BRITISH STANDARD

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Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates

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British Standards

National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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

Essais de réaction au feu des produits de construction - Modes opératoires de conditionnement et règles générales de sélection des substrats

Prüfungen zum Brandverhalten von Bauprodukten - Konditionierungsverfahren und allgemeine Regeln für die Auswahl von Trägerplatten

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Foreword

This document (EN 13238:2010) has been prepared by Technical Committee CEN/TC 127 “Fire safety in buildings”, 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of an identical text or by endorsement, at the latest by August 2010, and conflicting national standards shall be withdrawn at the latest by August 2010.

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Introduction

The Construction Products Directive requires products to be tested in their end use condition which, for the purpose of substrates, could lead to an economically unrealistic large variety of tests to be carried out. This large spectrum has been reduced to a practical number of standard substrates that enables the majority of end use conditions to be represented. Rules for the selection of such substrates are given in this European Standard.

This European Standard is intended for use in conjunction with European Standards covering the reaction to fire test methods for the relevant construction products.

1 Scope

This European Standard describes the conditioning procedures for test specimens which will be tested according to the European standards for reaction to fire.

The rules for the selection of substrates for construction products when carrying out reaction to fire tests are also detailed in this European Standard.

This European Standard does not contain requirements for

— the pre-drying of test specimens for the non-combustibility test according EN ISO 1182;

— methods of cleaning (e.g. washing) and other methods for the assessment of durability aspects, which are dealt with in the relevant product standards.

2 Normative references

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

EN 312, *Particleboards — Specifications*

EN 520, *Gypsum plasterboards — Definitions, requirements and test methods*

EN 636, *Plywood — Specifications*

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

EN 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

EN 14306, *Thermal insulation products for building equipment and industrial installations — Factory made calcium silicate (CS) products — Specification*

EN 14390, *Fire test — Large-scale room reference test for surface products*

EN ISO 1182, *Reaction to fire tests for building products — Non-combustibility test (ISO 1182:2002)*

EN ISO 1716, *Reaction to fire tests for building products — Determination of the heat of combustion (ISO 1716:2002)*

EN ISO 9239-1, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2002)*

EN ISO 11925-2, *Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame – Part 2: Single-flame source test (ISO 11925-2:2002)*

EN ISO 13943:2000, *Fire safety — Vocabulary (ISO 13943:2000)*

ISO 390, *Products in fibre-reinforced cement — Sampling and inspection*

ISO 1887, *Textile glass — Determination of combustible-matter content*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 13943:2000 and the following apply.

3.1
material
single basic substance or uniformly dispersed mixture of substances, e.g. metal, stone, timber, concrete, mineral wool with uniformly dispersed binder or polymers

3.2
product
material, element or component about which information is required

3.3
substrate
product which is used immediately beneath the product about which information is required

NOTE For a flooring, it is the floor on which the flooring is mounted or the material which represents this floor.

3.4
standard substrate
product which is representative of the substrate used in end use applications

3.5
test specimen
piece of the product which is to be tested together with or without any substrate or treatment

NOTE The test specimen may include an air gap.

3.6
conditioning
exposure to a controlled atmosphere

4 Conditioning procedures

4.1 General

Test specimens used by the laboratory to conduct tests according to EN ISO 1182, EN ISO 1716, EN ISO 9239-1, EN ISO 11925-2, EN 13823 and EN 14390 shall be conditioned at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) %.

NOTE This corresponds to the recommended atmosphere and normal tolerances given in ISO 554.

Test specimens shall be arranged within the conditioning environment in such a way that air can circulate around each individual test specimen.

Test specimens shall be conditioned either until constant mass is achieved (see 4.2) or for a fixed period (see 4.3).

4.2 Conditioning to constant mass

Before testing, the test specimens shall be conditioned in the atmosphere specified in 4.1 for a minimum period of 48 h, until constant mass is achieved.

Constant mass is considered to be achieved when two successive weighing operations, carried out at an

interval of 24 h, do not differ by more than 0,1 % of the mass of the specimen or 0,1 g, whichever is the greater.

A number of weighing devices may be necessary. At least one weighing device shall have an accuracy of at least 0,1 g.

4.3 Conditioning for a fixed period

Before starting conditioning for a fixed period, the test specimens shall be properly cured in accordance with manufacturer's instructions and shall not contain excess water. The content of excess water shall be measured and shall be below 40 % before the test specimens are placed in the conditioning environment.

Before testing the test specimens shall be conditioned in the atmosphere specified in 4.1 for the following minimum periods:.

a) Minimum conditioning period of eight weeks:

   1) fire retardant treated wood and fire retardant treated wood based products;

   2) cement based products;

b) Minimum conditioning period of four weeks:

   1) not fire retardant treated wood and not fire retardant treated wood based products;

   2) calcium silicate products;

   3) gypsum and gypsum based products;

   4) all other products containing hygroscopic materials;

c) Minimum conditioning period of two weeks: all other products.

5 General rules for selection of substrates

5.1 General

The substrates used by the laboratory to conduct tests according to EN ISO 9239-1, EN ISO 11925-2, EN 13823 and EN 14390, shall be evaluated when appropriate to determine their reaction to fire test performance and thus compliance with this standard. One indicative test shall be conducted on each batch of substrates.

5.2 Standard substrates for floorings

5.2.1 Test results using a standard substrate complying with the requirements of 5.2.2 or 5.2.3 are applicable if the density of the end use substrate is at least 75 % of the nominal value of the density of that standard substrate.

5.2.2 End use substrates of classes A1 and A2-s1,d0 are represented by fibre cement board (in accordance with ISO 390) with thickness (8 ± 2) mm, with density (1 800 ± 200) kg/m^3 and with classification $A2_{fl}$-s1, when – insofar as for the EN ISO 9239-1 test – the fibre cement board is tested as flooring but without a substrate.

5.2.3 End use substrates of wood and of classes A1 and A2-s1,d0 are represented by not fire retardant treated particleboard (in accordance with EN 312) with thickness (20 ± 2) mm, with density (680 ± 50) kg/m^3 and with classification C_{fl}-s1 when tested (according to EN ISO 9239-1) as flooring but without a substrate.

5.2.4 When the end use substrates are not of wood and not of class A1 and not of class A2-s1,d0, the flooring shall be tested in end use condition.

5.2.5 The method of attachment (e.g. adhesive) of floorings shall be representative of end use application (see NOTE).

The method of attachment in end use practice shall be reproduced in the preparation of the test specimens, i.e. end use adhesive and end use quantities, etc. If the order in which the attachments are conducted is known, this shall also be reproduced in the test specimens, e.g. if in end use practice the adhesive is applied to the substrate and not to the flooring, then it shall be applied to the substrate during the test specimen preparation. The same or greater time for curing and drying as used in end use practice shall also be allowed.

If in practice different types of adhesive are used, test specimens with each of the different adhesives shall be prepared.

NOTE Some floorings may also be tested without attachment (e.g. adhesive).

5.3 Standard substrates for construction products excluding floorings

5.3.1 A list of standard substrates is given in Table 1.

5.3.2 The choice of the substrate for the test specimens shall be made in view of the field of application of test results, taking into account the end use substrate and the following rules which apply together:

5.3.2.1 Each standard substrate represents end use substrates which have a density of at least 75 % of the nominal value of the density of that standard substrate.

5.3.2.2 Standard substrates of classes A1 and A2-s1,d0 represent end use substrates of classes A1 and A2-s1,d0 only.

5.3.2.3 The standard particleboard substrate and the standard plywood substrate represents end use wood based substrates and also any end use substrate of classes A1 and A2-s1,d0.

5.3.2.4 The standard gypsum plasterboard substrate is representative of end use gypsum plasterboard substrates and also any end use substrate of classes A1 and A2-s1,d0. The standard calcium silicate board substrate is not representative of a gypsum plasterboard end use substrate.

5.3.2.5 The standard steel sheet substrate is only representative of end use metal substrates with a melting point equal to or greater than 1 000 °C.

5.3.2.6 The standard aluminium sheet substrate is only representative of end use metal substrates with a melting point equal to or greater than 500 °C.

5.3.2.7 Where in the end use of a surface product an air gap is incorporated, this shall be reproduced as part of the test specimens up to a maximum depth of 25 mm, unless a higher value is specified in the applicable test standard.

5.3.2.8 For a surface product, where there are layers behind the immediate substrate which can influence the performance of the product, e.g. an insulating material behind a painted steel sheet, the surface product together with its immediate substrate and the additional layers shall be representative of the end use application and shall be included in the test specimens.

5.3.2.9 Surface products with end use substrates not represented by a standard substrate shall be tested in end use condition.

5.3.2.10 The method of attachment (e.g. adhesive) of surface products shall be representative of end use application.

The method of attachment in end use practice shall be reproduced in the preparation of the test specimens, i.e. end use adhesive and end use quantities, etc. If the order in which the attachments are conducted is known, this shall also be reproduced in the test specimens, e.g. if in end use practice the adhesive is applied to the substrate and not to the surface product, then it shall be applied to the substrate during the test specimen preparation. The same or greater time for curing and drying as used in end use practice shall also be allowed.

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Table 1 — List of standard substrates for construction products excluding floorings

Nature	Density kg/m^3	Thickness mm	Class [a]	Rules applying (as listed in 5.3)
Fibre cement board (ISO 390)	1 800 ± 200	8 ± 2	A2-s1,d0	5.3.2.1 5.3.2.2 5.3.2.7 5.3.2.10
Calcium silicate board (EN 14306)	870 ± 50	11 ± 2	A2-s1,d0	5.3.2.1 5.3.2.2 5.3.2.7 5.3.2.10
Rock fibre mineral wool slab, mass loss less than 3,0 % at 550 °C (mass loss determined according to ISO 1887)	50 ± 20	25 ± 5	A1	5.3.2.1 5.3.2.2 5.3.2.7 5.3.2.10
Steel sheet	7 850 ± 50	0,8 ± 0,2	A1	5.3.2.1 5.3.2.2 5.3.2.5 5.3.2.7 5.3.2.10
Aluminium sheet	2 700 ± 50	1,0 ± 0,2	A1	5.3.2.1 5.3.2.2 5.3.2.6 5.3.2.7 5.3.2.10
Gypsum plasterboard (EN 520)	700 ± 100	12,5 ± 0,5	A2-s1,d0	5.3.2.1 5.3.2.2 5.3.2.4 5.3.2.7 5.3.2.10
Particleboard, not fire retardant treated (EN 312)	680 ± 50	12 ± 2	D-s2,d0 [b]	5.3.2.1 5.3.2.3 5.3.2.7 5.3.2.10
Plywood, not fire retardant treated (EN 636)	450 ± 50	9 ± 1	D-s2,d0 [b]	5.3.2.1 5.3.2.3 5.3.2.7 5.3.2.10

[a] The substrate shall fulfil the classification criteria given in EN 13501-1 for the class stated in this column – insofar as for the EN 13823 test and the EN ISO 11925-2 test with the product mounted directly against a (11 ± 2) mm calcium silicate board with density (870 ± 50) kg/m^3.

[b] In addition, the $FIGRA_{0,4\ MJ}$ value for the product mounted directly against a (11 ± 2) mm calcium silicate board with density (870 ± 50) kg/m^3 and tested according to EN 13823 shall be (500 ± 100) W/s and the $TSP_{600\ s}$ value shall be (50 ± 20) m^2.

Bibliography

[1] ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

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