

Mr Clive Betts MP Chair of the Housing, Communities and Local Government Select Committee House of Commons London SW1A 0AA

6th July 2018

Inquiry into Dame Judith Hackitt's Independent Review of Building Regulations and Fire Safety

Dear Mr Betts.

Thank you for inviting Kingspan Group to give evidence to the Housing, Communities and Local Government Select Committee regarding your inquiry into Dame Judith Hackitt's Independent Review of Building Regulations and Fire Safety.

First, I wanted to take this opportunity to reiterate that as the world's leading manufacturer of insulated construction products containing both combustible and non-combustible insulation our first priority is safety. We are deeply saddened by the terrible tragedy of Grenfell and take our responsibilities as a manufacturer very seriously. We believe that Kingspan has carried out more product and full system fire safety tests than any other construction material company and are committed to doing whatever is necessary to address the issues of transparency, labelling, traceability and technical/installation support identified by Dame Judith Hackitt.

I also wanted to repeat that the applications and products caught by a ban on combustible materials as proposed by the Government's consultation on "Banning the use of combustible materials in the external walls of high-rise residential buildings" would represent significantly less than 1% of Kingspan's Group turnover. Our position is not about commercial benefit but about ensuring that building regulations are always rooted in science and engineering.

We watched the evidence given by Dr Debbie Smith, Managing Director, BRE Global; Claire Curtis-Thomas, Chief Executive Officer, British Board of Agrément; Mark Hardingham, Chair (Protection and Business Safety Committee), National Fire Chiefs Council; and Sir Ken Knight, Chair of the Independent Expert Advisory Panel, with great interest and broadly agree with the evidence they gave. In particular, we support the comments of Claire Curtis-Thomas and Mark Hardingham on testing and share the caution expressed by Sir Ken Knight, Claire Curtis-Thomas and Dr Debbie Smith regarding a potential ban on combustible materials.

Regarding BS 8414 we would also like to take this opportunity to agree with the comments of Sir Ken Knight and Mark Hardingham, notably that the test is set at a very high-bar, that its credibility is not as doubtful as some have suggested, and that of the 300 buildings that have the wrong cladding none have undertaken or passed the test. We also support the view of the entire second panel that there is an important place for desktop studies in the building regulations, provided they are reformed, rooted in primary test evidence and carried out by qualified assessors.

I have set out Kingspan's position in more detail below and enclose copies of Tenos International Fire Engineering Consultants' BS 8414 Review and details of the failed A1 / A2 tests which I referred to in my evidence. I hope this information proves useful to the Committee and if you have any further questions then please do not hesitate to contact me.

Thank you again for inviting Kingspan Group to give evidence before the Committee.

Yours sincerely,

Richard Burnley

Managing Director, Kingspan Insulation Britain and Ireland

Hackitt Review

Kingspan supports the findings of the Hackitt Review and welcomes the emphasis on the need to raise levels of competence for all construction professionals engaged in the fire prevention aspects of a building, including design, construction, inspection and maintenance. We also welcome the call for greater oversight of the quality of installation, much stronger enforcement of the rules, and sanctions for those who do not follow them.

As the world's largest manufacturer of insulated construction products, Kingspan supports the introduction of a system of labelling and product tracing to ensure that cladding systems are only made up of tested and safe combinations. We have already taken steps to introduce these practices with our channel partners.

The fire safety of any building depends on the proper installation of its cladding system. Incorrect installation will create a significant fire risk regardless of the materials used. Furthermore, the correct design of cavity barriers for example, is every bit as important as the insulation / cladding products used.

The Construction (Design and Management) Regulations 2015 are a useful example of how greater regulatory clarity and accountability can be achieved. Since their introduction, site safety has improved considerably, and we believe that a similar system, such as the RIBA Plan of Work, could support further progress.

Kingspan recognises that the cultural change identified by Dame Judith will require time. However, we believe that subjecting all cladding systems to large scale testing and the introduction of a Building Control taskforce to inspect installation would be important short term interventions. In this regard, we welcome the Government's announcement that the Local Government Association and National Fire Chiefs Council are convening a joint expert inspection team and that further funding is being made available to support local authorities on further enforcement steps.

Government consultation on "Banning the use of combustible materials in the external walls of high-rise residential buildings"

What Kingspan, and, we believe, many others, want to see is effective regulation that meets identified objectives. The key objective should be the safety of building occupants in the event of fire, and we fully support the Government's aim in this regard. However, simply banning combustible building materials will not achieve this objective.

Kingspan's position is that all cladding systems should be tested as complete systems in their intended configuration in order to meet this objective of fire safety and to ensure consistency in outcomes. Anything short of whole system testing does not reach the identified objective and therefore we do not accept that the arguments made against whole system testing undermine its value as the central element of judging the safety of products used on external facades of tall buildings.

Kingspan is formulating its full response to the Government's consultation and will share this with the Committee as soon as it has been submitted.

"Combustibility" Classifications

Classification as "non-combustible" and "limited-combustibility" relies predominantly on the determination of the gross calorific value of a product, not on its flammability - i.e. it is a measure of the organic content of a product. Therefore "non-combustible" doesn't mean "non-flammable" (although it is likely to be the case). More importantly, this does not mean that materials that are "combustible" are "flammable".

There is a significant range of performance in "combustible" materials from those that, to all intents and purposes, have the same performance as "non-combustible" to those that are "highly flammable".

Furthermore, just because a material can burn, does not mean that it will burn in any given circumstances.

Product classifications say nothing about how one material will perform when combined with another in a system. For example, systems comprising "non-combustible" / "limited-combustibility" insulation and/or cladding materials have failed to meet BR 135 criteria (i.e. fail BS 8414). Similarly, systems comprising "non-combustible" / "limited-combustibility" insulation materials have been involved in some major fires around the world.

Systems incorporating "combustible" thermoset insulation materials can pass BS 8414 because, despite not meeting the requirements to be classified as "non-combustible" or "limited-combustibility", thermoset insulation materials are also mostly "non-flammable". They have been designed to char when exposed to fire / heat and self-extinguish when that fire / heat is removed. Therefore, relying on simplistic classification of individual products is not sufficient.

Given that passing BS 8414 / BR 135 requires better performance than requiring insulation and cladding materials to be "non-combustible" or "limited-combustibility there can be no case to ban combustibles if systems in which they are incorporated can pass BS 8414 / BR 135. If Government is insistent on banning all but "non-combustible" or "limited-combustibility" materials then the systems that are used in future should still be subject to BS 8414 testing and classification according to BR 135

BS 8414

The BS 8414 test is designed to replicate a fire starting inside a room, breaking out through a window of a multi-storey building and exposing the external cladding to fire. It is designed to evaluate the rate and extent of fire spread within a cladding system.

A recent report by Tenos International Fire Engineering Consultants has compared the BS 8414 test to the NFPA 285 whole system tests used in other regulatory regimes, notably including the USA, UAE and New Zealand. The Tenos study found that the fire load used in BS 8414 was more onerous than that in NFPA 285 because the minimum heat flux to which the cladding system is exposed is greater in a BS 8414 test and the overall heat energy (i.e. intensity and duration of simulated fire exposure) to which a cladding system is subjected in BS 8414, significantly exceeds that achieved in NFPA 285.

Tenos also compared the fire load from BS 8414 against measurements taken from experimental fully furnished apartment fires. They concluded that the heat load from BS 8414 is more severe and last considerably longer than that measures from these experimental, but wholly realistic, fires.

The Tenos study also analysed readily available information about fire spread in recent fires in residential buildings of over five storeys in height. The study identified 17 fires and found that none of them contained a combination of materials which would have passed a BS 8414 test. They included systems with non-combustible insulation as well as systems with combustible insulation. Kingspan is not aware of a building anywhere in the world where there has been an out of control cladding fire where the system has passed, or would pass, a BS 8414 test.

The Tenos report concluded that the absence of evidence of fires with significant fire spread in cladding systems compliant with BS 8414 is indicative that such systems are achieving the standard of fire performance required.

Kingspan believes that large-scale full system fire tests, such as BS 8414, are the best measure of fire performance. Notably, large-scale full system fire tests are also used to regulate the performance of cladding systems in the UAE, Australia, USA, France, Sweden, New Zealand, China and Canada, and we understand that Turkey has recently announced a plan to move to a BS8414 underpinned regulatory system. This evidences a strong international consensus that large-scale full systems testing provides the best measure of cladding fire safety.

Kingspan have published all of our reports for BS 8414 tests on our website, including passes and fails.

"Desktop Studies"

Kingspan has been clear that Desktop Studies are in need of radical reform or replacement. The test results of each BS 8414 test only apply to the precise design and specification that was tested. Changing details of a cladding system such as the cavity width, or brand of product, would require another test. With the vast array of available products and potential small variations in design, it would be impossible to test everything via a BS 8414 test as there simply is not the test rig capacity to do so. Only circa 100 tests are available per-year in UKAS approved laboratories, worldwide. For that reason the regulatory system needs a process by which the validity of BS 8414 test results can be extended beyond the system that was actually tested.

As a minimum, Kingspan believes that any new testing process should include mandatory qualifications and a certification scheme for those performing assessments, a register of certified assessors, a standard methodology for assessments, a published register of assessments, and for desktop studies to be limited to use where a full scale test with a higher risk combination of products has already been passed.

Kingspan also believes that assessments should be based on evidence derived from a standardised intermediate-scale system test e.g. ISO 13785-1: 2002 or similar. ISO 13785-1: 2002 is effectively a one-third scale version of the BS 8414 test. Requiring assessments to use test data from intermediate-scale tests on the actual system being assessed could make this route to compliance far more robust, but also make regulation more realistic.

Innovation

Combustible and non-combustible materials bring different benefits to buildings. For example, non-combustibles typically offer better sound proofing whilst combustible materials are lightweight and, because of their high thermal efficiency, they are thin. This makes combustible materials well suited to refurbishment, as they can transform the energy efficiency of a building, without placing undue strain on the original structure.

Banning products solely on the basis of their combustibility classification would severely restrict innovation across the building industry. Such a move would effectively stop architects from designing the most appropriate systems for each building with corresponding detriments to inhabitants.

Failed A1 / A2 Large Scale Fire Tests

Kingspan has evidence of three failed large scale fire tests where the cladding system was made up of A1 and A2 products. The tests are detailed below and supporting documentation is enclosed.

Test One

This is a failed test which was conducted at BRE on 27th October 2016. This system was comprised of Alucopanel solid core A2 ACM along with Fujairah Rockwool foil faced mineral fibre / stone wool insulation, rated as A1. The system failed on flame height which can be seen on a high resolution video which has been sent to the Committee in the post. We understand that no test report was produced for this test.

Enclosed are two PDFs showing details of the build-up and three images of this test which clearly show the Alucopanel branding, and also the "FRF" on the outside of the insulation, which is Fujairah Rockwool. We also enclose literature on the Fujairah Rockwool product.

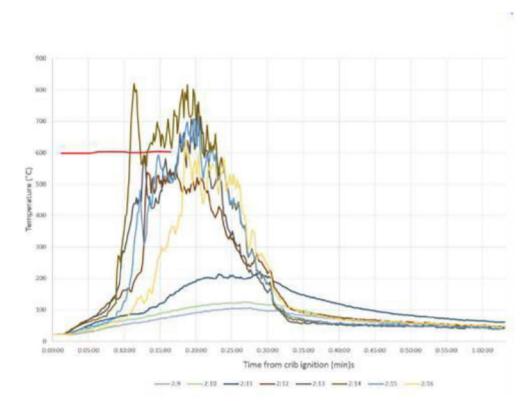
The system tested in this test is not typical in UK construction as the insulation is foil faced. However, it is rated as A1 and so would be allowed under the Government's proposals.

Test Two

This is a failed test conducted in Australia on 6th March 2018. The system was comprised of an Alpolic solid core A2 panel in combination with Rockwool mineral fibre / stone wool. The test used was AS5113 which is identical to the method used for BS 8414, but with different pass/fail

criteria. Nonetheless, if the BR 135 fail criteria which are used in BS 8414 tests are applied to the AS5113 data, the system fails. A copy of the report is enclosed.

The temperature shown on any of the thermocouples in the chart on page 48 of the report cannot go over 600 degrees C for more than 30 seconds in the 15 minutes of the test after the external level 1 thermocouples go over 200 degrees C (which was at about 2 minutes). The 600 degree C limit for this 15 min time period is the red line in the copy of the chart below. The brown temperature line is clearly above the red line for longer than 30 seconds, and it was in fact over the line for 5-6 minutes.



The Australian test is also not typical of construction in the UK because the insulation is within the steel wall framework and sheathed in a steel sheet to protect it from the fire. However, it is broadly reflective of some systems used in the UK where a steel faced sandwich panel is used in lieu of an insulation board which is then overclad with an ACM with a ventilated cavity between. In any case, it provides for a system that should be "safer" than naked stone wool, because steel is entirely non-combustible, whereas stone wool contains 3-5% by weight of an organic combustible binder.

The other notable difference with this test is that, contrary to guidance in Approved Document B, the system does not include cavity barriers. This evidences that poor installation of cladding systems containing non-combustible / limited combustibility products may cause them to fail BS 8414 and highlights the importance of correct installation and the need for cultural change as identified by Dame Judith Hackitt.

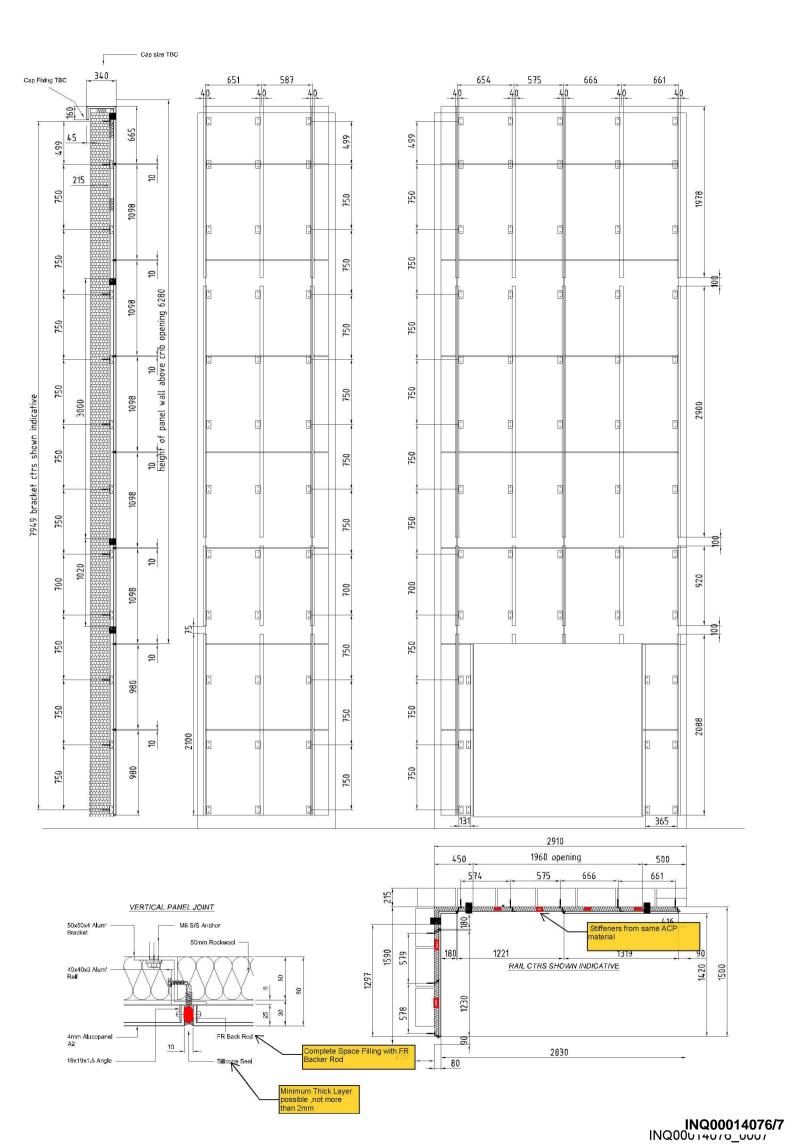
Test Three

This is a test which was carried out at Exova in Dubai on July 2nd 2018. The test was commissioned by Kingspan. The system was comprised of Rockwool DuoSlab (which is rated A1) and Vitracore G2 (which is rated A2). The construction of the test rig was a replica of the Ministry of Housing, Communities and Local Government tests conducted immediately after the tragedy at Grenfell Tower. The test failed on the basis of thermocouple data which is detailed in the enclosed preliminary report from Exova.

Enclosed are brochures detailing Rockwool DuoSlab and Vitracore G2 as well as PDFs of the sectional drawings of the test rig. Also enclosed are contact sheets of stills from the build and test. Video of the first 15 minutes of this test has been posted to the Committee. Kingspan is waiting for the final

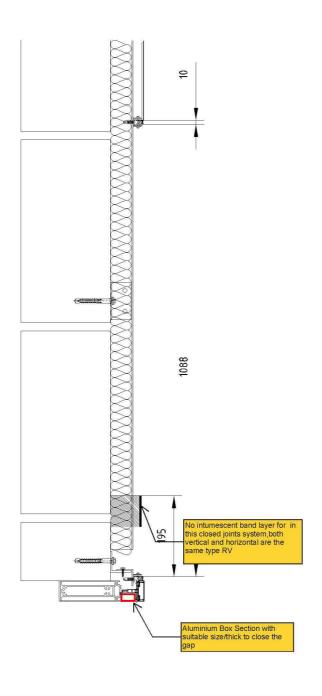
classification, test reports and full video footage and these will forwarded to the Committee as soon as they are received.

Despite failing this BS 8414 test, the products used in this system are A1 and A2 and would therefore be automatically permitted under current Building Regulations and the Government's proposals on banning the use of combustible cladding. This evidence supports Kingspan's view that cladding systems should be subject to large scale tests (as complete systems in their intended configuration) in order to meet the objective of fire safety.

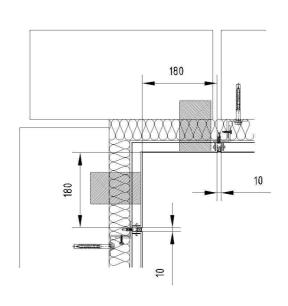


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TOP OF OPENING DETAIL



CORNER PANEL DETAIL









Fujairah Rockwool Slabs



Fujairah Rockwool slabs conforming to ASTM C-612 and equivalent BS 3958 Part 5 and BS EN 13162 are designed for the thermal and acoustic insulation of flat or slightly curved surfaces operating at both high and low temperatures.

These slabs are produced from long, non-combustible resin bonded fibers. They are easy to cut, fit and handle.

The robust fibers in the slabs combine high levels of thermal efficiency and acoustic absorption.

Facings

Code	Description
2	Reinforced aluminum foil
4	Black Ceiling Veil

Types

Code	Description
SXXX	Slab without facing
S2XX	Slab with reinforced aluminum foil on one side
S22X	Slab with reinforced aluminum foil on both sides
S4XX	Slab with Black ceiling veil on one side
S44X	Slab with Black ceiling veil on both sides

Applications

Designed for a wide range of applications, at both high and low service temperatures, and can be used on flat or slightly curved surfaces for thermal and acoustic insulation.

They are suitable for thermal insulation of ducts, tanks, large vessels, oven, furnaces, boilers and other industrial equipments as well as for cavity walls, curtain walls and sandwich panels.

It is also ideal for fire protection of steel structures and insulation of bulk heads and ship decks.

High density slabs are suitable for applications where high compressive strength is required and where the insulation is subjected to mechanical loads and vibration. They are ideal for traffic areas and insulation of tank roofs.

Standard Delivery

Standard Size (m)	Standard Thickness (mm)	Standard Density (kg/m³)
1.2 x 0.6	50, 75, 100	30, 50, 80, 100, 140

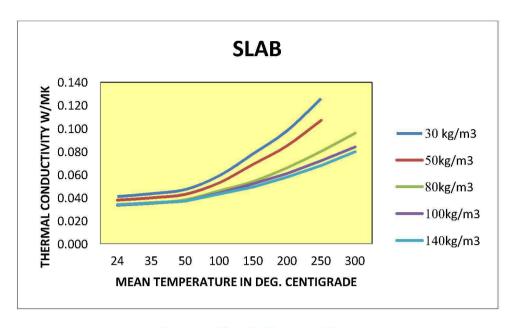
Other sizes, densities and thicknesses are available upon request.

Thermal Conductivity

Thermal conductivity is the main product property of thermal insulation material and Fujairah Rockwool products show remarkably low thermal conductivity values. Typical figures are shown below in accordance with BS 874 : 1986, equivalent to ASTM C-177 / C-518 (ISO 8302 / ISO 8301) and DIN 52612. We have test reports at 35°C mean temperature for 40 kg/m 3 and 70 kg/m 3 nominal densities and at different mean temperatures for 140 kg/m 3 nominal density.

Mean Temp °C	k-value W/mK 30 kg/m³	k-value W/mK 50 kg/m³	k-value W/mK 80 kg/m³	k-value W/mK 100 kg/m ³	k-value W/mK 140 kg/m ³
24	0.041	0.038	0.034	0.033	0.034
35	0.043	0.040	0.036	0.035	0.035
50	0.047	0.043	0.038	0.037	0.037
100	0.059	0.053	0.046	0.044	0.043
150	0.078	0.069	0.054	0.052	0.049
200	0.098	0.085	0.066	0.061	0.058
250	0.126	0.107	0.080	0.072	0.068
300	-	-	0.096	0.084	0.080

These are typical values subjected to normal manufacturing and testing variance. The table shows the results for their raw density in accordance with the test report.



Acoustical Properties

Typical sound absorption figures are shown below in accordance with BS 3638 & ISO 0354 and equivalent ASTM C-423. We have test certificate for 70 kg/m3 and 100 kg/m3 nominal densities.

The table shows the test results for their raw density in accordance with the test report.

Hz	30 kg/m ³	50 kg/m ³	80 kg/m ³	100 kg/m ³	140 kg/m³
125	0.22	0.22	0.23	0.23	0.22
250	0.60	0.62	0.64	0.66	0.66
500	0.86	0.88	0.98	1.05	1.05
1000	0.92	0.95	1.04	1.07	1.06
2000	0.99	1.02	1.03	1.05	1.01
4000	0.98	0.99	0.98	0.97	0.96

Note that components of the whole system should be considered for the Sound Absorption requirement.

Compression Resistance

Table below shows typical data of compression resistance in accordance with ASTM C-165 @ 10%.

Density Kg/m ³	30	50	60	80	100	140
Compressive Resistance KPa	1.2	2.5	3.5	6.0	12.0	24.0

Service Temperature

Rockwool Insulation has a service temperature of 780°C when tested in accordance with DIN 52271 for 80mm thickness and 100 kg/m3 density. However there is possible deviation for lower densities.

The user is advised that it is possible that the maximum use temperature of facings and adhesives is lower than the maximum use temperature of the insulation .The user shall ensure that sufficient thickness shall be installed so none of these accessory items (facings and adhesives) are exposed to temperatures above their maximum use temperature.

Fire Safety

Non-combustible when tested in accordance with BS-476 part 4 ,ASTM E-136 and BS EN ISO 1182. Class A, when tested in accordance with ASTM E-84. The products have been tested following BS EN ISO 1182 and BS EN ISO 1716 and shown a reaction to fire performance of Class A1 following BS EN 13501-1 and can be considered as non- combustible.

Biological Properties

Rot-proof, non-hygroscopic, will not sustain vermin and will not encourage growth of bacteria, mold or fungi.

Compatibility

Compatible with all other forms of material with which it is likely to come in contact in normal industrial and building applications.

Chemical Neutrality

Chemically neutral with a pH value of 7-8 when tested in accordance with BS 2972: Section 22. It will neither cause nor promote corrosion. It meets the requirements of ASTM C-795 the standard specification for thermal insulation for use in contact with austenitic stainless steel when measured according to standard methods of ASTM C - 692 (Corrosion Test) and ASTM C -871 (Chemical Analysis). It contains low level of chlorides when tested in accordance with BS 2972: Section 21, ASTM C-871 and AGI Q 135.

Physical Properties

Asbestos-free and shot content is very low when tested as per ASTM C-1335 and BS-2972 Section 14.

Packaging

Supplied in shrink wrapped polyethylene sheet.

Unit Price

For details on price, our Sales Office can be contacted.

Technical Advice

For further details of information on technical data, specialist product information, applications, heat loss calculations or economic thickness, our Sales Office can be approached.



Fire test of 4mm Alpolic A2 cladding fixed to Aclad 4000 framing system in accordance with BS 8414.2-2015 (Amdt 1) as modified by AS 5113-2016

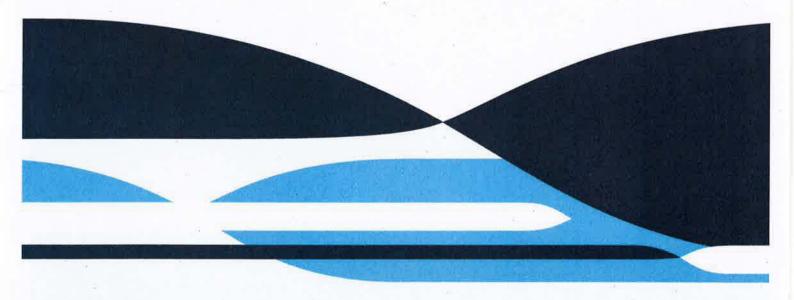
Test Report

Author: Brett Roddy Report number: FNW 7936

Date: 4/6/2018

Client: Architectural Façade Cladding Solutions Pty Ltd

Commercial-in-confidence



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1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as 4mm Alpolic A2 cladding fixed to Aclad 4000 framing system with the unexposed face of the wall system lined with fire grade plasterboard.

1.2 Sponsor

Architectural Façade Cladding Solutions Pty Ltd 21 Ingleston Road Wakerly, QLD 4154

1.3 Manufacturer

Aclad 4000 system: Architectural Façade Cladding Solutions Pty Ltd 21 Ingleston Road Wakerly, QLD 4154 Alpolic cladding panels: Mitsubishi Chemical Corporation Alpolic Department 1-1-1, Marunouchi, Chiyoda-ku, Tokyo 100-8251 JAPAN

Mitsubishi Chemical Corporation have provided permission in writing for CSIRO to undertake a test sponsored by Architectural Façade Cladding Solutions Pty Ltd.

1.4 Test standards

The testing was in accordance with BS 8414.2-2015 (Amdt 1) as appropriate for a non-loadbearing external cladding system fixed to and supported by a structural steel frame. The test was undertaken for the purpose of classification of the external wall in accordance with AS 5113-2016 Fire propagation testing and classification of external walls of buildings.

1.5 Test number

CSIRO Reference test number FNW 7936.

1.6 Test date

The fire-resistance test was conducted on 6th March 2018.

2 Description of specimen

2.1 Test Configuration

The test specimen is representative of a structural steel frame clad with an external wall panel.

2.2 Specimen Components

The test specimen comprised the following components:

Component reference	Manufac.	Material	Overall thickness	Density	Size (L x W x H)	Fixing method
CSR Fyrchek plasterboard	CSR Gyprock	Plasterboard	13-mm	10.5 kg/m²	Various	Screwed to lightweight wall framing in accordance with manufacturer's specification.
Lightweight steel wall framing	Rondo	Steel	0.75bmt	N/A	90-mm studs	Fixed to the structure with 12g series 500 Tek screws.
Mineral wool insulation	Bradford	CSR Fibertex 450 Rockwool Board	50mm	72.4 kg/m³	1200-mm x 600-mm x 50-mm thick	Friction fit into light weight wall frame cavity. The CSR Fibertex 450 Rockwool Board is not deemed combustible in accordance with AS 1530.1 (Refer test report FNC 9595).
12g series 500 Tek screw	iconn	Steel	5.5mm		65-mm	, A
Galvabond air seal sheet	Metalcorp	Steel	1mm BMT	7.85 kg/m²	2400mm x 1200mm	Fixed with 12g Tek screw onto lightweight wall framing at nom, 300-mm centres.
Stainless steel bolt set	ICONN	304 Stainless Steel	14 mm		90 mm	One bolt per framing bracket
Aclad 4000 aluminium framing bracket	Almax	T6 6106 aluminium	2.5mm		522-mm and 2300- mm vertical centres	Fixed through air seal sheet to structure with 12g series 500 Tek screws (4 Tek screws per bracket)
Aclad 4000 aluminium framing rail	Almax	T6 6106 aluminium	2.5mm		1213-mm centres	Fixed to frame bracket with single 14-mm stainless steel bolt set.
Aclad 4000 aluminium female	Almax	T6 6106 aluminium	2.5mm			Fixed to cladding panel using pop rivets at nom. 300-mm centres
Aclad 4000 aluminium male	Almax	T6 6106 aluminium	2.5mm			Fixed to frame rail using 12g Tek screws. Fixed to cladding panel using pop rivets at nom. 300-mm centres
Alpolic A2 Cladding Panel	Mitsubishi	Aluminium Composite Panel	4mm			Fixed to male and female extrusions using pop rivets at nom. 300-mm centres.
12g Tek screw	ICONN		5.5mm		35-mm	12-14 x 35 full thread
Pop rivets	Hobson	Aluminium/ steel				Rivet dome head open 73AS2 - aluminium and steel #54
Aluminium window subhead			3mm		150x50	Fixed to the structure with 12G Tek screws
Aluminium "F" extrusion	Almax	6106 T6 aluminium			(4)	Fixed to the structure with 12g Tek screws
Steel angle	Unknown	Mild Steel	3-mm		70-mm x70-mm	Fixed to steel cleats on test structure using two 12G series 500 Tek screws per wall cleat.

Refer to drawings in Appendix A.

2.3 Specimen Overall Dimensions

The steel substructure was overall 9.237m high. The main wall was 3.24m wide and the wing wall was 2.0m wide.

The specimen face was overall 9.186m high. The main wall specimen face was 2.941m wide and the wing wall substructure face was 1.64m wide

2.4 Assembly and construction method

Steel supporting cleats were fitted to the structural steel test frame using M16 bolts. Lengths of 70-mm x 70-mm x 3-mm mild steel angle were then screw fixed to the wall cleats to support the lightweight steel wall framing panels. The 90mm deep lightweight steel wall framing panels were lined using 13mm thick Fyrechek plasterboard sheets on the unexposed face of the wall system. The wall frame cavity was then filled with 50mm thick non-combustible Fibretex 450 Rockwool insulation batts which were friction fitted between the wall studs and located hard against the plasterboard wall lining. The wall framing was then lined with a single layer 1mm thick Galvabond air seal sheets which were screw fixed to the exposed side of the wall framing using 12G x 35-mm Tek screws at nom. 300-mm centres.

Aclad 4000 system framing brackets were then screw fixed to the wall system at nom. vertical centres of 522-mm and 2300-mm using 4 off 12G series 500 Tek screws per bracket. The vertical Aclad 4000 system wall framing extrusions were then bolted to the Aclad 4000 framing brackets using a single 14-mm stainless steel bolt.

Mitsubishi Alpolic A2 cladding panels (4-mm thick) were rivet fixed at nom. 300-m centres to Aclad 4000 system male and female extrusions to form cladding panels nom. 1193-mm wide x 2400-mm high with a 20-mm deep panel return at the panel edges. The panels were attached to the Aclad 4000 system aluminium vertical framing rails using 12G x 35-mm Tek screws at nom. 300-mm centres through the Aclad 4000 system male extrusions used to form the panel framing. A 20-mm wide gap was maintained between cladding panels.

An aluminium window subhead channel was screw fixed at 400-mm centres using two 12G x35-mm Tek screws to an aluminium 'F' extrusion section located around the perimeter of the opening to the combustion chamber. The cladding panels were screw fixed to a 70-mm x 70-mm x 3-mm aluminium angle using 12G x 35-mm Tek screws at nom. 400-mm centres through the Aclad 4000 system aluminium male extrusions at both sides of the combustion chamber opening. The cladding panels were not fixed to the aluminium window subhead positioned above the opening of the combustion chamber.

2.5 Pre - conditioning

The external cladding was installed between the 28th February and the 3rd March 2018 in an internal laboratory location.

2.6 Sampling and specimen selection

All test materials were supplied and installed by the sponsor. The laboratory was not involved in the sampling or selection of the test specimen for the fire test.

3 Documentation

The following documents were supplied or referenced by the sponsor as a complete description of the specimen and should be read in conjunction with this report:

 Drawings titled Fire-101 to Fire-109 (inclusive), all dated 10 April 2018, issued by Aclad Architectural Façade Cladding Solutions Pty Ltd.

Confidential information about the test specimen has not been submitted to CSIRO Infrastructure Technologies.

4 Equipment

4.1 Ambient Temperature and Wind Speed

The specimen was tested under indoor laboratory conditions. The ambient temperature at the start of the test was 22°C and the wind speed at the start of the test was 0.0m/s when measured perpendicular and parallel to the main wall of the specimen at level 2.

4.2 Ignition source

The crib was constructed from softwood (Pinus Radiata) with a moisture content of between 10% and 15% and a density ranging between 480 kg/m³ and 520 kg/m³, in accordance with the requirements of AS 5113-2016 clause 4.2. The crib was otherwise constructed in accordance with BS 8414.2-2015 (amdt1).

4.3 Temperature

The instrumentation was provided in accordance with BS 8414.2- 2015 as detailed below.

All exposed and internal temperatures were measured by mineral insulated metal sheathed (MIMS) Type K thermocouples with an overall diameter of 1.5mm with the measuring junction insulated from the sheath.

The non-fire side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5mm soldered to 12mm diameter \times 0.2mm thick copper discs covered by 30mm \times 30mm \times 2.0 mm inorganic insulating pads. The thermocouple positions are described in Appendix B.

4.4 Measurement system

The primary measurement system comprised multiple-channel data loggers, scanning at 10-second intervals during the test.

The data from all sensors were collected for at least 5 minutes prior to the ignition of the timber crib.

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4.5 Audio Visual system

A continuous audio-visual record of the condition of the full height of the test faces was recorded for a minimum of 5 minutes prior to the ignition of the timber crib and throughout the 60 minute period of the test.

5 Departure from standard

The test was undertaken in accordance with BS 8414 Amdt 1 subject to the variations listed in AS 5113-2016.

6 Duration of the test

The test duration was 60 minutes.

7 Test results

7.1 Test observations

The following include observations of the significant behaviour of the specimen. Times are all in relation to crib ignition.

Time	Observation
0 minutes	Ignition of timber crib. Start temperature (Ts) of 22°C
01 minutes	Main wall façade surface damage observed.
02 minutes	Deformation of main wall façade lining observed.
03 minutes	Deformation of the exposed face of main wall façade.
03 minutes	Smoke emitted from the wall cavity at the top of specimen and mid-width of the main wall of the façade.
05 minutes	Deformation of the exposed face of wing wall façade.
07 minutes	Debris observed falling from main wall façade, flaming duration > 20sec of the fallen debris noted at this time.
07 minutes	Debris observed falling from main wall façade, no flaming noted.
08 minutes	Wing wall façade lining blistered.
08 minutes	Debris observed falling from main wall façade, duration of flaming > 20sec of fallen debris noted at this time.
08 minutes	The exposed lining of the main wall burnt through to 2.3m above furnace opening.
09 minutes	Main wall façade facing below TC 2:4 bowing out.
12 minutes	Debris observed falling from main wall façade, flaming duration > 20sec of the fallen debris noted at this time.
13 minutes	The exposed lining of the main wall façade burnt through exposing rain screen layer.
14 minutes	Large pieces of debris falling from main wall façade, no flaming observed.

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Time	Observation
15 minutes	The exposed lining of main wall façade burnt through to 4m above combustion chamber opening.
17 minutes	Debris falling from main wall façade.
18 minutes	Debris falling from main wall façade.
19 minutes	Flaming observed above the main wall.
19 minutes	Wing wall façade surface damaged.
28 minutes	Flaming reduced on the head of combustion chamber opening.
30 minutes	Test terminated.

7.2 Post Test Observations

Time	Observation	
Day following test	The exposed aluminium skin buckled from the core and melted, refer to Figure D1 and Figure D2 for more detail.	
	The core dislodged and melted above the combustion chamber opening and along the central joint. Melting does not extend to the top of the specimen of beyond the minimum confines of the specimen on wing wall. Refer to Figure D3 and Figure D4 for more detail.	
	Smoke staining and heat damage of Galvabond air seal sheet layer on the exposed side evident on the main wall above the combustion chamber. Molter aluminium also evident on the face of the air seal sheet. Refer to Figure D5 and Figure D6 for more detail.	
	Smoke staining (not melting or charring) of Rockwool layer on the exposed side evident on the main wall above the combustion chamber. Refer to Figure D7 and Figure D8 for more detail.	
	Localized smoke staining and charring on the exposed side of the plasterboard layer evident on the main wall above the combustion chamber. Refer to Figure D9 for more detail.	
	No damage observed on the plasterboard on the unexposed side of the specimen. Refer to Figure D10 for more detail.	

7.3 Mass of Debris fallen from Specimen

Debris	No. of fragments	Result (g)
Total mass of debris less than 100g	~710	11,353
Total mass of debris between 100g and 200g	12	1,521
Total mass of debris between 200g and 300g	3	731
Total mass of debris between 300g and 400g	0	0
Total mass of debris between 400g and 500g	1	402
Total mass of debris with a mass greater than 500g	5	32,433
The total mass of debris	T	46,440

Refer to Figures C10 to C12 for examples of debris collected at the conclusion of testing.

8 Test results

8.1 Peak Temperatures

Parameter	Temperature reached	Time Temperature Reached	
Level 1 temperature	Average Exceeded 200°C	8 minute 59 seconds (t _s) then sustained above that temperature for > 30 seconds	
Level 2, 50mm from the external face	Max 547°C	14 minutes 25 seconds	
Level 2, in the cavity behind the Alpolic A2 cladding	Exceeded 250°C	At 9 minutes 29 seconds after ignition then sustained above that temperature for > 30 seconds	
Level 2, within Rockwool layer	Exceeded 250°C	At 24 minutes 55 seconds after ignition then sustained above that temperature for > 30 seconds	
Peak temperature/time on the unexposed side at 900mm above combustion chamber.	80°C	28 minutes 9 seconds	

All times above are times after ignition of crib source and all temperature measurements are presented in Appendix E.

9 Classification

The AS 5113:2016 criteria for classification as appropriate for a BS 8414-2 testing are detailed below.

Classification Criteria	Related classification measure	Result in test	Pass/Fail
5.4.5(a) T _{w5m}	≤600°C	Max 547°C	Pass
5.4.5(b) T _{layer5m - Cavity}	≤250°C	Exceeded at 9 min 29 Sec	Fail
5.4.5(b) T _{layer5m - Rockwool}	≤250°C	Exceeded at 24 min 55 sec	Not applicable
5.4.5(c) T _{unexposedside0.9m}	≤180°C Rise	58°C Rise	Pass
5.4.5(d) flaming	No flaming	Did not occur	Pass
5.4.5(d) openings	No openings	Did not occur	Pass
5.4.5(e) spread	Spread beyond specimen	Did not occur	Pass
5.4.5(f) debris flaming	≤20 s	Flaming ≥ 20s occurred	Fail
5.4.5(g) debris mass	≤2 kg	≥ 46.440kg debris	Fail
* .		Classification	Not classified

10 Field of direct application of test results

The results of this test are applicable to the construction tested when exposed to fire from the external side as tested.

The result of fire tests may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

This report details methods of construction, the test conditions and the results obtained when the specific element of the construction described herein was tested following the procedure outlined in AS 5113.

Any significant variation with respect to size, constructional details, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report.

Because of the difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy of the result.

11 Tested by

B. Rong

Brett Roddy Testing Officer

Appendices

Appendix A – Specimen drawings

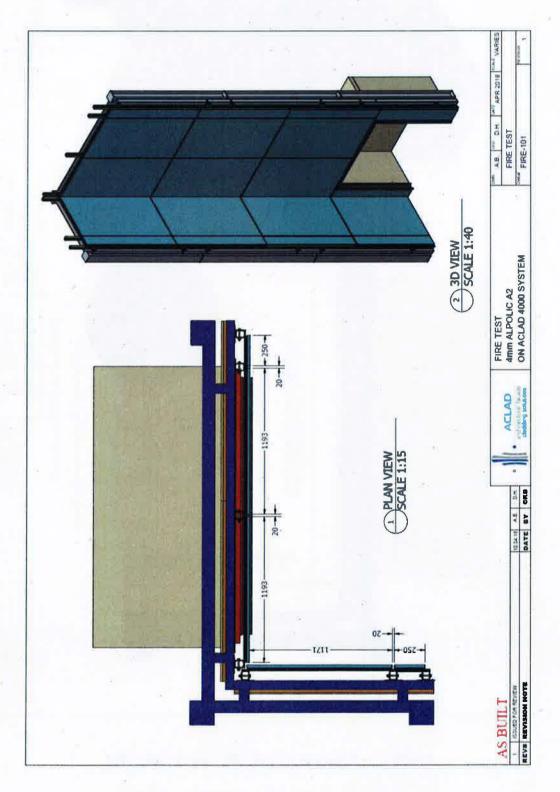
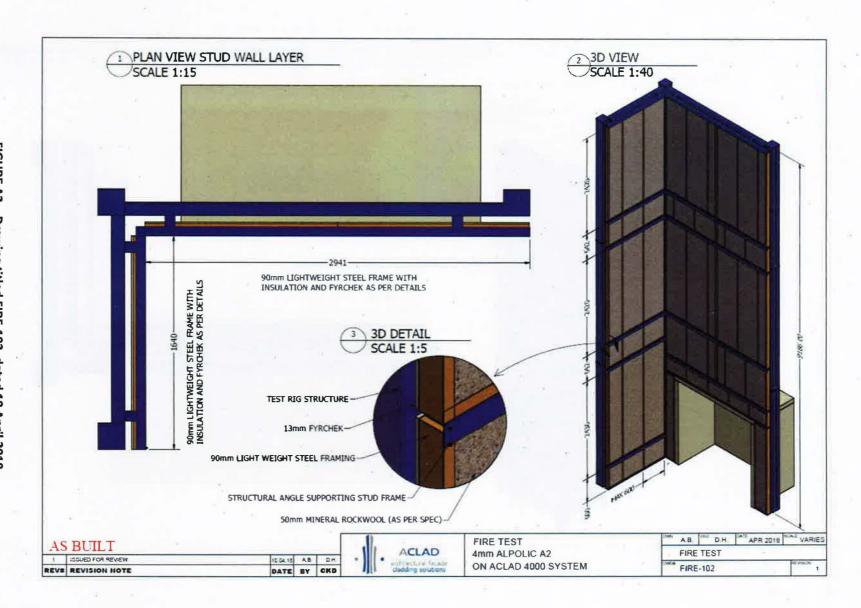


Figure A1 – Drawing titled FIRE-101, dated 10 April 2018

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PLAN VIEW - ACLAD 4000 SYSTEM FRAMING
SCALE 1:15

2 3D VIEW SCALE 1:40

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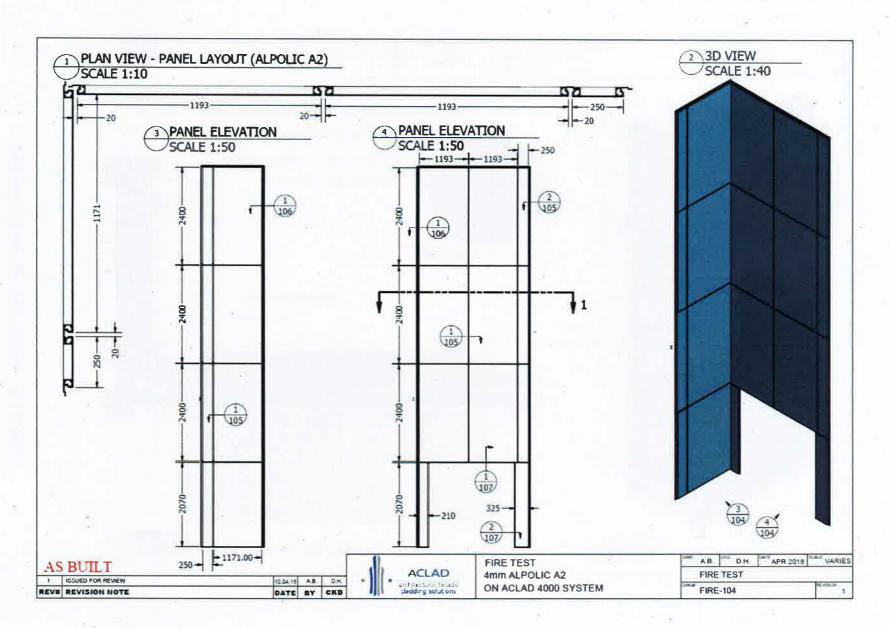


Figure A4 – Drawing titled FIRE-104, dated 10 April 2018

INQ00014076/35



INQ00014076/36



Appendix B - Measurement locations

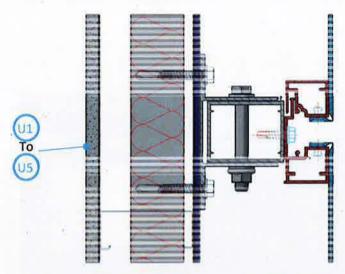


Figure B1: On unexposed face 900mm above combustion chamber opening, plan view

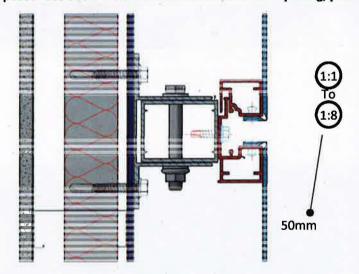


Figure B2: Level 1 - 2.5m above combustion chamber opening, plan view

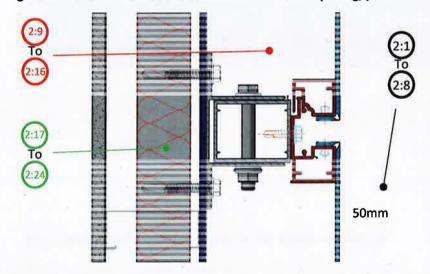


Figure B3: Level 2 - 5m above combustion chamber opening, plan view

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Figure B4: Thermocouple locations, elevation view

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Appendix C – Test photographs



Figure C1 – Exposed face of the specimen prior to testing

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Figure C2 – Unexposed face of the specimen prior to testing



Figure C2 – Exposed face of the specimen at crib ignition



Figure C3 – Exposed face of the specimen at 3 minutes after crib ignition



Figure C4 – Exposed face of the specimen at 7 minutes after crib ignition



Figure C5 – Exposed face of the specimen at 11 minutes after crib ignition

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Figure C6 – Exposed face of the specimen at 17minutes after crib ignition

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Figure C7 – Exposed face of the specimen at 19 minutes after crib ignition

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Figure C8 – Exposed face of the specimen at 30 minutes into the test



Figure C9 – Exposed face of the specimen at the conclusion of the test

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Figure C10 –Debris collected at the conclusion of the test



Figure C11 – Debris collected at the conclusion of the test



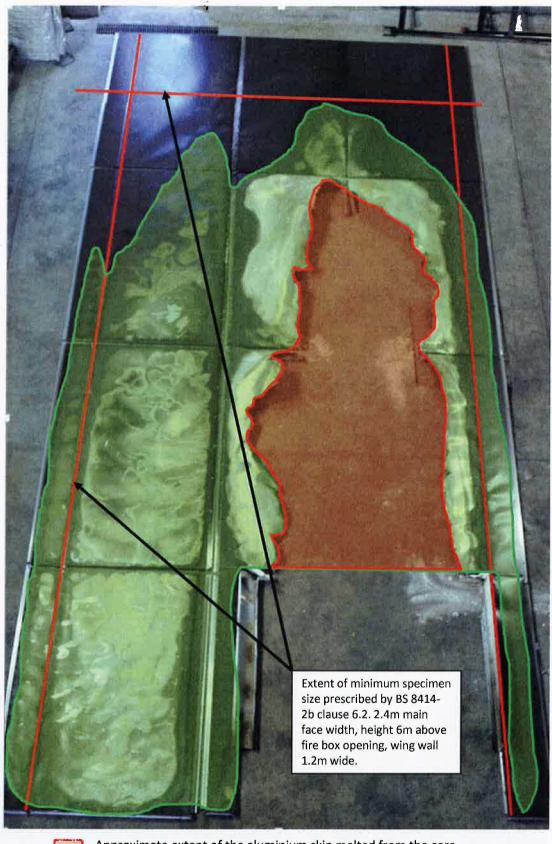
Figure C12 – Debris collected at the conclusion of the test

Appendix D – Extent of Spread



Figure D1 – Damage to the exposed aluminium skin at the conclusion of testing

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Approximate extent of the aluminium skin melted from the core

Approximate extent of the aluminium skin buckled from the core

Figure D2 - Damage of the exposed aluminium skin at the conclusion of testing

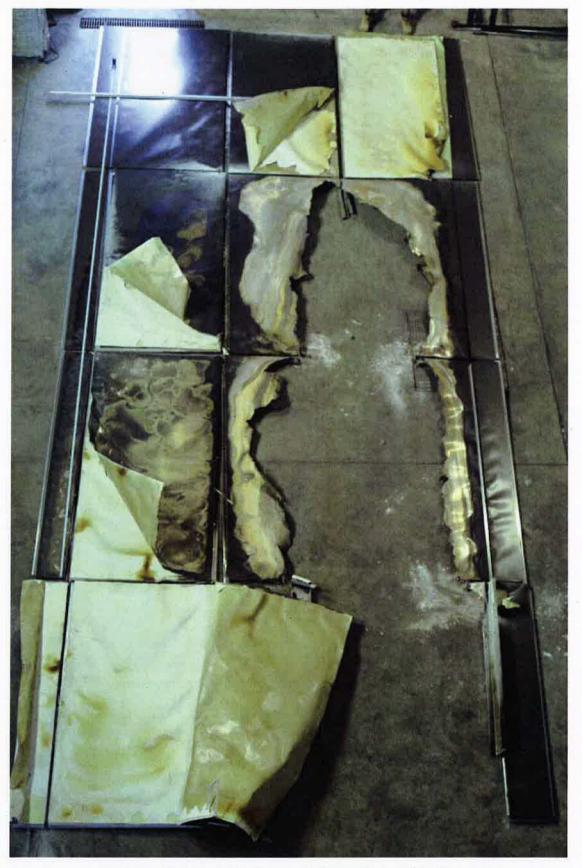
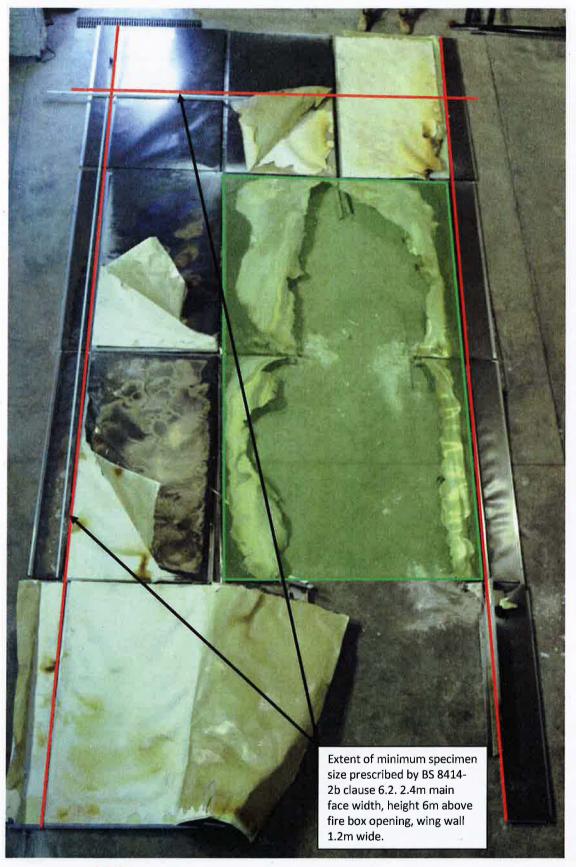


Figure D3 – Damage to the core at the conclusion of testing



Approximate extent of the core dislodged and melted

Figure D4 - Damage to the core at the conclusion of testing

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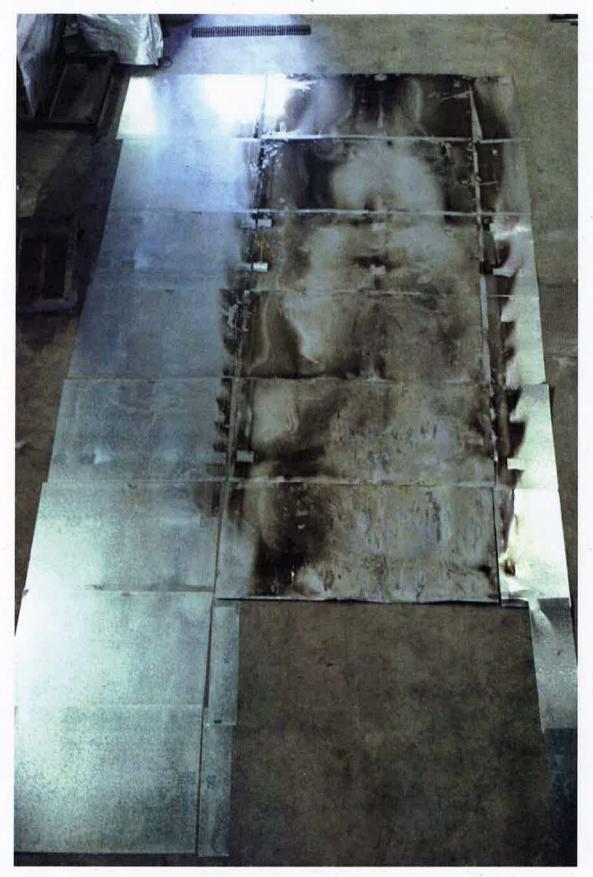
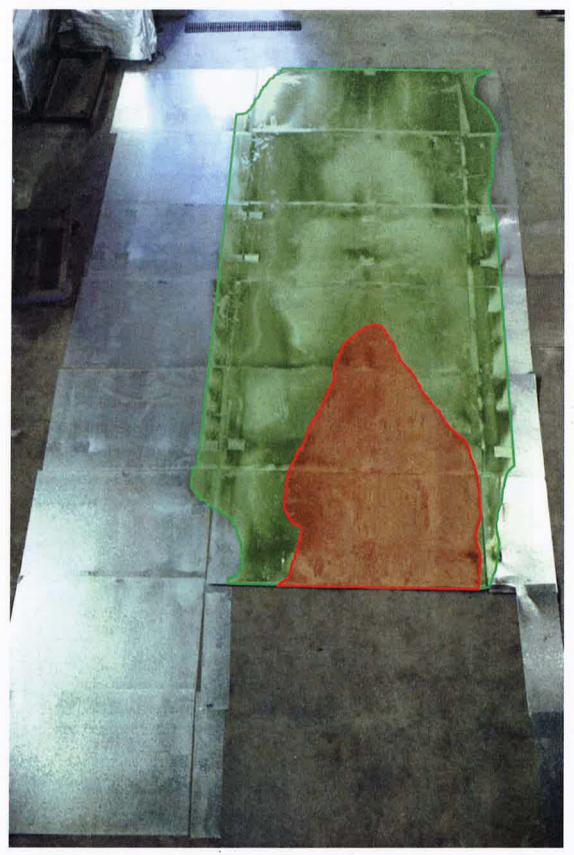


Figure D5 – Damage to the Galvabond air seal sheet layer at the conclusion of testing



Approximate extent of the smoke staining to Galvabond air seal sheet

Approximate extent of heat damage to Galvabond air seal sheet

Figure D6 – Damage to the Galvabond air seal sheet layer at the conclusion of testing



Figure D7 – Damage to the Rockwool layer at the conclusion of testing



Approximate extent of smoke staining to the Rockwool layer

Figure D8 - Damage to the Rockwool layer at the conclusion of testing



Figure D9 – Damage to the exposed side of plasterboard layer at the conclusion of testing



Figure D10 – Undamaged state of the unexposed side of plasterboard layer at the conclusion of testing

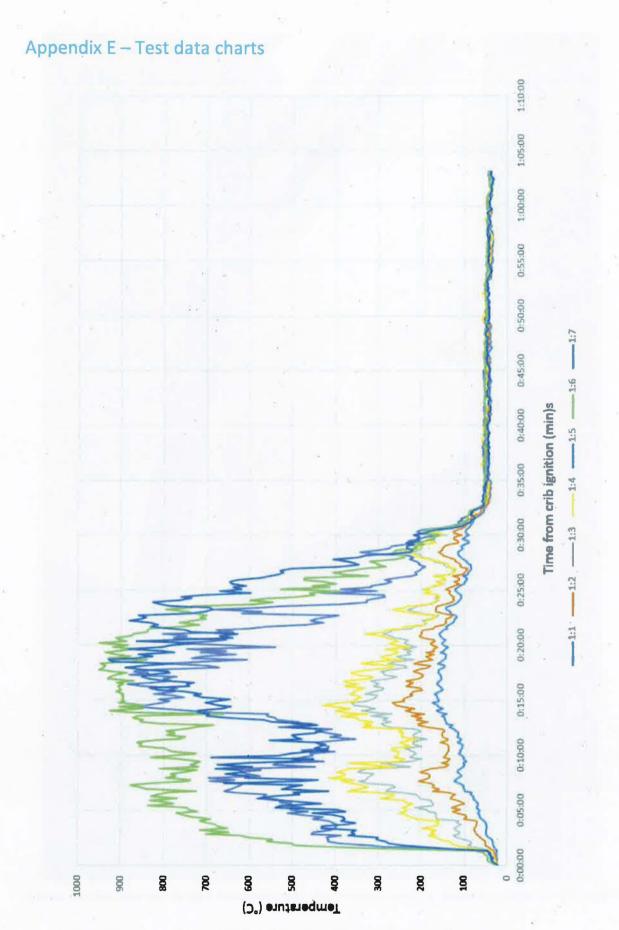


Figure E1 - Level 1, external temperatures vs. time

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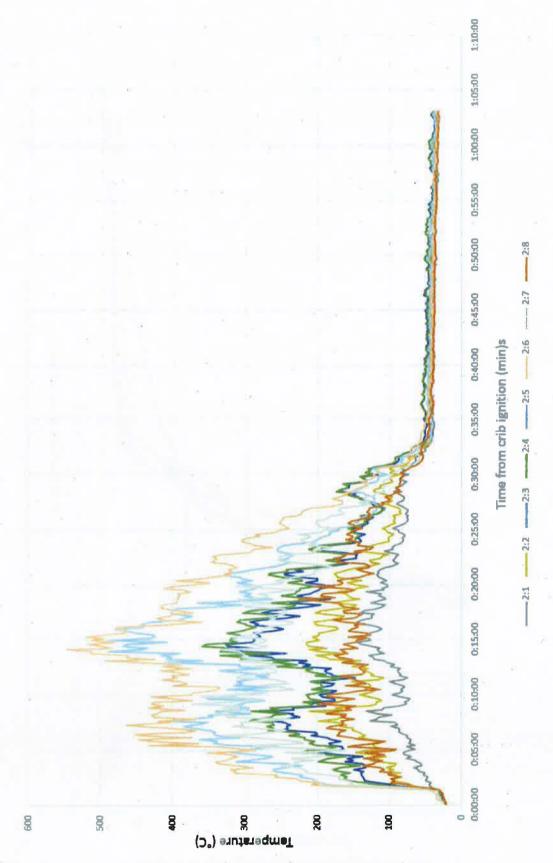


Figure E2 – Level 2, external temperatures vs. time

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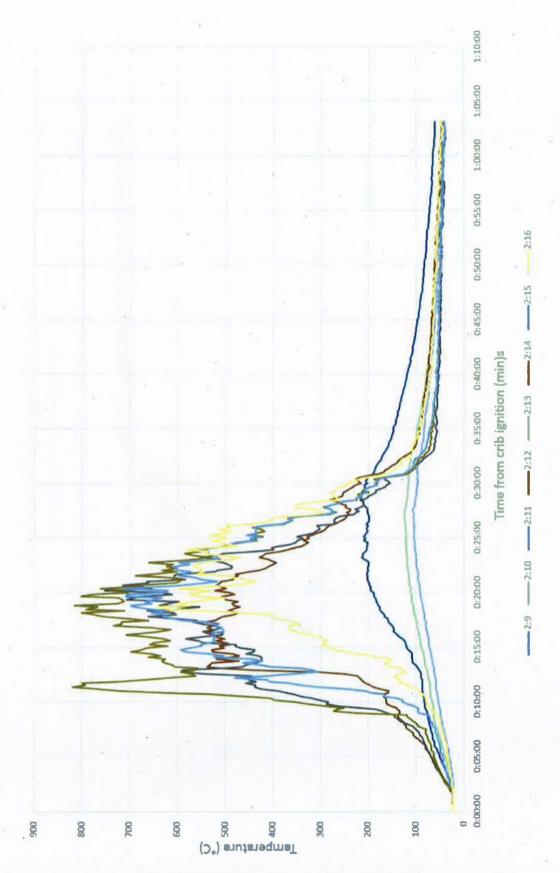


Figure E3 – Level 2, cavity behind Alpolic A2 cladding panel, temperatures vs. time

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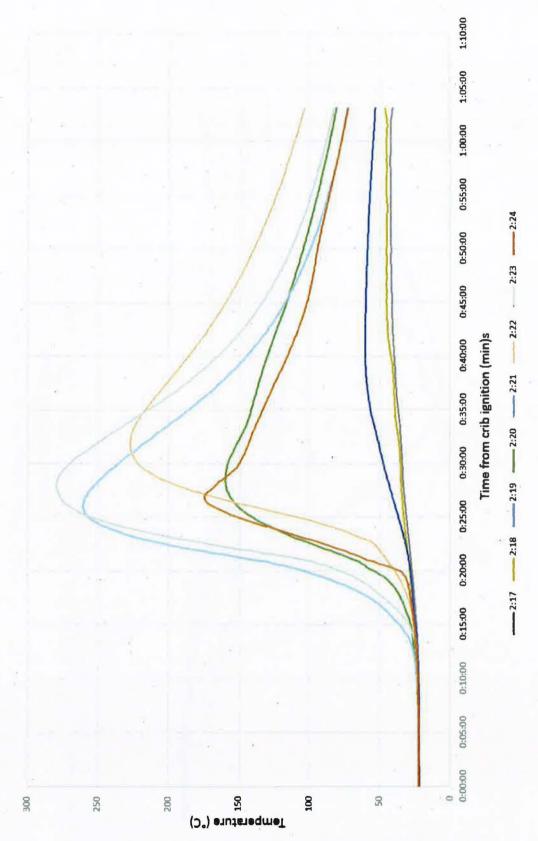
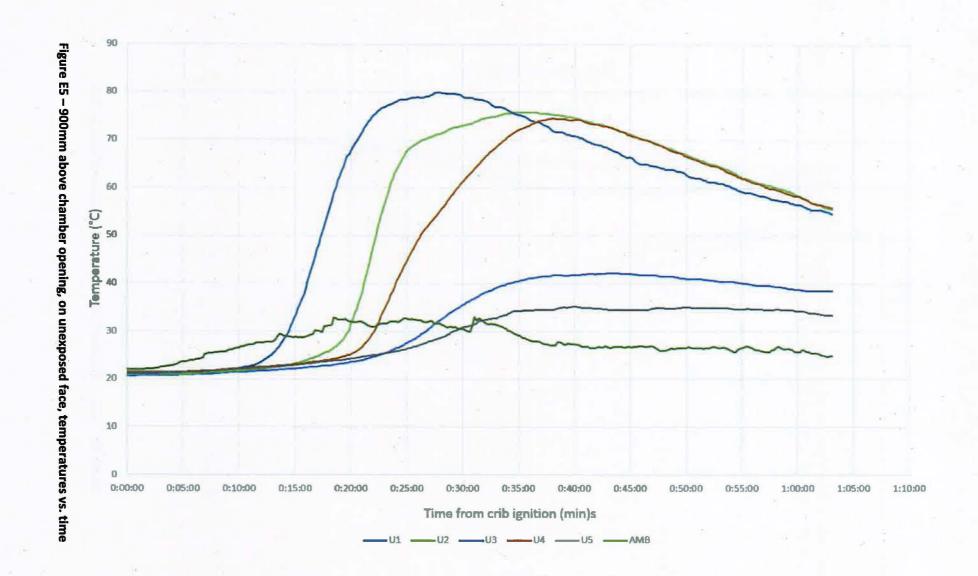


Figure E4 – Level 2, Mid depth of Rockwool layer, temperatures vs. time

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References

The following informative documents are referred to in this Report:

AS 5113:2016 Fire propagation testing and classification of external walls of buildings.

BS 8414-2 Part 2: Test method for non-loadbearing external cladding systems fixed to and

supported by a structural steel frame

END OF REPORT

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FOR FURTHER INFORMATION

Infrastructure Technologies

Brett Roddy

Team Leader, Fire Testing and Assessments

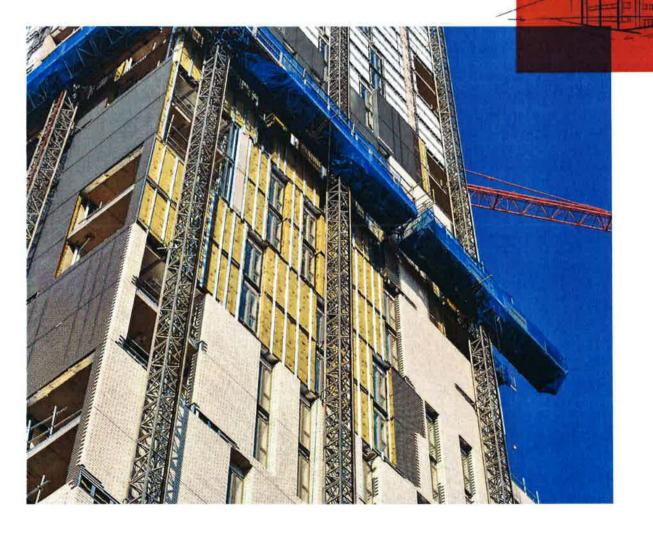
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e brett.roddy@csiro.au

w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx



Non-combustible thermal insulation







- Designed for use on high rise buildings
- Water-repellent: Fibres impregnated with a water-repelling agent during manufacture
- Fewer fixings required for installation compared to standard stone wool slabs
- Robust front face resists damage and over-driving of fixings

Description

RAINSCREEN DUO SLAB is a dual density slab comprising a robust outer surface (designed to withstand the rigours imposed on site), and a resilient inner face (designed to accommodate the substrate to which it is being applied)

The robust outer surface offers improved weather resistance and a more clearly defined cavity width, whilst the resilient inner surface accommodates itself to irregularities in the surface of the substrate, thus maximising thermal performance.

The slabs will knit together when tightly butt jointed so that way extraneous heat loss caused by gaps is eliminated.

This also prevents water transmission through the insulation layer and is proven over 25 years in traditional masonry wall construction.

The slab is designed for use in conditions of severe climatic exposure. Because of its unique dual density construction, the product requires fewer fixings, thus providing a cost-effective solution in overcladding applications.

Standards and approvals

ROCKWOOL RAINSCREEN DUO SLAB has been examined by the British Board of Agrement (BBA) and granted Certificate 17/5402 for use in Ventilated Rainscreen Cladding Systems on both domestic and non-domestic buildings

RAINSCREEN DUO SLAB* satisfies the requirements of BS EN 13162: 2012 – 'Thermal insulation products for buildings – Factory made mineral wool (MW) products – specification'.



RAINSCREEN DUO SLAB®

Effective, non-combustible thermal insulation for ventilated rainscreen and

RAINSCREEN DUO SLAB® is a dual

developed for insulation behind

density slab which has been specifically

rainscreen cladding systems and also for sealed cladding systems such as curtain wall and other over cladding systems.

overcladding applications.

Dimensions

RAINSCREEN DUO SLAB³ satisfies Standard size of 1200 × 600 mm and is available in standard thicknesses from 50 to 180mm. For all other thicknesses please contact ROCKWOOL

Performance

Fire

Rated A1 when tested to EN 13501-1 classification using test data from reaction to fire test

Wind resistance

RAINSCREEN DUO SLAB* fixed as indicated in Figure 1 has successfully undergone wind resistance testing by the Building Research Establishment. Windloading fatigue tests were used to simulate the performance of the slabs when fully exposed and subjected to fluctuating wind loads during the construction stages of buildings. The tests simulated and exceeded the maximum UK basic wind speed of 56 m/s as defined by BS CP3: Chapter 5: Part 2: 1972 Test report BRE G12801

Water resistance

ROCKWOOL stone wool repels liquid water due to its fibre orientation and the presence of water repellent additives.

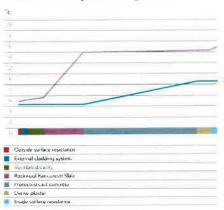
Acoustic performance

The slabs can significantly improve the acoustic performance of the external building structure. Condensation control Vapour resistivity = 5.9 MNs/gm. The slabs, therefore reduce the risk of condensation, allowing natural drying out of the structure. See typical relative humidity / temperature graph above right.

Key Metal floring Polypropylene lixing

Figure 1
Typical fixing pattern with 3 fixings per square metre

Interface/dewpoint temperatures



U-values - RAINSCREEN DUO SLAB® Ventilated Rainscreens

Construction

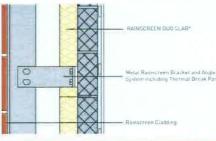
RAINSCREEN DUO SLAB® between Metal Bracket System on 150 mm Reinforced Concrete or dense block wall Internal finishes: (a) plaster (b) plaster/board on dabs

enstruction 2

RAINSCREEN DUO SLAB" on 150min deep metal studs at 600mm centres with 140mm ROCKWOOL FLEXI installed within the frame.

Internal finish Thickness (mm)	U-Values W/m²K	b U-Values W/m²K
125	0.35	0 34
150	0.32	0.31
175	0 28	0.28
200	0.26	0.26
275	0 22	0 22
325	0.20	0.20

Thickness (mm)	ROCKWOOL FLEXI* thickness (mm)	U-Values W/m²K	
75	140	0.25	
100	140	0.22	
125	140	0 20	
150	140	0.18	
180	140	0 17	



Vapour control layer and plasterboard Lightweight metal trami Rainscreen Cladding RAINSCREEN DUO SI AB* Cement particle board ROCKWUOL FLCXI* Metal Rainscreen Bracket, and Anglic System including Thermat Break Pad

Notes for Construction 1:

- Tables based on pointloss scenarios where only the rainscreen brackets bridge the thermal insulation layer.
- A thermal bridging allowance of 0.1 W/m2K has been added to the wall U-value (e.g., a calculated U-value of 0.25 will be increased to 0.35 W/(m2K) to allow for predicted bridging). (Based on data supplied by the BRE using a 5 min thick thermal break paid and brackets at 600 mm x 600 mm fixing matrix).

Notes for Construction 2:

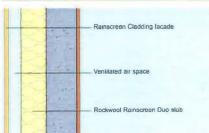
 U-values shown have been calculated with a thermal bridging allowance which has been determined using a 3-Dimensional analysis in accordance with BR443. The systems modelled included 8mm ROCKPANEL Rockclad and FastFrame rainscreen Brackets

ROCKWOOL recommend all U-value calculations for rainscreen application be verifed by the cladding manufacturer utilising 3D thermal modelling software

Construction 3

RAINSCREEN DUO SLAB® between timber rails on 150 mm Dense Concrete or dense block wall. Internal finishes: (a) plaster-Lambda 0 180 W/mk (b) Plasterboard on dabs

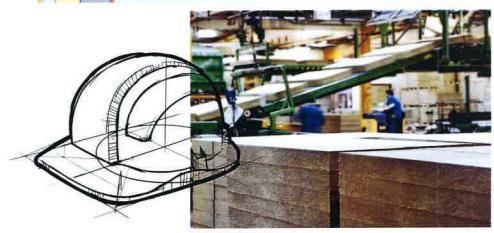
Internal finish	a	Ь	
Thickness (mm)	U-Values W/m²K	U-Values W/m ² K	
100	0.35	0.34	
125	0.29	0.28	
140	0.26	0.26	
150	0.25	0.24	
200	0.19	0.19	
225	0.17	0.17	



Typical specification

Horizontal joints should be staggered and all joints tight butted.

The Slabs should be fixed with the robust (patterned) surface facing outwards.



ROCKWOOL Ltd

ROCKVI

Work on site

Installation

RAINSCREEN DUO SLAB" are light and easy to cut to any shape with a sharp knife. They are shrink wrapped in polyethene and supplied on pallets that are shrouded with a waterproof hood suitable for outside storage. Once installed, due to their robust outer facing surface, the slabs can be left unprotected for an extended period of time prior to fixing the rainscreen cladding.

Workability

Light and easy to handle, the slabs are easy to cut to shape or size with a sharp knife, to suit the cladding system.

Rainscreen cladding – Metal rail systems

To obtain the optimum performance of the system, the Slabs should be applied with the patterned side facing outwards (see Figure 4). The resilient inner layer will accommodate surface irregularities (see Figure 3).

Close butt the slabs at all vertical and horizontal joints.

Stagger the horizontal joints of the insulation in accordance with good fixing practice

Fix using a combination of metal and polypropylene fixings in accordance with the detail shown in Figure 1, Fixings should have a minimum head diameter of 70 mm.

RAINSCREEN DUO SLAB" should be cut and tightly fitted around wall brackets where these occur. See 'Construction 1' on the back page for typical U- values relating to this construction.

Suitable Fixing Munufacturers
Hilti:
ITW Construction Products Ltd :

Eischer

Rainscreen cladding – Timber rail application

The Slabs should be tightly fitted between the treated timber rails prior to the installation of the external cladding boards and mechanically fixed as shown in Figure 2. Provision should be made for a minimum 25 mm ventilated air space behind the cladding boards.

All horizontal joints should be closely butted to optimise the insulation performance.

See 'Construction 3' on the back page for typical U-values relating to this construction.



Figure 2 Typical fixing pattern between treated timber cladding rails

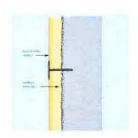


Figure 3 Dual density

Figure 4
Textured outer face of slab

Sustainability

As an environmentally conscious company, ROCKWOOL promotes the sustainable production and use of insulation and is committed to a continuous process of environmental improvement.

All ROCKWOOL products provide outstanding thermal protection as well as four added benefits



Fire resistance



Acoustic comfort





Health & Safety

The safety of ROCKWOOL stone wool is confirmed by current UK and Republic of Ireland health & safety regulations and EU directive 97/69/EC:ROCKWOOL fibers are not classified as a possible human carcinogen.

A Material Safety Data Sheet is available and can be downloaded from www.rockwoul.co.uk to assist in the preparation of risk assessments, as required by the Control of Substances Hazardous to Health Regulations (COSHH).

Environment

Made from a renewable and plentiful naturally occuring resource, ROCKWOOL insulation saves fuel costs and energy in use and relies on trapped air for its thermal properties.

ROCKWOOL insulation does not contain (and has never contained) gases that have ozone depletion potential (ODP) or global warming potential (GWP).

ROCKWOOL is approximately 97% recyclable. For waste ROCKWOOL material that may be generated during installation or at end of life, we are happy to discuss the individual requirements of contractors and users considering returning these materials to our factory for recycling.



Notes:

Interested?

For further information, contact the Technical Solutions Team on or email technical solutions@rockwool.co.uk

Notes:

Notes:

July 2017

ROCKWOOL Limited

Pencoed Bridgend CF35 6NY

Tel:

info@rockwool.co.uk

rockwool.co.uk



PRODUCT INFORMATION



NON-COMBUSTIBLE COMPOSITE PANEL / MANUFACTURED BY FAIRVIEW as deemed by the BCA





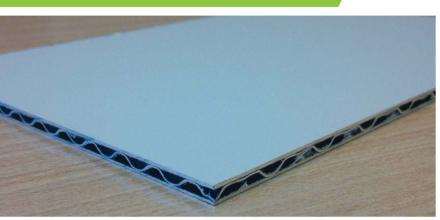




WWW.VALCAN.CO.UK

ABOUT







PRODUCT DESCRIPTION

Manufactured by Fairview; Vitracore Generation 2 (G2), is a deemed non-combustible when tested to EN13501-1 as per the requirements set out in the BCA.

Visually, Vitracore G2 is the same as traditional composite panel; but what makes it different is the technology of the core, which is constructed from an aluminium structure rather than combustible material.

It is the same to fabricate and install as traditional composite panels, and utilises the PPG coating system; thus is available in the same extensive colour range as Vitrabond.

The technology of the core also allows continual production; providing an exceptionally consistent and cost effective product. This high performance panel is ideal for all façade and soffit applications; providing the decisive solution to high demands and requirements.

The benefits of Vitracore G2 include its high mechanical properties and simple fabrication. The outstanding surface flatness of Vitracore is enhanced with a high quality PVDF coating system, which provides optimum resistance to weather and industrial pollutants in an unlimited range of colours, or a selection of natural finishes.

Vitracore G2 can be easily and accurately installed by a pre-made cassette system, requires very minimal maintenance and comes with a 15 year warranty.

KEY BENEFITS

- DEEMED NON-COMBUSTIBLE AS REQUIRED BY THE BCA
- COST EFFECTIVE, LARGE STOCK HOLDINGS & SHORT LEAD TIMES
- 15 YEAR WARRANTY
- TESTED TO EN13501-1

- VISUALLY THE SAME AS TRADITIONAL COMPOSITE PANEL
- IMITATIONS SUCH AS CORTEN
- CORE TECHNOLOGY ALLOWS FOR CONTINUAL PRODUCTION; RESULTING IN AN EXCEPTIONALLY CONSISTENT PRODUCT
- AVAILABLE IN MANY FINISH OPTIONS INCLUDING Solid & Metallic, Natural Copper &Zinc, Stainless Steel, Special Effects Colours, Stone, Timber Look & Natural Metal

FIRE RESISTANCE

In today's Architecture, it is the technical details, as well as the appearance that count; such as sustainability, thermal insulation, and fire protection.

Vitracore G2 is one of the few composite panels globally, that is deemed non-combustible under the Building Control Alliance (BCA) and when tested to EN13501-1, therefore suitable for use on buildings over 18m high.

Visually, Vitracore G2 is the same as traditional composite panel; but what makes it different is the technology of the core, which is constructed from an aluminium structure rather than combustible material such as polyethylene and fire rated mineral. This makes Vitracore G2 the ideal product for all applications where fire resistance is required; be it high-rise buildings, Schools, Hospitals.

As with all building products, the use of Vitracore G2 must be authorised by the regulatory body.

The Fire Resistance standards achieved with standard Vitracore G2 are as follows

	VITRACORE G2
TEST STANDARD	RESULT
EN13501-1	A2-s1, d0



QUALITY



MANUFACTURING QUALITY

A dedication to the total fulfillment of our client's and customer's expectations is reflected by a complete quality control system, beginning at the point of specification and continuing through to delivery of the guaranteed products. All activities are carried out in a manner which:

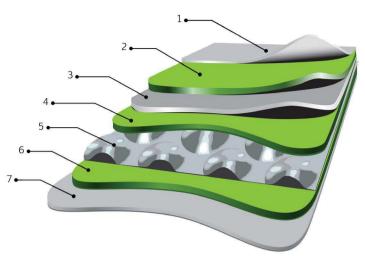
- Uses the framework of ISO9000 Quality Standards to verify the quality of our systems
- Ensures that our products and services are of the highest standards
- Create continuous improvements to our product through the application of the best quality practices.

ACCEPTANCE VARIATION

WIDTH	±2.0 mm
LENGTH	±4.0 mm
THICKNESS	±2% for 3 mm & 4 mm; 3% for 6 mm
BOW MAXIMUM	0.5% of the length and/or width
SQUARENESS MAXIMUM	5.0 mm
SURFACE DEFECTS	The surface shall not have any irregularities such as dents, scratches and other imperfections in accordance with our quality assurance

WARRANTY

The standard warranty is 15 years, with longer warranties available on a project specific basis.



TYPICAL COMPOSITION

- 1. Peel-off Protective Film
- 2. Clear Coating
- 3. PVDF Coloured Coating
- 4. Primer Coating
- 5. 0.7mm Aluminium Skin
- 6. 3mm Profiled Aluminium Core
- 7. 0.5mm Aluminium Skin
- 8. Polyester Anti-corrosion Coating

The composite material is rigid, resistant to blows, breakage and pressure, and has high bending, buckling and breaking strengths.

SKIN & CORE

Aluminium Skins - surface material both sides: 0.7mm faceskin, 0.5mm rear skin. Core Material - Aluminium

DIMENSIONS

WIDTH	LENGTH	THICKNESS	
1250	3200		
	4000	4	
4500	3200 4mm	4mm	
1500	4000		
CUSTOM S	IZES ARE AVAILABLE, PLEASE SPEAK TO THE VALO	CANTEAM	

WEIGHT

THICKNESS	WEIGHT (kg/m2)
4mm	4.4

TECHNICAL DATA

CLASSIFICATION	TEST STANDARD	UNIT	VITRACORE G2
PANEL WEIGHT		[kg/m2]	4.4kg/m2
THICKNESS		[mm]	4
THICKNESS OF ALUMINIUM FACE		[mm]	0.7
WIDTH		[mm]	1220/1500
ALUMINIUM SKIN			
TENSILE STRENGTH			160MPa
ALLOY/TEMPER OF AUMINIUM LAYERS			3003 H24
SURFACE PROPERTIES (PVDF COATINGS)			
DRY FILM THICKNESS (NOMINAL)	ASTM D1400		0.20-0.30 mil primer 0.70-0.80 mil topcoat
GLOSS	ASTM D523		Standard @ 60°: 25-35 Duranar LG @ 85°: <10
PENCIL HARDNESS	ASTM D3363		F-2H
FLEXIBILITY	T-Bend, ASTM D4145		0-2 T-Bend; No pick-off
ADHESION	ASTM D3359 Reverse Impact 1/16' crosshatch		No adhesion loss
REVERSE IMPACT	ASTM D2794		1.5 x Metal thickness (aluminium): No cracking or adhesion loss
ACID RESISTANCE	ASTM D1308		10% Muriatic acid - 24 hrs: No effect
ACID RAIN TEST	Kesternich SO², DIN 50018		15 Cycles min. No objection- able colour change
ALKALI RESISTANCE	ASTM D1308 10%, 25%, NaOH, 1 hr.		No effect
SALT SPRAY RESISTANCE	ASTM B117 5% salt fog @ 95°F		Passes 4000 hrs. Less than 1/1' avg. creepage from scribe; None or few #8 blisters
HUMIDITY RESISTANCE	ASTM D714 ASTM D2247 100% relative humidity @ 95°F		Passes 4000 hrs. No #8 blisters
EXTERIOR EXPOSURE	10 yrs. @ 45°, South Florida ASTM D2244ASTM D4214		Max. 5 fade Max. 8 chalk

FINISHES



STOVE LACQUERING

Vitracore G2 uses only the highly recognised PVDF KYNAR 500 or FEVE paints known for their high durability. These premium paints provide an optimum resistance to weather and industrial pollution. More than 40 years of South Florida Exposure Testing is continuing to confirm the superior chemical and physical properties of fluoro polymer coatings.

Vitracore G2 has unlimited colour, we are able to match any finish, from any colour range.

ANODISING

Vitracore G2 panels come in a range of Anodised finishes, offering both standard and customised colours and textures.

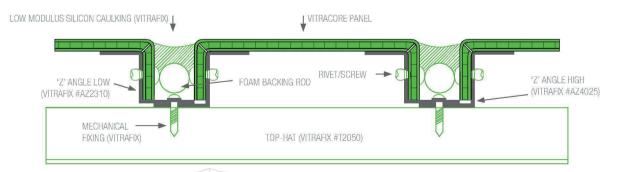
NATURAL FINISHES

Fairview offers the following natural finished panels.

- Vitracore G2/ZN Natural zinc composite panel
- Vitracore G2/CU Natural copper composite panel
- Vitracore G2/SS Stainless Steel composite panel

FIXING SYSTEM

CASSETTE FIX



For more details, please refer to the Vitracore G2 Installation Manual

O F



NON-COMBUSTIBLE COMPOSITE PANEL / MANUFACTURED BY FAIRVIEW as deemed by the BCA

VALCAN LTD PRODUCT RANGE:











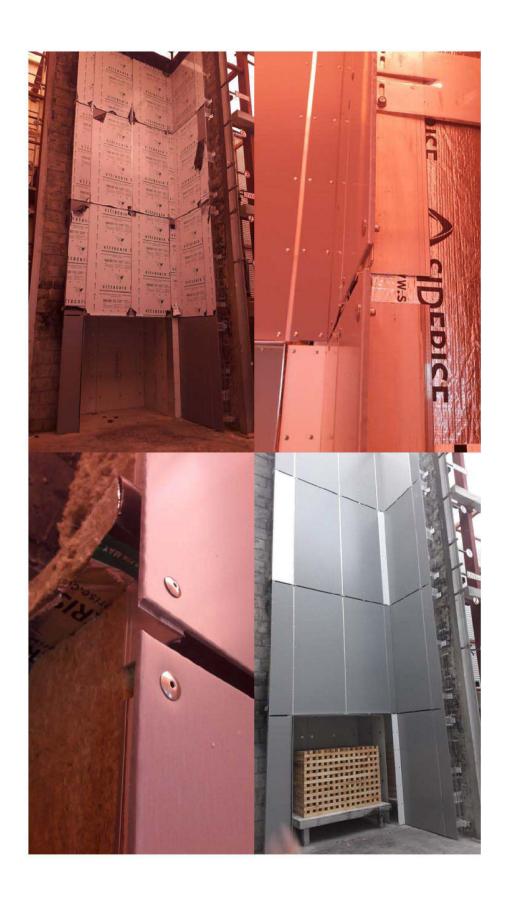


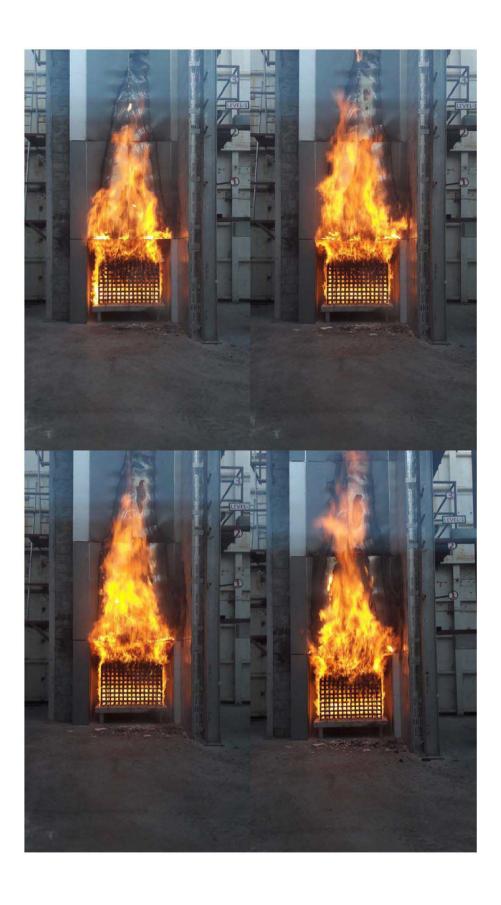




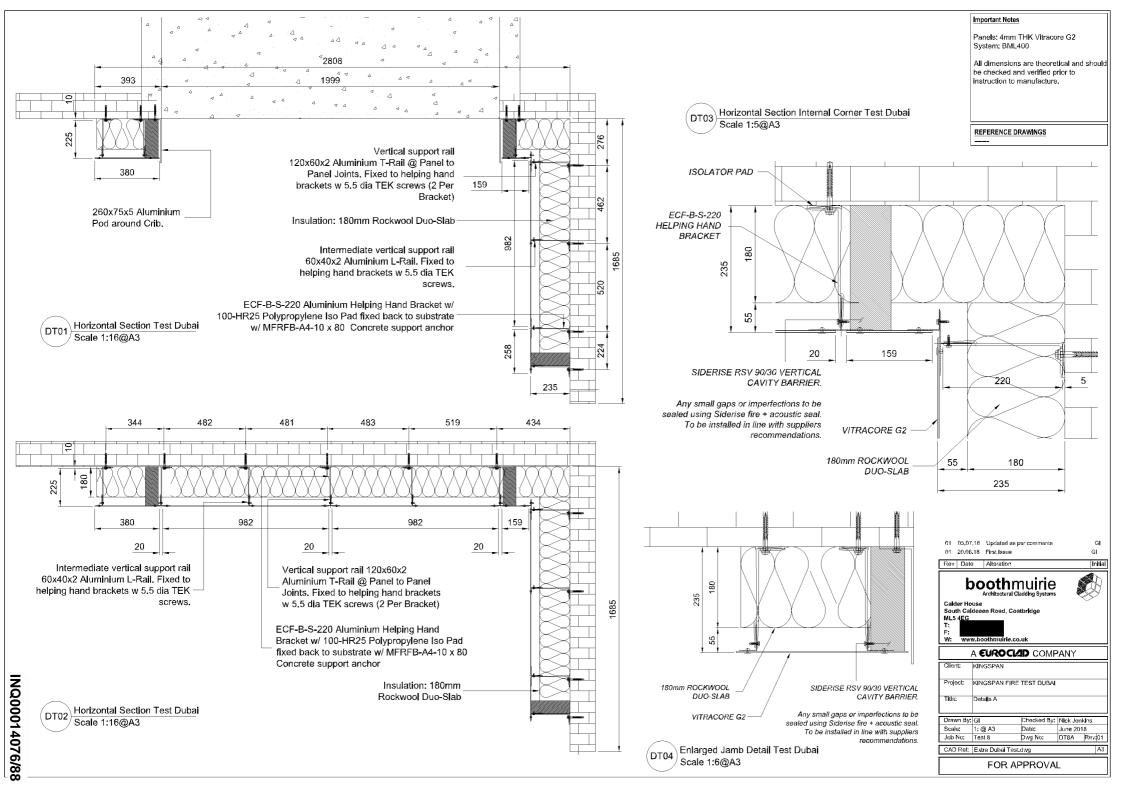


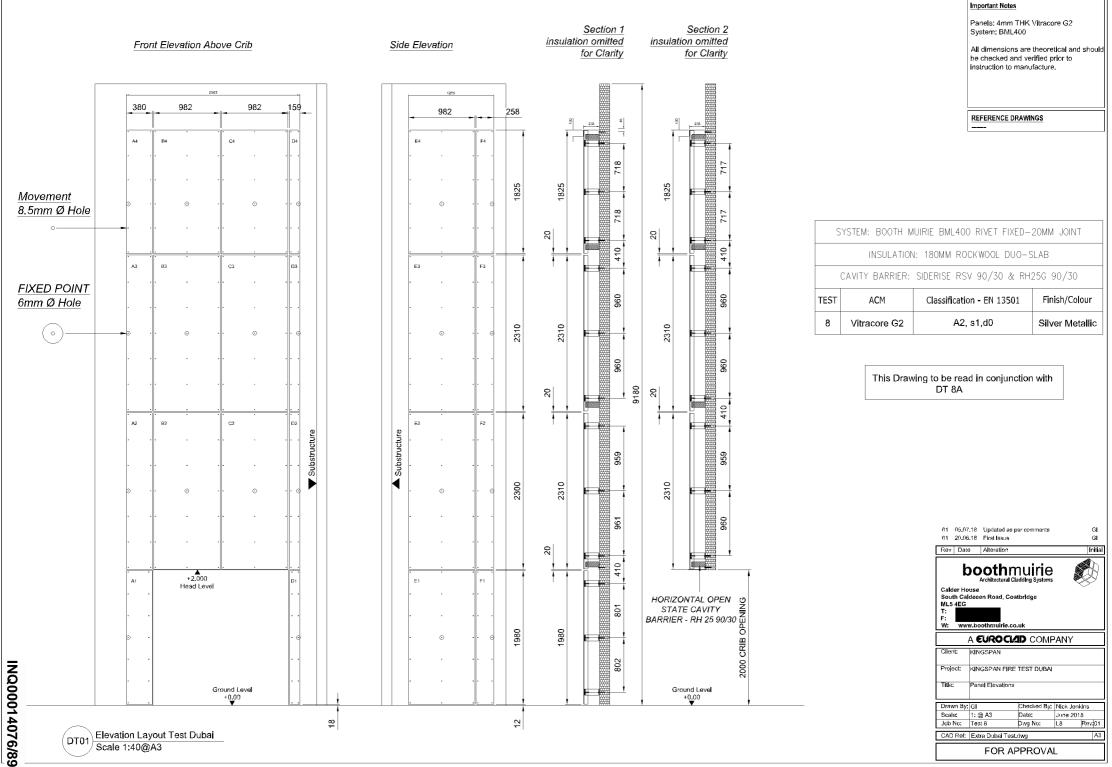














Façade Testing & Advisory Services

05 July 2018

Kingspan Insulation Ltd	Tel. / Fax	By email
Adrian Brazier	Fax ref.	
Arun Kumar Murugan	AFE tel.	8 -
Arun.Kumar@Exova.com	AFE fax	
System Development	Pages	1
BS8414-1 Test - Preliminary Result		
	Adrian Brazier Arun Kumar Murugan Arun.Kumar@Exova.com System Development	Adrian Brazier Fax ref. Arun Kumar Murugan AFE tel. Arun.Kumar@Exova.com AFE fax System Development Pages

Dear Sir,

Reference to the recent test conducted on 02nd July 2018, please find the following preliminary result of the test conducted in accordance with BS 8414-1:2015+A1:2017 and classified as per BR135:2013 Annex A to determine the fire performance of the external cladding system.

The tested sample consisted of an external wall cladding system (Vitracore G2 Composite Panel with 180mm Rockwool Duo Slab Insulation) installed by European Aluminium System on behalf of Kingspan Insulation Ltd.

Test Result:

Parameters	Fire Spread Time, t₅	Result
External fire spread	>15 minutes	Non-compliant

The above results are valid only for the conditions under which the tests were conducted.

These preliminary results are supplied at the request of Kingspan Insulation Ltd. AFE can accept no responsibility for the way in which they may be used/interpreted. A comprehensive report containing the sample details, drawings and the test conditions will be issued shortly.

If you require any further information, please do not hesitate to contact me directly.

Yours faithfully,

Al Futtaim Exova,

Arun Kumar Murugan

Project Engineer - Façade Testing & Advisory Services



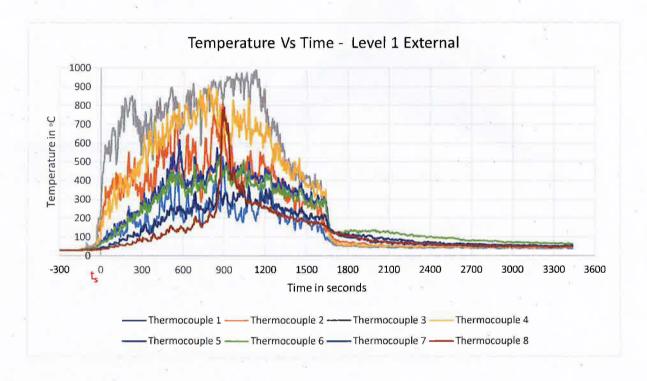
Prepared for: Kingspan Insulation Ltd

Project: System Development

Sample: Vitracore G2 Composite Panel with 180mm Rockwool Duo Slab Insulation

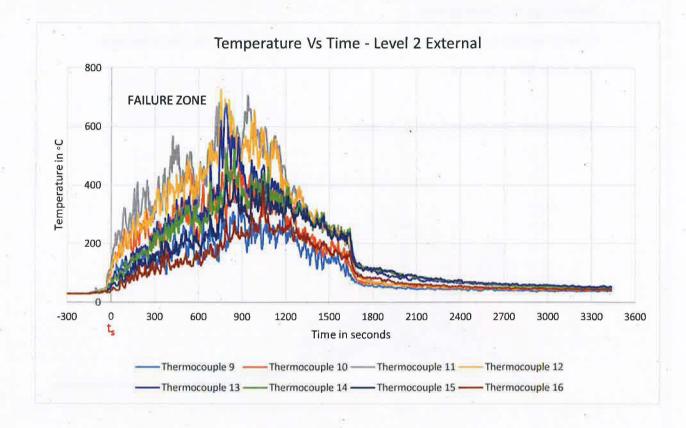
Test date: 02nd July 2018

Thermocouple Readings on Level 1 - External



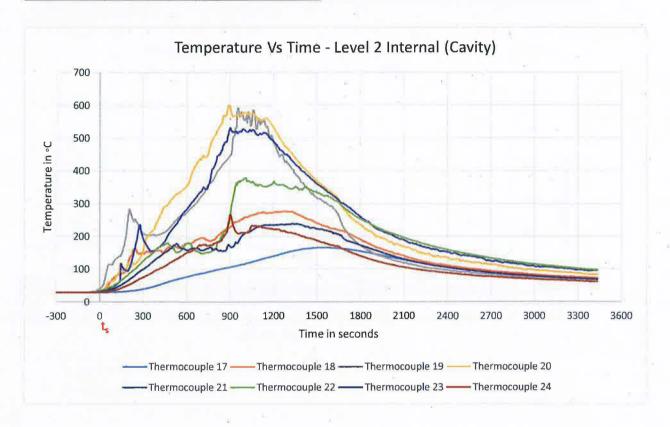


Thermocouple Readings on Level 2 - External





Thermocouple Readings on Level 2 - Internal (Cavity)





Thermocouple Readings on Level 2 - Internal (Mid-depth of 180mm Rockwool Duo Slab Insulation)

