

Loss Prevention Standard



LPS 1181: PART 2: ISSUE 2.0

Series of Fire Growth Tests for LPCB Approval and Listing of Construction Product Systems

Part Two: Requirements and tests for sandwich panels and built-up systems for use as internal constructions in buildings

This document stipulates the test, performance and installation/set-up requirements for composite cladding products including sandwich panels and built-up systems for compliance with the LPC Design Guide for the Fire Protection of Buildings. It is appropriate for sandwich panels and built-up systems used for internal constructions.

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PARTICIPATING ORGANISATIONS

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

Association of British Insurers / Lloyd's
 Association of Chief Police Officers
 Association for Specialist Fire Protection
 British Fire Protection Systems Association
 British Rigid Urethane Foam Manufacturers' Association
 British Security Industry Association
 Chief Fire Officers' Association
 Door & Hardware Federation
 Electrical Contractors Association
 EURISOL UK Mineral Wool Association
 Glass and Glazing Federation
 Health & Safety Executive
 Heating, Ventilating and Air Conditioning Manufacturers' Association
 Intumescent Fire Seals Association
 Modular & Portable Building Association
 National Council of Building Material Producers
 Office of the Deputy Prime Minister
 Risk Engineering Data Exchange Group
 Royal Institution of Chartered Surveyors

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FOREWORD

This standard identifies the evaluation and testing practices undertaken by LPCB for the purposes of approval and listing of products. LPCB listing of products and services for inclusion in the “Red Book” is based on the following

- i. Satisfactory product performance during testing and audit testing by LPCB
- ii. Satisfactory product construction
- iii. Satisfactory system installation
- iv. Satisfactory manufacturing processes
- v. Satisfactory product or system service experience
- vi. Satisfactory verification by the LPCB of the establishment and maintenance of the manufacturer’s or service provider’s quality management systems

NOTES:- Compliance with this LPS standard does not of itself confer immunity from legal obligations.

Users of Loss Prevention Standards should ensure that they possess the latest issue and all amendments.

The LPS 1181 series includes the following standards:

- LPS 1181: Part 1 Requirements and tests for built-up cladding and composite sandwich panel systems for use as the external envelope to buildings
- LPS 1181: Part 2 Requirements and tests for sandwich panels and built-up systems for use as internal constructions in buildings
- LPS 1181:Part 3 PODS and building system modules
- LPS 1181:Part 4 Requirements and Tests for External Thermal Insulated cladding systems with rendered finishes (ETICS) or Rain Screen Cladding systems (RSC) applied to the face of a building
- LPS 1181:Part 5 Requirements and Tests for non-loadbearing external cladding systems fixed to and supported by a structural steel frame

This document should be read in conjunction with scheme document SD 049.

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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 obtained in hard copy or CD by telephoning +44 (0) 1923 664100.

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1 SCOPE

This document specifies the test and performance requirements for sandwich panels and built-up systems used internally in buildings, for compliance with the LPC Design Guide for the Fire Protection of Buildings. It is appropriate for sandwich panels used internally in food factory clean rooms, cold stores, and refrigerated spaces and for self-supporting built-up systems for use as room separation within a building.

For wall and ceiling lining systems used for the external envelope of all types of industrial buildings refer to LPS 1181: Part 1.

The LPS1181 test series are used to determine the fire growth performance of the cladding products used in different applications. The performance determined relates only to the combination tested, i.e. the wall and roof panels, including the composition of the panels, the joint details and the detailing at eaves, corners etc.

If a test is required to determine the performance of only a wall panel or a roof panel, the panel not being assessed shall be an LPCB approved product of similar insulation level (i.e. similar U-values) and shall have the same generic type of core material. Alternatively, another arrangement for the non-test panels may be agreed by LPCB. Limiting conditions applicable to the listing of the panel being tested may be set because of the combination being tested. The test arrangement and any limiting conditions shall be agreed in writing by LPCB and the panel manufacturer before testing commences. Details of test arrangements must be provided and approved by LPCB prior to the provision of the LPCB quotation for product approval.

Note:- This document does not address quality of installation of these products within buildings. Quality of Installation requirements will be addressed in a separate standard.

2 DEFINITIONS

2.1 Sandwich panels

Building product consisting of two metal faces positioned on either side of a core of rigid thermally insulating material, which is firmly bonded to both faces so that the three components act compositely when under load.

2.2 Built-up Systems

Composite systems comprising of a combination of components and materials installed within buildings to provide the acoustic barriers, thermal insulation and surface lining, which are assembled on site from individual components. Built-up systems, in the context of this standard, will be self-supporting.

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2.3 Surface lining

In respect to this standard, this shall be taken to refer to the facing of the panel inside the test building.

2.4 Surface finish

Paint or coating applied to outside metal face of a sandwich panel or the outermost component of a built-up system.

2.5 Burning

For the purposes of this standard, this covers both flaming and smouldering.

2.6 Crib/burner fire area

This is the area of the walls and ceiling which is within the area boundaries as shown in the diagram in appendix B. The criteria for internal surface flaming, concealed burning, burning brands and extent of damage do not apply within this area.

2.7 Reaction to fire

The response of a product in contributing, by its own decomposition, to a fire to which it is exposed, under specified conditions.

2.8 Fire resistance

The ability of an element of construction to withstand exposure to a standard temperature/time and pressure regime without loss of its fire separating function (integrity and insulation) and/or loadbearing capacity for a given time. The requirements are as defined in LPS 1208 "LPCB Fire resistance requirements for elements of construction used to provide compartmentation".

3 REQUIREMENTS

3.1 Product specification

The manufacturer of the system shall supply the following information, in English, in their application for approval:

3.1.1 Details of the range of heights, widths and thicknesses in which the panels or built-up systems are supplied for normal use.

3.1.2 In the case of built-up systems, details of the system components and any variants.

3.1.3 Details of the type of insulation and its important physical characteristics, including precise details of the composition of the insulation.

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In order to characterise the insulation material, the requirements given in 3.3.2.10 shall be met. This test data is required for quality control purposes to allow checking of the consistency of the insulation material.

Relevant reaction to fire data to provide well-documented evidence on the materials behaviour under fire conditions may also be supplied.

Some permitted variations in the insulating material are covered in appendix A.

- 3.1.4 Details of the surface finishing material, including thickness and coating specification.
- 3.1.5 Fully dimensioned details of the joint system and the recommended supporting system, including a full specification of the individual components. Where alternative joint systems are available, these should be separately detailed.
- 3.1.6 Details of all other components used to assemble the panels.
- 3.1.7 Details of classification sought i.e. INT-1, INT-2 or INT-3. Where INT-1 or INT-2 is sought full details of the fire resistance tests shall be supplied.

3.2 Fire resistance

3.2.1 General.

Where grades INT-1 and INT-2 are required, both walls and ceiling elements shall also be tested and approved to LPS 1208, in order to provide the integrity and insulation data required for these grades.

The fire resistance test shall be agreed by the LPCB to ensure that the correct configuration of elements is tested. The tests shall be carried out by a UKAS accredited laboratory.

3.2.2 Historical data

Historical data may be assessed by the LPCB and at their discretion be considered as supporting data to 3.2.1 only.

3.2.3 Fire resistance - Test sample

For the fire resistance test only, the thinnest sandwich panel capable of satisfying the insulation requirements shall be tested.

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3.3 Reaction to fire (wall and ceiling lining test)

3.3.1 General

The approval will be limited to the material type tested and shall be agreed prior to the provision of the LPCB quotation for product approval. Further information is given in the Field of Application of test results, Clause 4.3. Products not installed in accordance with the defined specification shall not be considered as approved.

The combination of the insulation materials used in the wall and/or roof panels will affect the overall performance. Therefore certificates and listings will identify the type of core material used in both the wall panel and the roof panel. Panels that meet the test requirements for one combination of type of core material may not pass with another combination, for example, PIR cored wall panels tested in combination with mineral wool roof panels may pass the test criteria, but if tested with PIR cored roof panels may fail on some or all of the test criteria.

The complete system shall be subjected to the Wall and Ceiling Test using the appropriate thermal exposure – see 3.3.2.7.

3.3.2 Wall and Ceiling Test

3.3.2.1 Test Sample

Test samples shall be representative of the manufactured product. For composite panels, the construction shall be tested with the wall free standing and the ceiling supported from above on a suitable framework and the ceiling shall not rely only on the walls for support. For built up systems, the construction, including walls and ceiling, shall be self-supporting.

- 1) The maximum panel or system thickness shall be tested. Additionally, the thermal insulation level of both wall and roof panels should be similar. Individually the wall and/or ceiling panels should not be less than the minimum thickness that would be used in practice.
- 2) The panels or components of a built-up system shall be installed by the client or his authorised agent in accordance with the instructions supplied to the LPCB.
- 3) A vertical joint shall be made in the wall directly in line with the centre line of the crib/burner. The first line of ceiling supports shall also be arranged directly above the burner or crib. This is designed to ensure that both a wall panel and ceiling panel joint are directly exposed to the fire source.
- 4) The longer edges of the ceiling panels shall be arranged to be parallel to the 10m length (see figure 1). The span of each ceiling panel from the first support above the burner/crib to the next support shall not be exceeded in practice.

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If a test is required to determine the performance of only a wall or a roof panel or built-up system, the wall or roof panel or system not being assessed shall be an LPCB approved product of similar insulation level (i.e. similar U-values) and shall have the same generic type of core material. Alternatively, another arrangement for the non-test panels may be agreed by LPCB. Limiting conditions applicable to the listing of the panel being tested may be set because of the combination being tested. The test arrangement and any limiting conditions shall be agreed in writing by LPCB and the panel manufacturer before testing commences. Details of test arrangements must be provided by the manufacturer and be approved by LPCB.

3.3.2.2 General arrangement for the test

The test system shall be constructed to form an open fronted building, comprising two side walls, an end wall and a ceiling/roof, and have overall dimensions nominally 10m long by 4.5m wide by 3m high. A ventilation opening and observation window shall be provided. At the open end, a 750mm downstand shall be provided to give an opening height of 2250mm. The building should be built onto a solid concrete, or similar floor/base. The panels shall be supported as specified in 3.3.2.1.

To assist in observations, individual panels shall be suitably labelled. Also horizontal lines shall be marked on walls at $\frac{1}{2}$ and $\frac{3}{4}$ heights, to help judge depth of smoke layer, and the limit for the burn area of the crib shall be marked on walls A and C.

3.3.2.3 Test conditions

Where possible, all tests should be undertaken indoors in a suitable large test building to avoid variations due to weather. The following conditions are to be met during the test period:

Ambient temperature:

Minimum ambient air temperature 5°C

Maximum ambient air temperature 25°C

Maximum wind speed:

The horizontal wind speed, measured at a horizontal distance of 1m from the centre of the inlet opening shall not exceed 1.75m/s, this shall be taken as a number of 10s readings and taking account of gusts. This requirement shall be met a maximum of 5 minutes before the crib is ignited.

For tests undertaken outdoors, it is essential that wind-breaks are suitably located around the test system to ensure that the burning of the crib is not affected by wind. The minimum specification for a suitable system is given in appendix B, clause B4.

In addition, for tests conducted outdoors, the weather conditions shall be dry.

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3.3.2.4 Ventilation opening

The ventilation opening shall be located at the left-hand corner of the test building. It shall have dimensions 1000mm wide by 1000mm high.

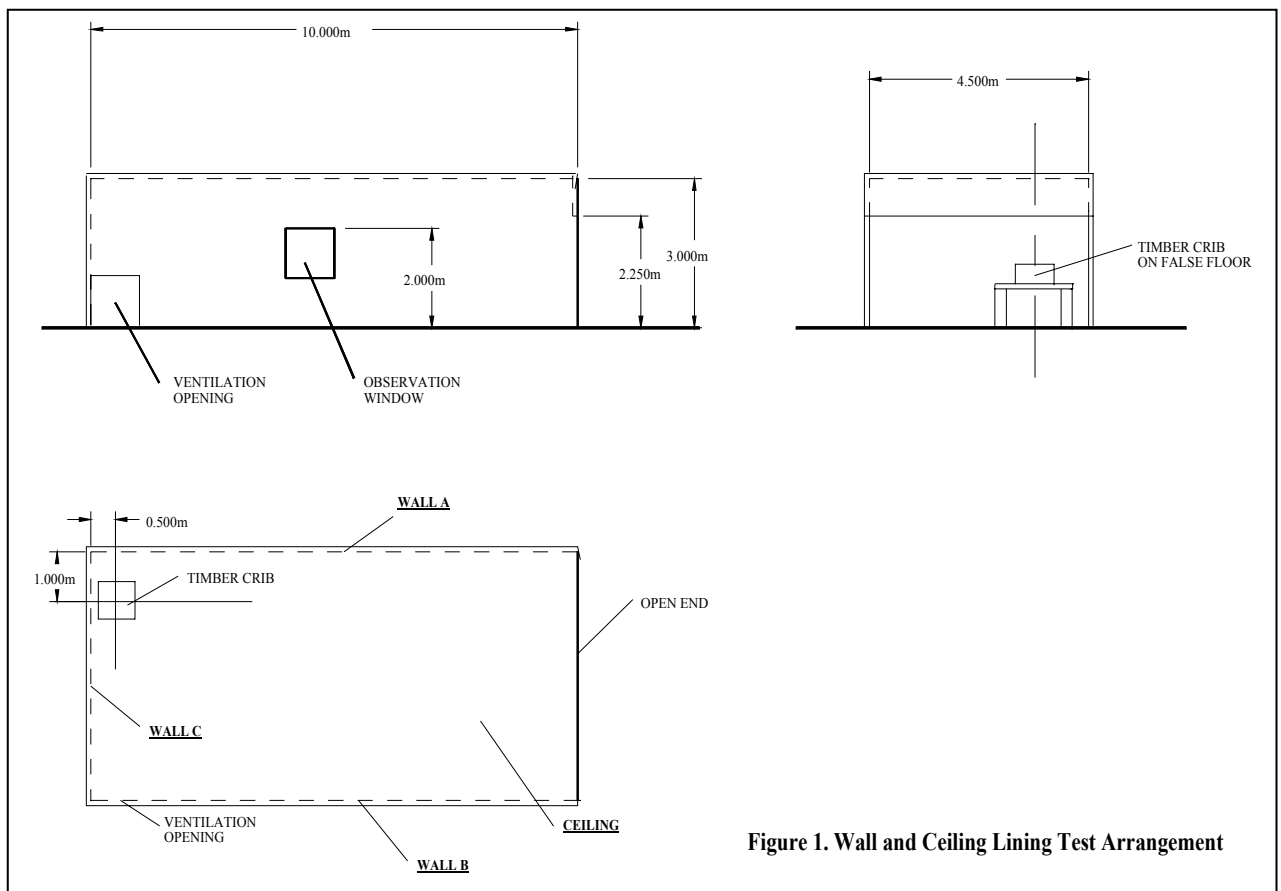


Figure 1. Wall and Ceiling Lining Test Arrangement

3.3.2.5 Observation window

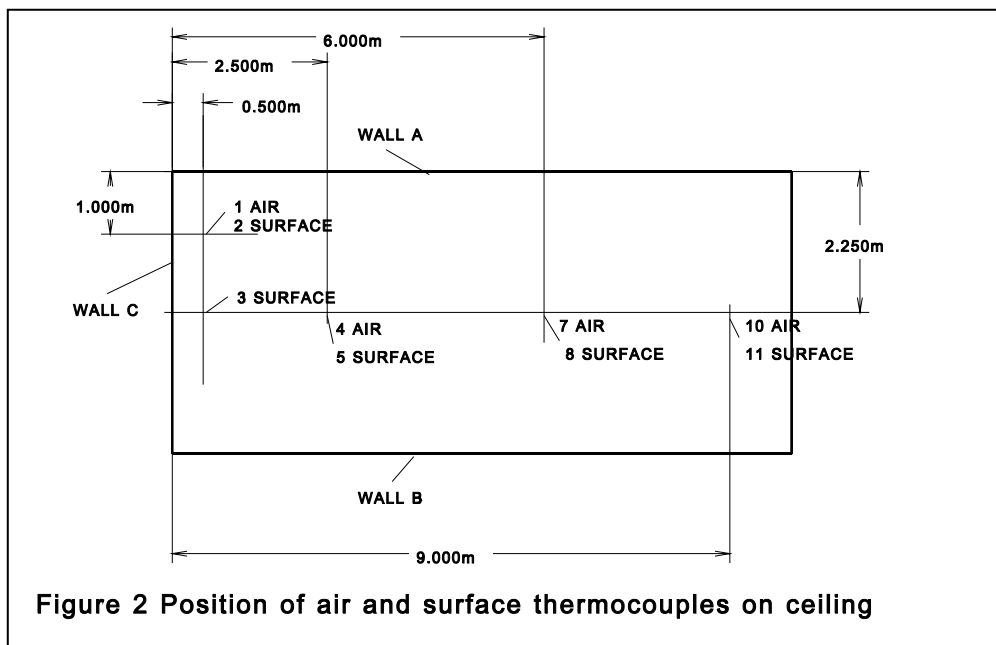
The observation window shall be located in the same wall as the ventilation opening and have overall dimensions approximately 1m by 1m. Fire resisting glass should be used. To assist in observations, individual panels shall be suitably labelled. Also horizontal lines shall be marked on walls at $\frac{1}{2}$ and $\frac{3}{4}$ heights to help judge depth of smoke layer.

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3.3.2.6 Instrumentation

3.3.2.6.1 Gas temperature

Four chromel/alumel mineral-insulated thermocouples, 1.0mm diameter shall be suspended 100mm below the ceiling and located at the positions shown in figure 2



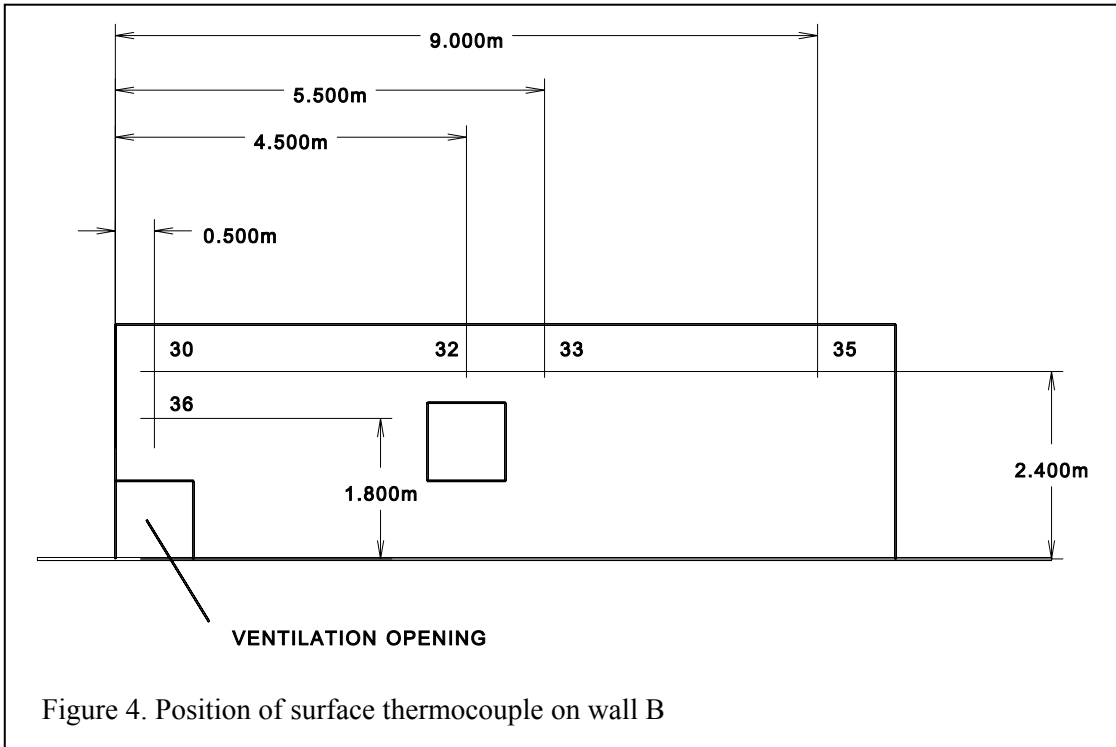
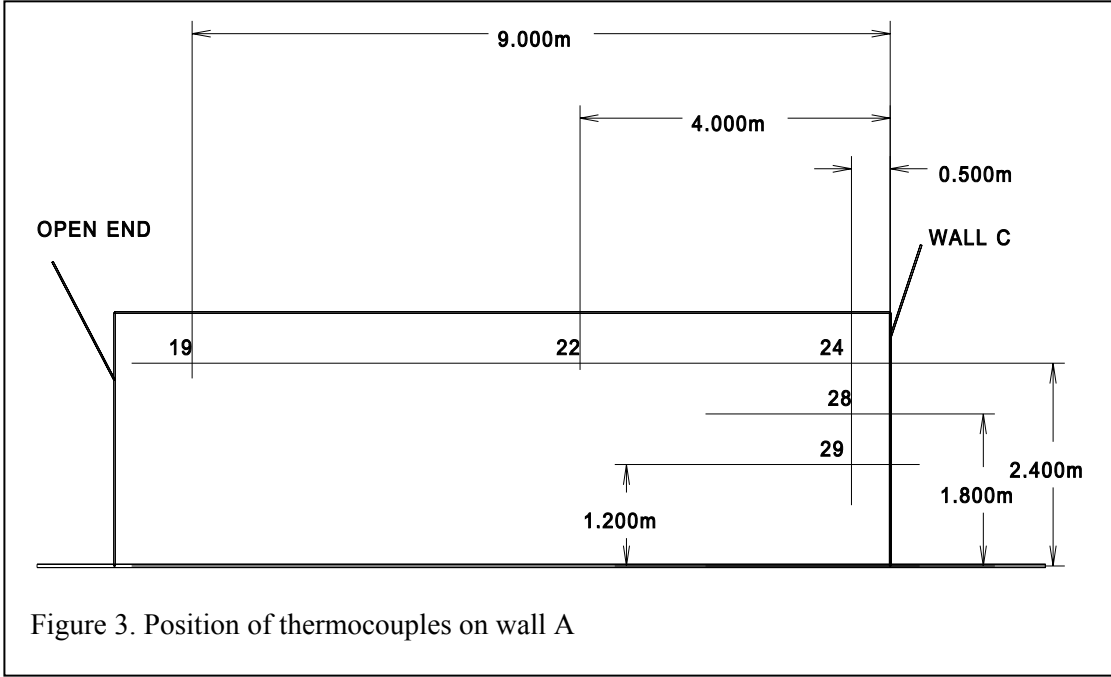
3.3.2.6.2 Surface temperatures

Eighteen chromel/alumel type K thermocouples, comprising 0.5mm diameter twisted wire thermocouples, shall be located and suitably fixed at the positions shown in figures 2-5. The leads to pass through the cladding/lining via a 2.5mm diameter hole drilled at a distance of approximately 12mm from the thermocouple junction and mechanically fixed to the inner skin.

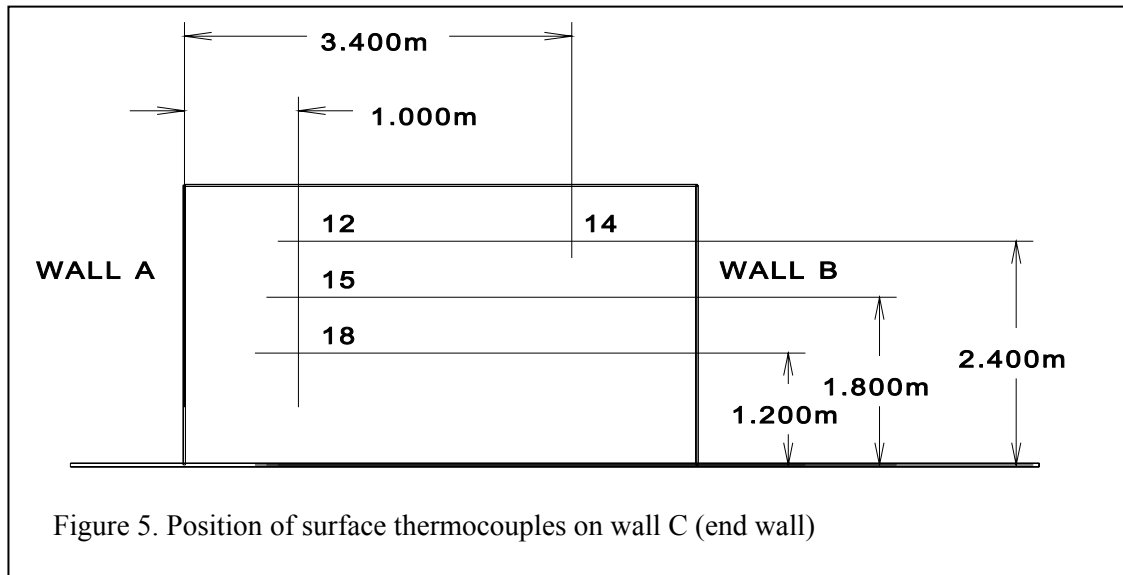
These thermocouples are to be used by the LPCB to compare the recorded temperatures with existing data, but are not part of the criteria.

3.3.2.6.3 Ceiling deflection

A means of measuring deflection of the ceiling throughout the test shall be provided.



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3.3.2.7 Heat source

3.3.2.7.1 Gas burner

Where an enhanced heat exposure is required as part of the approval process, a gas burner shall be provided. The gas burner shall comprise a steel trough nominally 750mm x 750mm x 350mm-deep, filled with randomly sized ceramic blocks, mean dimension nominally 50mm x 50mm x 50mm. A 19mm-diameter gas pipe connection shall be located to the underside of the burner. The gas shall be distributed through holes in a 500mm square loop in the base of the burner thus ensuring dispersed gas flow between the blocks. A metal mesh shall be inserted to keep the ceramic blocks off the gas pipe. The burner shall be constructed such that the top of the burner shall be located 760mm above the floor.

The burner shall be located asymmetrically at the right hand corner of the test building opposite the air inlet opening, with one centreline 500mm from the short wall and the other 1000mm from the long wall.

The fuel used shall be commercial grade propane.

3.3.2.7.2 Timber crib

Where a standard thermal exposure is required, a timber crib shall be used. The timber crib shall be constructed from lengths of kiln dried rough-sawn timber Type V Redwood/Scots Pine, comprising 70 No. sections of nominal dimension 50mm x 25mm x 750mm. The acceptability of any specific timber crib shall be assessed primarily by measurement of the moisture content followed by density and weight. Prior to a crib being wrapped and sealed and shipped to a test site by BRE Testing, all of the following parameters shall be met.

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The moisture content of the crib shall be measured and recorded using a deep probe Protimeter, type Digital Timbermaster with Hammer Electrode. A series of random measurements shall be taken using a minimum of 15 separate samples. Measurements should be taken at the centre of the sample to a mid-depth point. An average reading of between 7-9% should be achieved and cribs outside this limit shall be rejected. The moisture content shall be measured prior to packaging for shipment and not more than 15 minutes before the start of the test. As a further guide of acceptance, the density and weight of the test crib shall also be recorded. The samples taken for assessment of moisture content shall be weighed separately and a typical density calculated. The crib density shall be in the range $525\text{kg/m}^3 \pm 5\%$ with the total weight $34\text{kg} \pm 1\text{kg}$.

The crib shall be located asymmetrically at the right hand corner of the test building opposite the air inlet opening, with one centreline 500mm from the short wall and the other 1000mm from the long wall. The crib shall be constructed such that the first row is laid parallel with the shorter wall. The distance between the timber lengths shall be 55mm. The crib shall be built on top of a false floor so that the base of the crib is 760mm above the concrete floor. The false floor shall be constructed from $12\text{mm} \pm 2\text{mm}$ -thick calcium-silicate board, 1600mm x 1600mm, with a layer of sand laid on top with a second layer of 12mm calcium-silicate board, 1000mm x 1000mm laid on top of the sand, central to the crib.

Just prior to the start of the test, nine paraffin-soaked fibreboard strips, 750mm x 12mm x 12mm, shall be placed in the spaces between the sticks in the bottom layer.

Note: Crib design and condition is critical, as it will affect the burning rate. Other types of crib design are unacceptable.

3.3.2.8 Test procedure

3.3.2.8.1 Gas burner

This test shall be undertaken under a suitable large-scale calorimeter to measure and control the heat output of the gas burner.

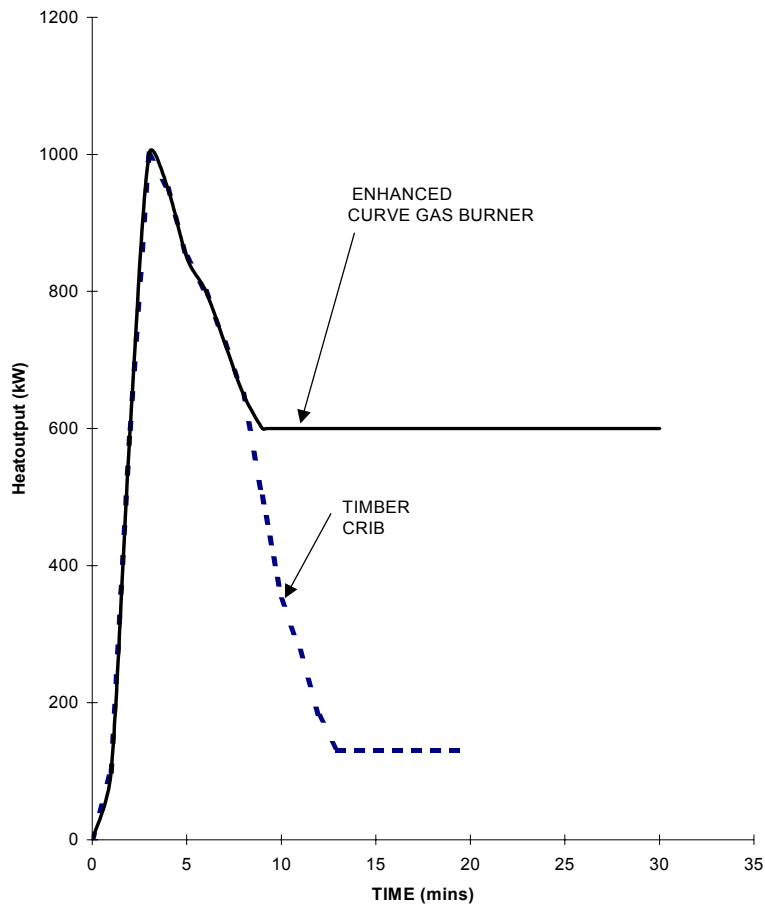
The burner shall be ignited using two small sections of ceramic blanket soaked in heptane, which are placed on top of the ceramic blocks and manually lit.

The heat output of the gas burner shall be controlled by a mass flow controller to follow the heat output defined below.

The timing device and all calorimeter and temperature recording instruments shall be started simultaneously. Detailed observations shall be recorded during the test about the general behaviour of the cladding, including start and duration of any flaming and its location, deformation of panels, de-lamination of any facings and any indication of collapse or partial collapse of the test building.

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In addition, a video and photographic record shall be made of the entire test duration. After the burner has been extinguished (30 minutes), the test will continue until all flaming of the panels, particularly in respect to flaming of the insulation, has ceased completely. However, after 40 minutes, it is permissible to extinguish any areas still flaming and cease recordings.



3.3.2.8.2 Timber crib

The paraffin-soaked fibreboard shall be ignited, the timing device and all temperature recording instruments shall be started simultaneously. Detailed observations shall be recorded during the test about the general behaviour of the cladding, including start and duration of any flaming and its location, deformation of panels, delamination of any facings. Also, a video and photographic record shall be made of the entire test duration. After the crib has burnt out completely, the test will continue until all flaming of the panels, particularly in respect to flaming of the insulation, has ceased completely. However, after 30 minutes, it is permissible to extinguish any areas still flaming and cease recordings.

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3.3.2.9 Post-test examination

As soon as it is safe to do so and not later than 24 hours after the end of the fire test, the extent of damage to the facings both internally and externally shall be measured and recorded. All internal facings on the walls and ceiling shall be removed and the extent of damage to the insulation measured and recorded. The extent of char in all fire-damaged areas shall also be measured. Sufficient measurements shall be taken of the depth of char at each fire-damaged area.

3.3.2.10 Sampling of Core Material

To assist in quality control during factory inspections, the core/insulating material shall be subjected to the test method described in BS 476: Part 15/ISO 5660-1 "Method of measuring the rate of heat release of products". The samples shall be exposed to irradiances of 25 and 35 or 35 and 50 kW/m² (see standard for guidance). There is no pass or fail criterion attached to this, as the results will be compared to samples taken from the manufacturer during surveillance. It is important that the core sample is removed from a spare panel supplied from the same batch supplied by the manufacturer for the Wall and Ceiling test. The results from this test will be reported separately to the LPCB.

Note:- Other methods of monitoring the core/insulating material may be used at the discretion of the LPCB.

In every instance, where the core/insulation material in the wall panels and the roof panels is different, samples from both shall be subjected to BS476: Part 15/ISO5660-1 testing.

3.3.2.11 Test report

The test report shall include a detailed description of the panel construction, graphs and/or tabulations of all recorded temperatures and all observations recorded. Scaled drawings showing the extent of damage of the facings or linings and insulation on all walls and the ceiling shall be included. Damage to surface coatings need not be included in the report.

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The report shall include a clear statement on the compliance with the criteria given in 4.2. This shall be presented as shown below:

CRITERIA See 4.2	COMPLIANCE Pass/Fail
1. Flashover	
2. Internal surface flaming	
3. External surface flaming	
4. Concealed burning	
5. Burning brands	
6. Damage, e.g. charring	
7. Stability	

3.3.2.12 LPCB Assessment

Based on the measurements, photographs and video taken by the laboratory, LPCB (or their assessor) will check compliance with the criteria. They shall examine the temperature recorded during the test above the crib and also surface temperature readings to ensure similar conditions to other tests. They will also consider the field of application using the guidance given in clause 4.3.

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4 CLASSIFICATION AND DESIGNATION

4.1 Fire resistance requirements

Requirements for internal applications				
GRADE	Fire resistance		Wall and ceiling lining test Thermal exposure	
	Integrity (minutes)	Insulation (minutes)	Level	Source
INT-1	60	60	Enhanced	Gas burner
INT-2	30	30	Standard	Timber crib
INT-3			Standard	Timber crib

4.2 Test Criteria

The wall and ceiling lining test shown in figure 1 shall be of 40 or 30 minutes duration, dependant on fire source, in respect to all recordings of data and observation. The following seven criteria will be used to judge the performance:

1. *Flashover*: There shall be no flashover at the ceiling. Flashover shall be deemed to have occurred if the average temperature of the hot gas layer below the ceiling exceeds 600 °C at any time (or for any duration) throughout the test. Thermocouples 4, 7 and 10 shall be used to determine compliance.
2. *Internal Surface Flaming*: There shall be no sustained surface flaming* beyond 1.5m from the perimeter of the crib in both horizontal directions (e.g. outside crib fire area). There shall be no sustained flaming* through any of the joints on any of the walls or ceiling outside the burn area of the crib. Further guidance is given in Appendix B.
3. *External Surface Flaming*: There shall be no flame spread* at any location on the external surface of the test building. There shall be no fire/flame penetration to the exterior from any joints, around the fascias etc.

* Note to 2 and 3 above – Defined as any visible sustained flaming for more than 60 seconds duration (e.g. not intermittent) at any time during the test.

4. *Concealed Burning*: Compliance with this requirement can be determined during the post test survey and be judged on the extent of damage described in 6.
5. *Burning Brands*: There shall be no fall of burning brands from the ceiling outside the vicinity of the crib fire area which is defined in 2.6 and appendix B.
6. *Damage*: Compliance with this criterion shall be judged by LPCB with account being taken of existing data.
 - No part of the insulation or core shall be completely destroyed so that the external skin could be directly exposed to heat transfer from the fire, unless the total aggregate

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area is not more than 0.5m².

The area of damage, outside the crib fire area (see 2.6 and appendix B) indicative of contribution to the fire, e.g. charring, shall not exceed the following:

Limitations on damage for sandwich panels				
Note reference	Part that is damaged	Wall	Ceiling	Total
1	Surface finishes	No requirement		
2	Surface lining	No requirement		
3	Damage to core	5m ²	8m ²	13m ²
Total permitted Damage Area		5m ²	8m ²	13m ²

The requirement of this standard is that the damaged area of the tested sample should not exceed the total damage area or any category of damage area stated above.

Main purpose of this requirement is to ensure that burning of the insulating core/material beyond the crib fire area is restricted.

Note 1 - Coated/painted surface finishes to metal facings covering insulating cores shall not be judged under this criterion, neither shall paper lined plasterboard. However, the surface must meet the internal flaming criterion.

Note 2 - This requirement may be ignored for steel faced sandwich panels, but the limits to the damage to the insulating core in note 3 in the above table cannot be exceeded.

Note 3 - Details of measurement are given in appendix B.

If the damaged area is close to the limits given above (i.e. within 20% of the specified limit), compliance with the damage criteria may be judged, as being met if the amount of charred material is less than 35 % of the thickness of core material present based on the core samples taken from the charred areas of the walls and ceiling. Where only surface char exists, the unaffected core depth shall be recorded as being the total core depth at that measuring point. The charred areas shall be separately tabulated for the wall areas and the ceiling areas and the criteria shall be separately applied.

7. *Stability*: This will be satisfied if no part of the test building collapses during the fire test. This will be deemed to have occurred if the deformation exceeds 1/30 of the distance between the ceiling support centres. De-lamination of the exposed skin from the core shall not be judged under this criterion.

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4.3 FIELD OF APPLICATION OF TEST RESULTS

Note: This field of application guidance has been prepared specifically for sandwich panels and may not apply to some types of built-up systems, advice should be sought from LPCB on application for certification.

4.3.1 Type of product

The test results can only apply to the specific product tested.

4.3.2 Product thickness

In relation to grade INT-1 and INT-2, the range of thickness allowed are those from the thickness tested in the fire resistance test up to the thickness tested in the wall and ceiling test. In respect to grade INT-3 panels, the thickness tested will be the maximum thickness that is allowed.

4.3.3 Unsupported span for ceiling

The centres between supports used for the wall and ceiling lining test shall not be exceeded. It is therefore important that the span between supports tested represents the maximum span to be recommended in practice.

4.3.4 Height of walls

Where it is not possible in practice to introduce intermediate supports, then the maximum height will be subject to examination of the detail design proposed for partition to ceiling for heights greater than tested. Part of the LPCB appraisal will cover:

- How the design ensures that the deformation of the partition can be minimised for heights greater than tested
- Examination of the perimeter details and method of support
- Adequacy of joint to prevent escape of volatile gases at heights greater than that tested
- Ability to remain stable under fire conditions

For perimeter walls, these may be supported from framework at the same centres used for the ceiling.

4.3.5 Support distances when fire resistance required

The spans employed in fire resistance testing tend to restrict the applicability of results to greater spans and heights. It is recommended that the fire resistance test period is increased for at least a further 25% (and integrity requirements are still met) and that deflections at no time during the fire resistance tests exceed 75mm.

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5 MARKING, LABELLING AND PACKAGING

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

The requirements for the LPCB marking or labelling of a product are described in the accompanying scheme document (SD049) and in the BRE Publication PN103 "Use of the Certification Mark(s)".

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6 PUBLICATIONS REFERRED TO

LPC Design Guide for the Fire Protection of Buildings.

Loss Prevention Standard LPS1208, LPCB Fire resistance requirements for elements of construction used to provide compartmentation

Red Book: List of Approved Fire and Security Products and Services. The Loss Prevention Certification Board.

Loss Prevention Standard LPS1181: Part 1 – Requirements and tests for built-up cladding and composite sandwich panel systems for use as the external envelope to buildings

- | | |
|------------------------|---|
| BS 476 : Part 4 : 1970 | "Fire Tests on Building Materials and Structures. Non-combustibility test for Materials". |
| BS 476: Part 11: 1982 | "Fire Tests on Building Materials and Structures. Method for assessing the heat emission from building materials". |
| BS 476-15/ISO 5660-1 | Method for measuring the rate of heat release of products |
| BS 476 :Part 22 : 1987 | "Fire Tests on Building Materials and Structures. Method for the Determination of the Fire Resistance of Non-loadbearing Elements of Construction". |
| BS EN 13501-1:2002 | "Fire classification of construction products and building elements- Part 1: Classification using data from reaction to fire tests" |
| BS EN 13823:2002 | "Reaction to fire tests for building products excluding floorings- thermal attack by single burning item" |
| BS EN ISO 1182: 2002 | "Reaction to fire tests for building products-Non-combustibility test" |
| SD 049 | LPS 1181 Series of Fire Growth tests scheme document. |
| PN103 | Use of the BRE Certification Mark. |

For undated references, use the latest issue.

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APPENDIX A - Changes to specification of sandwich panels or built-up system used internally from that tested and approved by LPCB

A1 Change of chemical supplier

If an alternative supplier of a chemical, which is deemed to be equivalent, the following procedure shall be adopted by LPCB:

Raw material data sheets to be supplied by approved company. These will be examined to verify no difference, e.g. chemical functionality of polyols, molecular weight of polyisocyanates, pH and viscosity. If these are deemed to be equivalent, test core samples to BS 476:Part 15/ISO 5660-1 at irradiances of 25 and 35 or 35 and 50 kW/m² (see standard). Compare to existing data. If little or no difference in peak or total heat release, then change in supplier will be allowed. If data shows different levels of peak or total heat release, then a full test to LPS 1181 shall be undertaken.

Note:- Other material identification methods may be used at the discretion of the LPCB.

A2 Any change in formulation or physical panel change

Unless supporting test data is available, such as from corner tests with full calorimeter data, full test to LPS 1181 to be undertaken.

A3 Any major change

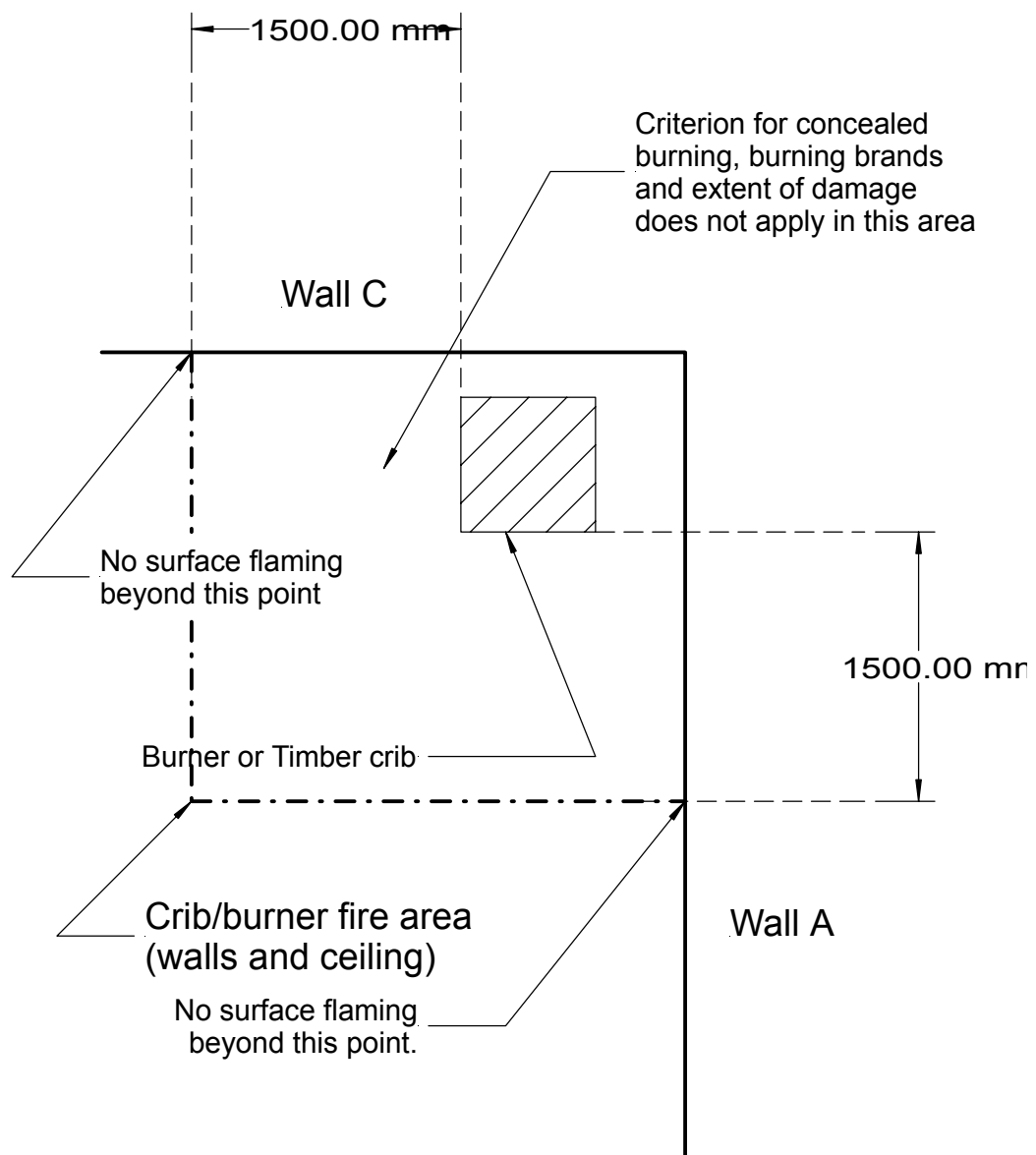
Full test to LPS 1181: Part 2 to be undertaken. In some circumstances an independent technical assessment may be possible where adequate and applicable test data is available.

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APPENDIX B - Additional guidance

B1 Internal surface flaming, concealed burning and extent of damage

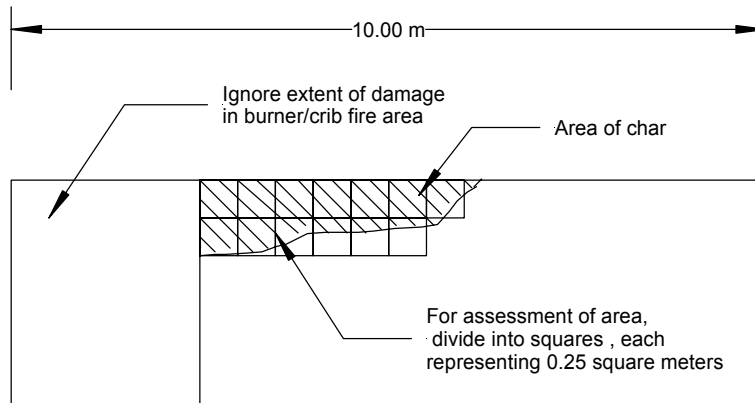
The diagram below interprets the requirements for internal surface flaming and concealed burning and extent of damage.



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B2 Measurement of area of extent of damage.

Only the areas that are clearly charred shall be used by LPCB to determine compliance with extent of damage. Measurements may be made on the basis shown in the diagram shown below:



Wall A used as example of measurement of charred area

Typically, for PUR or PIR foam cores, char is defined as material that has turned black through the effects of burning or heating. Areas with a char depth of less than 6mm should be ignored in determining the extent of damage. For measurement areas (i.e. 0.25m x 0.25m squares) that are not 100% black char, the 6mm char depth boundary shall be determined.

B3 Locations for taking off-cuts to determine depth of char

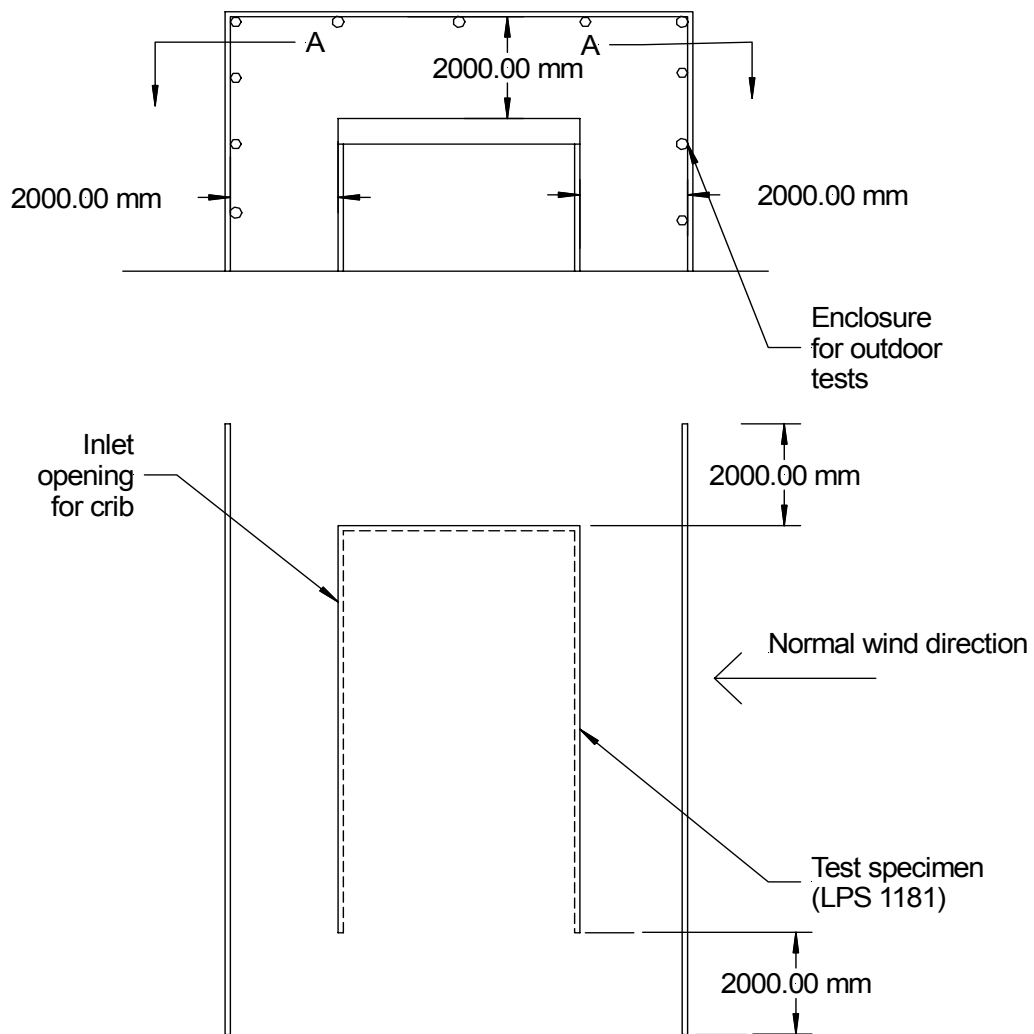
Take a core sample from each area of char. Record the location, which it was taken from. The charred area will dictate number of core samples taken. At least one sample shall be taken from each charred area and for large areas a core shall be removed per 1m² of char.

Measure and record depths of char from each core sample. Do not take any samples or measurements from the area of the crib fire area.

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B4 Method for providing protection to LPS 1181 test outdoors

Where the wall and ceiling lining test has to be carried out outdoors, adequate protection against wind and rain shall be provided. The minimum specification for a suitable system is shown below. The enclosure should be located with the prevailing wind direction normal to the 10m long side of the test rig.



Section AA

Design of protective enclosure for outdoor tests

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Amendments Issued Since Publication

DOCUMENT NO.	AMENDMENT DETAILS	SIGNATURE	DATE
LPS 1181: Part 2 – Issue 2	<p>Change in scope and other references to include built-up systems.</p> <p>Update to latest template and copyright plus editorials</p>	TB	26/10/2005