



# 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: FRT210226

Test date: 9 August 2021 Revision: R1.0

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



## Quality management

| Revision | Date           | Information about the report |   |   |
|----------|----------------|------------------------------|---|---|
| R1.0     | 13 August 2021 | Description                  | Initial issue   |   |
|          |                | Name                         | Prepared by   | Reviewed by   |
|          |                | Signature                    | Authorised by   |   |
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|          |                |                              |  |   |
|          |                |                              |   |  |

## 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 9 August 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 × 10 mm high |
| B             | East vertical control joint    | H.B. Fuller – Firesound™       | 10 mm wide × 1200 mm high |

**Table 3 Test results**

| Penetration system/<br>control joint | Criteria            | Results                   | Fire resistance level (FRL) |
|--------------------------------------|---------------------|---------------------------|-----------------------------|
| A                                    | Structural adequacy | Not applicable            | -/120/120                   |
|                                      | Integrity           | No failure at 121 minutes |                             |
|                                      | Insulation          | No failure at 121 minutes |                             |
| B                                    | Structural adequacy | Not applicable            | -/120/120                   |
|                                      | Integrity           | No failure at 121 minutes |                             |
|                                      | Insulation          | No failure at 121 minutes |                             |

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# 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 9 August 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<br>Dandenong South VIC 3175<br>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 aerated 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            | Unequal angle   |
|                           | Material             | Galvanised mid steel, slotted   |
|                           | Size                 | 50 mm × 75 mm × 1200 mm long, 1.2 mm BMT  |
| 4.                        | Item name            | Cladding screws   |
|                           | Description          | 14-10 × 65 mm long hex head Type 17   |
| SE                        | Overall size         | 1200 mm high × 1200 mm wide × 75 mm thick   |
|                           | Restraint conditions | Restrained on all edges   |
|                           | Installation         | <ul style="list-style-type: none"><li>Four angles (item 3) were secured on all sides of the test frame, and finished flush with the exposed side using M6.5 × 40 mm long masonry anchors at nominal 500 mm centre.</li><li>Two Hebel® panels (Item 1) were secured to the angles (item 3) using screws (item 4) at nominal 320 mm centre on the studs and nominal 200 mm centre on the tracks.</li><li>The centre vertical joint was mortared using the Hebel® adhesive (item 2).</li></ul> |
| Fire-stopping protections |                      |   |
| Sealant                   |                      |   |
| 5.                        | Item name            | Sealant   |

| Item                   | Description                    |  |
|------------------------|--------------------------------|--|
|                        | Product name                   | H.B. Fuller Firesound™   |
|                        | Density                        | 1497 kg/m <sup>3</sup>   |
| <b>Backing rod</b>     |                                |  |
| 6.                     | Item name                      | Open cell backing rod  |
|                        | Material                       | Polyethylene   |
|                        | Size                           | 1200 mm high × 10 mm wide  |
|                        | Description                    | The backing rods were installed between the testing frame and the Hebel® panels (item 1) at a depth of 10 mm, from the unexposed side. |
| <b>Control joint A</b> |                                |  |
| <b>A</b>               | Service                        | 10 mm wide × 1200 mm long  |
|                        | Location                       | Upper horizontal control joint located on the top side between the Hebel® panel and the concrete block work of the test frame.         |
|                        | Local fire-stopping protection |  |
|                        | Protection                     | The sealant (Item 5) was applied from the unexposed side into the control joint at depth of 10 mm and finished flush.                  |
| <b>Control joint B</b> |                                |  |
| <b>B</b>               | Service                        | 10 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                     | The sealant (Item 5) was applied from the unexposed side into the control joint at depth of 10 mm and finished flush.                  |

## 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                              | 7 July 2021   |
| Start date for installation of fire-stopping protection for the control joints | 7 July 2021   |
| Completion date for constructing and installing the test specimen              | 7 July 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 appropriate for control joints.   |       |
| Variations                     | None  |       |
| Pre-test conditioning          | The construction and installation of the test specimen was completed on 7 July 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  | <p>The laboratory was not involved in sampling or selecting the test specimen for the fire resistance test.</p> <p>The results obtained during the test only apply to the test samples as received and tested by Warringtonfire.</p>  |       |
| Ambient laboratory temperature | Start of the test   | 13 °C |
|                                | Minimum temperature   | 13 °C |
|                                | Maximum temperature   | 22 °C |
| Test duration                  | 121 minutes   |       |
| 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 × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads.</li> <li>The thermocouple positions are shown in Table 10 and in Figure 5, Figure 6 and 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>Cotton pads were available during the test to assess the performance of the specimen under the criteria of integrity.</li> <li>The furnace pressure was measured at approximately mid-height of the vertical control joint B.</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/<br>control joint | Criteria            | Results                   | Fire resistance level (FRL) |
|--------------------------------------|---------------------|---------------------------|-----------------------------|
| A                                    | Structural adequacy | Not applicable            | -/120/120                   |
|                                      | Integrity           | No failure at 121 minutes |                             |
|                                      | Insulation          | No failure at 121 minutes |                             |
| B                                    | Structural adequacy | Not applicable            | -/120/120                   |
|                                      | Integrity           | No failure at 121 minutes |                             |
|                                      | Insulation          | No failure at 121 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 were completed by Warringtonfire.

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

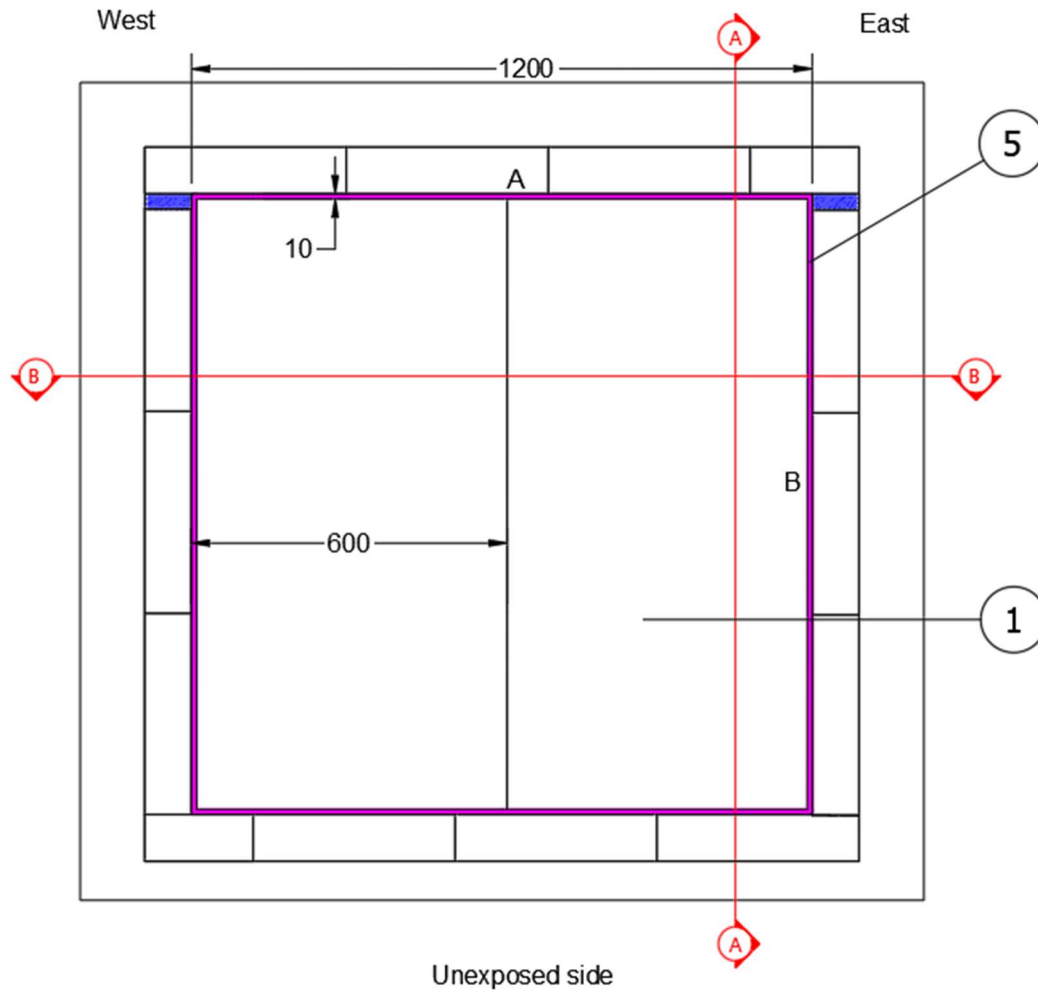


Figure 1 Plan view / elevation view of test specimen (unexposed side)

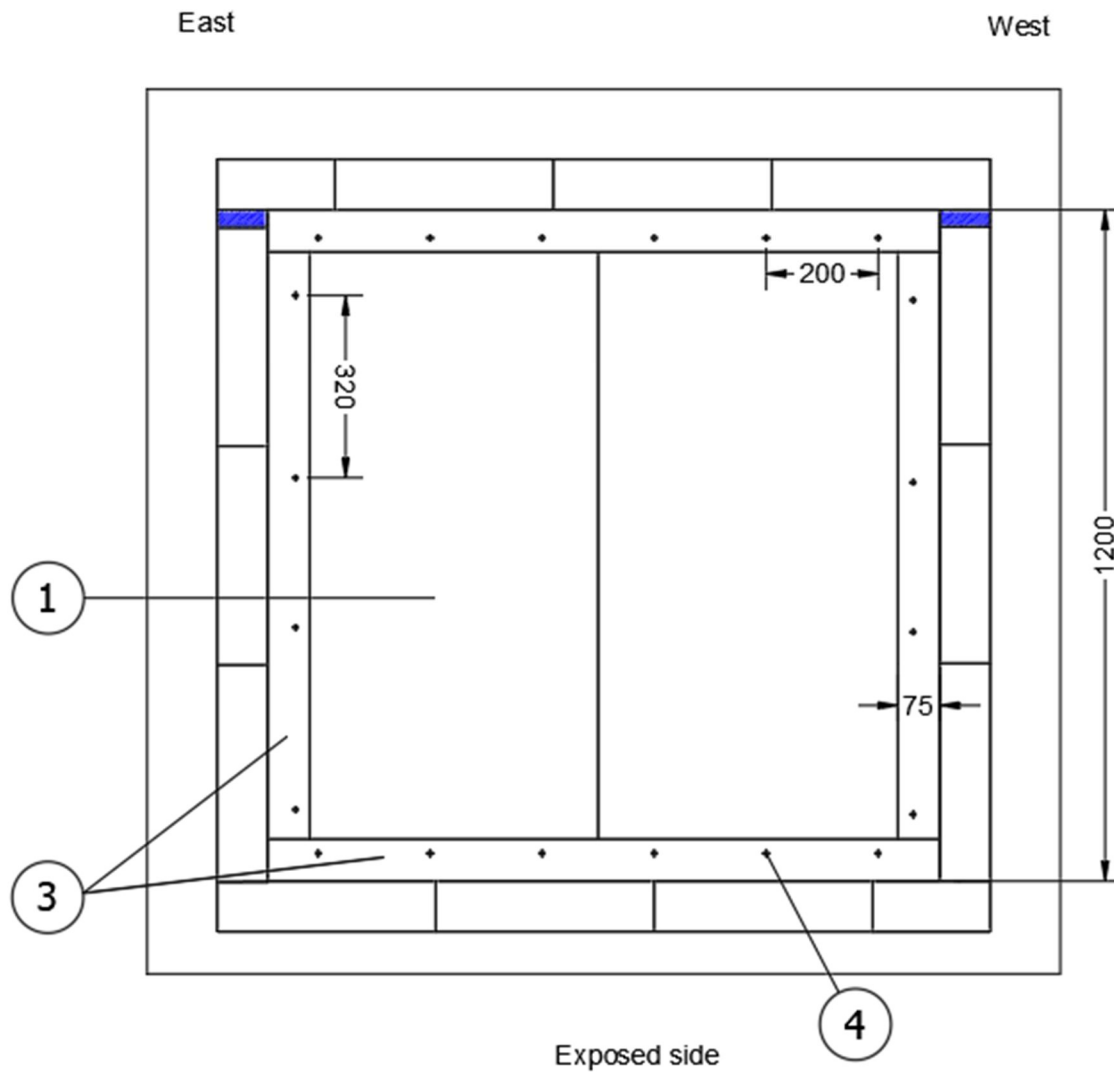
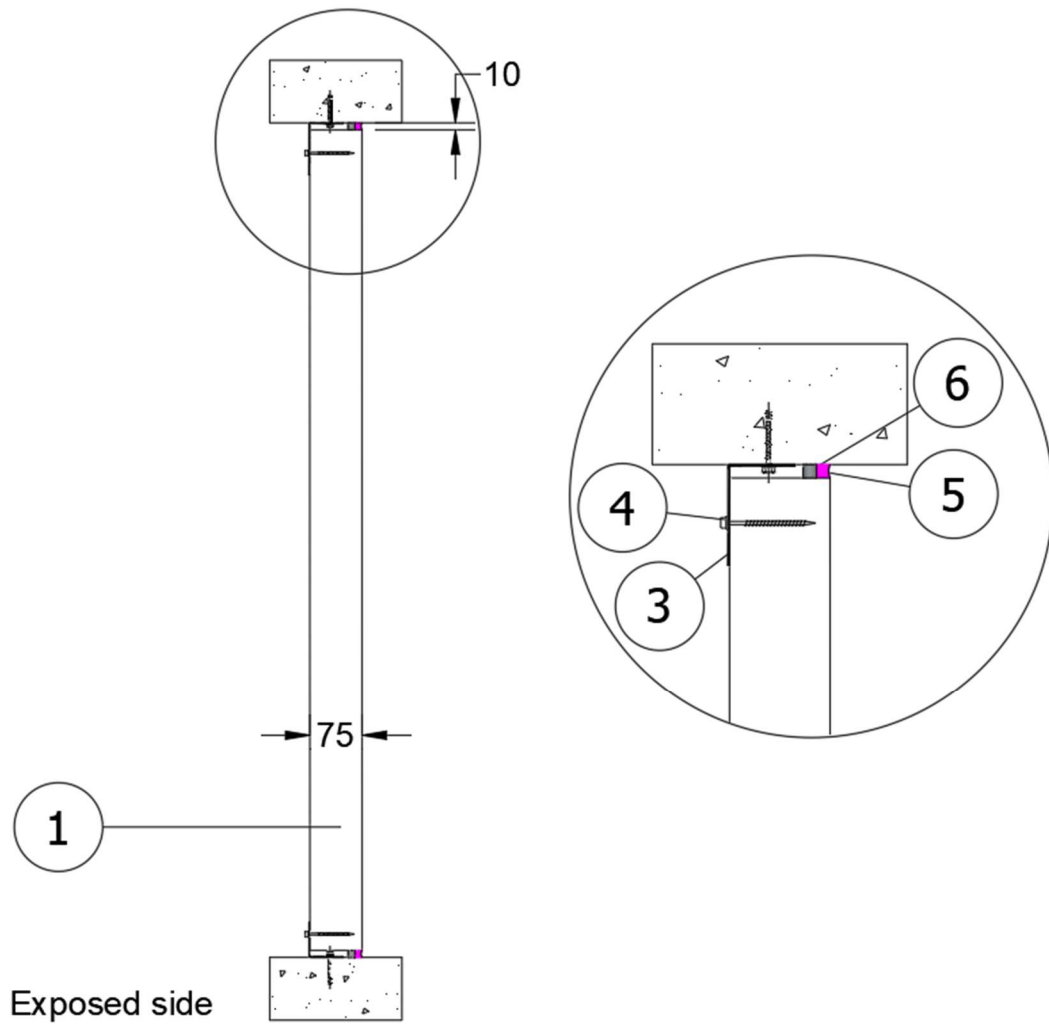


Figure 2 Elevation view / plan view of test specimen (exposed side)



**Figure 3** Cross-section A-A

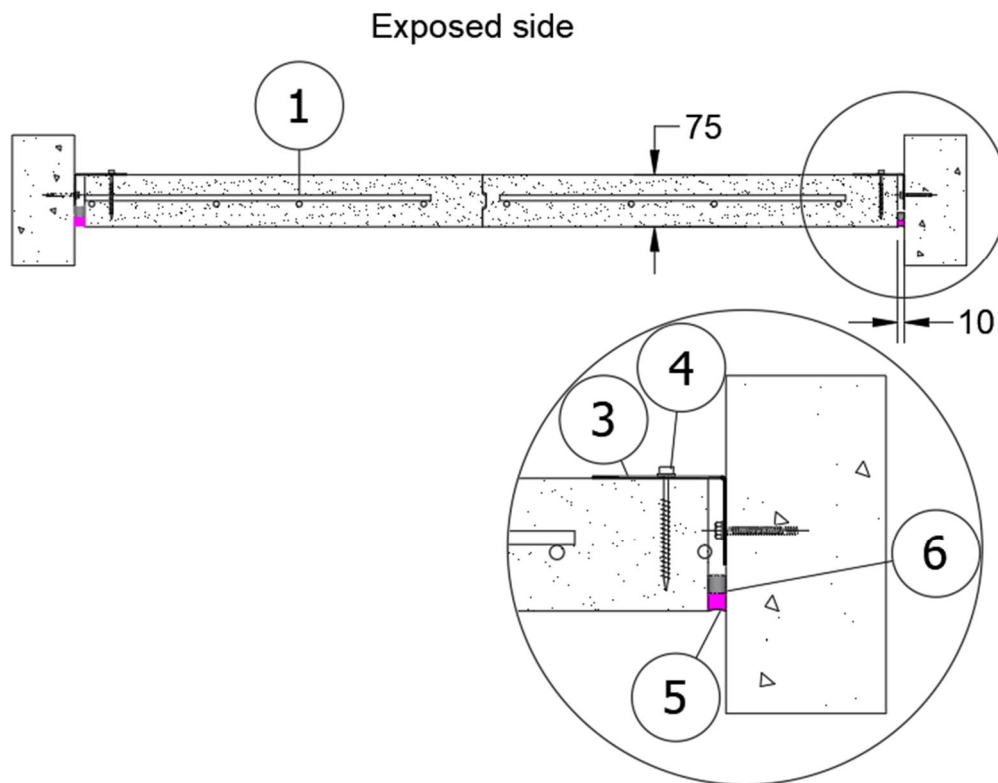


Figure 4 Cross-section B-B

## 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 |   |
| <b>Control joint A</b> |     |   |
| 00                     | 00  | Fire resistance test started. The initial temperature of the specimen was approximately 13 °C.      |
| 15                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 19                     | 41  | A crack had appeared on the top joint between the two Hebel® panels.                                |
| 30                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 41                     | 43  | A crack had appeared on the top west side of the Hebel® wall.                                       |
| 45                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 47                     | 31  | Sealant started expanding out between the centre of the join and TC005.                             |
| 50                     | 47  | Sealant expanding out around TC003.   |
| 60                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 60                     | 34  | A second crack had appeared on the top west side of the Hebel® wall.                                |
| 75                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 78                     | 00  | Sealant was uniformly expanding out.  |
| 90                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 120                    | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 121                    | 00  | The test was stopped.   |
| <b>Control joint B</b> |     |   |
| 00                     | 00  | Fire resistance test started. The initial temperature of the specimen was approximately 13 °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. |
| 46                     | 22  | Sealant started expanding out around TC007.   |
| 60                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 75                     | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 78                     | 00  | Sealant was uniformly expanding out.  |
| 86                     | 10  | A crack had appeared approximately 15 mm from TC009 on the Hebel® wall.                             |
| 88                     | 03  | A crack had appeared at the east of the Hebel® wall and at the bottom of the joint.                 |

| Time |     | Observation   |
|------|-----|---|
| Min  | Sec |   |
| 90   | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 110  | 00  | The roving thermocouple applied next to TC009 recorded a temperature of 98 °C.                      |
| 119  | 00  | The roving thermocouple applied next to TC009 recorded a temperature of 115 °C.                     |
| 120  | 00  | The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014. |
| 121  | 00  | The test was 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.



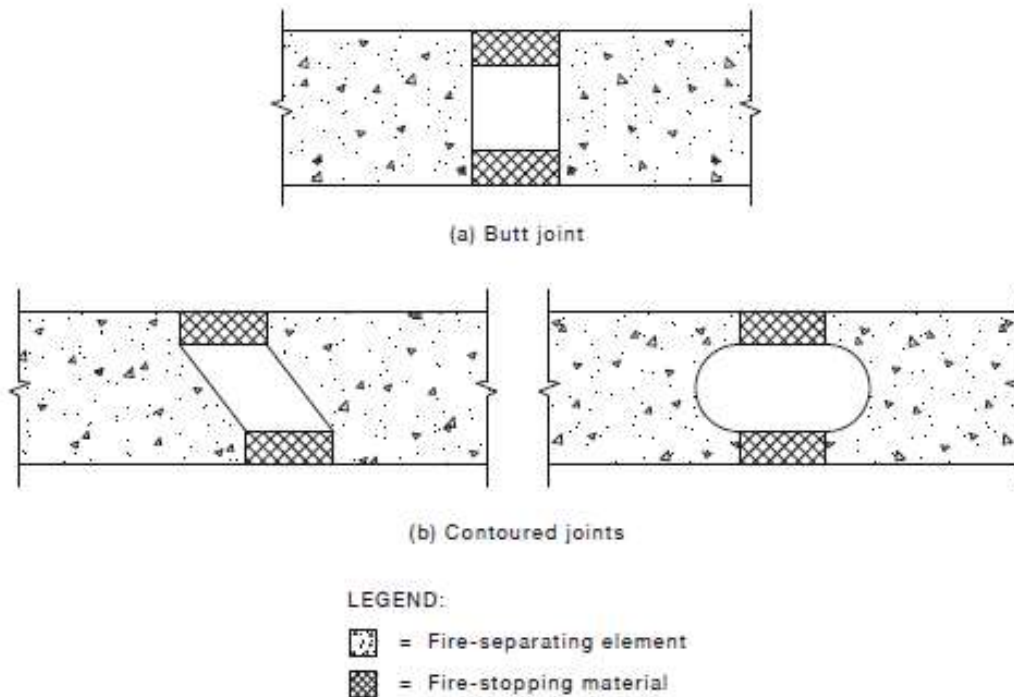


FIGURE 10.12.6 CONTOURED CONTROL JOINTS

## Appendix D Instrumentation locations

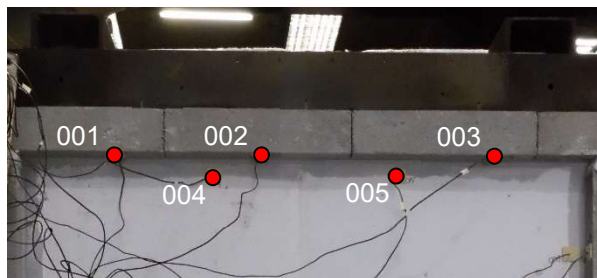


Figure 5 Upper horizontal control joint A

Figure 6 East vertical control joint B

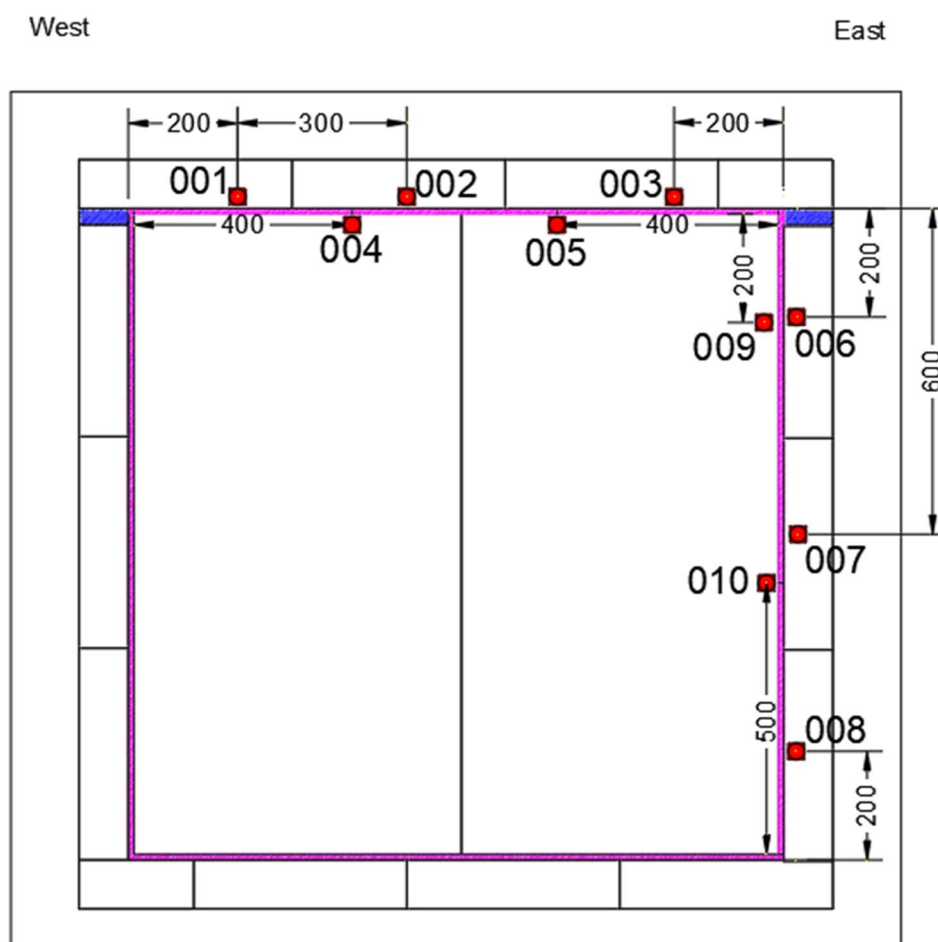


Figure 7 Overview of the thermocouple location on the unexposed side

**Table 10 Thermocouple locations**

| Control joint | T/C # | Description  |
|---------------|-------|--|
| A             | 001   | On the block, 200 mm from the west edge of the joint.      |
|               | 002   | On the block, 500 mm east from the west edge of the joint. |
|               | 003   | On the block, 200 mm from the east edge of the joint.      |
|               | 004   | On the Hebel®, 400 mm from the west edge of the joint.     |
|               | 005   | On the Hebel®, 400 mm from the east edge of the joint.     |
| B             | 006   | On the block, 200 mm from the top edge of the joint.       |
|               | 007   | On the block, 600 mm from the top edge of the joint.       |
|               | 008   | On the block, 200 mm from the bottom edge of the joint.    |
|               | 009   | On the Hebel®, 200 mm from the top edge of the joint.      |
|               | 010   | On the Hebel®, 500 mm from the bottom edge of the joint.   |

## Appendix E Test data

### E.1 Furnace temperature and severity

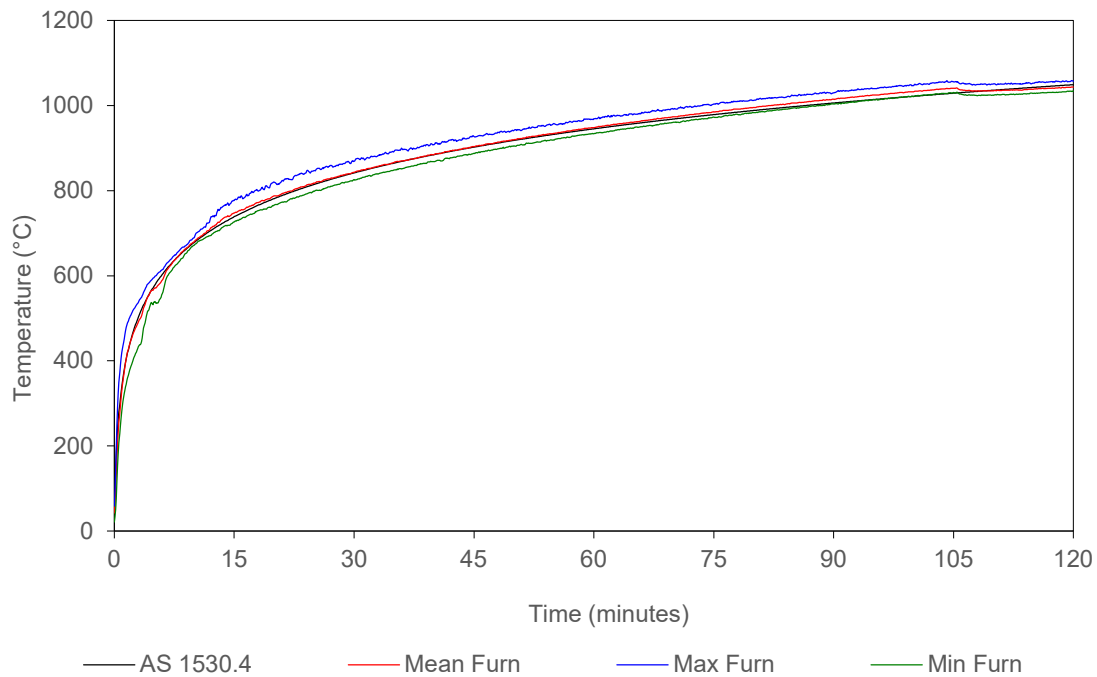


Figure 8 Furnace thermocouple temperature vs time

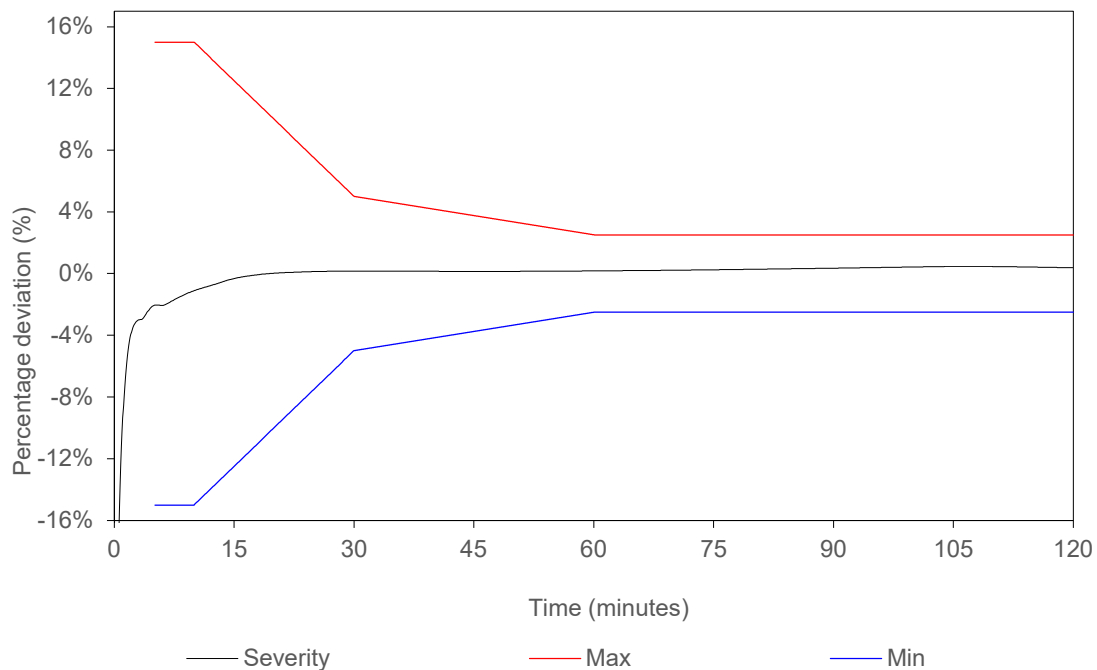


Figure 9 Percentage deviation of exposure severity vs time

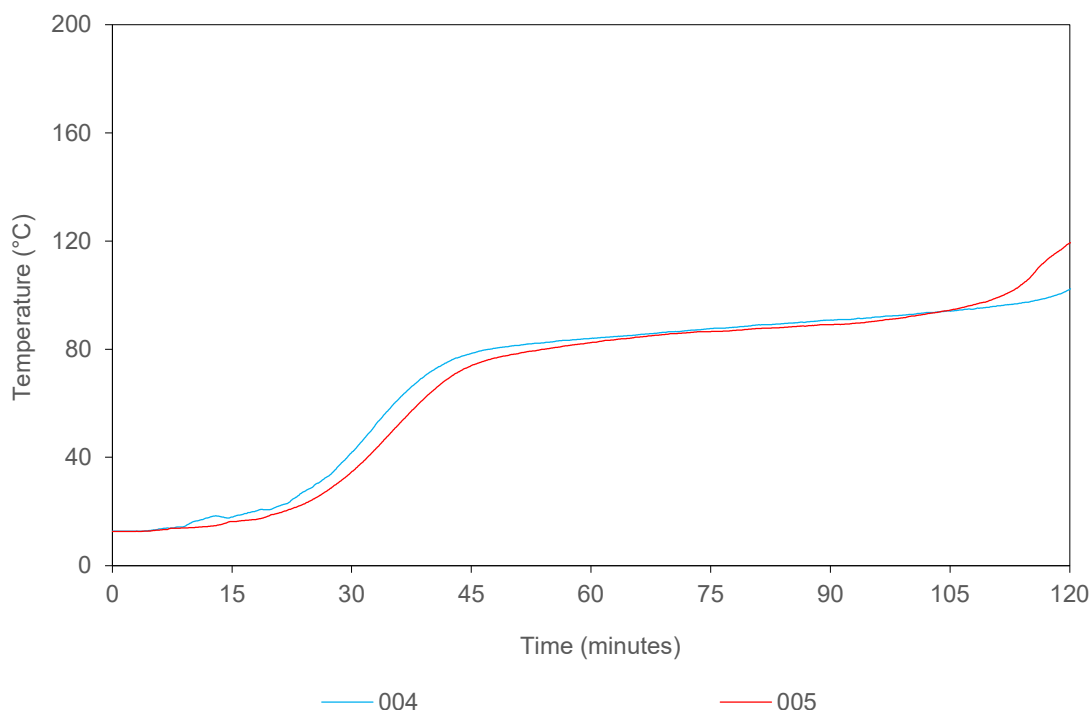
## E.2 Furnace pressure

The furnace pressure was measured at mid-height of east vertical control joint B.

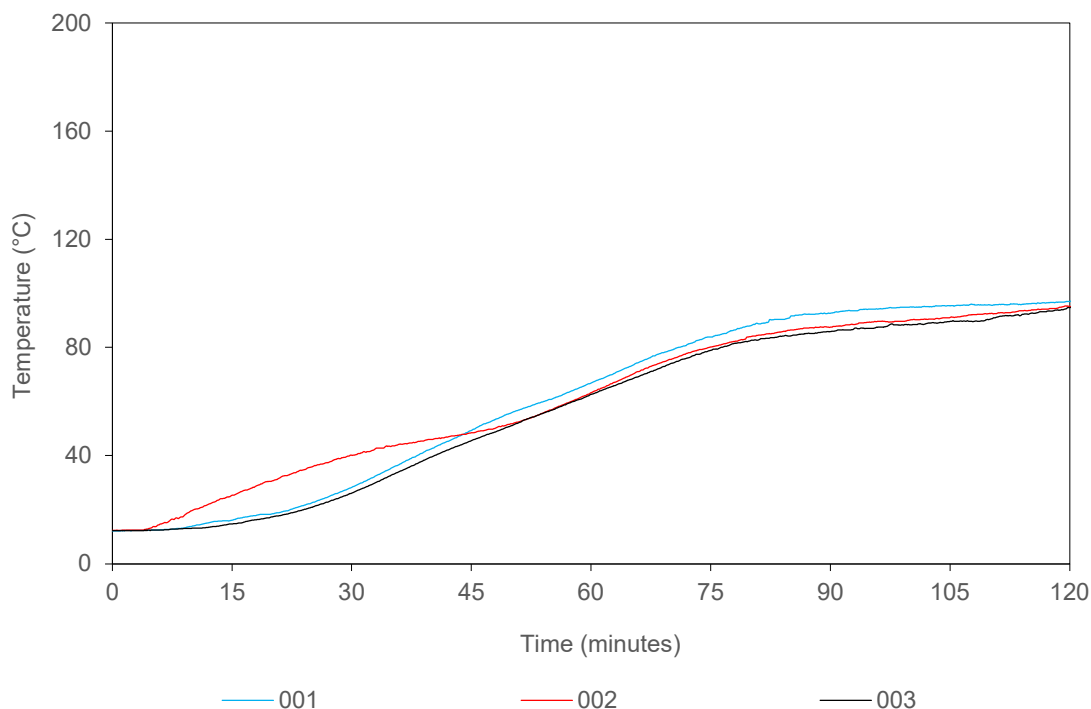
**Table 11 Furnace pressure**

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

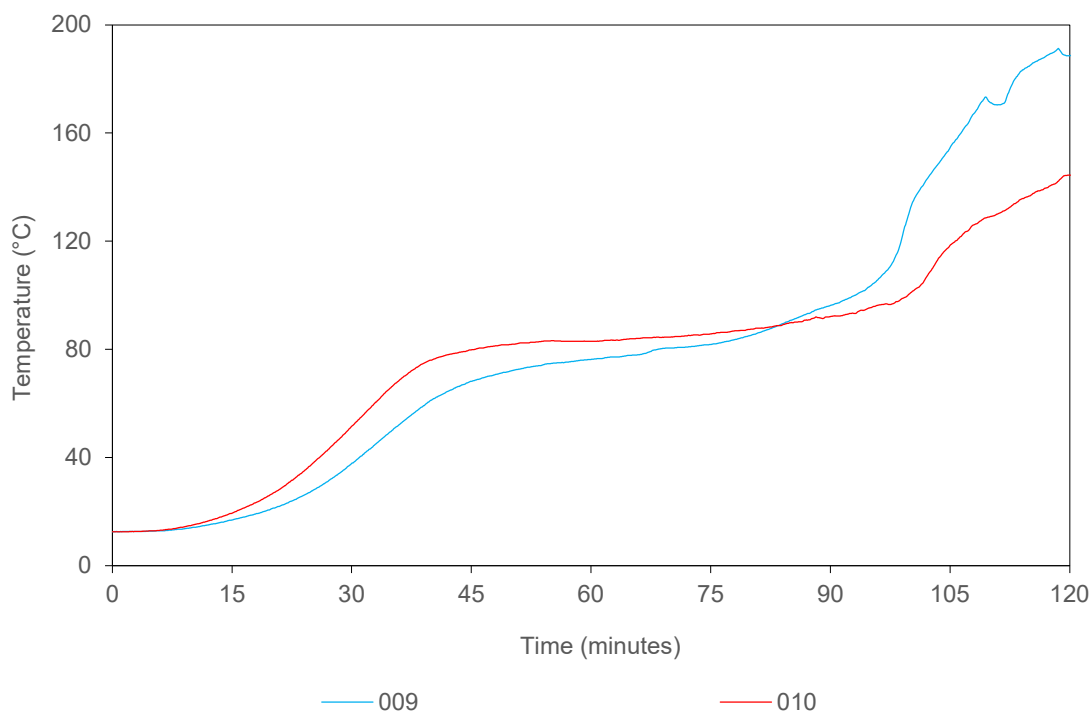
## E.3 Specimen temperatures



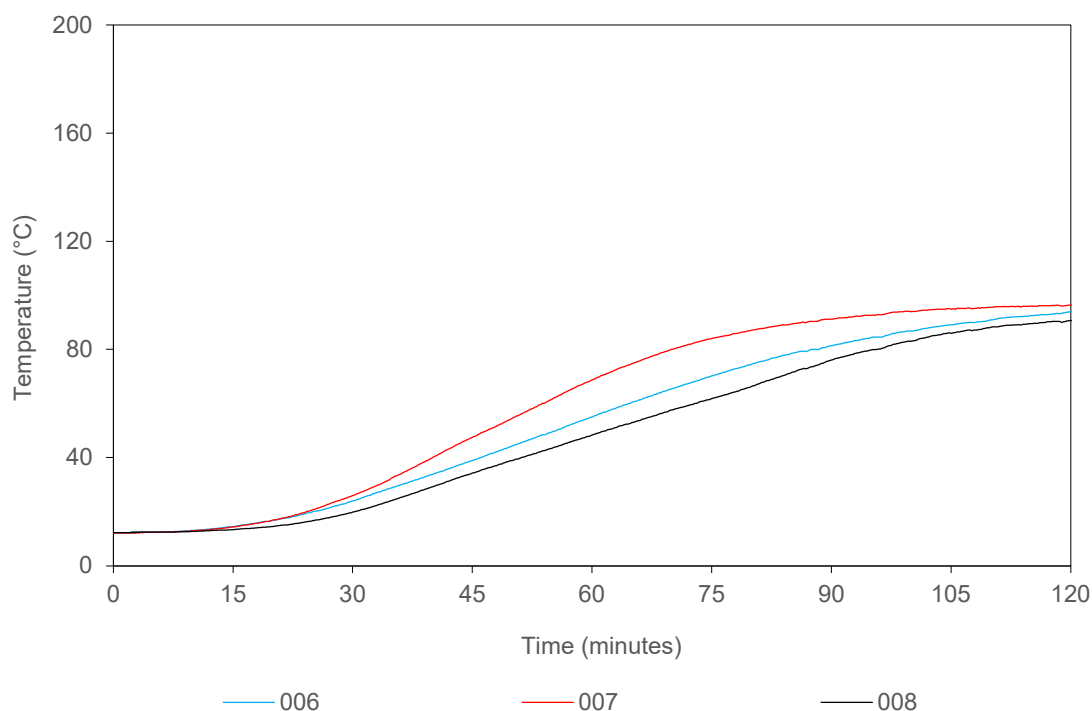
**Figure 10 Upper horizontal control joint A on the Hebel® wall – temperature vs time**



**Figure 11** Upper horizontal control joint A on the concrete blocks – temperature vs time



**Figure 12** East vertical control joint B on the Hebel® wall – temperature vs time



**Figure 13** East vertical control joint C on the concrete blocks – temperature vs time

**Table 12** Test specimen temperatures

| Penetration system/<br>Control joint | T/C # | Description <sup>1</sup>                                   | Temp (°C) at t (minutes) |      |      |      |       | Limit <sup>2</sup><br>(minutes) |
|--------------------------------------|-------|--|--------------------------|------|------|------|-------|---------------------------------|
|                                      |       |  | t=0                      | t=30 | t=60 | t=90 | t=120 |                                 |
| A                                    | 001   | On the block, 200 mm from the west edge of the joint.      | 12                       | 28   | 67   | 93   | 97    | —                               |
|                                      | 002   | On the block, 500 mm east from the west edge of the joint. | 12                       | 40   | 63   | 88   | 95    | —                               |
|                                      | 003   | On the block, 200 mm from the east edge of the joint.      | 12                       | 26   | 63   | 86   | 95    | —                               |
|                                      | 004   | On the Hebel®, 400 mm from the west edge of the joint.     | 13                       | 42   | 84   | 91   | 102   | —                               |
|                                      | 005   | On the Hebel®, 400 mm from the east edge of the joint.     | 13                       | 35   | 82   | 89   | 119   | —                               |
| B                                    | 006   | On the block, 200 mm from the top edge of the joint.       | 12                       | 24   | 55   | 81   | 94    | —                               |
|                                      | 007   | On the block, 600 mm from the top edge of the joint.       | 12                       | 26   | 69   | 91   | 97    | —                               |
|                                      | 008   | On the block, 200 mm from the bottom edge of the joint.    | 12                       | 20   | 48   | 76   | 91    | —                               |
|                                      | 009   | On the Hebel®, 200 mm from the top edge of the joint.      | 13                       | 38   | 76   | 96   | 189   | —                               |
|                                      | 010   | On the Hebel®, 500 mm from the bottom edge of the joint.   | 13                       | 51   | 83   | 92   | 145   | —                               |



- 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.
  - <sup>3</sup> 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 14 Unexposed face of the specimen before the start of the test

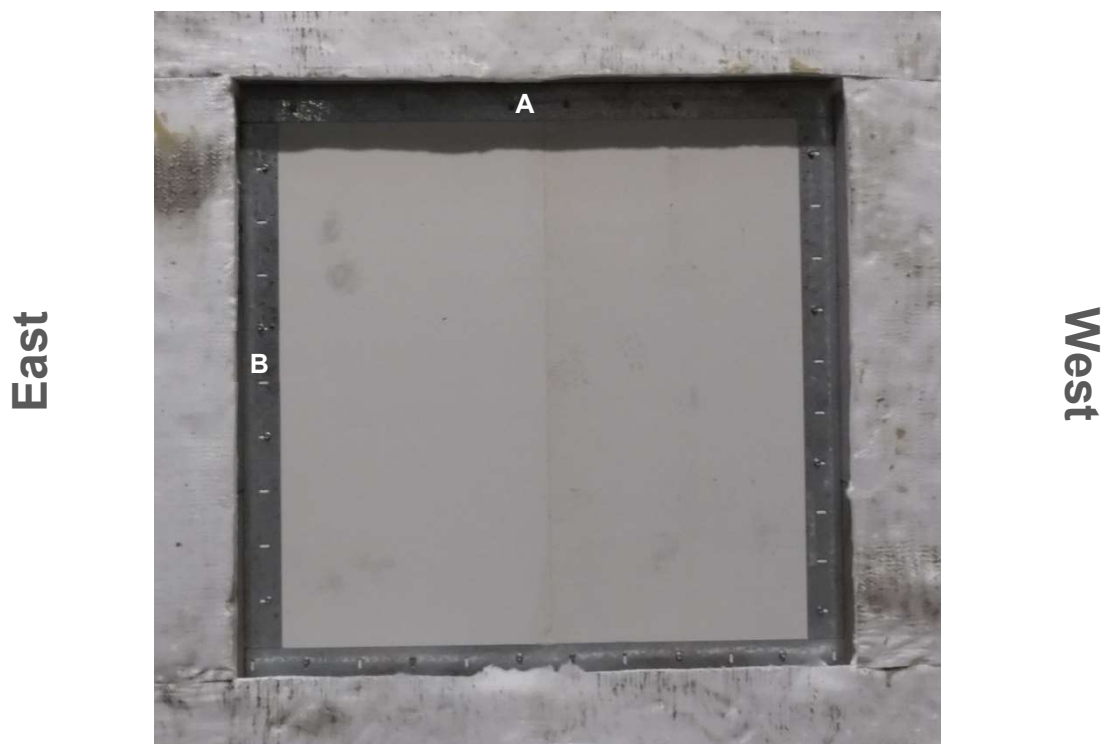


Figure 15 Exposed face of the specimen before the start of the test

West



East

Figure 16 Unexposed face of the specimen at the end of the test

East



West

Figure 17 Exposed face of the specimen at the end of the test

# warringtonfire

Proud to be part of  element



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#### General conditions of use

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