LPCB®

Loss Prevention Standard

LPS 1581: Issue 2.1

Requirements and tests for LPCB approval of non-load bearing external cladding systems applied to the masonry face of a building

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PARTICIPATING ORGANISATIONS

This standard was approved by the LPC Fire and Security Board and Expert Group D. The following organisations participated in the preparation of this standard:-

Association of British Insurers
Association of Building Engineers
Association of Chief Police Officers
Association for Specialist Fire Protection
British Automatic Fire Sprinkler Association
British Rigid Urethane Foam Manufacturers' Association
British Security Industry Association
Chief Fire Officers Association
Door & Hardware Federation
Electrical Contractors Association
Engineered Panels in Construction
EURISOL UK
European Fire Sprinkler Network
Fire Industry Association
Glass and Glazing Federation
Health & Safety Executive
Heating, Ventilation and Air Conditioning Manufacturers' Association
International Association for Cold Storage Construction (IACSC)
Intumescent Fire Seals Association
Metronet
Modular & Portable Building Association
National Access and Scaffolding Confederation
Risc Authority
Risk Engineering Data Exchange Group
Royal Institution of Chartered Surveyors

REVISION OF LOSS PREVENTION STANDARDS

Loss Prevention Standards will be revised by issue of revised editions or amendments. Details will be posted on our website at www.redbooklive.com

Technical or other changes which affect the requirements for the approval or certification of the product or service will result in a new issue. Minor or administrative changes (e.g. corrections of spelling and typographical errors, changes to address and copyright details, the addition of notes for clarification etc.) may be made as amendments. (See amendments table on page 13)

The issue number will be given in decimal format with the integer part giving the issue number and the fractional part giving the number of amendments (e.g. Issue 3.2 indicates that the document is at Issue 3 with 2 amendments).

USERS OF LOSS PREVENTION STANDARDS SHOULD ENSURE THAT THEY POSSESS THE LATEST ISSUE AND ALL AMENDMENTS.

FOREWORD

This standard identifies the evaluation and testing practices undertaken by LPCB for the purposes of approval and listing of non-load bearing external cladding systems applied to the masonry face of buildings. LPCB listing and approval of products and services is based on evidence acceptable to LPCB:-

- that the product or service meets the standard;
- that the manufacturer or service provider has staff, processes and systems in place to ensure that the product or service delivered meets the standard;

and on:-

- periodic audits of the manufacturer or service provider including testing as appropriate;
- compliance with the contract for LPCB listing and approval including agreement to rectify faults as appropriate.

This standard builds on the guidance set out in section 12 of Volume 2 of Approved Document B – Fire safety, and BR 135 *Fire performance of external thermal insulation for walls of multi-storey building* to address some of the fire safety and property protection issues associated with external fire spread in multi-storey buildings.

The BS 8414-1 *Fire performance of external cladding systems, Part 1: Test method for non-loadbearing external cladding systems applied to the face of the building* test method forms the basis of the full scale test in this standard. This test does not cover exposure to radiant heat from a fire in an adjacent building and does not assess the fire resistance characteristics of the system.

The test is intended to represent the action of a fire impinging on the external surfaces of the cladding system. This type of fire can occur as the result of an external fire in close proximity to the building envelope, such as fires involving general waste or malicious fire setting or as the consequence of a fire developing to flashover within a building and breaking out from the room of origin through a window opening or doorway.

This standard primarily addresses the refurbishment of existing masonry faced constructions, but can also be used for new build structures of this type with a masonry substrate.

This document should be read in conjunction with scheme document SD 104.

Following the successful implementation of LPS 1181: Part 4: Issue 1 which was subsequently replaced by LPS 1581: Issue 1, this full revision takes into account the experience gained during this period in both testing and the market expansion for this product type.

NOTES

Compliance with this LPS does not of itself confer immunity from legal obligations. Users of LPSs should ensure that they possess the latest issue and all amendments.

LPCB welcomes comments of a technical or editorial nature and these should be addressed to "the Technical Director" at enquiries@breglobal.co.uk.

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Listed products and services appear in the LPCB "List of Approved Products and Services" which may be viewed on our website: www.redbooklive.com or by downloading the LPCB Red Book App from the App Store (for iPhone and iPad), from Google Play (for Android devices) or from the Windows Store (for Windows 8 Phones and Tablets from 2014).

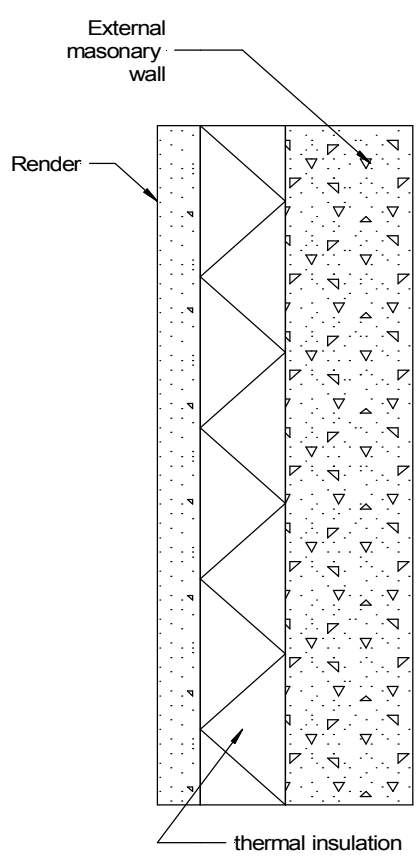
1 SCOPE

This document specifies the fire test and approval requirements for non-load bearing External cladding systems such as rendered insulation, brick slips, rainscreen panel or similar systems applied to the masonry face of a multi-story building.

This standard applies to systems installed on masonry faced constructions, as either refurbishment or new build.

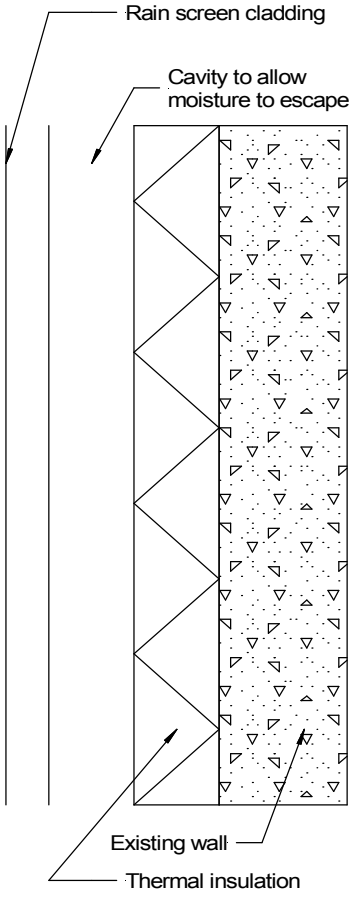
This standard does not address systems applied to structural framed buildings which are covered by LPS 1582 Requirements and Tests for LPCB approval of Non-load bearing External Cladding Systems fixed to and supported by a structural steel frame.

A schematic sketch of typical system types is shown in figures 1 and 2.



External Thermal Insulated cladding system

Figure 1



Rain screen cladding

Figure 2

2 DEFINITIONS

For the purposes of this standard the definitions contained in BS 8414-1 Fire performance of external cladding systems, Part 1: Test method for non-loadbearing external cladding systems applied to the face of the building, apply.

3 REQUIREMENTS

3.1 Documentation

The applicant shall supply the following documented information:

3.1.1 A schematic description of the system to identify each component and layer used.

3.1.2 A complete set of production drawings (where applicable) and installation drawings relevant to the system submitted for test and approval including all proposed variations.

3.1.3 Full specification of all components used in the production and installation of the system. This shall include details of the component manufacturers, part numbers, data sheets and all fire performance characteristics to EN 13501-1 Fire classification of construction products and building elements. Part 1: Classification using test data from reaction to fire tests and EN 13501-2 Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services, as appropriate.

3.1.4 Full installation instructions as supplied to the installation contractors.

3.2 Test Requirements

3.2.1 Initial type testing requirements

3.2.1.1 System reaction to fire classification

For each complete system subject to approval, a reaction to fire classification in accordance with BS EN 13501-1 shall be determined.

3.2.1.2 Glowing combustion – Insulation

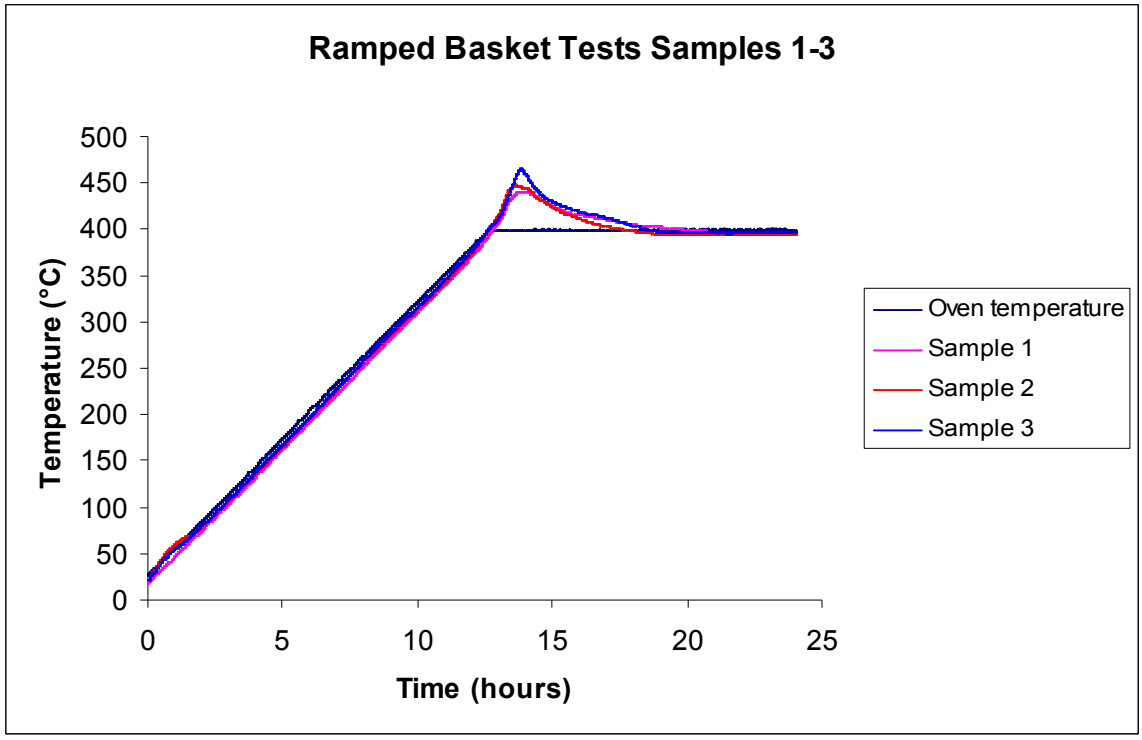
All insulation materials will be assessed for potential glowing combustion prior to acceptance for approval by LPCB. Where appropriate these will be tested against the ramped basket test as detailed below, where products are shown to exhibit glowing combustion, the system criteria given in section 4.1.7 will be applied.

Ramped Basket Test

The test is carried out in a mechanically ventilated oven with an inner chamber of sufficient size to accommodate the test piece and allow free air circulation around it.

A cubical wire mesh basket measuring 100mm on each edge is filled with the material under test and a 0.5 mm stainless steel sheathed chromel/alumel thermocouple is inserted into the centre of the sample to monitor the central temperature. The filled cube is then suspended in the oven together with a second thermocouple to register oven temperature. The thermocouples shall be connected to a data acquisition system capable of recording data at a minimum of 10 s intervals.

The screening test is run over a 24 hour period. The temperature of the oven is set to increase at a nominal rate of 0.5°C per minute from room temperature up to a maximum of 400°C. Once the temperature has been attained the oven is maintained at this temperature for the remainder of the 24 hour period. The central thermocouple will detect any exothermic reaction where the temperature increases independently of the oven temperature. The onset of an exotherm may be measured by determining the temperature at which the central temperature exceeds the oven temperature crossing point.



The figure above shows a test trace for a material exhibiting self-heating behaviour.

If the central temperature of the sample tracks the oven temperature for the whole of the test duration (24 hours), the material may be said to exhibit no propensity for glowing combustion over the time and temperature ranges investigated.

3.2.2 Full Scale System Test

3.2.2.1 Specification of test specimen

The specification of the test specimen shall be agreed between the applicant and LPCB. These details shall be provided to LPCB as detailed in section 3.1.

The client shall be responsible for the installation of the system as detailed in their submitted documentation.

3.2.2.2 Full scale test method

The test arrangement shall be as described in BS 8414-1.

3.2.2.3 Test conditions

The conditioning and test environment shall be as specified in BS 8414-1.

In addition, all tests shall be undertaken in a suitable test building and the test faces shall be a minimum of 3m from any reflecting surface.

3.2.2.4 Test procedure and Reporting

The test shall be carried out to the procedure and reported fully in accordance with the BS 8414-1. The timber crib ignition source specified in BS 8414-1 Annex B shall be used for all tests.

A crib collapse zone shall be marked on the floor of the test facility. This shall be 2.4m x 1.2m in area and positioned centrally on the centre line of the hearth opening (2.4m length parallel to the face of the hearth). In addition to the general observations required by BS 8414-1 regarding system performance during the test; any droplets, debris or collapse to the floor shall be reported with reference to this marked area.

In addition, a full video record of the test shall also be taken and supplied to LPCB with the laboratory test report.

3.2.3 Audit Test Requirements

Additional information on continued compliance and audit requirements are provided in Scheme Document SD104.

3.2.3.1 Component Fire Test Data

These tests are used to establish the baseline fire performance characteristics of the system components for ongoing auditing and system verification.

These tests are used for quality control purposes and are not part of the system performance requirements.

3.2.3.2 Insulation materials

Samples of the insulation from the full scale test programme shall be taken by the laboratory and submitted for test.

The test protocols used to establish and verify the baseline fire performance characteristics of the insulation material shall be determined by LPCB based on the most appropriate methodology for the type of insulation material.

3.2.3.3 External finish systems

The Gross Calorific Value (PCS) for all external finish systems including basecoats and meshes, as applicable, shall be determined using EN 1716 Reaction to fire tests for building products – Determination of the heat of combustion. These values shall be used to establish and verify the baseline fire performance characteristics for the external finish system.

4 CLASSIFICATION AND DESIGNATION

For the purposes of this standard the definitions contained in BS 8414-1 apply.

4.1 Test Criteria

4.1.1. Early test termination

Failure of the system is deemed to have occurred if the test is terminated within the duration of the full test period for any safety reason.

4.1.2. Visible flaming

Failure of the system is deemed to have occurred if visible flaming, which exceeds the confines of the test rig either vertically or laterally during the full 60 minute test period, is observed. For the purposes of this clause, visible flaming is defined as a continuous flame which is observed for more than 60 seconds duration (i.e. not intermittent or glowing)

4.1.3. External fire spread

Failure due to external fire spread is deemed to have occurred if the temperature rise above Ts of any of the external thermocouples at level 2 exceeds 600°C for a period of at least 30 seconds, within 30 minutes of the start time ts.

4.1.4. Internal fire spread

Failure due to internal fire spread is deemed to have occurred if the temperature rise above Ts of any of the internal thermocouples at level 2 exceeds 600°C, for a period of at least 30 seconds, within 30 minutes of the start time ts.

4.1.5. Mechanical performance

Failure will be deemed to have occurred if there is collapse of the system or part thereof, flaming or not, onto the floor of the test facility outside the designated crib collapse zone, see note 1, within the duration of the full 60 minute test period.

4.1.6. Burning debris and pool fires

Failure is deemed to occur if burning debris or a pool fire develops on the floor of the test facility, outside the designated crib collapse zone, see note 1.

Burning debris is defined as visible flaming for more than 60 seconds duration (i.e. not intermittent or glowing) within the duration of the full 60 minute test period.

Note 1: The crib collapse zone is defined as a 2.4m x 1.2m positioned centrally on the centre line of the hearth opening (2.4m length parallel to the face of the hearth).

4.1.7. Glowing combustion

Where an insulation product exhibits the propensity for glowing combustion, the system design shall restrict the potential spread of self-propagating combustion within the insulation vertically beyond subsequent floor levels and laterally beyond the line of internal compartment walls.

Failure in relation to this standard is deemed to occur if the area of system damage spreads vertically beyond level 2 or reaches the outer edge of the wing wall, in the area between Level 1 and Level 2, within 24 hours of the termination of the full 60 minute test period.

4.2 Field Of Application Of Test Results

4.2.1 Type of system tested

The test results apply to the specific system specification as tested.

4.2.2 Insulation thickness

In order to cover a range of insulation thicknesses, the thinnest and thickest insulation for a given system type, where all other system specifications remain unchanged, shall be tested. Where only one thickness is tested, the LPCB approval will be limited to that thickness.

4.2.3 Cavity depths

The range of cavity depths and associated closure systems shall be declared on application as part of section 3.1. Typically, in order to cover a range of cavity depths, where all other system specifications remain unchanged, the minimum and maximum

depths shall be tested. Where only one depth is tested, the LPCB approval will be limited to that depth.

4.2.4 Insulation density

The test result will only apply to the density tested. If various densities are available, further evaluation will be required.

4.2.5 Change in inner leaf

The test uses a masonry wall as the inner leaf. Other types of leaves fall outside the scope of this standard.

4.2.6 Position of fire breaks

Where fire breaks are employed, test results will only apply to the type, fixing and position arrangements as tested. The spacing of fire breaks will be limited up to the maximum spacing as tested.

4.3 Classification

Where the system meets the approval criteria to LPS 1581 and associated LPCB certification requirements, the system will be classified as meeting the requirements of the standard.

The classification will provide the following details:

- reaction to fire classification to BS EN 13501-1 for the approved system;
- the specification reference for the system;
- the scope of application of the approved system as defined in 4.2.

5 MARKING, LABELING & PACKAGING:

The manufacturer shall provide appropriate marking, labelling and packaging for the safe transport and subsequent installation and performance of the cladding system. This shall clearly show the manufacturers name, contact address, the cladding system identification reference as well as any other relevant safety requirements.

The requirements for the LPCB marking or labelling of a cladding system are described in the accompanying scheme document (SD 104) and in the “Use of the BRE Global Certification Marks” publication PN103.

6 PUBLICATIONS REFERRED TO:

BS 8414-1	Fire performance of external cladding systems, Part 1: Test method for non-loadbearing external cladding systems applied to the face of the building.
BS 8414-2	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
BS EN 13501-1	Fire classification of construction products and building elements. Part 1: Classification using test data from reaction to fire tests.
	BS EN 13501-2 Fire classification of construction products and building elements. Part 2: Classification using data from fire resistance tests, excluding ventilation services.
BS EN ISO 1716	Reaction to fire tests for building products – Determination of the heat of combustion
SD 104	Scheme Document for LPS 1581 and LPS 1582.
PN103	Use of the BRE Global Certification Marks.
BR135	Fire performance of external thermal insulation for walls of multi-storey buildings.
ADB	Approved Document B - Fire Safety. Volume 2 – Buildings other than dwelling houses. Building Regulation 2000

For undated references please refer to the latest published issue.

Amendments Issued Since Publication

DOCUMENT NO.	AMENDMENT DETAILS	SIGNATURE	DATE
LPS 1581-2.0	Full Revision	TB	Feb.2010
LPS 1581-2.1	1. New front cover 2. Title added to header 3. Notes added on Page 3 4. Repagination 5. Update to copyright information	DC	Jan. 2014