

Fire performance of external cladding systems —

**Part 2: Test method for non-loadbearing
external cladding systems fixed to and
supported by a structural steel frame**

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Committees responsible for this British Standard

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- Architectural and Specialist Door Manufacturers
- Association of Building Component Manufacturers Ltd.
- Association of Interior Specialists
- British Plastics Federation
- British Rigid Urethane Foam Manufacturers' Association
- British Textile Technology Group
- BRE (Building Research Establishment)/LPC Laboratories
- Ceram Research Ltd.
- Engineered Panels in Construction
- EURISOL (UK Mineral Wool Association)
- European Phenolic Foam Association
- Fire Brigades Union
- Fire Safety Development Group
- Flat Glass Manufacturers' Association
- Gypsum Products Development Association
- IFS (Institute of Fire Safety)
- Office of the Deputy Prime Minister (ODPM) (represented by the BRE)
- Office of the Deputy Prime Minister (ODPM) — Building Regulations Division
- RAPRA Technology Ltd.
- TIMSA Thermal Insulation Manufacturers
- UK Steel Association
- University College London
- University of Bath
- Warrington Fire Research Centre
- Co-opted members

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Foreword

This British Standard has been prepared by a joint working group from Technical Committees FSH/21/7 and FSH/22/7 under the direction of FSH/21 and FSH/22.

This British Standard was developed from BRE Fire Note 9 [1], following a recommendation by the then House of Commons Environment, Transport and Regional Affairs Committee on the potential risk of fire spread in buildings via external cladding systems [2].

BS 8414, *Fire performance of external cladding systems*, consists of the following parts:

- *Part 1: Test method for non-loadbearing external cladding systems applied to the face of a building; and*
- *Part 2: Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 17 and a back cover.

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1 Scope

This British Standard provides a test method for assessing the behaviour of non-loadbearing external cladding systems, such as curtain walling, glazed elements, infill panels and insulated composite panels, fixed to and supported by a structural steel frame when exposed to a fully-developed (post-flashover) fire in a room, venting through an opening such as a window aperture that exposes the cladding to the effects of external flames, or from an external fire source.

This method of test does not apply to non-loadbearing external rainscreen overcladding systems or external wall insulation systems applied to the face of a building, the fire testing of which are covered in BS 8414-1. This test does not cover exposure to radiant heat from a fire in an adjacent building.

2 Normative references

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

BS EN ISO 13943, *Fire safety — Vocabulary*.

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN ISO 13943 and the following apply.

3.1

collapse

any part of the cladding system which falls away and becomes detached

3.2

combustible layer

layer incorporated in the construction product which, if tested in isolation, would fail the non-combustibility definition in Approved Document B:2004 [3]

3.3

damaged area

total of those surface areas which have been affected permanently by fire under specified conditions

NOTE 1 It is expressed in square metres.

NOTE 2 Users of this term should specify the types of damage to be considered. This could include, for example, loss of material, deformation, softening, melting, charring, combustion, pyrolysis or chemical attack.

NOTE 3 This definition is taken from BS EN ISO 13943.

3.4

external cladding system

complete cladding assembly

NOTE This includes, for example, sheeting rails, fixings, cavities, insulation and weathering membranes, coatings, flashings or joints.

3.5

level 1 height

2 500 mm above the top of the combustion chamber opening in the test apparatus

3.6

level 2 height

5 000 mm above the top of the combustion chamber opening in the test apparatus

3.7

start temperature

T_s

mean temperature of the thermocouples at level 1 height during the five minutes prior to ignition of the heat source

3.8

start time

t_s

time when the temperature recorded by any external thermocouple at level 1 height equals or exceeds a 200 °C temperature rise above T_s and remains above this value for at least 30 s

4 Principle

The test method simulates a fully developed fire in a room abutting the external face of a building and venting through an aperture. In this test, the external cladding system is fixed to, and supported by, a structural steel frame, so as to simulate the external face of a building in the form of a main face together with a return wing, with the cladding system attached in the manner specified by the test sponsor. At the base of the vertical system, an opening is provided through which the fire can vent.

The extent of damage caused to the external cladding system is evaluated, particularly the ability of the external cladding system to resist the propagation of the fire upwards. Any falling debris and fire penetration from the external to internal face should also be assessed.

5 Test apparatus

5.1 Test facility

5.1.1 General. The test apparatus shall utilize a vertical structural steel frame (5.1.2), representative of a structural steel framed building, with a vertical main test wall and a vertical return wall (wing) at 90° angles to, and at one side of the main test wall. The main wall shall be provided with a combustion chamber conforming to 5.1.5. The apparatus shall be capable of enduring the effects of the test procedure without itself suffering undue damage or distortion.

NOTE An example of a typical test apparatus is shown in Figure 1.

5.1.2 Test frame, conforming to the requirements detailed in Annex A.

5.1.3 Main wall. The vertical main wall shall extend at least 6.0 m above the top of the combustion chamber opening and shall be at least 2.8 m wide.

5.1.4 Return wall (wing). The vertical return wall (wing) shall be the same height as the main test wall and have a minimum width of 1 500 mm. The wing shall be constructed perpendicular to the main test wall to allow a distance of 260_{-100}^0 mm from the side of the opening on a finished face to the combustion chamber (see Figure 1).

5.1.5 Combustion chamber, positioned at the base of the main vertical test wall such that the fire can project through the opening at the base of the main vertical test wall. The top of the chamber opening shall be $(2\,000 \pm 100)$ mm above the base of the test facility and shall be $(2\,000 \pm 100)$ mm wide. The combustion chamber shall be capable of enduring the effects of the test procedure without itself suffering undue damage or distortion. The chamber shall be constructed in accordance with the dimensions shown in Figure C.1, including the provision of a robust lintel across the head of the chamber opening and a suitable solid platform to support the heat source. A suitable heat source as specified in 5.2 shall be installed within the combustion chamber.

5.2 Heat source

The heat source shall:

- a) be calibrated in accordance with Annex B; or
- b) be as specified in Annex C.

NOTE The wooden crib described in Annex C has been found to meet the requirements of Annex B and may be used without conducting a calibration exercise. A calibration exercise needs to be conducted in accordance with Annex B on all other heat sources such as gas burners.

