

**INTERNATIONAL
ASSOCIATION
FOR COLD
STORAGE
CONSTRUCTION
(European Division)**

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COOL COMMENTS

Issue 13

July 2005

Editorial

Our hot and humid summer is passing extremely quickly and its time for our mid-year round-up of “Cool Comments”. Before I launch into the detail of immediate past events and important technical issues I want yet again to reiterate that “Cool Comments” is your quarterly information sheet and it is important that you, our members, contribute to its contents and provide your views and comments on the matters of concern to your industry. It gives you the opportunity of voicing your views rather than feeling there is nothing you can do about xxxxxxxx!! So put pen to paper, or phone and discuss anything you like and, provided it is neither libellous, nor scandalous, we will be prepared to include the matter in your “Cool Comments”.

Turning now to our recent Annual Conference

We once again had an excellent turn-out of delegates and it is rumoured that some of our 24-hour delegates saw in the dawn as they reviewed and chewed the fat over life, living, working and anything else that occurred to them in the course of a long and very convivial night. Those of you who did not manage to make the Conference this year missed out on a great opportunity of meeting friends and competitors in a uniquely friendly environment. So make sure you book in for next year and let us know if there are any specific items/topics you would want covered.

As you will all know the programme was a blend of the current technical issues bedevilling our industry and where we are going with NVQ assessments in the future. We are very indebted to all of the presenters who spent a great deal of time preparing their papers, and whose input ensured the success of the conference. Our grateful thanks go to them all - Peter Jackman, Terry Day, Joe Twomey (Special Advisor to the EU Commission), Tony Bingham (Barrister and Specialist in Arbitration), Mike Fennelly (CITB), Richard Brittain, Jerry Quayle (IFC Certification Ltd), and Nick Steine (President IACSC USA). We would like to register our pleasure at the attendance of our US colleagues Nick Steine, Jeff Wiersum and Peter Bartell and we hope they will be able to come over each year since it is always extremely useful to meet them and hear their views. We are also very grateful to Jeff Wiersum for his letter which is printed at the end of this editorial.

I will update the technical issues presented at the conference in the review of the meetings of our Technical Committee below, but I would like to highlight the very important - and humorous, and very serious - presentation by Tony Bingham on the difficulties of litigation and liability. Up until the conference our Technical Committee in its review of EXAP (Extended Field of Application for Insulating Sandwich Panels) had considered that the designer would bear the brunt of liability in the event of litigation for any structure higher than 5-6 metres. Our barrister colleague - who also chairs a tribunal in London dealing with construction issues - blasted this view out of Court. In his view, based on many years of dealing with construction issues, all elements involved in building ambient/temperature-controlled insulated structures would have to bear a degree of liability if things go wrong, and litigation would ensue. He considered that everybody in the chain - designer, architect, fire test laboratory, panel manufacturer, installer, and probably end-user client - could be hit, and he urged that every sector should very carefully review their written input - fire test results, building designs, panel brochures, installer tenders - to ensure accuracy of description of materials and techniques. Tony Bingham produced a compellingly provocative presentation, and has given us all much food for thought. He has promised to present at next years conference - something not to be missed!!

The NVQ side of the conference was also extremely well presented and I believe that we are very lucky to have Richard Brittain as our future "Internal Verifier" who will play a part in developing the required number of "Registered Assessors" who will in turn educate/assess the candidates in our industry for Level 2 NVQ, - a process which will be starting from August 2005 onwards. All our contractor members will need to forward the CVs of their employees so that candidates for training can be selected - we shall be contacting our contractor members shortly.

Technical Issues

Our Technical Committee met on 14 July 2005 and as you might expect the subject of EXAP was uppermost on the agenda. The Committee is clear as to the importance of EXAP in terms of the height to which insulated structures are currently built, but the problems of developing a set of rules which can be flexibly and rationally interpreted by those responsible for the design/build of any structures are proving extremely complex. Even the "experts" on the Committee find it difficult to formulate rules and the difficulties experience by the CEN EXAP Draft Standard Committee are well understood. Nevertheless for the future good of the industry the Committee will continue

their labours, and hopefully we shall also be able to influence the CEN Draft Standard.

Another principal item on the agenda was the first discussion on the initial draft of the new Chapter 6 (for the Revise of our Guide on *Design, Construction, Specification and Fire Management of Insulated Envelopes for Temperature Controlled Environments*). The new Chapter 6 is an amalgamation of Chapters 7 & 8 of the current Guide and incorporates all the new aspects of Fire Management (including EXAP) which have arisen since 1999. Chapter 6 is a major element in the Revise and we shall be refining it and liaising with other agencies over the coming winter to ensure it contains all the up-to-date information and recommendations (including the revise of Approved Document 'B' (Fire Safety) which has now been issued for consultation).

Conclusion

Finally, let us turn to immediate past events - some good and some bad. The selection of London as the venue for the Olympics in 2012 can only but be good news for our industry since undoubtedly our construction techniques/materials will be sought after for the various stadium and competitor villages. On the other hand the sad and horrible events of Thursday, 7 July 2005 underline the difficulties of the current situation in Great Britain and the need in our industry to raise the profile of fire safety in all of the structures with which we are involved. In this context the Revise of our Guide on *Design, Specification Construction and Fire Management of Temperature-controlled Insulated Structures* becomes even more important, and greater emphasis will undoubtedly be placed upon it by the Government, the Fire Services and the Insurance industry. The Revised Guide will be published in 2006 and its advice and recommendations will be extremely important for our members. We will keep you informed of its progress.

As noted the letter from Jeff Wiersum of GenFlex Roofing Systems, USA is included.



W J BITTLES OBE

Executive Secretary

Apologies

Apologies to Terry Day for not including the LPCB/BRE guidance notes on EXAP rules in the conference aide memoir. Please find these at the end of this newsletter.



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Fax 616-691-8570
Jeff.wiersum@omnova.com

July 11, 2005

Mr. W J Bittles OBE
Executive Secretary
IACSC (European Division)
20 Park Street
Princes Risborough
Buckinghamshire HP27 9AH
United Kingdom

Dear Jimmy,

I want to thank you for your hospitality at the recent IACSC 2005 European Annual Conference.

We had a terrific time and thoroughly enjoyed the comradery of your members and the insightfulness of your conference. We should make every effort to have US representation at every Annual European Conference and will make mention of this at our next board meeting at the 2005 IACSC Conference in Paradise Island the Bahamas. We are looking forward to seeing you there and hopefully many of the European members.

On a more serious note-

On behalf of the US membership we would like to offer our prayers and condolences to the people of the UK who have suffered recently at the hands of a cowardly group with no regard for the sanctity of human life.

History has proved to the world that the resolve and perseverance of the people of the United Kingdom is unwavering.

Please let us know if there is anything we can do.

Sincerely,

Jeff Wiersum
Vice Chairman - IACSC





New Members:

We are very pleased to welcome the following new members to our European Division.

Insulated Services

6 Cheviot Green

Warsash

Southampton

Hampshire SO31 9BT

Contact: Richard Brittain (Consultant)

Tel No: 01489 570860

Fax No: 01489 572 740

E-mail: rbatinsprojects@btinternet.com

Note: As our Internal Verifier Richard will perform an important function (NVQs) for our industry. Please give him your support.

TDM Fabrications Ltd

Unit 5

400 Cromwell Road

Grimsby

N E Lincs DB31 2BN

Contacts: Daryl Boarder/Tony Foxon

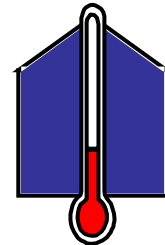
Tel No: 01472 358 398

Fax No: 01472 358 399



IACSC/IFC LABELLING SCHEME

The scheme has been carried out and labelling of premises such as Safeway, Noon Foods and Excel Logistics depots.



If you have clients that may benefit from this scheme please contact, Penny Morgan, Paul McGahey, Graham Wiles or Peter Jackman on:

Phone: +44 (0) 1844 275500

Fax: +44 (0) 1844 274002

Email: ifc@intfire.com

Web: http://www.iacsc.org/iacsc/european_division/labelling_scheme.asp



INTERNATIONAL FIRE
CONSULTANTS LTD



International Fire Consultants Ltd, part of the IFC Group of companies have recently updated their website and at the same time have published a page on the IACSC/IFC labelling scheme. This can be found at:

http://www.intfire.com/labelling_scheme.htm

or by following the link on their home page.

The page is very informative and also takes you through the related pages of the Building Regulations 'Approved Document B'.

The page also demonstrates the different types of labels used, shows pictures of them being used and also the enhanced fire plan used by the emergency services.

Editors Note!

I asked Paul Ashley to produce this article to show how initiative and hard graft can overcome adversity. It also shows the need for all companies to develop a **Disaster Plan** to help overcome any difficulty of the Clark Door magnitude. It could happen to anyone at any time!!

Stronger and better

Clark Door Limited suffered a flood of Atlantis like proportions in January with over seven feet of sewerage polluted water engulfing the Carlisle based specialist door manufacturer’s premises. All of the equipment, machine tools and stock built up over thirty years of trading was lost with very little being recoverable from the single storey premises located in the worst affected area of Carlisle.



The morning after the floods and the high water level is shown by the damp wall

The company immediately took a lease on a brand new building at Kingmoor Park in Carlisle and implemented a fast track recovery programme to enable production to be at seventy five percent of normal output level within six weeks of the flood. Managing Director Paul Ashley stated, “The huge flood calamity was grasped as an

opportunity by the Clark Door team and a multi million pound investment has gone into creating a state of the art door manufacturing facility. We have had the opportunity to start again with a blank piece of paper and expect to emerge a stronger and better company.



A deal was done only days after the floods to take ownership of a newly built unit

The factory refurbishment is

now complete and office staff are currently working out of temporary premises in Kingmoor Park where the company is designing a new office suite. The company expresses gratitude to its suppliers and customers for their support through this period.”



New hinged door production machinery

The company has been able to continue its product development programme despite the flooding and is now able to offer hinged doors in single or double leaf configuration with up to a four hour fire rating and in a variety of finishes including stainless steel – all certificated by the LPCB. This reinforces the company’s position as the premier supplier of fire doors to the industry having both sliding and hinged doors with a four hour fire rating.

Contact:

Brian Payne – Sales Director

Tel: 01228 522321 mail@clarkdoor.com

prEN 14509 Self-supporting double skin metal faced insulating panels – Factory made products – Specifications

A personal view by Penny Morgan

The draft European Standard consists of 32 pages plus 112 of annexes A - material properties tests; B - durability; C - fire performance; D - dimensional tolerances; E - design procedures.

It covers sandwich panels for

- Roofs and cladding
- External walls and wall cladding
- Walls (including partitions)

Ceilings within the envelope

Core materials: rigid PU (includes PUR and PIR) EPS, XPS, PF (phenolic foam), CG (cellular glass) and MW (MRF).

Metal faces :(steel), stainless steel, aluminium or copper.

The EN includes use in cold stores and flags up ETA-Guideline 'Cold storage premises kit'. It does **not** cover multi-layered panels, curved panels, panels with perforated facings or panels with thermal conductivity for the core $>0.06\text{W/m.K}$ at 10°C

There is some useful information enshrined in the document – for example EPS cored panels should be restricted to where temperatures do not exceed $+80^\circ\text{C}$. My favourite on page 19 is the datum that 'metal faced sandwich panels are considered impermeable to water vapour.' If this is correct with respect to all types of panel then we need no longer worry about panels sucking up water and bowing.

The sheer range of normative information is huge but it begs a high price for manufacturers to pay for 51 tests (not including the EN 1991 that is listed but not found in the text)

Annex A: Testing procedures for material properties contains some welcome practical suggestions for cutting specimens for example on page 33 how to avoid delamination and spoiling of up to a maximum of 30%

of those cut for any family of tests.

Note that in A.9 test for resistance to point loads and repeated loads...A 9.1.3 'The test specimen shall be a single panel of full width. The length (span) shall be the largest envisaged in practice.' No extended application there then.

All water permeability turns out to be for external walls and roof only as it is a test for resistance to driving rain under pulsating pressure unless of course the rain can drive through the roof and onto the internal ceilings and walls.

Annex B: Durability testing method for sandwich panels includes the specific test for MW panel types where humidity is main cause of ageing.

The wedge test in B 5.4 looks like fun to do. Echoes of Heath Robinson in that for this one the panel has a wedge pressed between the two faces, the wedge is then loaded with a force of 3N and the specimen is then immersed in water at 70°C for 24 h – (I wonder idly how they arrived at quite this detail.) Failure results from the crack lengthening a further 20mm or the crack appears in the bond with the face material.

B 6 Repeated loading test shall 'be carried out on the thickest panel of the product family (so no help to the manufacturer here). I am also relieved to note that in B7 Thermal Shock Test, 'a clearly defined wrinkle at the internal support shall not be classed as a failure.'

Annex C: Fire performance tests - additional instructions and direct field of application

C1 Reaction to fire SBI Test – still cannot accept that panels for ceiling use can be tested vertically. But I did note that the test specimen shall always include both panel facings. The maximum size is 1.5m and no mention of any EXAP based on this test.

C 1.2 Ignitability Test. Very concerned to find that '*Where the thickness of the sandwich panel is greater than 60mm, the specimen shall be prepared by reducing the thickness to 60mm by cutting away the unexposed external face of the panel and some of the insulation. The facing may be replaced with a flat steel sheet adhesively bonded to the 60mm specimen.*' This point has already been raised with Peter Trew in a letter from IACSC last May. The method involves both surface flame attack and cut edge flame attack – '*other layers ie adhesive shall be considered non-substantial and shall not be tested*

individually. Here the concern is for those panels where the core is bonded, (not adhered to the inside of the steel facing), as to how appropriate a cut down and 'glued' unexposed facing is in assessing the performance of this panel compared to other types. In Table C 1 there is a caveat re thickness that *'where the panels are produced in different thickness either the maximum and minimum thickness shall be tested and the lowest classification declared.'* This should be 'both' or either or... does not make sense. Further it appears that *'results from specimens $100 \leq D < 150\text{mm}$ in thickness shall be valid for any panel'*. Panels can be of 200mm thickness when used as cladding.

Table C 1 does use the phrase 'direct field of application' with respect to the standard parameters and all tests on p 87 appear valid except for the MW orientation of fibres – on p88 rather more particularly with respect to thickness (see above); flashings - results are only valid for the same material as that tested. However wording seems odd with respect to metal corner flashings. *Tests carried out with no corner flashings or steel flashings shall be valid for all types of steel flashings.* Tests are only on minimum thickness and dimension in end use of flashings... *results are valid for any metal flashing of greater thickness or dimension used in practice.*

C 2 Fire resistance. This would benefit from a brief comment about the use of plate thermometers. Table C 2 has same caveat re orientation of MW cored panels; but extended applications on p 90 seem very clear; internal applications fixing distance and spans. *'Panels tested at 3m are valid for applications up to 4m spans providing the conditions in EN 1364-1 are satisfied.'* For width, results are *'valid for increases not greater than +20%.* This seems to contradict the impression I had that this EN was going to define and assist with the knotty problem of extended application (EXAP).

C4 Determination of the amount and thickness of the adhesive layer. I trust that no-one spends time on collecting the adhesive used on a reduced thickness panel in the ignitability test. However this is done there is no mention of how to use the information and there is no reference to a particular test.

Annex D: Dimensional tolerances provides Table 3 which defines which measurement should be taken. This appears admirably straightforward.

Annex E: Design procedures takes into account both permanent and variable actions and resistances, Tables E2 and E3. It includes the clear statement that creep is only relevant for panels used as a roof or ceiling.

By E5 combination rules provides the principles by which the relevant combinations of actions and resistances shall be compared to give appropriate safety levels in accordance with E 5.2 (ultimate limit state ie failure of the panel) –E 5.5 (serviceability limit states ie the rare combination of effects of actions, resistance at intermediate supports to frequent combination for deflections) See Table E 5.

Snow, wind and temperature are covered in E6 with alternative values of combination coefficients for national regulatory requirements. Load factors are covered in Table E8.

Table E9 deals with material safety factors such as wrinkling and shear failure.

E 7 calculation of the effects of actions. Using shear modulus of the core (*corresponding to an average value at normal indoor temperature*) the shear flexibility of the core can be taken into account when determining the internal stress resultants and deflections. The range of indoor temperatures not given and can only find the reference on p 16 to not using EPS and XPS above 80°C. Calculations are given for sandwich panels with plane or lightly profiled faces (Table E 10.1), or strongly profiled faces (Table E 10.2 for single span panels). The first gives equations for one-, two- and three-span panels (EXAP at last?)

Annex ZA: Clauses of this European Standard addressing the provisions of the EU Construction Products Directive to meet the requirements of Mandates M/121 and M/122. CE Marking examples given in the Figures for roofs, walls and internal walls and ceilings plus lists of information needed. Confusingly these are given in reverse order so it starts with internal walls and ceiling ZA 3.2

Overall this seems to be a detailed guide to specifying panels as it says on the tin but contributes almost nothing to the EXAP debate.

The standard is being voted on at the end of July. If it is not accepted it will not be published and many small manufacturers will sigh with relief as they will not have to present data from such a wide range of tests before they can sell their product in another EU country.

Is this the way the government works?

There was an article in The Guardian on Monday 18 July which has information on the timings for the introduction of the Energy Performance of Buildings Directive. The article can be viewed at the following web address, or you can read the text which I have copied below.

<http://www.guardian.co.uk/guardianpolitics/story/0,,1530722,00.html>

----- text of article -----

Energy-saving targets scrapped

Minister drops efficiency plan for older homes and postpones tougher regulations for new houses

Paul Brown, environment correspondent
Monday July 18, 2005, The Guardian

Pledges made by Tony Blair to force house builders to improve the energy efficiency of homes to cut Britain's greenhouse gas emissions are to be ditched, the Guardian has learned.

Proposed building regulations due to be announced this week have been watered down and some provisions dropped altogether as "unnecessary gold plating".

When the prime minister introduced the government's energy white paper in 2003 he promised that new building regulations, to be brought in during 2005, would be 25% tougher than the ones produced in 2002. New regulations for older, refurbished homes were also to be introduced at the end of this year. His aim was to bring Britain closer to the standards of the rest of northern Europe.

But last week, only days after the end of the G8 summit when Mr Blair vowed to continue international efforts on greenhouse gas emissions, Yvette Cooper, the housing minister, decided to drop regulations on refurbished houses altogether and postpone regulations for new buildings until next year.

The decision has caused tension between the Department of Environment and the Office of the Deputy Prime Minister. The environment minister, Elliott Morley, after repeated requests, is due to see Ms Cooper tomorrow.

Mr Blair is expected to chair the cabinet committee on energy on Thursday, a day before the new building regulations are due to be announced to the House of Commons.

Ms Cooper wants to drop plans for energy efficiency improvements in existing homes which have an extension or are to be refurbished. It had been intended that from January 1 next year homeowners or builders would have to spend an extra 10% of any building project on cost-effective energy efficiency measures like roof insulation. The regulation required the householder to do this to reduce the "carbon footprint" of their home.

This was part of the Department of Environment's climate change strategy to reduce emissions and was expected to save 500,000 tonnes of carbon dioxide by 2010 to help the government meet its 20% CO₂ reduction target. It had been widely welcomed by consumer groups.

The Guardian understands that Ms Cooper decided to ditch this regulation, describing it as "unnecessary gold plating" to civil servants.

Last week Mr Morley was asked in the House of Commons about the building regulations for new buildings and said that they would come into force in April 2006. He also said that the regulations would improve energy efficiency by 20%-30%.

But information obtained by the Guardian shows that the new instructions for builders designed by civil servants will actually only deliver around 18% better results than the existing regulations, and then only if they are properly policed. The lower target figure is as a result of lower standards on cavity wall insulation, one of the key energy saving areas.

Currently local authorities do not have either the staff

or the equipment to police building regulations. The Building Research Establishment at Garston, Watford, has shown that 60% of new homes do not conform to existing building regulations.

Last Friday Lady Perry, who chaired a House of Lords inquiry on energy efficiency, said the government "simply does not have a coherent policy on energy efficiency".

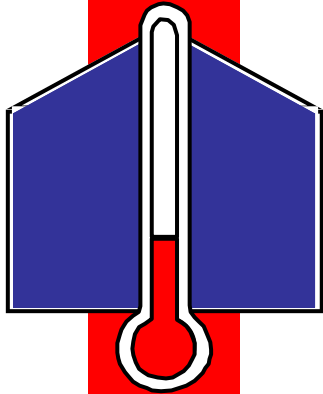
Andrew Warren, chairman of the Association for the Conservation of Energy, said: "The ODPM seems intent on undermining the whole government strategy for climate change and is sending the wrong signal to the building industry and householders. They seem to have a completely separate policy than the rest of government."

Mr Blair seems certain to raise the issue at a cabinet committee meeting on Thursday when a possible review of government policy on nuclear power stations is also on the agenda. One of the reasons civil servants are keen for an official review of the option of building new nuclear stations is that they say energy efficiency measures are not working.

An ODPM spokesman said announcements on the building regulations would be made "in due course".

Pictures from the Annual Conference





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Up and Coming Events

The list below provides an overview of the forth-coming events in 2005, which will be of interest to our members.



September 2005

Construction in the food industry

15 September 2005
CCFRA
www.campden.co.uk

PLASA 2005

Architectural Solutions at PLASA 2005
11 Sep 2005 to 14 Sep 2005
Earls Court 1, London
Tel: +44(0)20 7370 8208
www.plasashow.com

October 2005

Polyurethanes 2005

17 Oct 2005 – 19 Oct 2005
Houston, Texas, USA
Contact: API – Alliance for the Polyurethanes Industry, USA

Designing for the Healthcare Sector

26 Oct 2005
76 Portland Place, London W1
Tel: 0845 056 8069
Email:
constructconferences@emap.com

November 2005

Fire 2005

2 Nov 2005 to 3 Nov 2005
G-Mex, Manchester
www.fire2005.com

IACSC 26th Annual Conference and Expo

3 Nov 2005 – 6 Nov 2005
[Atlantis Paradise Island](http://AtlantisParadiseIsland.com), Bahamas
www.iacsc.org/iacsc/

Forty-first GA of Panama International

17 Nov 2005 – 18 Nov 2005
Barcelona, Spain
Contact: coolpanel@skynet.be

Civils 2005

Network. Debate. Innovate.
22 Nov 2005 to 24 Nov 2005
National Hall, Olympia, London
Tel: 020 7505 6714
www.civils.com

April 2006

Interbuild 2006

23 Apr 2006 to 27 Apr 2006
NEC, Birmingham
Tel: 020 7505 8614
www.interbuild.com

May 2006

Forty-second GA of Panama International

18 May 2006 – 19 May 2006
Prague, Czech Republic
Contact: coolpanel@skynet.be



INTERNAL GUIDANCE – Extended Field of Application Rules for Sandwich Panels tested to LPS1208

Subject

Extended field of application rules

Sandwich panels tested to LPS 1208-2

Scope

LPS 1208-2 covers all fire resisting separating/compartiment wall and floor applications. This guidance note only covers the use of metal faced sandwich panels used for:

- a) External cladding (in applications where they need to be fire resisting when in a boundary situation or part of the protected zone), typically supported by columns (often part of portal frame) with sheeting rails in between. It should be noted that openings are not permitted in the FPA/LPC Design Guide within 2.5m of the compartment wall.
- b) Internal sandwich panel walls provided with intermediate support by means of horizontal rails (or columns), and provided with restraint against lateral movement at top and bottom.
- c) Horizontal sandwich panels constructed ceiling panels, supported only at their ends. Intermediate insulated "top hat sections may be used to reduce the spans, but there is no other intermediate support.

Typical fire resistance levels covered are:

External Walls E 60, E 30, EI 15 (protected zone 60 minutes integrity, 15 minutes insulation)

Food factory enclosures (EI 30 and EI 60) (ceilings and internal walls)

Compartment walls (EI 90 to EI 240)

For internal applications, it is assumed that compartment/separating wall panels will be independently supported by a suitable framework or suspension system which will be fire protected. The purpose of this is to control thermally induced deflections, so as maintain compartmentation by avoiding collapse of compartment walls or by causing excessive gaps to open up.

For insulated enclosures, it is assumed that the supporting framework will not be exposed directly to a fire inside the enclosure and will not additionally be fire protected. An assessment under project specific extended application should be undertaken to determine the possibility of the supporting structure being exposed to a fire condition outside the enclosure.

The above ratings are appropriate to the recommendations in the LPC (FPA) Design Guide for the Fire Protection of Buildings.

The following give examples of applications that are excluded from these rules:

Internal sandwich panel walls without any intermediate support, fixed in position solely at the top and bottom of the panels. These shall be restricted to the guidance given under direct field of application defined in BS EN 1364-1 only for purposes of LPCB certification purposes. Heights and spans outside these shall be deemed to be covered under project specific extended application.

Note: For internal partitions in insulated enclosures, a double skin construction with support framework in the void between, provided test evidence is available, may be a possible solution.

Walls and ceilings that do not have a fire resisting function, e.g. hygiene, thermal insulation etc.

Unless adequate fire resistance data is provided as outlined in 3.6 below, the certification will not cover fire resistance where openings are provided in the sandwich panel system for doors, windows or services. This falls outside the scope of certification and rules would need to be developed under project specific extended application which is defined below.

Details unique to a specific building such as where a room changes height to accommodate a tall oven or blast freezer or where a wall changes line or steps.

1. Definitions

1.1. Direct Application rules

Rules that are stated in the appropriate EN test standard or LPS 1208 and are limited to a specific fire test result.

1.2. Extended Application rules

Rules generated by this standard that allows the product to be used outside the direct application rules by identifying those factors that will not have a negative effect on the required fire resistance classification in BS EN 13501-2 and is intended to increase the scope of certification.

1.3. Project specific extended application

An approach that considers a specific end use application that falls outside the scope of extended application rules and product certification.

These can for example take into account site specific construction characteristics as well as consider known levels of restraint and fixity, fire exposure (severity and duration) and direction.

1.4. Food factory enclosure

An insulated enclosure used to enclose a food production or food storage area.

1.5. Fire separating construction

A fire-resisting wall or ceiling membrane used in the separation of one fire compartment from another.

1.6. Fire separating

A separated part of a building which is a form of compartmentation in which part of a building is separated from another part of the same building by a compartment wall or fire resisting ceiling membrane.

1.7. Special risks

An area of a building, typically surrounded by fire separating wall and in some cases a fire resisting ceiling membrane, that contains critical business equipment, components, processes or stock.

1.8. Self supporting sandwich panel

A sandwich panel that is able to transmit any applied loading or induced loading or only subjected to self-load through to a supporting structure.

1.9. Unsupported span

The spacing between individual members or suspension bars of the structural framework or suspension system that supports a sandwich panel.

1.10. Fire resisting ceiling membrane

A fire resisting ceiling that provides a fire separating function.

1.11. Support framework

The framework or suspension system used to support a sandwich panel in practice.

1.12. Sandwich panel

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

1.13. Maintenance of composite action

Where under fire test conditions, both metal facings remain in contact with the insulating core

1.14. Maintenance of partial composite action

Where typically the bond between the insulating core and the exposed skin breaks and any composite action is between the core and the metal skin on the non-furnace side during a furnace test.

1.15. Failure of composite action

Where the bond between both metal facings and the insulating core breaks down during the furnace test.

1.16. limiting deflection

For the purposes of this guidance note, this is assumed to be the deflection where an integrity failure occurs or the maximum recorded deflection where no integrity failure occurs.



2. Test standards

The basic rule is that only published test standards shall be used for prime data. Draft standards may be used for guidance if considered applicable.

The following test standards are applicable:

BS 476: Part 22:1987, clause 5 (partitions)

BS 476:Part 22: 1987, clause 9 (ceilings)

EN 1364-1 (Fire resistance tests for non-loadbearing elements - walls)

EN 1364-2 (Fire resistance tests for non-loadbearing elements ceilings)

Other standards may be applicable if an assessment has been undertaken by a suitably qualified person, acceptable to LPCB, that demonstrates that the same classification would still have been achieved had the test been carried out to one of the above standards.

3. Test programme

3.1. General

It is assumed that tests will be undertaken in wall furnaces 3m by 3m and floor furnaces providing a clear span of 4m and a width not less than 3.5m and the extended field of application rules have been drafted on that assumption. In addition, some of the recommendations for testing are intended to be useful for project specific extended application.

3.2. Examination of product specification

The product specification shall be examined to establish the following, taking particular note of manufacturing tolerances and variations in core specification provided for that may have a critical influence on fire performance:

- Type of core, density range and composition, noting that variations may be taken as a separate product
- Intended orientation of longer panel joints when used in wall applications
- Maximum panel width
- Range of panel thickness offered
- Facing material, thickness and coating specification
- Maximum recommended support frame member distances for partition/wall
- Maximum recommended hanger support distances for ceilings
- Number of panel to panel vertical joint options available
- Details of all recommended junction details, including whether a horizontal joint system is available for joining two vertical panels together
- How the panels will be supported in practice, taking into account if the supporting framework or suspension rods/hangers will be protected from fire.
- What methods are used to allow for thermal expansion
- The method for providing openings for doors, windows and service installations, noting that any such product should not reduce the integrity performance of the sandwich panels.
- Details of fixity
- Details of providing expansion, noting in particular how this is to be applied at extended heights or spans.

3.3.Recommended test programme

LPCB will consider for certification purposes all test data supplied by the manufacturer. However, without a well structured test programme, some limitations under EXAP may occur.

Stage 1a Initial Analysis

The variations shall be analysed to see if it is possible to identify the combination that gives the worse performance. The effect of different levels of restraint at the edges of the test specimen need to be considered carefully. It cannot necessarily be assumed whether the shortest or longest panel width gives the worse result or that the thicker panel will provide a better integrity performance, so the aim should be to ensure that the initial testing gives this information. However, to introduce too many variations at this stage may make the analysis more difficult.

Stage 1b Initial testing

The amount of testing will largely be dictated by the number of variations in the product and the range of fire resistances to be covered. This shall be covered in the initial analysis.

If different jointing systems are used, then these shall ideally be evaluated first to establish variations in integrity and insulation performance. This is intended to establish which joint gives the lowest performance which is then utilised for tests in stage 2.

Whilst it is possible that the worse integrity performance will occur in a panel of maximum width, this should be proved by arranging for a minimum width and maximum width panel to be tested together using the same joint configuration.

Transverse joints shall be included in each test in stage 1b.

For walls where panels may be laid both vertically and horizontally, tests shall be undertaken for both configurations.

Stage 2

Using the joint system with the lowest integrity rating (unless the manufacturer agrees to a restricted application), test the minimum thickness and maximum available panel width. When a range of thicknesses are offered by the manufacturer he may elect to test at least [3] in the test programme (this can include data from stage 1). LPCB shall examine all junction details available in the product range to verify that these do not introduce a possibility of lowering fire resistance. *There are*

little provisions in the standard test methods to test junction details and consequently may fall within project specific extended application.

3.4. Preparation of partition panels for the fire resistance test

The partition shall be tested to the requirements of BS 476: Part 22:1987, method 5. (or BS EN 1364-1) The partition must incorporate at least one panel of maximum width, at least one panel joint, and the height of the partition should be the maximum height of panel available, or 3m, which ever is the smallest

If a horizontal joint system is available for joining two vertical panels together, as part of the system, then this shall be incorporated in at least one panel. The location of that joint shall be decided by LPCB.

It should be noted that at least one vertical edge shall be free for internal walls and partitions, but data with two free edges may still be acceptable if it is complemented by a test result with all four edges restrained. A free edge shall be by providing a gap of [75mm] and the void sealed with rock fibre mineral wool of density [80 to 100Kg/m³]. This shall be undertaken by the test laboratory to ensure that no restraint will be provided at the free edge.

External claddings may be tested with all four edges restrained.

3.5. Preparation of ceiling panels for the fire resistance test

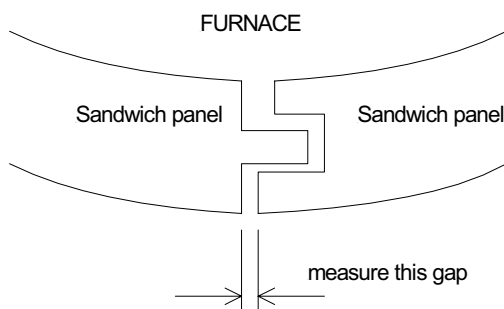
The ceiling shall be tested to the requirements of BS 476: Part 22:1987, method 9. (BS EN 1364-2) ensuring that there is a free edges along both longer edges The ceiling must incorporate at least one panel of maximum width and one of minimum width, and at least one longitudinal joint and one lateral joint. A gap of [75mm] shall be provided between the test frame/furnace and the void sealed with rock fibre mineral wool of density [80 to 100Kg/m³]. The length of at least one panel should be to the maximum length available, or 4.5m, which ever is the smallest. The area of the ceiling exposed to the furnace shall be at least 4m by 3.0m.

3.6. Duration of furnace test

Regardless of the classification required, to facilitate the maximum field of application, the test should be carried out until an integrity failure occurs. Even if an insulation failure occurs first, the test should be continued until an integrity failure occurs.

3.7. Additional measurements

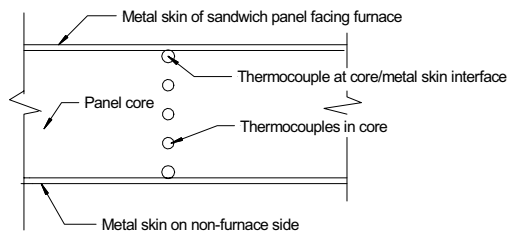
Where it is possible to do so safely, measure the gap width between adjacent panels at joint locations, particularly near position of maximum deflection.



These measurements shall be taken at 30 minute intervals and at end of the furnace test.

3.8. Additional instrumentation

Thermocouples shall be inserted within the core so that an indication can be given of any potential breakdown of composite action as well as providing data for heat flow calculations. Thermocouple shall be located at the both core/metal interfaces and at three further positions as shown below:



Cross-section through panel

Only one set of thermocouples are needed and these shall be located at approximately the middle of the panel in the central area of the specimen.

3.9. Protection of openings

For compartment wall applications and insulated envelopes the following aspects needs consideration:

3.9.1. Doors

Where doors are to be included under the scope of certification, the test data shall include evidence that the door has been tested with the sandwich panel being the supporting construction. This shall demonstrate that no reduction in integrity performance is developed at the junction between the door assembly and sandwich panel system.

Separate rules will need to be prepared for larger door assemblies.

3.9.2. Window openings

Where fire resisting window openings are to be included under the scope of certification, the test data shall include evidence that the window has been tested with the sandwich panel being the supporting construction. This shall demonstrate that no reduction in integrity performance is developed at the junction between the door assembly and sandwich panel system.

3.9.3. Openings for the passage of services

The minimum requirement shall be that fire resistance data is provided to show that the particular method for maintaining fire resistance when a service passes through the separating construction that the system has been tested with a sandwich panel used as the supporting construction in the furnace test.

4. Extended application

It is not possible to use the current draft EN EXAP rules (prEN 15254-5) for sandwich panels as this is still in draft and also test data supplied to LPCB does not currently have the data required in the draft standard, particularly in respect to gap size and relative deflection measurements. When the EXAP rules are published by CEN, this guidance note will be revised/withdrawn as appropriate.

It should be noted that this guidance note provides alternative methods of determining maximum spans/heights depending on the test data supplied. The available data supplied by the manufacturer shall be examined in detail, noting any departures from the recommended guidance provided in clause 3 above.

4.1. Basic rules

The following rules should be followed if an extended application is to be granted by LPCB

4.1.1. Direct Application

Direct field of application may be derived from the direct field of application rules defined in BS EN 1364-1 or BS EN 1364-2.

Direct application has two components:

- a) An extension of the performance to constructions which would obviously perform better because they are smaller in span or width, or are thicker, or the facings are thicker, or there is a change in construction that increases their stiffness and
- b) A simple extension of the performance to constructions of a larger size, thinner, or with thinner facings or less stiff which is permitted because of the quality of the measured fire resistance performance, i.e. the degree of overrun in the test. (noting this is also a factor in extended field of application)

Note: The latest version of the prEN 15254-5, issued by CEN TC 127/WG1, relating to sandwich panels may be used for guidance, but in addition, the following rules are applicable and shall be met in full.

These rules are simplistic and do not normally cover many typical applications for sandwich panels, particularly extended height or span. Neither do the test standards give guidance on what should be tested and this tends to be a significant objective of extended field of application rules which give an indication of the limitations of test data unless test programme has been

designed to take EXAP into account. This is a significant problem with much of the test data supplied by manufacturers.

4.1.2. Extended Application

The ability to grant an extended application is dependant on the data generated and emphasis on the design of the test programme is a major factor. This document provides some guidelines taking into account analysis of current data, noting different approaches on what is tested. Where the design of a sandwich panel system relies on provision for thermal expansion, this shall be increased pro-rata from the height or span tested.

4.1.3. Project specific extended application

Where a particular configuration cannot be covered in either direct field or extended application, than this is outside the scope of LPCB certification. Either judgement shall be made by LPCB or other party on a case by case basis or further rules shall be produced and added to this guidance document. It should be noted that this option does not exclude the possibility of further fire testing to generate appropriate data.

4.2. Generation of suitable test evidence

4.2.1. Over-run of test

Regardless of the classification to be achieved, the test shall be extended until integrity failure occurs or as a minimum, the required classification period is exceeded by.

Classification required	Minimum test extension above classification period
EI 30 to EI 90	15 minutes
EI 120	20 minutes
EI 180 to EI 240	25 minutes

The basic objective of the overrun is to check what margins are available to grant EXAP. If this is not complied with, any extended application granted may be restricted unless compensatory aspects can be identified. In addition, it may be possible for purposes of LPCB approval to accept historical BS test data where the over-run may to some extent compensate for the higher thermal exposure from furnaces controlled using plate thermocouples.

It is important to note if the sandwich panel maintains composite action in full, or partially or breaks down during the furnace test. The thermocouples specified in 3.6 may provide information that can be utilised for this purpose, noting that the joint system may provide some influence in this respect. Where complete breakdown of composite action, it may not be possible to grant EXAP without changes to the system being considered.

It is important to be able to identify the mode of failure, either panel joint or core dependant, although for most sandwich panels, mode of failure is more likely to be joint dependant.

Important note: The minimum extension is totally dependent on what information is required and therefore the above extension times are for guidance.

4.2.2. Deflection measurements

Deflection measurements shall be taken throughout the test so that the maximum deflection and its location can be determined. If deflection data is not available LPCB may require further testing or limited EXAP granted.

4.2.3. Density of core

Density of the core of the sandwich panel supplied for test must be verified by the laboratory. Statement of the nominal value by the manufacturer is not acceptable. If this is not done LPCB may require that further testing is undertaken to validate existing data.

4.2.4. Required extended field of application

The required extended field of application must be stated by the manufacturer at the time of application and this must be made available to the assessor before examining the data. Any changes in specification needed to suit specific end-use applications must be provided at the time of application or covered under project specific extended application.



4.2.5. Limitation of rules

The rules apply only to one system. It will not apply to:

- any change of core (including changes in chemical composition, as well as change in material)
- decrease in thickness of panel unless test evidence is available
- use of an untested joint
- centres of perimeter fixings increased outside what is permitted under this guidance document
- Different panel orientation

Any of the above shall be taken to be a different system and further test results/assessment will be required.

5. Guidance on application of Extended rules

It should be noted that this guidance note provides alternative methods of determining maximum spans/heights depending on the test data supplied, taking into account the mode of failure. Where the end use application falls outside the rules given under extended application, then the design required shall be assessed under project specific extended application.

The rules are based on the assumption that the standard size of furnace are used. If a manufacturer provides test results from a larger size furnace, consideration may be given in revising some of the limits stated in this guidance note.

5.1.1. Identification of factors that may influence fire resistance

Extended field of application should identify those factors that have both a positive or negative effect on fire resistance performance. Where a negative influence is identified, no extended field of application may be granted by LPCB.

Examples of some important factors that need consideration are:

- Wall height
- Span of ceiling supports
- Framing stiffness under fire conditions (taking into account if the supporting frame will be directly exposed to fire)
- Fixity
- Panel thickness
- Method(s) used to control deflection
- Ability to retain composite action

During any furnace based test, it is important to establish by observation and analysis of the data if any one factor (or several factors) has an overriding effect on fire resistance.

It should be noted that at 1050°C (furnace temperature at 120 minutes) steel oxidation increases rapidly and the rate of oxidation over the next 20 minutes will seriously change the panel characteristics.

5.1.2. Increased height for wall applications

Extended field of application for increased height beyond that allowed for in the direct rules given in BS EN 1364-1 will normally only be granted if the partition maintains integrity and insulation for a minimum of 15 minutes beyond the required fire resistance classification (EI), noting that the basic objective is to determine the time to reach an integrity failure. The position where an integrity failure occurs shall be noted by the LPCB assessor and its relationship with the location for maximum deflection noted.

The maximum deflection recorded on the unexposed face will be taken to be the limiting deflection. It is consequently important to extend the test until an integrity failure occurs to derive the maximum application.

Compartment Walls over the total height allowed under these rules shall be supported on a support frame system that is suitably protected from the effects of fire so as to minimise the potential for deflection that will contribute to an integrity failure. For design and assessment purposes, the temperature of the steel member shall not exceed 400°C (subject to load ratio) . This shall be regarded as falling under project specific extended application.

5.1.3. Increased span for ceilings

Where the unsupported span of ceilings exceed what is permitted in this guidance note, additional support must be introduced to limit the maximum unsupported ceiling panel to that developed in the furnace test.

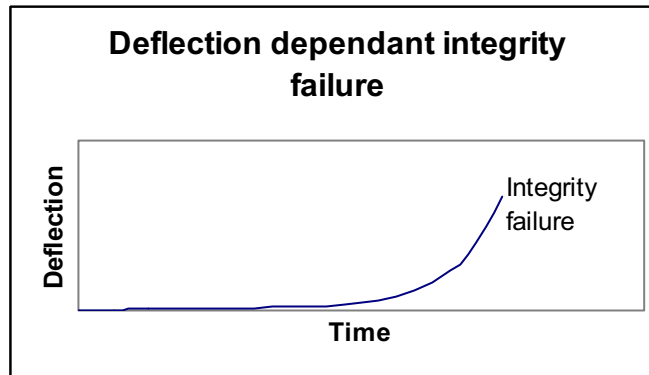
For ceiling supports, provided the distance of the supports does not increase, and the materials used do not have a softening temperature less than the hanger system used in the furnace test, a different hanger system can be used.

6. Appraisal method

The following rules intend to indicate the basic method used as a basis for LPCB approval, but may need to be developed for specific proprietary products.

6.1. Deflection dependant integrity failure

This is when the maximum deflection occurs at the same time or close to the time that an integrity failure at a joint. This is typically applicable to a ceiling system.



Provided the value of deflection (limiting deflection) at the time of integrity failure does not exceed [100mm], the maximum height or span, may be calculated using the following formulae:

$$ud = ts \times (ld/frd)^{0.5}$$

ud = maximum unsupported dimension for specific fire resistance period

ts = tested span or height (mm)

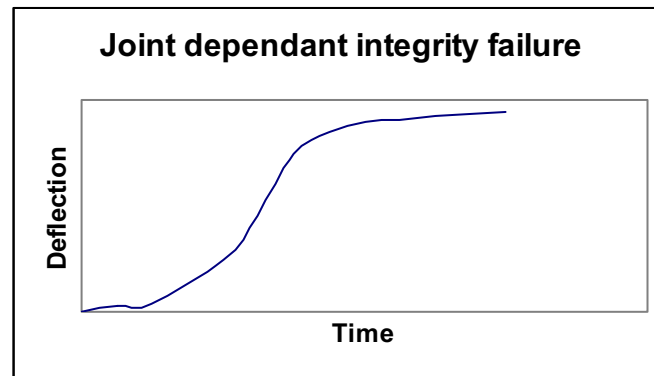
ld = limiting deformation

frd = recorded deflection at specific fire resistance period.

This formulae is based on the theory that deflection is related to the square of the span. If the limiting deflection is greater than 100mm, or there is an indication of the size of the gap at the joint increasing, or a clear breakdown of composite action, use the method stated in 6.4.

6.2. Joint dependant integrity failure

This relates to where the main deflection occurs well before a loss of integrity and may be more appropriate to wall constructions.



The maximum deflection at the time at which this occurs shall be taken as a basis for the method described in 6.1 above. The effect of the free edge on allowing thermal expansion needs to be considered. Any increase in panel joint gap width after the main deflection has taken place shall be noted as this may indicate that integrity failure was a combination of deflection and lateral opening of a joint. If an integrity failure occurs at least [20] minutes after the maximum deflection has been reached, this may indicate other factors combining to induce an integrity failure.

6.3. Core dependant integrity failure

Although not a common failure with fire resisting sandwich panels, a core dependant integrity failure may indicate inadequate thickness, core joint defect, too low a density of the core material or other cause. The reason for such a failure shall be investigated by LPCB. Consider required change in specification. If a change in thickness or density of the core is required, this may require at least five separate test results for an adequate extrapolation to be made but the manufacturer of the core material may provide suitable data for this purpose and this may be acceptable. Small scale furnace tests are suitable to generate this data.

6.4. Extension of height/span when no deflection data available.

This method may be adopted when no deflection data is available or the data is incomplete.

Height or span may be increased by the ratio of the achieved classification to the required classification, subject to a maximum of [5.5m]

Example:

A 3m high partition achieved an integrity of 105 minutes and insulation of 95 minutes. An EI 60 classification is required. $105/60 \times 3 = 5.25m$

6.5. Extension of height where test overrun does not meet the requirements given in 4.2.1

LPCB may extend approval to cover increase in heights if the deflection of a wall or ceiling can be limited to that measured in the test. This will typically require a wall or ceiling that is supported by a steel framework that is protected by a suitable fire protection system (or it can be demonstrated that in the particular application the supports will not be directly exposed to a fire) that can keep the temperature of the steelwork below [400° C] taking into account load ratio and that the spacing of framework of suspension points does not exceed [4m]. If the sandwich panels system is so designed to provide this protection, this must be demonstrated by testing.

6.6. Tests where no loss of integrity occurs

This may be due to the manufacturer/laboratory terminating the test after the required classification period has been passed. In such cases, some limits may need to be imposed. In such cases, the rule stated in 6.5 above shall be followed.

6.7. Extension of height where the above methods are not appropriate.

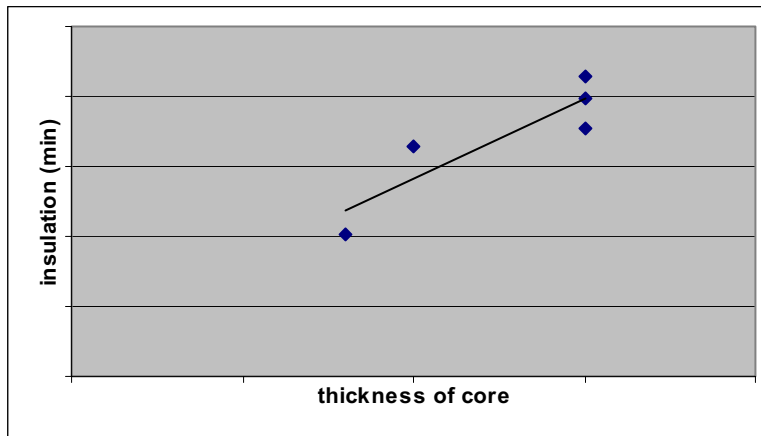
Cover under Project specific extended application based on the actual specification for a specific building taking into account:

- Required height or span
- Panel thickness
- Support method and centres
- Framing stiffness
- Effect of stiffness provided by walls at right angles
- End support conditions and fixity (noting that this can control thermally induced deflections)

Critical parameters identified during fire resistance tests.
 State of composite action
 End use of building
 Fire load
 Method for providing thermal expansion

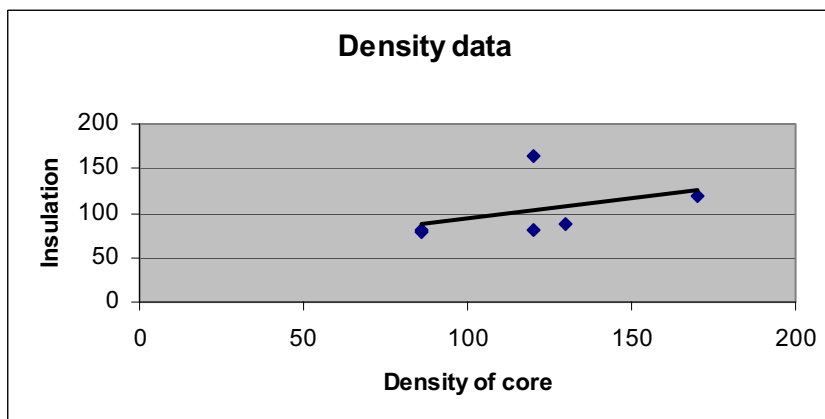
6.8. Insulation

Extrapolation on insulation values will not be permitted. Interpolation will be permitted provided at least five separate test results are available, noting that additional data for insulation can come from small scale furnace tests. Data shall be placed on an excel spread sheet (or similar) and the best fit determined as shown below.



The above relates to thickness, but variations in density may also be examined, but data over joints shall be disregarded as this may lead to variations shown below.

No interpolation is allowed if only stated densities are given in the test report.



6.9. Other factors

Where other factors have been shown by test to have influenced the test results, these shall be analysed and their potential effect on the required extended field of application be considered.

6.10. Procedure for dealing with applications outside the determined extended field of application

The derived extended field of application will have been based on the available test data provided to LPCB. If this does not cover all end use applications the manufacturer will be required to propose constructional solutions and/or provide additional data so that consideration may be given to reviewing the information provided.

7. **Project specific extended application**

It is clear that it is not possible to cover all aspects of the use of sandwich panels. It is vital that the building designer determines the suitability of the system for each specific application. As far as possible, the data generated for LPCB approval purposes has been designed to provide additional information that may be of some use to the designer who must seek expert advice to ensure that the required levels of fire resistance are not compromised.

Further testing and or detailed analysis will be required before a judgement can be made on the systems suitability.



8. Appraisal report

All tabulations of the data relevant to the appraisal shall be included and the basis for the extended field of application given, where appropriate, recommendations for further testing or obtaining additional data shall be given.

Limits for extended field of application must be clearly stated.

Appendix : Applicability of extended rules to specific applications

Matrix relating to EXAP elements requiring fire resistance			
Relevant body	Test laboratory	LPCB certification	Outside scope of LPCB certification as is appropriate to building design team
Type of rule	Direct application rules from test standard (+ and -)	Extended application rules to allow for product certification (+ and -)	Project specific extended application
Type of element			
External walls	Individual test result specific	EXAP rules applicable	Outside scope of this guidance note
Internal insulated panels (supported by intermediate supports)	Individual test result specific	EXAP rules applicable	Outside scope of this guidance note
Internal insulated panels with no intermediate supports	Individual test result specific	Not allowed	Outside scope of this guidance note
Insulated ceiling membranes with no internal support	Individual test result specific	Not allowed	Outside scope of this guidance note
Insulated ceiling membranes with internal support	Individual test result specific	EXAP rules applicable	Outside scope of this guidance note
Compartment walls with internal supports	Individual test result specific	EXAP rules applicable	Outside scope of this guidance note
Compartment walls with supports on the outside	Individual test result specific	EXAP rules applicable	Outside scope of this guidance note

Note: For wall heights greater than being applicable in this guidance note, these are outside the scope of LPCB certification and shall be regarded as Project specific extended application.

Acknowledgement

This guidance note has been produced in collaboration with the technical committee of the International Association for Cold Storage Construction (European Division) whose valuable assistance is gratefully acknowledged and who will contribute further to the development of this guidance. The assistance of Brian Morris, XL, is also acknowledged.



INTERNAL GUIDANCE – Extended Field of Application Rules for products tested and approved to LPS 1181:Part 1

Subject

Extended field of application rules for sandwich panels and cladding systems tested and approved to LPS 1181:Part 1

Scope

This guidance note is intended to cover products classified EXT-B to LPS 1181: Part 1 used as the external fabric of a building.

For guidance on sandwich panels or cladding systems that require to have fire resistance, refer to guidance note GD 022

Extended Application

External cladding systems approved by LPCB to LPS 1181: Part 1 may be judged to be suitable for any size of building (width, height or length) for the range of purlin and mid-rail spacings used provided the system meets regulatory requirements for wind-loading, snow loading and thermal insulation in the installed condition.

Justification

This clause recognises that to meet these requirements, the cladding must be adequately supported and panel joints well constructed and sealed to avoid air leakage that will reduce its thermal insulation. All these aspects have a direct influence on fire performance measured in LPS 1181.

Limitation

Limit applicability of LPS 1181 Part 1 approval to the following maximum support spacings:

3m span for roofs and 4m span for walls.

Systems falling outside these limits will be deemed to fall outside the scope of LPCB certification unless the systems are tested at longer spans - in which case the span is determined by the tested condition.

INTERNAL GUIDANCE – Extended Field of Application Rules for change in sandwich panel joint profile

Subject

Change in joint profile
Sandwich panels tested to LPS 1181:Part 1

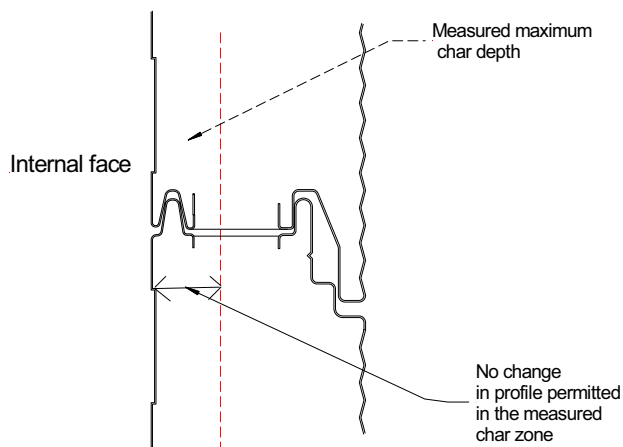
Scope

This applies to a change in joint profile for sandwich panels that have been tested and approved to LPS 1181:Part 1. It does not apply to other standards.

Extended Application

A change in joint profile will be permitted in the following restricted circumstances:

- the shape of the profile in the measured maximum depth of char does not change



- that the gap between adjacent edges of the panels when assembled are not greater than the tested and approved system unless compensated for by the profile design
- the surface profile of the internal faces of the sandwich panel remains the same as was tested
- the orientation of the joint does not change unless test results are available in both orientations
- That no changes in the composition of the core occur



Justification

This is based on the concept that the char layer is an indication of that part of the joint directly exposed to the test fire condition. Provided no changes occur at that position and the gap dimension at any point across the assembled joint does not exceed that tested, or the passage of hot gases is otherwise restricted, the performance in terms of the internal flaming criterion should still be satisfied. In respect to the external flaming criterion, experience has indicated that failure under this is generally an indication of poor installation.

Limitation

This applies to a single change only and if several changes in specification are also involved, a new fire test shall be performed.