H.B. FULLER AUSTRALIA

FIRE RESISTANCE TEST REPORT

Test standard: Sections 2 and 10 of AS 1530.4:2014
Reference Standard: AS 4072.1-2005 AMDT 1 (Rec:2016)
Test sponsor**:** H.B. Fuller Australia
Products: HB Fuller – Fulaflex FR hybrid
Job number**:** FRT190398
Revision: R1.1 Test date: 25 November 2019

Accredited for compliance with ISO/IEC 17025 – Testing

JENSEN HUGHES

jensenhughes.com/pacific

ilac-MRA

NATA
Accreditation No. 3277

Quality management

Revision	Date	Revision description		
R1.0	9 December 2019	Initial issue.		
		Prepared	**Reviewed**	**Authorised**
		Sumathi Gurusamy	Mandeep Kamal	Mandeep Kamal
R1.1	27 June 2025	Report rebranding and reference to AS 4072.1-2005		
		Prepared	**Reviewed**	**Authorised**
		Patrick Chan	Mandeep Kamal	Mandeep Kamal
				

Jensen Hughes Fire Testing Pty Ltd
ABN 81 050 241 524
Formerly Warringtonfire Australia Pty Ltd[1]

[1] Warringtonfire Australia Pty Ltd was acquired by Jensen Hughes in December 2023. Jensen Hughes Fire Testing Pty Ltd is not affiliated, associated, authorised, or endorsed by Warringtonfire Australia Pty Ltd, Warringtonfire Testing and Certification Limited or its "Warringtonfire" or "Certifire" brands.

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 with reference to AS 4072.1–2005 AMDT 1 (Rec:2016). The testing was done on 25 November 2019.

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

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	Plasterboard wall system	
Nominal separating element size	Width	1600 mm
	Height	1600 mm
	Thickness	90 and 96 mm
Number of control joints	Six	
Restraint conditions	Restrained on all edges	

Table 2 Test specimen

Control joint	Service	Local fire-stopping protection	Local aperture size (mm)	Sealant depth (mm)
A	Control joint	HB Fuller – Fulaxflex FR hybrid	16 × 1570	16
B	Control joint	HB Fuller – Fulaxflex FR hybrid	15 × 1570	16
C	Control joint	HB Fuller – Fulaxflex FR hybrid	20 × 1000	16
D	Control joint	HB Fuller – Fulaxflex FR hybrid	15 × 1570	13
E	Control joint	HB Fuller – Fulaxflex FR hybrid	20 × 584	13
F	Control joint	HB Fuller – Fulaxflex FR hybrid	13 × 1570	13

Table 3 Test results

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/120/90**
	Integrity	No failure at 120 minutes	
	Insulation	Failure at 99 minutes	
B	Structural adequacy	Not applicable	**-/120/90**
	Integrity	No failure at 120 minutes	
	Insulation	Failure at 91 minutes	
C	Structural adequacy	Not applicable	**-/90/90**
	Integrity	Failure at 109 minutes	
	Insulation	Failure at 97 minutes	
D	Structural adequacy	Not applicable	**-/90/60**
	Integrity	Failure at 90 minutes	
	Insulation	Failure at 68 minutes	
E	Structural adequacy	Not applicable	**NA**
	Integrity	No failure at 90 minutes	
	Insulation	Failure at 86 minutes	
F	Structural adequacy	Not applicable	**-/90/60**
	Integrity	No failure at 90 minutes	
	Insulation	Failure at 78 minutes	

NOTE: Control joint E did not meet the minimum length requirements of the standard so no FRL can be assigned.

Table of contents

1.0 Introduction

This report documents the findings of the fire resistance test of penetration systems/control joints in accordance with sections 2 and 10 of AS 1530.4:2014 with reference to AS 4072.1–2005 AMDT 1 (Rec:2016). The testing was done on 25 November 2019.

Jensen Hughes 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	16 - 22 Redgum Drive Dandenong south VIC 3175 Australia

2.0 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 Jensen Hughes.

All measurements were done by Jensen Hughes – 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	16 mm Fire rated plasterboard	
	Product name	USG Boral Firestop	
	Size	1600 mm high × 1000 mm wide × 16 mm thick	
	Density	831 kg/m^3 (measured)	
2.	Item name	Fire rated plasterboard	
	Product name	USG Boral Firestop	
	Size	1600 mm high × 584 mm wide × 13 mm thick	
	Density	923 kg/m^3 (measured)	
3.	Item name	Steel frame	
	Product name	+ Rondo 64 steel studs + Rondo 64 steel noggings + Rondo 64 steel tracks	
	Size	Rondo 64 steel studs	64 mm × 36 mm × 0.75 BMT
		Rondo 64 steel noggings	64 mm × 28 mm × 0.75 BMT
		Rondo 64 steel tracks	64 mm × 28 mm × 0.70 BMT
SE	Overall size	1600 mm wide × 1600 mm high × 90 mm/96 mm thick	
	Restraint conditions	Restrained on all edges	
	Installation - - - -	+ Wall frame The 96 mm plasterboard wall system incorporated 4 studs; 2 studs were fixed at the edges and two were positioned back to back with 15 mm spacing and head and bottom tracks. The 90 mm plasterboard wall system incorporated 4 studs; 2 studs were fixed at the edges and two were positioned back to back with 15 mm spacing and head and bottom tracks. Button head screws (Item 6) used to secure the studs and tracks. Masonry anchors (item 8) are used to secure the steel frame to the perimeter blockwork at nominal 400 mm centre on all four sides of the test frame. + 16 mm fire-rated plasterboard section One layer of 16 mm fire-rated plasterboard (item 1) fixed onto both sides of the steel framing (item 3) to construct 1600 mm high × 1000 mm wide × 96 mm thick wall system.	

Item	Description	
		The plasterboard was secured to the steel framing (item 3) with plasterboard screws (item 7) at nominal 300 mm centres vertically and 50 mm in from the edges to secure the plasterboard. + 13 mm fire-rated plasterboard section One layer of 13 mm fire-rated plasterboard (item 2) fixed onto both sides of the steel framing (item 3) to construct 1600 mm high × 584 mm wide × 90 mm thick wall system. The plasterboard was secured to the steel framing (item 3) with plasterboard screws (item 7) at nominal 300 mm centres vertically and 50 mm in from the edges to secure the plasterboard. See Figure 1 and Figure 2 in Appendix A for more details.
Fire-stopping protections		
Sealant		
4.	Item name	Sealant
	Product name	HB Fuller – Fulaflex FR hybrid
	Density	1822 kg/m^3 (measured)
Backing rod		
5.	Item name	Open cell backing rod
	Product name	Polyethylene
	Size	30 mm high × 20 mm wide
Fixings		
6.	Item name	Button head screws
	Product name	8g ×12 mm button head needle point screws
	Size	8g ×12 mm
7.	Item name	Plasterboard screw
	Product name	6g × 32 mm long needle point, fine thread plasterboard screws
	Size	6g × 32 mm
8.	Item name	Masonry anchors
	Product name	M6 × 40 mm long masonry anchors.
	Size	M6 × 40 mm
Penetration system A		
A	Service	Control joint
	Service detail	Control joint located at the west side between the concrete block work and the plasterboard.
	Aperture size	16 mm wide × nominally 1570 mm long
	Local fire-stopping protection	
	Protection	The sealant (item 4) was applied into the control joint to the depth of plasterboard to steel framing and finished flush with both the exposed & unexposed faces of wall. See Figure 1, Figure 2, Figure 5 and Figure 6 in Appendix A for more details.

Item	Description	
Penetration system B		
B	Service	Control joint
	Service detail	Control joint located at 500 mm away from the west side of the concrete block work.
	Aperture size	15 mm wide × nominally 1570 mm long
	Local fire-stopping protection	
	Protection	Backing rod (item 5) was installed into the control joint at a depth of 16 mm from both exposed and unexposed faces of the wall. The sealant (item 4) was applied into the control joint to the depth of backing rod and finished flush with both the exposed & unexposed faces of wall. See Figure 1, Figure 2, Figure 3 and Figure 6 in Appendix A for more details.
Penetration system C		
C	Service	Control joint
	Service detail	Control joint located at the west side top of the plasterboard.
	Aperture size	20 mm wide × nominally 1000 mm long
	Local fire-stopping protection	
	Protection	The sealant (item 4) was applied into the control joint to the depth of plasterboard to steel framing and finished flush with both the exposed & unexposed faces of wall. See Figure 1, Figure 2, Figure 5 and Figure 6 in Appendix A for more details.
Penetration system D		
D	Service	Control joint
	Service detail	Control joint located at 300 mm away from the east side of the concrete block work.
	Aperture size	15 mm wide × nominally 1570 mm long
	Local fire-stopping protection	
	Protection	Backing rod (item 5) was installed into the control joint at a depth of 13mm from both exposed and unexposed faces of the wall. The sealant (item 4) was applied into the control joint to the depth of backing rod and finished flush with both the exposed & unexposed faces of wall. See Figure 1, Figure 2, Figure 5 and Figure 6 in Appendix A for more details.
Penetration system E		
E	Service	Control joint
	Service detail	Control joint located at the east side top of the plasterboard.
	Aperture size	20 mm wide × nominally 584 mm long
	Local fire-stopping protection	
	Protection	The sealant (item 4) was applied into the control joint to the depth of plasterboard to steel framing and finished flush with both the exposed & unexposed faces of wall. See Figure 1, Figure 2, Figure 4 and Figure 6 in Appendix A for more details.
Penetration system F		
F	Service	Control joint
	Service detail	Control joint located at the east side between the concrete block work and the plasterboard.
	Aperture size	13 mm wide × nominally 1570 mm long
	Local fire-stopping protection	

Item	Description	
	Protection	The sealant (item 4) was applied into the control joint to the depth of plasterboard to steel framing and finished flush with both the exposed & unexposed faces of wall. See Figure 1, Figure 2, Figure 5 and Figure 6 in Appendix A for more details.

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	4 October 2019
Start date for installation of fire-stopping protection for the control joints	14 October 2019
Completion date for constructing and installing the test specimen	6 November 2019
Separating element constructed by	Representatives of Jensen Hughes
Fire-stopping protection for control joints installed by	Representatives of the test sponsor
Symmetry	Symmetrical

3.0 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	+ The 2005 revision of AS 4072.1 has all testing requirements removed from it and placed in AS 1530.4-2005 however the reference in the construction code was not updated to reflect this and still erroneously calls for testing to be in accordance with AS 4072.1. To accommodate this oversight, reference is made to AS 4072.1-2005 AMDT 1 (Rec:2016). + Control joint E was only 584 mm long and thus did not meet the minimum length requirements of section 10 and as such, no FRL could be assigned.	
Pre-test conditioning	The construction and installation of the test specimen was completed on 5 November 2019. 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 Jensen Hughes.	
Ambient laboratory temperature	Start of the test	24 °C
	Minimum temperature	24 °C
	Maximum temperature	29 °C
Test duration	120 minutes	
Instrumentation and equipment	The instrumentation was provided in accordance with AS 1530.4:2014 as follows: + 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. + The unexposed side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads. + The thermocouple positions are shown in Table 10 and in Figure 7 in Appendix D. + A roving thermocouple was available to measure temperatures at positions that appeared hotter than the positions monitored by the fixed thermocouples. + Cotton pads were available during the test to assess the performance of the specimen under the criteria of integrity. + The furnace pressure was measured at approximately 50 mm above the mid-height of the vertical control joints. It was monitored using a differential pressure transmitter. + All electronic data was sampled at 5 second intervals.	

4.0 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.

Appendix D includes instrumentation details of the specimen.

Photographs of the specimen are included in Appendix F.

Table 8 Test results

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/120/90**
	Integrity	No failure at 120 minutes	
	Insulation	Failure at 99 minutes	
B	Structural adequacy	Not applicable	**-/120/90**
	Integrity	No failure at 120 minutes	
	Insulation	Failure at 91 minutes	
C	Structural adequacy	Not applicable	**-/90/90**
	Integrity	Failure at 109 minutes	
	Insulation	Failure at 97 minutes	
D	Structural adequacy	Not applicable	**-/90/60**
	Integrity	Failure at 90 minutes	
	Insulation	Failure at 68 minutes	
E	Structural adequacy	Not applicable	**NA**
	Integrity	No failure at 90 minutes	
	Insulation	Failure at 86 minutes	
F	Structural adequacy	Not applicable	**-/90/60**
	Integrity	No failure at 90 minutes	
	Insulation	Failure at 78 minutes	

NOTE: Control joint E did not meet the minimum length requirements of the standard so no FRL can be assigned

5.0 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 Jensen Hughes Fire Testing 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 leaders in the drawings represent the items listed in section 2.1. All measurements – unless indicated – are in millimetres.

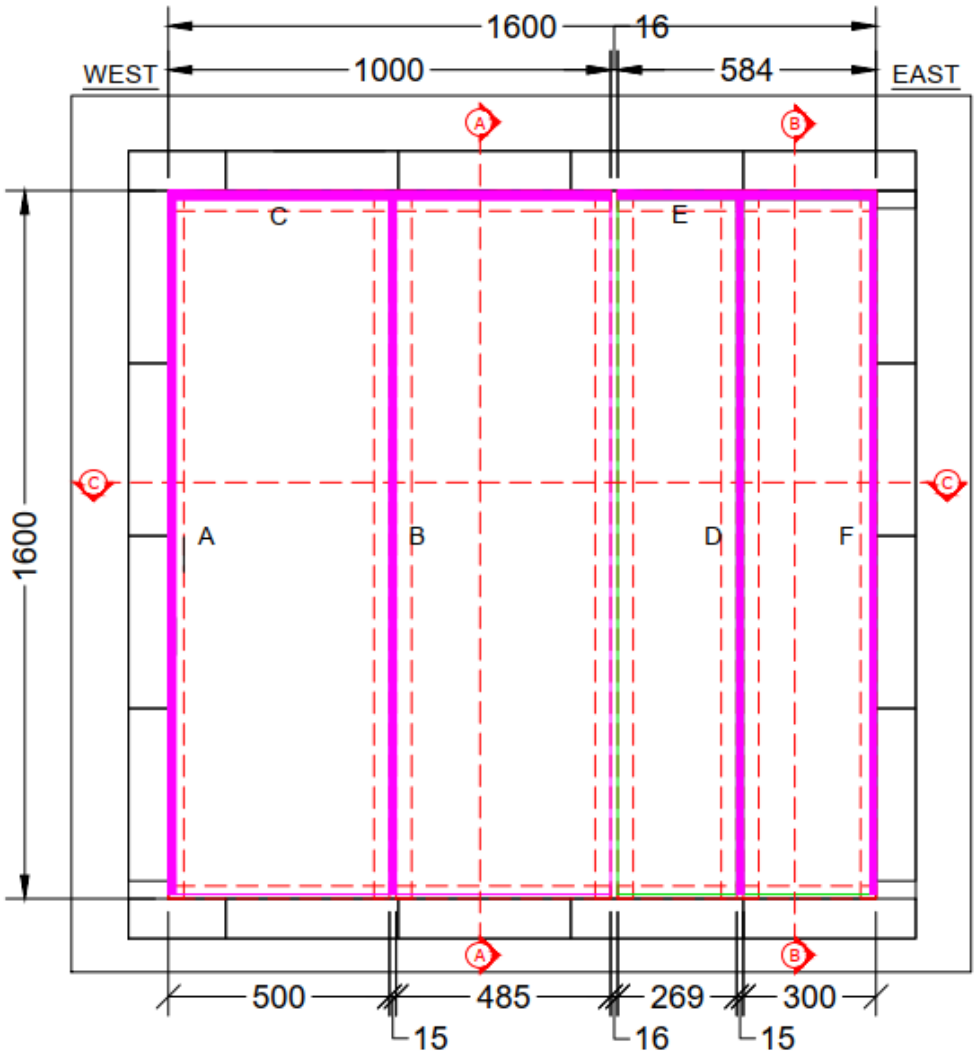


Figure 1 Elevation view of test specimen (unexposed side)

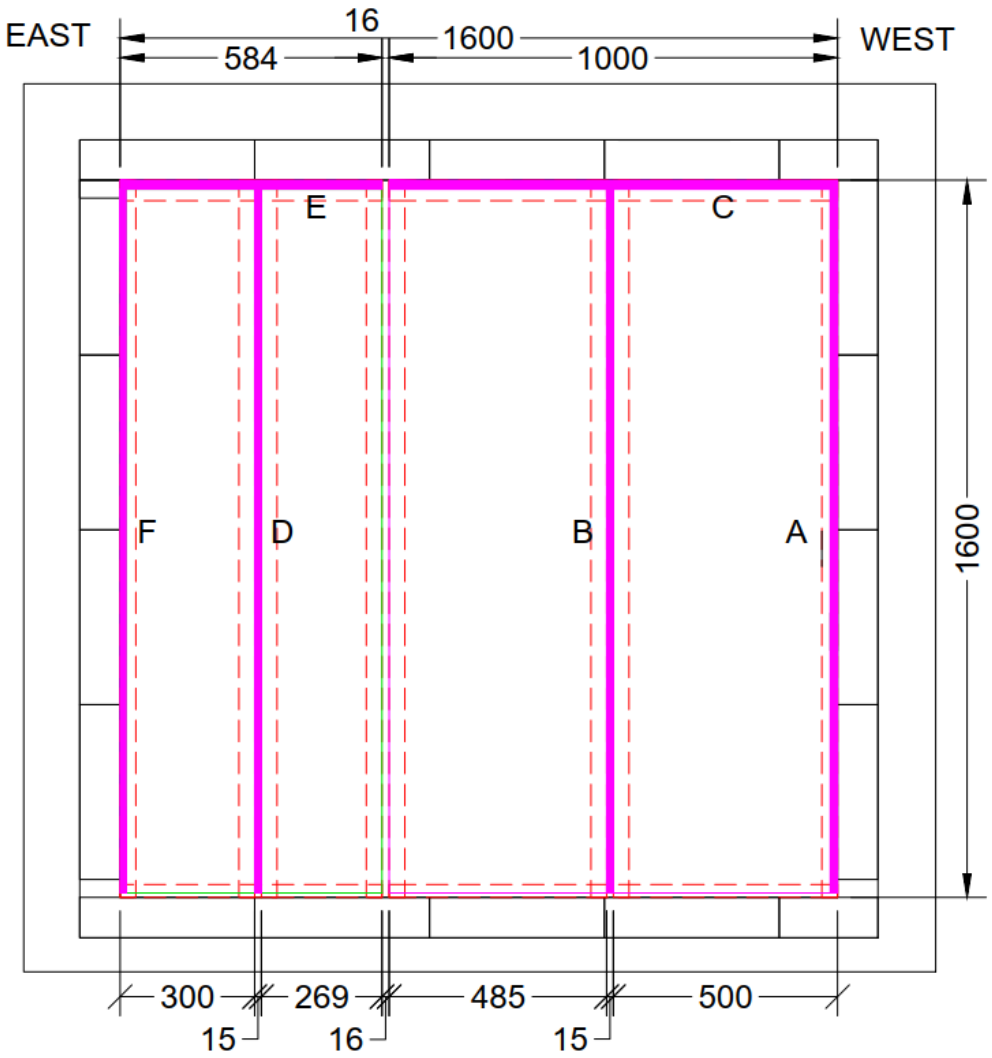


Figure 2 Elevation test specimen (exposed side)

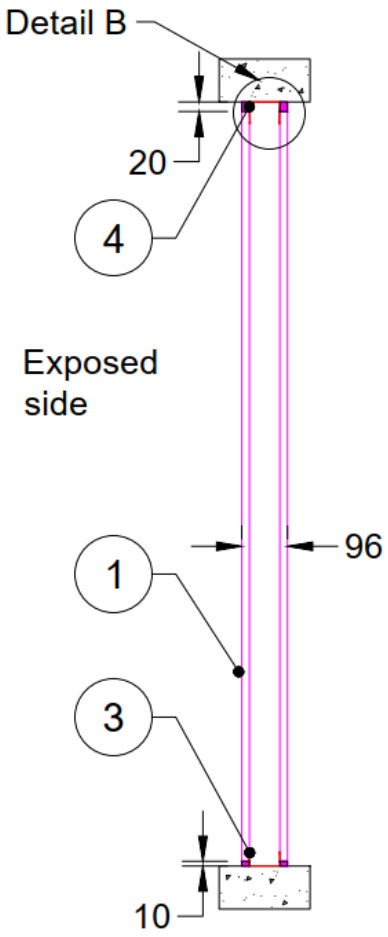


Figure 3 Cross-section A-A

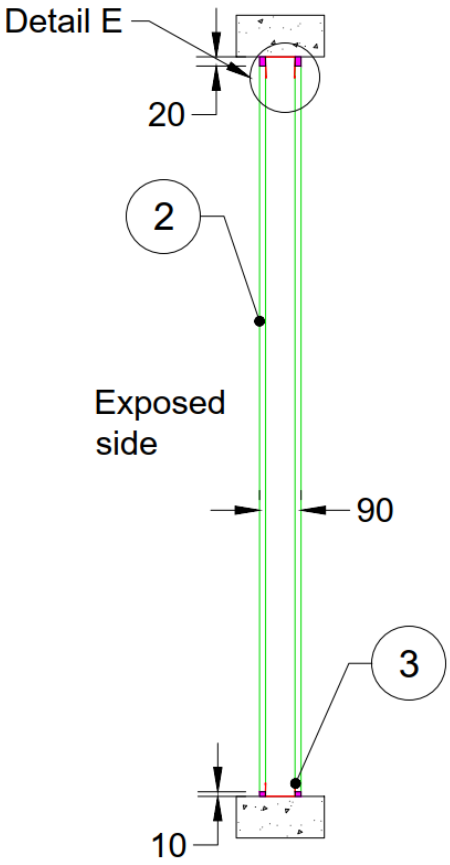


Figure 4 Cross-section B-B

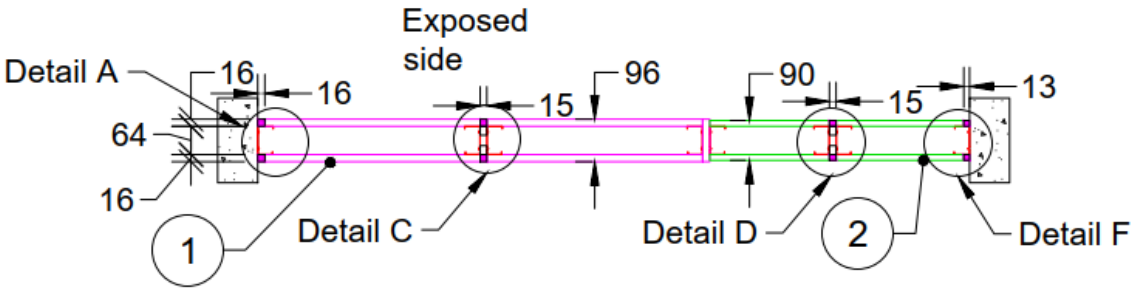


Figure 5 Cross-section C-C

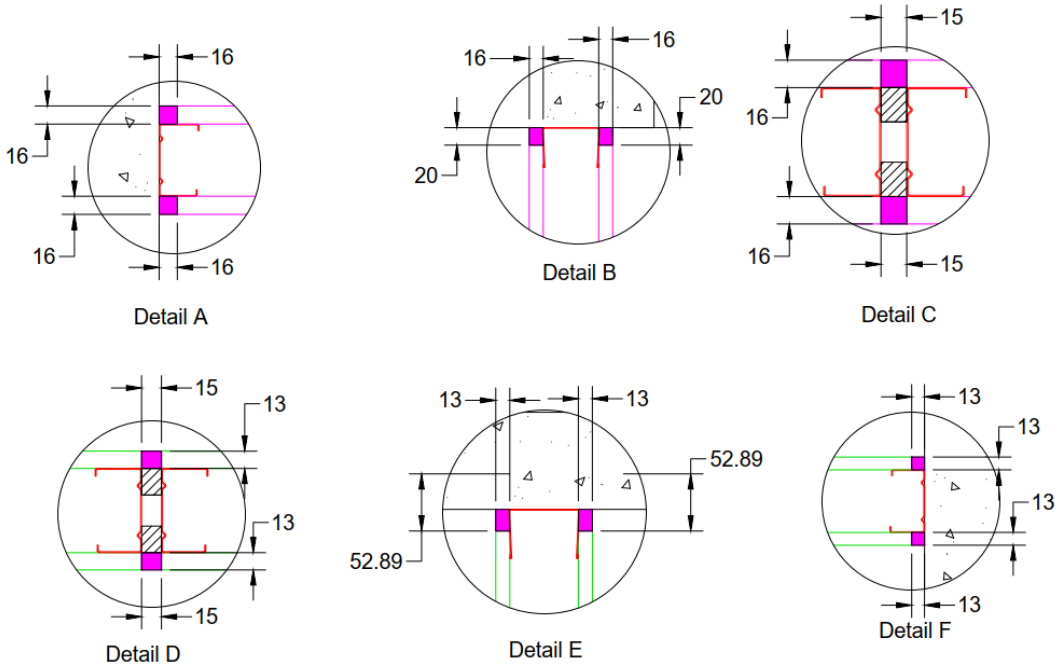


Figure 6 Detail view

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	
Penetration system A		
0	00	Fire resistance test started. The initial temperature of the test specimen was approximately 24 °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.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
99	**55**	**TC 018, on the plasterboard, 25 mm from control joint, recorded a temperature of 202°C.** **Failure of insulation in accordance with AS 1530.4:2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 018 exceeded the initial temperature by more than 180K.**
120	00	The test specimen continued to maintain integrity in accordance with AS 1530.4:2014.
		Test stopped.
Penetration system B		
0	00	Fire resistance test started. The initial temperature of the test specimen was approximately 24 °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.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
91	**00**	**TC 026, on the plasterboard, 125 mm above from the mid-height on the plasterboard, recorded a temperature of 205°C.** **Failure of insulation in accordance with AS 1530.4:2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 026 exceeded the initial temperature by more than 180K.**
103	27	Sealant had cracked and started discolouring along plasterboard interface with control joint.
117	35	A 30 second cotton pad test was carried out at the centre of the service, in accordance with Clause 2.13.2.2 of AS 1530.4:2014. No ignition of the cotton pad, so no failure.
120	00	The test specimen continued to maintain integrity in accordance with AS 1530.4:2014.
		Test stopped.
Penetration system C		
0	00	Fire resistance test started. The initial temperature of the test specimen was approximately 24 °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.

Time		Observation
Min	Sec	
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
75	17	Sealant had expanded in the control joint.
87	35	Plasterboard fixings had discoloured.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
97	**05**	**TC 036, on the plasterboard, 250 mm east from the mid-width on the plasterboard, recorded a temperature of 202°C.** **Failure of insulation in accordance with AS 1530.4:2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 036 exceeded the initial temperature by more than 180K.**
109	**25**	**Flaming for longer than 10 seconds at the top east side of the control joint.** **Failure of integrity in accordance with Clause 2.13.2.4 of AS 1530.4:2014, where flaming for more than 10 seconds on the unexposed side occurred.**
120	00	Test stopped.
Penetration system D		
0	00	Fire resistance test started. The initial temperature of the test specimen was approximately 24 °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.
68	**35**	**TC 045, on the plasterboard, 125 mm below from the mid-height on the plasterboard, recorded a temperature of 205°C.** **Failure of insulation in accordance with AS 1530.4:2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 045 exceeded the initial temperature by more than 180K.**
90	00	The test specimen continued to maintain integrity in accordance with AS 1530.4:2014.
91	00	Thermocouples removed.
94	00	Service covered with ceramic wool.
		Test stopped.
Penetration system E		
0	00	Fire resistance test started. The initial temperature of the test specimen was approximately 24 °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.
86	**30**	**TC 054, on the plasterboard, 250 mm west from the mid-width on the plasterboard, recorded a temperature of 202°C.** **Failure of insulation in accordance with AS 1530.4:2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 054 exceeded the initial temperature by more than 180K.**
90	00	The test specimen continued to maintain integrity in accordance with AS 1530.4:2014.
91	00	Thermocouples removed.

Time		Observation
Min	Sec	
94	00	Service covered with ceramic wool.
		Test stopped.
Penetration system F		
0	00	Fire resistance test started. The initial temperature of the test specimen was approximately 24 °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.
78	**05**	**TC 105, on the plasterboard, at mid-height , recorded a temperature of 203°C.** **Failure of insulation in accordance with AS 1530.4:2014 clause 2.13.3(b), where the maximum temperature of Thermocouple TC 105 exceeded the initial temperature by more than 180K.**
90	00	The test specimen continued to maintain integrity in accordance with AS 1530.4:2014.
91	00	Thermocouples removed.
94	00	Service covered with ceramic wool.
		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 and 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:

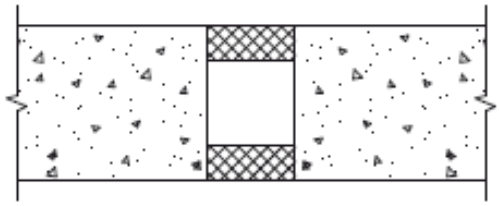
+ For elements manufactured from similar types of concrete or masonry, the results of the prototype test may be applied to materials of density within ±15% of the tested specimen. For greater variations, the opinion of a registered testing authority shall be obtained.
+ Test results obtained in conjunction 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

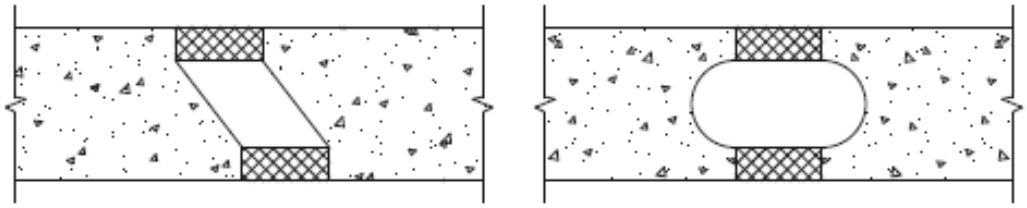
The following variations are permitted:

+ 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.



(a) Butt joint



(b) Contoured joints

LEGEND:

= Fire-separating element

= Fire-stopping material

FIGURE 10.12.6 CONTOURED CONTROL JOINTS

Appendix D Instrumentation locations

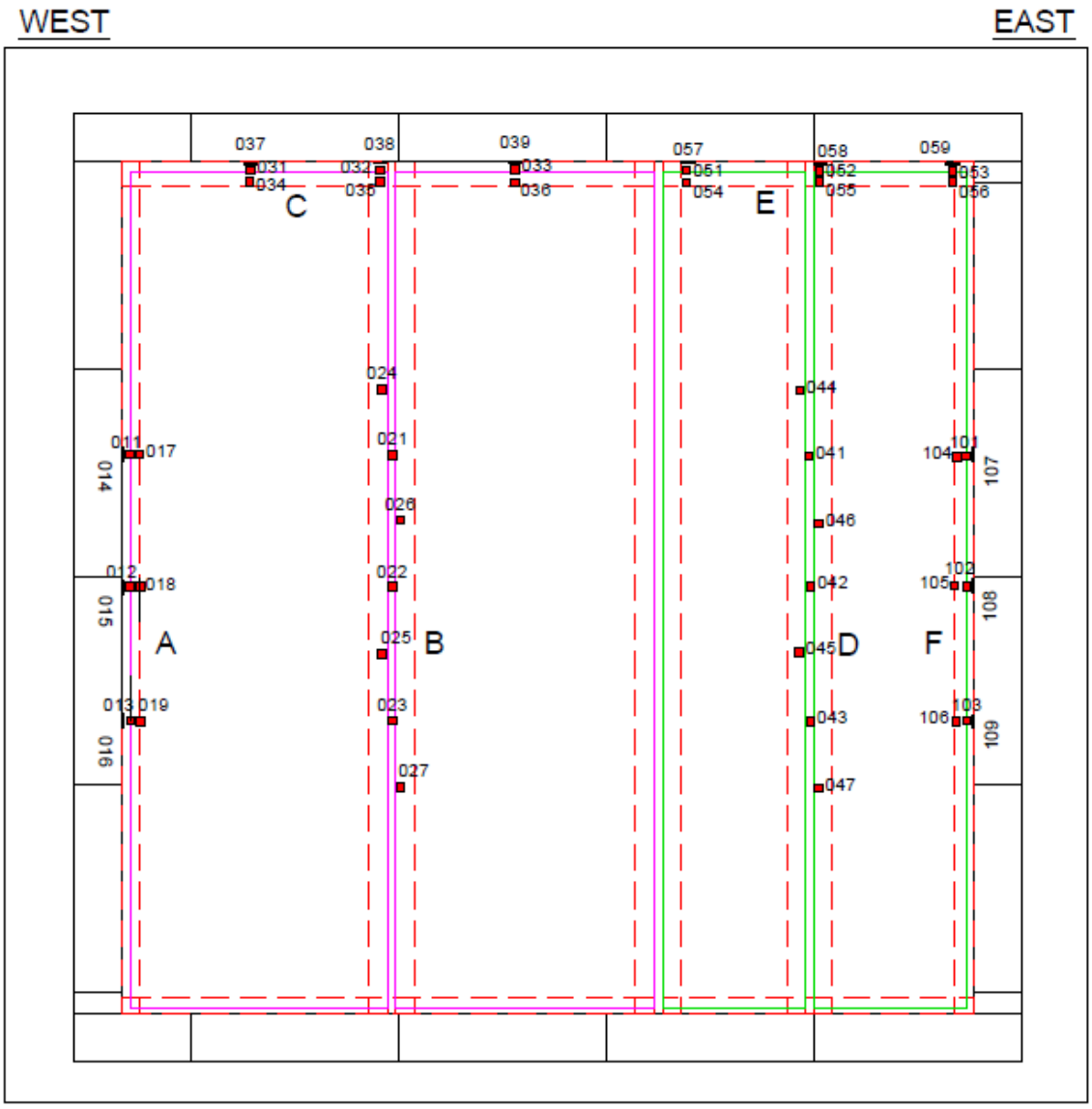


Figure 7 TC location of the control joints.

Table 10 Thermocouple locations

Control joint	TC No.	Description
A	011	On control joint, 250 mm above from the mid-height
	012	On control joint, at the mid-height
	013	On control joint, 250 mm below from the mid-height
	014	25 mm from control joint, 250 mm above from the mid-height on the concert block
	015	25 mm from control joint, on the mid-height
	016	25 mm from control joint, 250 mm below from the mid-height on the concert block
	017	25 mm from control joint, 250 mm above from the mid-height on the plasterboard
	018	25 mm from control joint, on the mid-height on the plasterboard
	019	25 mm from control joint, 250 mm below from the mid-height on the plasterboard
B	021	On control joint, 250 mm above from the mid-height
	022	On control joint, at the mid-height
	023	On control joint, 250 mm below from the mid-height
	024	25 mm from control joint, 375 mm above from the mid-height on the plasterboard
	025	25 mm from control joint, 125 mm below from the mid-height on the plasterboard
	026	25 mm from control joint, 125 mm above from the mid-height on the plasterboard
	027	25 mm from control joint, 375 mm below from the mid-height on the plasterboard
C	031	On control joint, 250 mm west from the mid-width
	032	On control joint, at the mid-width
	033	On control joint, 250 mm east from the mid-width
	034	25 mm from control joint, 250 mm west from the mid-width on the plasterboard
	035	25 mm from control joint, on the mid-width
	036	25 mm from control joint, 250 mm east from the mid-width on the plasterboard
	037	25 mm from control joint, 250 mm west from the mid-width on the concert block
	038	25 mm from control joint, on the mid-height
	039	25 mm from control joint, 250 mm east from the mid-width on the concert block
D	041	On control joint, 250 mm above from the mid-height
	042	On control joint, at the mid-height
	043	On control joint, 250 mm below from the mid-height
	044	25 mm from control joint, 375 mm above from the mid-height on the plasterboard
	045	25 mm from control joint, 125 mm below from the mid-height on the plasterboard
	046	25 mm from control joint, 125 mm above from the mid-height on the plasterboard
	047	25 mm from control joint, 375 mm below from the mid-height on the plasterboard
E	051	On control joint, 250 mm west from the mid-width
	052	On control joint, at the mid-width
	053	On control joint, 250 mm east from the mid-width
	054	25 mm from control joint, 250 mm west from the mid-width on the plasterboard

Control joint	TC No.	Description
	055	25 mm from control joint, on the mid-width
	056	25 mm from control joint, 250 mm east from the mid-width on the plasterboard
	057	25 mm from control joint, 250 mm west from the mid-width on the concrete block
	058	25 mm from control joint, on the mid-height
	059	25 mm from control joint, 250 mm east from the mid-width on the concrete block
F	101	On control joint, 250 mm above from the mid-height
	102	On control joint, at the mid-height
	103	On control joint, 250 mm below from the mid-height
	104	25 mm from control joint, 250 mm above from the mid-height on the plasterboard
	105	25 mm from control joint, on the mid-height
	106	25 mm from control joint, 250 mm below from the mid-height on the plasterboard
	107	25 mm from control joint, 250 mm above from the mid-height on the concrete block
	108	25 mm from control joint, on the mid-height
	109	25 mm from control joint, 250 mm below from the mid-height on the concrete block

Appendix E Test data

E.1 Furnace temperature and severity

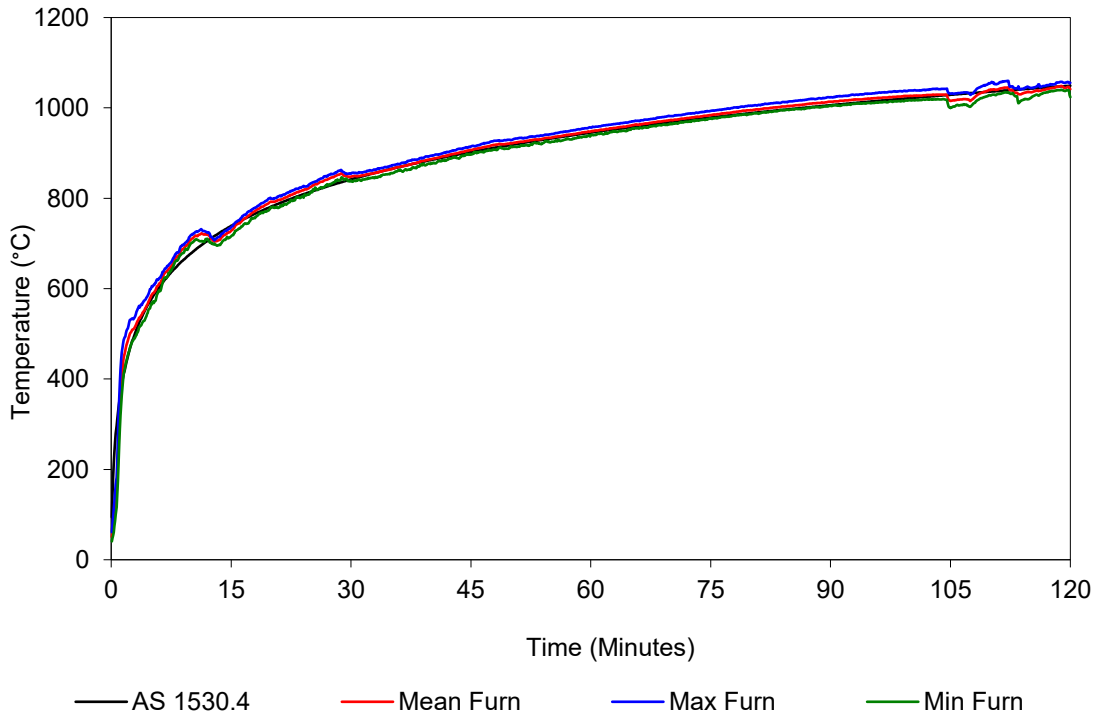


Figure 8 Furnace thermocouple temperature vs time

E.2 Furnace pressure

The furnace pressure was measured 50 mm above the mid-height of the vertical control joints.

Table 11 Furnace pressure

Time (minutes)	Average pressure (Pa)	Time (minutes)	Average pressure (Pa)	Time (minutes)	Average pressure (Pa)
5-10	17	45-50	15	85-90	17
10-15	16	50-55	15	90-95	17
15-20	16	55-60	16	95-100	18
20-25	15	60-65	16	100-105	18
25-30	17	65-70	17	105-110	18
30-35	16	70-75	17	110-115	17
35-40	16	75-80	18	115-120	14
40-45	18	80-85	17		

E.3 Specimen temperatures

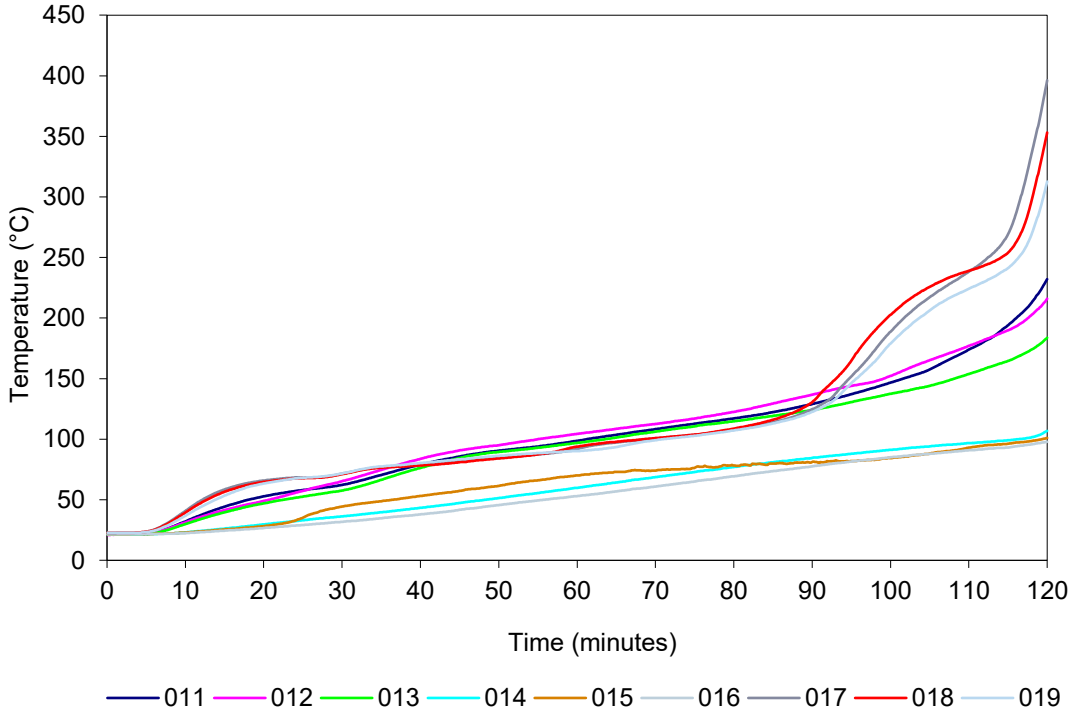


Figure 9 Penetration system A – temperature vs time

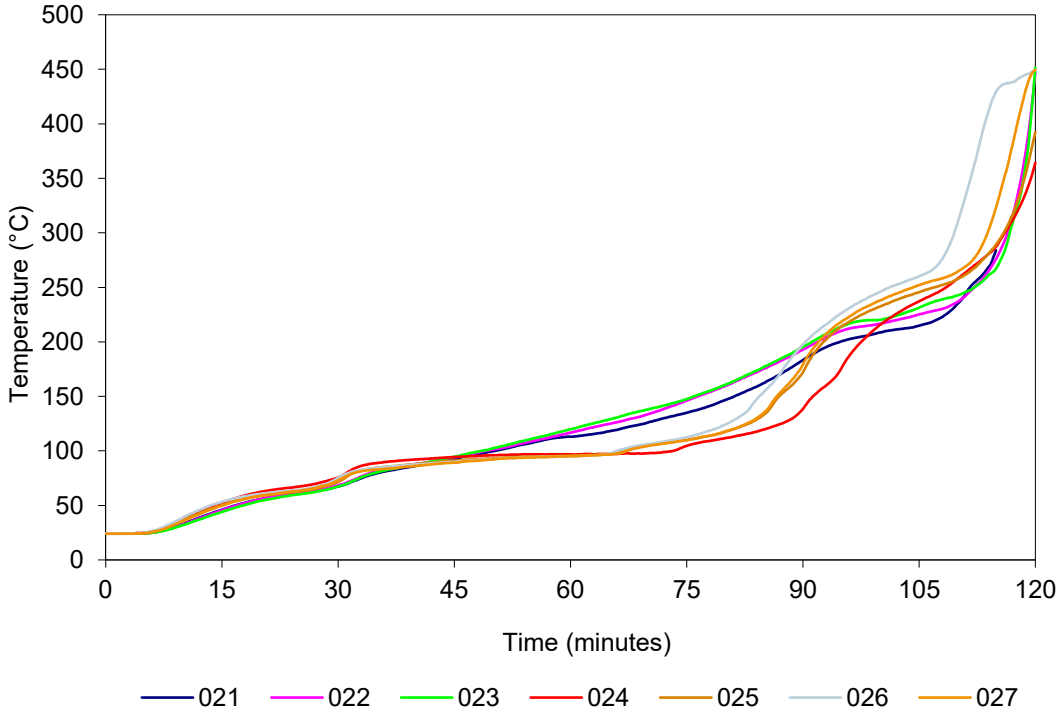


Figure 10 Penetration system B – temperature vs time

Note: TC021 detached at 115 minutes during the test.

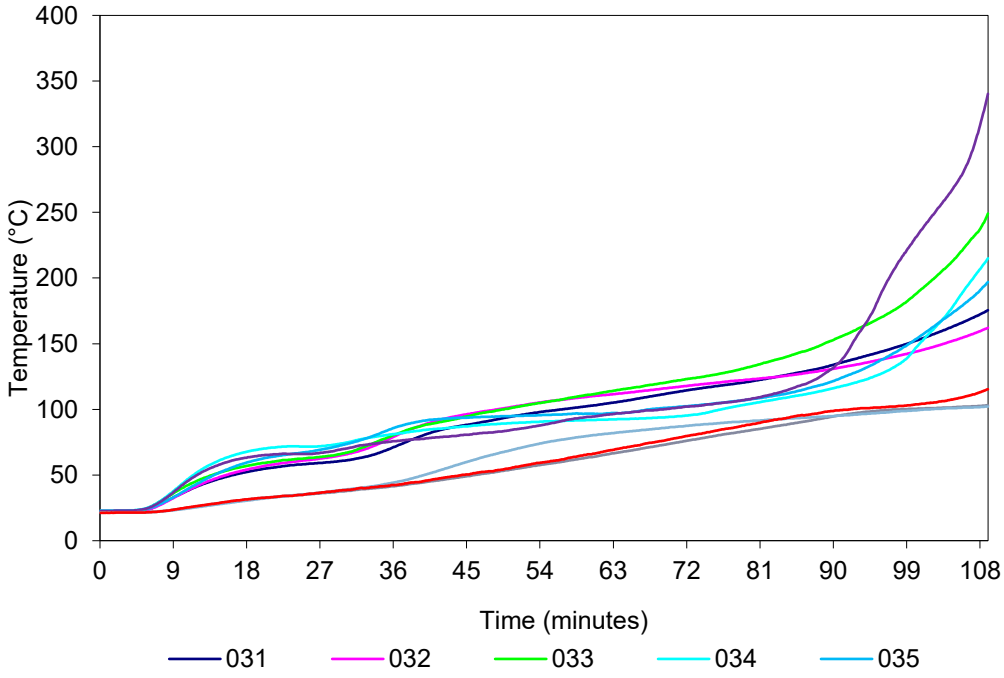


Figure 11 Penetration system C – temperature vs time

Note: Test discontinued at 109 minutes and 25 seconds.

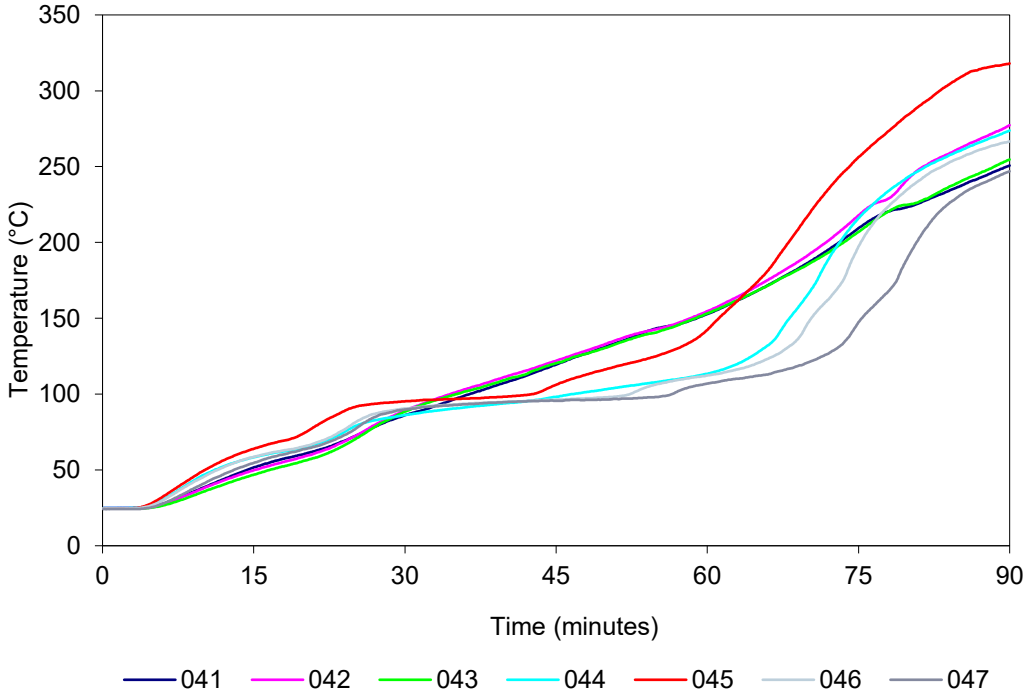


Figure 12 Penetration system D – temperature vs time

Note: Thermocouples were removed at 91 minutes

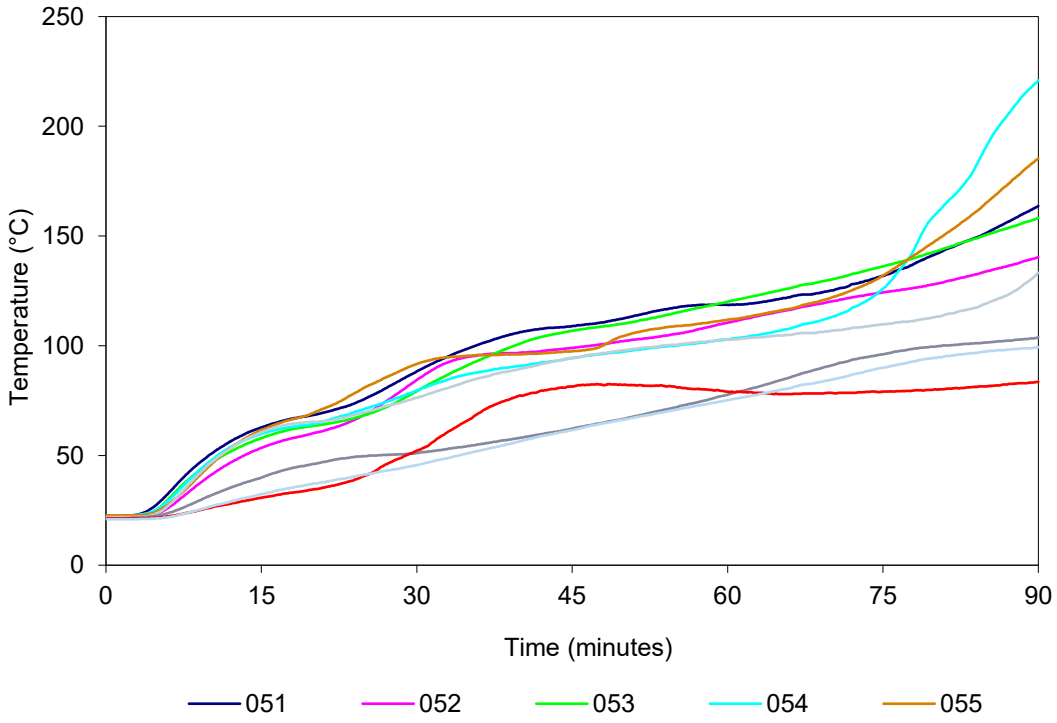


Figure 13 Penetration system E – temperature vs time

Note: Thermocouples were removed at 91 minutes

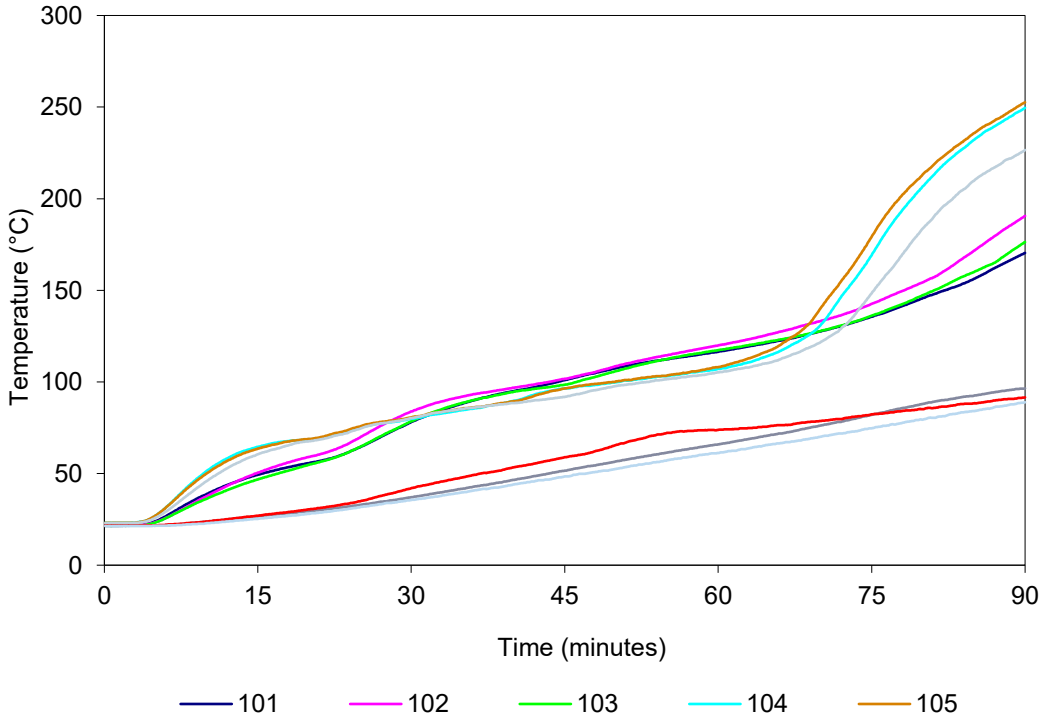


Figure 14 Penetration system F – temperature vs time

Note: Thermocouples were removed at 91 minutes

Table 12 Test specimen temperatures

Control joint	TC No.	Description[1]	Temp (°C) at t (minutes)					Limit[2] (minutes)
			t=0	t=30	t=60	t=90	t=120	
A	011	On control joint	21	62	98	129	229	116
	012	On control joint	21	65	104	136	213	117
	013	On control joint	21	57	97	124	182	-
	014	25 mm from the control joint	21	36	60	84	106	-
	015	25 mm from the control joint	22	44	70	81	101	-
	016	25 mm from the control joint	21	32	53	77	98	-
	017	25 mm from the control joint	23	71	92	124	385	102
	018	25 mm from the control joint	23	71	94	130	343	99
	019	25 mm from the control joint	23	71	90	122	304	104
B	021	On control joint	24	67	113	182	#	97
	022	On control joint	24	68	116	192	425	93
	023	On control joint	24	67	119	194	423	92
	024	25 mm from the control joint	24	75	97	137	356	98
	025	25 mm from the control joint	24	71	96	170	382	93
	026	25 mm from the control joint	24	74	95	196	448	91
	027	25 mm from the control joint	24	72	95	176	447	92
C	031	On control joint	21	61	102	134	#	#
	032	On control joint	22	65	110	131	#	#
	033	On control joint	22	66	111	152	#	102
	034	25 mm from the control joint	23	74	92	116	#	107
	035	25 mm from the control joint	23	73	97	121	#	109
	036	25 mm from the control joint	23	70	94	131	#	97
	037	25 mm from the control joint	21	38	63	94	#	-
	038	25 mm from the control joint	21	39	80	95	#	-
	039	25 mm from the control joint	21	38	66	99	#	-
D	041	On control joint	25	86	152	250	#	74
	042	On control joint	25	88	154	276	#	72
	043	On control joint	25	88	153	254	#	74
	044	25 mm from the control joint	25	86	113	273	#	73
	045	25 mm from the control joint	25	95	141	318	#	68
	046	25 mm from the control joint	25	90	112	266	#	75
	047	25 mm from the control joint	24	90	107	246	#	81
E	051	On control joint	22	88	119	163	#	-
	052	On control joint	22	84	110	140	#	-
	053	On control joint	21	79	120	158	#	-
	054	25 mm from the control joint	23	79	103	220	#	86

Control joint	TC No.	Description[1]	Temp (°C) at t (minutes)					Limit[2] (minutes)
			t=0	t=30	t=60	t=90	t=120	
	055	25 mm from the control joint	23	91	112	184	#	-
	056	25 mm from the control joint	22	76	103	132	#	-
	057	25 mm from the control joint	21	51	77	104	#	-
	058	25 mm from the control joint	21	52	79	83	#	-
	059	25 mm from the control joint	21	45	75	99	#	-
F	101	On control joint	22	78	116	170	#	-
	102	On control joint	22	83	120	190	#	-
	103	On control joint	22	78	117	176	#	-
	104	25 mm from the control joint	23	80	107	249	#	79
	105	25 mm from the control joint	23	80	108	252	#	78
	106	25 mm from the control joint	23	80	105	226	#	83
	107	25 mm from the control joint	21	37	66	96	#	-
	108	25 mm from the control joint	22	42	74	91	#	-
	109	25 mm from the control joint	21	35	61	89	#	-

1 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.

2 Refer to Table 10 for the locations of thermocouples as only a generic description is included in the table.

3 No insulation failure before thermocouple malfunction.

\# Thermocouple malfunction.

* Integrity failure of the control joints.

‘ – ’ 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

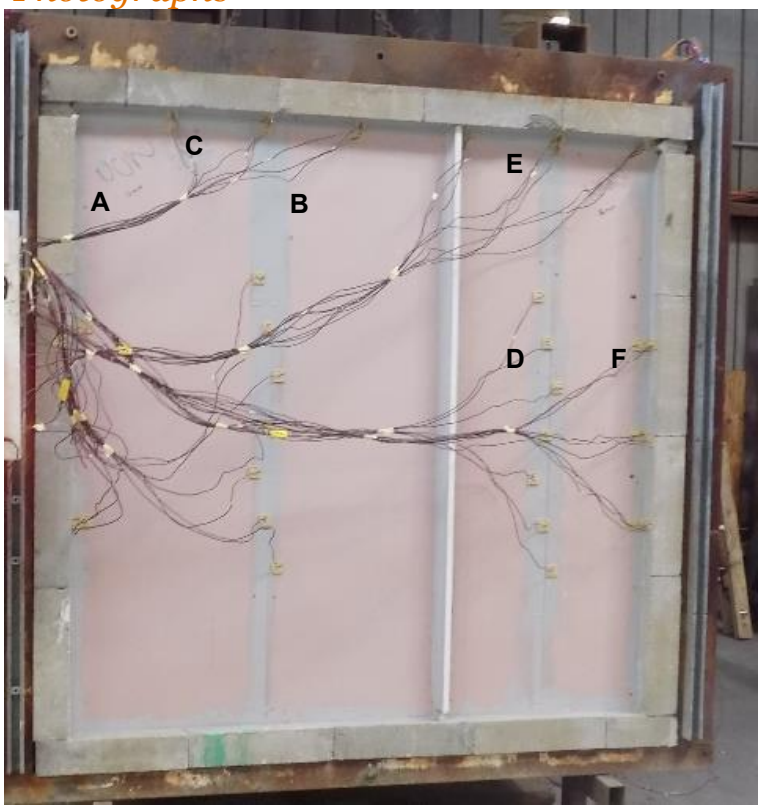


Figure 15 Unexposed face of the specimen before the start of the test

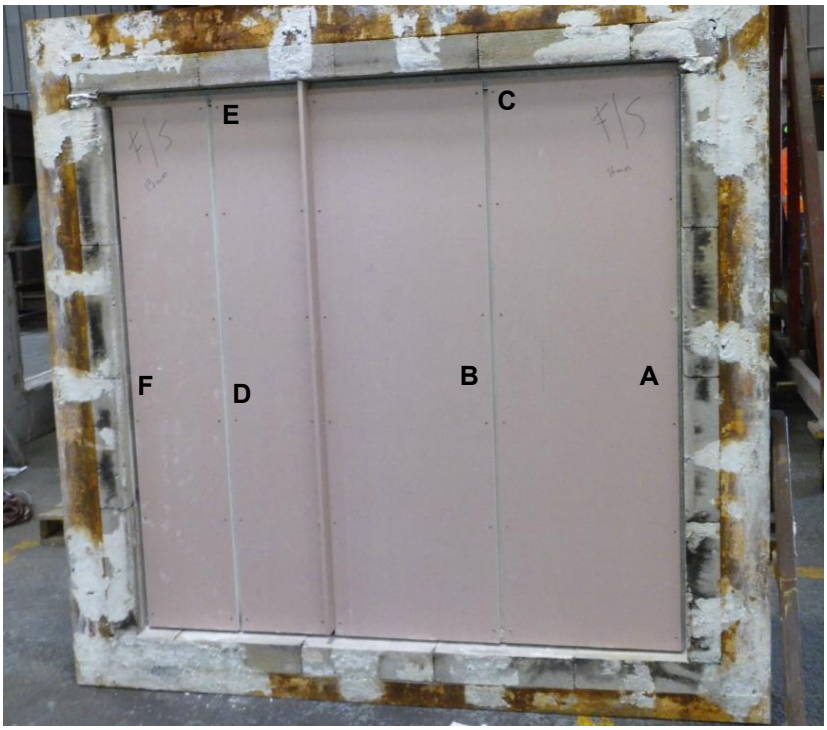


Figure 16 Exposed face of the specimen before the start of the test

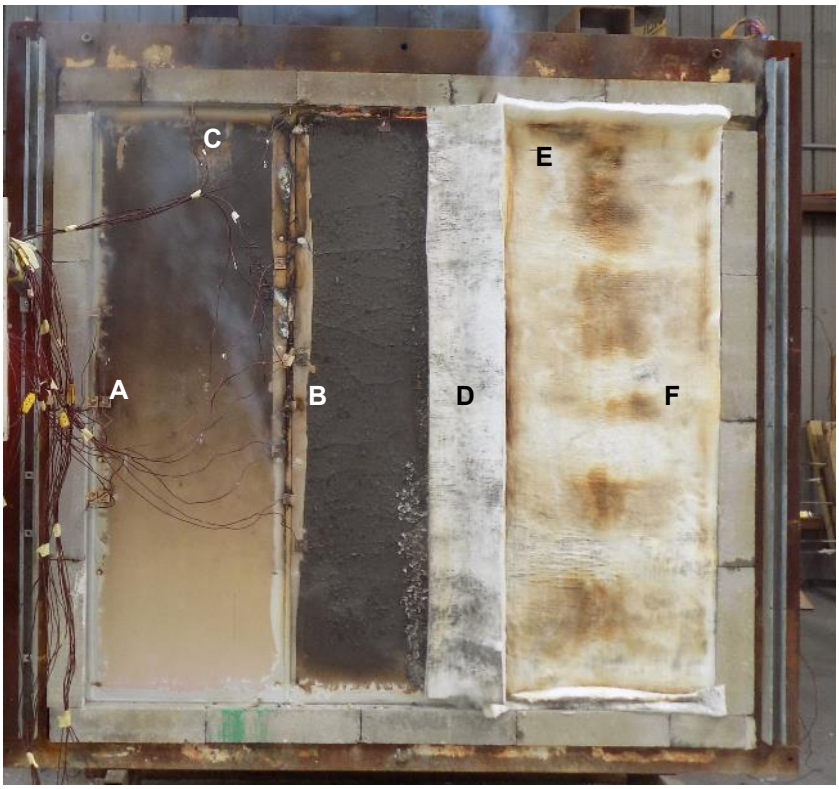


Figure 17 Unexposed face of the specimen at the end of the test

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

JENSEN HUGHES

Jensen Hughes Fire Testing Pty Ltd
ABN 81 050 241 524

Melbourne – NATA accredited laboratory

409-411 Hammond Road
Dandenong South Vic 3175
Australia
T: +61 3 9767 1000