

FIRE TEST REPORT

FP18716-01-1

THE FIRE RESISTANCE IN ACCORDANCE WITH AS 1530.4:2014 OF THREE CONTROL JOINTS INSTALLED IN A STEEL STUD PLASTERBOARD LINED WALL

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

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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
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Description of Test Specimen

The test specimen consisted of a nominally 1,000 mm high by 1,000 mm wide steel framed wall which was arranged to provide three, 1,000 mm high x 20 mm wide apertures. The framing was lined around two of the apertures with a single layer of 16 mm thick Knauf Firestop plasterboard on both faces. The wall was lined around the remaining aperture with a single layer of 13 mm thick Knauf Firestop plasterboard. The apertures were sealed with various control joint sealing systems. The specimen control joints were refenced A-C.

Date of Test

26 September 2024

Test Results

The fire resistance in minutes, in accordance with AS 1530.4:2014, of the two control joint systems installed in a steel stud wall lined with a single layer of 16 mm thick Knauf Firestop plasterboard, was as follows:

Specimen Ref	Control Joint Details Width x Depth	Integrity (min)	Insulation (min)	FRL
A	20 mm x 22 mm Firesound® Backing Rod	132 NF	115	-/90/90*
B	Rondo P35 20 mm x 22 mm Firesound® Backing Rod	132 NF	122	-/90/90*

NF = No Failure.

The test was terminated after 132 minutes.

*The test was conducted on a wall system with an established FRL of 90/90/90. The maximum FRL of any test specimen cannot exceed the FRL achieved by the wall system in which it is installed.

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The fire resistance in minutes, in accordance with AS 1530.4:2014, of one control joint system installed in a steel stud wall lined with a single layer of 13 mm thick Knauf Firestop plasterboard, was as follows:

Specimen Ref	Control Joint Details Width x Depth	Integrity (min)	Insulation (min)	FRL
C	Rondo P35 20 mm x 22 mm Firesound® Backing Rod	132 NF	94	-/60/60*

NF = No Failure.

The test was terminated after 132 minutes.

*The test was conducted on a wall system with an established FRL of 60/60/60. The maximum FRL of any test specimen cannot exceed the FRL achieved by the wall 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.

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DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	DESCRIPTION
01	17 October 2024	Initial Issue

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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 1,000 mm high by 1,000 mm wide steel framed wall which was arranged to provide three, 1,000 mm high x 20 mm wide apertures. The framing was lined around two of the apertures with a single layer of 16 mm thick Knauf Firestop plasterboard on both faces. The wall was lined around the remaining aperture with a single layer of 13 mm thick Knauf Firestop plasterboard. The apertures were sealed with various control joint sealing systems. The control joints specimens were refenced A-C.

2.1.1 Conditioning

The wall was assembled and lined on 13 June 2024. The backing rod and FulaFlex™ FR sealant was applied to the three control joint specimens on 20 June 2024. The P35 installation and stopping compound application for Specimen B and Specimen C was done on 17 September 2024. The specimens were kept under ambient laboratory conditions until testing on 26 September 2024.

2.1.2 Specimen Selection

BRANZ was responsible for the supply of materials and construction of the wall assembly, the client was responsible for the selection, supply and installation of the three control joint specimens.

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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.

2.2 Control Joint Details

2.2.1 Specimen A

The aperture for Specimen A was filled from both faces with a foam backing rod such that it was recessed within the aperture, nominally 22 mm from the outer face of the wall lining on both faces and with a nominal 12 mm air gap between the backing rods. Firesound® sealant was applied directly onto the backing rod and trowel finished to the surface of the outer face of the wall lining on both faces.

2.2.2 Specimens B & C

The apertures for Specimen B and Specimen C were filled with a foam backing rod such that it was recessed within the apertures to a depth to allow for nominally 22 mm of Firesound® sealant to be applied onto the backing rod and be finished level with the inner face of the wall lining on both faces.

RONDO P35 joint trim sections were fitted into both control joints on both faces which were fixed using 8 mm long staples, spaced at 150 mm centres on both flanges. A coat of Tradeset stopping compound was applied over the flanges. Details of the control joints are shown in Figure 1.

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

Table 1: Control Joint Details

Specimen Ref	Control Joint System (both faces)	Lining Thickness Knauf Firestop (mm)	Sealant Dimensions as Measured (mm)		
			Width	Depth	Height
A	Firesound®	16	20	22	1,010
B	Firesound® with P35	16	20	22	1,010
C	Firesound® with P35	13	20	22	1,010

2.3 Wall

2.3.1 Framing

The wall comprised RONDO 64, 0.5 mm BMT studs and track sections which were assembled to form five individual four-sided frames. The frames were arranged within a concrete lined specimen holder to provide three, 20 mm wide x 1,000 mm high specimen apertures and one, nominally 26 mm wide x 1,000 mm high gap which would be filled with two, 13 mm thick layers of Firestop plasterboard to act as a boundary between the two, 16 mm thick Knauf Firestop lined apertures and the one, 13 mm thick Knauf Firestop lined aperture. An expansion allowance of 16 mm was provided between the head of the studs and the head track sections. Each track section was fixed to the concrete lined specimen holder using two, 6 mm diameter x 50 mm long masonry screws. Details of the framing are shown in Figure 2.

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2.3.2 Lining

The framing around the apertures for Specimen A & Specimen B was lined with a single layer of 16 mm thick Knauf Firestop plasterboard on both faces. The framing around the aperture for Specimen C was lined with a single layer of 13 mm thick Knauf Firestop plasterboard on both faces. The plasterboard panels were sized to provide a gap between the board edge and the concrete lined specimen holder of 16 mm at the head and between 6-10 mm at the base and the vertical edges.

The plasterboard panels were fixed to the framing at nominally 200 mm centres at each stud. The 16 mm thick linings were fixed with 6g x 32 mm long screws and the 13 mm thick linings were fixed with 6g x 25 mm long screws.

The 16 mm thick Knauf Firestop had the following measured properties:

Measured thickness	16.0	mm
Measured weight per unit area	14.1	kg/m^2
Measured moisture content by weight	0.60	%

The 13 mm thick Knauf Firestop had the following measured properties:

Measured thickness	13.0	mm
Measured weight per unit area	11.2	kg/m^2
Measured moisture content by weight	0.63	%

2.3.3 Cavity Insulation

The voids between the framing members were filled with R-1.3 Earthwool Glasswool which was nominally 50 mm thick.

The 50 mm thick Earthwool Glasswool had the following measured properties:

Measured density	11.6	kg/m^3
Measured weight per unit area	0.58	kg/m^2
Measured moisture content by weight	1.84	%

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Figure 1: Control Joint Configuration - Section View

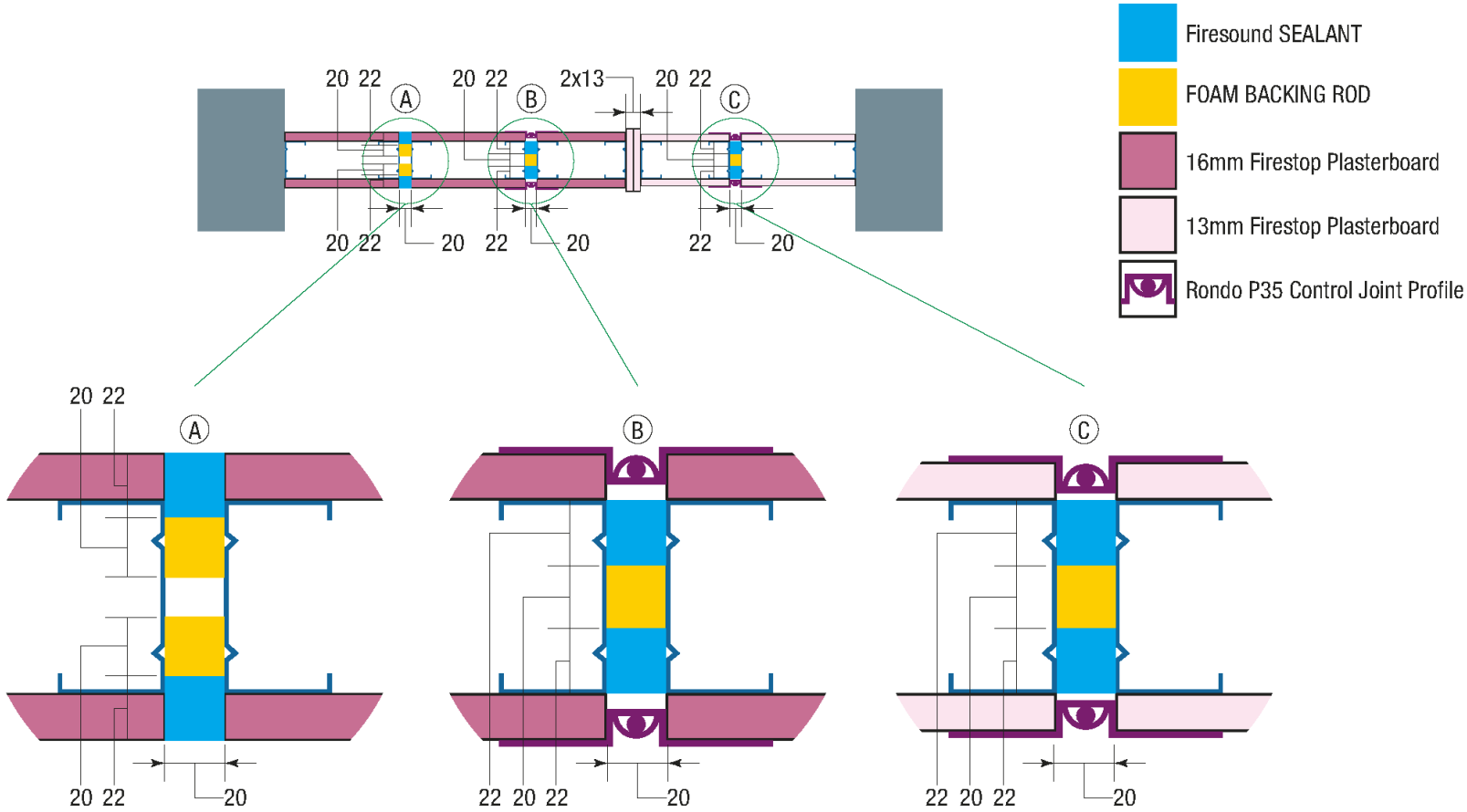
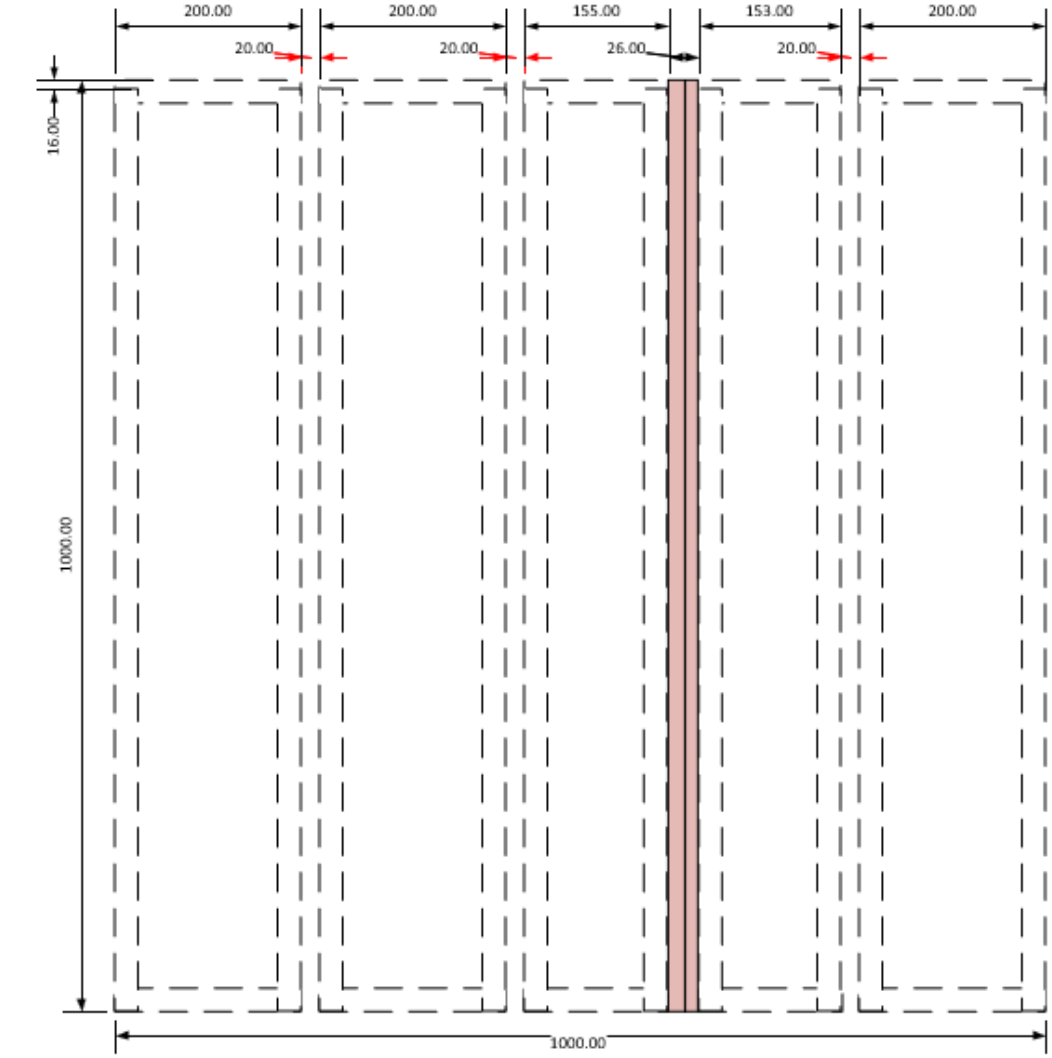


Figure 2: Framing Configuration - Elevation and Section View



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3. TEST CONDITIONS AND RESULTS

3.1 General

The specimen was tested on 26 September 2024, 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 14°C.

The specimen was placed against the vertical furnace 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 132 minutes.

3.2 Furnace Conditions

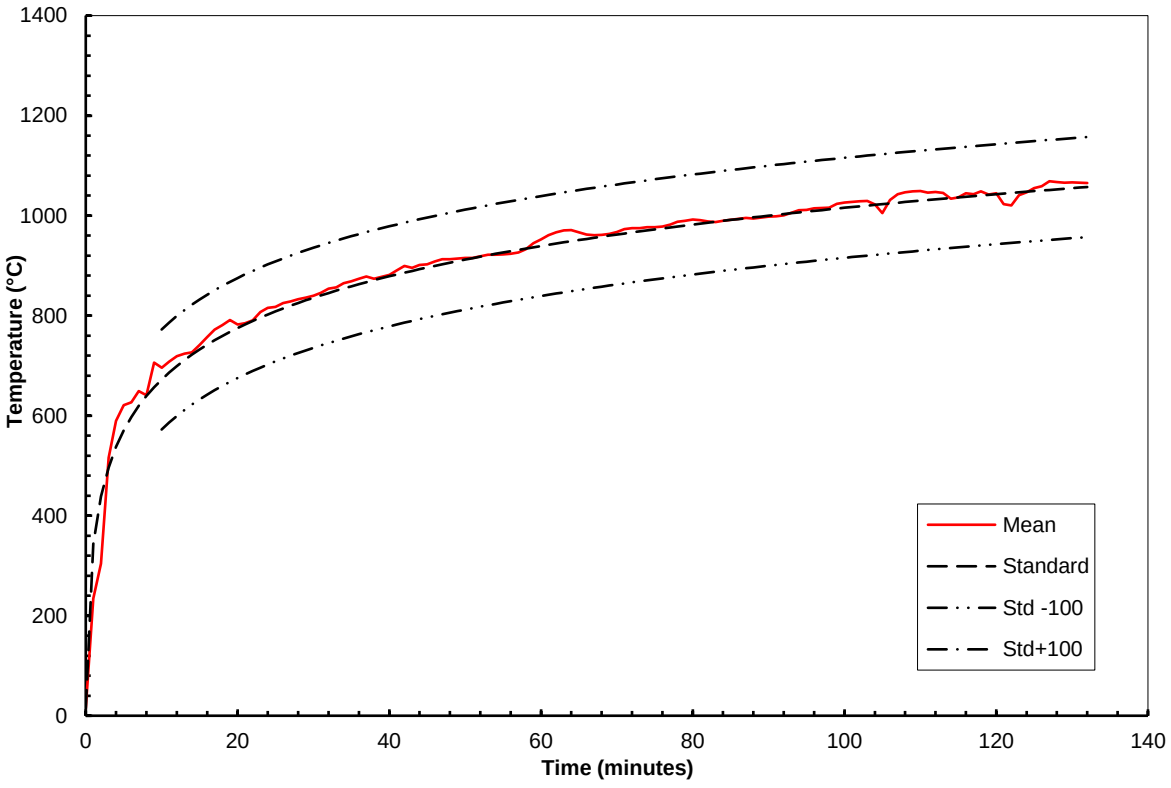
3.2.1 Furnace Temperature Measurement

Temperature measurement within the furnace was made using four mineral insulated metal sheathed (MIMS) chromel-alumel thermocouples uniformly distributed in a vertical plane approximately 100 mm from 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 3 shows the furnace temperature curve and the permitted upper and lower limits in accordance with AS 1530.4:2014.

Figure 3: Furnace Temperature



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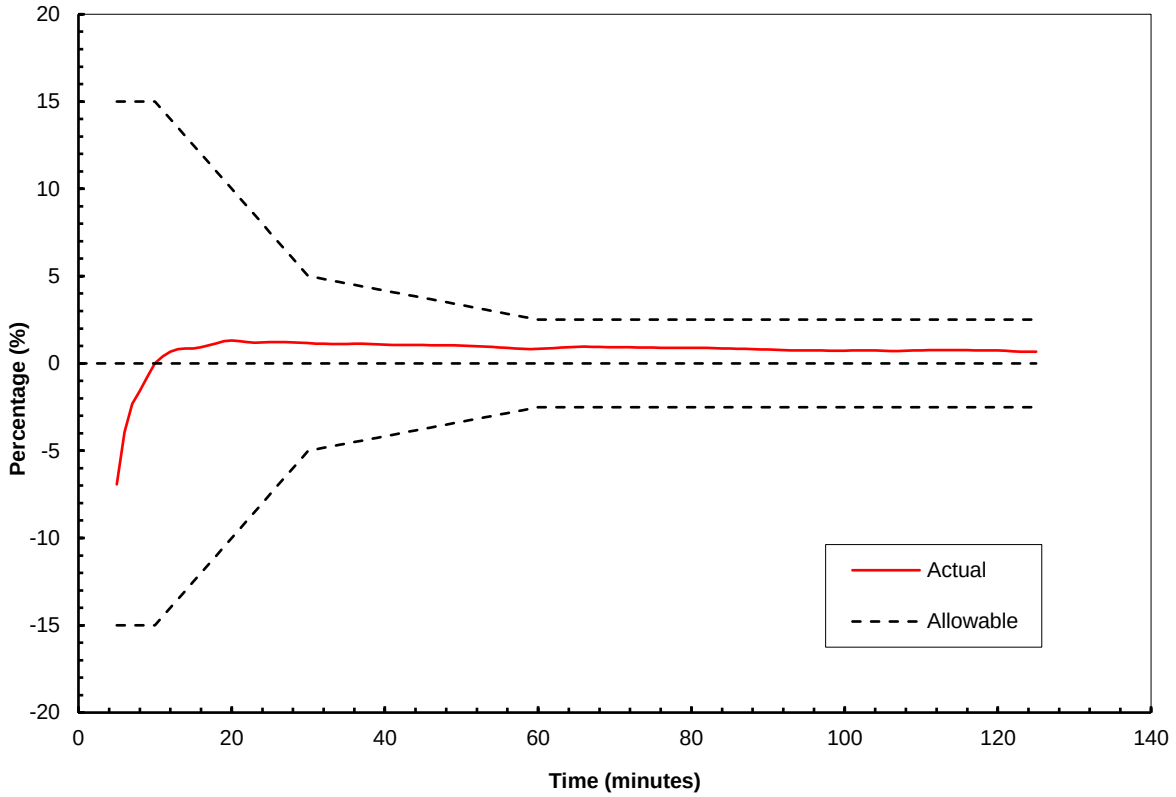
3.2.2 Furnace Control

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

Figure 4: Percentage Deviation from Standard Curve



3.2.3 Pressure Measurements

The furnace pressure was controlled to be 15 Pa at mid-height of the specimens as defined in the test standard. This corresponds to a pressure of 18.2 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 5 shows the pressure measured at the probe during the test.

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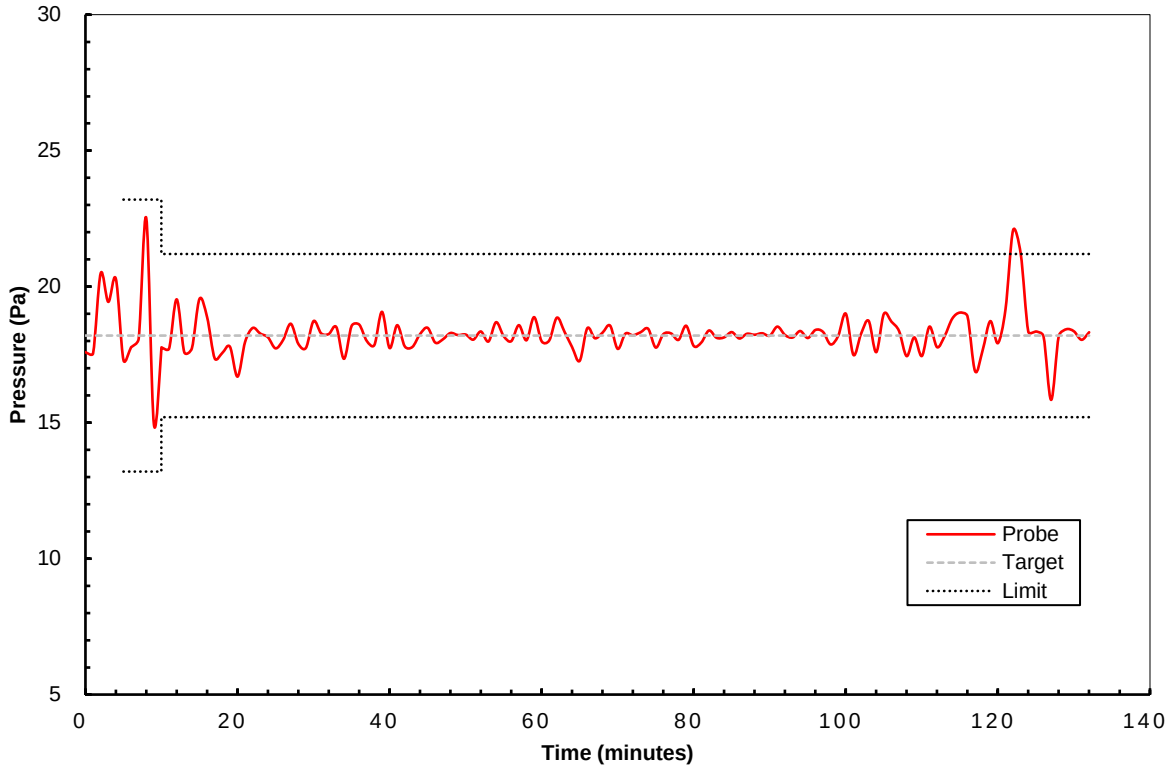
Figure 5: Mean Furnace Pressure



In summary the furnace conditions complied with the test standard for the majority of the 132 minute test duration except for a brief period where the furnace pressure was outside the upper limit. It is considered that this minor deviation would not have influenced the tested results.

3.3 Specimen Temperature Measurement

The temperature on the unexposed face of the control joint specimens and the wall 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.

According to clause 10.5.3, no unexposed face thermocouples were attached to the P35 components fitted to Specimen B and Specimen C as the width of these components were less than 12 mm.

The locations of the thermocouples are shown in Figure 6.

Figure 7 to Figure 9 show the temperature rise of each specimen.

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Figure 6: Unexposed Face Thermocouple Positions

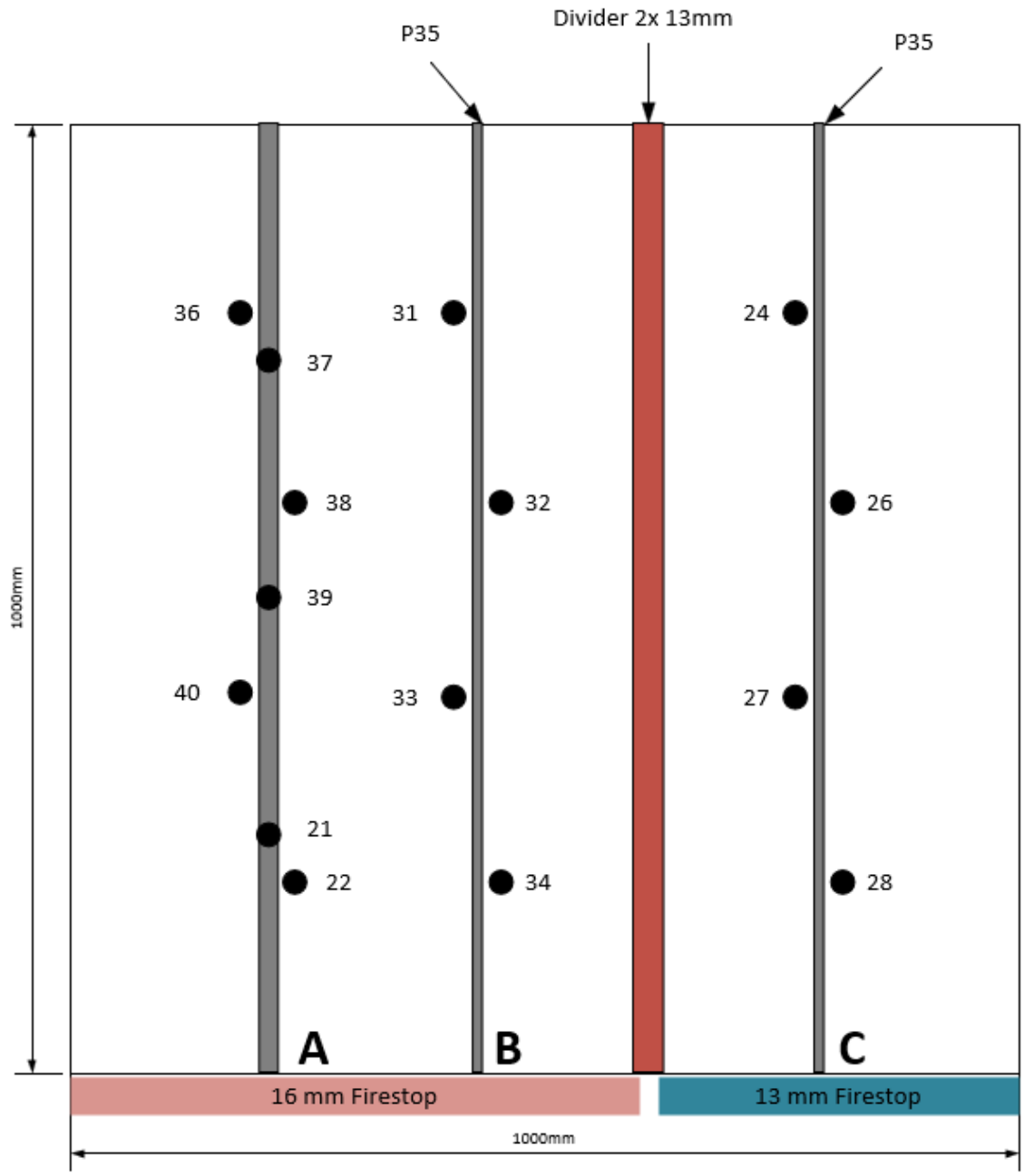

Figure 7: Specimen A - Temperature Rise

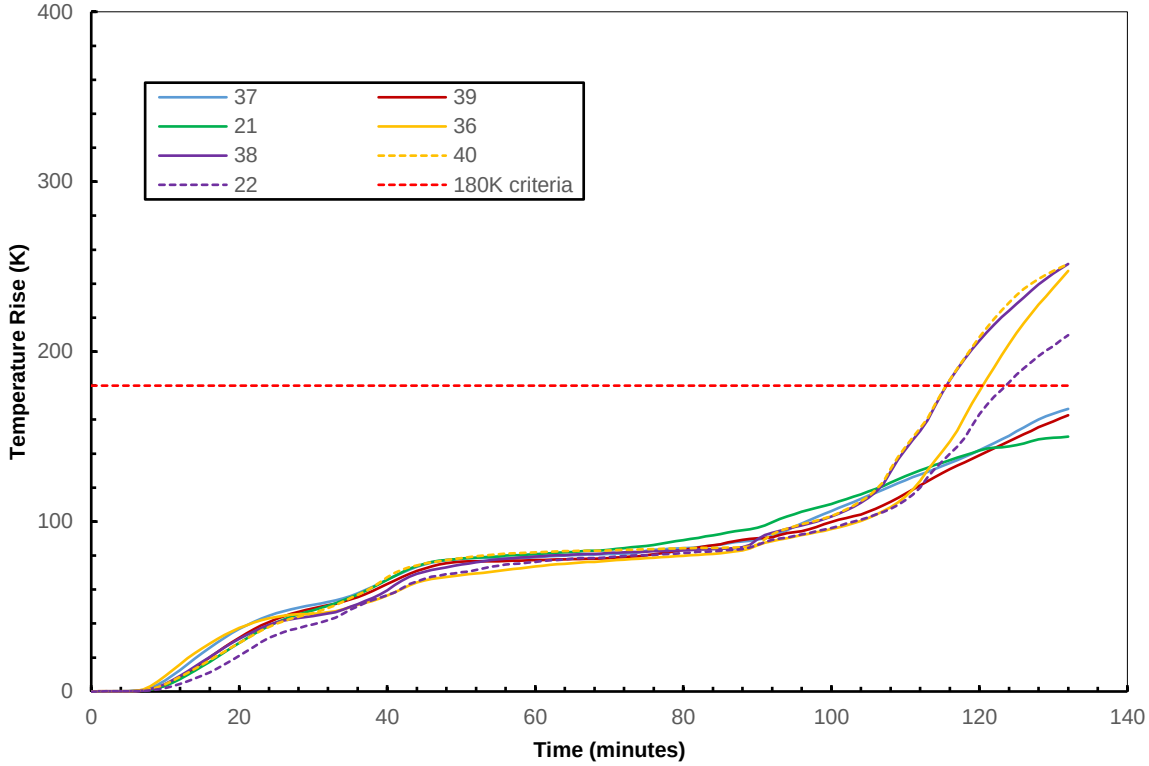

Figure 8: Specimen B - Temperature Rise

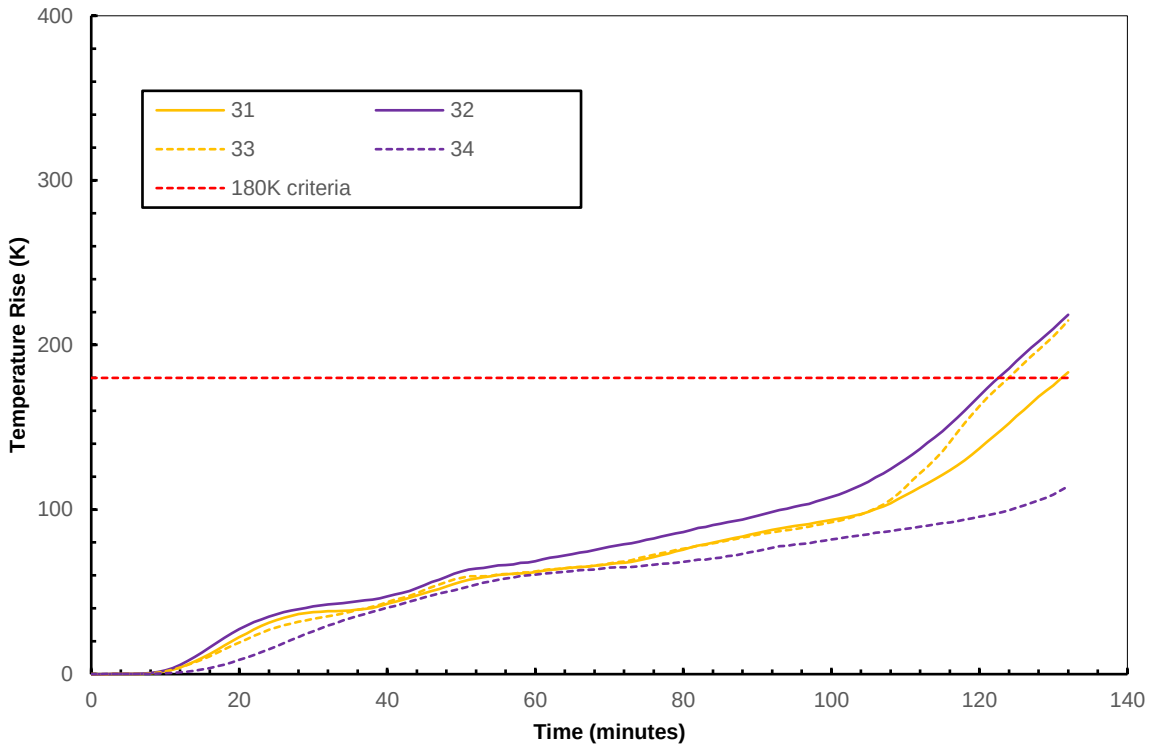

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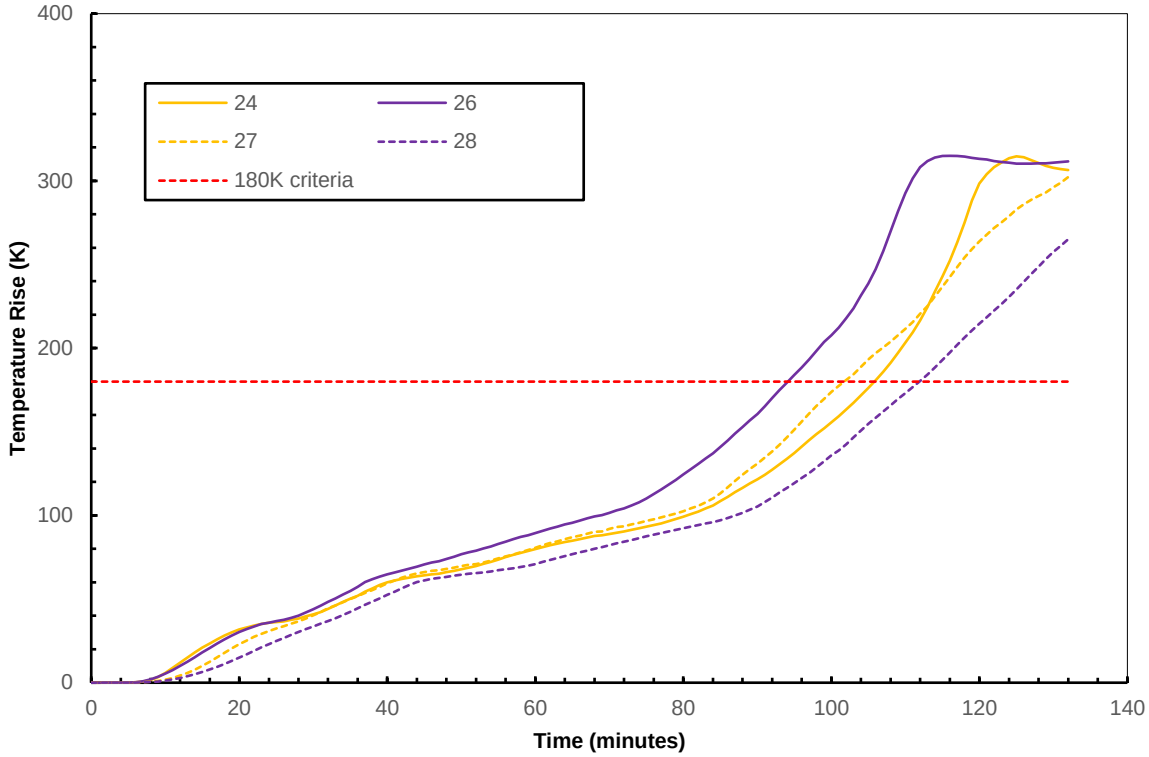
Figure 9: Specimen C - Temperature Rise



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	132 - No failure
B	132 - No failure
C	132 - 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	115 - TC38 & TC 40
B	122 - TC 32
C	94 - TC 26

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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.
08:30	E	The stopping compound is beginning to crack around specimens B and C.
16:10	E	Sections of the stopping compound have detached from specimens B and C.
40:00	U	The sealant in Specimen A is beginning to swell/bulge.
60:00	-	The specimens continue to maintain Integrity.
94:00	U	The black rubber seal in the P35 component of Specimen C has started to push out away from its housing, near to TC 26, smoke issue has started at this area and the flanges of the P35 are now becoming visible beneath the stopping compound.
95:00	E	The P35 component of Specimen C has bowed away from the wall by approximately 30 mm at mid-height of the joint.
120:00	-	The specimens continue to maintain Integrity.
121:00	U	Smoke issue commences from the P35 component of Specimen B near to TC 32.
132:10	-	The test is discontinued.

4. SUMMARY

The fire resistance in minutes, in accordance with AS 1530.4:2014, of the two control joint systems installed in a steel stud wall lined with a single layer of 16 mm thick Knauf Firestop plasterboard, was as follows:

Specimen Ref	Control Joint Details Width x Depth	Integrity (min)	Insulation (min)	FRL
A	20 mm x 22 mm Firesound® Backing Rod	132 NF	115	-/90/90*
B	Rondo P35 20 mm x 22 mm Firesound® Backing Rod	132 NF	122	-/90/90*

NF = No Failure.

The test was terminated after 132 minutes.

*The test was conducted on a wall system with an established FRL of 90/90/90. The maximum FRL of any test specimen cannot exceed the FRL achieved by the wall system in which it is installed.

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The fire resistance in minutes, in accordance with AS 1530.4:2014, of one control joint system installed in a steel stud wall lined with a single layer of 13 mm thick Knauf Firestop plasterboard, was as follows:

Specimen Ref	Control Joint Details Width x Depth	Integrity (min)	Insulation (min)	FRL
C	Rondo P35 20 mm x 22 mm Firesound® Backing Rod	132 NF	94	-/60/60*

NF = No Failure.

The test was terminated after 132 minutes.

*The test was conducted on a wall system with an established FRL of 60/60/60. The maximum FRL of any test specimen cannot exceed the FRL achieved by the wall 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."

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 FP18716-01 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.

5.1.1 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.

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PHOTOS

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

Photo 2: The Unexposed Face of the Assembly Prior to Testing

Photo 3: The Unexposed Face of the Test Assembly After a Duration of 30 Minutes

Photo 4: The Unexposed Face of the Test Assembly After a Duration of 60 Minutes

Photo 5: The Unexposed Face of the Test Assembly After a Duration of 90 Minutes

Photo 6: The Unexposed Face of the Test Assembly After a Duration of 120 Minutes

Photo 7: The Unexposed Face of the Test Assembly After a Duration of 132 Minutes

Photo 8: The Exposed Face of the Test Assembly Immediately After Testing

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