HB FULLER AUSTRALIA PTD LTD

FIRE ASSESSMENT REPORT

Cable and metal pipe penetrations protected with HB Fuller FIRESOUND sealant

Report number: 27001
Revision: R5.0 Reference number: FAS200117
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Quality management

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		S Hu	K G Nicholls	-
27001-01	Issue: 28 Feb 2013	Typographical amendments		
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		Sashini Sue	Imran Ahamed	Mahmoud Akl
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		Alim Rasel	Omar Saad	Omar Saad

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 penetration systems protected with HB Fuller Firesound sealant in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

The analysis in section 5.0 of this report found that the proposed systems, together with the described variations, will achieve FRL as shown in Table 1, Table 2 and

Table 3 – in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2.0, 3.0 and 6.0 of this report. The results of this report are valid until 30 November 2030.

Table 1 Overview of variations and assessment outcome

Specimen	Test standard	Reference test	Evidence of suitability	Governing requirements	Assessment outcome
Cables and pipes protected with HB Fuller Firesound sealant	Test is to older revisions of AS 1530.4 – the only variation is the version of the standard	WFRA 41527.1, FRT200220 R1.0	A5G3(1)(d)	S1C2(b)	*Refer to Table 2 and* *Table 3* Table 3

Table 2 Assessment outcome of proposed services penetrating AAC/concrete wall

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
1	AS 1530.4:2014 Appendix D1 cables	Maximum 350 mm wide × 90 mm high	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/90	-/180/90	-/180/90	WFRA 41527.1
2	AS 1530.4:2014 Appendix D2 cables	Maximum 200 mm wide × 160 mm high		-/120/120	-/180/120	-/180/120	WFRA 41527.1
3	A single 50 pair telecommunication cable	Maximum 40 mm	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 30 mm × 30 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/120	-/180/180	/180/180	WFRA 41527.1
4	22 mm (ID) steel sprinkler pipe with a wall thickness of 3 mm	Maximum 40 mm		-/120/120	-/180/180	/180/180	WFRA 41527.1
5	32 mm (ID) steel sprinkler pipe with a wall thickness of 3 mm	Maximum 40 mm	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/120	-/180/180	/180/180	WFRA 41527.1
6	100 mm (ID) copper pipe with a wall thickness of 2 mm	Maximum 150 mm		-/120/-	-/180/-	-/180/-	WFRA 41527.1
7	80 mm (ID) steel sprinkler pipe with a wall thickness of 4 mm	Maximum 100 mm		-/120/30	-/180/30	-/180/30	WFRA 41527.1

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	

Notes–

- The separating must be tested or assessed for required FRL by an Accredited Testing Laboratory (ATL). Alternatively, the concrete wall must be designed in accordance with AS 3600:2018 as appropriate.
- For D1 cables the cable tray can be maximum 325 mm wide × 47 mm high × 1 mm thick.
- For D2 cables the cable tray can be maximum 175 mm wide × 50 mm high × 1 mm thick.
- Express 290 D primer must be painted on the inside of the opening and up to 30 mm around the opening on both faces prior to sealing for all services.
- Open cell foam backing rod 30 mm × 20 mm with density of 20 Kg/m^3 must be positioned 10 mm back from both sides of the wall.

Table 3 Assessment outcome of proposed cable services penetrating in concrete floor

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
1	AS 1530.4:2014 Appendix D1 cables	Maximum 350 mm long × 90 mm wide	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/60	-/180/60	-/240/60	FRT200220 R1.0

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
2	22 (ID) steel pipe with 3 mm wall thickness	Maximum 40 mm	The Firesound sealant must be applied to a depth of 20 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/90	-/180/90	-/240/90	FRT200220 R1.0
3	32 (ID) steel pipe with 3 mm wall thickness	Maximum 50 mm	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/120	-/180/120	-/240/120	FRT200220 R1.0
4	80 (ID) steel pipe with 4 mm wall thickness	Maximum 100 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0
5	DN 32 Copper, brass, steel pipe with 0.91 mm wall thickness	Maximum 50 mm		-/120/120	-/180/120	-/240/120	FRT200220 R1.0
6	DN 40 -DN 65 Copper, brass, steel pipes with 0.91 mm wall thickness	**Pipe** / **Aperture** 40 mm / Maximum 60 mm 65 mm / Maximum 90 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0
7	DN 80 – DN 100 Copper, brass, steel pipes with 1.22 mm wall thickness	**Pipe** / **Aperture** 80 mm / Maximum 100 mm 100 mm / Maximum 150 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
8	DN 100 copper pipe with 2.0 mm wall thickness	Maximum 150 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0
9	DN 125 copper, steel pipe with 1.42 mm wall thickness	Maximum 175 mm	The Firesound sealant must be applied to a depth of 20 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/15	-/180/15	-/180/15	FRT200220 R1.0
10	DN 150 Copper, steel pipe with 1.63 mm wall thickness	Maximum 200 mm		-/120/15	-/180/15	-/180/15	FRT200220 R1.0

Notes–

+ The separating must be tested or assessed for required FRL by an Accredited Testing Laboratory (ATL). Alternatively, the concrete wall must be designed in accordance with AS 3600:2018 as appropriate.
+ Concrete floor must be designed in accordance with AS 3600:2018 as appropriate.
+ For D1 cables the cable tray can be maximum 350 mm wide × 90 mm wide.

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1.0 Introduction

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of cable and metal pipe penetrations in AAC/concrete walls and concrete floors protected with H B Fuller FIRESOUND sealant –in accordance with AS 1530.4:2014[2] and assessed in accordance with AS 4072.1:2005(R2016)[3].

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 HB Fuller Australia Ptd Ltd. The sponsor details are included in Table 4.

Table 4 Sponsor details

Sponsor	Address
H B Fuller Australia Pty Ltd	16-22 Redgum Drive Dandenong South VIC 3175 Australia

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

[2] Standards Australia, 2014, Methods for fire tests on building materials, components and structures – Part 4: Fire-resistance tests for elements of construction, AS1530.4:2014, Standards Australia, NSW.
[3] Standards Australia, 2005, Components for the protection of openings in fire-resistant separating elements – Part 1: 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.

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 15725:2023[5] 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 assessment 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 fire resistance level that apply to the assessed systems based on Specifications 1 and 2 for fire resistance for building elements.

The proposed details and systems (building elements) in this report are confirmed to be assessed, without the aid of an active fire suppression system, based on prototype tests that are equivalent to or more severe than a standard fire test as specified in section 4.4, in accordance with NCC 2022 S1C2(b). It is also confirmed that the differences between 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 10 October 2025, HB Fuller Australia Ptd Ltd confirmed that:

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

[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.

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 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 report relies on test evidence and applies only to the specific specimens tested. It does not verify ongoing compliance or the performance of future production batches.
- 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.

4.0 Description of the specimen and variations

4.1 Description of assessed system

Penetration services assessed in this assessment report include cables and metal pipes in AAC/concrete walls and concrete floors - protected with H B Fuller Firesound sealant on both sides. Firesound is a one part, water-based construction sealant for sealing joints and penetrations where fire resistance is required.

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
FRT200220 R1.0	H B Fuller Australia Pty Ltd	23 November 2020	Jensen Hughes Fire Testing Pty Ltd (Formerly known as Warringtonfire Australia)
WFRA 41257.1	H B Fuller Australia Company Pty Ltd	11 October 2006	

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
1	FRT200220 R1.0 WFRA 41257.1	A set of standard communication cables and metal pipe configurations in a 150 mm thick concrete floor protected with H B Fuller Firesound sealant were tested in FRT200220 R1.0 in accordance with AS 1530.4:2014. WFRA 41257.1 test specimens consisted of cable and metal pipe penetrations in a 150 mm thick wall system protected with H B Fuller Firesound sealant tested in accordance with AS 1530.4:2005.	Based on the results of the referenced tests, it is proposed to determine the expected fire resistance performance of various cables and metal pipes protected with H B Fuller Firesound sealant in AAC/concrete wall and concrete floor - in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

4.4 Test standard

Section 2 of AS 1530.4:2014 specifies the general requirements for conducting fire resistance tests. Section 10 of AS 1530.4:2014 gives guidelines for determining the fire resistance of elements of construction penetrated by services.

As per section 10.3 of AS 1530.4:2014, the purpose of the test covering service penetrations and control joints is to assess-

(a) The effect of the penetration or control joint on the integrity and insulation of the element.

(b) Insulation or integrity failure of the penetrating service or control joint.

4.5 Reference standard

AS 4072.1:2005 (R2016) sets out the minimum requirements for the construction, installation and application of fire resistance tests to sealing systems around penetrations through separating building elements that are required to have an FRL.

5.0 Assessment of cables and metal pipes

5.1 Description of variation

WFRA 41257.1 test included cable and metal pipe penetrations with various configurations protected by H B Fuller Firesound sealant on 150 mm thick steel reinforced CSR Hebel Powerpanel™ walls tested in accordance with AS 1530.4:2005. Test specimen in FRT200220 R1.0 included standard cable configurations and metal pipes protected by H B Fuller Firesound sealant in a 150 mm thick concrete floor tested in accordance with AS 1530.4:2014.

This assessment was done to determine the expected FRL performance of various telecommunication cables, power cables and metal pipes in an AAC/concrete wall and concrete floor protected by H B Fuller Firesound sealant in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

5.2 Methodology

The method of assessment used is summarised in Table 7.

Table 7 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
NCC procedure for determining fire performance	Specimen tested to an equivalent or more severe test S1C2(b) Variation differs in only a minor degree from a tested prototype S1C2(c)
Type of assessment	Qualitative and comparative

5.3 Relevance of WFRA 41257.1 test data with respect to AS 1530.4:2014

The fire resistance test WFRA 41257.1 was conducted in accordance with AS 1530.4:2005, which differs from AS 1530.4:2014. The effect these differences have on the fire resistance performance of the referenced test specimens is discussed below.

Furnace temperature measurement

The specifications for furnace thermocouples in AS 1530.4:2014 are the same as those specified in AS 1530.4:2005.

Furnace temperature regime

AS 1530.4:2005 and AS 1530.4:2014 specify furnace temperature to follow the following trend:

$$T_{AS\,1530.4:2014} = 345log_{10}(8t + 1) + 20$$

The parameters outlining the accuracy of control of the furnace temperature in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

Furnace pressure

The furnace pressure conditions for single and multiple penetration sealing systems in AS 1530.4:2005 and AS 1530.4:2014 are not appreciably different. The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

Furnace pressure regime

AS 1530.4:2014 and AS 1530.4:2005 specify that a pressure of 15 ± 3 Pa shall be established at the centre of the lowest penetration service.

Specimen temperature measurement

The specification and location for specimen thermocouples in AS 1530.4:2014 are the same as those specified in AS 1530.4:2005.

Integrity performance criteria

AS 1530.4:2014 stipulates that, in addition to the 20 mm thick × 100 mm × 100 mm cotton pads, additional cotton pads shall be provided with a reduced 30 mm × 30 mm × 20 mm with an additional wire frame holder and shall be used to determine integrity failure.

Apart from the above variation, the failure criteria for integrity in AS 1530.4:2014 and AS 1530.4:2005 are not appreciably different.

Insulation performance criteria

The insulation criteria specified in AS 1530.4:2014 are the same as those specified in AS 1530.4:2005.

Restraint

The application of restraint to the test specimen in AS 1530.4:2014 and AS 1530.4:2005 is not appreciably different.

Active fire suppression

Both AS 1530.4:2014 and AS 1530.4:2005, which are standards for fire resistance testing of elements of building construction, do not incorporate provisions for active fire suppression systems. Consequently, the FRL achieved by the prototype was attained without the aid of an active fire suppression system.

Application of WFRA 41257.1 test data as to AS 1530.4:2014

The average pressure over a 5 minute period at various times during the test exceeded the maximum variation of ± 3 Pa; the running average of pressure at all times during the test remained within the specified limits of variance, this variation is considered slightly more onerous than that required by the test standard and is not considered to significantly affect the results of the test.
Upon commencement of the fire resistance test it had become evident that some thermocouples had become faulty, causing some services to not comply with the thermocouple locations specified in AS 1530.4:2014. The remaining thermocouples did however cover at least one point of the thermocouple locations specified in AS 1530.4:2014. Roving thermocouple readings were taken where possible. This variation in not considered to significantly affect the results of the test.
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 WFRA 41257.1 – can be used to assess the integrity and insulation performance in accordance with AS 1530.4:2014.

5.4 Assessment of cables and metal pipes

5.4.1 Tested systems

Appendix D1 power cables, protected with Firesound sealant, were tested in CSR Hebel PowerPanel™ walls (Test Reference: WFRA 41257.1), achieving 180 minutes of integrity and 90 minutes of insulation. When tested in concrete floors (Test Reference: FRT200220 R1.0), the same cable type achieved 240 minutes of integrity and 60 minutes of insulation.

Appendix D2 cables, also protected with Firesound sealant, were tested in CSR Hebel PowerPanel™ walls under WFRA 41257.1. The system achieved a Fire Resistance Level (FRL) of -/180/120, with no integrity failure observed at 181 minutes when the test was terminated.

A single 50-pair PVC insulated copper telecom cable was tested in a 150 mm thick wall system (Test Reference: WFRA 41527.1). The system maintained both integrity and insulation performance for 180 minutes.

Steel pipes of various diameters and wall thicknesses were tested in a 150 mm thick concrete wall under WFRA 41527.1. A 22 mm steel pipe with a wall thickness of 3 mm achieved 180 minutes of integrity and insulation. Similarly, a 32 mm steel pipe with a wall thickness of 3 mm also achieved 180 minutes of integrity and insulation. An 80 mm steel pipe with a wall thickness of 4 mm achieved 180 minutes of integrity and 41 minutes of insulation.

Copper pipes were tested in both wall and floor systems. A 100 mm copper pipe with a wall thickness of 2 mm was tested in a concrete wall (WFRA 41527.1) and achieved 180 minutes of integrity. The same pipe tested in a concrete floor (FRT200220 R1.0) achieved 241 minutes of integrity and 24 minutes of insulation. A 32 mm copper pipe with a wall thickness of 0.91 mm, tested in a concrete floor, achieved 241 minutes of integrity and 127 minutes of insulation. A 200 mm copper pipe with a wall thickness of 2.03 mm, also tested in a concrete floor, achieved 228 minutes of integrity and 17 minutes of insulation.

A 100 mm brass pipe with a wall thickness of 2.02 mm was tested in a 150 mm concrete floor (FRT200220 R1.0) and achieved 241 minutes of integrity and 37 minutes of insulation.

5.4.2 Assessment of metal pipes

AS 1530.4 clause 10.12.3.1 stipulates that the results may be applied to brass pipes of the same composition up to a maximum outside diameter of 101.6 mm and to copper and ferrous metal pipes having wall thicknesses greater than or equal to those listed in Table 10.12.3.1 provided the same penetration sealing system was used for the above penetration in the same type of separating element and all the specimens achieved the required FRL.

TABLE 10.12.3.1
METAL PIPE DEEMED TO HAVE EQUIVALENT FIRE RESISTANCE LEVELS

Nominal size	Actual OD (outside diameter)	Actual wall thickness
mm	mm	mm
32	31.75	0.91
40	38.10	0.91
50	50.80	0.91
65	63.50	0.91
80	76.20	1.22
90	88.90	1.22
100	101.60	1.22
125	127.00	1.42
150	152.40	1.63

5.4.3 Assessment of steel pipes

According to AS 1530.4:2014 section 10, results of the above specimen may be applied to pipes of the same material and to ferrous (steel) metal pipes having an outside diameter not greater than the tested diameter and a thickness not less than the tested thickness. Generally, the melting point of steel metal pipes is higher than that of copper pipes. Thus, steel pipes are unlikely to excessively soften or melt. Therefore, the risk of integrity failure due to the formation of through gaps, sustained flaming or the passage of hot gasses or smoke from the exposed side to the unexposed side is not increased with the use of steel pipes.

The conductivity of steel is also much lower than that of copper pipes. Hence, steel pipes of the same size are unlikely to heat up to the same level as a copper pipe. Therefore, the risk of insulation failure is also reduced.

5.4.4 Separating element thickness

In practice, the FRL of the penetration service will be governed by the FRL of the separating element they are installed into. As per AS/NZS 3600:2018[7], 120 mm, 150 mm and 175 mm concrete walls and floors are indicated to achieve FRLs of -/120/120, -/180/180 and -/240/240 respectively if appropriate design conditions are met. Based on the above, services are assessed to separating elements of appropriate thickness.

5.5 Assessment outcome

This assessment demonstrates that the services listed in Table 8 to Table 9 are capable of achieving FRL as listed in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

Commented [OS1]: Check

[7] Standards Australia, 2018, Concrete structures, AS 3600:2018 (Incorporating Amendment No. 1), Standards Australia, NSW.

Table 8 Assessment outcome of proposed services penetrating AAC/concrete wall

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
1	AS 1530.4:2014 Appendix D1 cables	Maximum 350 mm wide × 90 mm high	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/90	-/180/90	-/180/90	WFRA 41527.1
2	AS 1530.4:2014 Appendix D2 cables	Maximum 200 mm wide × 160 mm high		-/120/120	-/180/120	-/180/120	WFRA 41527.1
3	A single 50 pair telecommunication cable	Maximum 40 mm	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 30 mm × 30 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/120	-/180/180	/180/180	WFRA 41527.1
4	22 mm (ID) steel sprinkler pipe with a wall thickness of 3 mm	Maximum 40 mm		-/120/120	-/180/180	/180/180	WFRA 41527.1
5	32 mm (ID) steel sprinkler pipe with a wall thickness of 3 mm	Maximum 40 mm	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/120	-/180/180	/180/180	WFRA 41527.1
6	100 mm (ID) copper pipe with a wall thickness of 2 mm	Maximum 150 mm		-/120/-	-/180/-	-/180/-	WFRA 41527.1
7	80 mm (ID) steel sprinkler pipe with a wall thickness of 4 mm	Maximum 100 mm		-/120/30	-/180/30	-/180/30	WFRA 41527.1

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	

Note–

+ The separating must be tested or assessed for required FRL by an Accredited Testing Laboratory (ATL). Alternatively, concrete wall must be designed in accordance with AS 3600:2018 as appropriate.
+ For D1 cables the cable tray can be maximum 325 mm wide × 47 mm high × 1 mm thick.
+ For D2 cables the cable tray can be maximum 175 mm wide × 50 mm high × 1 mm thick.

Table 9 Assessment outcome of proposed cable services penetrating in concrete floor

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
1	AS 1530.4:2014 Appendix D1 cables	Maximum 350 mm long × 90 mm wide	The Firesound sealant must be applied to a depth of 10 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/60	-/180/60	-/240/60	FRT200220 R1.0
2	22 (ID) steel pipe with 3 mm wall thickness	Maximum 40 mm	The Firesound sealant must be applied to a depth of 20 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/90	-/180/90	-/240/90	FRT200220 R1.0
3	32 (ID) steel pipe with 3 mm wall thickness	Maximum 50 mm	The Firesound sealant must be applied to a depth of 10 mm on both	-/120/120	-/180/120	-/240/120	FRT200220 R1.0

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
4	80 (ID) steel pipe with 4 mm wall thickness	Maximum 100 mm	the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/15	-/180/15	-/240/15	FRT200220 R1.0
5	DN 32 Copper, brass, steel pipe with 0.91 mm wall thickness	Maximum 50 mm		-/120/120	-/180/120	-/240/120	FRT200220 R1.0
6	DN 40 -DN 65 Copper, brass, steel pipes with 0.91 mm wall thickness	**Pipe** / **Aperture** 40 mm / Maximum 60 mm 65 mm / Maximum 90 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0
7	DN 80 – DN 100 Copper, brass, steel pipes with 1.22 mm wall thickness	**Pipe** / **Aperture** 80 mm / Maximum 100 mm 100 mm / Maximum 150 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0
8	DN 100 copper pipe with 2.0 mm wall thickness	Maximum 150 mm		-/120/15	-/180/15	-/240/15	FRT200220 R1.0
9	DN 125 copper, steel pipe with 1.42 mm wall thickness	Maximum 175 mm	The Firesound sealant must be applied to a depth of 20 mm on both the exposed and unexposed side from the separating element. A 50 mm × 50 mm fillet of the sealant must also be applied around the service on both exposed and unexposed sides of the separating element.	-/120/15	-/180/15	-/180/15	FRT200220 R1.0
10	DN 150 Copper, steel pipe with 1.63 mm wall thickness	Maximum 200 mm		-/120/15	-/180/15	-/180/15	FRT200220 R1.0

Item no.	Service	Aperture size	Sealing system	FRL			Reference test
				Minimum separating element thickness			
				120 mm	150 mm	175 mm	
Notes– + Concrete floor must be designed in accordance with AS 3600:2018 as appropriate. + For D1 cables the cable tray can be maximum 350 mm wide × 90 mm wide.							

6.0 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 HB Fuller Australia Ptd 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 – WFRA 41257.1

Table 10 Information about test report

Item	Information about test report
Report sponsor	H B Fuller Australia Pty Ltd
Test laboratory	Warrington Fire Research Aust Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was completed on 11 October 2006.
Test standards	The test was done in accordance with AS 1530.4:2005.
Variation to test standards	The average pressure over a 5 minute period at various times during the test exceeded the maximum variation of ±3Pa, the running average of pressure at all times during the test remained within the specified limits of variance. This variation is considered slightly more onerous than that required by the test standard and not considered to significantly affect the results of the test. Upon commencement of the fire resistance test it had become evident that some thermocouples had become faulty, causing some services not to comply with the thermocouple locations specified in AS 1530.4:2005. The remaining thermocouples did however cover at least one point of the thermocouple locations specified in AS 1530.4:2005. Roving thermocouple readings were taken where possible. This variation is not considered to significantly affect the results of the test.
General description of tested specimen	The test assembly comprised a nominal 1300mm wide × 1250mm × 150mm thick steel reinforced CSR Hebel Powerpanel™ wall system penetrated by the standard cable configurations for the evaluation of electrical and telecommunications cables and various sized metal pipes protected by H B Fuller Firesound sealant.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2005.

All the service penetrations except Service A are relevant to this assessment, the details of which are provided below in Table 11.

Table 11 Test specimens

Service	Description	Protection
B	AS1530.4-2014 Appendix D2 cables (standard configuration)	Foam backing rod was positioned in the annular gap a nominal 10 mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.
C	Single PVC insulated copper telecommunication cable	Foam backing rod was positioned in the annular gap a nominal 10 mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.
D	A 22mm (ID-measured) steel sprinkler pipe with a wall thickness of 3mm (measured).	Foam backing rod was positioned in the annular gap a nominal 10mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.
E	A 32mm (ID-measured) steel sprinkler pipe with a wall thickness of 3mm (measured).	Foam backing rod was positioned in the annular gap a nominal 10mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.
F	A 100mm (ID-measured) copper pipe with a wall thickness of 2mm (measured)	Foam backing rod was positioned in the annular gap a nominal 10mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.

Service	Description	Protection
G	An 80mm (ID-measured) steel sprinkler pipe with a wall thickness of 4mm (measured)	Foam backing rod was positioned in the annular gap a nominal 10mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.
H	AS1530.4-2014 Appendix D1 cables (standard configuration)	Foam backing rod was positioned in the annular gap a nominal 10mm back from both sides of the wall face. HB Fuller FIRESOUND sealant was used on both sides and was applied around the annular gap to the backing rod.

The test specimens achieved the following results – see Table 12.

Table 12 Results summary for this test report

Service	Criteria	Result	FRL
B	Integrity	No failure at 181 minutes	-/180/120
	Insulation	149 minutes	
C	Integrity	No failure at 181 minutes	-/180/180
	Insulation	No failure at 181 minutes	
D	Integrity	No failure at 181 minutes	-/180/180
	Insulation	No failure at 181 minutes	
E	Integrity	No failure at 181 minutes	-/180/180
	Insulation	No failure at 181 minutes	
F	Integrity	No failure at 181 minutes	-/180/-
	Insulation	14 minutes	
G	Integrity	No failure at 181 minutes	-/180/30
	Insulation	41 minutes	
H	Integrity	No failure at 181 minutes	-/180/90
	Insulation	100 minutes	

A.2 TEST REPORT – FRT200220 R1.0

Table 13 Information about test report

Item	Information about test report
Report sponsor	H B Fuller Australia Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was completed on 23 November 2020.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	The pressure was up to 1 Pa below the limits prescribed in the standard during the 225-230 minute period. The pressure and temperature were within the limits for the rest of the test. Due to the nature of the specimen and the fact that no significant events occurred during this time period, this under pressure is unlikely to have invalidated the test results.
General description of tested specimen	The test assembly comprised a nominal 1760 mm long × 1200 mm wide × 150mm thick concrete floor slab penetrated by standard cable configurations and various sized metal pipes protected by HB Fuller Firesound sealant.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

All the service penetrations except Service D are relevant to this assessment, the details of which are provided below in Table 14.

Table 14 Test specimens

Service	Description	Protection
A	D1 power cable group and 300 mm cable tray	A backing rod (item 2) was installed into the annular gap between the service and the separating element at a depth of 10 mm from the separating element on both the unexposed and exposed sides. The Firesound sealant (item 3) was then applied to the depth of the backing rod – that is, to 10 mm. A 50 mm × 50 mm fillet of sealant was also applied around the service on both the exposed and unexposed sides of the separating element.
B	DN 32 type D copper pipe, outer diameter 31.75 mm, thickness 0.91 mm	A backing rod (item 2) was installed into the annular gap between the service and the separating element at a depth of 10 mm from the separating element on both the unexposed and exposed sides. The Firesound sealant (item 3) was then applied to the depth of the backing rod – that is, to 10 mm. A 50 mm × 50 mm fillet of sealant was also applied around the service on both the exposed and unexposed sides of the separating element.
C	DN 100 type A copper pipe, outer diameter 101.6 mm, thickness 2.03 mm	A backing rod (item 2) was installed into the annular gap between the service and the separating element at a depth of 10 mm from the separating element on both the unexposed and exposed sides. The Firesound sealant (item 3) was then applied to the depth of the backing rod – that is, to 10 mm. A 50 mm × 50 mm fillet of sealant was also applied around the service on both the exposed and unexposed sides of the separating element.
E	DN 200 type B copper pipe, outer diameter 203.2 mm, thickness 2.03 mm	A backing rod (item 2) was installed into the annular gap between the service and the separating element at a depth of 20 mm from the separating element on both the unexposed and exposed sides. The Firesound sealant (item 3) was then applied to the depth of the backing rod – that is, to 20 mm. A 50 mm × 50 mm fillet of sealant was also applied around the service on both the exposed and unexposed sides of the separating element.

Service	Description	Protection
F	DN 25 type B copper pipe, outer diameter 25.4 mm, thickness 1.22 mm	A backing rod (item 2) was installed into the annular gap between the service and the separating element at a depth of 20 mm from the separating element on both the unexposed and exposed sides. The Firesound sealant (item 3) was then applied to the depth of the backing rod – that is, to 20 mm. A 50 mm × 50 mm fillet of sealant was also applied around the service on both the exposed and unexposed sides of the separating element.
G	DN 100 brass pipe, outer diameter 101.6 mm, thickness 2.02 mm	A backing rod (item 2) was installed into the annular gap between the service and the separating element at a depth of 20 mm from the separating element on both the unexposed and exposed sides. The Firesound sealant (item 3) was then applied to the depth of the backing rod – that is, to 20 mm. A 50 mm × 50 mm fillet of sealant was also applied around the service on both the exposed and unexposed sides of the separating element.

The test specimen achieved the following results – see Table 15.

Table 15 Results summary for this test report

Service	Criteria	Results	FRL
A	Integrity	No failure at 241 minutes	-/240/60
	Insulation	Failure at 60 minutes	
B	Integrity	No failure at 241 minutes	-/240/120
	Insulation	Failure at 127 minutes	
C	Integrity	No failure at 241 minutes	-/240/15
	Insulation	Failure at 24 minutes	
E	Integrity	Failure at 228 minutes	-/180/15
	Insulation	Failure at 17 minutes	
F	Integrity	No failure at 241 minutes	-/240/90
	Insulation	Failure at 100 minutes	
G	Integrity	No failure at 241 minutes	-/240/30
	Insulation	Failure at 37 minutes	