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Classification report

Classification of a non-loadbearing external wall system in accordance with AS 5113:2016 Amendment 1

Test sponsor: Victorian Building Authority

Product: Rendered expanded polystyrene clad wall system

Job number: RTF190234 Revision: ASCR1.1

External wall (EW) test date: 4 June 2020 Building to building (BB) test date: N/A

Quality management

Version	Date	Information about the report			
R1.0	30 July 2020	Description	Initial issue.		
			Prepared by	Reviewed by	Authorised by
		Name	Anthony Rosamilia	Muntaqim Pereira	Steven Halliday
R1.1	9 December 2020	Description	Correction to the stated construction date in Table 7 and further specification of the material properties of item 1 of Table 6.		
			Prepared by	Reviewed by	Authorised by
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General conditions of use

Executive summary

This report presents the classification of the external wall system detailed in the schedule of components in section 3. The test procedure and classification were carried out in accordance with the procedures given in AS 5113:2016 Amendment 1 – Classification of external walls of buildings based on reaction-to-fire performance. A fire performance of EW is provided if the system passes all classification criteria, whereas, a fire performance of NIL is provided if the system doesn't pass all classification criteria. That classification standard should be read together with this report.

The test referenced in this classification report is:

- RTF190234, done on 4 June 2020 in accordance with BS 8414-2:2015 and the additional requirements of AS 5113:2016 Amendment 1 to provide a classification that complies with the requirements of AS 5113:2016.

Warringtonfire Australia performed the test to classify the external wall system at the request of the test sponsor. The test specimen consisted of a timber framed wall system clad with rendered expanded polystyrene (EPS) panel. The test specimen achieved the following classification as specified in AS 5113:2016 Amendment 1:

Fire performance (FP): NIL/-

Table 1 EW classification test results

Classification criteria	Related classification measure	Result in test	Pass/Fail
5.4.5(a) T_{w5m}	≤ 600 °C	A temperature of 600 °C or greater for 30 seconds or more was achieved at 8 minutes 51 seconds after ignition of crib	Fail
5.4.5(b) $T_{cavity5m}$	≤ 250 °C	A temperature of 250 °C or greater for 30 seconds or more was achieved at 9 minutes 41 seconds after ignition of crib	Fail
5.4.5(b) $T_{layer5m}$	≤ 250 °C	A temperature of 250 °C or greater for 30 seconds or more was achieved at 10 minutes 20 seconds after ignition of crib	Fail
5.4.5(c) $T_{unexposedside0.9m}$	≤ 180 K	The maximum temperature recorded during the test was 100 °C at 12 minutes 20 seconds after ignition of crib	No failure at 12 minutes 12 seconds*
5.4.5(d) flaming	No flaming	No flaming on the unexposed side of the specimen was observed during the test.	No failure at 12 minutes 12 seconds*
5.4.5(d) openings	No openings	No opening was observed during the test.	No failure at 12 minutes 12 seconds*
5.4.5(e) spread	No spread beyond specimen	There was flaming beyond the minimum confines of the specimen located at both the top and wing wall of the specimen.	Fail
5.4.5(f) debris flaming	≤ 20 s	There was flaming on the ground for more than 20 seconds from any debris or molten material during the test.	Fail
5.4.5(g) debris mass	≤ 2 kg	The total mass of debris collected was approximately 12.96 kg.	Fail
Classification			**NIL**
*Due to flame spread extending above the test apparatus the reaction-to-fire test was terminated early, as outlined in BS 8414-2:2015+A1:2017, section 8.6 clause a). It is unknown whether the system would have satisfied the classification criteria had the test run for the full test time. The system had not failed this criterion at 12 minutes 12 seconds, the point of early test termination.			

Contents

1. Introduction

This report presents the classification of the external wall system detailed in the schedule of components in section 3. The test procedure and classification were carried out in accordance with the procedures given in AS 5113:2016 Amendment 1 – Classification of external walls of buildings based on reaction-to-fire performance. That classification standard should be read together with this report.

The test referenced in this classification report is:

- RTF190234, done on 4 June 2020 in accordance with BS 8414-2:2015 and the additional requirements of AS 5113:2016 Amendment 1 to provide a classification that complies with the requirements of AS 5113:2016.
- A BB test in accordance with appendix C of AS 5113:2016 Amendment 1 had not been conducted at the time this report was issued.

Warringtonfire Australia did the test to classify the external wall system at the request of the test sponsor listed in Table 2.

Table 2 Test sponsor details

Test sponsor	Address
Victorian Building Authority	Goods Shed North 733 Bourke Street Docklands VIC 3008 Australia

2. Construction details

Table 3 provides details of the test assembly.

Table 3 Test assembly

Item	Detail	
Nominal non-loadbearing timber framed wall system	Height (h): Thickness(t):	10020 mm 207 mm
Width of main wall finished face	2815 mm	
Width of wing wall finished face	1460 mm	
Meeting point of main wall and wing wall	Internal corner	

Table 4 provides a summary of the test specimen. A full description of the specimen is provided in Appendix A and Section 3.

Table 4 Test specimen

Item	Detail
Test specimen	The wall system was a timber framed wall clad with expanded polystyrene (EPS) panels on the exposed (external) side. The EPS panels had a render applied to it over the external face. Regular plasterboard was used to clad the unexposed (internal) side of the wall. The timber framing was built into three floor levels whilst the EPS panels and render ran continuously, except for a horizontal control joint running across the width of the system, 4.4 mm above ground level.

Table 5 shows the installation details.

Table 5 Installation details

Item	Detail
Start date for construction of the test specimen	11 May 2020
Finish date for construction of the test specimen (not including render)	19 May 2020
Date of application of render	20 May 2020
Date of application of topcoat	25 May 2020
Completion date for construction of the test specimen	25 May 2020
External wall system constructed by	Representatives of Warringtonfire Melbourne
Orientation	Asymmetrical: There are rendered EPS panels on the exposed side of the wall that would normally be on the outside of the building and standard plasterboard on the unexposed side that would usually be on the inside of the building. It was confirmed that the system was exposed from the side that would normally face the outside of the building.

3. Schedule of components

EW test specimen schedule

Table 6 lists the schedule of components for the test specimen. These were provided by the test sponsor and surveyed by Warringtonfire Australia.

Table 6 EW schedule of components

General Description		
To be read in consulting the drawings in Appendix A. The wall system was built on three floor levels – with an additional partial floor - using steel hollow sections (SHS) as false slabs (item 31). The false slabs were located at approximately 3000 mm vertical centres, as shown in Appendix A - Figure 3 & Figure 4. Within these false slab levels, timber frames (item 3) were screw fixed (item 22) to the false slabs, which were built to the specifications shown in Appendix A - Figure 3 & Figure 4. The lower level of the timber framing was built upon and screw (item 23) fixed into 150 mm tall Hebel blocks (item 32), which were used to simulate a raised concrete slab. The unexposed face of the timber framing was clad with 10 mm thick standard plasterboard (item 2) fixed with plasterboard screws (item 25), with exposed screws and joints base-coated (item 21). The exposed face of the timber framing was weather protected using sarking (item 13) fixed with staples (item 28). Aluminium tape (item 14) was adhered to the sarking on the main wall, vertically in line with the double stud of the timber framing (item 3). Aluminium tape (item 14) was also used around the large orifice at the bottom of the timber framing. The frame (item 3) and sarking (item 13) were then clad with pre-rendered expanded polystyrene (EPS) panels (item 1) fixed with screws and washers (item 27) leaving an opening approximately 2 m by 2 m, at the bottom of the main wall. The opening was capped with painted timber reveals (item 10) – which were screw fixed (item 25) to the timber framing (item 3). Attached to these timber strips were aluminium extrusions (item 12), that were screw fixed (item 25). These strips created the reveal of the opening with the aluminium extrusions (item 12) representing the perimeter of an aluminium framed window. Packers (item 10) were placed between the reveal (item 10) and the timber framing (item 3). Timber architraves (item 11) were used to cap the opening on the plasterboard (item 2) side of the wall. The EPS panels (item 1) were screw (item 27) fixed over the top of the sarking (item 13). Panel to panel joins were butt joined with a bead of expandable foam (item 15) used at the centre of the thickness of the panel. The vertical external edges of the main and wing walls were capped with a layer of fire-rated plasterboard (item 9), which was screw (item 24) fixed. Expandable foam (item 15) was applied between the FR-plasterboard (item 9) and the EPS panels (item 1). Mid-width of the 2 m by 2m opening, extending vertically to the top of the specimen, was a 10 mm wide vertical control joint, residing over the aluminium tape (item 14). Parts of the EPS boards (item 1) that ran over the tape had sealant (item 16) applied between the board and the tape – refer to Figure 1, Figure 5 and Figure 9. Approximately 2.4 m above the opening was a horizontal control joint that spanned both main and wing walls. The panels above and below the horizontal control joint were capped with an aluminium starter channel (item 6) and a galvanized steel flashing (item 5), respectively. To the face of the pre-rendered EPS panels (item 1) was applied render, simultaneously with various reinforcing elements. These reinforcing elements were aluminium beads with a fiberglass mesh (item 8), applied over the FR-plasterboard capping (item 9), – and self-adhesive fiberglass mesh (item 20) – which was applied to panel to panel joins. The render system was then finished off with a topcoat (item 18). Once the topcoat and render system hardened, a backing rod (item 17) and sealant (item 16) were applied to the vertical control joint. Sealant (item 16) was also applied at the corner between the aluminium extrusions (item 12) and the finished render (item 18) at the 2 m by 2 m opening. The top of the specimen was capped with metal rigid capping (item 7) fixed with roofing screws (item 26).		
Item	**Description**	
Cladding		
1	Item name	External lining
	Product name	100 mm thick pre-rendered expanded polystyrene (EPS) panels
	Material	Approximately 100 mm thick medium grade expanded polystyrene with a flame-retardant additive and a density of 20 kg/m^3 (verified) with one of the large faces covered by a layer of render with a thickness of approximately 1 mm. Within the render covering the entire rendered face was a mesh 0.4 mm in thickness with a 6 mm × 4 mm grid pattern.
	Size	2397 mm long × 1197 mm wide × 101 mm thick

General Description		
		Mass per unit area: 3.4 kg/m^2
	Installation	Screw fixed to the timber frame (item 3) with the rendered side of the panels facing away from the timber frame. Fixings were at stud locations with 400 mm vertical screw centres using EPS board screws and washers (item 27). There was a vertical 10 mm gap located central to the 2 m by 2m opening extending vertically up the specimen. At the bottom of the specimen there was a 75 mm EPS panel overhang in front of the Hebel blocks (item 32). See - Figure 5 & Figure 6.
2	Item name	Internal lining
	Product name	10 mm thick standard plasterboard
	Size	Uncut: 1200 mm wide × 3600 mm or 3000 mm long × 10 mm thick Mass per linear metre: 7.5 kg/m
	Installation	Screw (item 25) fixed to the timber frame at stud locations with 400 mm vertical screw centres in field and 300 mm centres around the periphery, with a 25 mm offset from the horizontal edges. A 10 mm gap was left at the top and bottom of slab levels between the plasterboard and false slabs (including the Hebel blocks – item 32). This gap was filled with fire-rated sealant (item 19).
Framing		
3	Item name	Timber framing
	Material	90 mm × 45 mm MGP10 timber with a density of 430 kg/m^3 and an approximate water content of 9 %.
	Size	Full frames were approximately 2850 mm tall × 2900 mm wide × 90 mm deep for the main wall and approximately 2850 mm tall × 1635 mm wide × 90 mm deep for the wing wall. Studs were at a max 600 mm centres whilst noggins were at approximate 950 mm centres. At approximately 2.4 m above the combustion chamber opening spanning the width of the main and wing walls was added back blocking. For all details Appendix A.
	Installation	Screw (item 22) fixed to the flase slabs at the head and base track at max 600 mm centres. The base track on the lower level was fixed (item 23) to the Hebel blocks (item 32).
Flashing/capping		
4	Item name	PVC starter channel
	Size	101 mm deep cavity × 30 mm front flange height × 58 mm back flange height Approximate thickness: 1.3 mm
	Installation	Installed (friction fitted) at the bottom of the lowest panels on the main and wing wall. See Figure 11 and Figure 15.
5	Item name	Control joint flashing - galvanised steel
	Size	0.6 mm thick × 118 mm deep web with 2 flanges – 52 mm and 20 mm long at ca.111 – 116 ° bend.
	Installation	Installed on the top of the EPS panels (item 1) below the 2.4 m horizontal control joint. Screw (item 24) fixed at 300 mm centres to the back blocking of the timber framing (item 3). See Figure 13 and Figure 15.
6	Item name	Control join starter channel – aluminium
	Size	0.6 mm thick angled channel with a 110 mm deep web with 2 perforated flanges - 50 mm and 24 mm long at ca.111 – 116 ° bend.
	Installation	Installed on the bottom of the EPS panel above the horizontal control joint (4.4 m above the ground). Screw (item 24) fixed at 300 mm centres to the back blocking of the timber framing (item 3). See Figure 13 and Figure 15.
7	Item name	Rigid Metal Capping – galvanized steel

General Description		
	Size	0.6 mm thick angled channel with a 212 mm deep web with 2 flanges - 52 mm and 34 mm long with a 9 mm long lip.
	Installation	Installed at the top of the specimen fitted around the rendered wall system and the plasterboard wall, fixed to the timber framing (item 3) using hex-head roofing screws (item 26) and 300 mm centres. See Figure 12 and Figure 15
8	Item name	Corner beads – aluminium with fiberglass mesh
	Size	22 mm × 24 mm × 0.32 mm thick perforated angle. The angle contained Ø8 mm perforations at repeating 12 mm centres on each flange. On the internal corner was fixed an angled fiberglass mesh approximately 85 mm × 115 mm. Mesh: 4 mm × 6 mm grid, 0.4 mm thick, 141 GSM.
	Installation	Installed on the sides of the specimen fitted around the rendered wall system and the plasterboard capping (item 9). Was placed in conjunction with the render (item 18). See Appendix A.
9	Item name	Fire-rated plasterboard capping – 13 mm FR-rated PB
	Size	~200 mm wide × 13 mm thick Density: 513 kg/m^3
	Installation	Installed at the outer vertical edges of the main and wing wall, screws fixed (item 24) at 300 mm centres starting from a 100 mm from the edge of the plasterboard – along the length.
10	Item name	Timber reveal and packers
	Size	Vertical reveal timber: 100 mm deep × 18.3 mm thick × 1815 mm tall (vertical). Painted white. Mass per linear metre: 1.25 kg/m Horizontal reveal timber: 100 mm deep × 18.3 mm thick × 2040 mm long (horizontal). Painted white. Mass per linear metre: 1.25 kg/m Packers: ~ 6 mm thick (for vertical reveal) Gap: ~ 16 mm high (for horizontal reveal – no packers)
	Installation	The head of the reveal was screw fixed to the vertical members. To the exposed side of the reveal the aluminium window framing (item 12) was screw fixed (item 25) at approximately 200 mm centres. The reveal assembly was then placed inside the timber framing (item 3) with the packers in between the vertical reveal timber and the timber frame and was screw fixed (item 25) at 300 mm centres. See Figure 7 & Figure 10.
11	Item name	Timber architraves
	Size	18 mm thick × 36 mm wide Mass per linear metre: 1.25 kg/m
	Installation	Installed around the 2 m by 2 m opening on the plasterboard fixed with brads (item 30) at approximately 300 mm centres. The corners, where the architraves met, were mitred to 45°. See Figure 7 & Figure 10.
12	Item name	Aluminium extrusion – window framing
	Size	75 mm total depth × 33 mm visible width × 1.5 mm thick
	Installation	Screw fixed to the exposed side of the timber reveal at ~200 mm centres using plasterboard screws (item 25). See Figure 7 & Figure 10.
Sarking		
13	Item name	Breathable plastic sarking

General Description		
	Size	2750 mm wide × 0.06 mm thick 65 GSM
	Installation	The sarking was installed horizontally over the timber frame (item 3) with a 200 mm overlap of the top sheet over the bottom. The sarking was fixed using 10 mm staples (item 28) at approximate 200 mm centres around the tracks and up the studs.
14	Item name	Aluminium tape
	Size	0.4 mm thick × 80 mm wide
	Installation	Used to tape the sarking (item 13) around the reveal and inline with the double stud.
Render/Sealant/Adhesive		
15	Item name	Expandable foam
	Material	Methylenediphenyl diisocyanate-containing foam
	Installation	Applied: - at the panel to panel (item 1) butt joins. - between the fire-rated plasterboard (item 9) and the EPS panels (item 1).
16	Item name	Silicone adhesive
	Material	White weather proofing silicone sealant.
	Installation	Applied: - on top of the backing rod (item 17) in the vertical control joint to a depth of 10 mm. - between the panels (item 1) and aluminium tape (item 14) - at the panel (item 1) and the timber reveal (item 10) junction.
17	Item name	Backing rod
	Material	Ø15 mm closed cell backing rod
	Installation	Applied to the vertical control joint creating a cavity with a depth of 10 mm.
18	Item name	Render, primer and texture (white)
	Material	Render (grey): High polymer-containing cementitious modified for EPS render with 10 – 35% Portland cement Thickness: Approximately 3 mm Density: 1776 kg/m^3 Texture (white): A marble/acrylic paint mix. Thickness: Approximately 1 mm Total render system (including that of EPS board): Mass per unit area: 6.6 kg/m^2 Free moisture content: 1.2 % Thickness: Approximately 5 mm
	Installation	The render was mixed with water and applied over the EPS panels (item 1) and over the fire-rated plasterboard capping (item 9) in one application. The render was allowed to cure for 4 to 5 days. Then primer was added over the render and allowed to dry for 2 hours. The texture was then applied over the top in one application.
19	Item name	Fire-rated sealant
	Installation	Applied to the 10 mm gap located between the plasterboard (item 2), timber frame (item 3) and the false slabs and the Hebel blocks (item 32).

General Description		
20	Item name	Fibreglass mesh – with self-adhesion (Orange)
	Material	Fibreglass grid: 5 mm by 5 mm grid. 200 mm wide × 0.4 mm thick.
	Installation	Applied in combination with render (item 18) over the EPS panel to panel (item 1) joins.
21	Item name	Basecoat and mesh
	Material	Basecoat: An all-purpose premix containing limestone and perlite – 24-hour curing. Fibreglass mesh: 50 mm wide. 3 mm × 3 mm grid × 0.3 mm thick – 76 GSM
	Installation	Base coat and mesh were applied to plasterboard to plasterboard joins (item 2). The basecoat was applied to visible screw heads (item 25) in the plasterboard (item 2).
Fixings		
22	Item name	Ø5.4 × 65 mm long hex head (male) screws – 50 mm long thread SDS
	Installation	Used to fix the timber framing (item 3) to the false slabs (item 31).
23	Item name	Ø5.2 × 100 mm long head screws – 50 mm long coarse thread, needle point, Philips drive
	Installation	Used to fix the timber framing (item 3) to the Hebel blocks (item 32).
24	Item name	#6 × 45 mm long bugle head screws - coarse thread, needle point, Philips drive
	Installation	Used to: - fix the horizontal steel flashing (item 5) to the timber framing (item 3) - fix the horizontal joint aluminium starter channel (item 6) to the timber framing (item 3) - fix the FR plasterboard capping (item 9) to the timber framing (item 3)
25	Item name	#6 × 32 mm long plasterboard screws – coarse thread, needle point
	Installation	Used to screw fix: - the plasterboard (item 2) to the timber framing (item 3). Screw centre were 400 mm centres in-field and 300 mm centres around the perimeter. - the vertical reveal members (item 10) to the timber framing (item 3). - the aluminium extrusions (item 12) to the reveal timber (item 10)
26	Item name	Ø6 mm × 65 mm long – 35 mm long thread roofing hex-head screws – SDS, coarse thread.
	Installation	Used to fix the rigid metal capping (item 7) to the timber framing (item 3) at the top of the specimen.
27	Item name	EPS board screws with nylon washer
	Size	Screw: 130 mm long × Ø5.0 mm class 3, bugle head, needle point Washer: O.D. ~48 mm, I.D. (for screw) 6 mm, min/max thickness: 1 mm/7 mm.
	Installation	Used to fix the EPS panels (item 1) to the timber framing (item 3).
28	Item name	10 mm long × 13 mm wide staples
	Installation	Used to fix the sarking (item 13) to the timber frame (item 3).
29	Item name	Ø3 mm × 70 mm long nails

General Description		
	Installation	Used to fix timber framing (item 3) members together. 2 nails were used at each end of the noggins and at the top and bottoms of each stud.
30	Item name	50 mm long brads
	Installation	Used to fix the architraves (item 11) to the plasterboard (item 2) around the 2 m by 2m opening.
Steel substrate and slab levels		
31	Item name	Steel substrate
	Size	The steel substrate was 9300 mm high × 3245 mm wide for the main wall and 9300 mm high × 2000 mm wide for the wing wall
	Installation	The substrate consisted of structural steel sections and square hollow sections (SHS). In addition, movable SHS - 150 mm × 150 mm, acting as false slabs were also present. These were located at heights of 3075 mm, 6075 mm and 9075 mm from the ground (measured from the centre of the false slab).
32	Item name	Hebel block
	Size	Uncut block: 150 mm tall × 200 mm deep × 600 mm wide Density: 830 kg/m^3
	Installation	Installed below the timber framing (item 3) on the bottom to simulate a raised concrete slab. The blocks were fixed to the floor using Hebel adhesive (item 33). The Hebel was cut to suit the specimen and allow for the test setup. See Figure 14.
33	Item name	Hebel adhesive
	Material	Containing Quartz, GP cement, limestone and non-hazardous materials
	Installation	Mixed with water and used as a paste to secure the Hebel blocks (item 32) to the concrete floor.

4. Test procedure

Table 7 details the test procedure for the tests conducted to ascertain compliance with this classification.

Table 7 Test procedure

Item		Detail	
Statement of compliance	EW	The EW test was performed in accordance with the requirements of BS 8414-2:2015 and AS 5113:2016 Amendment 1 for a non-loadbearing external cladding system fixed to and supported by a structural steel frame.	
	BB	Test was not conducted at the time this report was issued.	
Variations		The ignition source of the test was constructed from Radiata Pine instead of Pinus Silvestris.	
Pre-test conditioning		The construction of the external wall system was completed on 25 May 2020. Once the construction of the system was completed, the test specimen was protected from adverse environmental conditions.	
Environmental conditions at the start of the test		Start of the test	18 °C
		Wind speed (in all directions)	0.1 – 0.4 m/s
Ignition source		Crib material	Softwood (radiata pine)
		Moisture content	13.0 %
		Density	0.49 kg/dm^3
Sampling / specimen selection		Materials for the build were sourced and surveyed by Warringtonfire Australia at the request of the test sponsor.	
Test duration		12 minutes 12 seconds	
Instrumentation and equipment		The instrumentation was provided in accordance with BS 8414-2:2015 as follows: • All exposed and cavity temperatures were measured by mineral insulated metal sheathed (MIMS) Type K thermocouples with an overall diameter of 1.5 mm with the measuring junction insulated from the sheath. • The unexposed side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads. • The thermocouple positions are shown in Figure 16 in Appendix B. • The wind speed was measured by an anemometer at Level 2, 1000 mm forward from the centre line of the combustion chamber. • Timber crib moisture was measured by a J2000 Delmhorst moisture meter.	

5. Test results

Table 8 shows the peak temperatures the EW test specimen achieved.

Table 8 EW peak temperatures

Parameter	Results
t_s, start time	3 minutes 50 seconds after ignition of crib
Peak temperature/time at Level 2, 50 mm external	979 °C at 8 minutes 15 seconds after t_s
Peak temperature/time at Level 2, panel cavity	1000 °C at 8 minutes 15 seconds after t_s
Peak temperature/time at Level 2, frame cavity	978 °C at 8 minutes 15 seconds after t_s
Peak temperature/time at Level 1, 50 mm external	994 °C at 8 minutes 05 seconds after t_s
Peak temperature/time at 900 mm above lintel	106 °C at 8 minutes 20 seconds after t_s

Table 9 shows the EW classification indices as listed in AS 5113:2016 Amendment 1 and as provided by BS 8414-2:2015+A1:2017.

Table 9 EW classification test results

Classification criteria	Related classification measure	Result in test	Pass/Fail
5.4.5(a) T_{w5m}	≤ 600 °C	A temperature of 600 °C or greater for 30 seconds or more was achieved at 8 minutes 51 seconds after ignition of crib	Fail
5.4.5(b) $T_{cavity5m}$	≤ 250 °C	A temperature of 250 °C or greater for 30 seconds or more was achieved at 9 minutes 41 seconds after ignition of crib	Fail
5.4.5(b) $T_{layer5m}$	≤ 250 °C	A temperature of 250 °C or greater for 30 seconds or more was achieved at 10 minutes 20 seconds after ignition of crib	Fail
5.4.5(c) $T_{unexposedside0.9m}$	≤ 180 K	The maximum temperature recorded during the test was 100 °C at 12 minutes 20 seconds after ignition of crib	No failure at 12 minutes 12 seconds*
5.4.5(d) flaming	No flaming	No flaming on the unexposed side of the specimen was observed during the test.	No failure at 12 minutes 12 seconds*
5.4.5(d) openings	No openings	No opening was observed during the test.	No failure at 12 minutes 12 seconds*
5.4.5(e) spread	No spread beyond specimen	There was flaming beyond the minimum confines of the specimen located at both the top and wing wall of the specimen.	Fail
5.4.5(f) debris flaming	≤ 20 s	There was flaming on the ground for more than 20 seconds from any debris or molten material during the test.	Fail
5.4.5(g) debris mass	≤ 2 kg	The total mass of debris collected was approximately 12.96 kg.	Fail
Classification			**NIL**
*Due to flame spread extending above the test apparatus the reaction-to-fire test was terminated early, as outlined in BS 8414-2:2015+A1:2017, section 8.6 clause a). It is unknown whether the system would have satisfied the classification criteria had the test run for the full test time. The system had not failed this criterion at 12 minutes 12 seconds, the point of early test termination.			

A BB test in accordance with appendix C of AS 5113:2016 Amendment 1 had not been conducted at the time this report was issued

The test specimen achieved the following classification as specified in AS 5113:2016 Amendment 1:

Fire performance (FP): NIL/-

6. Application of test results

6.1 Test limitations

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.

These results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, and they do not necessarily reflect the actual behaviour in fires.

6.2 Variations from the tested specimen

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described here 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.

6.3 Uncertainty of measurements

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

Appendix A Drawings of test assembly

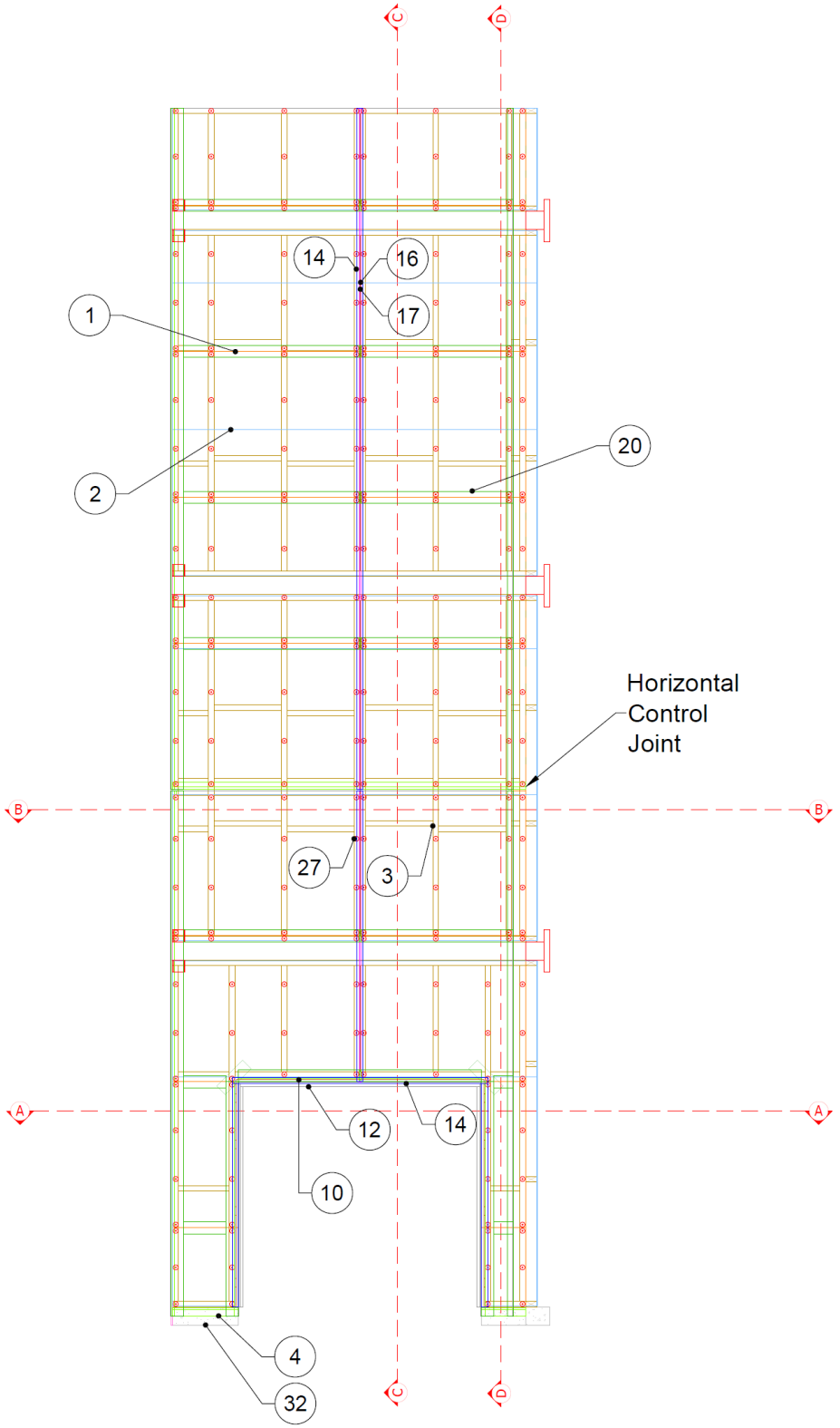

Figure 1 Panel layout (elevation and section – main wall)

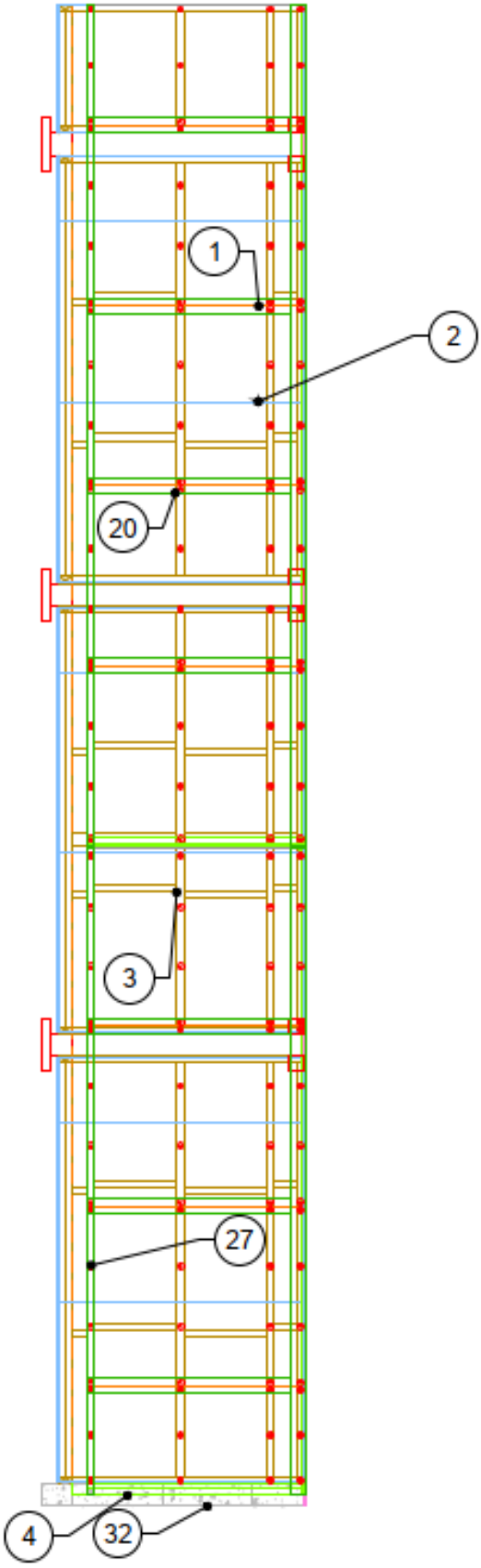

Figure 2 Panel layout (elevation – wing wall)

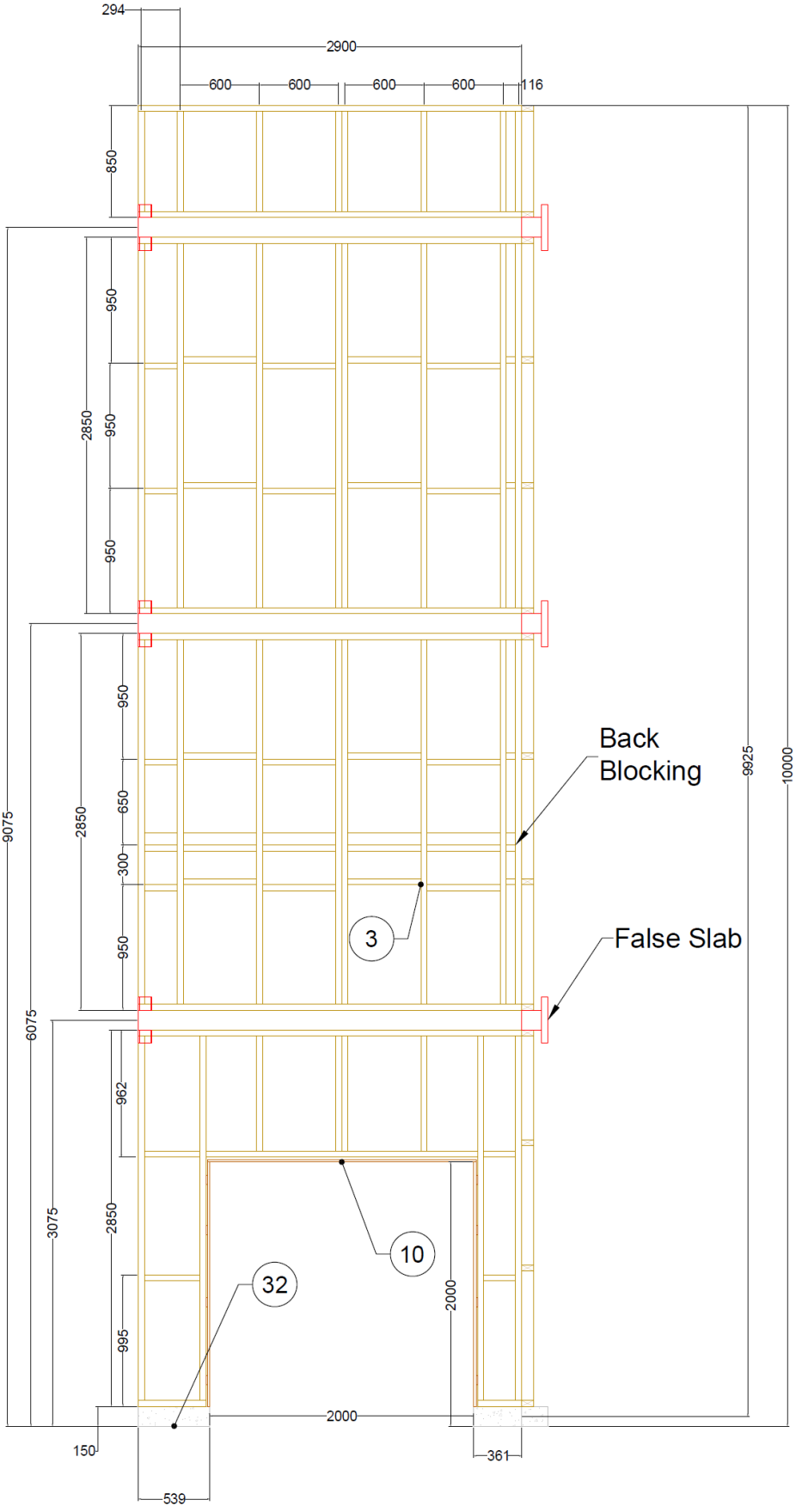

Figure 3 Framing layout (elevation – main wall)

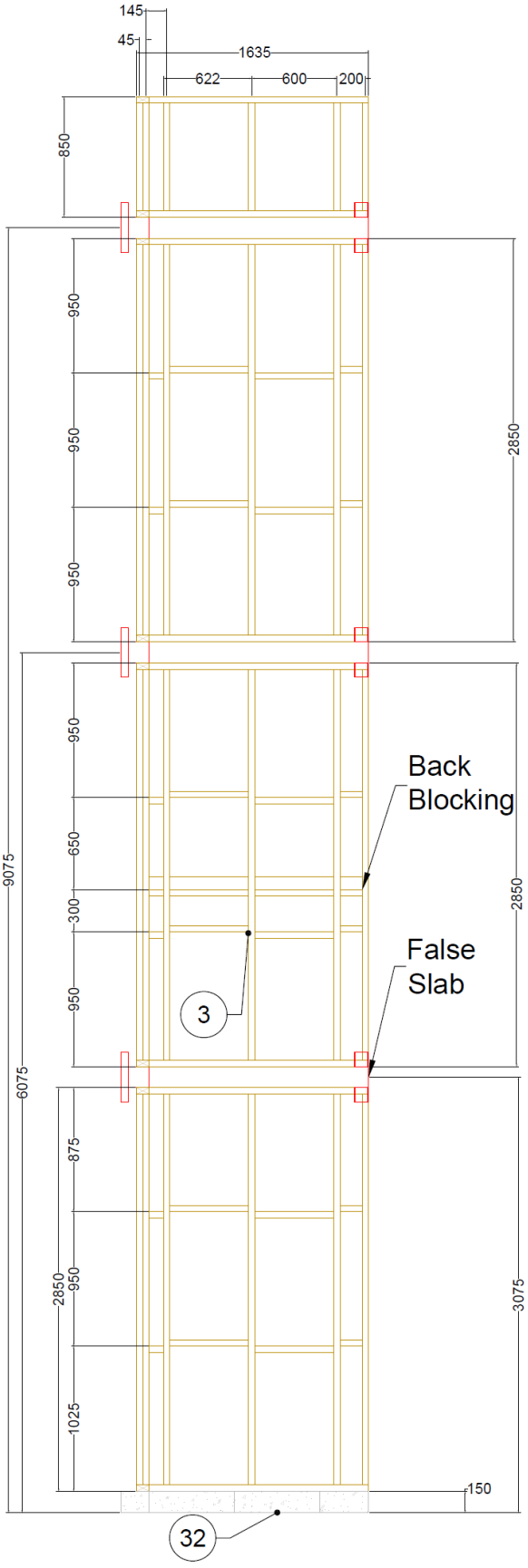

Figure 4 Framing layout (elevation – wing wall)

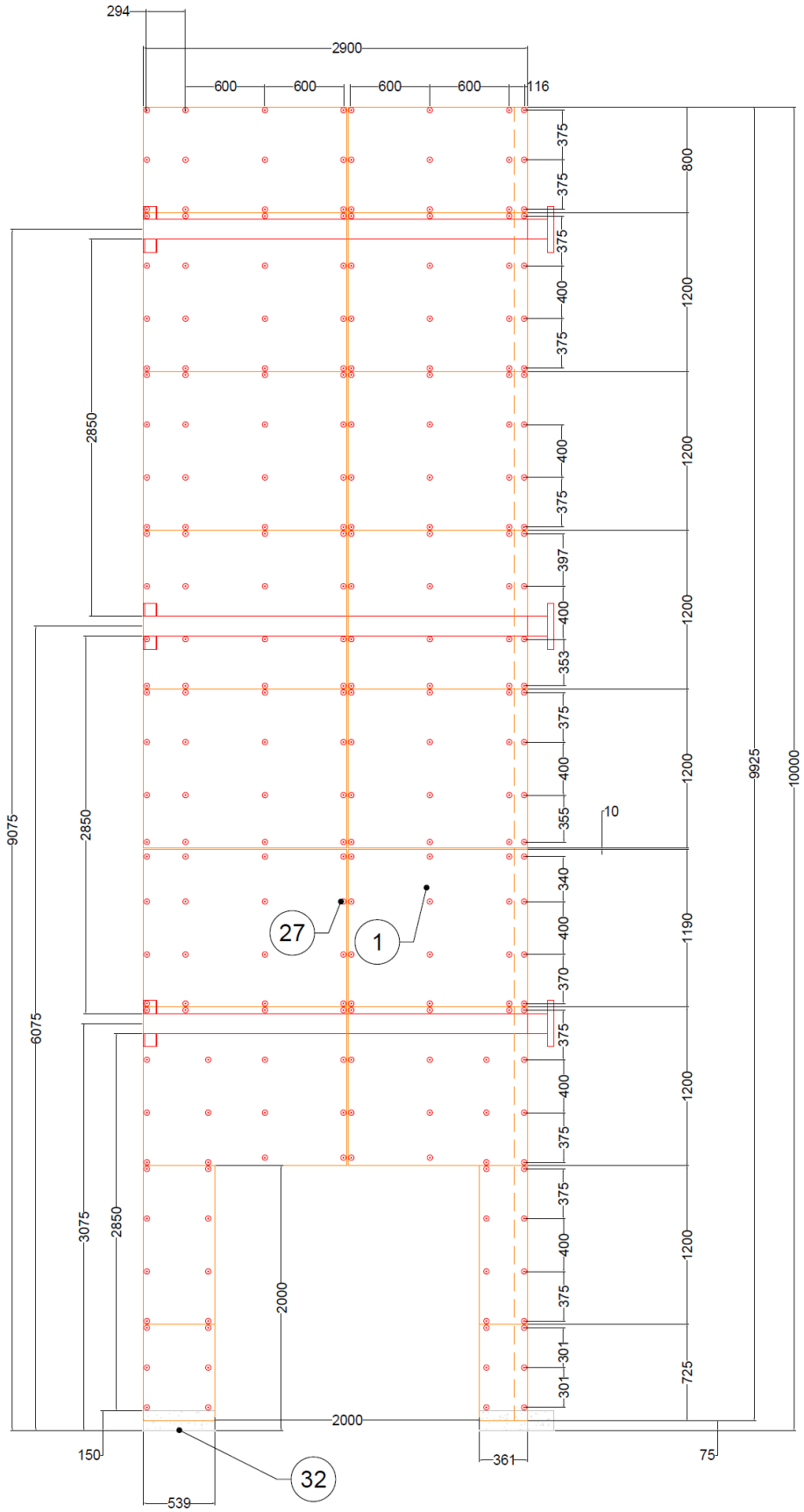

Figure 5 Panel and fixing layout (elevation – main wall)

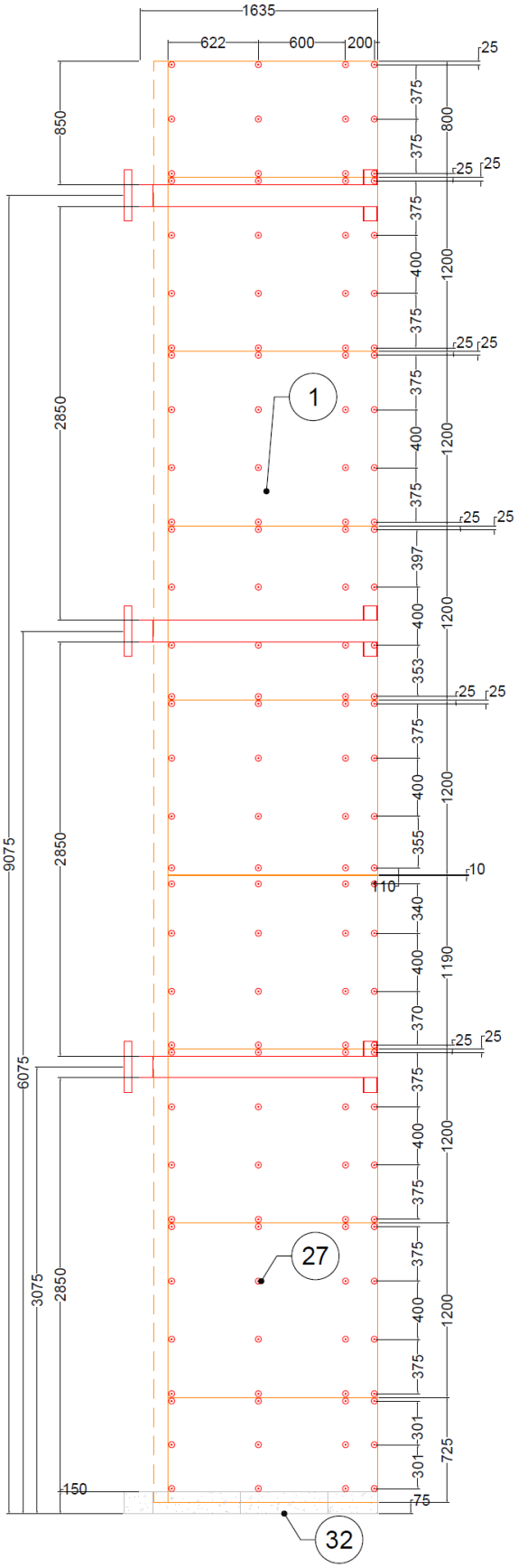

Figure 6 Panel and fixing layout (elevation – wing wall)

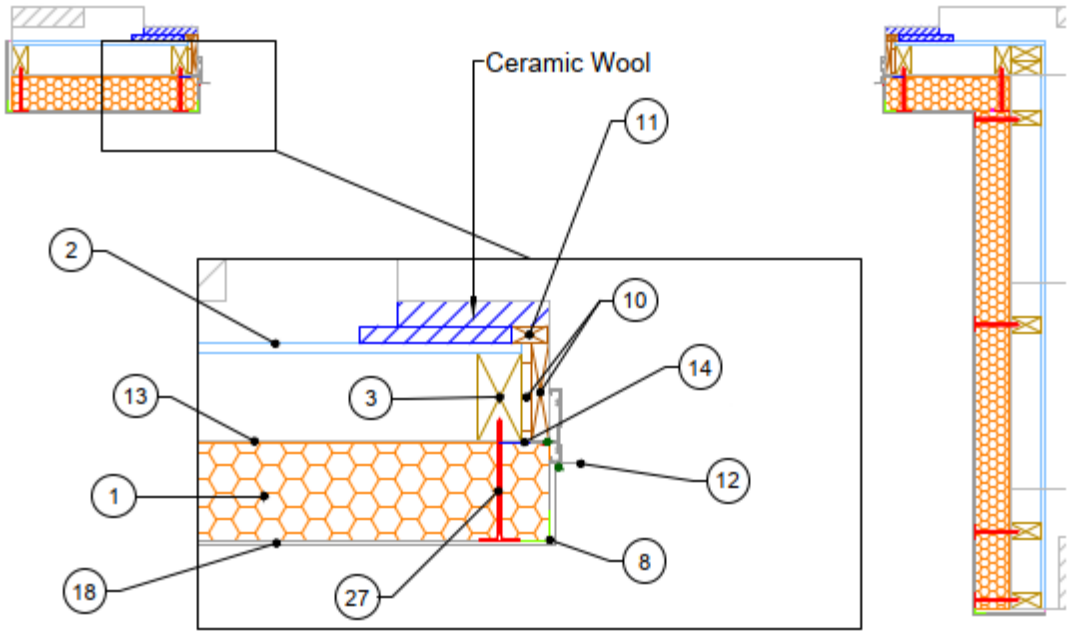

Figure 7 Cross-section A-A

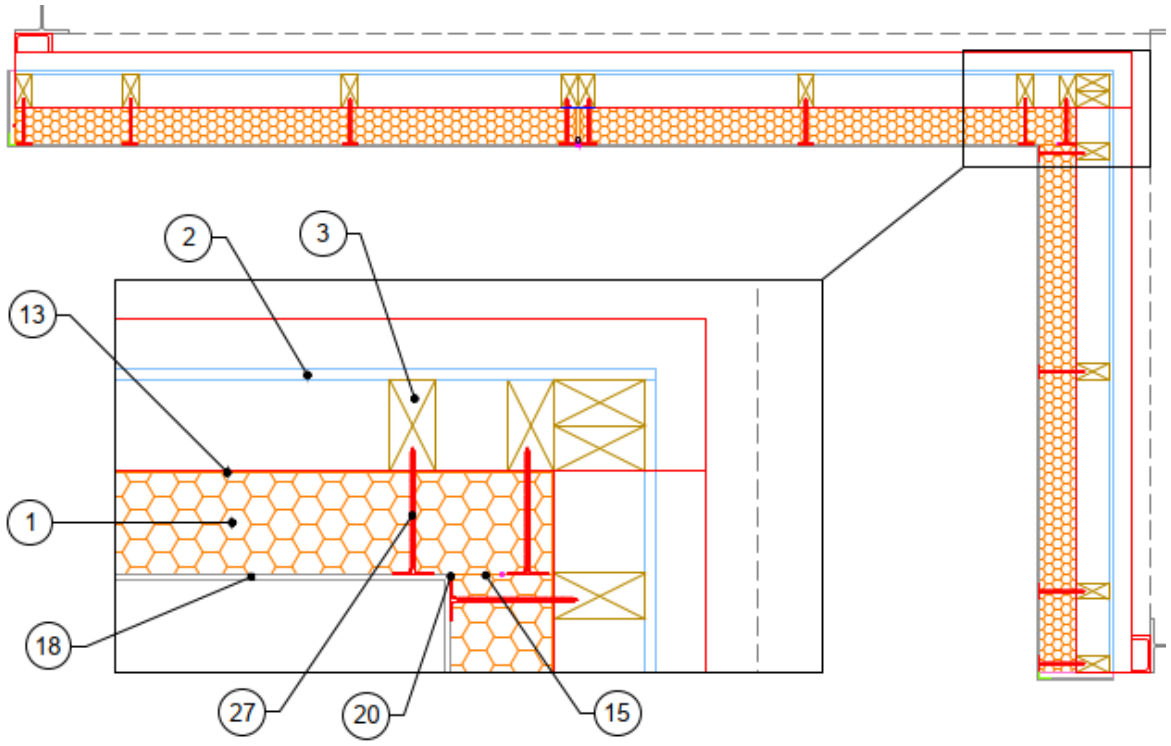

Figure 8 Cross-section B-B

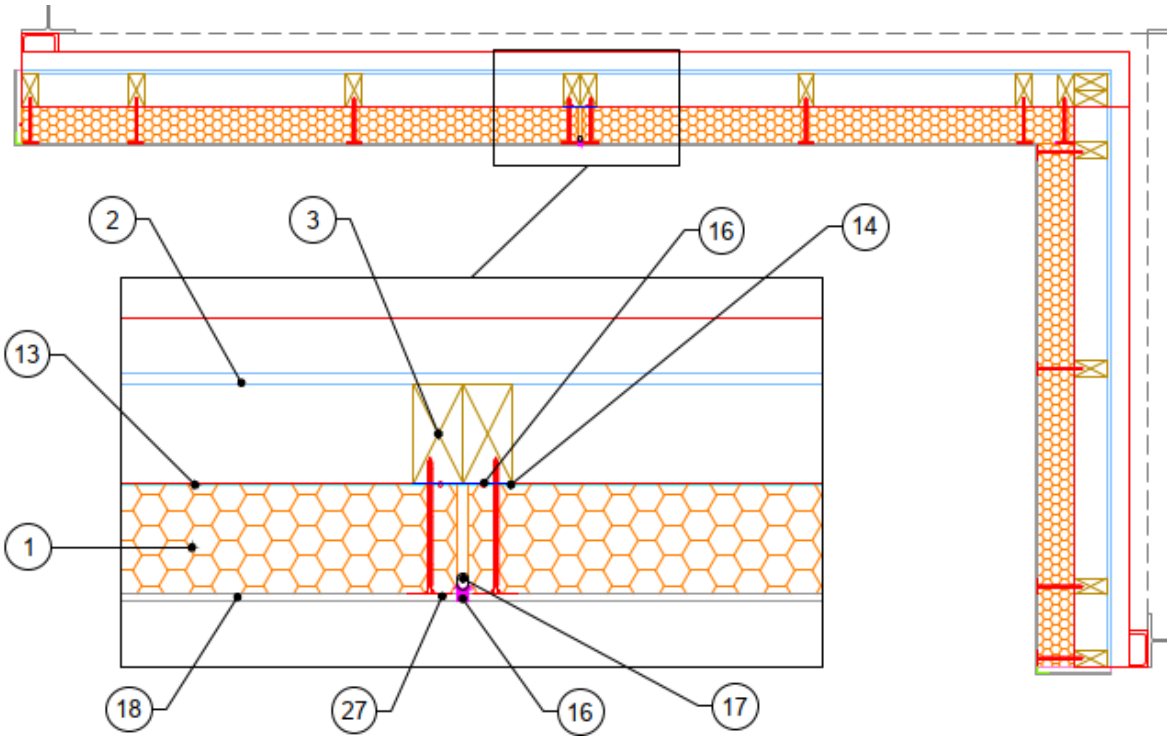

Figure 9 Cross-section B-B (Vertical construction control joint detail)

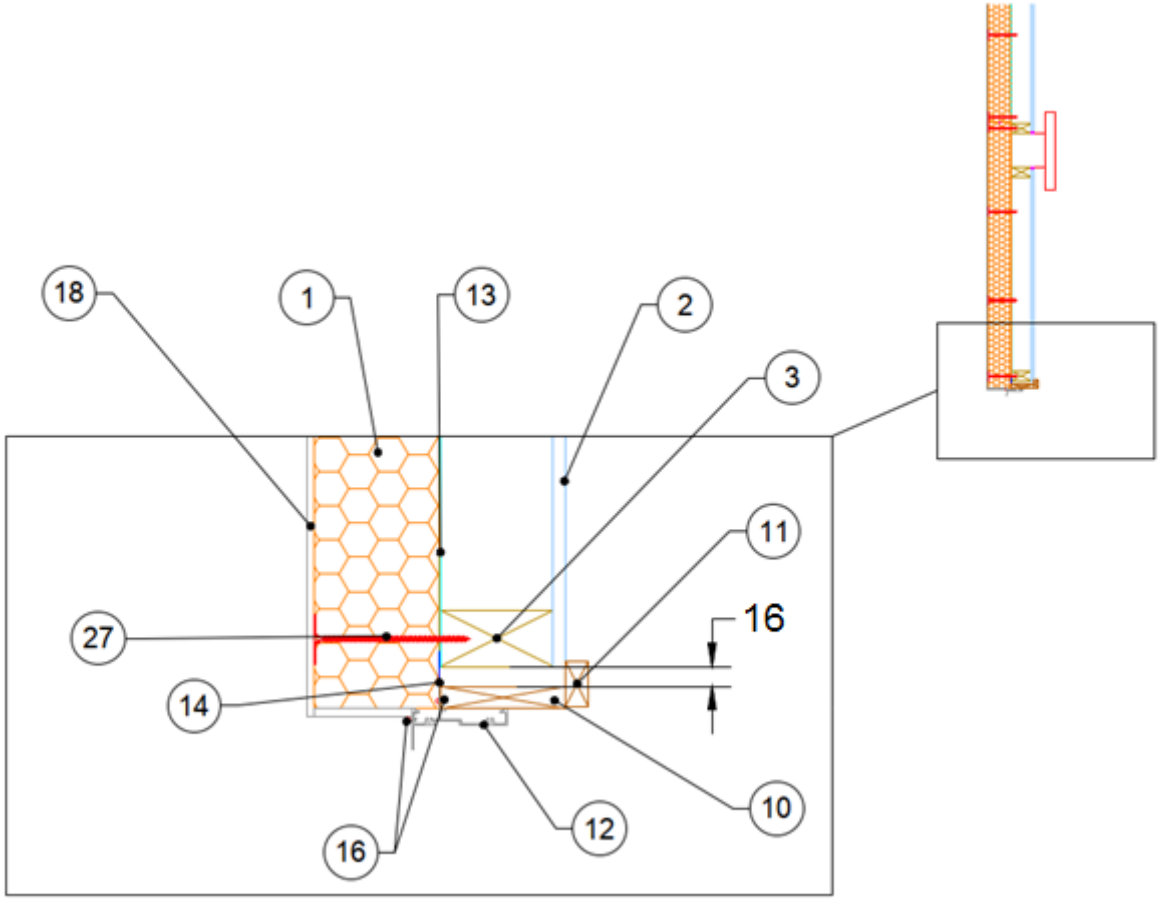

Figure 10 Cross-section C-C (Combustion chamber opening)

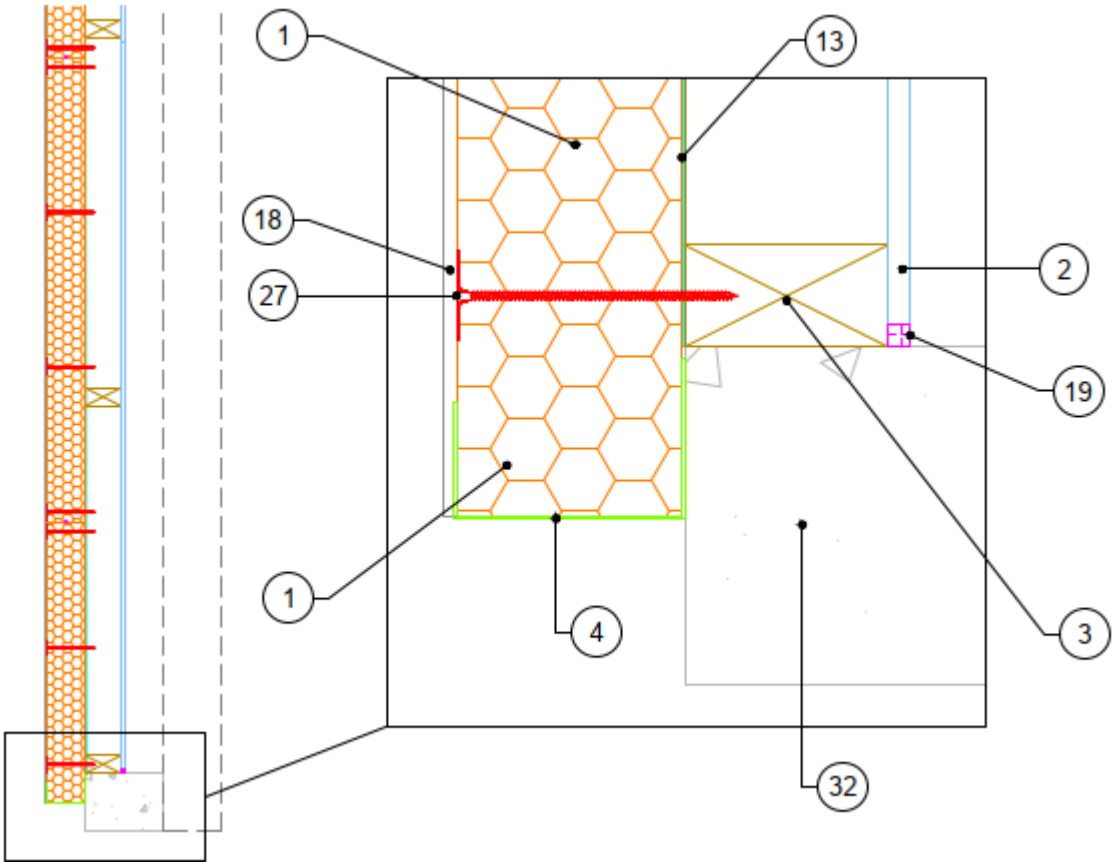

Figure 11 Cross-section D-D (Sill detail)

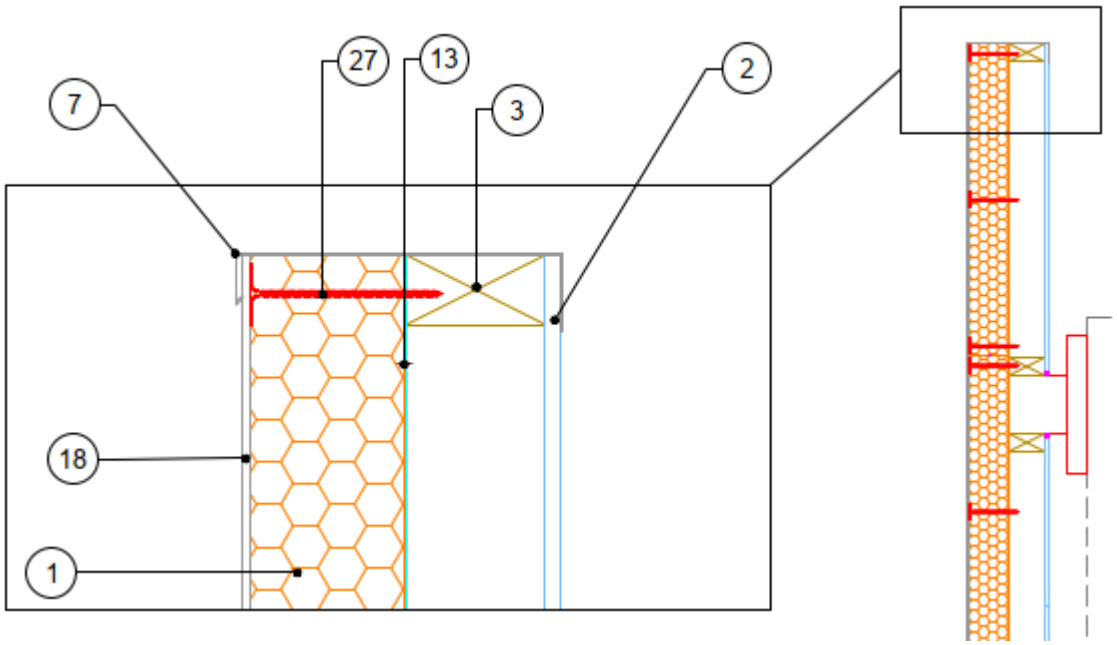

Figure 12 Cross-section D-D (Head of specimen detail)

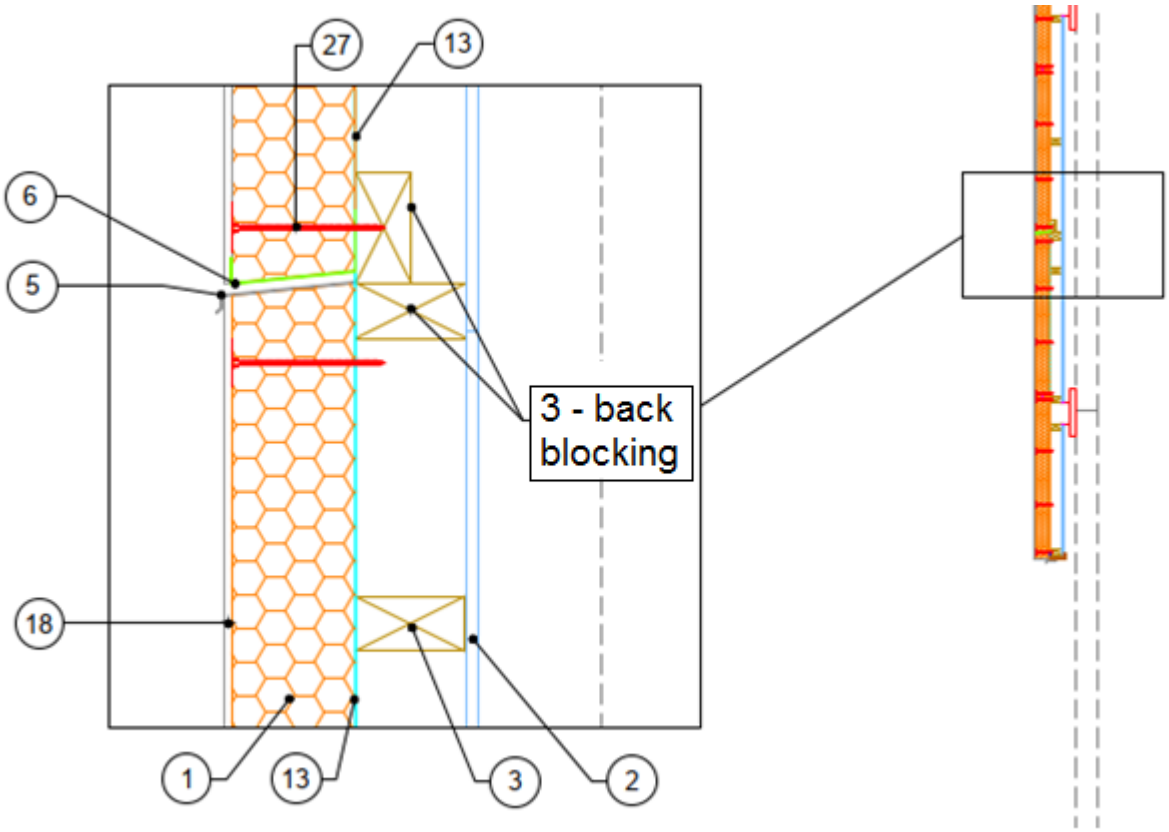

Figure 13 Cross-section C-C (Control joint detail)

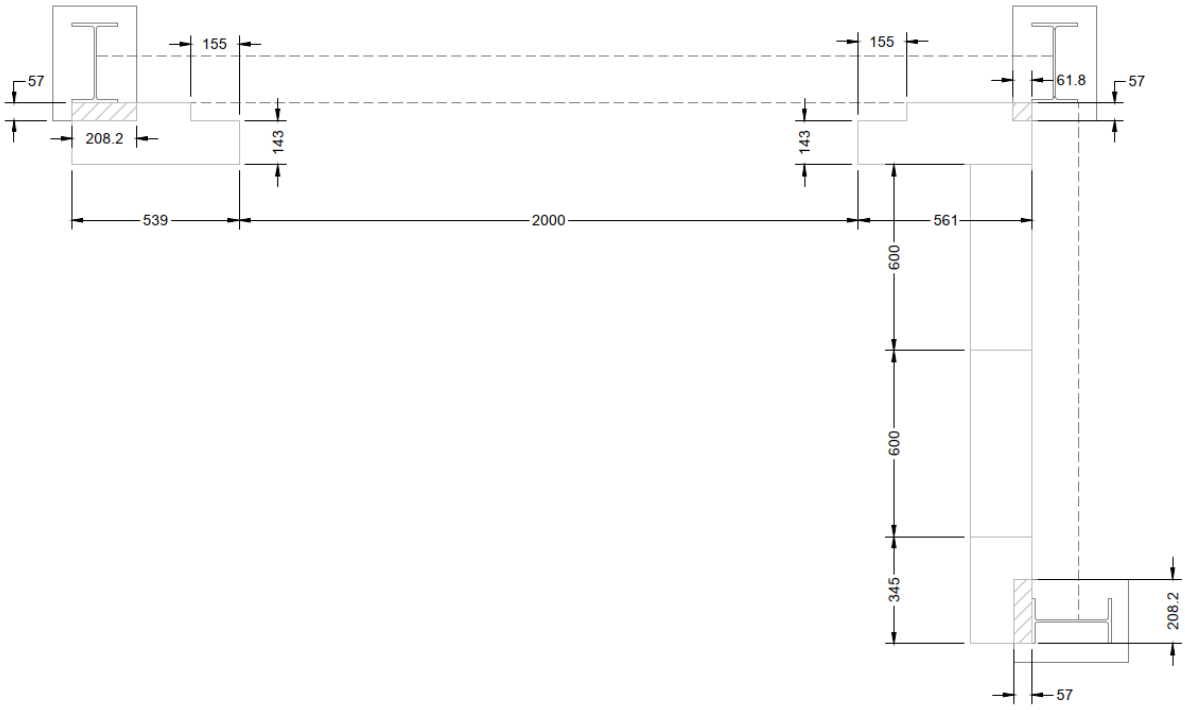

Figure 14 Hebel block layout (from above)

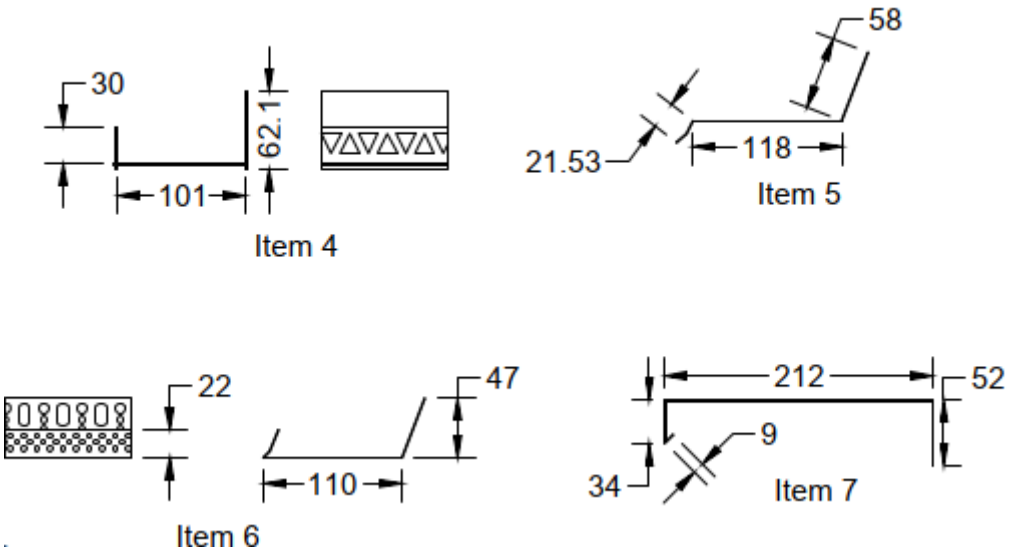

Figure 15 Drawings of flashing components

Appendix B Instrumentation positions

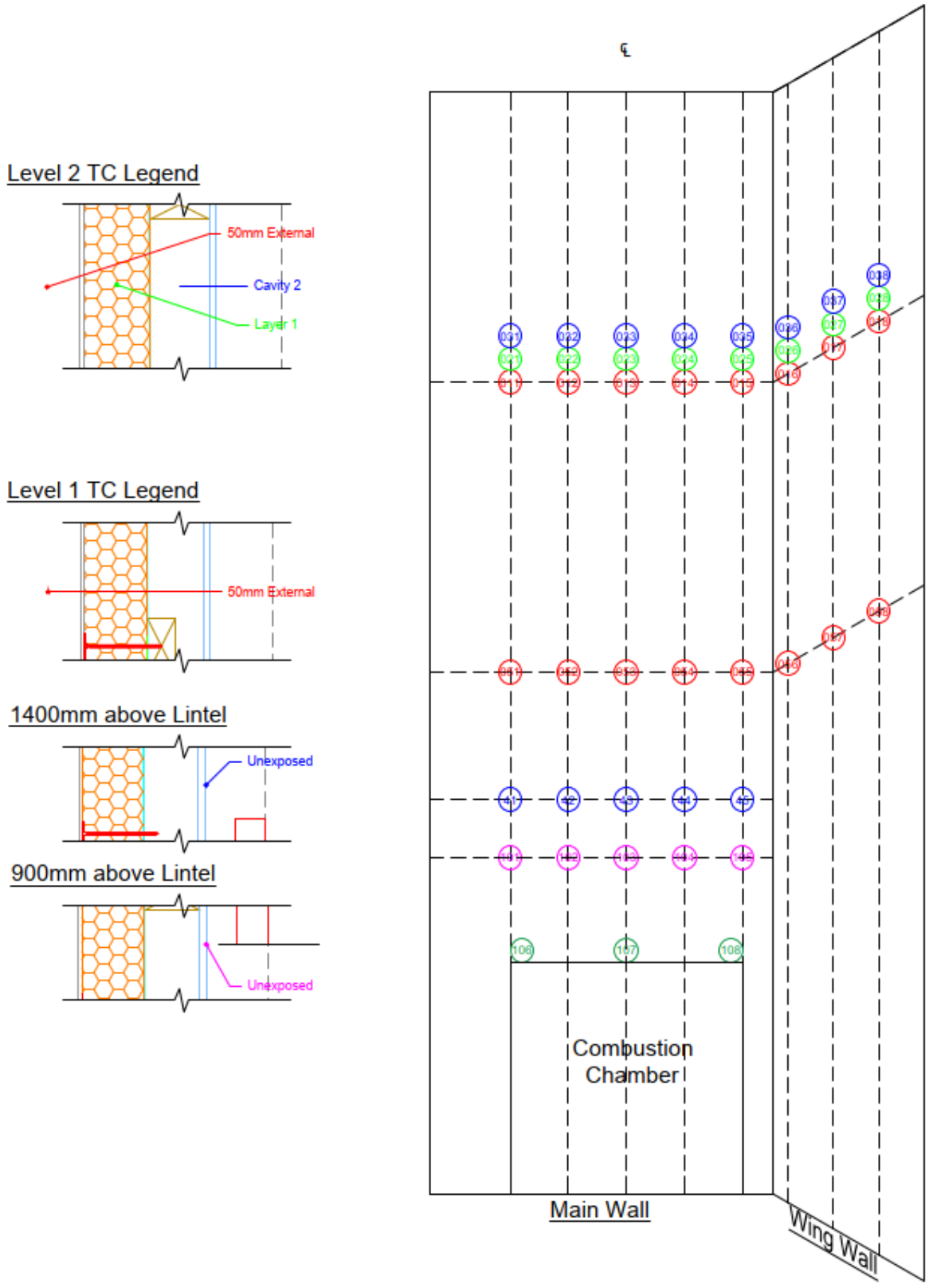

Figure 16 Thermocouple locations

Appendix C Test data

C.1 Specimen temperatures

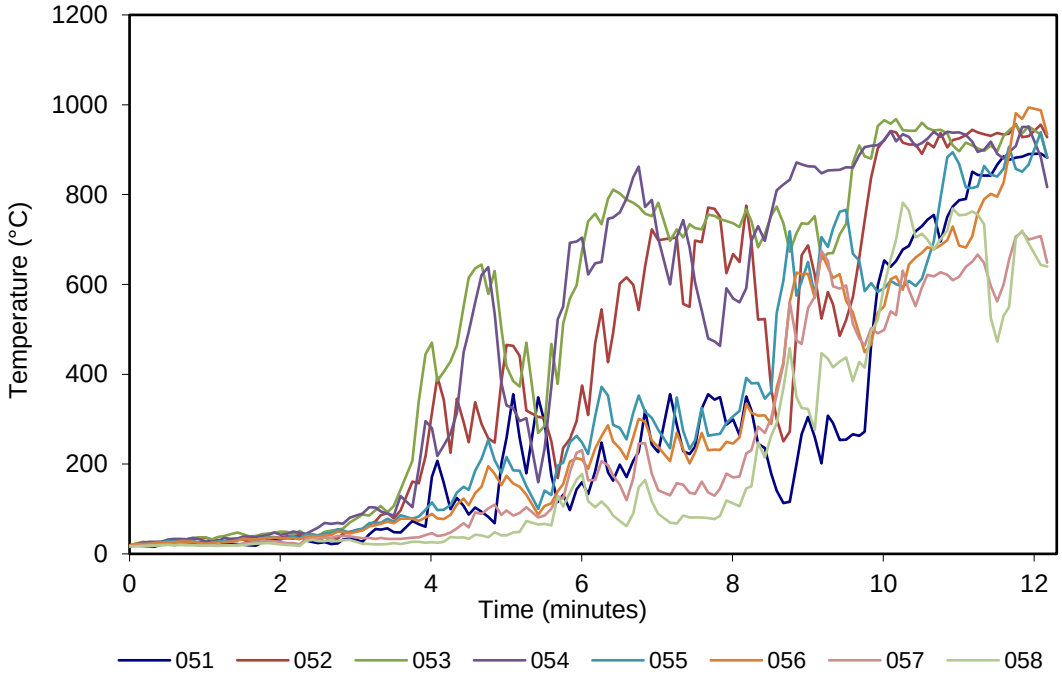

Figure 17 **Level 1, external – temperature vs time (from crib ignition)**

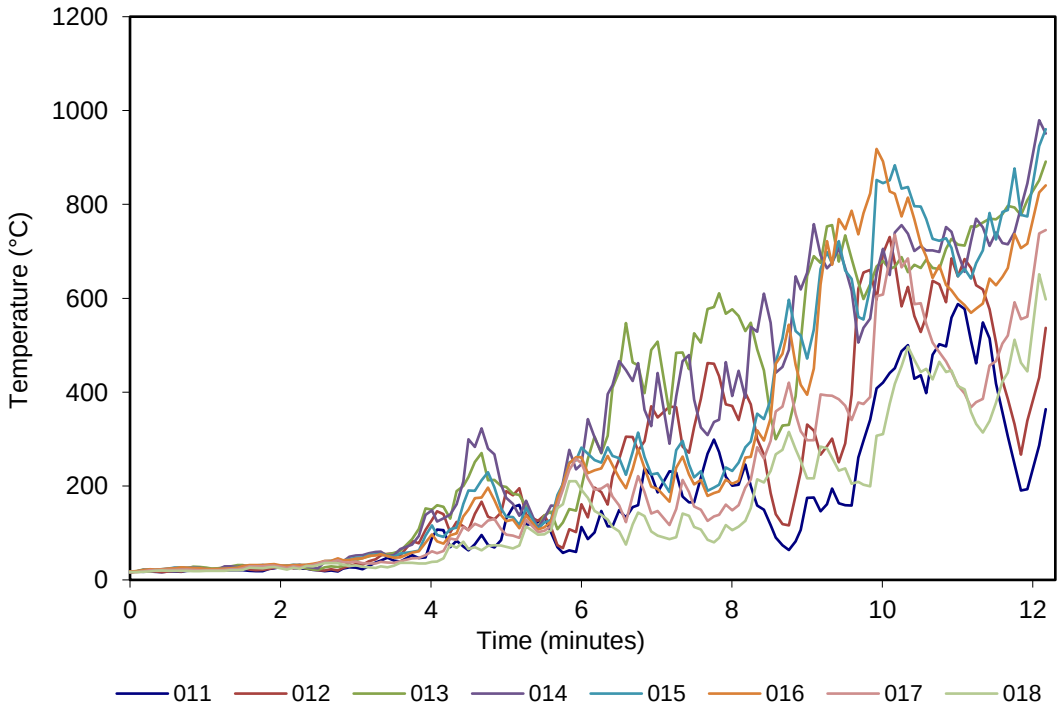

Figure 18 **Level 2, external – temperature vs time (from crib ignition)**

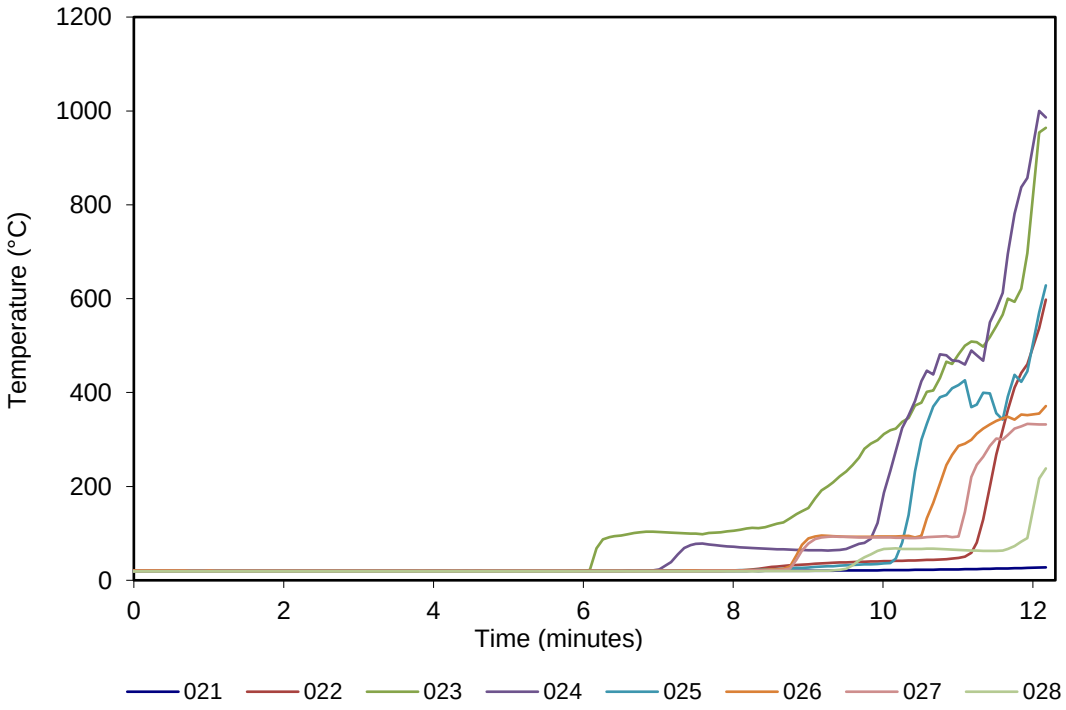

Figure 19 **Level 2, panel layer – temperature vs time (from crib ignition)**

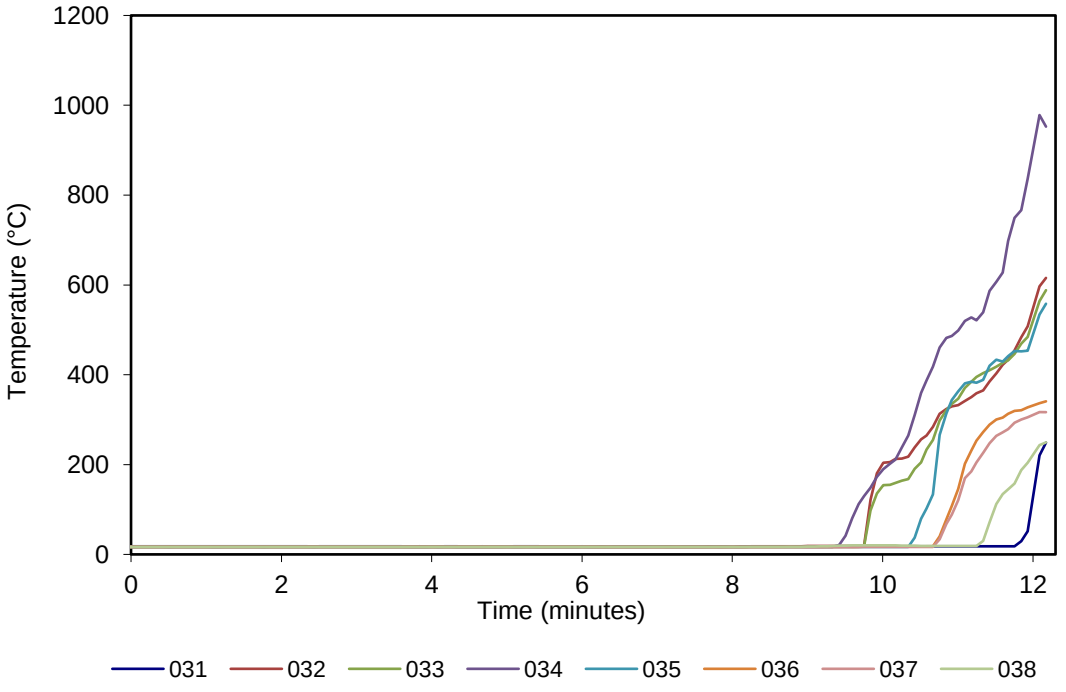

Figure 20 **Level 2, frame cavity – temperature vs time (from crib ignition)**

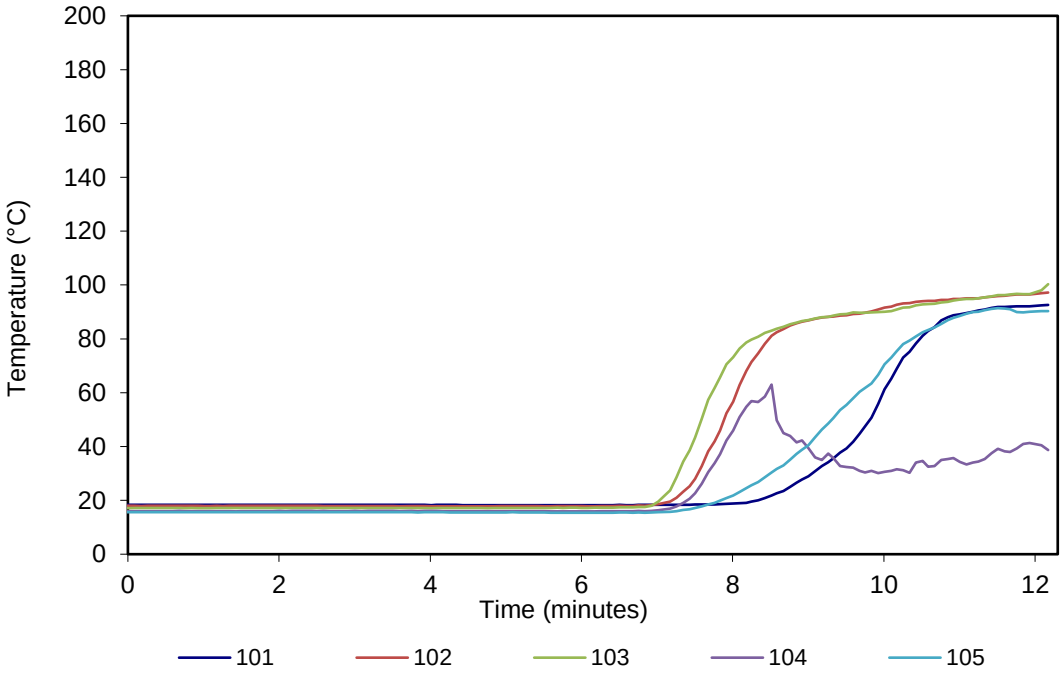

Figure 21 **900mm above chamber opening – temperature vs time (from crib ignition)**

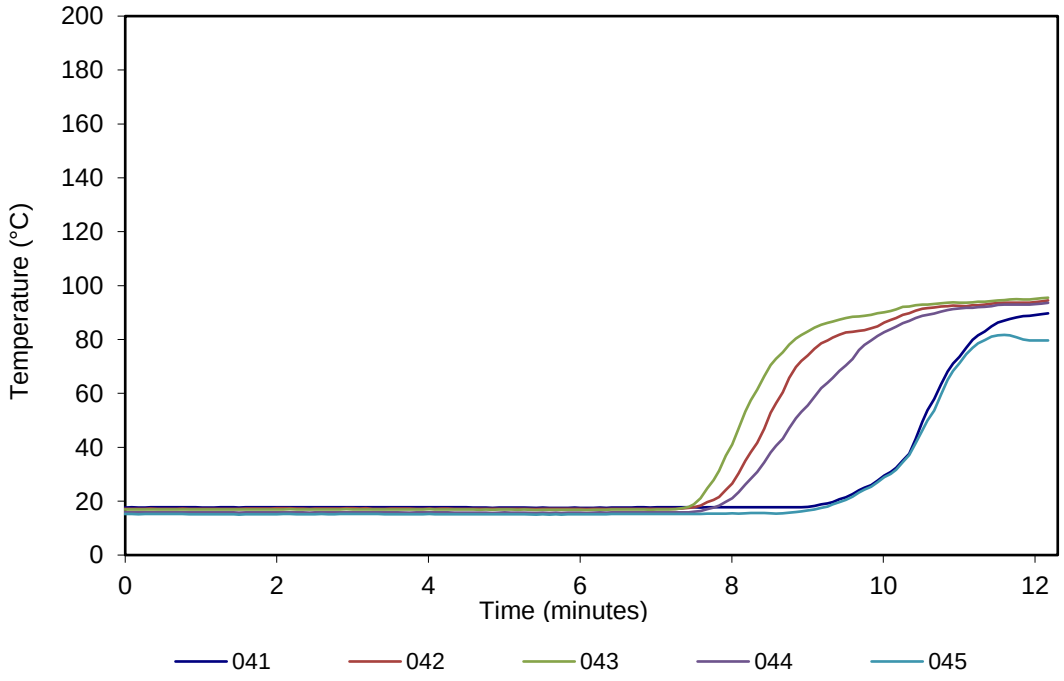

Figure 22 **1400mm above chamber opening – temperature vs time (from crib ignition)**