Fire Protection Association

SYSTEM BRIEF DETAIL

Test report detailing the testing and classification of an aluminium rainscreen façade system with mineral wool insulation tested in accordance with the requirement as described in British Standard 8414

CUSTOMER TEST REPORT

UKAS TESTING
10536

BS 8414-2:2015+A1:2017 Test Report with Classification in Accordance with BR135

Prepared by:
The Fire Protection Association
London Road
Moreton-in-Marsh
Gloucestershire
GL56 9LH

Prepared for:
Siderise Insulation
Knauf Insulation
Sotech

Report Date(s): 14th August 2020

Report Reference: 102217.8414

Version number: 2.0

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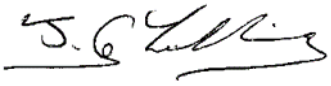
FPA
Fire Protection Association

UKAS TESTING
10536

Review

Approval	Name	Date
Author	Tim Cansiz	27/05/2020
Reviewed and authorised by	Dr James L.D. Glockling	01/06/2020
Reviewer/authoriser's signature		

Distribution

Name	Company
Steven Swales	Siderise Insulation
Chris Hall	Siderise Insulation
Graham Laws	Siderise Insulation
Chris Mort	Siderise Insulation
Mike Leonard	Building Alliance

Document version history

Version	Date	Superseded documents/description/details
1.0	04/06/2020	Initial Release
2.0	14/08/2020	Updated to reflect project contractual changes

Disclaimer

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- *This report may only be distributed in its entirety, without amendment.*
- *Results presented relate only to the specimens tested.*
- *FPA takes no responsibility for the design, materials, workmanship or performance of the product tested.*
- *The report is simply a demonstration report, and does not constitute an approval, certification or endorsement of the products tested.*
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- *The report does not imply that FPA believe the BS8414 test regime alone is appropriate for the guarantee of end-use system performance.*

Contents

1 Introduction

The test method, BS 8414-2:2015+A1:2017 describes a method of assessing the behaviour of non-load bearing external cladding systems, rain screen over cladding systems and external wall insulation systems when applied to the face of the building and exposed to an external fire under exposed conditions. The fire exposure is claimed to be representative of an external fire source or a fully developed (post-flashover) fire in a room, venting through an opening such as a window aperture that exposes the cladding to the effects of external flames.

This report applies to the cladding system as detailed. The report only covers the details as tested.

The test method does not cover the performance of glazed window openings or the detailing at such openings. It does not apply to curtain walling systems or systems that include glass panels.

Performance Criteria and Classification methodology of the external fire performance covered by this test can be found in report *BR 135: Fire performance of external thermal insulation for walls of multi -storey buildings.*

2 Details of the test carried out

Name of Test House:	Fire Protection Association Ltd
Test House Address:	London Road Moreton-in-Marsh Gloucestershire GL56 0RH
Test reference:	102217.002
Date of Test:	26/02/2020
Sponsor(s):	Siderise Insulation Ltd Knauf Insulation Ltd Sotech Ltd

Sponsor Address(es):	Siderise Insulation Ltd Forge Industrial Estate Bridgend CF34 0AH	Knauf Insulation Ltd Stafford Road St Helens Merseyside WA10 3NS	Sotech Ltd Unit 2, Whitehouse Business Park Peterlee County Durham SR8 2RU

Method:	Tested in accordance with BS 8414-2:2015+A1:2017
Deviations:	None

3 Details of test apparatus used (BS 8414-2:2015+A1:2017)

The apparatus is defined in the Test Standard [1] and consists of a steel frame structure that forms a vertical main test wall and a vertical return wall at a 90° angle at one end of the main test wall as shown in Figure 1. The main wall includes the combustion chamber.

Aside from apparatus described above, and the applied fuel, all additional items used to form the built up 'system' are considered part of the cladding system under test.

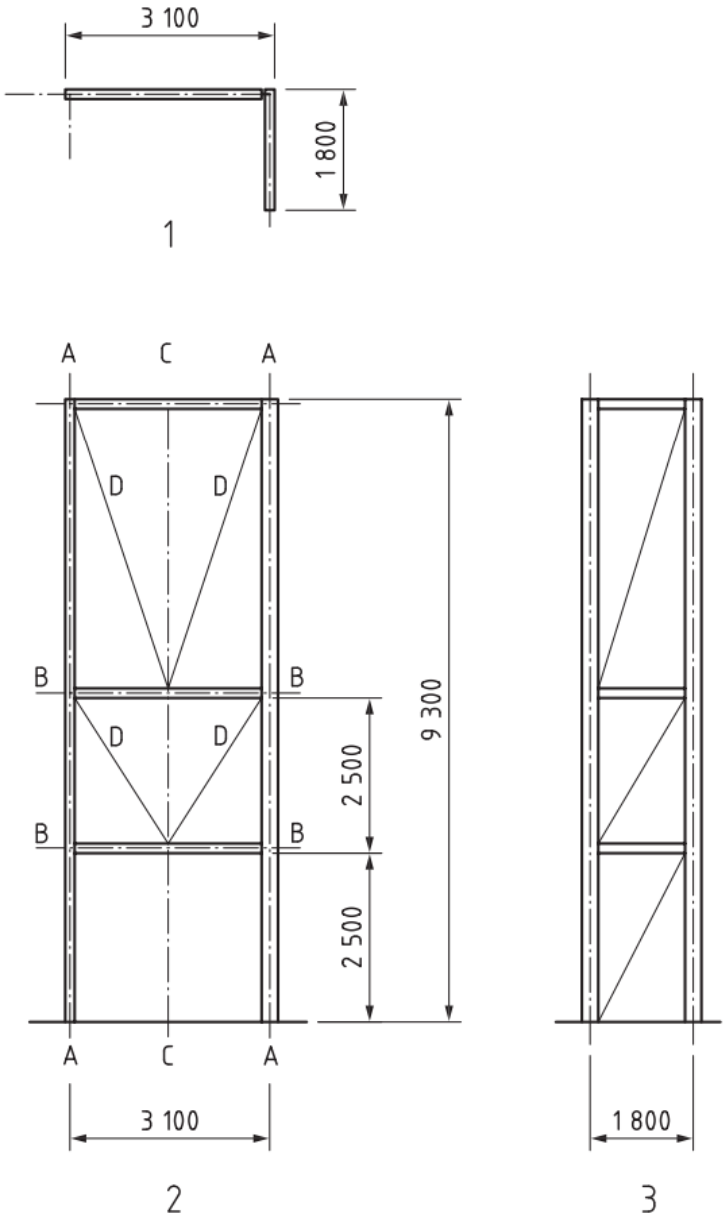


Figure 1 - Test apparatus dimensions [As specified by test Standard Figure B.1]

4 Description of the system under test

Aside from apparatus described in Section 3, and the applied fuel, all additional items used to form the built-up 'system' are considered part of the cladding system under test with the potential to impact upon its overall performance. These include, but might not be limited to:

- Panels
- Insulation
- Cavity barriers and their rating
- Bracketry
- All fixtures and fittings
- Window / aperture material specification
- Vapour and breather membranes

Similarly, many assumed design factors pertinent to the installation might also contribute to overall performance such as:

- The building substrate
- Method of panel attachment
- Form of panel
- Insulation thickness / rating
- Void size behind panel
- Panel spacing (gap between panel edges)
- Distance between cavity barriers
- Cavity barrier locations
- Type of cavity barrier used
- Assumed window detailing – recessed or flush

Some elements of a cladding system are not by default tested through this test regime which again have the potential to be important to overall performance such as:

- Provision of breaches within the system, such as vents
- Provision of vapour and breather membranes

Expert consideration of all assumed test design factors will need to be made when using the test data to confirm end-use suitability where deviation in the material specification or design detailing from the as-tested design may exist.

4.1 Description of product

4.1.1 Structural Steel Frame

- 150mm Kingframe SFS
  - Fixed to test rig steelwork with Hilti S-MD 05GZ 5.5x50
  - Fixed together with Hilti S-MD 03ZW 5.5x25
  - Knauf Mineral Wool insulation infilled between Kingframe sections

4.1.2 Sheathing Board

- 12.5mm Siniat Weather Defence Board
  - Fixed using Gtec Wet Area self-drilling screws
  - 200 joints sealed using Gtec fire rated silicon sealant

4.1.3 Cavity Barriers

- Siderise RH25G-90/30 Horizontal Fire Barrier
  - Fixed using Siderise galvanised steel support brackets and Hilti S-MD 03S 5.5x32 fixings
  - Siderise OCI Cassette Insert bonded to inside of panel to coincide with Horizontal Fire Barrier
- Siderise RV-90/30 Vertical Fire Barrier
  - Fixed using Siderise galvanised steel support brackets and Hilti S-MD 03s 5.5x32 fixings

4.1.4 Insulation

- Knauf 180mm Rainscreen Mineral Wool insulation
  - Fixed using Hilti S-ID 01LSS 4.8x210 fixings and Hilti S-IW 4.9 64x64 Steel plates

4.1.5 Rails & Helping Hand Bracketry

- Hilti MFT-MFI-185-L-6.5 or MFT-MFI-180-L-6.5
  - Fixed using Hilti S-MD 53s 5.5x63 fixings
- Bolted ‘Optima TFC+’ Carrier Rails
  - Fixed to Nvelope brackets using Hilti S-AD 01S 5.5x19 fixings

4.1.6 Façade Panels

- Sotech 3mm PPC Aluminium ‘Optima TFC+’ Panel System
  - Hilti S-AD 01s 5.5x22 Anti Lift Fixings

4.2 Test Specimen

4.2.1 Installation of specimen

The design, installation, procurement and specification of the materials of the cladding system were undertaken by the test sponsor. It was the responsibility of the test sponsor to ensure that all components were install as per the manufacturer's guidelines.

Figure 2 – Completed test specimen prior to test start

4.2.2 Measurements of system installed

Wall component	Requirement for BS8414-2	Actual measurement
Width of main wall	≥ 2600mm	2810mm
Width of return wall	≥ 1500mm	1605mm
Combustion chamber opening height	2000mm ±100mm	2120mm
Combustion chamber opening width	2000mm ±100mm	1980mm
Jamb of combustion chamber to the front face of return wall	260mm ±100mm	329mm

4.3 Test conditions

Test date:	26/02/2020
Ambient temperature:	6˚C
Wind speed:	0.1 m/s
Frequency of measurement:	All temperature measurements recorded at 0.2 Hz
Fuel load:	300m softwood pinus silvestris 50mm x 50mm sticks arranged in a stacked crib
Ignition package:	16 strips of low density fibreboard, 25mm x 12mm x 1000mm. Uniformly soaked in 5 litres of white sprit.
Fuel load density: *(average of 4 randomly selected crib sticks)*	0.51 kg/dm^3
Fuel load moisture content: *(average of 4 randomly selected crib sticks)*	12.2%

5 Test results

5.1 Fire spread and start time

Test results for the evaluation of fire spread and start time are detailed in the tables below. Temperature profiles recorded during the test are shown in Figure 3 to Figure 6.

Table 1 – Start temperature and start time

Parameter	Result
T_s, Start temperature – the mean temperature of the thermocouples at level 1 during the 5 minutes before ignition	6.7 ˚C
t_s, Start time – the time when the temperature of any external thermocouple at level 1 equals or exceeds a 200 ˚C temperature rise above T_s, and remains above this value for at least 30 seconds	135 seconds after ignition of the crib

Table 2 – Peak temperatures measured by level 2 thermocouples within 15 minutes of start time (t_s)

External fire spread								
Level 2, external thermocouples								
Thermocouple ID	1A	2A	3A	4A	5A	6A	7A	8A
Peak temperature (˚C)	196.0	286.1	321.8	285.5	199.0	169.2	153.5	144.2
Internal fire spread								
Level 2, thermocouples in cavity								
Thermocouple ID	1B	2B	3B	4B	5B	6B	7B	8B
Peak temperature (˚C)	84.6	107.3	196.3	158.8	116.9	79.7	113.8	53.3
Level 2, thermocouples in insulation								
Thermocouple ID	1C	2C	3C	4C	5C	6C	7C	8C
Peak temperature (˚C)	3.1	3.2	39.0	3.6	4.3	3.1	3.3	6.0

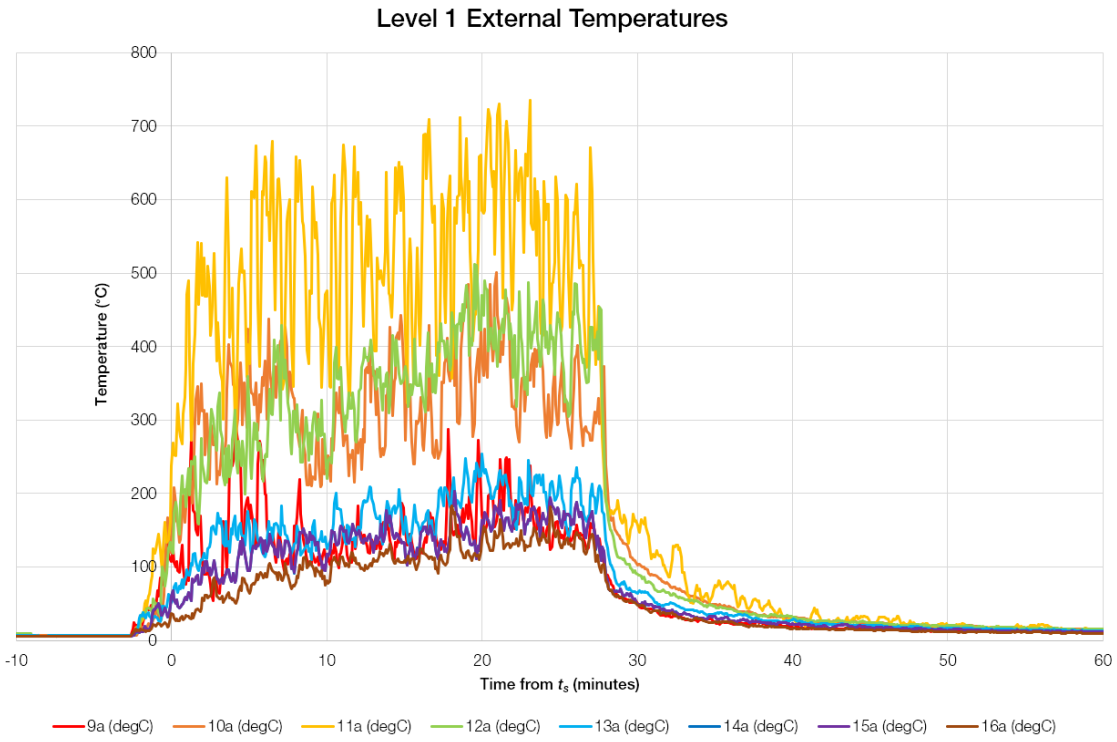


Figure 3 – External temperatures at level 1

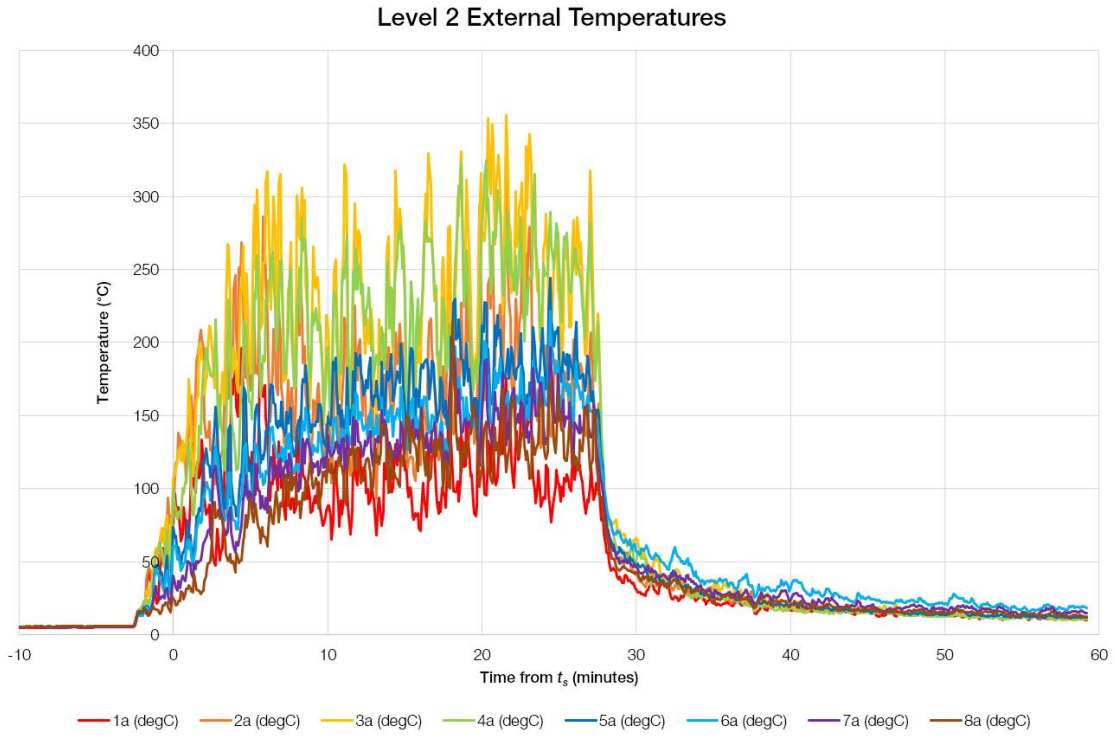


Figure 4 – External temperatures at level 2

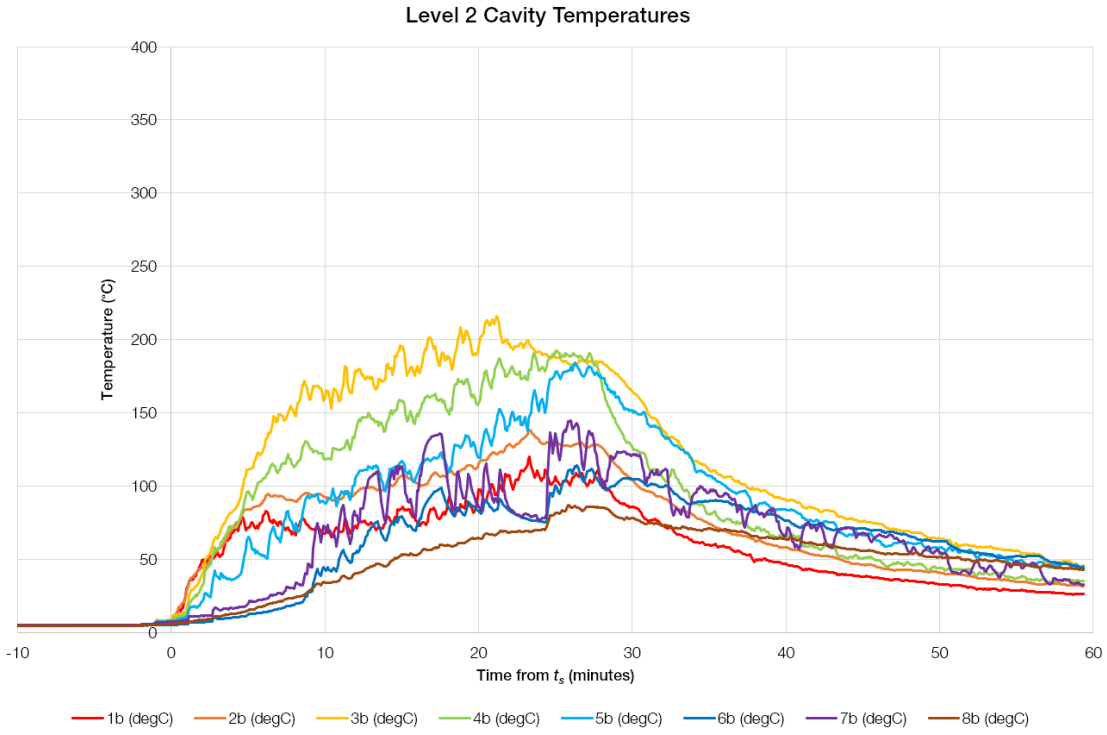


Figure 5 – Cavity internal temperatures at level 2

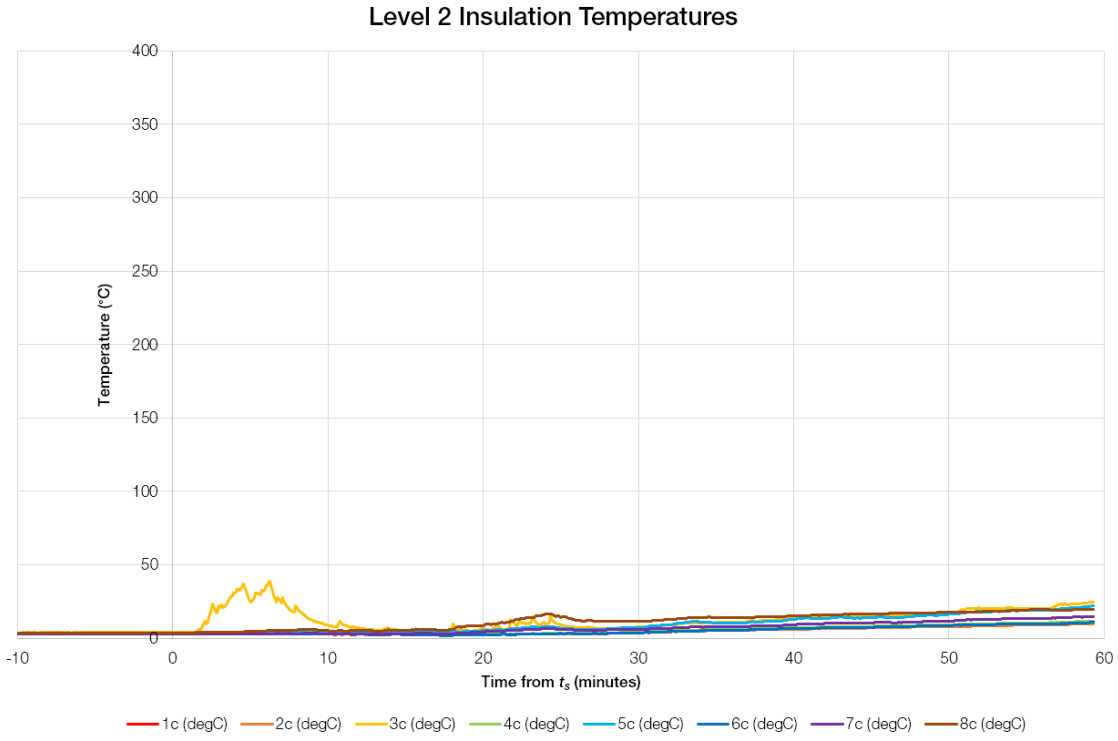


Figure 6 – Insulation internal temperatures at level 2

5.2 Visual observations

Visual observations from direct observation are detailed in the table below.
(Where direct observation was unsafe and to augment direct observations, visual observation of test video was also used).

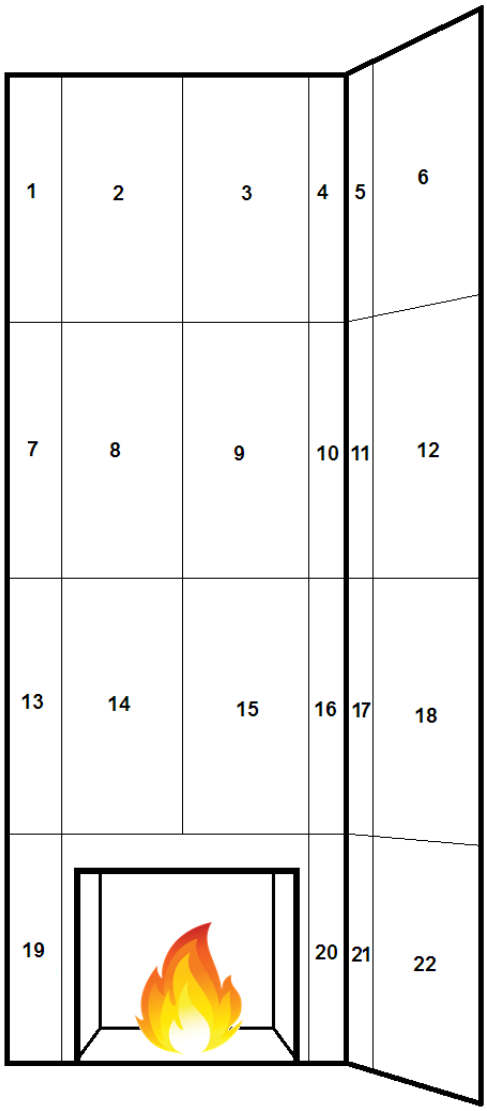


Figure 7 – Façade Panel Numbering

Table 4 – Key tests times and visual observations.

Time from ignition (mins:secs)	Description
-10:30	Datalogger and video recording started
-09:30	Stopwatch started
-04:00	Fibreboard sticks inserted into crib
00:00	Ignition of crib
00:10	Ignition complete
01:05	Flames reach lintel height
02:15	t_s temperature point reached at Level 1
04.30	Panel around burn chamber reveal starting to warp
05.50	Smoke emerging from behind panels 2 & 3
06.15	Panels 14 & 15 warped, with visible flaming behind
07.20	Panel covering lintel area melting/degrading, pieces of debris falling – 1-20 cm
09.00	Panel 15 begins visibly melting
11.10	Piece of debris ~30 cm, falls from around panel 14
16.40	Piece of debris ~70 cm, falls from around panel 14
24.10	Popping sounds begin
28.00	Popping sounds continue
30:05	Crib extinguishment commences
30:10	Burn chamber water sprays on
30:35	Remote suppression branch on
34:00	No further flaming observed
40:00	Water supply switched off
60:00	Test Complete

5.3 Test Footage

The test was filmed using the FPA's SANCE CCTV system in the test chamber. The following images (Figure 8 to Figure 15) are screenshots taken directly from the footage recorded of the test.

Figure 8 – Ignition of fuel source

Figure 9 – 05:00 after ignition

Figure 10 – 10:00 after ignition

Figure 11 – 15:00 after ignition

Figure 12 – 20:00 after ignition

Figure 13 – 25:00 after ignition

Figure 14 – 30:00 after ignition

Figure 15 – Test End

5.4 Mechanical Performance

5.4.1 Sheathing Board

Minor scorching was observed on the sheathing boards around the burn chamber opening, and further small signs of heat damage were found further up the wall, however this was not found to affect the structural integrity of the boards.

5.4.2 Cavity Barriers

The horizontal cavity barriers appeared to have operated as intended, preventing the vertical spread of fire.

No flaming or fire spread was observed on the wing wall.

5.4.3 Insulation

Minor discolouration was observed on the rockwool insulation, however there was no evidence of fire breaking through the insulation layer.

There was no evidence of the insulation contributing to the spread of fire.

5.4.4 Rails & Helping Hand Bracketry

The brackets and rails had melted away in the areas that suffered direct flame impingement from the fuel source, however all other rails maintained structural integrity and none of the façade panels became loose or fell during the test.

5.4.5 Façade Panels

Initially the painted finish of the panels briefly flared up and then burned away, exposing the bare aluminium. The aluminium then melted away in the regions that suffered direct flame impingement from the fuel source.

Heat discolouration was noted on the panels above those that melted, as well as on the wing wall, however all panels remained attached to the rails.

There was no evidence of the façade panels contributing to the spread of fire.

6 Disclaimers

- The FPA is responsible for all the information provided in this report, except when information is provided by the customer.
- The FPA is not responsible for the validity of results that rely on information supplied by the customer.
- The customer is responsible for providing the installed system for test (‘the sample’). Therefore, the results contained within this report apply to the sample as received.

7 References

[1] British Standards Institute, “BS 8414-2:2015+A1:2017, Fire performance or external cladding systems – Part 2: Test method for non-loadbearing external cladding systems fixed to supported by a structural steel frame,” British Standards Institute, London, 2017.

[2] S. Colewell and T. Baker, “BR135 Fire performance of external thermal insulation for walls of multistorey buildings, Third Edition,” HIS BRE Press, Watford, 2013.

8 Appendix A – Location of thermocouples on test wall

Figure 16 – Thermocouple locations on the test wall

9 Appendix B – Installation process

Figure 17 – SFS framework installed

Figure 18 – Mineral wool infill in the SFS

Figure 19 – Sheathing board and bracketry installed

Figure 20 – Cavity barriers installed

Figure 21 – Finished specimen with rainscreen attached

10 Appendix C – Post-test photographs

Figure 22 – Rainscreen removed, scorching observed between cavity barriers

Figure 23 – Intumescent activation on cavity barriers clear to see, metal fixings for insulation all in place

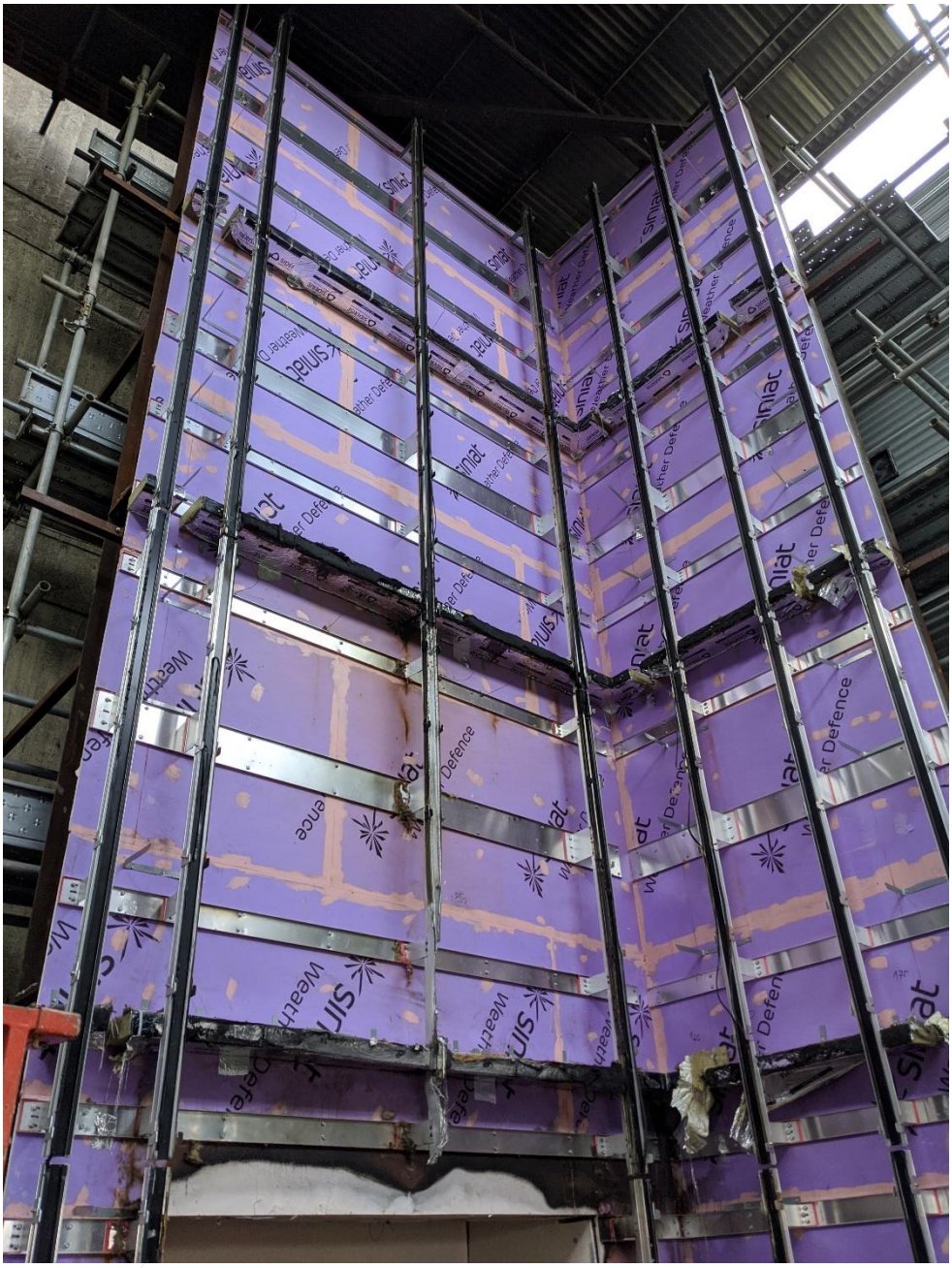
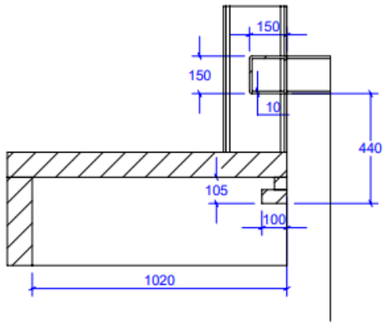


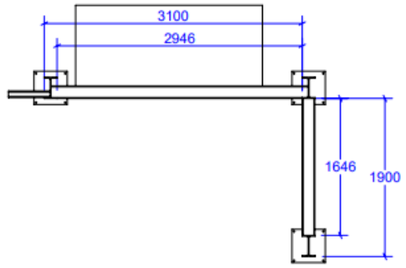
Figure 24 – Insulation removed, light scorch marks on sheathing boards visible and damage to vertical rails clearer

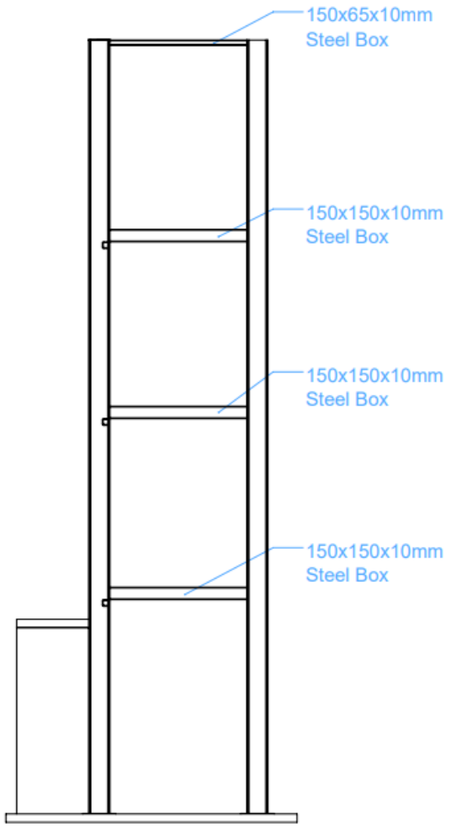
Figure 25 – Further detail of damage to vertical rails, both above and below lower cavity barriers

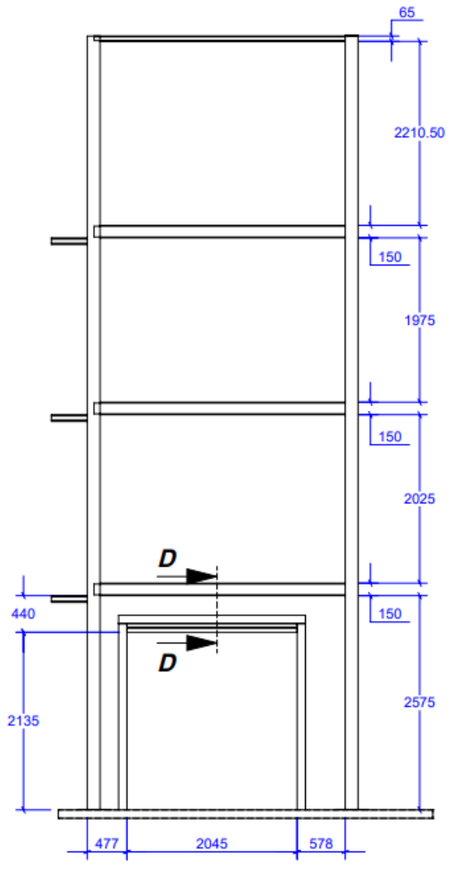
11 Appendix D – System Drawings

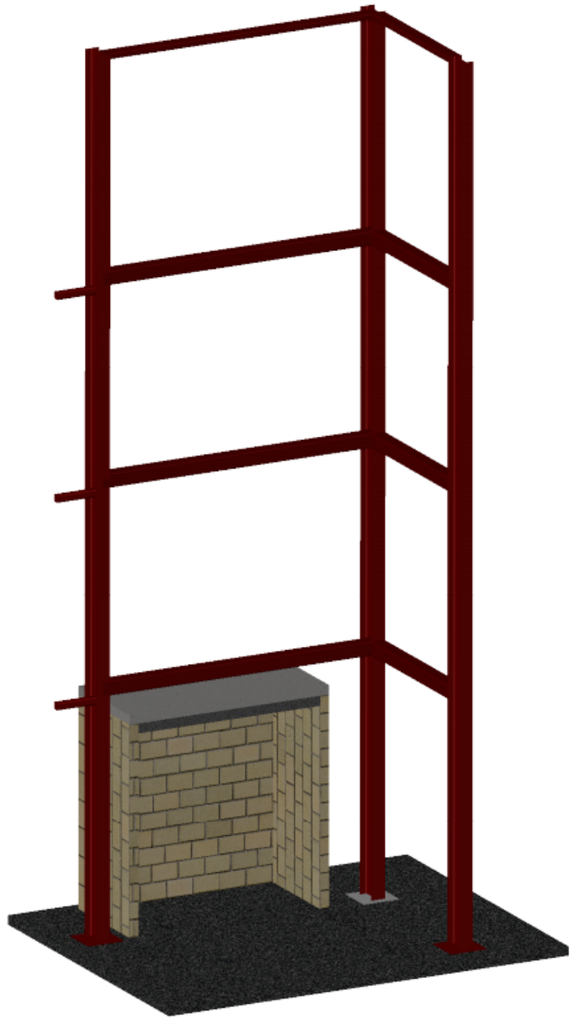


SECTION D-D
(Furnace Head)









DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: FPA Rig Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

SOTECH
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

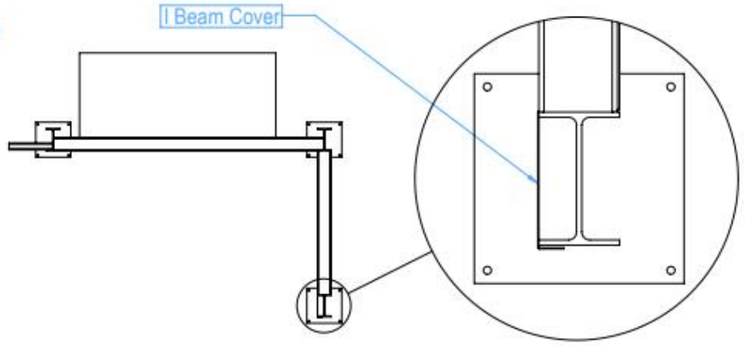
Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

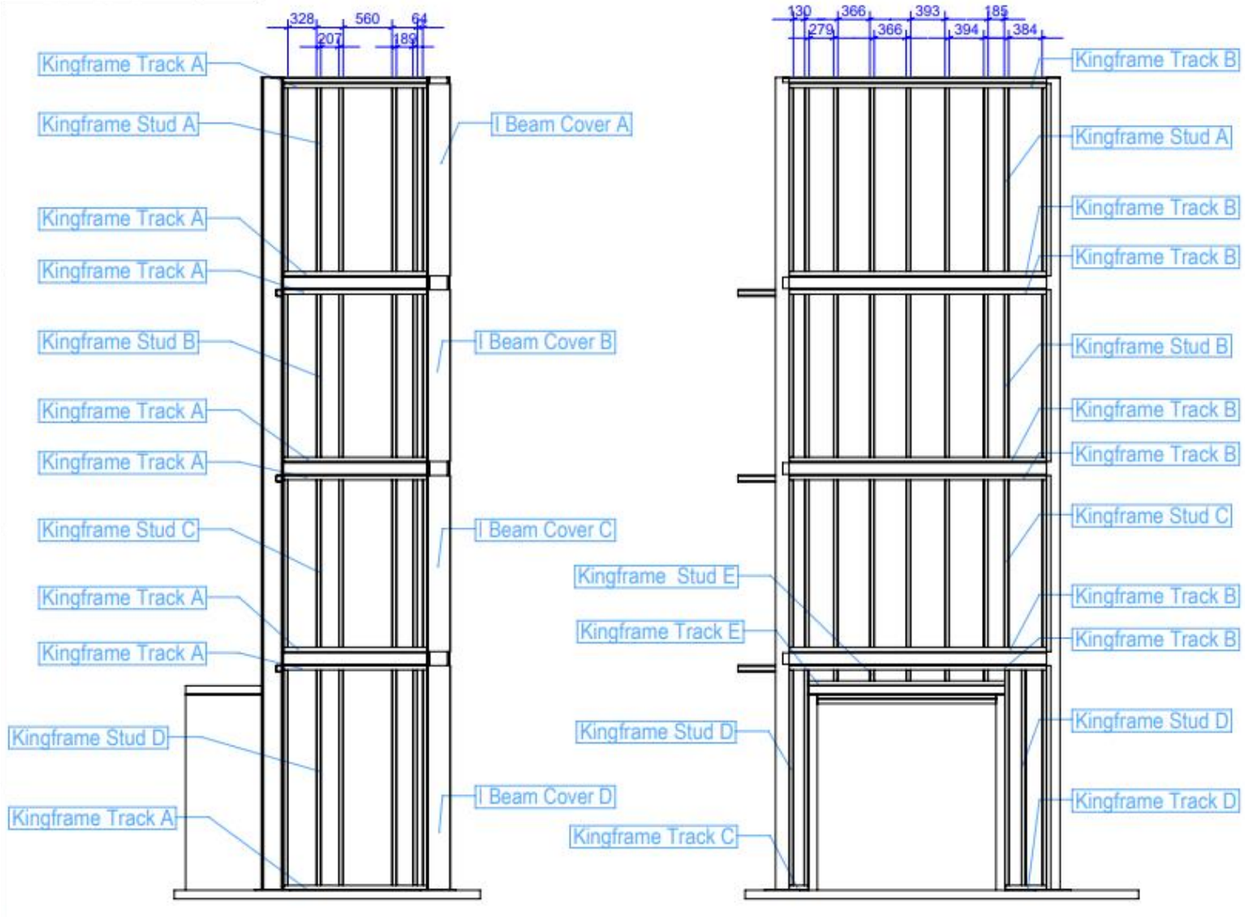
SHEET: 1 OF: 10

SW-Configuration Name(Configuration Name)	QTY.
Kingframe Track B	7
Kingframe Track A	8
Kingframe Track E	1
Kingframe Track C	1
Kingframe Track D	1
Kingframe Stud C	15
Kingframe Stud D	11
Kingframe Stud B	15
Kingframe Stud A	15
Kingframe Stud E	5
I Beam Cover A	1
I Beam Cover B	1
I Beam Cover C	1
I Beam Cover D	1

Kingframe SFS Fixed to 10mm Steel Box using
Hilti S-MD 05GZ 5.5x50

Kingframe SFS fixed together using
Hilti S-MD03ZW 5.5x25





SHEET: 2 OF: 10

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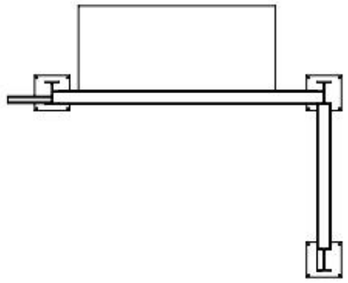
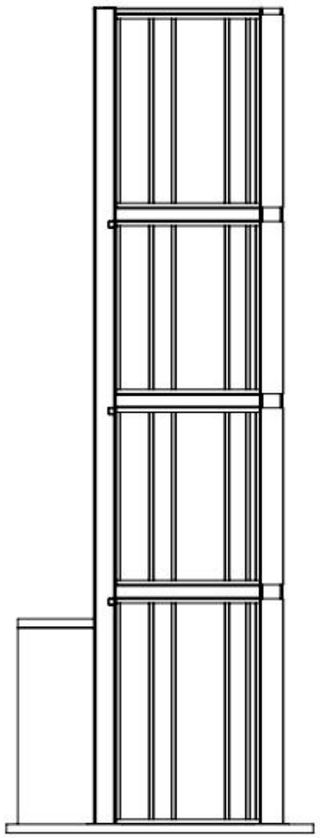
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

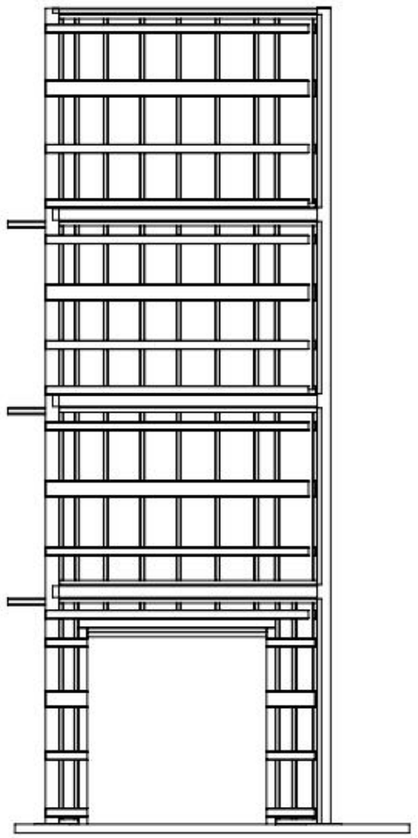
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: Kingframe Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

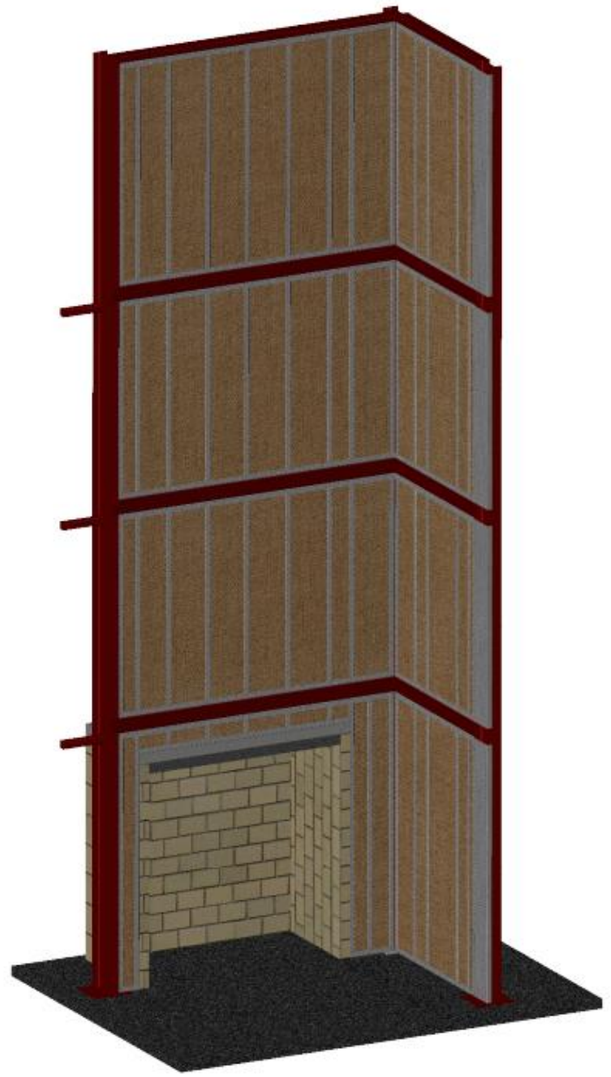
Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

Knauf Rainscreen Slab fitted between Kingframe sections









SOTECH

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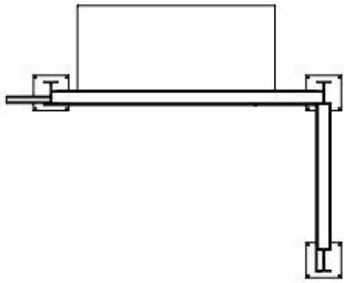
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: Knauf Insulation Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

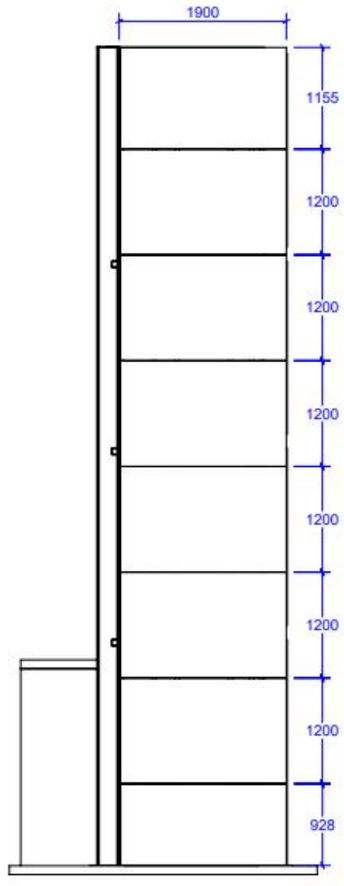
Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

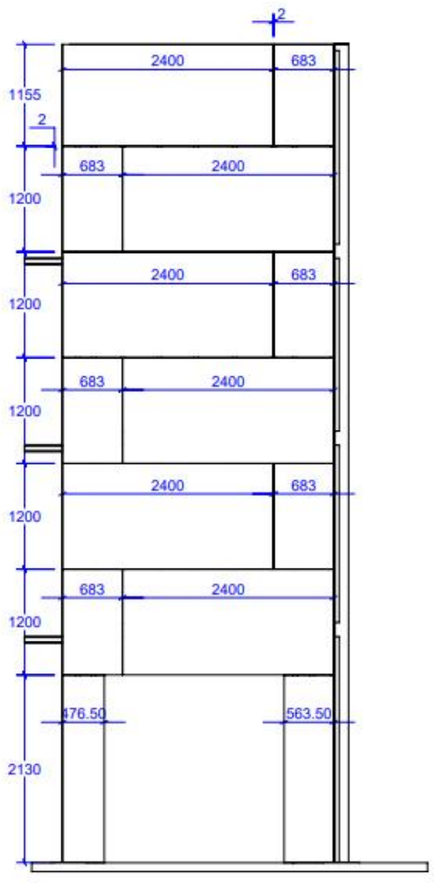
SHEET: 3 OF: 10

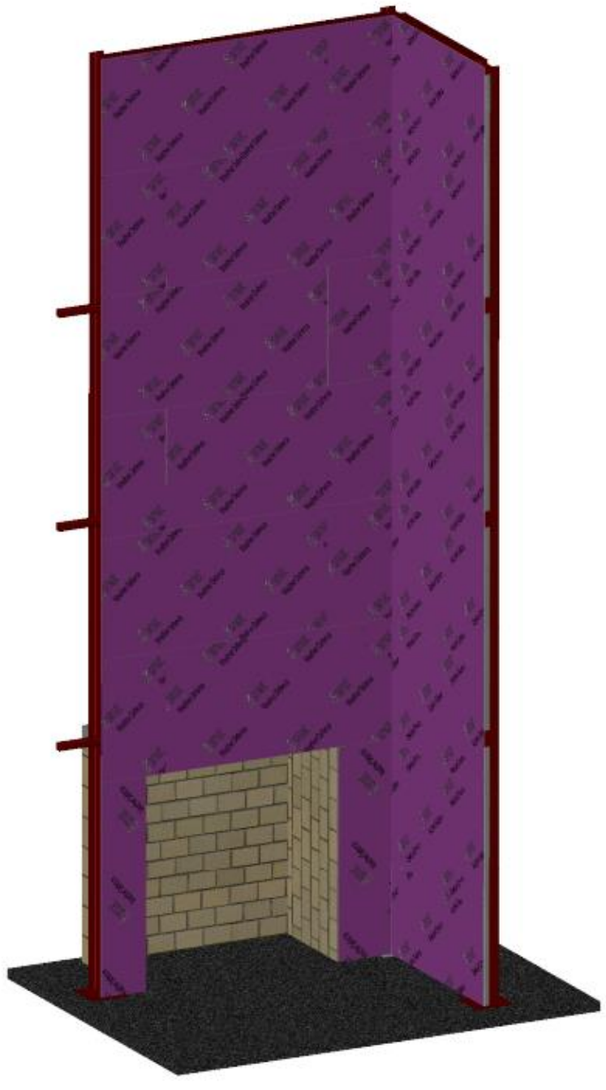
Siniat board fixed to Kingframe SFS using **GTEC Wet Area Self Drilling Screws**

2mm gaps between boards filled with **GTEC Fire Rated Silicon Sealant**









SOTECH

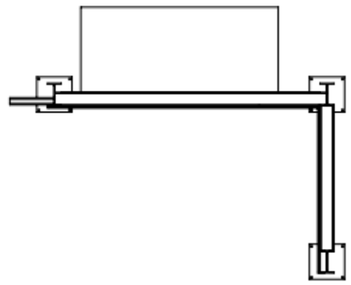
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

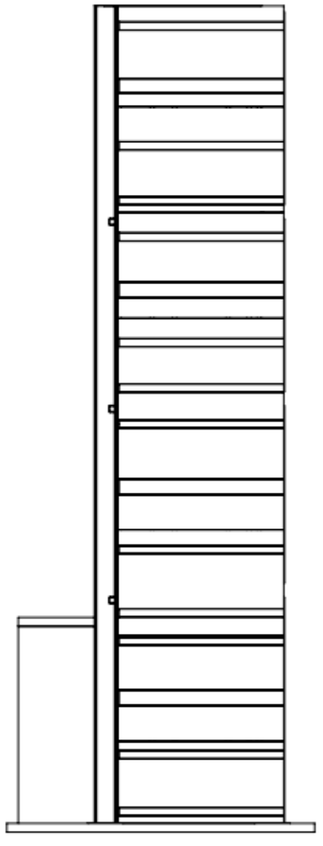
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: Siniat Board Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

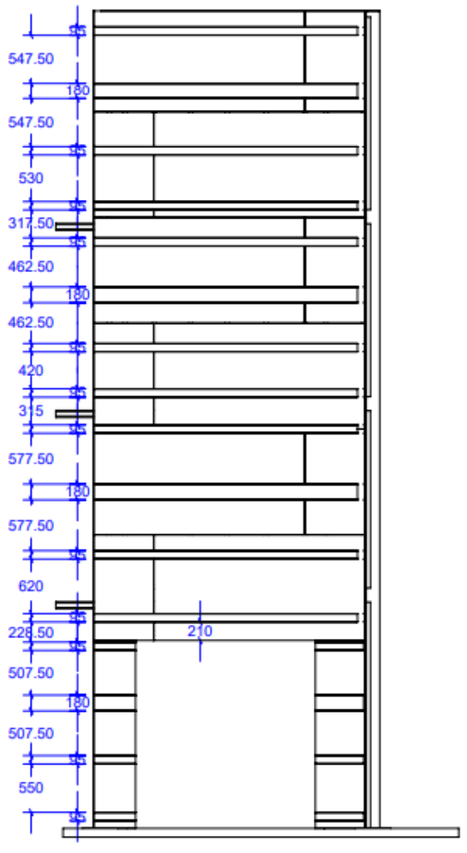
Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

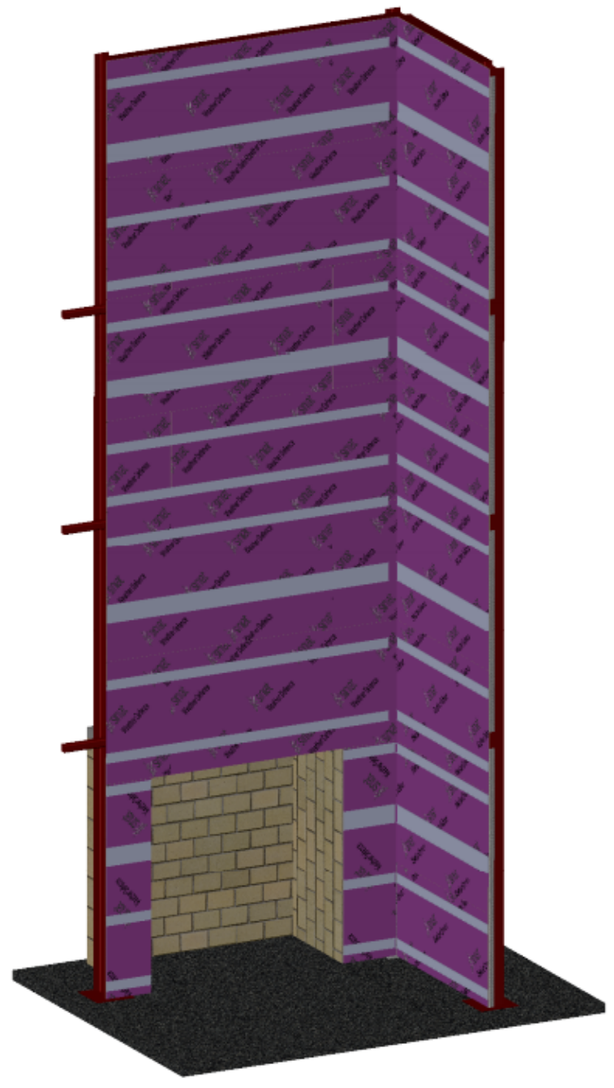
SHEET: 4 OF: 10

Support Channels Fixed through Siniat boards into King Frame using **Hilti S-MD53s 5.5x63**









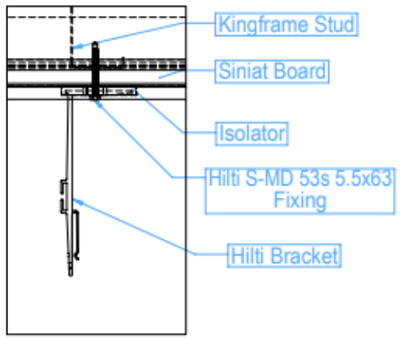
SOTECH
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

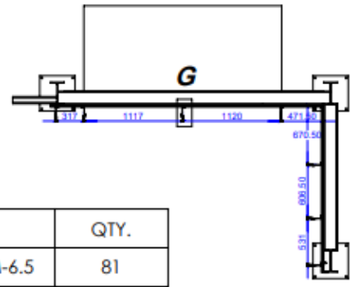
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: Support Channel Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

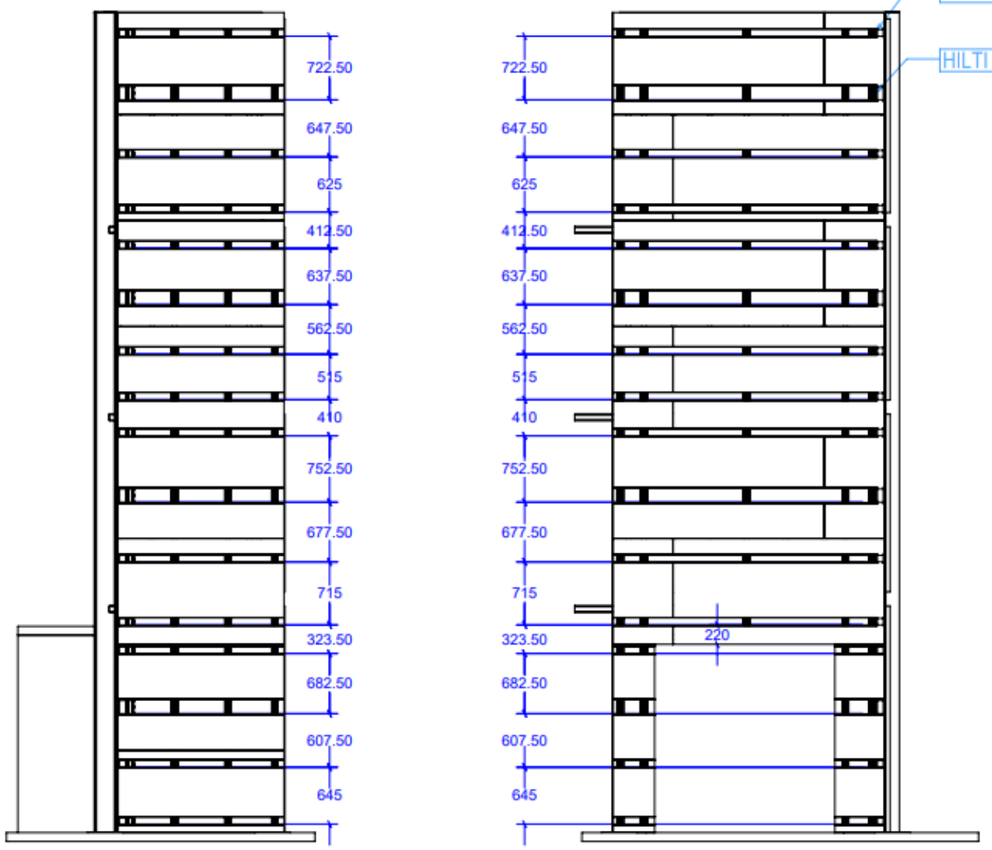
SHEET: 5 OF: 10

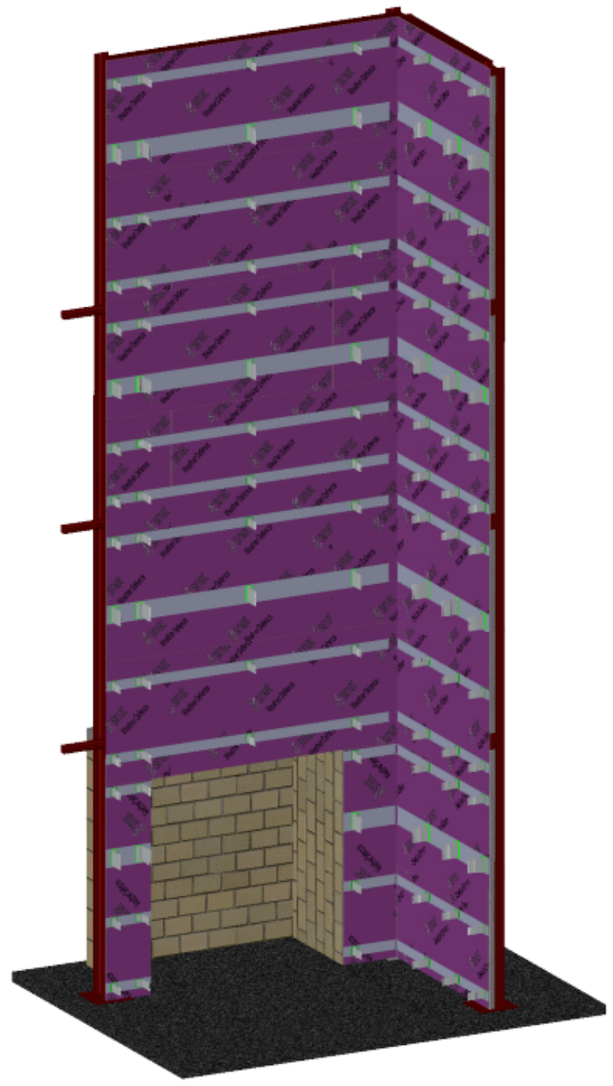
Hilti Brackets fixed through Siniat Board into Kingframe SFS using
Hilti S-MD 53s 5.5x63





PART NUMBER	QTY.
HILTI MFT-MFI-155-M-6.5	81
HILTI MFT-MFI-155-L-6.5	27





SHEET: 6 OF: 10

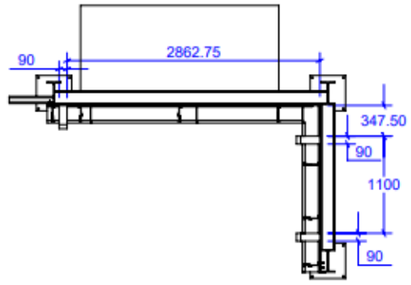
SOTECH
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

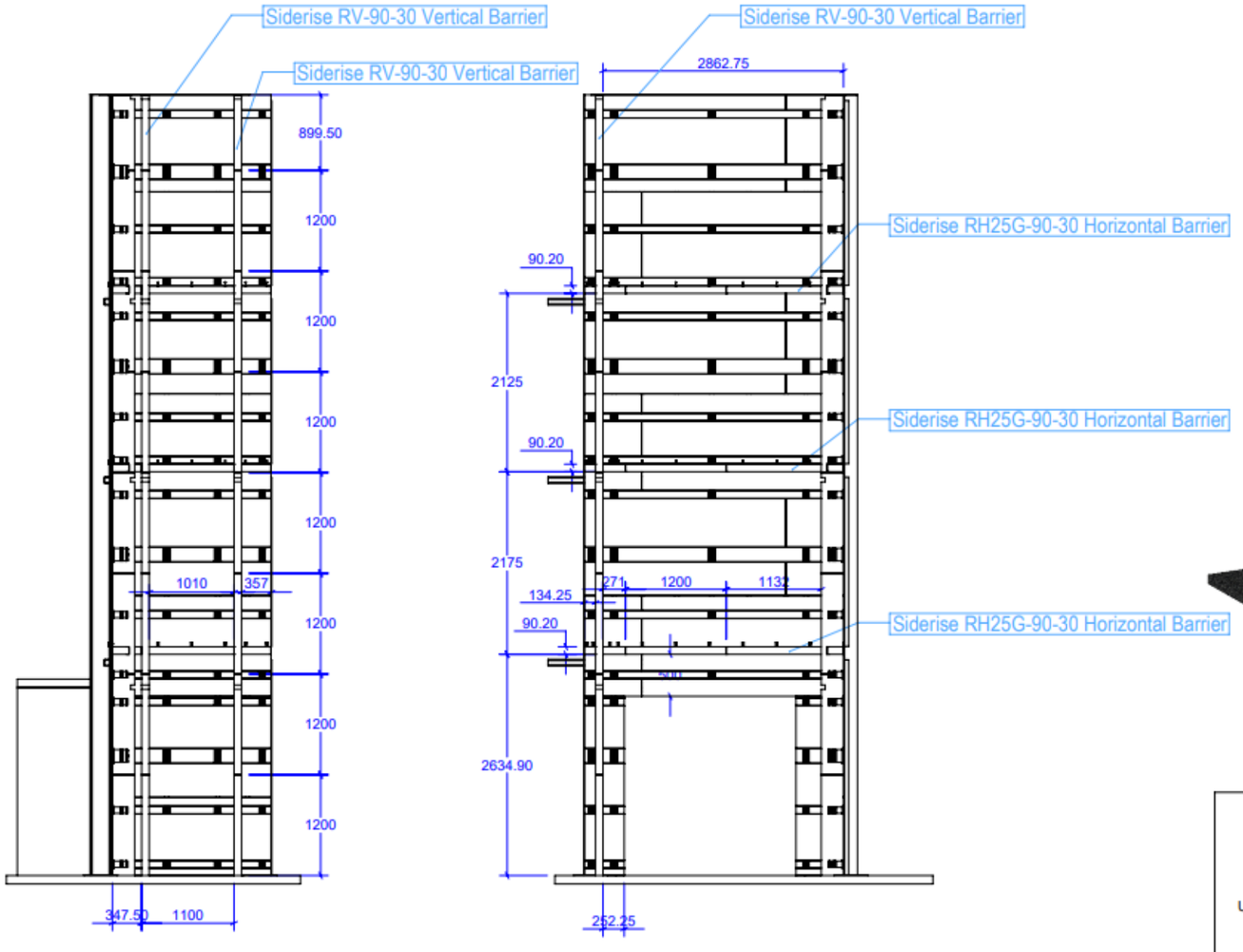
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: HILTI Bracket Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

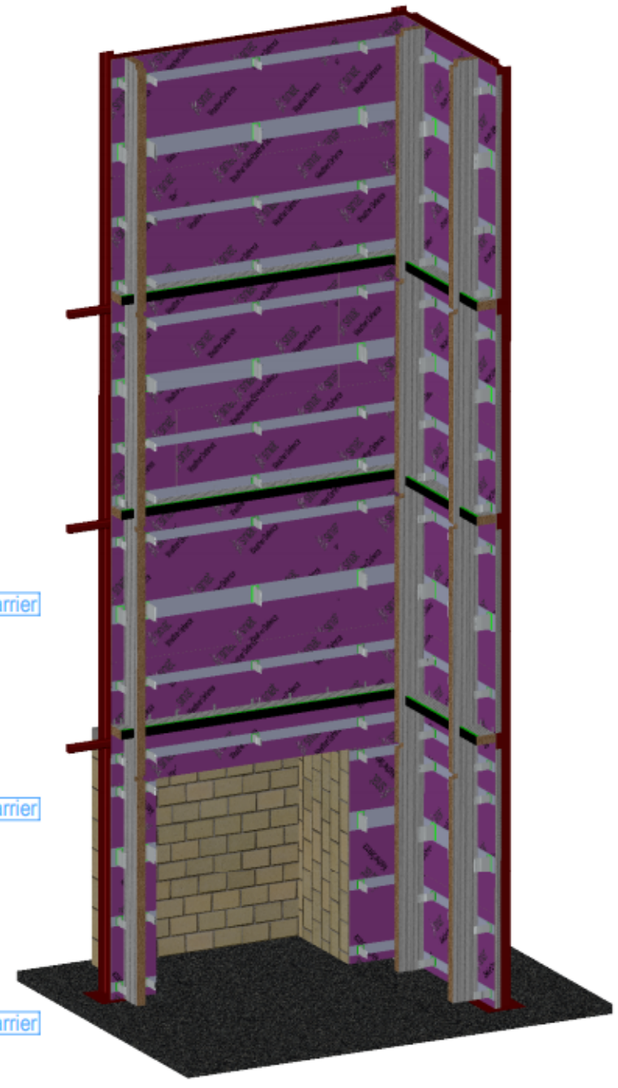
Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

Siderise 'RH' Horizontal and 'RV' Vertical Fire Barriers fixed using Galvanised mild steel fixing Brackets and **Hilti S-MD 03s 5.5x32** Fixings

Vertical barriers to be continuous, with the horizontal barriers tightly abutted to prevent gaps. The top surface of horizontal barriers to be sealed with foil tape at all joints.







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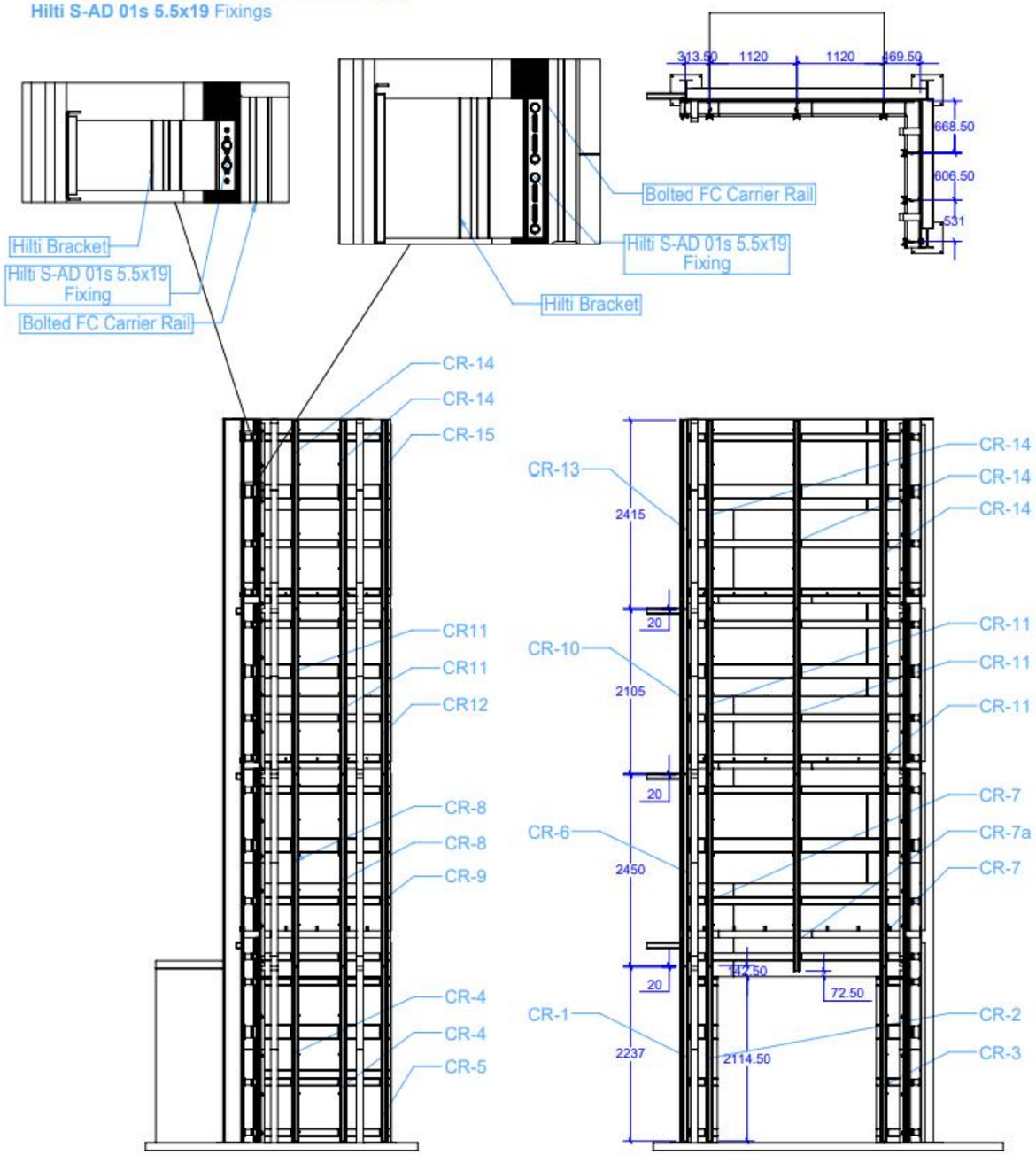
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: Siderise Fire Barrier Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

SHEET: 7 OF: 10

FC Carrier Rail fixed to Nvelope brackets using
Hilti S-AD 01s 5.5x19 Fixings



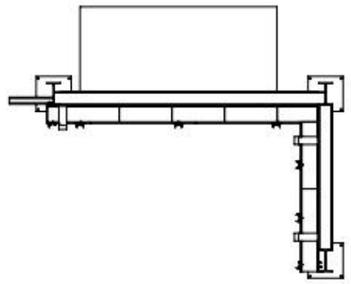
SHEET: 8 OF: 10

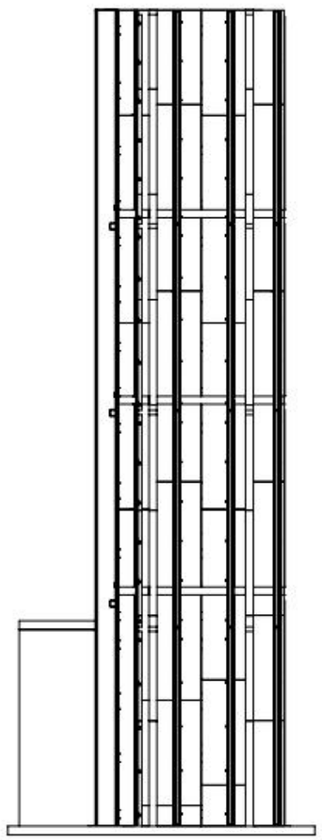
SOTECH
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

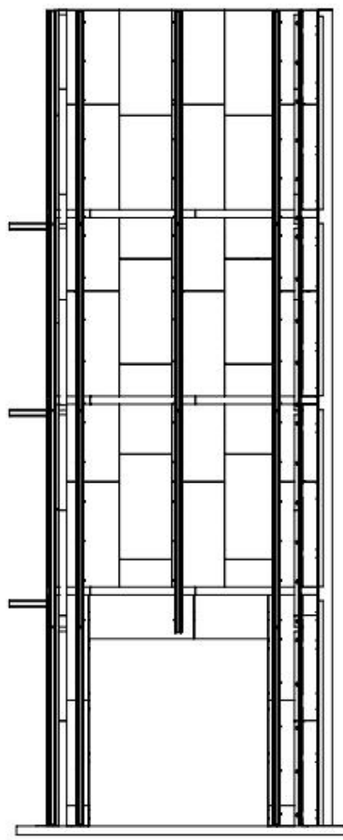
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: FC Carrier Rail Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

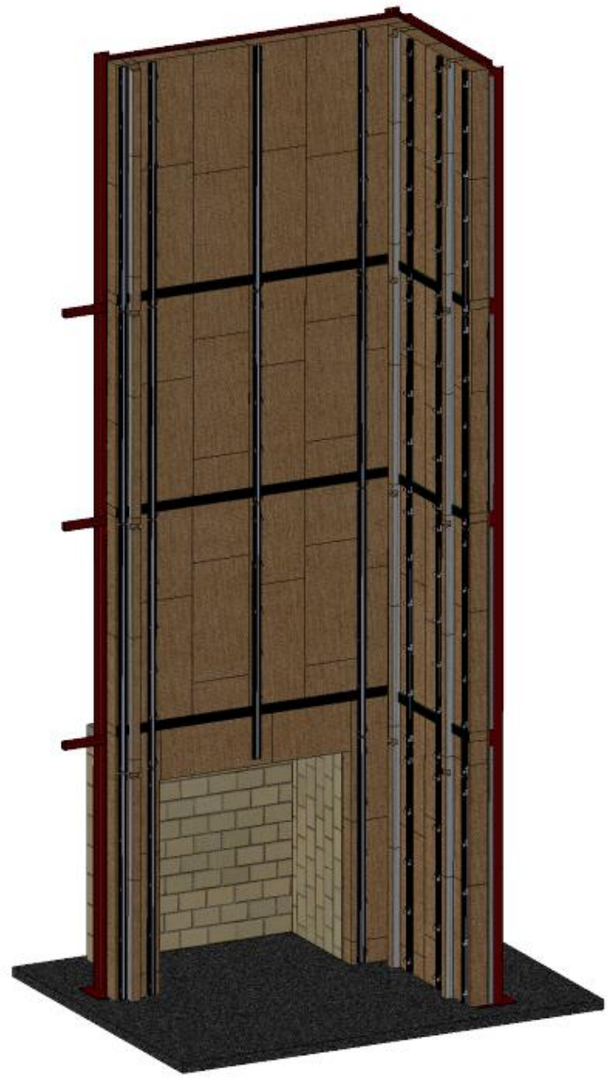
Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm. All bends 90° unless stated

180mm Kanuf Rainscreen Slab tightly abbutted fixed using
Hilti S-ID 01LSS 4.8,210 & Hilti S-IW 4.9 64x64 Steel Plate







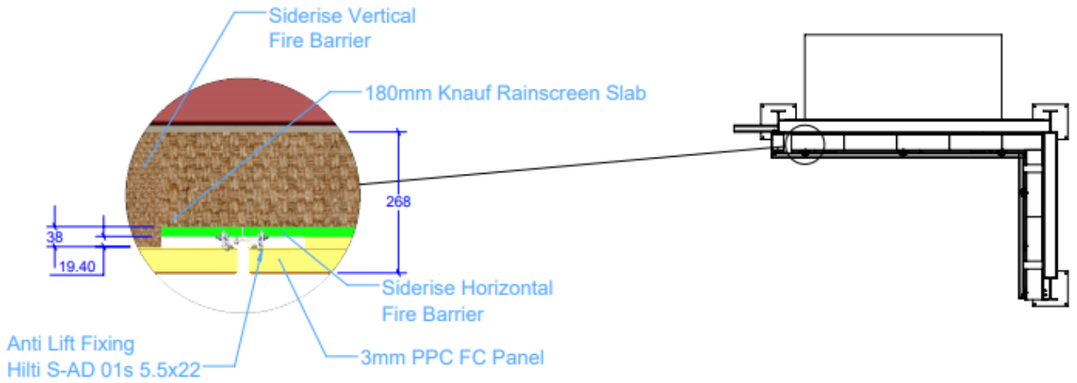


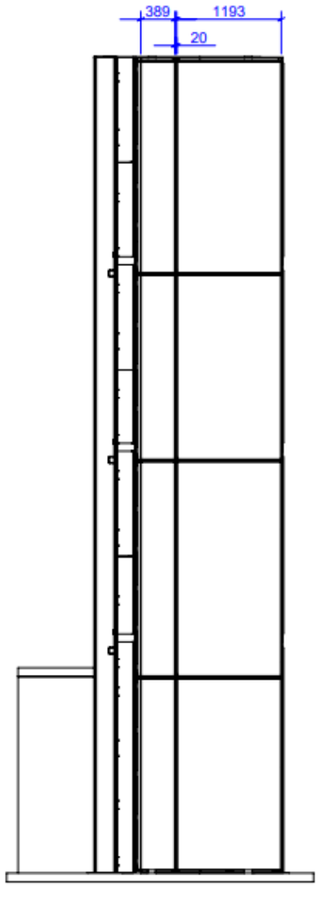
SHEET: 9 OF: 10

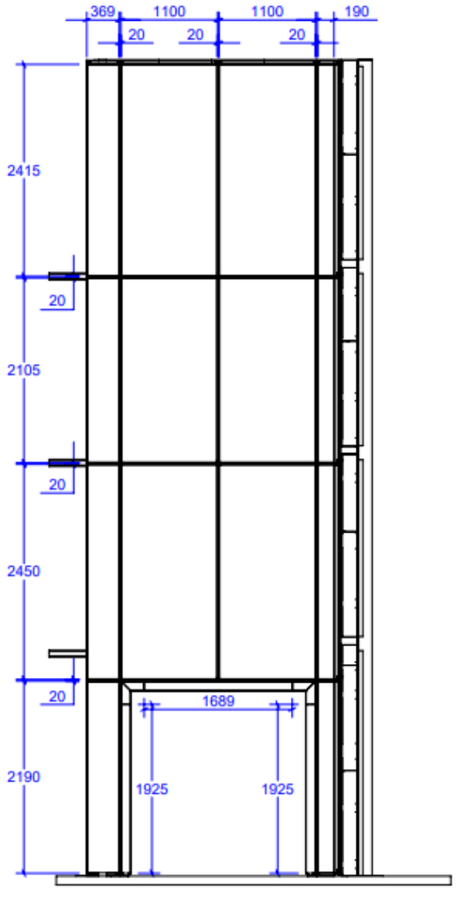
SOTECH
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

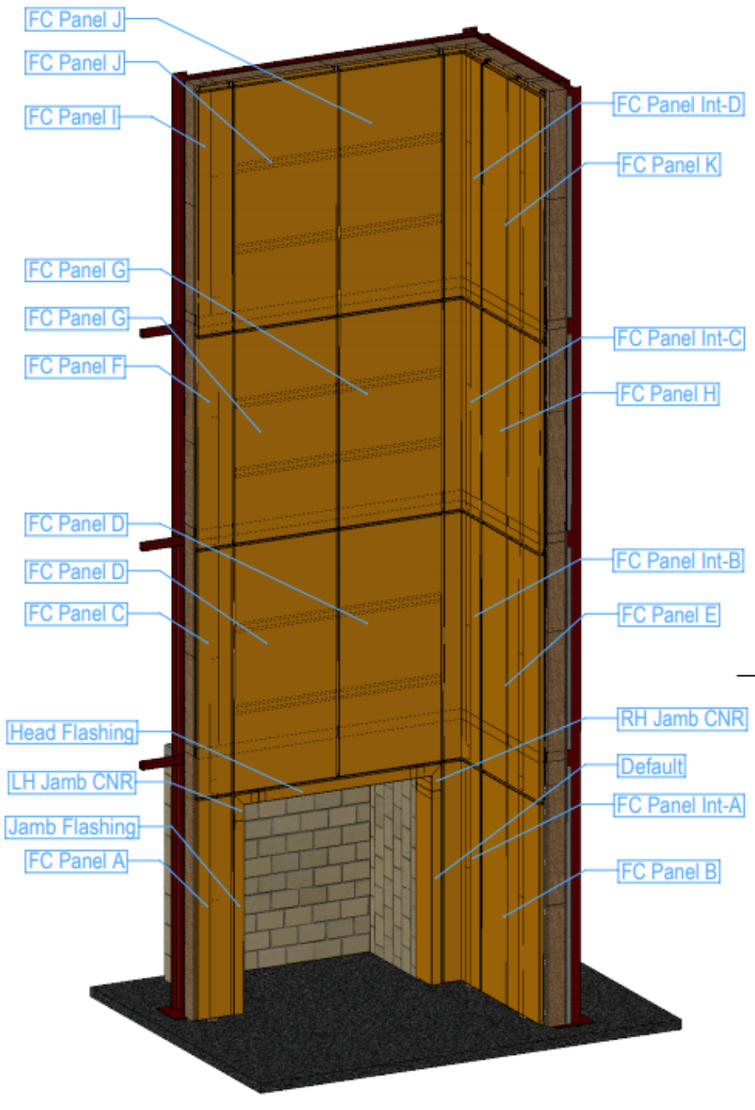
DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: Knauf Insulation Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated









SHEET: 10 OF: 10

SOTECH
Unit 2, Traynor Way, Whitehouse Business Park
Peterlee, County Durham, SR8 2RU
Tel: 0191 5872287 Fax: 0191 5180703
W: www.sotech-optima.co.uk

DRAWN: LeeGravett	DATE: 23/10/2019
DRAWING REF: FC Panel Layout	REV:
FINISH: PPC Ral Y2205I Interpon (Gold Splender)	
CUSTOMER: Sotech	
PROJECT: 3mm PPC FC	
AREA OF BUILDING: BS8414 Fire Test	

Tolerances: +/- 1mm, Angle +/- 0.5 Deg. All Dims in mm, All bends 90° unless stated

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12 Appendix E - Equipment Calibration details

12.1 Time

Two timers were used during the test and data analysis, details of equipment used, and verification tests are as follows:

Procedure and reference equipment	
FPA procedure	MEOP-08: Management and use of chronometers, Version 1.0
Reference equipment	British Telecom 'Speaking Clock'
Test equipment	
Stopwatch A	
Description	Salter digital timer
Asset tag ID	9032
Date of last verification test	13th June 2019
Stopwatch B	
Description	Salter digital timer
Asset tag ID	9034
Date of last verification test	13th June 2019
Stopwatch C	
Description	Salter digital timer
Asset tag ID	9034
Date of last verification test	13th June 2019

12.2 Distance

Measurements of length were taken using an EU Class 1 retractable tape measure, details as follows:

Procedure and test equipment	
FPA procedure	MEOP-07: Management and use of linear distance measuring devices, Version 2.0
Description of equipment	2x Fisco TL8M Tri-Lok 8m tape measure
Asset tag ID	9002 & 9105

12.3 Temperature

72 thermocouples were used in the test. Details of equipment used, and verification test conducted are as follows:

Procedure and reference equipment					
FPA procedure	MEOP-03: Management and use of thermocouples, Version 2.0				
Test equipment					
Datalogger	Datataker DT85, Asset ID: 9017				
Laptop	Lenovo Ideapad T430, Asset ID: 9101				
Thermocouples	1.5mm type k mineral insulated thermocouples, Asset ID numbers: FPA TC0181 to FPA TC0222 *(TC Set FPA 8414-05)* FPA TC0171 and TC0173 *(TC Set FPA 8414-04)*				
Date of last verification tests	31st July 2019				
Thermocouple locations on test wall, see					
Test location	Asset ID	Test location	Asset ID	Test location	Asset ID
1A	FPA TC0181	5A	FPA TC0197	9	FPA TC0215
1B	FPA TC0182	5B	FPA TC0198	10	FPA TC0216
1C	FPA TC0183	5C	FPA TC0199	11	FPA TC0217
2A	FPA TC0185	6A	FPA TC0201	12	FPA TC0218
2B	FPA TC0186	6B	FPA TC0202	13	FPA TC0219
2C	FPA TC0187	6C	FPA TC0203	14	FPA TC0220
3A	FPA TC0189	7A	FPA TC0205	15	FPA TC0221
3B	FPA TC0190	7B	FPA TC0206	16	FPA TC0222
3C	FPA TC0191	7C	FPA TC0207	17	FPA TC0171
4A	FPA TC0193	8A	FPA TC0209	18	FPA TC0173
4B	FPA TC0194	8B	FPA TC0210		
4C	FPA TC0195	8C	FPA TC0211		

12.4 Moisture content

The fuel load moisture content was measured using a conductivity moisture meter for use with wood, details as follows:

Procedure and test equipment	
FPA procedure	MEOP-10: Management and use of wood moisture sensors, Version 1.0
Description of equipment	FPA's Wood Moisture Meter
Asset tag ID	9005

12.5 Wind Speed Measurement

Wind speed was measured using a hot wire anemometer, details as follows:

Procedure and test equipment	
FPA procedure	MEOP-11: Management and use of anemometers, Version 1.0
Description of equipment	FPA's hot-wire air velocity meter
Asset tag ID	9104