Apply a total load of 3 N ± 0.03 N to the specimen through the indentor. Within 5 s zero the dial gauge and then immediately apply the test load of 500 N ± 5 N. Apply the test load smoothly, without shock, so that it is applied in not less than 3 s and not more than 6 s.

6.5.6 At intervals of 90 s and 15 min after loading, measure and record the depth of penetration of the indentor under the test load to the nearest 0.01 mm.

6.5.7 Immediately after taking the final measurement, reduce the load on the indentor to 3 N ± 0.03 N taking not less than 3 s and not more than 6 s and taking care to ensure that the load does not fall below 3 N.

6.5.8 Remeasure the depth of penetration of the indentor, to the nearest 0.01 mm, after 90 s, 15 min, 150 min and 22 h recovery.

6.5.9 Record any cracking or splitting of the surface of the specimen after the test.

6.6 Calculation of result

Calculate the indentation (i) in mm, by subtracting the depth of penetration of the indentor under the initial load from the depth of penetration under the test load, for 90 s and 15 min after the application of the test load.

The residual indentation (r) is the depth of penetration of the indentor 90 s, 15 min, 150 min and 22 h after the removal of the test load.

6.7 Report

The test report shall state the following:

a) the number and date of this British Standard, i.e. BS 7188:1998;

b) the date of the test;

c) the name and/or reference of the product under test;

d) the manufacturer or supplier;

e) the nominal thickness of the surfacing, in millimetres (mm);

f) the initial thickness of each specimen;

g) the indentation *(i)* under the test load of each specimen after 90 s and 15 min;

h) the residual indentation (*r*) of each specimen after 90 s, 15 min, 150 min and 22 h;

i) the cracking or splitting observed in the surface of any of the specimens.

7 Ease of ignition

7.1 Performance requirements

When tested by the method described in **7.2**, **7.3**, **7.4**, **7.5** and **7.6**, moulded tiles, mats and cast in-situ rubber surfaces shall exhibit the following performance.

For each of the three specimens tested, the greatest radius of the effects of ignition shall not exceed 35 mm and shall thereby be classified as having a "LOW radius of effects of ignition".

NOTE Loose impact absorbing surfaces (LIAS) may also be tested for this classification using BS 4790, modified as relevant to the LIAS being tested.

7.2 Principle

A heated stainless steel nut is placed on the use-surface of the material to be tested. The times of flaming and of afterglow and the greatest radius of the effects of ignition from the point of application of the nut are measured.

7.3 Apparatus

The apparatus shall be in accordance with that given in BS 4790.

7.4 Test specimen

Three test specimens are required, each representative of the impact absorbing surfacing under test, of dimensions 300 mm × 300 mm, and of the thickness at which the material is normally installed.

NOTE When the product is supplied in tiles or blocks individually smaller than this, several blocks may be joined together in the manner in which they should be installed, to make up the test specimen.

If the product incorporates any additional component, such as a concrete core, foam insert, separate base plate, or other item, any such component shall be incorporated into the test specimen in the manner in which it would be incorporated in use.

7.5 Procedure

7.5.1 Condition the test specimens for a minimum of 3 h at 23 °C ± 2 °C immediately before the test.

7.5.2 Measure and record the nominal thickness of each specimen.

7.5.3 Carry out the test in accordance with BS 4790:1987, clauses **8** and **9**.

NOTE Toxic products of combustion may evolve during this test and proper care should be taken to protect the operatives throughout the test.

7.6 Calculation of results

For each of the specimens, express the results in accordance with BS 4790:1987, clause **10**.

7.7 Report

The report shall include the following:

a) the number and date of this standard, i.e. BS 7188:1998;

b) the date of the test;

c) the name and/or reference of the product under test;

d) the manufacturer or supplier;

e) the nominal thickness of the surfacing, in millimetres;

f) the statement "The test results relate only to the behaviour of the test specimens after application of a small source of ignition; they shall not be used as a means of assessing how the product will contribute to an established fire";

g) where appropriate, for each specimen the time in seconds for the extraction of the flame and of afterglow and/or smouldering, measured as described in BS 4790:1987, **9.3.1**;

h) where appropriate, for each specimen the time in seconds for the effects of ignition to reach the clamping ring, measured as described in BS 4790:1987, **9.3.2**;

i) the greatest radius to the nearest 5 mm of the affected area, measured as described in BS 4790:1987, **9.3.3**;

j) where possible, the greatest radius to the nearest 5 mm of the affected area, measured as described in BS 4790:1987, **9.3.4**; if the under-surface is not observable the reason for this shall be stated;

k) the words "Did not ignite", if the specimen did not ignite (see BS 4790:1987, **9.3.5**);

l) if used, the type and quantity of adhesive (see BS 4790:1987, **8.3**);

m) the method of mounting test specimens, i.e. method 1, 2 or 3 as given in BS 4790:1987, clause **8**.

8 Tensile properties

8.1 Performance requirements

When tested by the method described in **8.3**, **8.4**, **8.5**, **8.6** and **8.7**, moulded tiles, mats and cast in-situ rubber surfaces shall exhibit the following performance.

For specimens cut from the upper wearing layer of a surfacing system, for each of the three specimens tested, the tensile strength shall be not less than 0.4 MPa and the elongation at break shall be not less than 75 %.

For specimens cut from any lower unexposed, supporting layer (where such a layer exists), for each of the three specimens tested, the tensile strength shall be not less than 0.1 MPa and the elongation at break shall be not less than 25 %.

NOTE 1 It may be possible to determine the tensile properties of some other types of surfacing by this method, but the use of the test on surfaces other than rubber should be by agreement between purchaser and supplier.

NOTE 2 Where the composition of any lower layer is such that it cannot be tested by this method, an alternative means of measuring the tensile properties may be agreed between purchaser and supplier. In such cases, details of the procedure used should be included in the report.

8.2 Principle

Shaped samples, cut from the upper wearing layer of the material and from the lower layer or layers (if any), are clamped in a tensile testing machine and extended at constant speed until they break, recording the force applied and the extension of the sample throughout.

8.3 Apparatus

A laboratory tensile testing machine conforming to BS ISO 5893.

8.4 Test specimens

Three test specimens are required, each representative of the particular layer of the impact absorbing surfacing under test. Where the layer to be tested is greater than 20 mm in thickness, its thickness shall be reduced by, cutting, slicing or other suitable means to produce a sheet with two parallel faces, not more than 20 mm thick.

NOTE Care should be taken when cutting or machining these materials, that the integrity of their structure is not affected by the process. In particular, methods that generate heat within the specimen should be avoided.

Dumbell-shaped specimens shall be cut from the layer to be tested, using the shaped cutter described in ISO 1926.

8.5 Procedure

8.5.1 Condition the cut specimens for a minimum of 3 h at 23° ± 2 °C immediately before the test.

8.5.2 Measure and record the thickness of each specimen.

8.5.3 Carry out the test in accordance with the procedure described in BS 903-A2, using a separation speed of 100 mm per minute.

8.6 Calculation of results

For each of the specimens, determine the ultimate tensile strength and the elongation at break, in accordance with BS 903-A2.

8.7 Report

The report shall include the following:

a) the number and date of this standard, i.e. BS 7188:1998;

b) the date of the test;

c) the name and/or reference of the product under test;

d) the minimum measured thickness of the surfacing, in millimetres;

e) details of the location within the product from which the sample was prepared;

f) the mean ultimate tensile strength and the mean elongation at break of the three specimens;

g) the nominal thickness of the layer from which the specimen was cut;

h) the method used to reduce the thickness of the test specimen (if any).

Bibliography

Standards publications

Amendment No. 2 to BS 5696-3:1979, *Play equipment intended for permanent installation outdoors — Part 3: Code of practice for installation and maintenance*. (To be withdrawn 31 December 1998.)

ANSI/ASTM F355-7S, *Standard method of test for shock absorbing properties of playing surface system*.

Other documents

[1] KORNERUP, A. and J. H. WANSCHER. *Handbook of colour*. London: Eyre Methuen, 1978. 3rd revised ed. ISBN 0413 33400 7.

NOTE This publication is currently out of print but is available from most libraries.

Further information can be obtained from the following publications.

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