



FIRE TEST REPORT

FP21481-02-1

**THE FIRE RESISTANCE IN ACCORDANCE WITH
AS 1530.4:2014 OF SIX DOUBLE CAULKED CONTROL
JOINTS INSTALLED IN A 120 MM THICK CONCRETE
FLOOR SLAB**

CLIENT

H.B. Fuller Company Australia Pty. Ltd
16-22 Red Gum Drive
Dandenong
South VIC 3175
Australia



All tests and procedures reported herein, unless indicated, have been performed in accordance with the laboratory's scope of accreditation



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

1 of 23

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TEST SUMMARY

Objective

To determine the fire resistance of control joint sealing systems in accordance with AS 1530.4:2014, *Fire-resistance tests for elements of construction: Section 10, Service penetrations and control joints*, with reference to AS 4072.1-2005.

Test Sponsor

H.B. Fuller Company Australia Pty. Ltd
16-22 Red Gum Drive
Dandenong
South VIC 3175
Australia

Description of Test Specimen

The test specimen consisted of a nominally 2,400 mm long by 1,200 mm wide by 120 mm thick segmented concrete floor slab. The floor slab was provided with six nominally 1,000 mm long apertures which were sealed with various control joint sealing systems. The control joints were referenced A-F.

Date of Test

2 July 2026

Test Results

The fire resistance in minutes, in accordance with AS 1530.4:2014, of six double caulked control joint systems installed in a 120 mm thick concrete floor slab, was as follows:

Specimen Ref	Control Joint Details Width x Depth	Integrity (min)	Insulation (min)	FRL*
A	1 st - 50 mm x 25 mm Firesound® 2 nd - 50 mm x 25 mm Firesound®	245 NF	204	-/120/120
B	1 st - 30 mm x 15 mm Firesound® 2 nd - 30 mm x 15 mm Firesound®	245 NF	168	-/120/120
C	1 st - 20 mm x 10 mm Firesound® 2 nd - 20 mm x 10 mm Firesound®	245 NF	140	-/120/120
D	1 st - 20 mm x 10 mm FulaFlex™ FR 2 nd - 20 mm x 10 mm FulaFlex™ FR	245 NF	145	-/120/120
E	1 st - 30 mm x 15 mm FulaFlex™ FR 2 nd - 30 mm x 15 mm FulaFlex™ FR	245 NF	129	-/120/120
F	1 st - 50 mm x 25 mm FulaFlex™ FR 2 nd - 50 mm x 25 mm FulaFlex™ FR	245 NF	198	-/120/120

The installation of the joints was from the exposed face (EXF) with the 2nd layer of sealant located on the exposed face of the slab.

NF = No Failure.

The test was terminated after 245 minutes.



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

2 of 23

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*The test was conducted on a floor system with an established FRL of -/120/120. The maximum FRL of any test specimen cannot exceed the FRL achieved by the floor system in which it is installed.

The test standard requires the following statement to be included:

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

"This report details methods of construction, the test conditions and results obtained when the specific element of construction described herein was tested following the procedure outlined in this standard. Any significant variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report."

"Because of the 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 of the result."

LIMITATION

The results reported here relate only to the item/s tested.

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

3 of 23

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CONTENTS

SIGNATORIES	6
DOCUMENT REVISION STATUS	6
1. TEST PROCEDURE.....	7
1.1 Integrity Failure Criteria	7
1.2 Insulation Failure Criteria	7
2. DESCRIPTION OF THE TEST SPECIMEN	7
2.1 General.....	7
2.1.1 Conditioning.....	7
2.1.2 Specimen Selection.....	7
2.1.3 Drawings and Specification.....	7
2.2 Control Joint Details.....	8
2.3 Floor Slab	8
3. TEST CONDITIONS AND RESULTS	10
3.1 General.....	10
3.2 Furnace Conditions	10
3.2.1 Furnace Temperature Measurement	10
3.2.2 Furnace Control.....	11
3.2.3 Pressure Measurements	11
3.3 Specimen Temperature Measurement.....	12
3.4 Specimen Integrity.....	17
3.5 Specimen Insulation.....	17
3.6 Observations	18
4. SUMMARY	19
5. PERMISSIBLE VARIATIONS	20
5.1 General.....	20
5.2 Separating Elements	20



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

4 of 23

THE LEGAL VALIDITY OF THIS REPORT CAN ONLY BE CLAIMED ON PRESENTATION OF THE COMPLETE SIGNED PAPER REPORT.
EXTRACTS OR ABRIDGMENTS OF THIS REPORT SHALL NOT BE PUBLISHED WITHOUT PERMISSION FROM BRANZ LTD.

FIGURES

Figure 1: Control Joint Configuration - Section View	9
Figure 2: Furnace Temperature	10
Figure 3: Percentage Deviation from Standard Curve	11
Figure 4: Mean Furnace Pressure	12
Figure 5: Unexposed Face Thermocouple Positions	13
Figure 6: Specimen A - Temperature Rise	14
Figure 7: Specimen B - Temperature Rise	14
Figure 8: Specimen C - Temperature Rise	15
Figure 9: Specimen D - Temperature Rise	15
Figure 10: Specimen E - Temperature Rise	16
Figure 11: Specimen F - Temperature Rise	16

TABLES

Table 1: Joint Details.....	8
Table 2: Specimen Integrity.....	17
Table 3: Specimen Insulation	17
Table 4: Observations	18

PHOTOS

Photo 1: The Unexposed Face of the Assembly Prior to Testing.....	21
Photo 2: The Unexposed Face of the Test Assembly After a Duration of 60 Minutes	21
Photo 3: The Unexposed Face of the Test Assembly After a Duration of 120 Minutes	22
Photo 4: The Unexposed Face of the Test Assembly After a Duration of 180 Minutes	22
Photo 5: The Unexposed Face of the Test Assembly After a Duration of 240 Minutes	23
Photo 6: The Exposed Face of the Test Assembly Immediately After Testing.....	23



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

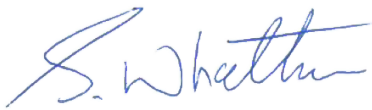
29 July 2026

PAGE:

5 of 23

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SIGNATORIES



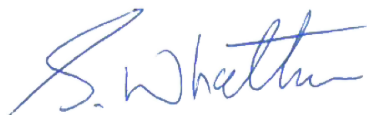
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DOCUMENT REVISION STATUS

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REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

6 of 23

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1. TEST PROCEDURE

The control joint test was conducted in accordance with AS 1530.4:2014, "Methods for fire tests on building materials, components and structures, Part 4 *Fire-resistance tests for elements of construction: Section 10, Service penetrations and control joints*, with reference to AS 4072.1-2005 for which the fire resistance of the specimen is the time, expressed in minutes, to Integrity and Insulation failure under one or more of the following criteria.

1.1 Integrity Failure Criteria

Failure shall be deemed to occur if;

- a) there is sustained flaming for a period greater than 10 seconds on the unexposed face;
or
- b) flames and/or hot gases cause flaming or glowing of the cotton fibre pad.

1.2 Insulation Failure Criteria

Failure shall be deemed to occur if;

- a) the maximum temperature at any point on the unexposed surface of the control joint exceeds the initial temperature by 180 K; or
- b) the maximum temperature on the unexposed surface of the surround element, 25 mm from control joint edge exceeds the initial temperature by 180 K.

2. DESCRIPTION OF THE TEST SPECIMEN

2.1 General

The test specimen consisted of a nominally 2,400 mm long by 1,200 mm wide by 120 mm thick segmented concrete floor slab. The floor slab was provided with six nominally 1,000 mm long apertures which were sealed with various control joint sealing systems. The control joints were referenced A-F.

2.1.1 Conditioning

The concrete blocks were cast on 10 February 2026. The control joint specimens were installed into their apertures on 25 May 2026. The specimens were kept under ambient laboratory conditions until testing on 2 July 2026.

2.1.2 Specimen Selection

BRANZ was responsible for the construction of the concrete floor slab, the client was responsible for the selection, supply and installation of the six control joint specimens.

2.1.3 Drawings and Specification

A client supplied drawing of the control joint specimens is shown in Figure 1.

Where discrepancies between the dimensions in the report text and those shown in the attached drawings exist, the text takes precedence.



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

7 of 23

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2.2 Control Joint Details

The control joints were of an asymmetric double caulked configuration comprising a 1st layer seal (internal) and a 2nd layer seal (external). In all cases, the 1st layer seal was applied first. The application description that follows is based on application from the exposed face.

The 1st layer backing rod was inserted from the exposed face to a depth to suit the overall control joint configuration (1st and 2nd layers). For Control Joint A and Control Joint F this was two, nominally 20 mm thick x 30 mm wide, for Control Joint B and Control Joint E this was nominally 40 mm thick x 40 mm wide and for Control Joint C and Control Joint D this was nominally 20 mm thick x 30 mm wide. The 1st layer of sealant was then applied directly onto the backing rod to the desired depth.

The 2nd layer of backing rod was then inserted into the aperture to a depth corresponding to the desired depth of the 2nd layer of sealant. For Control Joint A and Control Joint F this was a nominally 40 mm thick x 40 mm wide and a nominally 30 mm thick x 20 mm wide, for Control Joint B and Control Joint E this was nominally 20 mm thick x 30 mm wide and for Control Joint C and Control Joint D this was nominally 20 mm thick x 30 mm wide. The 2nd layer of sealant was then applied directly onto the backing rod and trowel finished flush to the exposed face of the slab.

An assumed nominal 20 mm air gap was provided between the 1st layer sealant and the 2nd layer backing rod for Control Joint C and Control Joint D.

Table 1 lists the measured dimensions of the control joint system components.

Table 1: Joint Details

Specimen Ref	Control Joint System	2 nd Layer Location	Sealant Dimensions as Measured (mm)		
			Width	Depth	Length
A	Firesound® - 1 st Layer	EXF	50	25	1,018
	Firesound® - 2 nd Layer		50	25	
B	Firesound® - 1 st Layer	EXF	30	15	1,014
	Firesound® - 2 nd Layer		30	15	
C	Firesound® - 1 st Layer	EXF	20	10	1,020
	Firesound® - 2 nd Layer		20	10	
D	FulaFlex™ FR - 1 st Layer	EXF	20	10	1,020
	FulaFlex™ FR - 2 nd Layer		20	10	
E	FulaFlex™ FR - 1 st Layer	EXF	30	15	1,018
	FulaFlex™ FR - 2 nd Layer		30	15	
F	FulaFlex™ FR - 1 st Layer	EXF	50	25	1,020
	FulaFlex™ FR - 2 nd Layer		50	25	

2.3 Floor Slab

The floor slab consisted of seven individual normal weight 120 mm thick concrete slabs. The slabs were positioned on top of a concrete lined specimen holder to provide six gaps each at least 1,000 mm long. The measured density of the concrete was 2,177 kg/m³ and the measured moisture content at the time of the test was 3.57%.



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

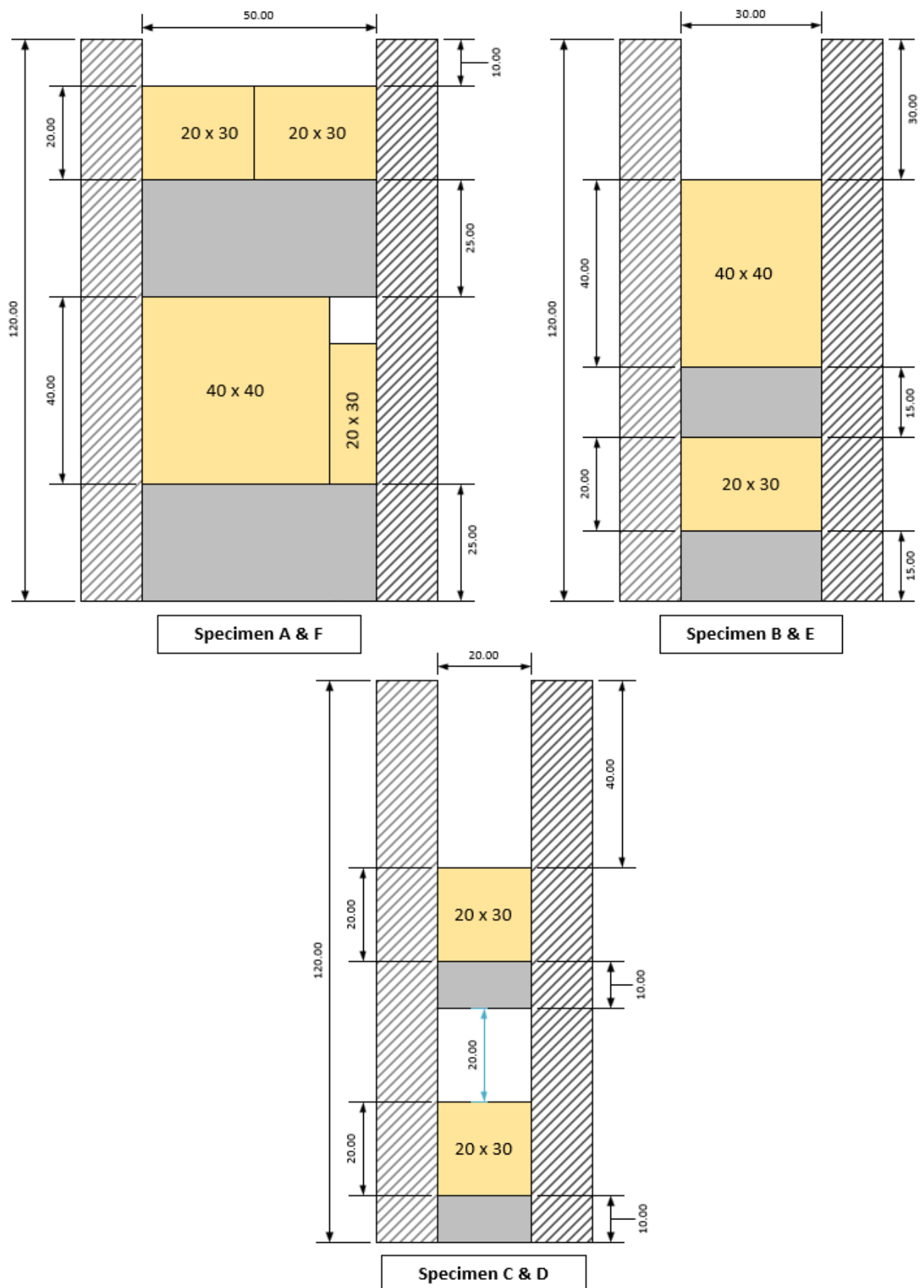
29 July 2026

PAGE:

8 of 23

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Figure 1: Control Joint Configuration - Section View



3. TEST CONDITIONS AND RESULTS

3.1 General

The specimen was tested on 2 July 2026, at the BRANZ laboratories at Judgeford, New Zealand, representatives of the client witnessed the test.

The ambient temperature at the beginning of the test was 11°C.

The floor slab specimen was placed on top of the Pilot Furnace in the horizontal orientation and the temperature and pressure conditions were controlled to the limits defined in AS 1530.4:2014.

The test was terminated after the specimen had been exposed to the standard fire resistance conditions for 245 minutes.

3.2 Furnace Conditions

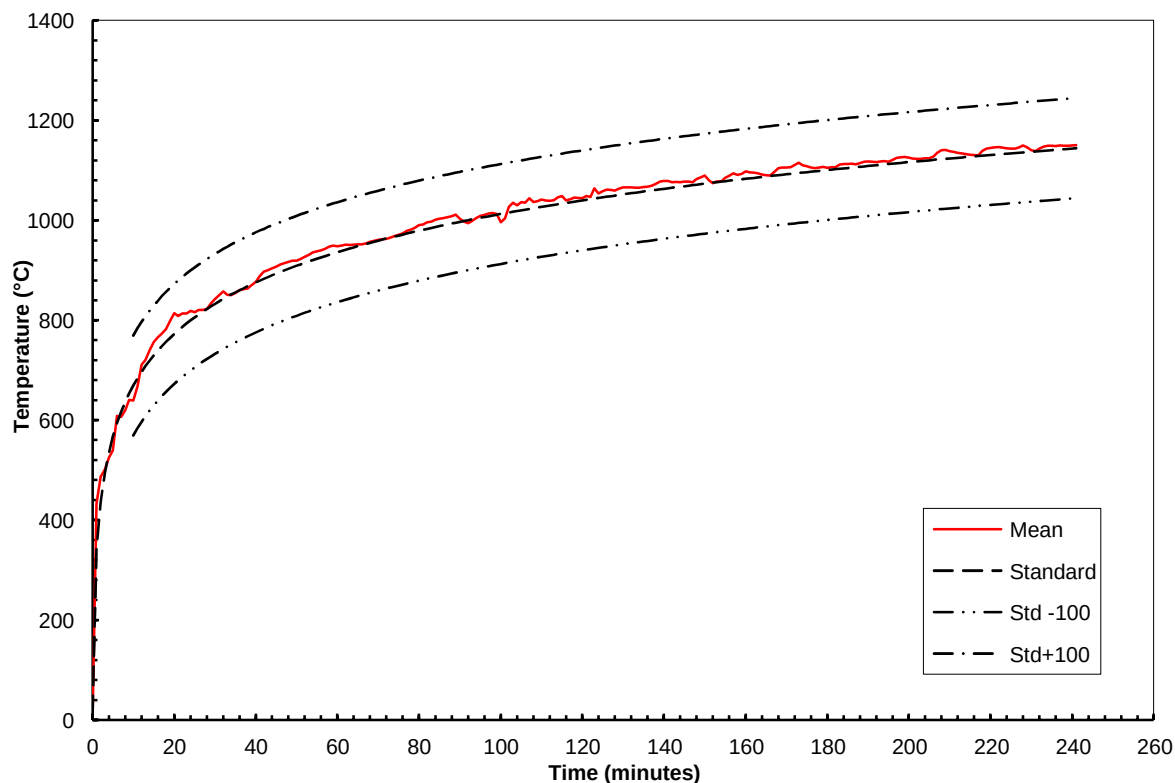
3.2.1 Furnace Temperature Measurement

Temperature measurement within the furnace was made using four mineral insulated metal sheathed (MIMS) chromel-alumel thermocouples uniformly distributed in a horizontal plane approximately 100 mm below the exposed face of the specimen.

The furnace thermocouples were connected to a computer-controlled data logging system which recorded the temperatures at 15 second intervals.

Figure 2 shows the furnace temperature curve and the permitted upper and lower limits in accordance with AS 1530.4:2014.

Figure 2: Furnace Temperature

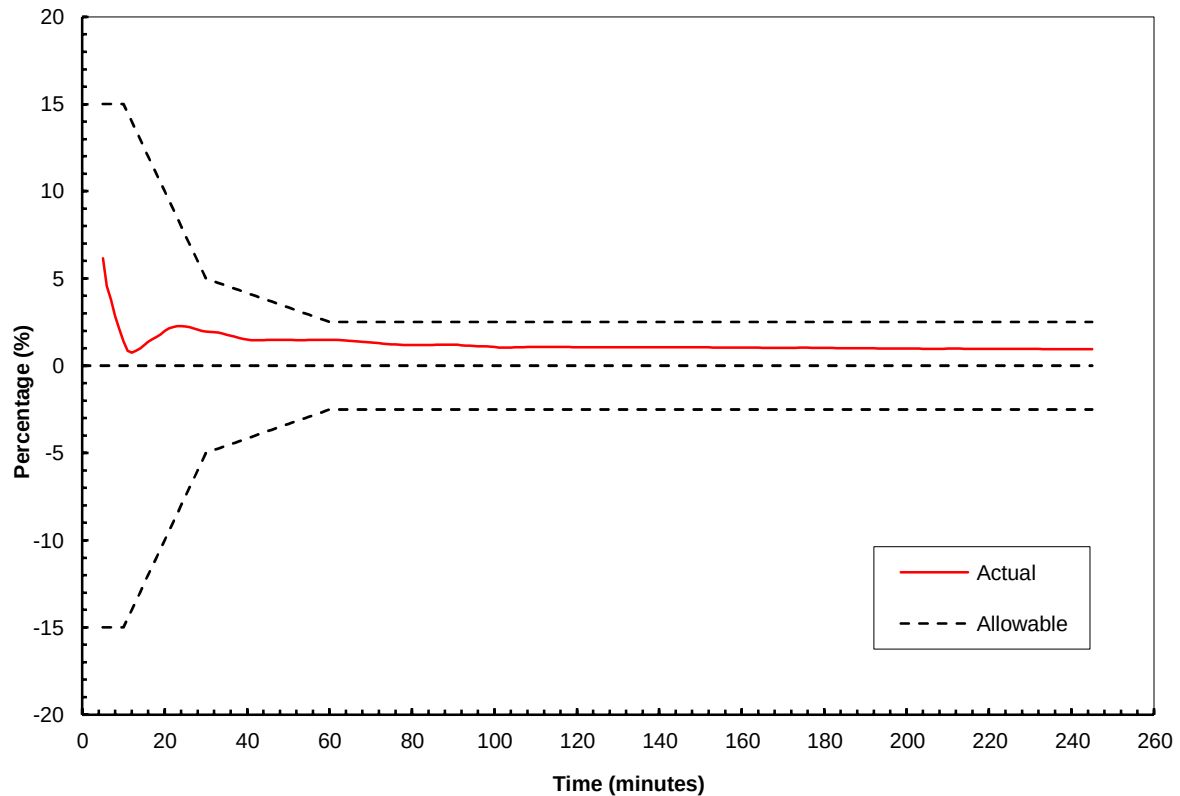


3.2.2 Furnace Control

The percentage deviation of the area under the curve of the furnace mean temperature from the standard temperature/time curve was within the standard requirements.

Figure 3 shows the percentage deviation of the mean furnace temperature from the Standard curve.

Figure 3: Percentage Deviation from Standard Curve

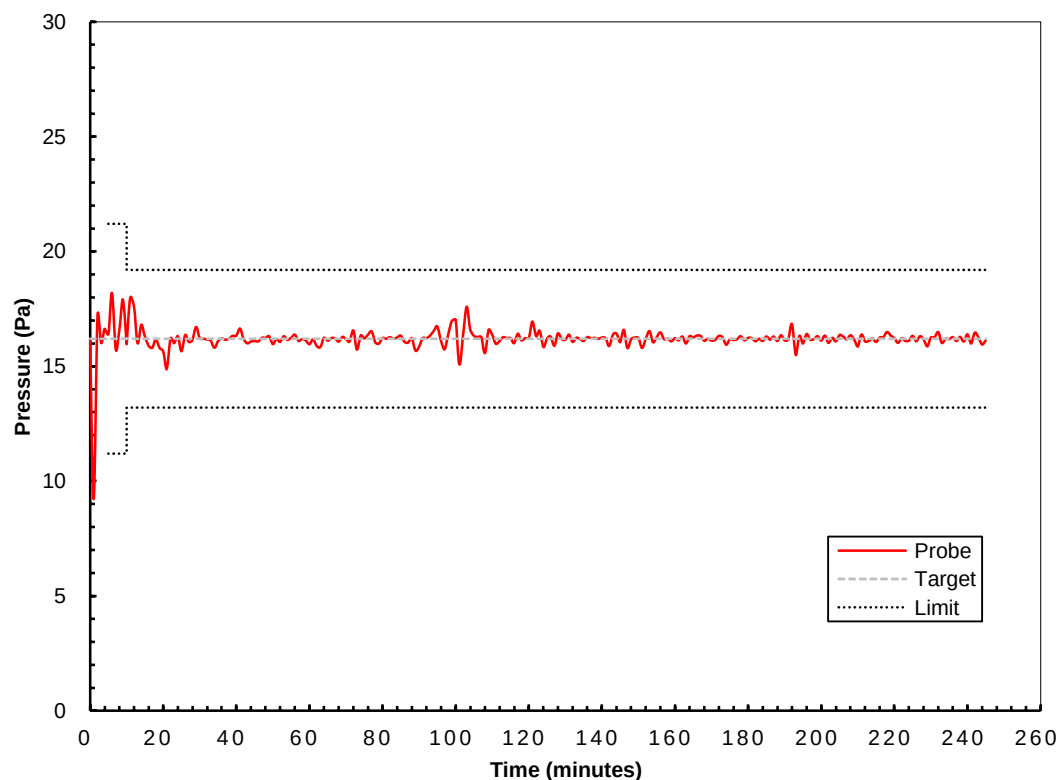


3.2.3 Pressure Measurements

The furnace pressure was controlled to be 20 Pa at 100 mm below the soffit of the specimen as defined in the test standard. This corresponds to a pressure of 15.9 Pa at the pressure probe. The differential pressure was monitored using a micromanometer connected to a computer-controlled data acquisition system which recorded the pressure at 15 second intervals.

Figure 4 shows the pressure measured at the probe during the test.

Figure 4: Mean Furnace Pressure



In summary the furnace conditions complied with the test standard.

3.3 Specimen Temperature Measurement

The temperature on the unexposed face of the control joint specimens and the floor slab were measured with chromel-alumel thermocouples attached to the specimens. The arrangement consisted of thermocouples placed as specified in clause 10.5 of the test standard AS 1530.4:2014.

The locations of the thermocouples are shown in Figure 5.

Figure 6 to Figure 11 show the temperature rise of each specimen.

Figure 5: Unexposed Face Thermocouple Positions

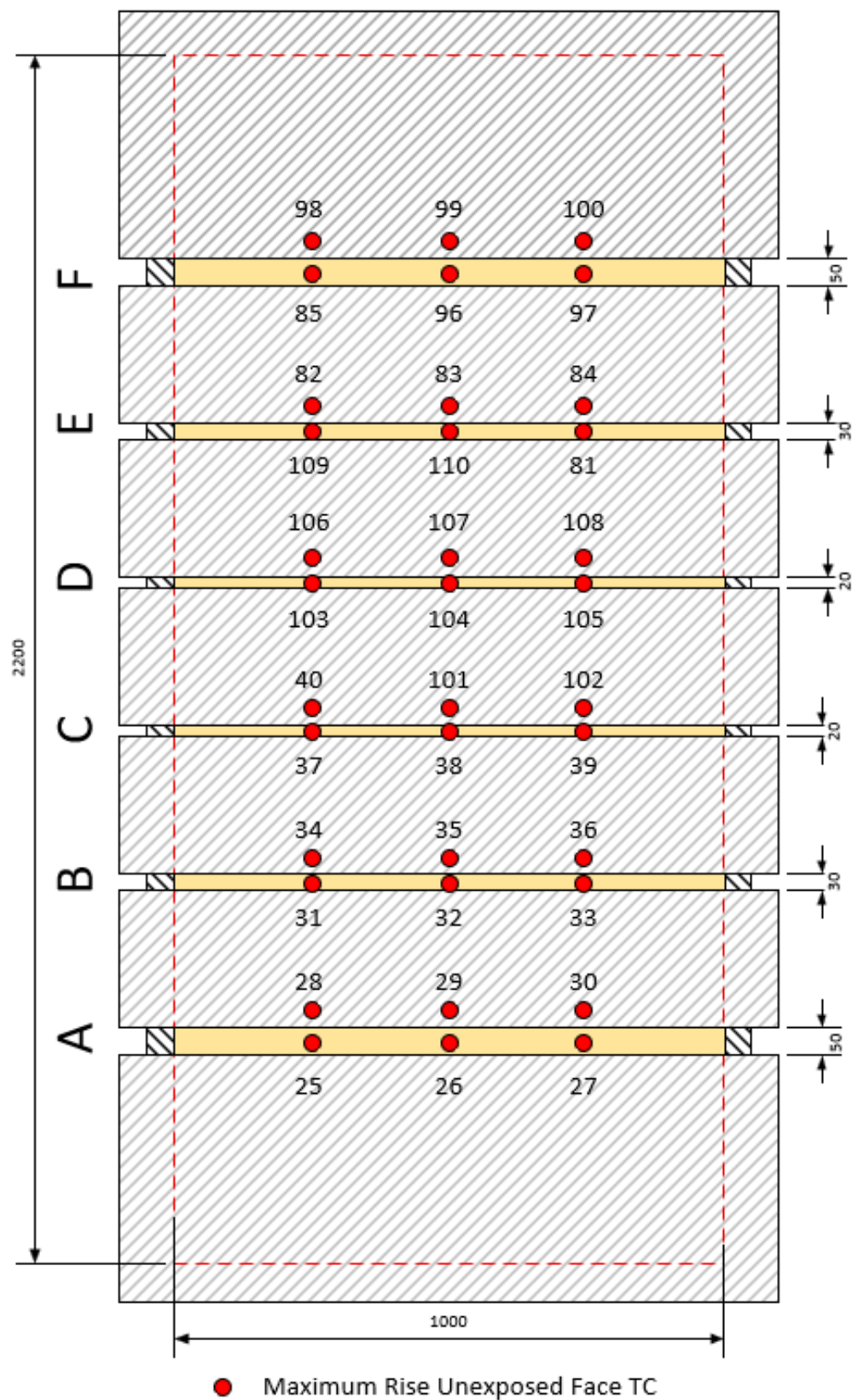


Figure 6: Specimen A - Temperature Rise

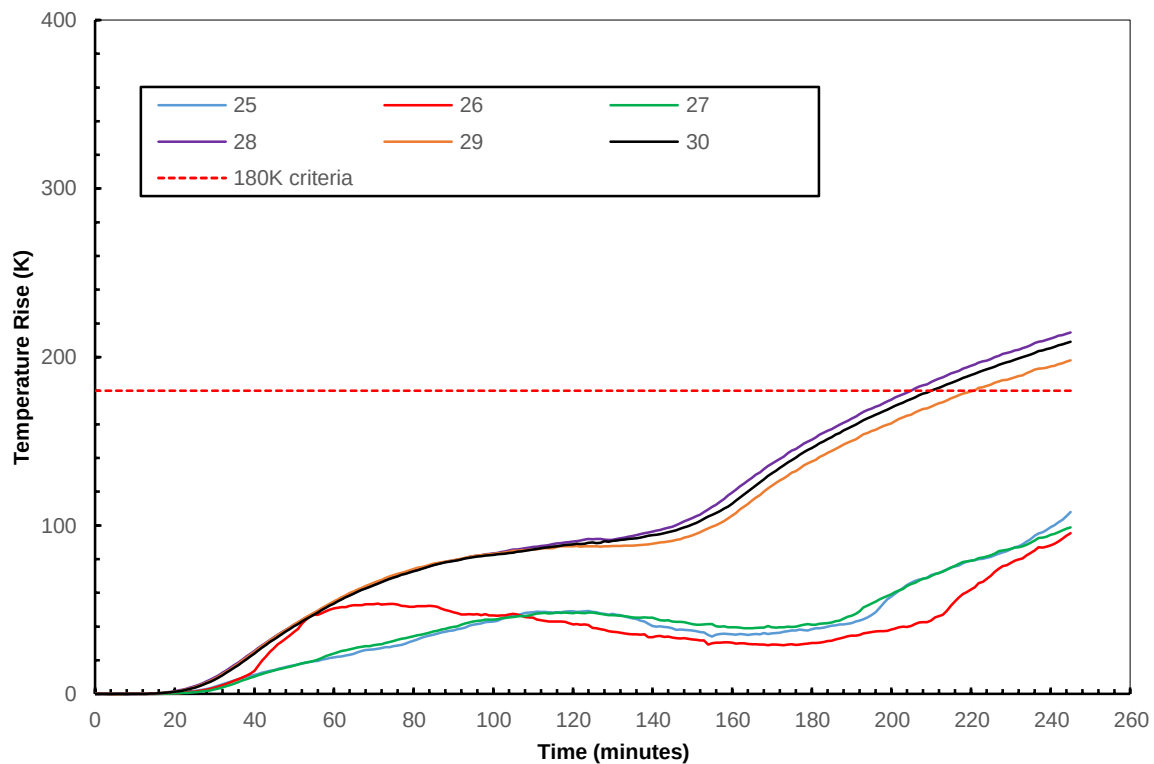


Figure 7: Specimen B - Temperature Rise

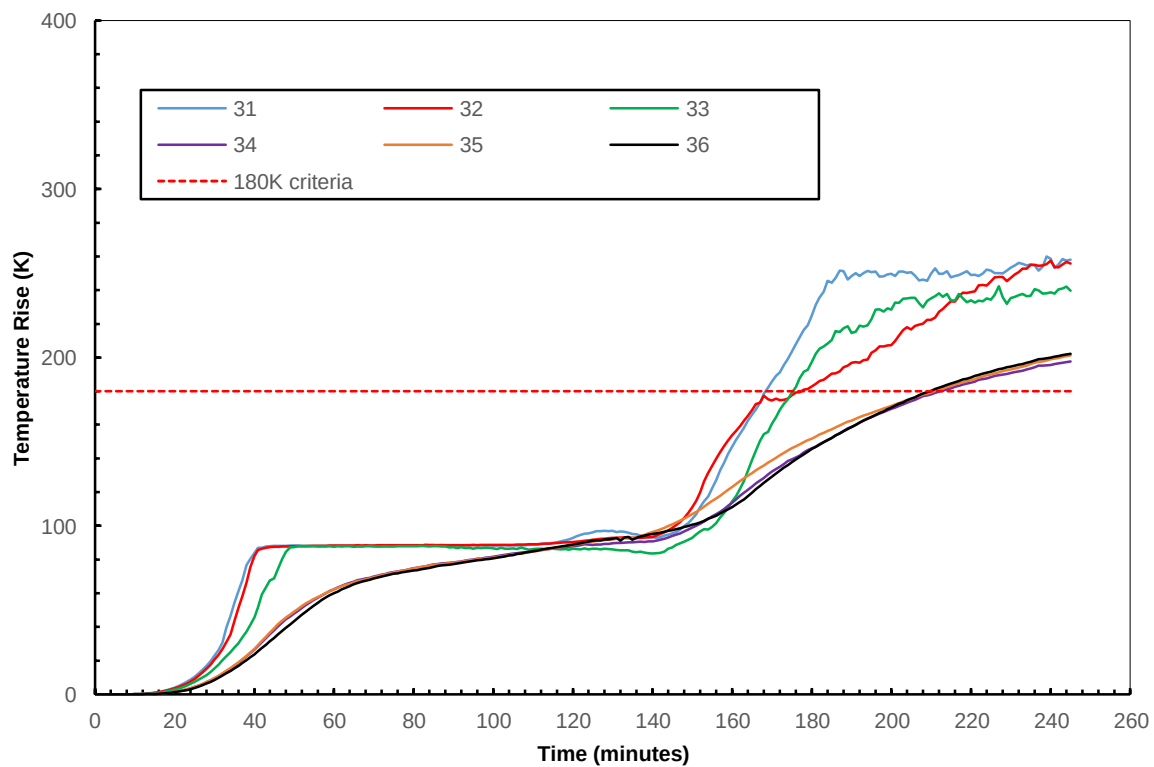


Figure 8: Specimen C - Temperature Rise

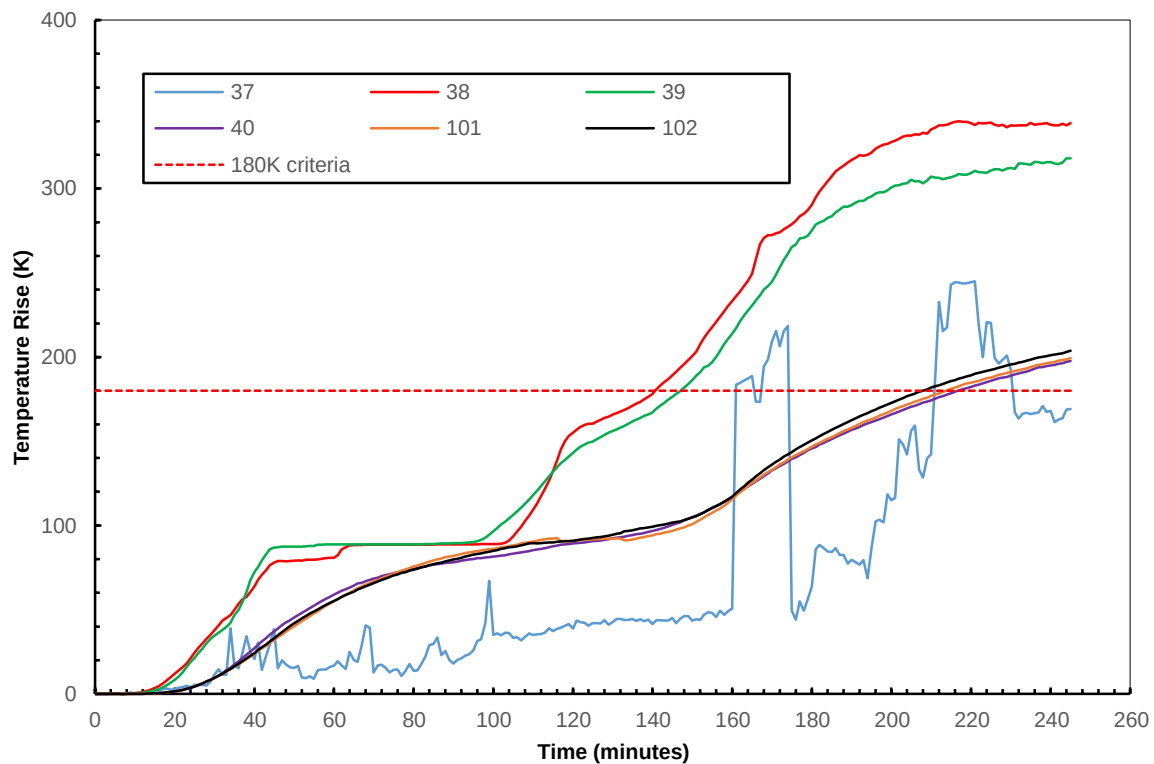


Figure 9: Specimen D - Temperature Rise

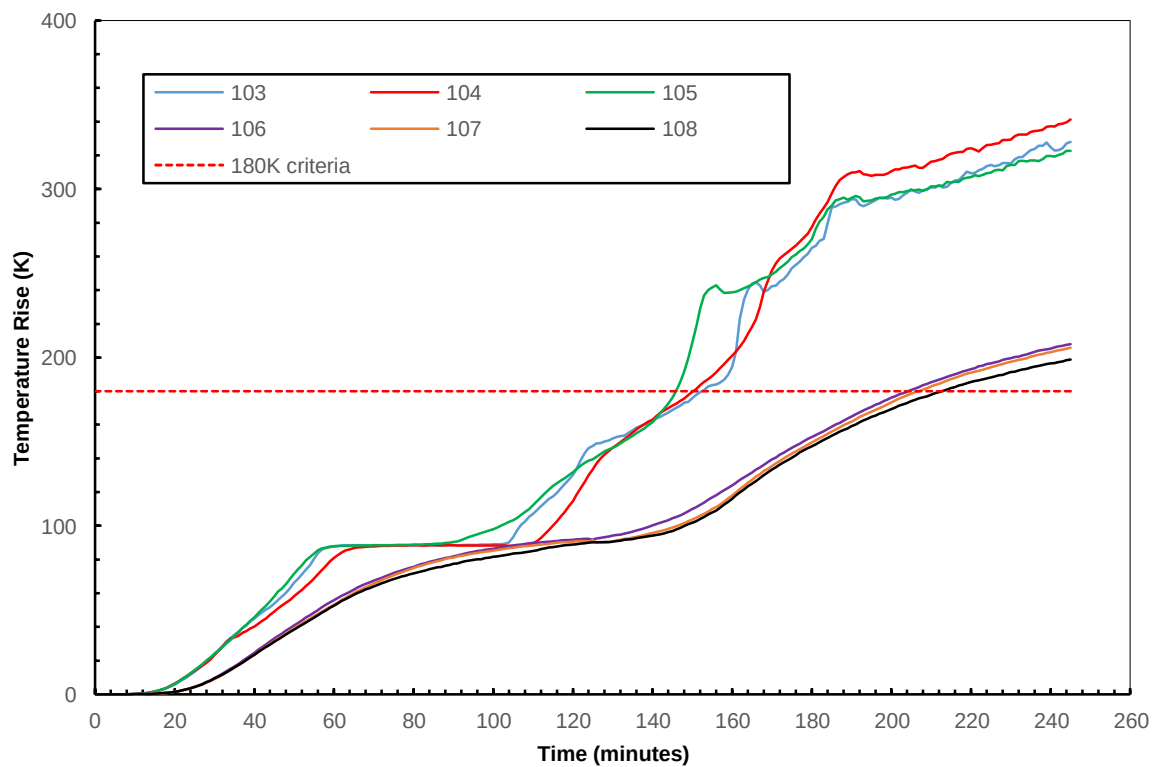


Figure 10: Specimen E - Temperature Rise

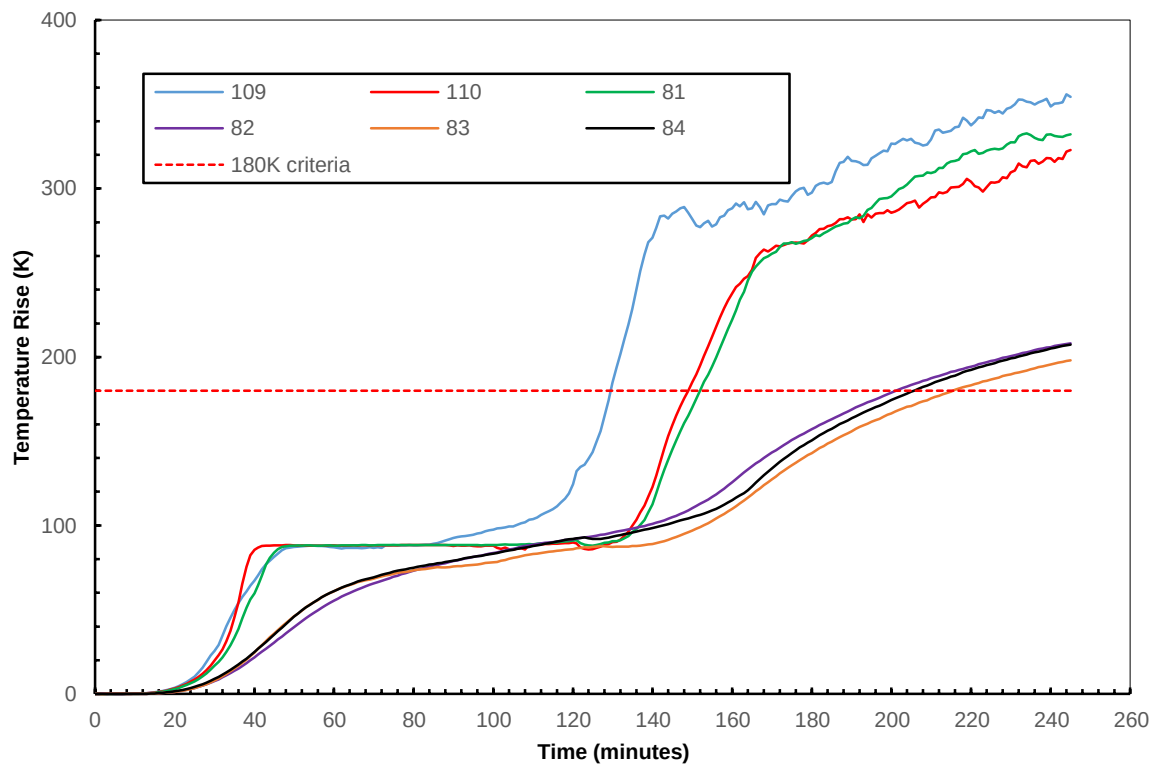
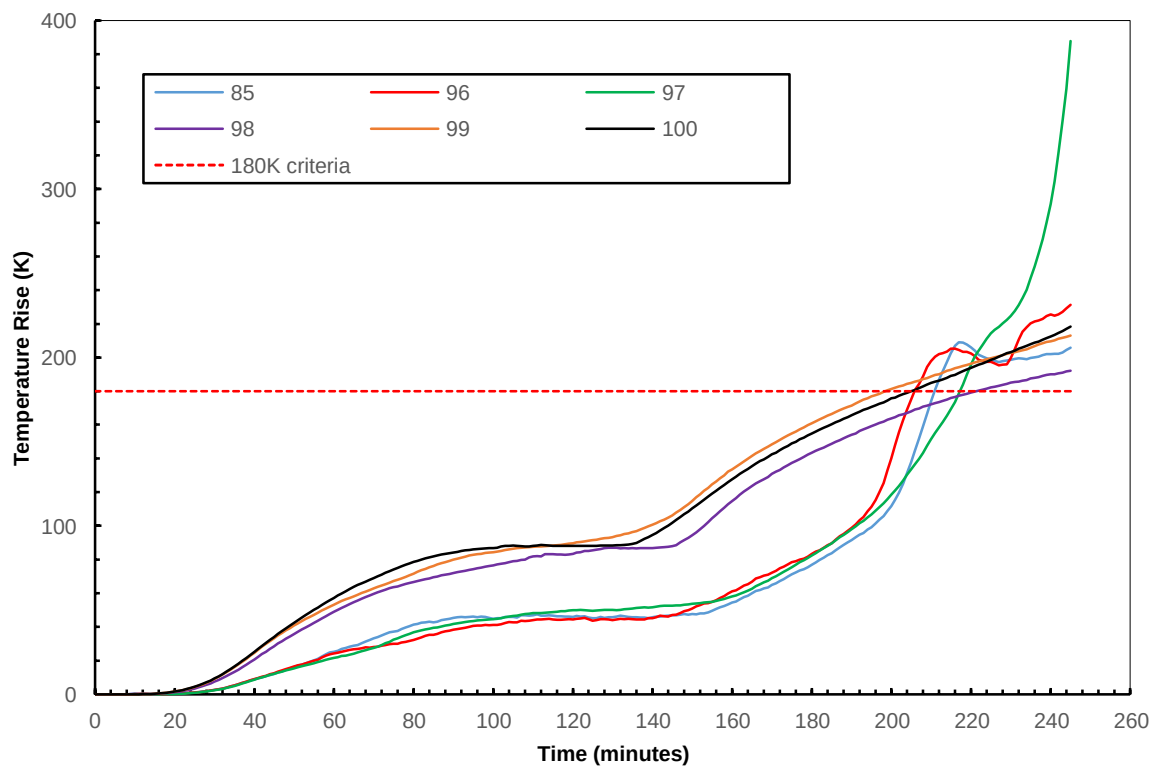


Figure 11: Specimen F - Temperature Rise



3.4 Specimen Integrity

Integrity failures were recorded as follows in Table 2

Table 2: Specimen Integrity

Specimen Ref	Time (minutes) Until Integrity Failure Occurred
A	245 - No failure
B	245 - No failure
C	245 - No failure
D	245 - No failure
E	245 - No failure
F	245 - No failure

3.5 Specimen Insulation

Insulation failures were recorded as follows in Table 3

Table 3: Specimen Insulation

Specimen Ref	Time (minutes) Until Failure Occurred (T>180K)
A	204 - TC 28
B	168 - TC 31
C	140 - TC 38
D	145 - TC 105
E	129 - TC 109
F	198 - TC 99

3.6 Observations

Observations related to the Integrity performance of the specimens were at the times stated in minutes and seconds as shown in Table 4.

U = Observations from the unexposed face.

E = Observations from the exposed face.

Table 4: Observations

Time (Min:Sec)	Test Face	Observations
00:00	-	The test commences.
20:00	U	Smoke/steam issue commences from the ends of Specimens A, B and C.
30:00	U	Water pooling/bubbling within the aperture of Specimen C near to the end of the joint (TC 39 end).
35:00	U	Water pooling on the unexposed face surface of the large, left hand side concrete slab.
66:00	U	A hole in the backing rod of Specimen D has appeared, 25 mm from the end, (TC 105 end).
70:00	U	A cotton wool pad was applied to area of Specimen D observed at 66 minutes, no ignition of the cotton wool pad was observed.
75:00	U	The size of the hole in the backing rod of Specimen D is increasing, approximately 30-40 mm long x width of aperture.
79 To 234	U	During this period, numerous cotton wool pads were applied to the area of the seal of Specimen D where the hole in the backing rod was present, each time no ignition of the cotton wool pad was observed. During this period, the observed discolouration of the cotton wool pad became less as the test duration increased.
80:00	U	Smoke issue increasing from Specimen C, approximately 50 mm from the end of the joint.
95:00	U	A faint glowing is visible within Specimen D.
120:00	-	All specimens continue to maintain Integrity.
122:00	U	A hole in the backing rod of Specimen E has appeared, 25 mm from the end, (TC 109 end).
123:00	U	A further hole in the backing rod of Specimen E has appeared, 50 mm from TC 81.
125:00	U	The backing rod of Specimen A is being pushed upwards.
135:00	U	The hole in the backing rod observed at 122 minutes has increased in size to approximately 150 mm, the backing rod has now completely shrunk away in the vicinity of TC 109 which is now effectively 'floating' above the seal.
155:00	U	The backing rod of Specimen E is beginning to shrink away near to TC 81.
167:00	U	Sections of the backing rod of Specimen B and D are shrinking away.
190:00	U	Discolouration of the backing rod of Specimen F has begun.
240:00	-	All specimens continue to maintain Integrity.
245:30	-	The test is discontinued.



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

18 of 23

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4. SUMMARY

The fire resistance in minutes, in accordance with AS 1530.4:2014, of six double caulked control joint systems installed in a 120 mm thick concrete floor slab, was as follows:

Specimen Ref	Control Joint Details Width x Depth	Integrity (min)	Insulation (min)	FRL*
A	1 st - 50 mm x 25 mm Firesound® 2 nd - 50 mm x 25 mm Firesound®	245 NF	204	-/120/120
B	1 st - 30 mm x 15 mm Firesound® 2 nd - 30 mm x 15 mm Firesound®	245 NF	168	-/120/120
C	1 st - 20 mm x 10 mm Firesound® 2 nd - 20 mm x 10 mm Firesound®	245 NF	140	-/120/120
D	1 st - 20 mm x 10 mm FulaFlex™ FR 2 nd - 20 mm x 10 mm FulaFlex™ FR	245 NF	145	-/120/120
E	1 st - 30 mm x 15 mm FulaFlex™ FR 2 nd - 30 mm x 15 mm FulaFlex™ FR	245 NF	129	-/120/120
F	1 st - 50 mm x 25 mm FulaFlex™ FR 2 nd - 50 mm x 25 mm FulaFlex™ FR	245 NF	198	-/120/120

NF = No Failure.

The test was terminated after 245 minutes.

The installation of the joints was from the exposed face (EXF) with the 2nd layer of sealant located on the exposed face of the slab.

*The test was conducted on a floor system with an established FRL of -/120/120. The maximum FRL of any test specimen cannot exceed the FRL achieved by the floor system in which it is installed.

The test standard requires the following statement to be included:

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

"This report details methods of construction, the test conditions and results obtained when the specific element of construction described herein was tested following the procedure outlined in this standard. Any significant variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report."

"Because of the 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 of the result."



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

19 of 23

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5. PERMISSIBLE VARIATIONS

In accordance with AS 1530.4:2014 clause 10.12, the permissible variations that are relevant to the tested penetration systems reported in test report FP21481-02 are as follows.

5.1 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 the following changes have been made.

5.2 Separating Elements

Results obtained 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.



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

20 of 23

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PHOTOS

Photo 1: The Unexposed Face of the Assembly Prior to Testing

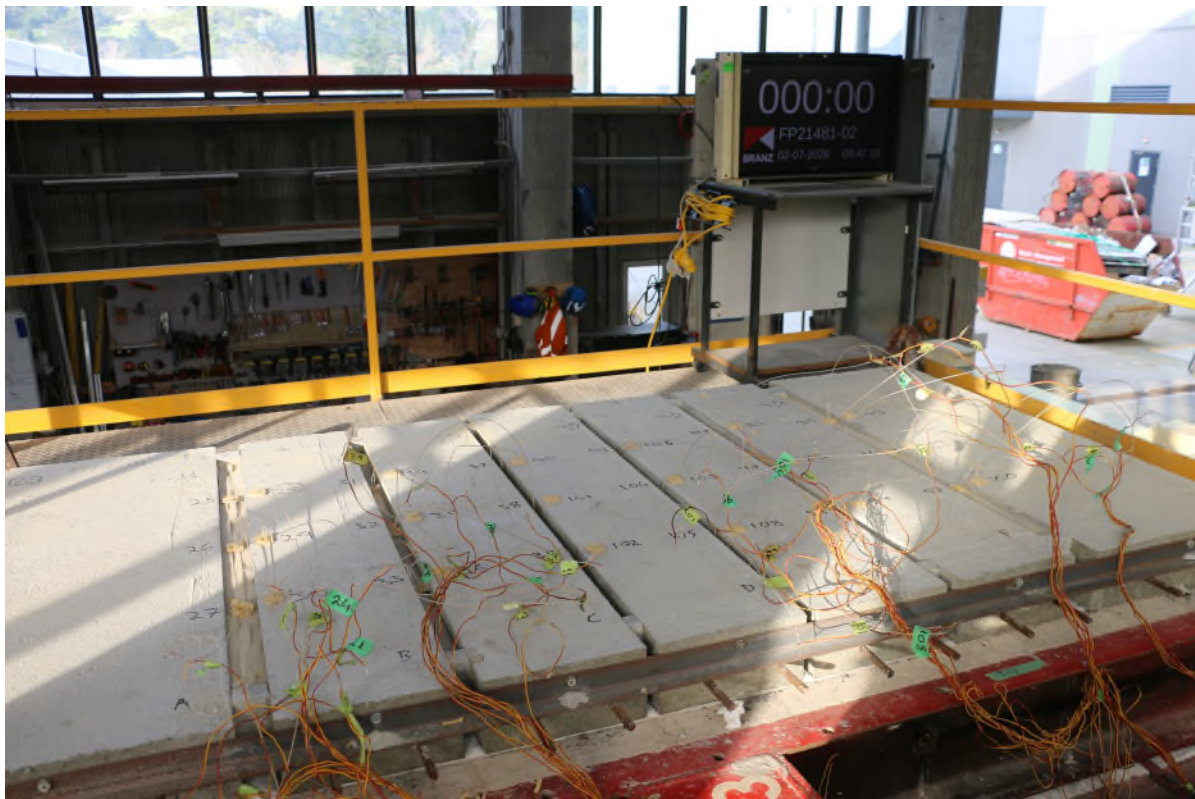
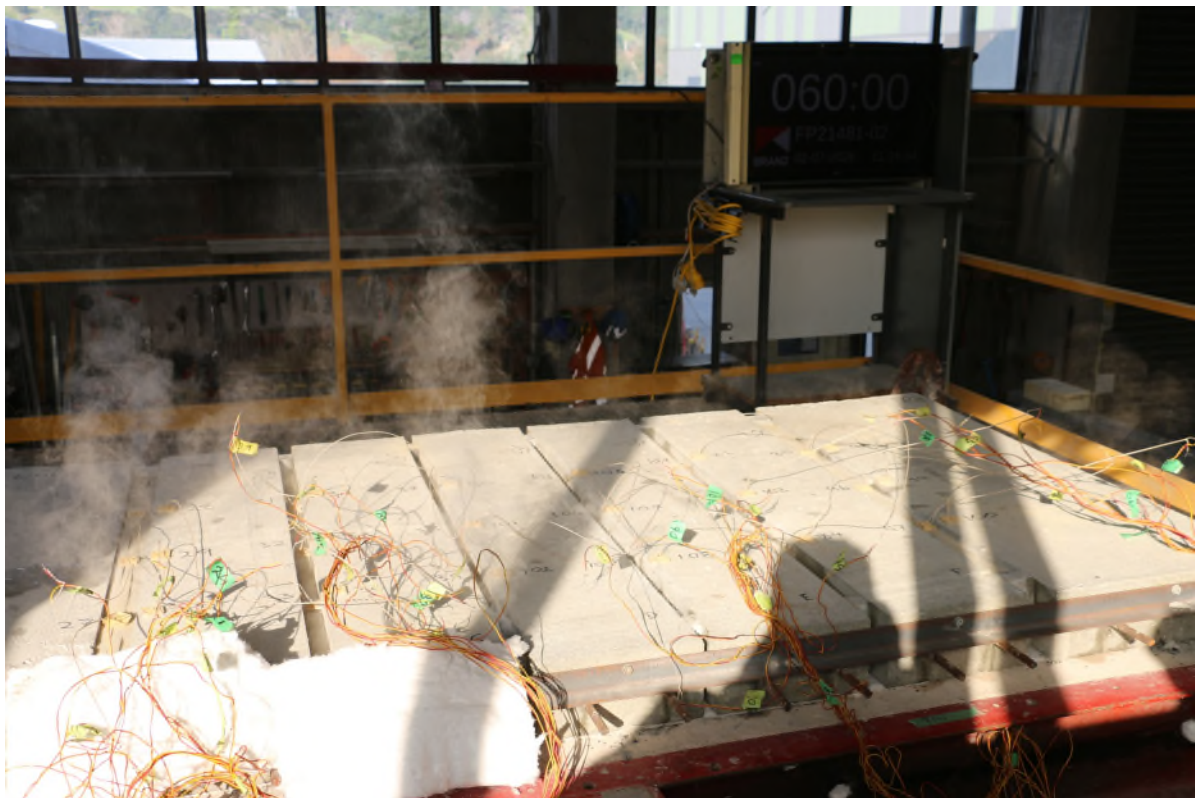


Photo 2: The Unexposed Face of the Test Assembly After a Duration of 60 Minutes



REPORT NUMBER:

FP21481-02-1

ISSUE DATE:

29 July 2026

PAGE:

21 of 23

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Photo 3: The Unexposed Face of the Test Assembly After a Duration of 120 Minutes

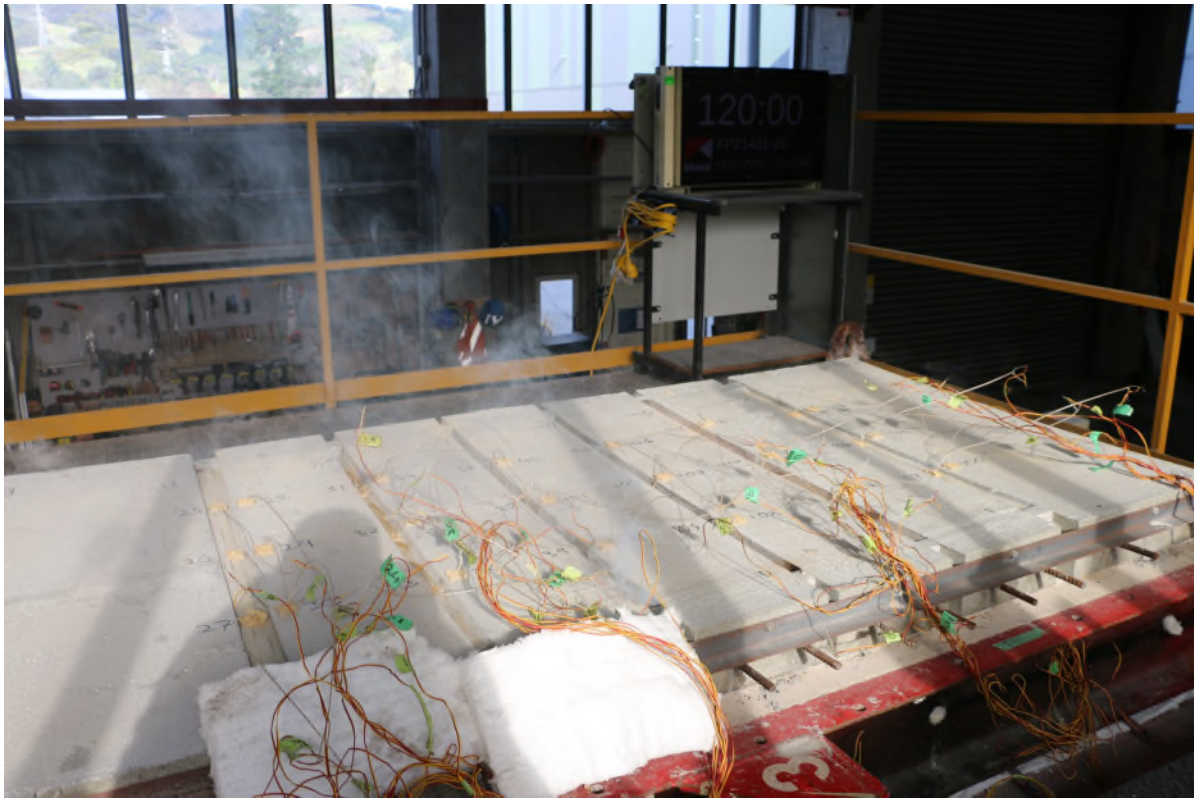


Photo 4: The Unexposed Face of the Test Assembly After a Duration of 180 Minutes

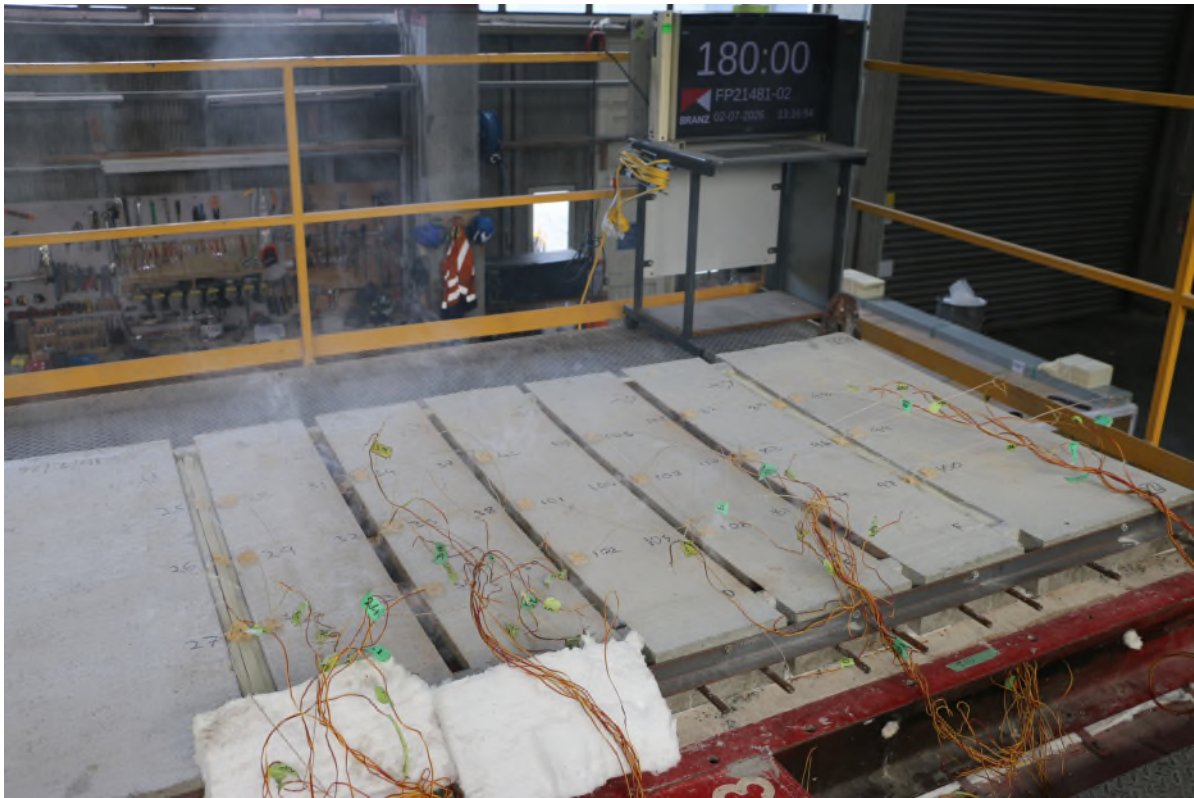


Photo 5: The Unexposed Face of the Test Assembly After a Duration of 240 Minutes



Photo 6: The Exposed Face of the Test Assembly Immediately After Testing

