JENSEN HUGHES

FIRE ASSESSMENT REPORT

BOSS FireStrip-ALX linear gap seals in accordance with AS 1530.4:2014 and AS 4072.1:2005

Sponsor: Boss Products (Australia) Pty Ltd

Report number: FAS190039 Revision: R3.0

Issued date: 13 November 2025 Expiry date: 30 April 2030

Quality management

Revision	Date	Revision Description		
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		Prepared	**Reviewed**	**Authorised**
		Sina Soylu	Omar Saad	Omar Saad
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		Prepared	**Reviewed**	**Authorised**
		Pius Jerome	Omar Saad	Omar Saad
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		Omar Saad	Alim Rasel	Alim Rasel

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 assessment undertaken to determine the fire resistance level (FRL) of various linear gaps protected with BOSS FireStrip-ALX linear gap seals, which consist of graphite based intumescent strips and elastomeric foam in accordance with AS 1530.4:2014 and AS 4072.1:2005.

The analysis in section 5.0 and section 6.0 of this report found that the proposed systems together with the described variations were capable of achieving the outcomes as shown in Table 2 and Table 3 in accordance with AS 1530.4:2014 and AS 4072.1: 2005.

Table 1 Overview of variations and assessment outcome

No	Variation	Test standard	Reference test	Evidence of suitability	Governing requirements	FRL
1.	+ Assessment of the applicability of test results in accordance with AS 1530.4:2014 and AS 4072.1- 2005 + The length of the linear gap exposed to the furnace chamber in the referred tests were 900 mm instead of 1000 mm as per AS 1530.4:2014 + System assessed with normal weight concrete	If the test is to a recognised overseas test standard – the only variation is the version of the standard	WF 148052	A5G3(1)(d)	S1C2(b)	As per Table 2
2.			WF 160399			
3.			WF 157402			As per Table 3

Table 2 Assessment outcomes – System A

Joint	Ref. test	Max. gap width (mm)	Floor/ wall separating element details			Local fire protection	FRL
			Type	Min. Density (kg/m^3)	Min. thickness (mm)		
B1	WF 148052	25	Autoclaved aerated concrete floor or normal weight concrete	670	250	BOSS FireStrip-ALX, minimum depth of 12mm	-/120/-
B2		50				BOSS FireStrip-ALX, minimum depth of 25 mm	-/30/-
B3		150				BOSS FireStrip-ALX, minimum depth of 100 mm	-/120/120
C2	WF 160399	35	Autoclaved aerated concrete floor or normal weight concrete			BOSS FireStrip-ALX, minimum depth of 20 mm	-/240/60
C3		50				BOSS FireStrip-ALX, minimum depth of 25 mm	-/240/-
C4		75				BOSS FireStrip-ALX, minimum depth of 50 mm	-/240/60
F1	WF 148052	25	Autoclaved aerated concrete wall or normal weight concrete			BOSS FireStrip-ALX, minimum depth of 12mm	-/120/-
F2		50				BOSS FireStrip-ALX, minimum depth of 25 mm	-/90/90
F3		150				BOSS FireStrip-ALX, minimum depth of 100 mm	-/120/120
G2	WF 160399	35	Autoclaved aerated concrete wall or normal weight concrete			BOSS FireStrip-ALX, minimum depth of 20 mm	-/180/60
G3		50				BOSS FireStrip-ALX, minimum depth of 25 mm	-/60/30
G4		75				BOSS FireStrip-ALX, minimum depth of 50 mm	-/240/90

Table 3 Assessment outcomes – System B

Joint	Ref. test	Max. gap width (mm)	Floor/ wall separating element details			Local fire protection	FRL
			Type	Min. Density (kg/m^3)	Min. thickness (mm)		
D1	WF 157402	10	Autoclaved aerated concrete floor or normal weight concrete	670	250	BOSS FireStrip-ALX, minimum depth of 12mm	-/120/30
D3		50				BOSS FireStrip-ALX, minimum depth of 25mm	-/60/-
D4		100				BOSS FireStrip-ALX, minimum depth of 100mm	-/120/60
H1		10	Autoclaved aerated concrete wall or normal weight concrete			BOSS FireStrip-ALX, minimum depth of 12mm	-/60/60
H2		25				BOSS FireStrip-ALX, minimum depth of 12mm	-/60/-
H3		50				BOSS FireStrip-ALX, minimum depth of 25 mm	-/30/-
H4		100				BOSS FireStrip-ALX, minimum depth of 100 mm	-/120/120

Contents

1.0 Introduction

This report documents the findings of the assessment undertaken to determine the fire resistance level (FRL) of various linear gaps protected with BOSS FireStrip-ALX linear gap seals, which consist of graphite based intumescent strips and elastomeric foam in accordance with AS 1530.4:20142 and AS 4072.1:20053.

It has been confirmed by the sealant manufacturer, FSi Limited (previously known as Firestopit Limited), that the chemical composition and manufacturing process of the products referenced in the test reports have not changed since the date of the test. The sealants are identified as BOSS FireStrip-ALX in Australia.

BOSS Products (Australia) Pty Ltd declares that they have obtained the approval from other test sponsors to use their report in this assessment as per the email correspondence dated 24 September 2019 between the client, Ben Peach of FSi Limited and Omar Saad of Jensen Hughes.

This report may be used as evidence of suitability in accordance with the requirements of the relevant National Construction Code (NCC) to support the use of the material, product, form of construction or design as given within the scope of this assessment report. It also references test evidence for meeting deemed-to-satisfy (DTS) provisions of the NCC that apply to the assessed systems.
This assessment was carried out at the request of Boss Products (Australia) Pty Ltd. The sponsor details are included in Table 4.

Table 4 Sponsor details

Sponsor	Address
BOSS Products (Australia) Pty Ltd	Unit 1, 16 Atkinson Rd, Taren Point NSW 2229

2.0 Framework for the assessment

2.1 Assessment approach

An assessment is a professional opinion about the expected performance of a component or element of structure subjected to a fire test.

No specific framework, methodology, standard or guidance documents exists in Australia for undertaking these assessments. We have therefore followed the ‘Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence’ prepared by the Passive Fire Protection Forum (PFPF) in the UK in 2021[4].

This guide provides a framework for undertaking assessments in the absence of specific fire test results. Some areas where assessments may be offered are:

- Where a modification is made to a construction which has already been tested
- The interpolation or extrapolation of results of a series of fire resistance tests, or utilisation of a series of fire test results to evaluate a range of variables in a construction design or a product

[2] Standards Australia, 2014, Methods for fire tests on building materials, components and structures – Part 4: Fire-resistance tests for elements of construction, AS 1530.4:2014, Standards Australia, NSW.
[3] Standards Australia, 2005, Components for the protection of openings in fire-resistant separating elements: Service penetrations and control joints, AS 4072.1:2005, Standards Australia, NSW.
[4] Passive Fire Protection Forum (PFPF), 2021, Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence, Passive Fire Protection Forum (PFPF), UK.

- Where, for various reasons – e.g. size or configuration – it is not possible to subject a construction or a product to a fire test.

Assessments can vary from relatively simple judgements on small changes to a product or construction through to detailed and often complex engineering assessments of large or sophisticated constructions.

This assessment uses established empirical methods and our experience of fire testing similar products to extend the scope of application by determining the limits for the design and performance based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance of the elements in accordance with AS 1530.4:2014.

This assessment has been written in accordance with the general principles outlined in EN 15725:20235 for extended application on the fire performance of construction products and building elements: Principle of EXAP standards and EXAP reports.

This assessment has been written using appropriate test evidence generated at accredited laboratories to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturer's stated design.

2.2 Compliance with the National Construction Code

This report has been prepared to meet the evidence of suitability requirements of the NCC 2022[6] under A5G3(1)(d). It references test evidence for meeting deemed-to-satisfy (DTS) provisions of the NCC under A5G5 for FRLs that apply to the assessed systems; the FRL was determined in accordance with Specifications 1 and 2 for fire resistance for building elements.
The details and systems (building elements) in this report are confirmed to be:

- Assessed on the basis that the tests referenced are equivalent or more severe without the assistance of an active fire suppression system than the standard fire test AS 1530.4:2014 referenced in section 0, in accordance with NCC 2022 S1C2(b) and / or
- The differences in the proposed systems and details compared to the tested prototypes are considered minor in accordance with NCC 2022 S1C2(c).

This assessment report may also be used to demonstrate compliance with the requirements for evidence of suitability under the relevant sections of previous versions of the NCC.

2.3 Declaration

The 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal on 11 October 2024, Boss Products (Australia) Pty Ltd confirmed that:

- To their knowledge, the variations to the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the standard against which this assessment is being made.

[5] European Committee for Standardization, 2023, Extended application on the fire performance of construction products and building elements: Principle of EXAP standards and EXAP reports, EN 15725:2023, European Committee for Standardization, Brussels, Belgium
[6] National Construction Code Volumes One and Two - Building Code of Australia 2022, Australian Building Codes Board, Australia

- They agree to withdraw this assessment from circulation if the component or element of structure is the subject of a fire test by a test authority in accordance with the standard against which this assessment is being made and the results are not in agreement with this assessment.
- They are not aware of any information that could adversely affect the conclusions of this assessment and – if they subsequently become aware of any such information – they agree to ask the assessing authority to withdraw the assessment.

3.0 Requirements and limitations of this assessment

- The scope of this report is limited to an assessment of the variations to the tested systems described in section 4.3.
- This report details the methods of construction, test conditions and assessed results in accordance with AS 1530.4:2014.
- This assessment applies to floor systems exposed to fire from below in accordance with the requirements of AS 1530.4:2014 where horizontal elements must be exposed to heat from the underside only
- This assessment applies to wall systems exposed to fire from each side/one side in accordance with the requirements of AS 1530.4:2014, where vertical elements must be exposed to heat from the direction required to resist fire exposure.
- This assessment report has been prepared based on the fire resistance performance and condition of the products/systems at the time they were tested. Any deterioration of fire resistance performance due to external factors including but not limited to passage of time and exposure to elements – is not considered in this report.
- Jensen Hughes has provided this report on the fire performance of building elements in a controlled laboratory setting, strictly within the parameters allowed by the test standards and building regulations. The outcomes of this report are intended to assist in verifying the suitability of the product or system for practical use in specific applications.
- This report is only valid for the assessed systems and must not be used for any other purpose. Any changes with respect to size, construction details, loads, stresses, edge or end conditions – other than those identified in this report – may invalidate the findings of this assessment. If there are changes to the system, a reassessment will need to be done by an Accredited Testing Laboratory (ATL) that is accredited to the same nominated standards of this report.
- This report has been prepared using information provided by others. Jensen Hughes has not verified the accuracy and/or completeness of that information and will not be responsible for any errors or omissions that may have been incorporated into this report as a result.
- This assessment is based on the proposed systems being constructed under comprehensive quality control practices and following appropriate industry regulations and Australian Standards on quality of materials, design of structures, guidance on workmanship and expert handling, placing and finishing of the products on site. These variables are beyond the control and consideration of this report.
- The separating element to be designed in accordance with the relevant standards to achieve the minimum FRL to match the required FRL of the control joint in accordance with AS 1530.4:2014.

- Furthermore, when used in practical applications, the FRL of the proposed linear gaps are limited by the insulation performance rating of the separating element. The separating element shall have an FRL determined in accordance with AS1530.4:2014 .

4.0 Description of the specimen and variations

4.1 Description of assessed systems

Fire test report WF 148052, WF 157402 and WF 160399 consisted of various linear gaps within 250 mm thick autoclaved aerated concrete floor slabs/ blockwork walls.

4.2 Referenced test data

The assessment of the variation to the tested systems and the determination of the performance are based on the results of the fire tests documented in the reports summarised in Table 5. Further details of the tested systems are included in Appendix A.

Table 5 Referenced test data

Report number	Test sponsor	Test date	Testing authority
WF 148052	Firestopit Limited	20/09/2005	Bodycote Warringtonfire Global Safety (UK)
WF 157402	Firestopit Limited	17/10/2006	
WF 160399	Firestopit Limited	15/02/2007	

4.3 Variations to the tested systems

The tested systems and variations to those tested systems – together with the referenced standard fire tests – are described in Table 6.

Table 6 Variations to tested systems

Item	Reference test	Description	Variations
System A	WF 148052 and WF 160399 Tested to BS 476: Part 20: 1987 and prEN 1366-4	The separating elements were: + 250 mm thick aerated concrete wall + 250 mm thick aerated concrete floor slab.	1. Assessment of the applicability of test results in accordance with AS 1530.4:2014 and AS 4072.1-2005. 2. The length of the linear gap exposed to the furnace chamber in the referred tests were 900 mm instead of 1000 mm as per AS 1530.4:2014 3. System assessed with normal weight concrete
System B	WF 157402 Tested to BS EN 1363 - 1:19997 and prEN 1366-4	The separating elements were: + 250 mm thick aerated concrete wall + 250 mm thick aerated concrete floor slab.	

The assessments presented in this report do not address any variations with respect to the linear gap width and sealant material depth of the proposed systems. As described in Table 7, only the

[7] British Standards Institute (1999) Fire resistance tests, General requirements, BS EN 1363.1:1999

applicability of the test results with variations as outlined in Table 6 are assessed in accordance with AS 1530.4:2014 and AS 4072.1:2005.

4.4 Reference standard

Section 2 of AS 1530.4:2014 specify the general requirements for conducting fire resistance tests and section 10 of the standard specifies the guidelines for determining the fire resistance of elements of construction penetrated by services such as linear gaps.

AS 4072.1:2005 sets out the minimum requirements for the construction, installation and application of fire resistance tests to sealing systems. These include linear gaps between building elements that are required to have a FRL.

4.5 Schedule of components

Table 7 outlines the schedule of components for the assessed systems. We have based this schedule of component from the reference test report shown in Table 5.

Table 7 Schedule of components of assessed systems

Item		Description
1.	**Name**	Separating floor lintels/slabs
	Material	Autoclaved aerated concrete lintel
	Density	670 kg/m3
	Thickness	250 mm
2.	**Name**	Separating wall blockwork
	Material	Autoclaved aerated concrete lintel
	Density	670 kg/m3
	Thickness	250 mm
Floor linear gap system B1 – Refer to Figure 1 and Figure 2 for details		
B1	**Joint width**	25 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS20/2
	Material	Compressible linear gap seal consisting of alternating layers of two, 3 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	29 mm
	Fixing method	Friction fitted within the cavity on the unexposed side of the separating element
Floor linear gap system B2 – Refer to Figure 1 and Figure 2 for details		
B2	**Joint width**	50 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS50/2
	Material	Compressible linear gap seal consisting of alternating layers of three, 3 mm thick graphite based intumescent polymer facing strips (two facing and single central strip) and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	54 mm

Item		Description
	Fixing method	Friction fitted within the cavity at the centre of the separating element
Floor linear gap system B3 – Refer to Figure 1 and Figure 2 for details		
B3	**Joint width**	150 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS150/2
	Material	Compressible linear gap seal consisting of alternating layers of seven, 3 mm thick graphite based intumescent polymer facing strips (two facing and five intermediate strips) and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	170 mm
	Fixing method	Friction fitted within the cavity at the centre of the separating element
Floor linear gap system C2 – Refer to Figure 3 and Figure 4 for details		
C2	**Joint width**	35 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited 50x20
	Material	Compressible linear gap seal consisting of alternating layers of 3 × 1.2 mm thick graphite based intumescent sheets and 2 × flame retardant foam.
	Uncompressed thickness	53.6 mm
	Fixing method	Friction fitted within the cavity at nominally mid-depth
Floor linear gap system C3 – Refer to Figure 3 and Figure 4 for details		
C3	**Joint width**	50 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited 60x25
	Material	Compressible linear gap seal consisting of alternating layers of 3 × 1.2 mm thick graphite based intumescent sheets and 2 × flame retardant foam.
	Uncompressed thickness	63.6 mm
	Fixing method	Friction fitted within the cavity at nominally mid-depth
Floor linear gap system C4 – Refer to Figure 3 and Figure 4 for details		
C4	**Joint width**	75 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited 85x50
	Material	Compressible linear gap seal consisting of alternating layers of 4 × 1.2mm thick graphite based intumescent sheets and 2 × flame retardant foam.
	Uncompressed thickness	85 mm
	Fixing method	Friction fitted within the cavity at nominally mid-depth
Floor linear gap system D1 – Refer to Figure 5 and Figure 6 for details		
D1	**Joint width**	10 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS10/2

Item		Description
	Material	Compressible linear gap seal consisting of alternating layers of 1 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	12 mm
	Fixing method	Friction fitted within the cavity on the unexposed side of the separating element
Floor linear gap system D3 – Refer to Figure 5 and Figure 6 for details		
D3	**Joint width**	50 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS50/2
	Material	Compressible linear gap seal consisting of alternating layers of 3 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	54 mm
	Fixing method	Friction fitted within the cavity on the unexposed side of the separating element
Floor linear gap system D4 – Refer to Figure 5 and Figure 6 for details		
D4	**Joint width**	100 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS100/2
	Material	Compressible linear gap seal consisting of alternating layers of 7 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	126 mm
	Fixing method	Friction fitted within the cavity on the unexposed side of the separating element
Wall linear gap system F1 – Refer to Figure 7 and Figure 8 for details		
F1	**Joint width**	25 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS20/2
	Material	Compressible linear gap seal consisting of alternating layers of two, 3 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	29 mm
	Fixing method	Friction fitted within the cavity on the unexposed side of the separating element
Wall linear gap system F2 – Refer to Figure 7 and Figure 8 for details		
F2	**Joint width**	50 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS50/2
	Material	Compressible linear gap seal consisting of alternating layers of three, 3 mm thick graphite based intumescent polymer facing strips (two facing and single central strip) and elastomeric foam bonded with high tack double sided tape.

Item		Description
	Uncompressed thickness	54 mm
	Fixing method	Friction fitted within the cavity at the centre of the separating element
Wall linear gap system F3 – Refer to Figure 7 and Figure 8 for details		
F3	**Joint width**	150 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS150/2
	Material	Compressible linear gap seal consisting of alternating layers of three, 3 mm thick graphite based intumescent polymer facing strips (two facing and single central strip) and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	170 mm
	Fixing method	Friction fitted within the cavity at the centre of the separating element
Wall linear gap system G2 – Refer to Figure 9 and Figure 10 for details		
G2	**Joint width**	35 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited 50x20
	Material	Compressible linear gap seal consisting of alternating layers of 3 × 1.2 mm thick graphite based intumescent sheets and 2 × flame retardant foam.
	Uncompressed thickness	53.6 mm
	Fixing method	Friction fitted within the cavity at nominally mid-depth.
Wall linear gap system G3 – Refer to Figure 9 and Figure 10 for details		
G3	**Joint width**	50 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited 60x25
	Material	Compressible linear gap seal consisting of alternating layers of 3 × 1.2 mm thick graphite based intumescent sheets and 2 × flame retardant foam.
	Uncompressed thickness	63.6 mm
	Fixing method	Friction fitted within the cavity at nominally mid-depth.
Wall linear gap system G4 – Refer to Figure 9 and Figure 10 for details		
G4	**Joint width**	75 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited 85x50
	Material	Compressible linear gap seal consisting of alternating layers of 4 × 1.2mm thick graphite based intumescent sheets and 2 × flame retardant foam.
	Uncompressed thickness	85 mm
	Fixing method	Friction fitted within the cavity at nominally mid-depth.
Wall linear gap system H1 – Refer to Figure 11 and Figure 12 for details		
H1	**Joint width**	10 mm
	Details of seal	

Item		Description
	Manufacturer / reference	Firestopit Limited LGS10/2
	Material	Compressible linear gap seal consisting of alternating layers of 1 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	12 mm
	Fixing method	Friction fitted within the cavity on the exposed side of the separating element
Wall linear gap system H2 – Refer to Figure 11 and Figure 12 for details		
H2	**Joint width**	25 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS25/2
	Material	Compressible linear gap seal consisting of alternating layers of 2 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	32 mm
	Fixing method	Friction fitted within the cavity on the exposed side of the separating element
Wall linear gap system H3 – Refer to Figure 11 and Figure 12 for details		
H3	**Joint width**	50 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS50/2
	Material	Compressible linear gap seal consisting of alternating layers of 3 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	54 mm
	Fixing method	Friction fitted within the cavity on the exposed side of the separating element
Wall linear gap system H4 – Refer to Figure 11 and Figure 12 for details		
H4	**Joint width**	100 mm
	Details of seal	
	Manufacturer / reference	Firestopit Limited LGS100/2
	Material	Compressible linear gap seal consisting of alternating layers of 7 × 1.2 mm thick graphite based intumescent polymer facing strips and elastomeric foam bonded with high tack double sided tape.
	Uncompressed thickness	126 mm
	Fixing method	Friction fitted within the cavity on the exposed side of the separating element

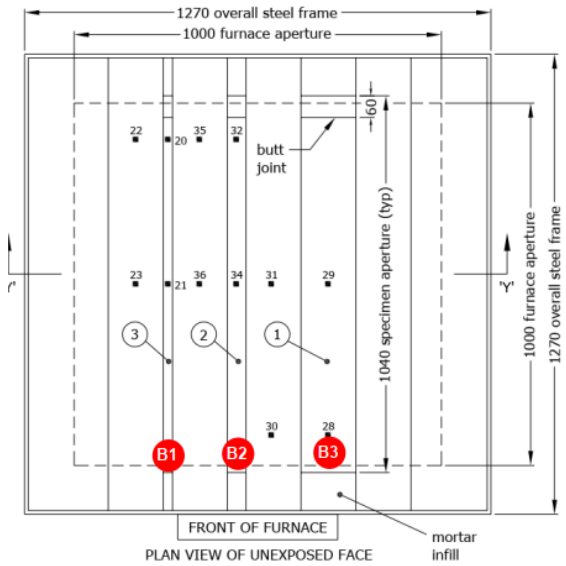

Figure 1 Floor linear gap systems B1-B3 – assessment 1 (as shown in WF 148052) – dimensions in mm

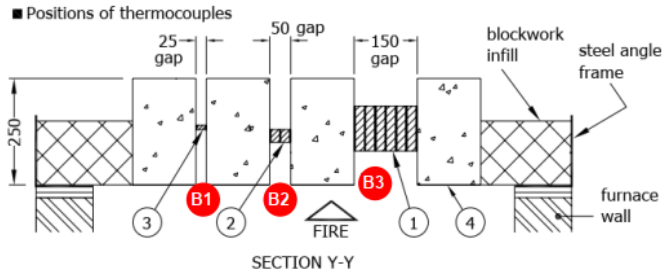

Figure 2 Cross-section of floor linear gap systems B1-B3 – assessment 1 (as shown in WF 148052) – dimensions in mm

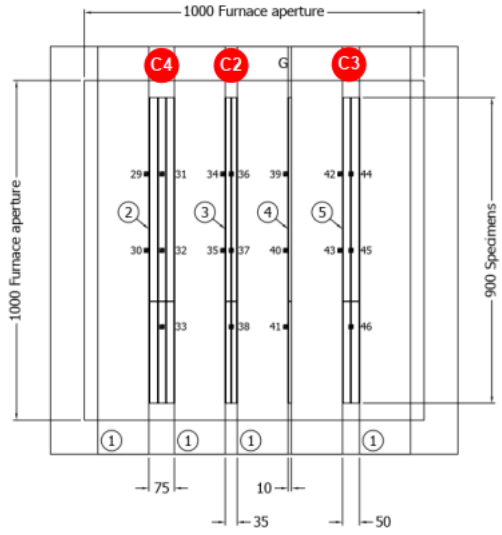

Figure 3 Floor linear gap systems C2-C4 – assessment 1 (as shown in WF 160399) – dimensions in mm

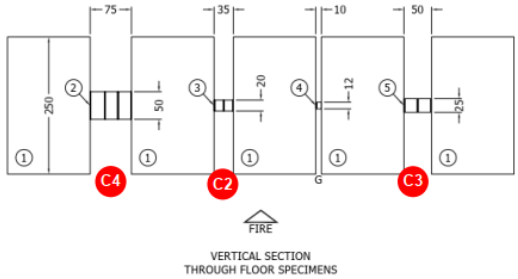

Figure 4 Cross-section of floor linear gap systems C2-C4 – assessment 1 (as shown in WF 160399) – dimensions in mm

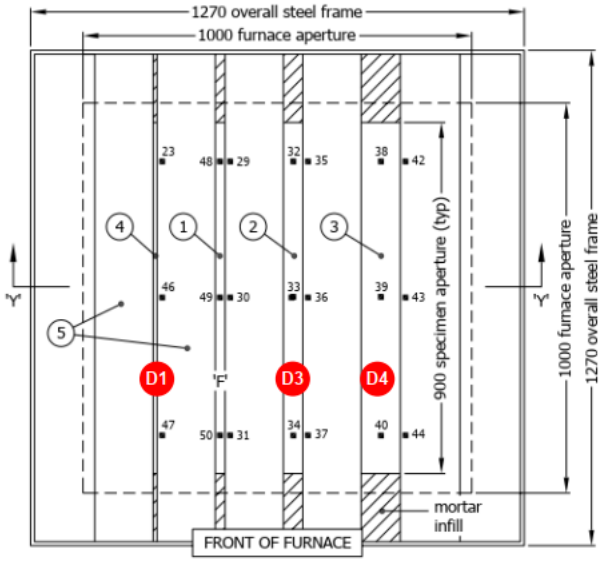

Figure 5 Floor linear gap systems D1, D3 and D4 – assessment 2 (as shown in WF 157402) – dimensions in mm

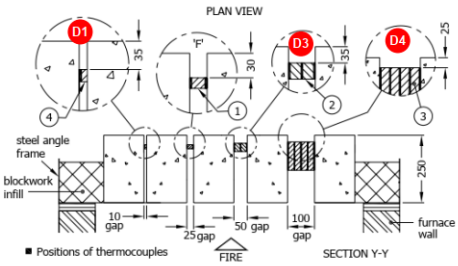

Figure 6 Cross-section of floor linear gap systems D1, D3 and D4 – assessment 2 (as shown in WF 157402) – dimensions in mm

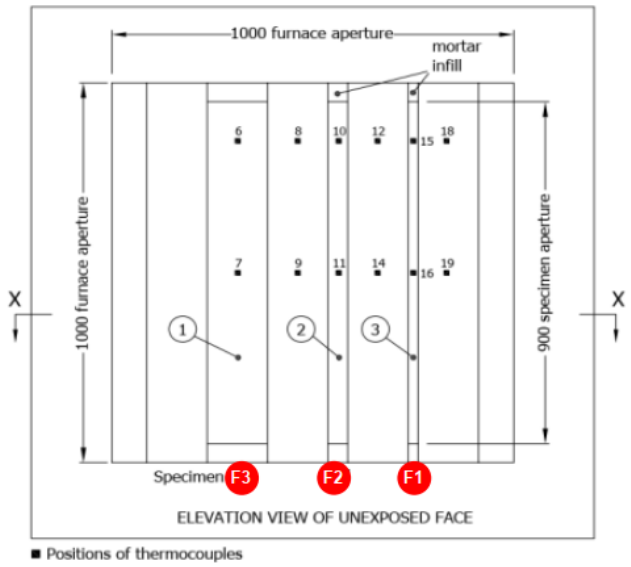

Figure 7 Wall linear gap systems F1-F3 – assessment 1 (as shown in WF 148052) – dimensions in mm

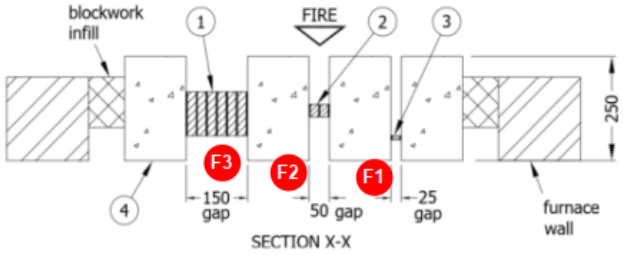

Figure 8 Cross-section of wall linear gap systems F1-F3 – assessment 1 (as shown in WF 148052) – dimensions in mm

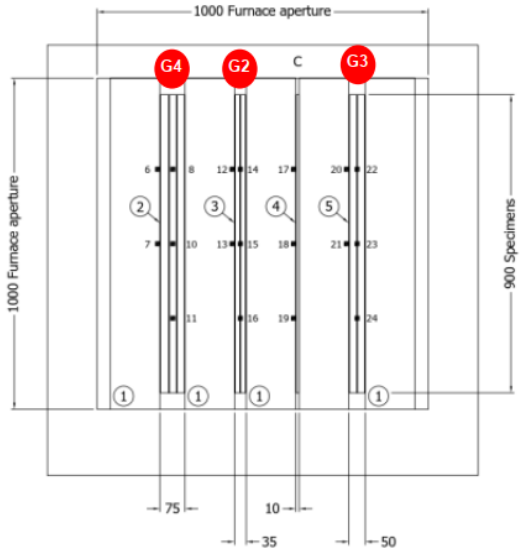

Figure 9 Wall linear gap systems G2-G4 – assessment 1 (as shown in WF 160399) – dimensions in mm

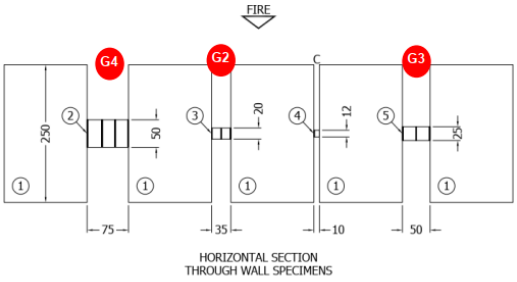

Figure 10 Cross-section of wall linear gap systems G2-G4 – assessment 1 (as shown in WF 160399) – dimensions in mm

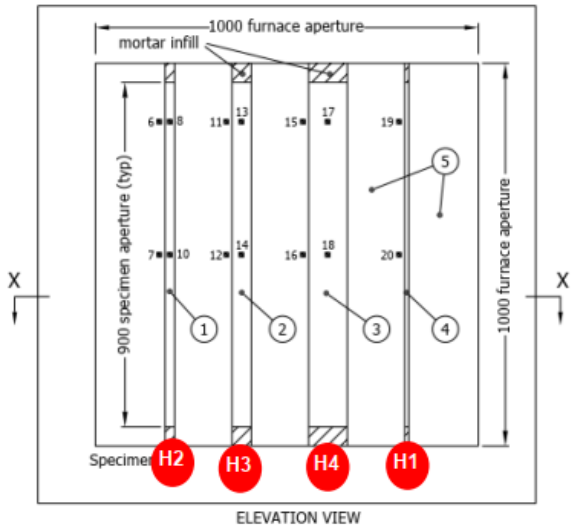

Figure 11 Wall linear gap systems H1-H4 – assessment 2 (as shown in WF 157402) – dimensions in mm

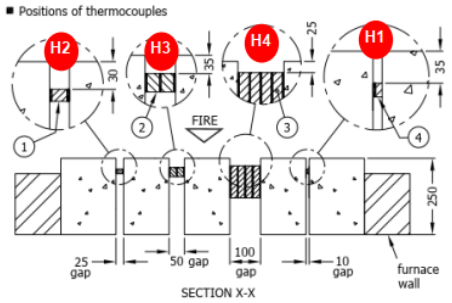

Figure 12 Cross-section of wall linear gap systems H1-H4 – assessment 2 (as shown in WF 157402) – dimensions in mm

5.0 Assessment 1

5.1 Description of variation

Assessment 1 refers to test reports WF 148052 and WF 160399. These reports comprise fire tests of linear gaps within floor and wall separating elements (systems B1 to B3, C1 to C4, F1 to F3 and G1 to G4 in Table 7). Both tests were done in accordance with BS 476: Parts 20 1987.
The proposed variations are as follows.

- Assessment of the applicability of test results in accordance with AS 1530.4:2014 and AS 4072.1:2005.
- The length of the linear gap exposed to the furnace chamber in the referred tests
- System assessed with normal weight concrete

5.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 8.

Table 8 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
NCC procedure for determining FRL	Differs in only a minor degree from a tested prototype S1C2(b)
Type of assessment	Qualitative and comparative

5.3 Assessment

WF 148052 and WF 160399 comprise various horizontal and vertical linear gaps with widths varying between 10 mm to 150 mm – Refer to Figure 1 to Figure 4 and Figure 7 to Figure 10 for details. The separating elements were made of 250 mm thick autoclaved aerated concrete lintels with a density of 670 kg/m3.

The system is assessed for 1000 mm as per the requirement of AS 1530.4:2014 instead of tested 900 mm. The length of a joint can influence the outcome of test. A shorter joint might exhibit different thermal behaviour and integrity performance compared to a longer one due to variations in heat transfer paths and edge effects. The length of a joint can influence the pathways and rate of heat transfer during a test. In a shorter 900 mm specimen, a larger proportion of the joint is in closer proximity to the surrounding furnace environment. This might result in a faster temperature rise at these locations compared to a longer joint. A shorter specimen is expected to experience more rapid heating at its ends, potentially leading to earlier localised failure of integrity or insulation, which would suggest a more conservative outcome. Based on this discussion we can assess the control joint for 1000 mm as per the requirement of AS 1530.4:2014.

The tests were conducted in accordance with BS 476: Parts 20: 1987 with additional guidelines adopted from BS EN 1366-4. A comparison of these guidelines and the Australian standards AS 1530.4:2014 and AS 4072.1-2005 is provided in section 7.0 . As per the discussion presented in section 7.0, the results are considered to be in accordance with AS 1530.4:2014 and AS 4072.1-2005.

Based on the above, if the separating elements of floor and wall linear gap systems B1 to C4 and F1 to G4 were tested in accordance with AS 1530.4:2014 and AS 4072.1:2005, while maintaining a

density not less than 670 kg/m3 and the minimum 250 mm slab thickness, the results of the referenced tests are expected to be the same.

5.4 Conclusion

This assessment demonstrates that the linear gaps assessed are capable of achieving the FRLs shown in Table 9, in accordance with the AS 1530.4:2014 and AS 4072.1-2005.

Table 9 Summary of Assessment 1 conclusions

Product	Reference test	FRL
Floor linear gap system B1	WF 148052	-/120/-
Floor linear gap system B2	WF 148052	-/30/-
Floor linear gap system B3	WF 148052	-/120/120
Floor linear gap system C2	WF 160399	-/240/60
Floor linear gap system C3	WF 160399	-/240/-
Floor linear gap system C4	WF 160399	-/240/60
Wall linear gap system F1	WF 148052	-/120/-
Wall linear gap system F2	WF 148052	-/90/90
Wall linear gap system F3	WF 148052	-/120/120
Wall linear gap system G2	WF 160399	-/180/60
Wall linear gap system G3	WF 160399	-/60/30
Wall linear gap system G4	WF 160399	-/240/90

6.0 Assessment 2

6.1 Description of variation

Assessment 2 refers to the test report WF 157402. This report comprises fire test of linear gaps within floor and wall separating elements (systems D1 to D4 and H1 to H4 in Table 7). The test was done in accordance with BS EN 1363-1:1999.
The proposed variations are as follows.

- Assessment of the applicability of test results in accordance with AS 1530.4:2014 and AS 4072.1:2005.
- The length of the linear gap exposed to the furnace chamber in the referred tests
- System assessed with normal weight concrete

6.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 10.

Table 10 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
NCC procedure for determining FRL	Differs in only a minor degree from a tested prototype S1C2(b)
Type of assessment	Qualitative and comparative

6.3 Assessment

WF 157402 comprises various horizontal and vertical linear gaps with widths varying between 10 mm to 100 mm – Refer to Figure 5, Figure 6, Figure 11 and Figure 12 for details. The separating elements were made of 250 mm thick autoclaved aerated concrete lintels with a density of 670 kg/m3.

The system is assessed for 1000 mm as per the requirement of AS 1530.4:2014 instead of tested 900 mm. The length of a joint can influence the outcome of test. A shorter joint might exhibit different thermal behaviour and integrity performance compared to a longer one due to variations in heat transfer paths and edge effects. The length of a joint can influence the pathways and rate of heat transfer during a test. In a shorter 900 mm specimen, a larger proportion of the joint is in closer proximity to the surrounding furnace environment. This might result in a faster temperature rise at these locations compared to a longer joint. A shorter specimen is expected to experience more rapid heating at its ends, potentially leading to earlier localised failure of integrity or insulation, which would suggest a more conservative outcome. Based on this discussion we can assess the control joint for 1000 mm as per the requirement of AS 1530.4:2014.

The test was conducted in accordance with BS EN 1363-1:1999 in conjunction with additional guidelines adopted from prEN 1366-4:2001. A comparison of these guidelines and the Australian standards AS 1530.4:2014 and AS 4072.1-2005 is provided in section 8.0 in this report. As per the discussion presented in section 8.0, the tests are considered to be in accordance with AS 1530.4:2014 and AS 4072.1-2005.

Based on the above information, if the separating elements of floor and wall linear gap systems D1 to D4 and H1 to H4 were tested in accordance with AS 1530.4:2014 and AS 4072.1:2005 while

maintaining a density not less than 670 kg/m3 and the minimum 250 mm thickness, the results of the referenced tests are unlikely to be changed significantly.

6.4 Conclusion

This assessment demonstrates that the linear gaps assessed are capable of achieving the FRLs shown in Table 11, in accordance with the AS 1530.4:2014 and AS 4072.1-2005.

Table 11 Summary of Assessment 2 conclusions

Product	Reference test	FRL
Floor linear gap system D1	WF 157402	-/120/30
Floor linear gap system D3	WF 157402	-/60/-
Floor linear gap system D4	WF 157402	-/120/60
Wall linear gap system H1	WF 157402	-/60/60
Wall linear gap system H2	WF 157402	-/60/-
Wall linear gap system H3	WF 157402	-/30/-
Wall linear gap system H4	WF 157402	-/120/120

7.0 Assessment 3

Relevance of BS 476: Part 20:1987 test data with respect to AS 1530.4:2014 and AS 4072.1-2005

7.1 General

The fire resistance tests WF 148052 and WF 160399 were conducted utilising the heating conditions of BS 476: Part 20: 1987, which differs to a minor degree from AS 1530.4:2014. The effects these differences have on the fire resistance performance of test specimens are discussed below.

7.2 Furnace heating regime

The furnace temperature regime for fire resistance tests conducted in accordance with AS 1530.4:2014 follows a similar trend to BS 476: Part 20:1987.
The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4:2014 and BS 476: Part 20:1987 are not appreciably different.

7.3 Furnace Thermocouples

For furnace thermocouples specified in AS 1530.4:2014 are Type K, mineral insulated metal sheathed (MIMS) with a stainless steel sheath having a wire of diameter of less than 1.0 mm and an overall diameter of 3mm. The measuring junction protrudes at least 25 mm from the supporting heat resistant tube.

The furnace thermocouple types in BS 476: Part 20:1987 shall be one of the following two types:

- Bare Nickel Chromium/Nickel Aluminium wires, 0.75 mm to 1.5 mm in diameter, welded or crimped together at their ends and supported and insulated from each other in a twin bore porcelain insulator. However, for 25 mm approximately from the weld/crimp, the wires shall be exposed and be separated from each other by at least 5 mm. (To be replaced or recalibrated after 6hrs of usage).
- Nickel Chromium/Nickel Aluminium wire contained within mineral insulation in a heat resisting steel sheath of diameter 1.5 mm, the hot junctions being electrically insulated from the sheath. The thermocouple hot junction shall project 25 mm from a porcelain insulator. The assembly shall have a response time on cooling in air of not greater than 30 seconds.

The relative distance of the furnace thermocouples from the exposed face of the specimen, for both AS 1530.4:2014 and BS 476:Part 20:1987, is 100 mm +10 mm.

7.4 Furnace Pressure

It is a requirement of AS 1530.4:2014 that for vertical elements a furnace gauge pressure of zero (0) Pa is established at a height 500 mm above the notional floor level. For horizontal elements a furnace pressure of 20 Pa is established at 100 mm below the underside of concrete slab. The pressure is maintained at 8 Pa per metre height.

For BS 476.20:1987 – for vertical elements – the neutral axis is maintained at a height of 1000 mm. The pressure is maintained at 8.5 Pa per metre height for horizontal elements the pressure is 20Pa at a point 100 mm below the soffit of the floor assembly.

Therefore, based on an average pressure gradient of 8.5 Pa/m, at a particular height above the notional floor level, while in AS 1530.4:2014 the pressure gradient is 8 Pa/m, AS 1530.4:2014 requires the pressure to be approximately 4Pa higher than BS 476.20:1987 for vertical elements.

In the test WF 148052 and WF 160399, the pressure is maintained between 18 Pa and 20 Pa, which makes it comparable to AS 1530.4:2014.

7.5 Specimen Size

In the tests WF 148052 and WF 160399, length of the linear gap exposed to the furnace chamber was 900 mm

AS 1530.4:2014 states that the length of the linear gap exposed to the furnace chamber shall not be less than 1 m. The linear gaps tested in the reference test reports all have a length of 900 mm.

The length of a joint can influence the outcome of test. A shorter joint might exhibit different thermal behaviour and integrity performance compared to a longer one due to variations in heat transfer paths and edge effects. The length of a joint can influence the pathways and rate of heat transfer during a test. In a shorter 900 mm specimen, a larger proportion of the joint is in closer proximity to the surrounding furnace environment. This might result in a faster temperature rise at these locations compared to a longer joint. A shorter specimen is expected to experience more rapid heating at its ends, potentially leading to earlier localised failure of integrity or insulation, which would suggest a more conservative outcome. Based on this discussion we can assess the control joint for 1000 mm as per the requirement of AS 1530.4:2014.

7.6 Performance Criteria

AS 1530.4:2014 specifies the following performance criteria for building materials and structures:

- Structural Adequacy – (Not relevant to the referenced test)
- Integrity
- Insulation

7.7 Integrity

The integrity criteria differ slightly between AS 1530.4:2014 and BS 476: Part 20:1987. For uninsulated specimens or for specimens that have exceeded their insulation criteria performance – the specimen shall be deemed to have failed the integrity criterion in accordance with AS 1530.4:2014 if it sustains flaming for 10 seconds, or if the ignition of the cotton pad occurs or if a gap forms that allows the penetration of a 25 mm diameter gap gauge anywhere on the specimen, or if a gap forms that allows a 6mm × 150 mm gap gauge to penetrate the specimen anywhere on the specimen.

The integrity criteria for BS 476: Part 20: 1987 are similar to the above. However, the use of cotton pad is not as strictly regulated in the BS standard. Therefore, the AS standard is considered more onerous in measuring the integrity performance of linear gaps. However from the test reports it is evident that the cotton pads were used during the test duration.

7.8 Insulation

The thermocouple locations for measuring insulation in AS 1530.4:2014 and BS 476: Part 20:1987 are different. AS 1530.4:2014 specifically nominates positions for thermocouples for maximum temperature rise and allows the application of a roving thermocouple anywhere on the specimen.

The failure criteria for insulation in AS 1530.4:2014 and BS 476: Part 20:1987 are not appreciably different except for the positioning of thermocouples as noted above.

For linear gaps, AS 1530.4:2014 specifies the following requirements when placing thermocouples on the unexposed face in Clause 10.5.1 (f).

- At least three on the surface of the seal, with one thermocouple for each 0.3 m^2 of surface area, up to a maximum of five, uniformly distributed over the area (one thermocouple being located at the centre of the seal)
- On the surface of the seal, 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.
- On the surface of the separating element, 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.

Furthermore, Clause 10.5.3 of AS 1530.4:2014 specifies that thermocouples used for the evaluation of the insulation performance of linear gaps shall be positioned on the unexposed face of the sealing system and the separating element, except where the unexposed face of the seal is recessed within the separating element. Where this occurs, thermocouples shall only be fitted to the seal when the joint width is greater than or equal to 12 mm. Under such circumstances, the size of the pad may be reduced to facilitate the fitting of the thermocouple.

In the test 148052, for both the wall and the floor there were two thermocouples on the surface of each seal, which differs from the requirement of AS1530.4:2014 which requires three thermocouples. For wall seals, it is possible to ignore the requirement of the third TC as it will record lower temperatures compared to the centre of the specimen. The requirement for TC on the centre of the specimen is met. For the criteria for thermocouples at 500 mm perimeter, the test shows there are two, in addition to that there are two thermocouples on the surface of the separating element and on each seal.

In the test 160399, for both wall and floor there have three thermocouples on the surface of each seal, which meets the requirement of AS 1530.4:2014.

Based on the above, it is concluded that the criteria for thermocouple locations to determine insulation failure, as outlined in AS 1530.4:2014, are met. Any deviations from the prescribed thermocouple placements in the standard are not expected to detrimentally affect the test results.

7.9 Restraint

The application of restraint to the test specimen in AS 1530.4:2014 and BS 476: Part 20:1987 is not appreciably different.

7.10 Active fire suppression

Both AS 1530.4:2014 and BS 476: Part 20:1987, do not incorporate provisions for active fire suppression systems. Therefore, the FRL achieved by the prototype was attained without the aid of an active fire suppression system.

7.11 Application of referenced test data to AS 1530.4:2014 and AS 4072.1-2005.

The variations in furnace heating regimes, furnace thermocouples, furnace pressure, specimen size and the responses of the different thermocouple types to the furnace conditions are considered minor and not expected to have an effect on the outcome of the referenced tests.

The variations in furnace pressure conditions can theoretically be more onerous and could affect the performance of the test specimens, where the results can be considered more conservative. In particular, the upper area of the specimen after the formation of gaps, cracks or fissures, which was not evident in the tests. Also, in the tests WF 148052 and WF 160399, the pressure is maintained between 18 Pa and 20 Pa, which is in accordance with AS 1530.4:2014.

The difference in the joint length is not expected to have a detrimental impact on the outcome of the referenced fire resistance test. Therefore, they are considered to be in accordance with AS 1530.4:2014.

Based on the above discussion and in absence of any foreseeable integrity and insulation risk, it is concluded that the results relating to the integrity and insulation performance of the specimens – tested in WF 148052 and WF 160399 – can be used to assess the integrity and insulation performance in accordance with AS 1530.4:2014.

8.0 Assessment 4

Relevance of BS EN 1363-1:1999 and BS EN 1366-4: 2006 test data with respect to AS 1530.4:2014 and AS 4072.1-2005

8.1 General

Reference is made to a fire resistance test, WF 157402, which was conducted in accordance with BS EN 1363.1:1999 and BS EN 1366-4:2006. These standards differ to a minor degree from AS 1530.4:2014. The effects of these differences had on the fire resistance performance of test specimens listed in section three are discussed below.

8.2 Furnace Temperature Regime

The furnace temperature regime for fire resistance tests conducted in accordance with AS 1530.4:2014 follows a similar trend to BS EN 1363.1:1999.
The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4:2014 and BS EN 1363.1:1999 are not appreciably different.

8.3 Furnace Thermocouples

The furnace thermocouples specified in AS 1530.4:2014 are type K, mineral insulated metal sheathed (MIMS) with a stainless-steel sheath having a wire of diameter of less than 1.0 mm and an overall diameter of 3mm. The measuring junction protrudes at least 25 mm from the supporting heat resistant tube.

The furnace thermocouple specified in BS EN 1363-1:1999 is made from folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen with the thermocouple hot junction protected by a pad of insulating material.

The plate part is to be constructed from 150 ±1 mm long by 100 ±1 mm wide by 0.7 ±0.1 mm thick nickel alloy sheet strips.

The measuring junction is to consist of Nickel Chromium/Nickel Aluminium (Type K) wire as defined in IEC 60584-18, contained within mineral insulation in a heat-resisting steel alloy sheath of nominal diameter 1 mm, the hot junctions being electrically insulated from the sheath.

The thermocouple hot junction is to be fixed to the geometric centre of the plate, by a small steel strip made from the same material as the plate. The steel strip can be welded to the plate or may be screwed to it to facilitate replacement of the thermocouple. The strip should be approximately 18 mm by 6 mm if it is spot-welded to the plate, and nominally 25 mm by 6 mm if it is to be screwed to the plate. The screw is to be 2 mm in diameter.

The assembly of plate and thermocouple should be fitted with a pad of inorganic insulation material 97 ±1 mm by 97 ±1 mm by 10 ±1 mm thick with a density of 280 ±30 kg/m3.

The relative location of the furnace thermocouples for the exposed face of the specimen, for AS 1530.4:2014 and BS EN 1363.1:1999, is 100 mm +10 mm and 100 mm +50 mm respectively.

The furnace control thermocouples required by BS EN 1363.1:1999 are less responsive than those specified by AS 1530.4:2014. This variation in sensitivity can produce a potentially more onerous

[8] Thermocouples - Part 1: EMF specifications and tolerances

heating condition for specimens tested to BS EN 1363.1:1999, particularly when the furnace temperature is changing quickly in the early stages of the test.

8.4 Furnace Pressure Regime

It is a requirement of AS 1530.4:2014 that for vertical elements a furnace gauge pressure of zero (0) Pa is established at a height 500 mm above the notional floor level. For horizontal elements a furnace pressure of 20 Pa is established at 100 mm below the underside of concrete slab. The pressure is maintained at 8 Pa per metre height.

It is a requirement of AS 1530.4:2014 that for vertical elements a furnace gauge pressure of 15+3Pa is established at the centre of lowest penetration.

It is a requirement of AS 1530.4:2014 that for a single horizontal penetration tested in a vertical separation element that has a height of more than 1 m, it shall be tested with a pressure of 20±3 Pa at the top of the separation element and in such cases the horizontal penetrating service shall be included in the zone where the positive pressure exceeds 10 Pa.

Furthermore, if more than one penetration sealing system is tested in a vertical separation element, the pressure conditions specified above shall apply to the lowest penetration.

It is a requirement of AS 1530.4:2014 and BS EN 1363-1:1999 that for horizontal elements, a furnace gauge pressure of 20 Pa is established at a height 100 mm below the floor soffit level.

For BS EN 1363.1:1999 – for vertical elements – the neutral axis is maintained at a height of 500 mm. Irrespective of this the pressure shall not exceed 20 Pa at the top of the test specimen. When testing with multiple specimens on vertical separating elements, the pressure is maintained at the lowest test specimen and the limit of 20Pa at the top of specimen does not apply.

The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014 and EN 1363.1:1999 are also not appreciably different.

In the test WF 157402, the pressure is maintained at 15±2 Pa which is in accordance with AS 1530.4:2014.

8.5 Specimen Size

BS EN 1366-4:2006 states that a linear joint seal shall be of uniform design cross sectional area and for non-movement joints, a shorter length of not less than 900 mm can be used.

AS 1530.4:2014 states that the length of the linear gap exposed to the furnace chamber shall not be less than 1m. The linear gaps tested in the reference test reports all have a length of 900 mm. However, the difference in the cavity length is not expected to have an overall significant effect on the outcome of the referenced fire resistance test. Therefore, they are assumed to be in agreement with the Australian Standards' requirements.

8.6 Performance Criteria

AS 1530.4:2014 specifies the following performance criteria for building materials and structures:

- Structural Adequacy – (Not relevant to the referenced test)
- Integrity
- Insulation

8.7 Integrity Performance Criteria

The integrity criteria differ slightly between AS 1530.4:2014 and BS EN 1363.1:1999

For uninsulated specimens or for specimens that have exceeded their insulation criteria performance – the specimen shall be deemed to have failed the integrity criterion in accordance with AS 1530.4:2014 if it sustains flaming for 10 seconds, or if the ignition of the cotton pad occurs or if a gap forms that allows the penetration of a 25 mm diameter gap gauge anywhere on the specimen, or if a gap forms that allows a 6mm × 150 mm gap gauge to penetrate the specimen anywhere on the specimen.

Except for minor technical variations, the integrity criteria in BN EN 1363.1:1999 are generally applied in an equivalent manner.

8.8 Insulation performance criteria

For linear gaps, AS 1530.4:2014 specifies the following requirements when placing thermocouples on the unexposed face in Clause 10.5.1 (f).

- At least three on the surface of the seal, with one thermocouple for each 0.3 m^2 of surface area, up to a maximum of five, uniformly distributed over the area (one thermocouple being located at the centre of the seal)
- On the surface of the seal, 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.
- On the surface of the separating element, 25 mm from the edge of the opening, with one thermocouple for each 500 mm of the perimeter.

Furthermore, Clause 10.5.3 of AS 1530.4:2014 specifies that thermocouples used for the evaluation of the insulation performance of linear gaps shall be positioned on the unexposed face of the sealing system and the separating element, except where the unexposed face of the seal is recessed within the separating element. Where this occurs, thermocouples shall only be fitted to the seal when the joint width is greater than or equal to 12 mm. Under such circumstances, the size of the pad may be reduced to facilitate the fitting of the thermocouple.

A review of Figures 5, 6, 11 and 12 of BS EN 1366-4:2006 show that while the unexposed surface thermocouple locations specified are in agreement with those specified in AS 1530.4:2014, the BS EN 1366-4:2006 standard is more severe in certain aspects.

8.9 Restraint

The application of restraint to the test specimen in AS 1530.4:2014 and BS EN 1366-4:2006 is not appreciably different.

8.10 Active fire suppression

Both AS 1530.4:2014 and BS EN 1366-4:2006, do not incorporate provisions for active fire suppression systems. Therefore, the FRL achieved by the prototype was attained without the aid of an active fire suppression system.

8.11 Application of Test Data to AS 1530.4:2014

The variations in furnace heating regimes, furnace thermocouples, furnace pressure, specimen size and the responses of the different thermocouple types to the furnace conditions are considered minor and not expected to have an effect on the outcome of the referenced tests.

The variations in furnace pressure conditions can theoretically be more onerous and could affect the performance of the test specimens. In particular, the upper area of the specimen after the formation of gaps, cracks or fissures which was not evident in the tests. Also, in the test WF 157402, the pressure is maintained between 15 ± 2 Pa, which makes it comparable to AS 1530.4:2014.

Based on the above discussion and in absence of any foreseeable integrity and insulation risk, it is concluded that the results relating to the integrity and insulation performance of the specimens – tested in WF 157402 – can be used to assess the integrity and insulation performance in accordance with AS 1530.4:2014.

9.0 Validity

Jensen Hughes does not endorse the tested or assessed products and systems in any way. The conclusions of this assessment may be used to directly assess fire resistance, but it should be recognised that a single test method will not provide a full assessment of fire resistance under all conditions.

Due to the nature of fire testing and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

This assessment is based on test data, information and experience available at the time of preparation. If contradictory evidence becomes available to the assessing authority, the assessment will be unconditionally withdrawn and the report sponsor will be notified in writing. Similarly, the assessment should be re-evaluated, if the assessed construction is subsequently tested since actual test data is deemed to take precedence.

The sponsor is responsible for formally notifying Jensen Hughes of any additional testing performed on their product/system. This obligation applies regardless of where the test was conducted, the results of the test, or whether it was initially considered part of Jensen Hughes' ongoing assessment. The primary goal of this notification is to allow Jensen Hughes to review the changes and determine whether they require re-evaluation or re-testing to determine whether the changes have affected the product's performance. It is important that the client promptly notify Jensen Hughes if any such changes are implemented.

The procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement. The sponsor is therefore recommended that this report be reviewed on, or before, the stated expiry date.

This assessment represents our opinion about the performance of the proposed systems that is expected to be demonstrated when subjected to test conditions in accordance with AS 1530.4:2014, based on the evidence referred to in this report.

This assessment is provided to Boss Products (Australia) Pty Ltd for their own specific purposes. This report may be used as evidence of suitability in accordance with the requirements of the relevant National Construction Code. Building certifiers and other third parties must determine the suitability of the systems described in this report for a specific installation.

Appendix A Summary of supporting test data

A.1 Test report – WF 148052

Table 12 Information about test report

Item	Information about test report
Report sponsor	Firestopit Limited
Test laboratory	Bodycote Jensen Hughes Global Safety (UK)
Test date	The fire resistance test was completed on 20/09/2005
Test standards	The test was done in accordance with BS 476: Part 20: 1987 and BS EN 1366-4.
Variation to test standards	Variations to relevant Australian standards addressed in section 7.0
General description of tested specimen	The test comprised of wall and floor separating elements incorporating various gap sealing systems. The specimens were made of 250 mm thick autoclaved aerated concrete with a density of 670kg/m3. The separating floor element had the overall dimensions of 1200 mm (L) × 1200 mm (W) × 250 mm (T) and was made up of autoclaved aerated concrete lintels arranged to provide 1-off 25 mm (W) × 1040 mm (L), 1-off 50 mm (W) × 1040 mm (L) and 1-off 150 mm (W) × 1040 mm (L). The separating wall element had the overall dimensions of 1000 mm (L) × 1000 mm (W) × 250 mm (T) and was made up of autoclaved aerated concrete lintels arranged to provide 1-off 25 mm (W) × 1000 mm (L), 1-off 50 mm (W) × 1000 mm (L) and 1-off 150 mm (W) × 1000 mm (L). Cavity length in all gaps was reduced to 900 mm with mortar infill for both wall and floor separating elements. Each gap was sealed with alternating layers of graphite based intumescent polymer strips and elastomeric foam bonded together with high tack double sided tape (referenced as LGS in the report). Each seal was friction fitted into the gaps. A description of each gap seal is given in Table 13.
Instrumentation	The test was conducted in conjunction with additional guidelines adopted from BS EN 1366-4. Given the test date, we assumed that the standard referenced is BS EN 1366-4:2001.

Table 13 Test specimen description for WF 148052

System	Gap width (mm)	Description
B1	25	12mm deep, friction-fitted on the unexposed face.
B2	50	25 mm deep, friction-fitted at the centre of separating element.
B3	150	100 mm deep, friction-fitted at the centre of separating element.
F1	25	12mm deep, friction-fitted on the unexposed face.
F2	50	25 mm deep, friction-fitted at the centre of separating element.
F3	150	100 mm deep, friction-fitted at the centre of separating element.

The test specimen achieved the results shown in Table 14.

Table 14 Summary of test results for WF 148052

Reference	Integrity* (min)	Insulation (min)
B1	132**	14
B2	31	20
B3	132**	132**
F1	132**	24
F2	98	92
F3	132**	132**

+ *No collapse of the specimen, sustained flaming on the unexposed surface or loss of impermeability was observed for the periods given in the table.
+ **Test duration. The test was discontinued after a period of 132 minutes.

A.2 Test report – WF 157402

Table 15 Information about test report

Item	Information about test report
Report sponsor	Firestopit Limited
Test laboratory	Bodycote Jensen Hughes Global Safety (UK)
Test date	The fire resistance test was completed on 17/10/2006
Test standards	The test was done in accordance with BS EN 1363-1:1999 and prEN 1366-4:2001.
Variation to test standards	Variations to relevant Australian standards addressed in section 8.0
General description of tested specimen	The test comprised of wall and floor separating elements incorporating various gap sealing systems. The specimens were made of 250 mm thick autoclaved aerated concrete with a density of 670kg/m3. The separating floor element had the overall dimensions of 1200 mm (L) × 1200 mm (W) × 250 mm (T) and was made up of autoclaved aerated concrete lintels arranged to provide 1-off 10 mm (W) × 900 mm (L), 1-off 25 mm (W) × 900 mm (L), 1-off 50 mm (W) × 900 mm (L) and 1-off 100 mm (W) × 900 mm (L). The separating wall element had the overall dimensions of 1000 mm (L) × 1000 mm (W) × 250 mm (T) and was made up of autoclaved aerated concrete lintels arranged to provide 1-off 10 mm (W) × 900 mm (L), 1-off 25 mm (W) × 900 mm (L), 1-off 50 mm (W) × 900 mm (L) and 1-off 100 mm (W) × 900 mm (L). Each gap was sealed with alternating layers of graphite based intumescent polymer strips and elastomeric foam bonded together with high tack double sided tape (referenced as LGS in the report). Each seal was friction fitted into the gaps. A description of each gap seal is given in Table 16.
Instrumentation	The test was conducted in conjunction with additional guidelines adopted from prEN 1366-4:2001.

Table 16 Test specimen description for WF 157402

System	Gap width (mm)	Description
D1	10	12mm deep, friction-fitted on the unexposed face.
D2	25	12mm deep, friction-fitted on the unexposed face.
D3	50	25 mm deep, friction-fitted on the unexposed face.
D4	100	100 mm deep, friction-fitted on the unexposed face.
H1	10	12mm deep, friction-fitted on the exposed face.
H2	25	12mm deep, friction-fitted on the exposed face.
H3	50	25 mm deep, friction-fitted on the exposed face.
H4	100	100 mm deep, friction-fitted on the exposed face.

The test specimen achieved the results shown in Table 14.

Table 17 Summary of test results for WF 157402

Reference	Integrity (min)		Insulation (min)
	Cotton pad	Sustained flaming	
D1	120*	120*	54
D2	6	6	6
D3	77	77	10
D4	120*	120*	88
H1	70	70	70

Reference	Integrity (min)		Insulation (min)
	Cotton pad	Sustained flaming	
H2	66	66	9
H3	40	40	9
H4	120*	120*	210*
+ *Test duration. The test was discontinued after a period of 120 minutes.			

A.3 Test report – WF 160399

Table 18 Information about test report

Item	Information about test report
Report sponsor	Firestopit Limited
Test laboratory	Bodycote Jensen Hughes Global Safety (UK)
Test date	The fire resistance test was completed on 15/02/2007
Test standards	The test was done in accordance with BS 476: Part 20: 1987 and BS EN 1366-4: 2006
Variation to test standards	Variations to relevant Australian standards addressed in section 7.0
General description of tested specimen	The test comprised of wall and floor separating elements incorporating various gap sealing systems. The specimens were made of 250 mm thick autoclaved aerated concrete with a density of 670kg/m3. The separating floor element had the overall dimensions of 1000 mm (L) × 1000 mm (W) × 250 mm (T) and was made up of autoclaved aerated concrete lintels arranged to provide 1-off 10 mm (W) × 900 mm (L), 1-off 35 mm (W) × 900 mm (L), 1-off 50 mm (W) × 900 mm (L) and 1-off 75 mm (W) × 900 mm (L). The separating wall element had the overall dimensions of 1000 mm (L) × 1000 mm (W) × 250 mm (T) and was made up of autoclaved aerated concrete lintels arranged to provide 1-off 10 mm (W) × 900 mm (L), 1-off 35 mm (W) × 900 mm (L), 1-off 50 mm (W) × 900 mm (L) and 1-off 75 mm (W) × 900 mm (L). Each gap was sealed with alternating layers of graphite based intumescent polymer strips and elastomeric foam bonded together with high tack double sided tape. Each seal was friction fitted into the gaps at nominally mid-depth. A description of each gap seal is given in Table 19.
Instrumentation	The test was conducted in conjunction with additional guidelines adopted from prEN 1366-4:2006.

Table 19 Test specimen description for WF 160399

System	Gap width (mm)	Description
C1	10	12mm deep, friction-fitted at the centre of separating element.
C2	35	20 mm deep, friction-fitted at the centre of separating element.
C3	50	25 mm deep, friction-fitted at the centre of separating element.
C4	75	50 mm deep, friction-fitted at the centre of separating element.
G1	10	12mm deep, friction-fitted at the centre of separating element.
G2	35	20 mm deep, friction-fitted at the centre of separating element.
G3	50	25 mm deep, friction-fitted at the centre of separating element.
G4	75	50 mm deep, friction-fitted at the centre of separating element.

The test specimen achieved the results shown in Table 20.

Table 20 Summary of test results for WF 160399

Reference	Integrity* (min)	Insulation (min)
C1	240**	***

Reference	Integrity* (min)	Insulation (min)
C2	240**	80
C3	240**	24
C4	240**	85
G1	240**	***
G2	199	72
G3	89	30
G4	240**	106

+ *No collapse of the specimen, sustained flaming on the unexposed surface or loss of impermeability was observed for the periods given in the table.
+ **Test duration. The test was discontinued after a period of 240 minutes.
+ ***Gap size deemed small to fit thermocouple (10 mm).