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Fire performance of external cladding systems —

**Part 1: Test method for non-loadbearing
external cladding systems applied to
the face of the building**

ICS 13.220.50

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee FSH/22, Fire resistance tests, to a joint working group from Subcommittees FSH/21/7, Large and intermediate scale tests, and FSH/22/7, Test procedures for partitions, upon which the following bodies were represented:

- Architectural and Specialist Door Manufacturers
- Association of Building Component Manufacturers Ltd.
- Association of Interior Specialists
- British Ceramic Research Ltd.
- British Plastics Federation
- British Rigid Urethane Foam Manufacturers' Association
- British Textile Technology Group
- BRE (Building Research Establishment)/LPC Laboratories
- External Wall Insulation Association
- EURISOL (UK Mineral Wool Association)
- European Phenolic Foam Association
- Fire Brigades Union
- Fire Resistant Glass and Glazing Federation
- Fire Safety Development Group
- Flat Glass Manufacturers' Association
- Gypsum Products Development Association
- Home Office
- IFS (Institute of Fire Safety)
- Institution of Structural Engineers
- Office of the Deputy Prime Minister (ODPM) (represented by the BRE)
- Office of the Deputy Prime Minister (ODPM) — Building Regulations Division
- RAPRA Technology Ltd.
- Timber Research and Development Association
- 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/22.

This British Standard was developed from an existing industry standard, BRE Fire Note 9 [published by the Building Research Establish (BRE)] [1], following a recommendation by the then House of Commons Environment, Transport and Regional Affairs Committee. This recommendation was contained within the committee's first report on the potential risk of fire spread in buildings via external cladding systems, which was published on 14 December 1999 (HC109) [2].

This part of BS 8414 has been produced to provide a test method for assessing the fire performance of non-loadbearing external cladding systems, rainscreen overcladding systems and external wall insulation systems at full-scale when applied to the face of a building and exposed to an external fire under controlled conditions. The fire exposure conditions have been developed to be representative of an external fire source or 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.

Further parts of this standard will be developed to cover the fire testing of curtain walling systems and systems that include glass panels.

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

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 13 and a back cover.

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1 Scope

This British Standard describes a method of assessing the behaviour of non-loadbearing external cladding systems, rainscreen overcladding systems and external wall insulation systems when applied to the face of a building and exposed to an external fire under controlled conditions. The fire exposure is representative of an external fire source or 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.

This British Standard does not cover the performance of glazed window openings or the detailing at such openings which are covered by separate tests. This British Standard does not apply to curtain walling systems or systems that include glass panels, the fire testing of which will be covered by further parts of this standard.

2 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

2.1

external cladding system

complete cladding assembly, including, for example, sheeting rails, fixings, cavities, insulation and weathering membranes or coatings

2.2

face of the building

external plane of a continuous external wall of the building (usually of masonry construction), to which the cladding system is applied

2.3

level 1

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

2.4

level 2

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

2.5

start temperature, T_s

mean temperature of the thermocouples at level 1 during the 5 min prior to ignition of the heat source

2.6

start time, t_s

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

3 Principle

The external cladding system is applied to a vertical external masonry surface simulating the external face of a building in the form of a main face together with a return wing. The cladding system is applied in the manner specified by the test sponsor or vendor of the system. At the base of the main vertical masonry wall an opening is provided through which the fire can vent. A fully developed fire in a room abutting the external face of a building venting through a broken window is simulated. The extent of damage caused to the external cladding system, and in particular the ability for the external cladding system to resist the propagation of the fire upwards, is evaluated.

4 Test apparatus

4.1 Test facility

4.1.1 General

The test apparatus shall be representative of the face of a building and shall consist of a masonry, or masonry infill, structure 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 4.1.4. 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.

4.1.2 Main test wall, vertical, extending at least 6 000 mm above the top of the combustion chamber opening and at least 2 600 mm wide.

4.1.3 Return wall (wing), vertical, of the same height as the main test wall and having a minimum width of 1 500 mm. The wing shall be constructed perpendicular to the main test wall at a distance of (250 ± 10) mm from the side of the opening to the combustion chamber (see Figure 1).

4.1.4 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 opening shall be $(2\,000 \pm 100)$ mm high and $(2\,000 \pm 100)$ mm wide. The combustion chamber shall have a volume of at least 4.275 m³ and shall have internal dimensions of at least 1 900 mm wide, 1 000 mm deep and 2 250 mm high. A suitable heat source as specified in 4.1.5 shall be installed within the combustion chamber.

4.1.5 Heat source, conforming to the thermal performance requirements given in Annex A. The wooden crib described in Annex B has been found to meet the requirements of Annex A and can be used without conducting a calibration exercise. A calibration exercise shall be conducted in accordance with Annex A on all other heat sources such as gas burners.

4.2 Thermocouples

4.2.1 General

All thermocouples shall be Type K (Chromel/Alumel) mineral insulated 1.5 mm (nominal) diameter thermocouples with insulated junctions. At each specified level, temperatures shall be monitored using thermocouples placed in accordance with 4.2.2 and 4.2.3.

4.2.2 External thermocouples

4.2.2.1 General

External thermocouples shall be positioned to a tolerance of ± 10 mm with the hot junction positioned (50 ± 5) mm in front of the face of the system under investigation.

4.2.2.2 External thermocouples at level 1, positioned:

- on the main face of the façade, in positions on the centre line and at distances of 500 mm and 1 000 mm each side of the centre line (five locations);
- on the wing, at distances of 150 mm, 600 mm and 1 050 mm from the finished face of the cladding systems on the main face (three locations) (see Figure 2).