



# Fire resistance test report

Test standard: Sections 2 and 10 of AS 1530.4:2014

Test sponsor: H.B. Fuller Australia Pty. Ltd.

Product: H.B. Fuller Firesound™

Job number: FRT210084




Test date: 11 May 2021 Revision: R1.1

Warringtonfire: accredited for compliance with ISO/IEC 17025 – Testing



Accreditation No. 3277

## Quality management

Revision	Date	Information about the report			
R1.0	28 May 2021	Description	Initial issue		
			Prepared by	Reviewed by	Authorised by
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R1.1	31 May 2021	Description	Initial issue		
			Prepared by	Reviewed by	Authorised by
		Name	Marina Castelli	Mandeep Kamal	Mandeep Kamal
		Signature			

## Executive summary

This report documents the findings of the fire resistance test of control joints in accordance with sections 2 and 10 of AS 1530.4:2014. The testing was done on 11 May 2021.

Warringtonfire performed the test at the request of H.B. Fuller Australia Pty. Ltd.

Table 1 provides details of the test assembly, and Table 2 provides a summary of the test specimen. A summary of the results is provided in Table 3.

**Table 1 Test assembly**

Item	Detail	
Separating element	CSR Hebel® PowerPanel wall system	
Nominal separating element size	Width	1200 mm
	Height	1200 mm
	Thickness	75 mm
Number of control joints	Two	
Restraint conditions	Restrained on all edges	

**Table 2 Test specimen**

Control joint	Service	Local fire-stopping protection	Local aperture size (mm)
A	Upper horizontal control joint	H.B. Fuller – Firesound™	1200 mm wide x 20 mm high
B	East vertical control joint	H.B. Fuller – Firesound™	20 mm wide x 1200 mm high

**Table 3 Test results**

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	- /120/120
	Integrity	No failure at 126 minutes	
	Insulation	No failure at 126 minutes	
B	Structural adequacy	Not applicable	- /120/120
	Integrity	No failure at 126 minutes	
	Insulation	No failure at 126 minutes	

**Note:** The FRLs for the specimens only apply to the tested orientation. As the FRL was only determined for one direction, an FRL cannot be assigned for the other direction.

## Contents

1.	Introduction	5
2.	Test specimen	5
2.1	Schedule of components	5
2.2	Installation details	7
3.	Test procedure	7
4.	Test measurements and results	8
5.	Application of test results	9
5.1	Test limitations	9
5.2	Variations from the tested specimen	9
5.3	Uncertainty of measurements	9
Appendix A	Drawings of test assembly	10
Appendix B	Test observations	13
Appendix C	Direct field of application	15
Appendix D	Instrumentation locations	17
Appendix E	Test data	19
Appendix F	Photographs	25

# 1. Introduction

This report documents the findings of the fire resistance test of control joints in accordance with sections 2 and 10 of AS 1530.4:2014. The testing was done on 11 May 2021.

Warringtonfire performed the test at the request of the test sponsor listed in Table 4.

**Table 4 Test sponsor details**

Test sponsor	Address
H.B. Fuller Australia Pty. Ltd.	16-22 Redgum drive Dandenong South VIC 3175 Australia

# 2. Test specimen

## 2.1 Schedule of components

Table 5 describes the test specimen and lists the schedule of components. These were provided by the test sponsor and surveyed by Warringtonfire.

All measurements were done by Warringtonfire – unless indicated otherwise.

Detailed drawings of the test specimen are provided in Appendix A.

**Table 5 Schedule of components**

Item	Description	
Separating element (SE)		
1.	Item name	Autoclaved air-rated concrete (AAC) tongue and groove panel
	Product name	CSR Hebel® PowerPanel
	Density	827 kg/m³
	Size	1200 mm high × 600 mm wide × 75 mm thick nominal
2.	Item name	Adhesive
	Product name	Hebel® Adhesive
3.	Item name	50 mm × 75 mm slotted unequal angle
	Material	Galvanised mid steel
	Size	50 mm × 75 mm × 1200 mm long × 1.2 mm BMT
4.	Item name	50 mm × 50 mm slotted equal angle
	Material	Galvanised mid steel
	Size	50 mm × 50 mm × 1200 mm long × 1.2 mm BMT
5.	Item name	Cladding screws
	Description	14-10 × 65 mm long hex head Type 17

Item	Description	
SE	Overall size	1200 mm high × 1200 mm wide × 75 mm thick
	Restraint conditions	Restrained on all edges
	Installation	<p>Three unequal angles (item 3) were secured to the top and sides of the test frame block work on the exposed side using M6.5 × 40 mm long masonry anchors located 25 mm in from the edges and then at 500 mm centres.</p> <p>An equal angle (item 4) was secured to the bottom of the test frame block work on the exposed side using M6.5 × 40 mm long masonry anchors located 25 mm in from the edges and then at 500 mm centres.</p> <p>Two Hebel® panels (item 1) were installed vertically onto the unexposed side of the angles (item 3 and 4).</p> <p>The Hebel® panels (Item 1) were secured to the unequal angles (item 3) along the vertical edges using screws (item 5) located at nominal 900 mm centres and 100 mm from the edges of the unequal angle.</p> <p>The panels (Item 1) were further secured to the upper and lower horizontal angles' edges (item 3 and 4) using the screws (item 5) located at nominal 500 mm centres and 30 mm for the upper unequal angle (item 3) and 25 mm for the lower equal angle (item 4).</p> <p>The centre vertical joint was mortared using the Hebel® adhesive (item 2).</p>
<b>Fire-stopping protections</b>		
<b>Sealant</b>		
6.	Item name	Sealant
	Product name	H.B. Fuller Firesound™
	Density	1497 kg/m <sup>3</sup>
<b>Backing rod</b>		
7.	Item name	Open cell backing rod
	Material	Polyethylene
	Size	1200 mm high × 20 mm wide
	Description	The backing rods were installed between the concrete block work and the Hebel® panels (item 1) at a depth of 16 mm, from the unexposed side.
<b>Control joint A</b>		
A	Service	20 mm wide × 1200 mm long
	Location	Upper horizontal control joint located on the top side between the Hebel® panel and the concrete block work.
	Local fire-stopping protection	
	Protection	<p>The sealant (Item 6) was applied on the unexposed side into the control joint from a depth of 16 mm and finished flush.</p> <p>See Figure 1 and Figure 2 in Appendix A for more details.</p>
<b>Control joint B</b>		
B	Service	20 mm wide × 1200 mm long
	Service detail	East vertical control joint located on the east side between the Hebel® panel and the concrete block work.
	Local fire-stopping protection	
	Protection	<p>The sealant (Item 6) was applied on the unexposed side into the control joint from a depth of 16 mm and finished flush.</p> <p>See Figure 1 and Figure 2 in Appendix A for more details.</p>

## 2.2 Installation details

Table 6 lists the installation details for the test specimen.

**Table 6 Installation details**

Item	Detail
Start date for construction of separating element	9 April 2021
Start date for installation of fire-stopping protection for the control joints	9 April 2021
Completion date for constructing and installing the test specimen	11 May 2021
Separating element constructed by	Representatives of Warringtonfire
Fire-stopping protection for control joints installed by	Representatives of the test sponsor
Symmetry	Asymmetrical due to: <ul style="list-style-type: none"> <li>The sealant applied on the unexposed side.</li> <li>The unequal angles were installed on the exposed side.</li> </ul>

## 3. Test procedure

Table 7 details the test procedure for this fire resistance test.

**Table 7 Test procedure**

Item	Detail						
Statement of compliance	The test was performed in accordance with the requirements of sections 2 and 10 of AS 1530.4:2014 as appropriate for control joints.						
Variations	None						
Pre-test conditioning	The construction and installation of the test specimen was completed on 11 May 2021. The test specimen was subjected to normal laboratory temperatures and conditions between the completion of construction of the test specimen and the start of the test.						
Sampling / specimen selection	The laboratory was not involved in sampling or selecting the test specimen for the fire resistance test. The results obtained during the test only apply to the test samples as received and tested by Warringtonfire.						
Ambient laboratory temperature	<table> <tr> <td>Start of the test</td><td>17 °C</td></tr> <tr> <td>Minimum temperature</td><td>17 °C</td></tr> <tr> <td>Maximum temperature</td><td>19 °C</td></tr> </table>	Start of the test	17 °C	Minimum temperature	17 °C	Maximum temperature	19 °C
Start of the test	17 °C						
Minimum temperature	17 °C						
Maximum temperature	19 °C						
Test duration	126 minutes						



Item	Detail
Instrumentation and equipment	<p>The instrumentation was provided in accordance with AS 1530.4:2014 as follows:</p> <ul style="list-style-type: none"> <li>The furnace temperature was measured by four mineral insulated metal sheathed (MIMS) Type K thermocouples – with wire diameters not greater than 1 mm, an overall diameter of 3 mm, and the measuring junction insulated from the sheath. The thermocouples protruded a minimum of 25 mm from steel supporting tubes.</li> <li>The unexposed side specimen temperatures were measured by type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter x 0.2 mm thick copper discs covered by 30 mm x 30 mm x 2.0 mm thick inorganic insulating pads.</li> <li>The thermocouples positions are shown in Figure 7 in Appendix D.</li> <li>A roving thermocouple was available to measure temperatures at positions that appeared hotter than the positions monitored by the fixed thermocouples.</li> <li>The furnace pressure was measured at mid-height of the vertical control joint B.</li> <li>Cotton pads were available during the test to assess the performance of the specimen under the criteria for integrity.</li> </ul>

## 4. Test measurements and results

Table 8 summarises the results the specimen achieved against the performance criteria listed in sections 2 and 10 of AS 1530.4:2014.

Appendix E includes details of the measurements taken during the test.

Table 9 in Appendix B includes observations of any significant behaviour of the specimen and details of the occurrence of the various performance criteria specified in AS 1530.4:2014.

Photographs of the specimen are included in Appendix F.

**Table 8 Test results**

Penetration system/ control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	-/120/120
	Integrity	No failure at 126 minutes	
	Insulation	No failure at 126 minutes	
B	Structural adequacy	Not applicable	-/120/120
	Integrity	No failure at 126 minutes	
	Insulation	No failure at 126 minutes	

**Note:** The FRLs for the specimens only apply to the tested orientation. As the FRL was only determined for one direction, an FRL cannot be assigned for the other direction.



## 5. Application of test results

### 5.1 Test limitations

The results of these 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.

### 5.2 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 1530.4:2014. Any significant variation with respect to size, construction details, loads, stresses, edge or end conditions, other than that allowed under the field of direct application in the relevant test method, is not covered by this report.

It is recommended that any proposed variation to the tested configuration – other than as permitted under the field of direct application specified in Appendix C – should be referred to the test sponsor. They should then obtain appropriate documentary evidence of compliance from Warringtonfire or another accredited testing authority.

### 5.3 Uncertainty of measurements

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy for the result.

## Appendix A Drawings of test assembly

The drawings of the test assembly completed by Warringtonfire.

The leaders in the drawings represent the items listed in section 2.1. All measurements – unless indicated – are in millimetres.

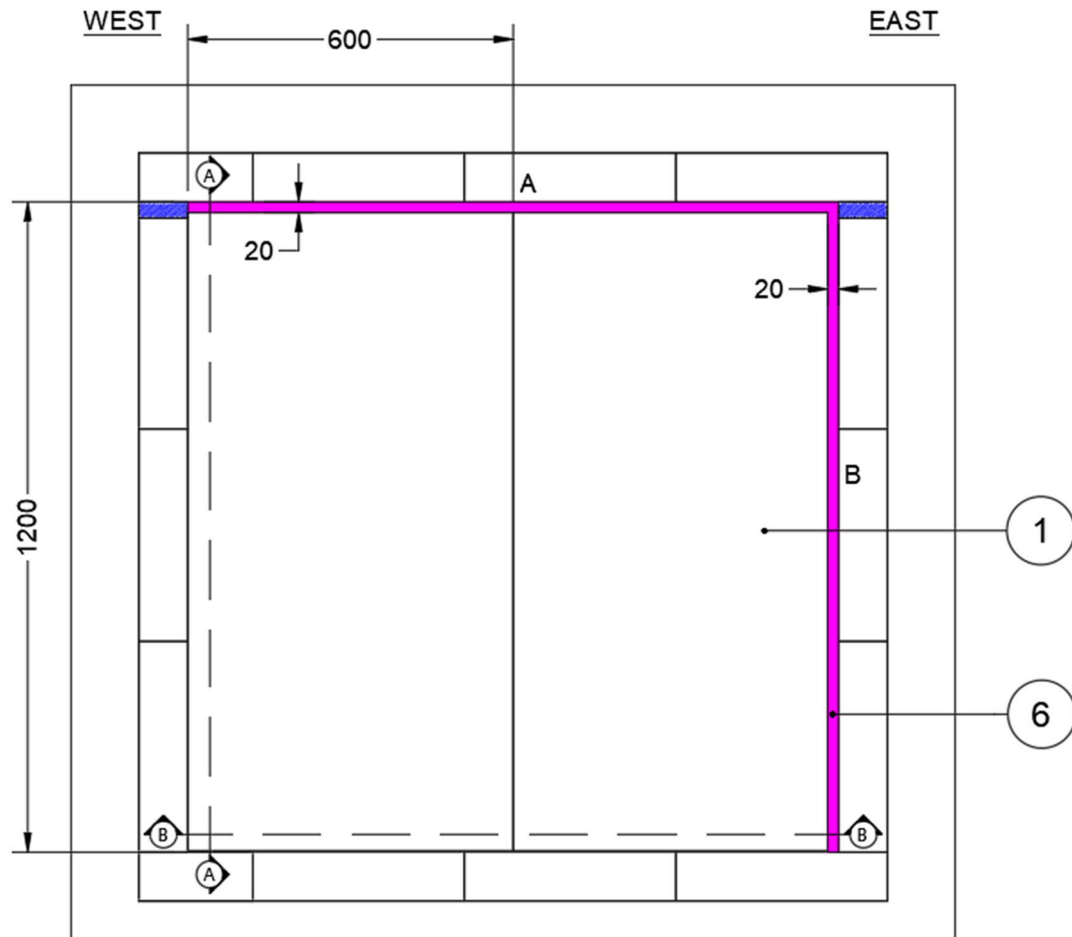
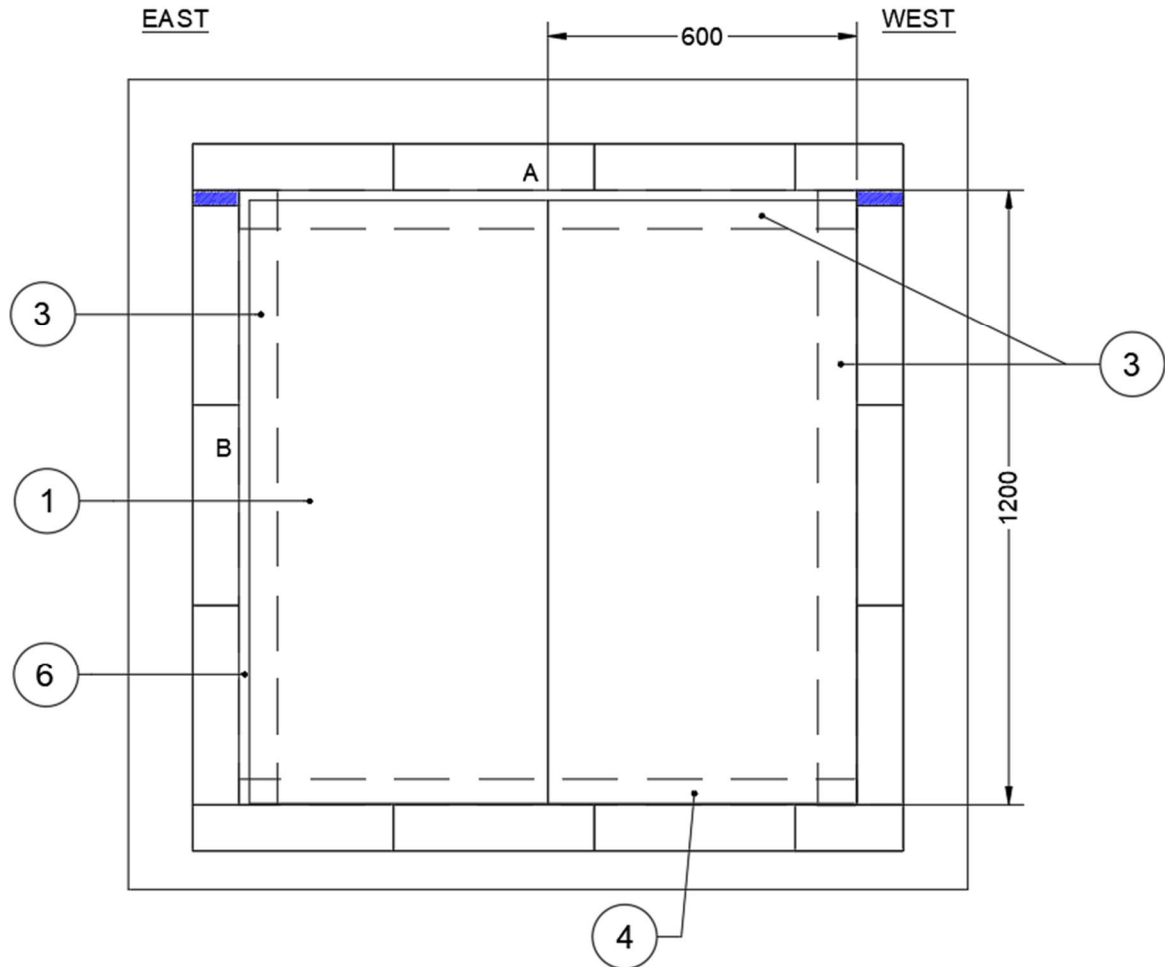


Figure 1 Elevation view of the test specimen (unexposed side)



**Figure 2** Elevation view of the test specimen (exposed side)

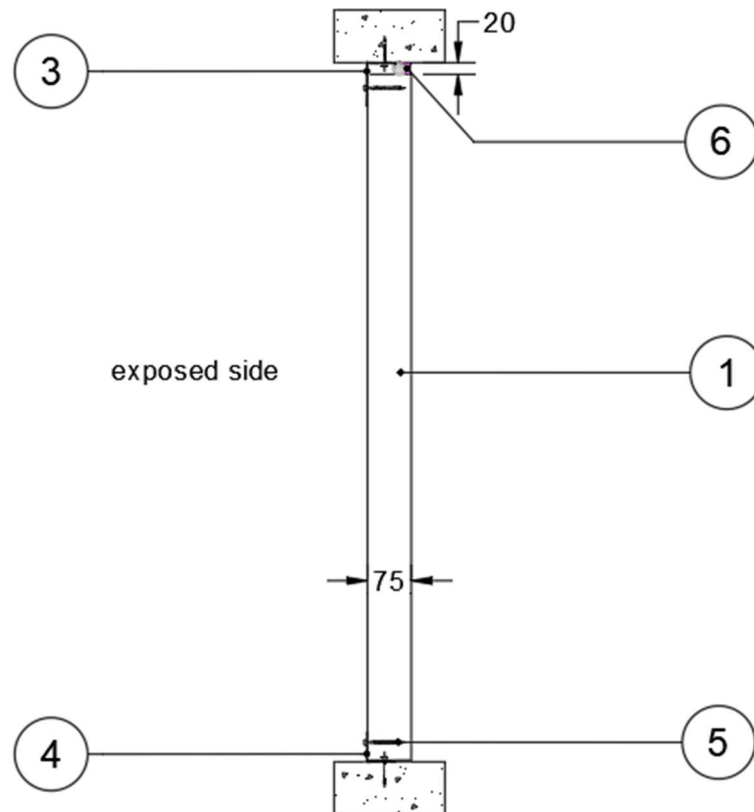


Figure 3 Cross section A-A

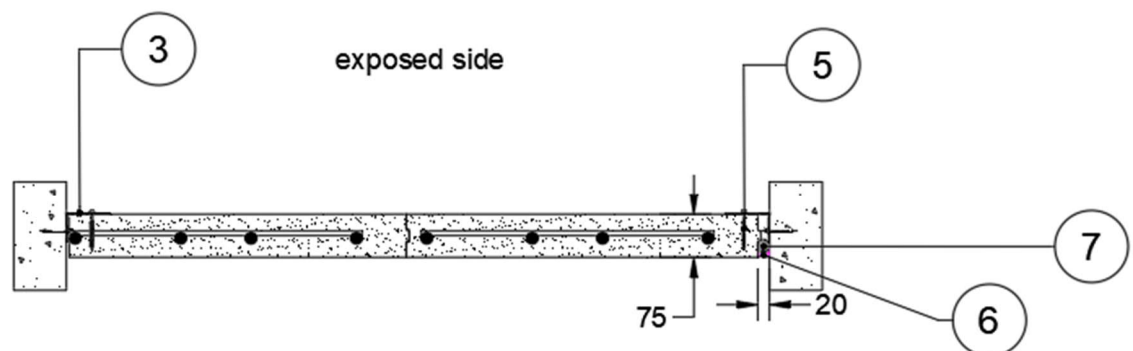


Figure 4 Cross section B-B

## Appendix B Test observations

Table 9 shows the observations of any significant behaviour of the specimen during the test.

**Table 9 Test observations**

Time		Observation
Min	Sec	
Control joint A		
0	00	Fire resistance test started. The initial temperature of the specimen was approximately 17 °C.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
43	30	Crack had appeared near the upper west quarter point of the wall.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
53	00	Sealant was expanding out.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
74	00	The vertical crack near the upper west quarter point of the wall had increased in width.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
116	40	The roving thermocouple applied next to TC001 recorded a temperature of 150 °C.
118	40	The roving thermocouple applied next to TC003 recorded a temperature of 125 °C.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	35	The roving thermocouple applied next to TC001 recorded a temperature of 159 °C.
126	00	Test stopped.
Control joint B		
0	00	Fire resistance test started. The initial temperature of the specimen was approximately 17 °C.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
62	00	Sealant was expanding out.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
119	45	The roving thermocouple applied next to TC012 recorded a temperature of 173 °C.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
123	30	The roving thermocouple applied next to TC012 recorded a temperature of 187 °C.

Time		Observation
Min	Sec	
126	00	Test stopped.

## Appendix C Direct field of application

The text, figures and tables in this appendix have been taken from section 10 of AS 1530.4:2014.

### C.1 General

The results of the fire test contained in the test report are directly applicable without reference to the testing authority to similar constructions where one or more of the changes set out in clauses 10.12.2 to 10.12.6 of AS 1530.4:2014 have been made.

### C.2 Separating elements

Results obtained for sealing systems in various types of masonry and concrete construction may be applied as follows:

- For elements manufactured from similar types of concrete or masonry, the results of the prototype test may be applied to materials of density within  $\pm 15\%$  of the tested specimen. For greater variations, the opinion of a registered testing authority shall be obtained.
- Test results obtained in conjunction with hollow concrete blocks may be used in a solid concrete element of the same overall thickness. The reverse does not apply.
- Results obtained from framed wall systems may be applied to the performance of a system in concrete, masonry or solid gypsum blocks of greater or equal thickness to that of the tested prototype. The reverse does not apply.
- Results obtained from framed wall systems may be applied to similar walls having studs of the same material with sizes greater than the tested prototype.
- Results obtained from a prototype test may be applied to framed wall systems of similar construction but having thicker facings of the same material applied to the studs.

### C.3 Control joints

The following variations are permitted:

- Results obtained from single test on a butt joints may be applied to contoured joints, provided the joints have —
  - equal width and equal or greater depth of sealant; and
  - equal or greater thickness of fire-separating element.
  - Note: Examples of butt and contoured control joints are shown in figure 10.12.6 of AS 1530.4:2014.
- Facings may be applied to the surface of the fire-stopping system.



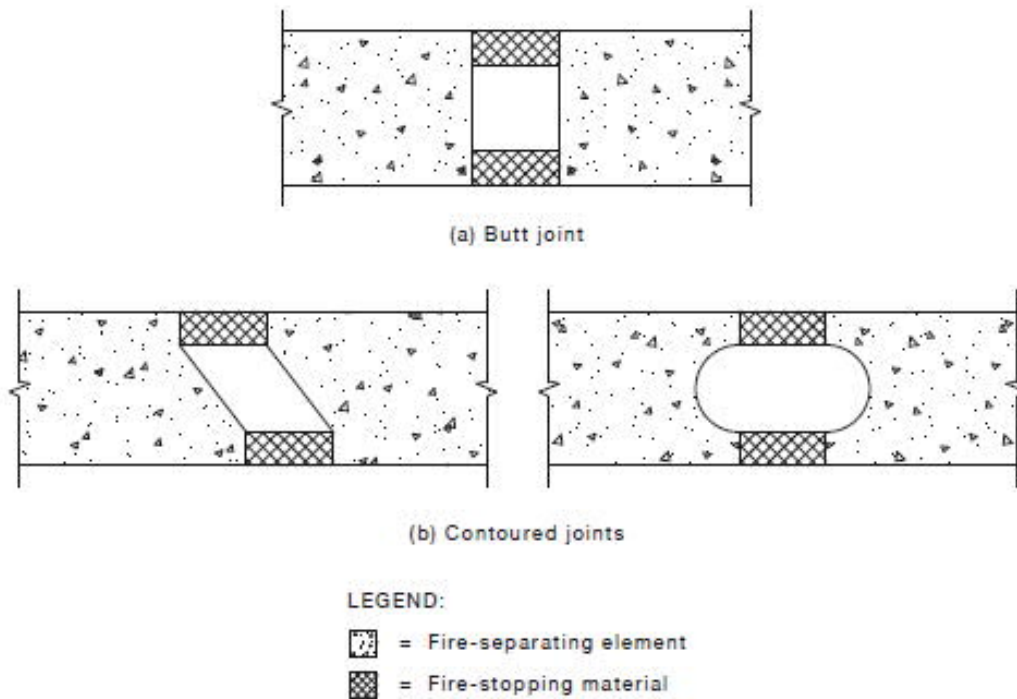


FIGURE 10.12.6 CONTOURED CONTROL JOINTS

## Appendix D Instrumentation locations

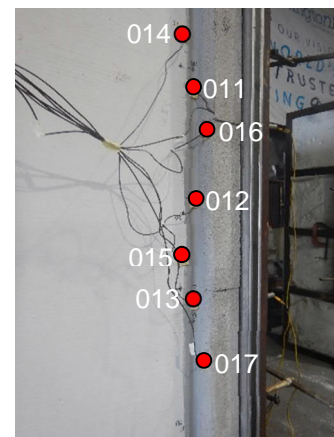
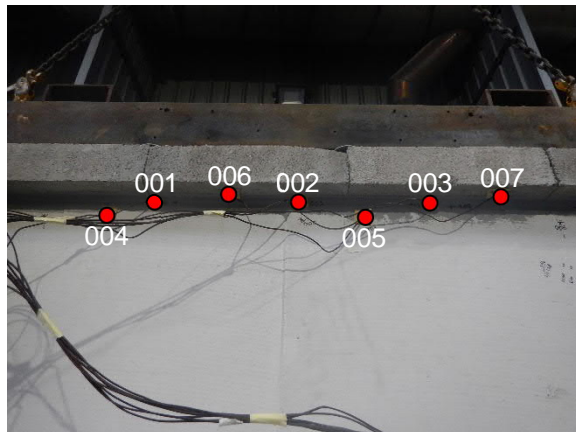


Figure 5 Upper horizontal control joint A (item 1) Figure 6 East vertical control joint B (item 1)

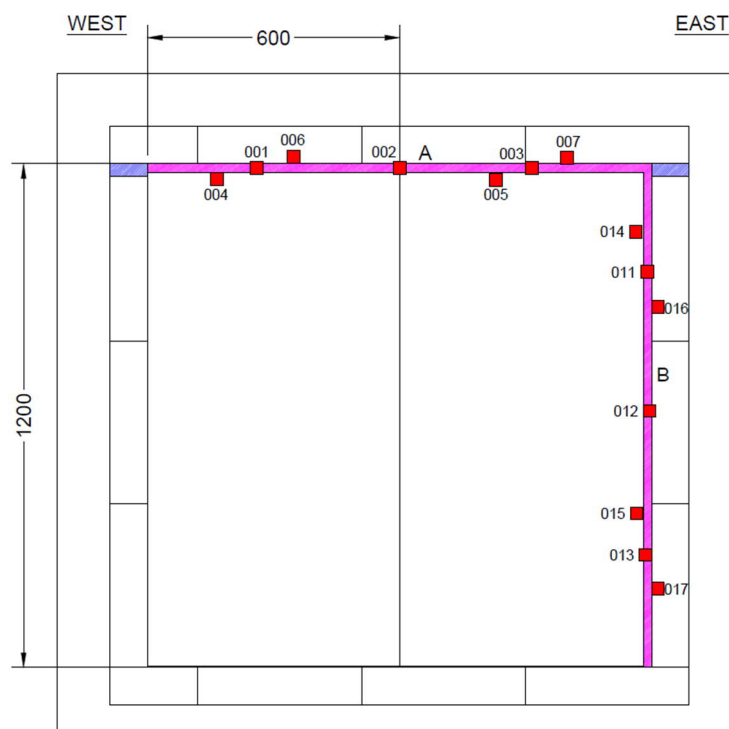


Figure 7 Overview of the thermocouple location on the unexposed side

**Table 10 Thermocouple position**

Control joint	T/C no.	Description
A	001	On the control joint, at the west quarter point, 250 mm from the mid-width.
	002	On the control joint at the mid-width.
	003	On the control joint, at the east quarter point, 250 mm from the mid-width.
	004	On the Hebel®, 125 mm west from TC 001.
	005	On the Hebel®, 125 mm east of TC 002.
	006	On the block, 125 mm east from TC 001.
	007	On the block, 125 mm east of TC 002.
B	011	On the control joint, at the upper quarter point, 250 mm from the mid-height.
	012	On the control joint at the mid-height.
	013	On the control joint, at the lower quarter point, 250 mm from the mid-height.
	014	On the Hebel®, 125 mm above TC 011.
	015	On the Hebel®, 125 mm below TC 012.
	016	On the block, 125 mm below TC 011.
	017	On the block, 125 mm below TC 013.

## Appendix E Test data

### E.1 Furnace temperature and severity

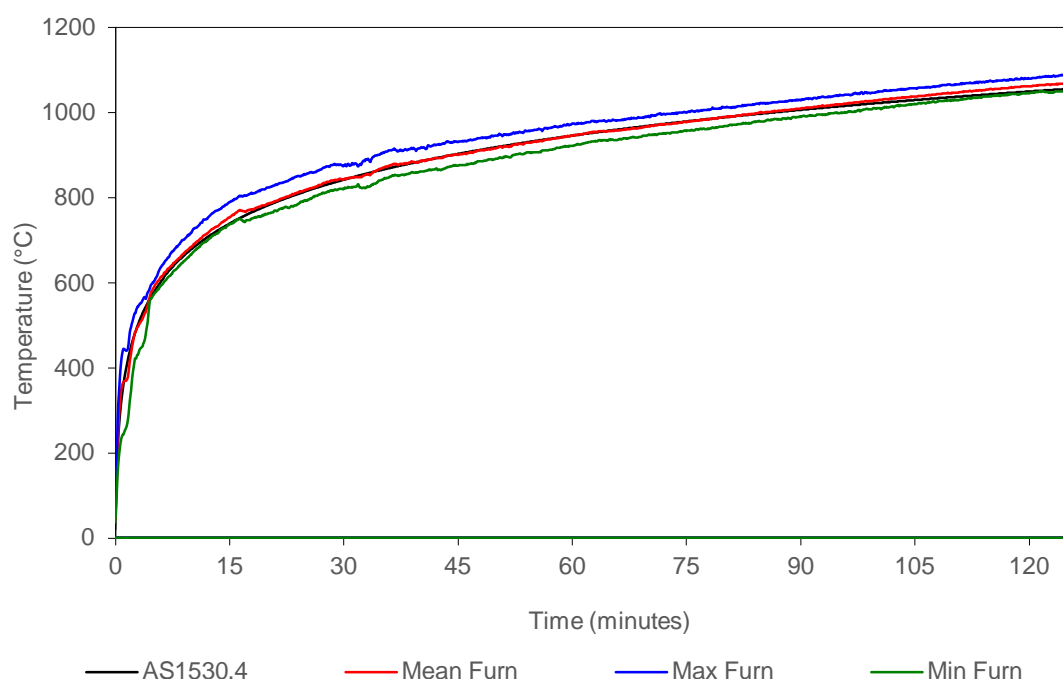


Figure 8 Furnace thermocouple temperature vs time

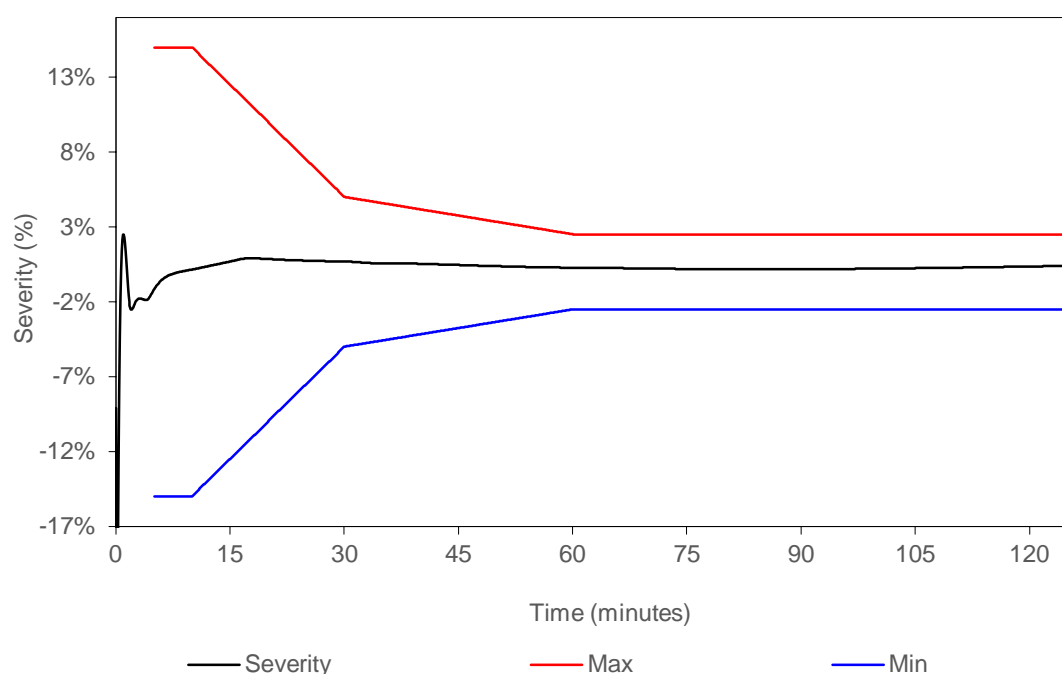


Figure 9 Furnace severity vs time

## E.2 Furnace pressure

The furnace pressure was measured mid-height of the vertical control joint B (Item 1).

Table 11 Furnace pressure

Time (minutes)	Average pressure (Pa)	Time (minutes)	Average pressure (Pa)	Time (minutes)	Average pressure (Pa)
5-10	15	45-50	14	85-90	16
10-15	15	50-55	14	90-95	16
15-20	16	55-60	15	95-100	15
20-25	16	60-65	15	100-105	15
25-30	14	65-70	15	105-110	16
30-35	17	70-75	16	110-115	16
35-40	16	75-80	16	115-120	16
40-45	15	80-85	15	120-125	17

## E.3 Specimen temperature

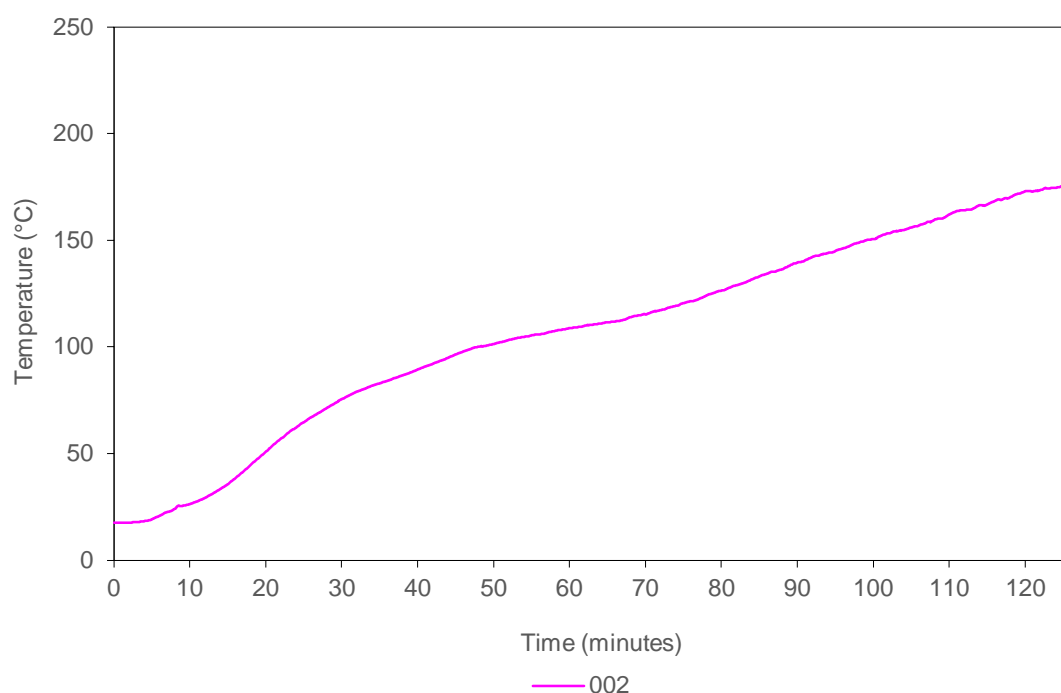
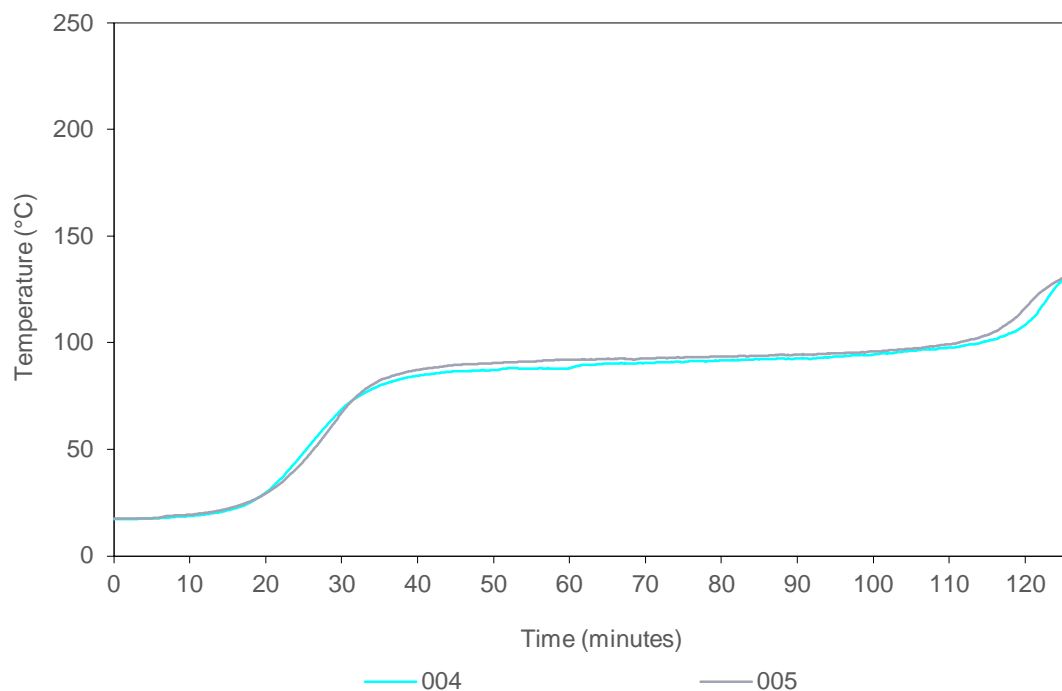
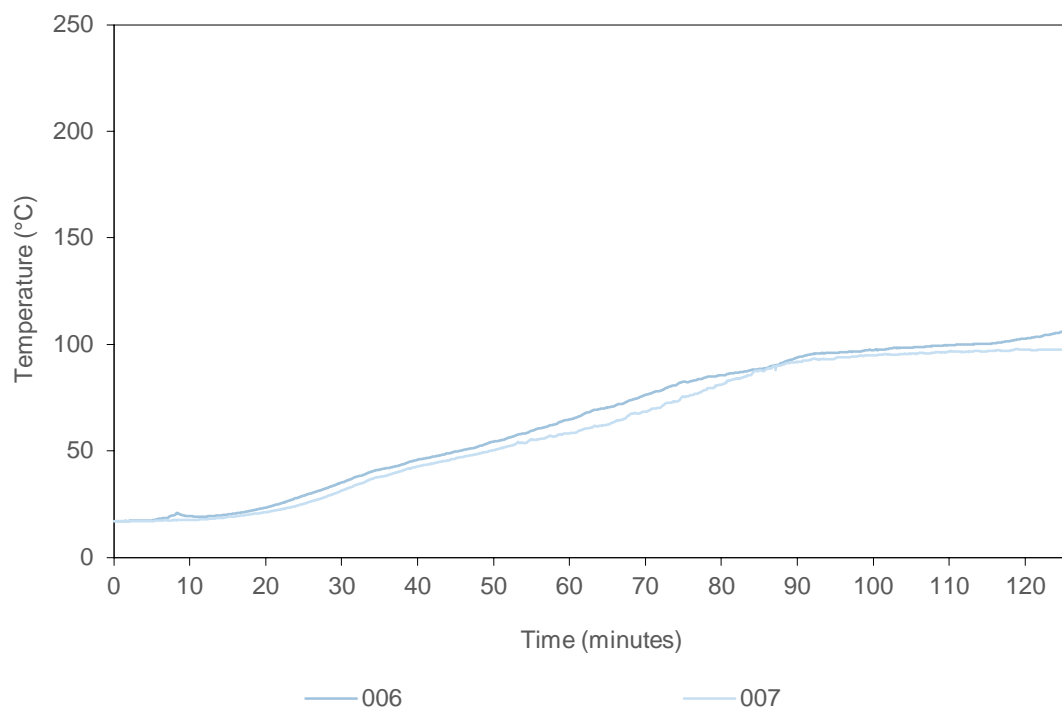


Figure 10 Upper horizontal control joint A on the sealant temperature vs time.

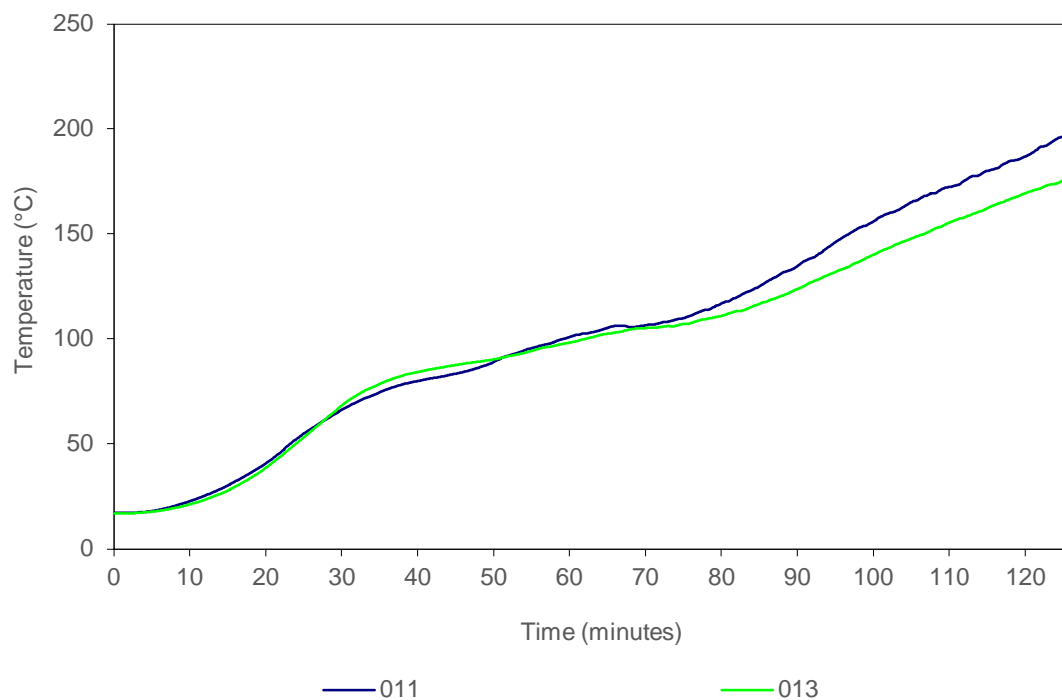
**Note:** TC001 and TC003 were located directly over a crack and the data has been omitted.



**Figure 11** Upper horizontal control joint A on the wall temperature vs time.

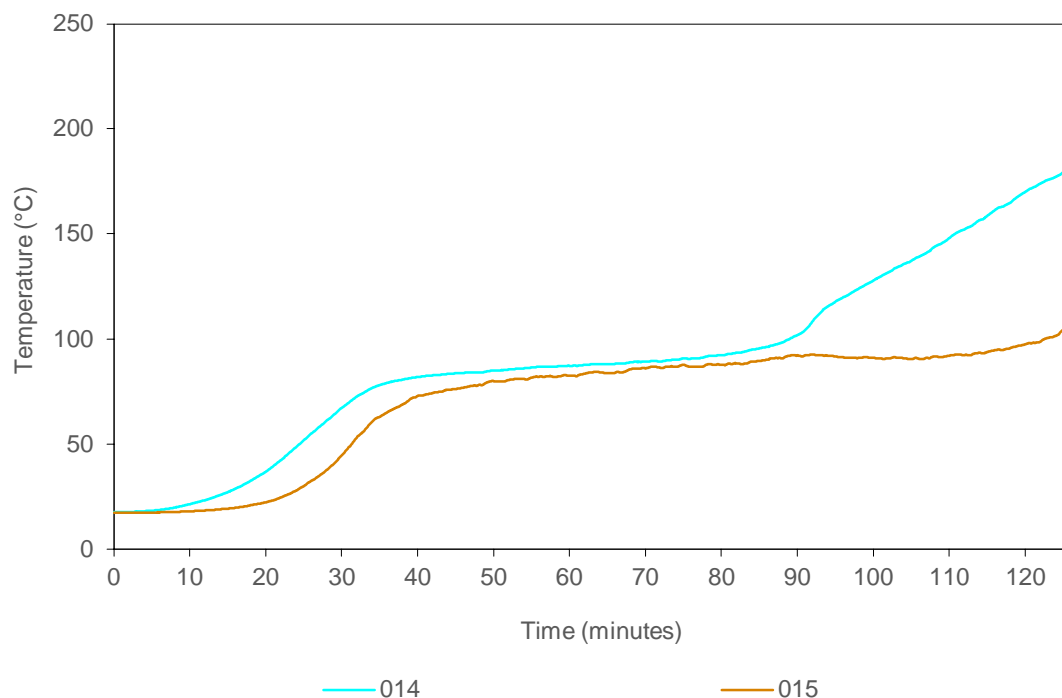


**Figure 12** Upper horizontal control joint A on the concrete blocks temperature vs time.



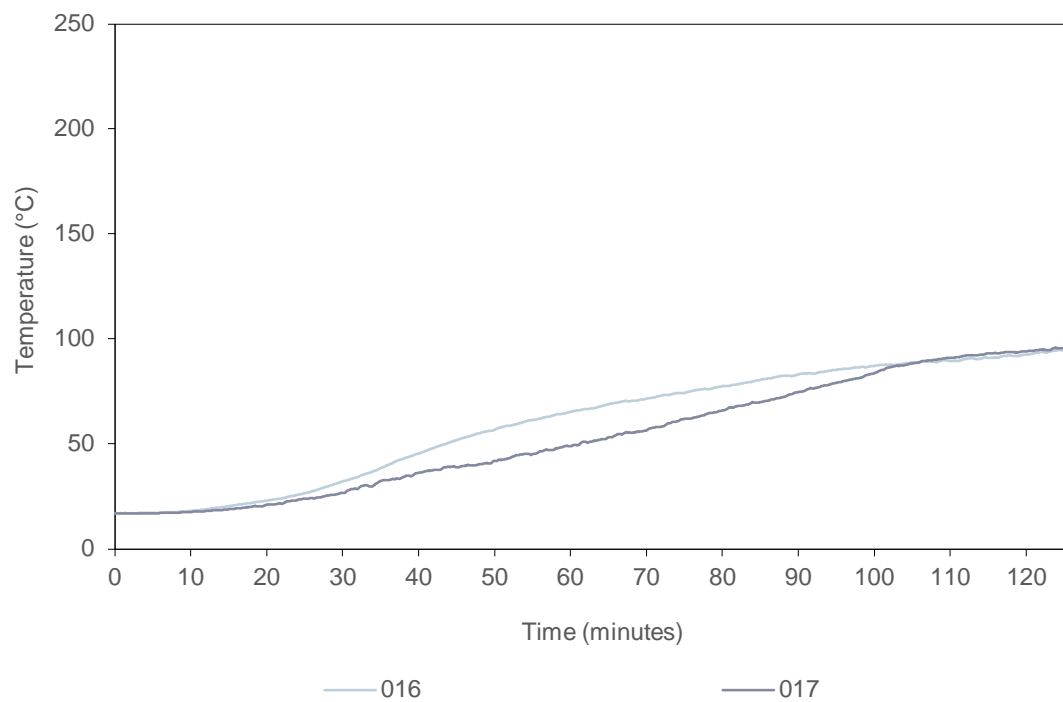
**Figure 13 East vertical control joint B on the sealant temperature vs time.**

**Note:** TC012 was located directly over a crack and the data has been omitted.



**Figure 14 East vertical control joint B on the wall temperature vs time.**





**Figure 15** East vertical control joint B on the concrete blocks temperature vs time.

**Table 12 Test specimen temperatures**

Penetration system/ Control joint	T/C #	Description <sup>1</sup>	Temp (°C) at t (minutes)					Limit <sup>2</sup> (minutes)
			t=0	t=30	t=60	t=90	t=120	
A	001	On control joint	#	#	#	#	#	N/A
	002	On control joint	18	75	109	140	173	—
	003	On control joint	#	#	#	#	#	N/A
	004	On Hebel®	18	69	88	93	108	—
	005	On Hebel®	18	67	92	94	116	—
	006	On block	17	35	65	94	103	—
	007	On block	17	31	58	92	98	—
B	011	On control joint	17	66	101	135	187	—
	012	On control joint	#	#	#	#	#	N/A
	013	On control joint	17	68	98	124	169	—
	014	On Hebel®	18	67	87	102	170	—
	015	On Hebel®	17	45	83	92	97	—
	016	On block	17	32	65	83	92	—
	017	On block	17	27	49	75	94	—

- Note:**
- <sup>1</sup> Refer to Table 10 for the locations of thermocouples as only a generic description is included in the table.
  - <sup>2</sup> Limit time is the time to the nearest whole minute, rounded down to the nearest minute, at which the temperature recorded by the thermocouple does not rise by more than 180 K above the initial temperature.
- # Thermocouple malfunction.
- Under limit column indicates the temperature limit was not exceeded during the test period or up until the time of integrity failure if a failure occurred.

## Appendix F Photographs

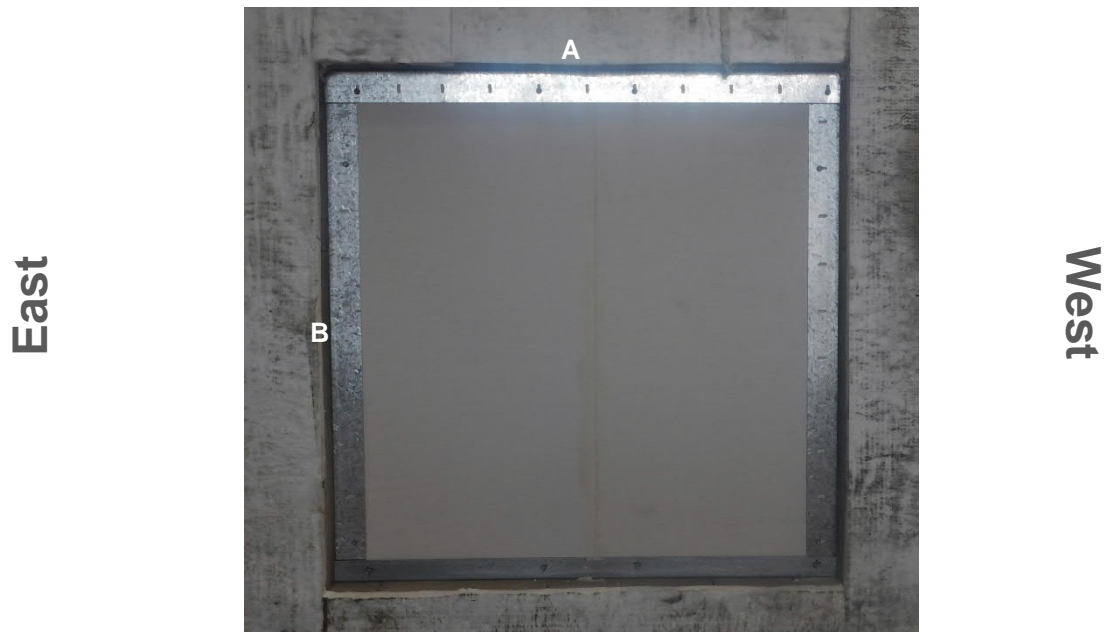


Figure 16 Exposed face of the specimen before the start of the test

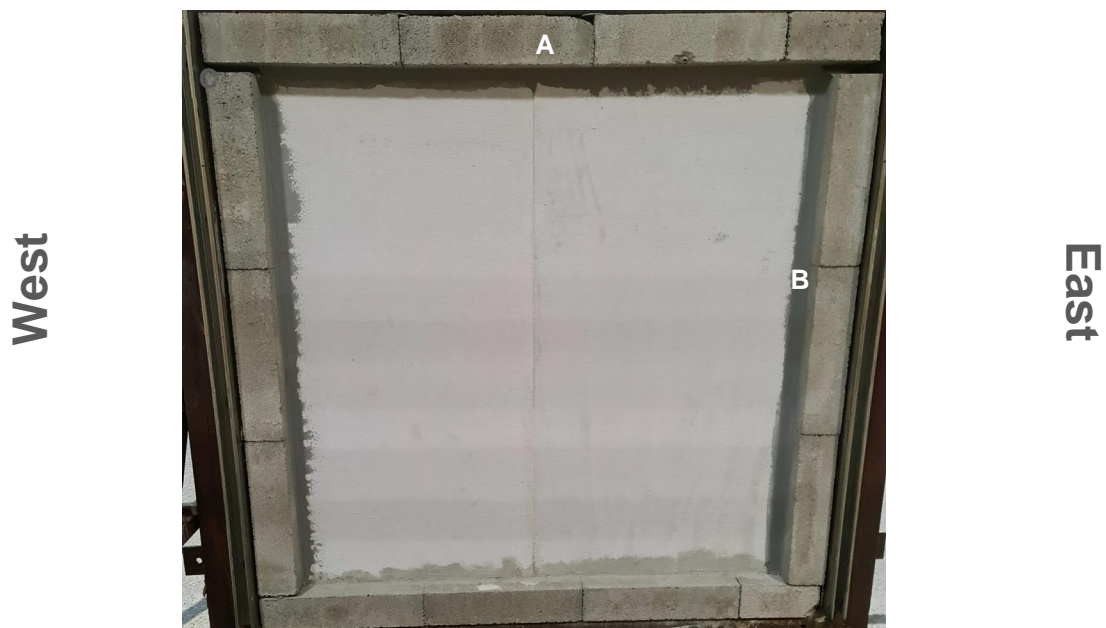
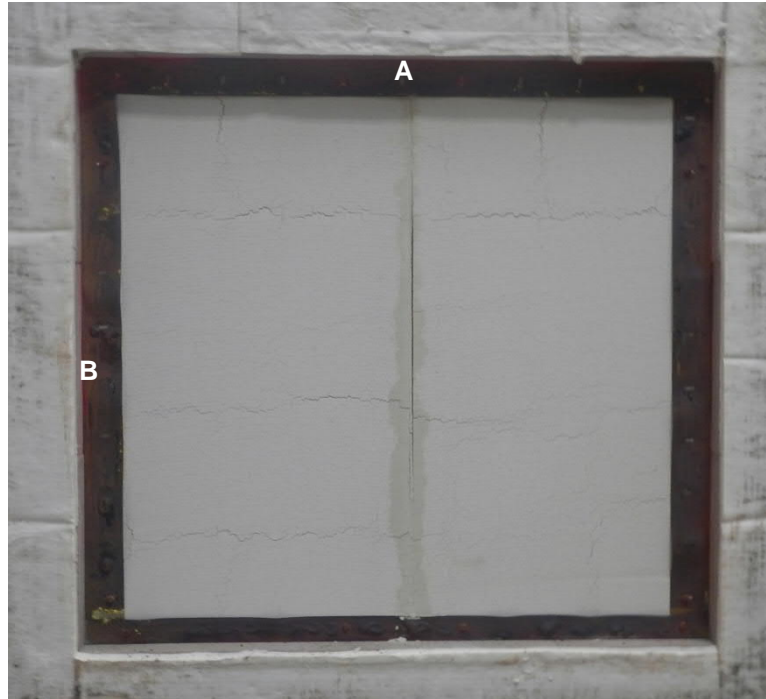


Figure 17 Unexposed face of the specimen before the start of the test

East



West

Figure 18 Exposed face of the specimen at the end of the test

West



East

Figure 19 Unexposed face of the specimen at the end of the test

# warringtonfire

Proud to be part of  element



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