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Fire assessment report

Control joints protected with HB Fuller Firesound in accordance with AS 1530.4:2014 and AS 4072.1:2005

Sponsor: HB Fuller Aust Co P/L

Report number: FAS200118 Revision: R1.2

Issued date: 17 September 2021 Expiry date: 31 July 2026

Quality management

Version	Date	Information about the report			
R1.0	Issue: 27/07/2021	Reason for issue	Initial issue		
			Prepared by	**Reviewed by**	**Authorised by**
		Name	Alim Rasel	Yomal Dias	Omar Saad
R1.1	Issue: 10/09/2021	Reason for issue	Updated with revised figures and typographical amendments		
			Prepared by	**Reviewed by**	**Authorised by**
		Name	Alim Rasel	Yomal Dias	Omar Saad
R1.2	Issue: 14/09/2021	Reason for issue	Minor typographical amendments		
			Prepared by	**Reviewed by**	**Authorised by**
	Expiry: 31/07/2026	**Name**	Dugald Watson	Yomal Dias	Yomal Dias
		Signature			

Executive summary

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of control joints protected with HB Fuller Firesound if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005.

HB Fuller Firesound is described as a water-based construction sealant which is generally used to seal construction joints and service penetrations in concrete walls and floors.

The analysis in section 5 of this report found that the proposed systems, together with the described variations, are expected to achieve FRLs as shown in Table 1 – Table 4, if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005.

Table 1 Control joints with sealant on both sides in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
50 mm	HB Fuller Firesound applied with open cell backing rod	25 mm	Applied on both sides as illustrated in Figure 1	-/120/120	-/180/180	-/240/240
40 mm		20 mm				
30 mm		15 mm				
20 mm		10 mm				
10 mm		10 mm				
*The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.						

Table 2 Control joints with sealant on fire side in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
35 mm	HB Fuller Firesound applied with open cell backing rod	25 mm	Applied on the exposed side as illustrated in Figure 2	-/120/60	-/180/60	-/240/60
20 mm		15 mm		-/120/30	-/180/30	-/240/30
10 mm		10 mm		-/120/120	-/180/180	-/240/240
*The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.						

Table 3 Control joints with sealant on non-fire side in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
35 mm	HB Fuller Firesound applied with	25 mm	Applied on the unexposed side as	-/120/90	-/180/90	-/240/90
20 mm		15 mm		-/120/90	-/180/120	-/240/120

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
10 mm	open cell backing rod	10 mm	illustrated in Figure 3	-/120/120	-/180/180	-/240/240
*The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.						

Table 4 Double caulked control joints in concrete walls and floors

Control joint width	Local fire-stopping protection	First layer sealant depth	Second layer sealant depth	Distance between sealant	FRL		
					Minimum separating element thickness***		
					120 mm	150 mm	175 mm
26 mm – 35 mm	HB Fuller Firesound with open cell backing rod	30 mm	20 mm	Minimum 45 mm with an airgap as shown in Figure 4	-/120/120	-/180/180	-/240/240**
11 mm – 25 mm wide		30 mm	20 mm*				
10 mm wide		10 mm	10 mm	Applied back-to-back or with an air gap as shown in Figure 4	-/120/120	-/180/180	-/240/240
*Can be reduced to 15 mm if installed in 120 mm concrete wall and floor for -/120/120. **Distance between the face of the exposed separating element and first layer of sealant must not be more than 40 mm. ***The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.							

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2, 3 and 6 of this report. The results of this report are valid until 31 July 2026.

Contents

1. Introduction

This report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of control joints protected with HB Fuller Firesound if tested in accordance with AS 1530.4:2014[1] and assessed in accordance with AS 4072.1:2005[2].

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) as applicable to the assessed systems.

This assessment was carried out at the request of HB Fuller Aust Co P/L. The sponsor details are included in Table 5.

Table 5 Sponsor details

Sponsor	Address
HB Fuller Aust Co P/L	16-22 Redgum drive Dandenong South VIC 3175 Australia

2. Framework for the assessment

2.1 Assessment approach

An assessment is an opinion about the expected performance of a component or element of structure if it was subject to a fire test.

No specific framework, methodology, standard or guidance documents exists in Australia for doing 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 2019[3].

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.

Assessments will 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 based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance if the elements were to be tested in accordance with AS 1530.4:2014.

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.

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1 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.
2 Standards Australia, 2005, Components for the protection of openings in fire-resistant separating elements: Service penetrations and control joints (Reconfirmed 2016), AS 4072.1:2005 (R2016), Standards Australia, NSW.
3 Passive Fire Protection Forum (PFPF), 2019, Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence, Passive Fire Protection Forum (PFPF), UK.

2.2 Compliance with the National Construction Code

This assessment report has been prepared to meet the evidence of suitability requirements of the National Construction Code Volumes One and Two – Building Code of Australia (NCC) 2019 including amendments[4] under A5.2 (1) (d).

This assessment has been written in accordance with the general principles outlined in EN 15725:2010[5] for extended application reports on the fire performance of construction products and building elements. It also references test evidence for meeting a performance requirement or deemed to satisfy (DTS) provisions of the NCC under A5.4 for fire resistance levels as applicable to the assessed systems.

This assessment report may also be used to demonstrate compliance with the requirements for evidence of suitability under NCC 2016 including amendments[6].

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 15 April 2020, HB Fuller Aust Co P/L confirmed that:

- To their knowledge 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.
- 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. 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 that are expected if the systems were tested in accordance with AS 1530.4:2014 and assessment in accordance with AS 4072.1:2005.
- This assessment is applicable 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 is applicable 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. The application of sealant related to direction of exposure is stipulated in relevant sections.
- The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.

[4] National Construction Code Volumes One and Two - Building Code of Australia 2019 including Amendments, Australian Building Codes Board, Australia
[5] European Committee for Standardization, 2010, Extended application reports on the fire performance of construction products and building elements, EN 15725:2010, European Committee for Standardization, Brussels, Belgium.
[6] National Construction Code Volumes One and Two - Building Code of Australia 2016 including Amendments, Australian Building Codes Board, Australia

- This report is only valid for the assessed systems and must not be used for any other purpose. Any changes with respect to size and construction details – 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).
- The documentation that forms the basis for this report is listed in Appendix A.
- This report has been prepared based on information provided by others. Warringtonfire has not verified the accuracy and/or completeness of that information and will not be responsible for any errors or omissions that may be 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 the expert handling, placing and finishing of the products on site. These variables are beyond the control and consideration of this report.

4. Description of the specimen and variations

4.1 System description

The proposed system consists of control joints in concrete walls and floors protected with HB Fuller Firesound sealant. The joints vary in their width and application of sealant subject to direction of exposure. The concrete separating elements vary in their thicknesses.

4.2 Referenced test data

The assessment of the variation to the tested system and the determination of the expected performance is based on the results of the fire tests documented in the reports summarised in Table 6. Further details of the tested system are included in Appendix A.

Table 6 Referenced test data

Report number	Test sponsor	Test date	Testing authority
FRT200213 R1.0	HB Fuller Aust Co P/L	25 August 2020	Warringtonfire Australia
FRT190135 R1.0		26 June 2019	
FRT200323 R1.1		21 June 2021	
FRT200212 R1.0		26 August 2020	

4.3 Variations to the tested systems

An identical system has not been subject to a fire test. We have therefore assessed the systems using baseline test information for similar systems. The variations to the tested systems – together with the referenced fire tests – are described in Table 7.

Table 7 Variations to tested systems

Item	Reference test	Sealant orientation	Description	Variations
Separating element	FRT200213 R1.0, FRT190135 R1.0, FRT200323 R1.1, FRT200212 R1.0.	Single sided and double sided	The joints were tested in a 150 mm thick concrete floor and a 175 mm thick concrete wall.	It is proposed that the joints in minimum 120 mm, 150 mm and 175 mm thick concrete walls and floors are assessed. The separating element may also include lightweight concrete, hollow core masonry construction.
Control joints	FRT200213 R1.0	Double sided	10 mm wide control joint with 10 mm deep HB Fuller	It is proposed that a 10 mm wide control joint with 10 mm deep HB Fuller Firesound

Item	Reference test	Sealant orientation	Description	Variations
			Firesound sealant on the exposed side was tested.	sealant on both side is assessed.
	FRT200323 R1.1		25 mm wide double caulked control joint with 25 mm and 15 mm deep sealant (applied back-to-back) was tested.	It is proposed that 25 mm wide double caulked control joint with 30 mm and 20 mm deep sealant applied with an air gap is assessed. Additionally, the sealant depth is proposed to be varied to 30 mm and 15 mm while installing in a 120 mm concrete wall and floor.
			35 mm, 25 mm and 10 mm wide double caulked control joints were tested.	It is proposed joints between the range of 11 mm – 25 mm and 26 mm – 35 mm are assessed.

4.4 Test and Assessment standards

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 and control joints.

AS 4072.1:2005 sets out minimum requirements for construction, installation and application of fire resistance tests to sealing systems.

4.5 Schedule of components

The proposed control joints and their protection with HB Fuller Firesound relative to the direction of exposure is illustrated in Figure 1 – Figure 4.

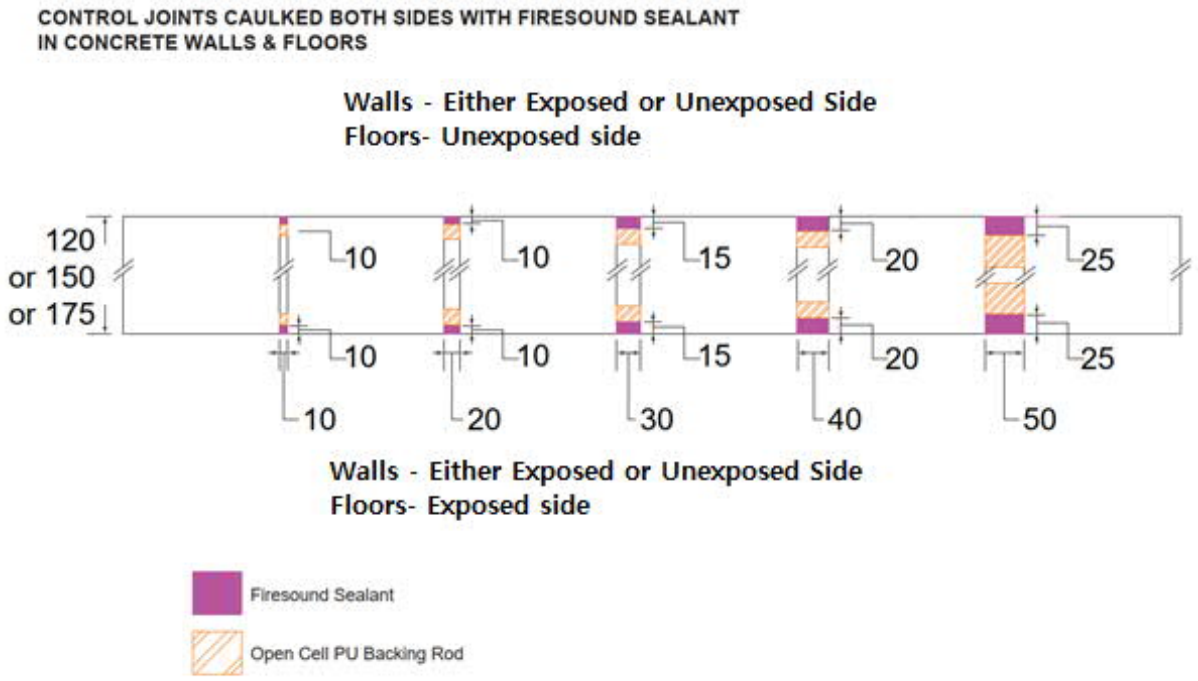

Figure 1 Control joints with HB Fuller Firesound sealant caulked on both sides in concrete walls and floors.

**CONTROL JOINTS WITH FIRESOUND SEALANT
ON FIRE SIDE ONLY IN CONCRETE WALLS & FLOORS**

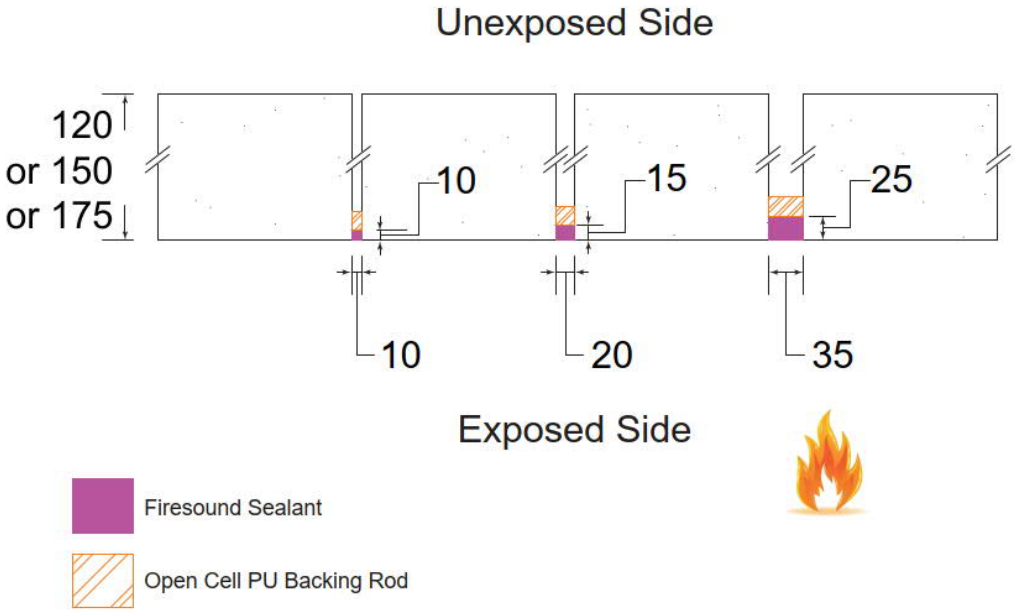

Figure 2 **Control joints with HB Fuller Firesound sealant on fire side in concrete walls and floors**

**CONTROL JOINTS WITH FIRESOUND SEALANT
ON NON FIRE SIDE ONLY IN CONCRETE WALLS & FLOORS**

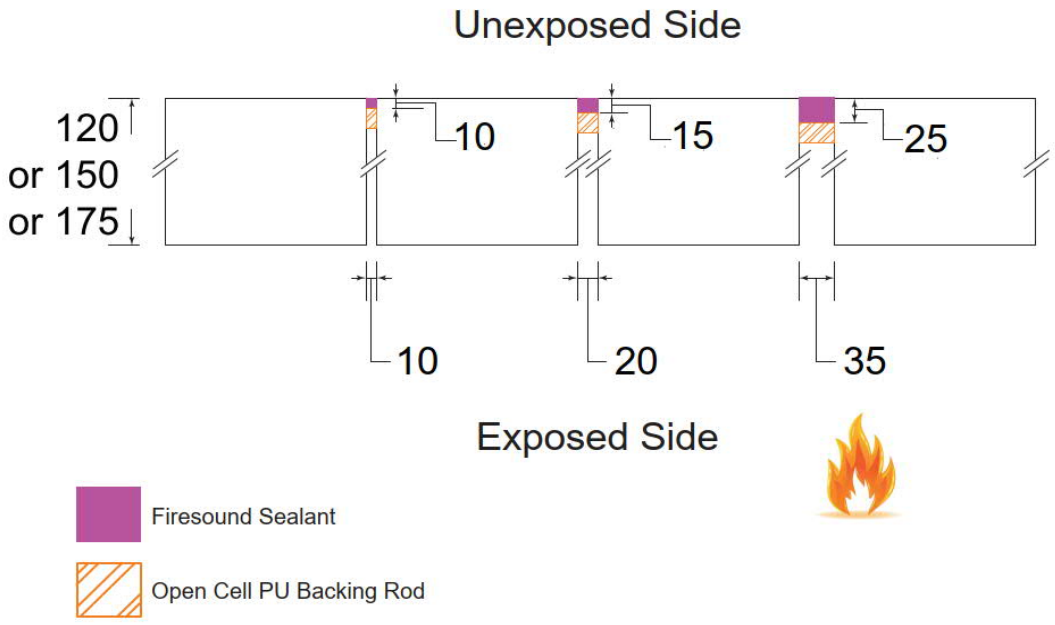

Figure 3 **Control joints with HB Fuller Firesound sealant on non-fire side in concrete walls and floors**

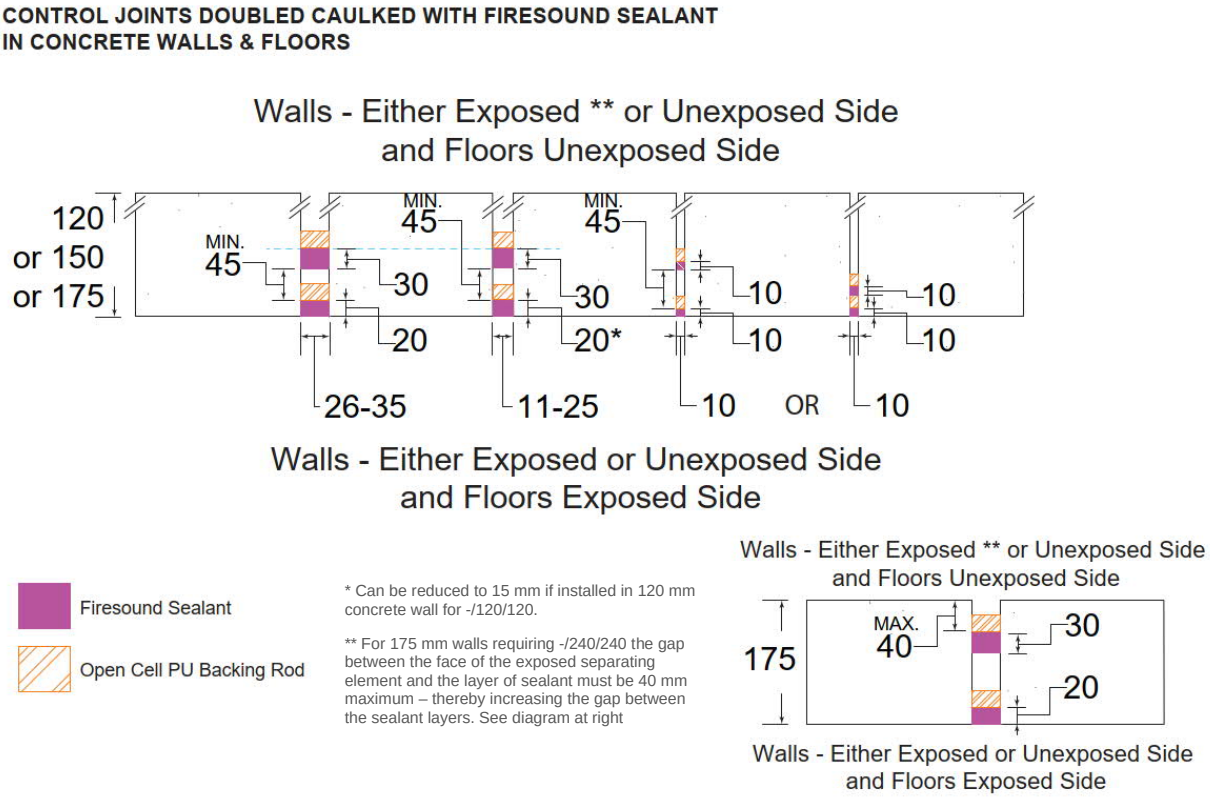

Figure 4 **Control joints double caulked with HB Fuller Firesound sealant in concrete walls and floors**

5. Assessment – Control joint protected with HB Fuller Firesound sealant

5.1 Description of variation

A series of control joints protected with HB Fuller Firesound sealant was tested in concrete walls and floors. It is proposed that the joints are assessed with sealant applied either on the fire side or the non-fire side or on both sides as illustrated in Figure 1 – Figure 4.

This assessment analyses the available test data and assesses the applicable fire resistance level of the proposed joints in accordance with AS 1530.4:2014 and AS 4072.1:2005.

5.2 Methodology

The method of assessment used is summarised in Table 8.

Table 8 **Method of assessment**

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative – interpolation/Comparative

5.3 Control joints with sealant on both sides

In test FRT200213 R1.0, a 50 mm wide control joint with 25 mm deep HB Fuller Firesound sealant on both sides, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using open cell backing rods. This construction achieved an FRL of -/240/180. The insulation failure at 213 minutes was recorded on the separating element. The joint otherwise

maintained insulation up to 240 minutes. Therefore, it is considered that if the sealant is installed in a 175 mm thick separating element with an established FRL of -/240/240, the temperature adjacent to the joint is not expected to fail insulation for at least up to 240 minutes.

Additionally, a 30 mm wide control joint with 15 mm deep HB Fuller Firesound sealant on both sides, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using open cell backing rods. This construction achieved an FRL of -/240/180. The insulation failure at 215 minutes was recorded on the separating element. The joint otherwise maintained insulation up to 240 minutes. Therefore, it is considered that if the sealant is installed in a separating element with an established FRL of -/240/240, the joint will retain the FRL of the separating element.

In test FRT190135 R1.0, a 40 mm wide joint with 20 mm deep HB Fuller Firesound sealant on both sides, installed in a 175 mm concrete wall system was tested in accordance with AS 1530.4:2014. This construction achieved an FRL of -/240/240. At 240 minutes, the maximum temperature on the sealant was recorded to be 155ºC. It is proposed that the tested joint will be installed in a concrete floor. Considering the exposure condition, it is expected that a similar temperature profile will be observed on the unexposed side if the 40 mm joint is installed in a 175 mm concrete floor. However, joints in floors are considered more onerous in terms of integrity due to the gravitational effect which can cause the sealant to detach and fall off. Such behaviour will largely depend on the fire resistance properties of sealant and their ability to maintain a connection with the separating element. As the wider 50 mm × 25 mm and narrower 30 mm × 15 mm joints have demonstrated their ability to maintain integrity performance in floor up to 240 minutes, it is reasonable to conclude that the proposed 40 mm × 20 mm joint will also maintain integrity up to 240 minutes. Based on the above, 40 mm wide control joint with 20 mm wide sealant applied on both sides is positively assessed for an FRL of -/240/240.

In test FRT200323 R1.1, a 10 mm wide control joint with 10 mm deep HB Fuller Firesound sealant on the exposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an FRL of -/240/240. This test validates the performance of HB Fuller sealant while protecting a 10 mm joint on fire side. It is proposed that the sealant will be applied on both sides. The additional layer of sealant is expected to act as a secondary barrier and hence improve the joint performance. Based on the above, a 10 mm wide control joint with 10 mm wide sealant applied on both sides is positively assessed for an FRL of -/240/240.

It is proposed that based on the above test data, a 20 mm wide joint with 10 mm deep HB Fuller Firesound sealant on both sides in concrete floor is assessed. In the test FRT190135 R1.0, a 20 mm wide joint with 10 mm deep HB Fuller Firesound sealant on both sides was tested in a 175 mm concrete wall system. This construction achieved an FRL of -/240/240. At 240 minutes, the maximum temperature on the sealant was recorded to be 156ºC. It is considered that a similar temperature profile will be observed if the 20 mm joint is installed in a 175 mm concrete floor. However, as discussed above, joints in floors are considered to be more onerous in terms of integrity due to the gravitational effect. As the wider 30 mm × 15 mm and the narrower 10 mm × 10 mm joints have demonstrated their ability to maintain integrity performance in floors up to 240 minutes, it is reasonable to conclude that the proposed 20 mm × 10 mm joint will also maintain integrity up to 240 minutes. Based on the above, a 20 mm wide control joint with 10 mm wide sealant applied on both sides is positively assessed for a FRL of -/240/240.

The above discussion establishes the ability of 50 mm, 40 mm, 30 mm, 20 mm and 10 mm wide joints with respective sealant depths of 25 mm, 20 mm, 15 mm, 10 mm and 10 mm to achieve up to 240 minutes of integrity and insulation performance in concrete floors. It is proposed that the joints will be installed in concrete walls. As discussed earlier, the performance of the sealant is governed by the level of fire resistance offered by the sealant and its ability to adhere to the separating element. The fire resistance performance of the sealant remains identical in floor and wall applications. However, joints in floors are considered to be more onerous in terms of integrity due to the gravitational effect which can cause the sealant to detach. As the sealant has demonstrated its performance in floors, which is considered to be the more onerous configuration, it is reasonable to conclude that the same performance will be replicated in walls. Based on the above, the proposed joints are positively assessed in walls.

The expected performance of the sealant in insolation was discussed above. However, in practice, the FRL of the joints 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, the applicable FRL of the control joints are summaries in Table 9.

Table 9 Control joints with sealant on both sides in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness		
				120 mm	150 mm	175 mm
50 mm	HB Fuller Firesound applied with open cell backing rod	25 mm	Applied on both sides as illustrated in Figure 1	-/120/120	-/180/180	-/240/240
40 mm		20 mm				
30 mm		15 mm				
20 mm		10 mm				
10 mm		10 mm				

5.4 Control joints with sealant on one side

5.4.1 Sealant on fire side

In test FRT200323 R1.1, a 10 mm wide control joint with 10 mm deep HB Fuller Firesound sealant on the exposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an FRL of -/240/240.

Additionally, a 20 mm wide control joint with 15 mm deep HB Fuller Firesound sealant on the exposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an FRL of -/240/30.

Furthermore, a 35 mm wide control joint with 25 mm deep HB Fuller Firesound sealant on the exposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an FRL of -/240/60.

The above observations establish the ability of 35 mm, 20 mm and 10 mm wide joints with respective sealant depths of 25 mm, 15 mm and 10 mm to achieve up to 240 minutes of integrity and insulation performance (as applicable) in concrete floor when applied on the exposed side. It is proposed the joints will be installed in concrete walls. The insulation performance of the joints is expected to remain identical in both wall and floor applications. However, as discussed above, joints in floors are considered more onerous in terms of integrity due to the gravitational effect. As the joints were tested in floors, it is reasonable to conclude that similar or better performance will be achieved if they are installed in walls. Based on the above, the proposed joints are positively assessed in walls.

In practice, the FRL of the joints will be governed by the FRL of the separating element they are installed into. As per AS/NZS 3600:2018, 120 mm, 150 mm and 175 mm concrete walls and floors are expected to achieve FRLs of -/120/120, -/180/180 and -/240/240 respectively if appropriate design conditions are meet. Based on the above, the applicable FRLs of the control joints are summarised in Table 10.

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

Table 10 Control joints with sealant on fire side in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness		
				120 mm	150 mm	175 mm
35 mm	HB Fuller Firesound™ applied with open cell backing rod	25 mm	Applied on the exposed side as illustrated in Figure 2	-/120/60	-/180/60	-/240/60
20 mm		15 mm		-/120/30	-/180/30	-/240/30
10 mm		10 mm		-/120/120	-/180/180	-/240/240

5.4.2 Sealant on non-fire side

In test FRT200212 R1.0, a 10 mm wide control joint with 10 mm deep HB Fuller Firesound sealant applied on the unexposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an FRL of -/240/180. The insulation failure at 183 minutes was recorded on the separating element. The joint otherwise maintained insulation up to 240 minutes. It is therefore considered that if the joint was installed into a 175 mm separating element with an established FRL of -/240/240, the temperature adjacent to the joint is not expected to fail insulation at least up to 240 minutes.

Additionally, a 35 mm wide control joint with 25 mm deep HB Fuller Firesound sealant on the unexposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an integrity performance of 241 minutes and insulation performance of 105 minutes. It is proposed the 35 mm wide joint will be installed in 120 mm concrete floor. The reduction in floor thickness is likely to increase the recorded temperature on the unexposed side. However, it is considered that, this is not sufficient to cause insulation failure at least up to 90 minutes. Based on the above, 35 mm wide control joint with 25 mm deep HB Fuller Firesound sealant on the unexposed side, installed in a 120 mm concrete floor is positively assessed for -/120/90.

Furthermore, a 20 mm wide control joint with 15 mm deep HB Fuller Firesound sealant on the unexposed side, installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealant was applied using an open cell backing rod. This construction achieved an integrity performance of 241 minutes and insulation performance of 124 minutes. It is proposed the 20 mm joint will be installed in 120 mm concrete floor. This signifies a reduction in separating element thickness which is likely to reduce the insulation of the joint. Therefore, 20 mm wide control joint with 15 mm deep HB Fuller Firesound sealant on the unexposed side, installed in a 120 mm concrete floor is conservatively assessed to -/120/90.

The above observations establish the ability of 35 mm, 20 mm and 10 mm wide joints with respective sealant depths of 25 mm, 15 mm and 10 mm to achieve up to 240 minutes of integrity and insulation performance (as applicable) in concrete floor when applied on the unexposed side. As joints in floor are considered more onerous, it is expected that the observed performance will be replicated in concrete walls.

In practical applications, the FRL of the joints will be dictated by the separating element they are installed into. As per AS/NZS 3600:2018, 120 mm, 150 mm and 175 mm concrete walls and floors are stipulated to achieve FRL of -/120/120, -/180/180 and -/240/240 respectively if appropriate design conditions are meet. Based on the above, the applicable FRLs of the control joints are summarised in Table 11.

Table 11 Control joints with sealant on non-fire side in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness		
				120 mm	150 mm	175 mm
35 mm		25 mm		-/120/90	-/180/90	-/240/90

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness		
				120 mm	150 mm	175 mm
20 mm	HB Fuller Firesound™ applied with open cell backing rod	15 mm	Applied on the unexposed side as illustrated in Figure 3	-/120/90	-/180/120	-/240/120
10 mm		10 mm		-/120/120	-/180/180	-/240/240

5.5 Double caulked control joints

In test FRT200323 R1.1, a 35 mm wide double caulked control joint with 30 mm and 20 mm deep sealant installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealants were applied 45 mm apart and installed using backing rods. This construction achieved an FRL of -/240/240.

Additionally, a 10 mm wide double caulked control joint with 10 mm and 10 mm deep sealant installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealants were applied back-to-back and installed using backing rods. This construction achieved an FRL of -/240/240.

Furthermore, a 25 mm wide double caulked control joint with 25 mm and 15 mm deep sealant installed in a 150 mm concrete floor was tested in accordance with AS 1530.4:2014. The sealants were applied back-to-back and installed using backing rods. This construction achieved an FRL of -/240/90. The reduction in insulation performance can be attributed to back-to-back installation of the sealant as it offers heat transfer through conduction in addition to radiation and convection.

It is proposed that the sealants will be applied 45 mm apart with an air gap. This is expected to eliminate the primary mode of heat transfer through conduction. Furthermore, the sealant depth will be increased to 30 mm and 20 mm. This proposal replicates the construction of 35 mm joints which achieved an FRL of -/240/240. The proposal to reduce width signifies 10 mm decrease in sealant which is being replaced by a more heat resistant concrete element. Therefore, the proposed construction is expected to achieve similar or better performance. Based on the above, the 25 mm wide double caulked control joint with 30 mm and 20 mm deep sealant is positively assessed for an FRL of -/240/240.

The above observations establish the ability of 35 mm, 25 mm and 10 mm double caulked joints with sealant depth as discussed above to achieve up to 240 minutes of integrity and insulation performance in concrete floor. It is proposed that the joints will be installed in walls. As joints in floor are considered more onerous, it is expected that the observed performance will be replicated in concrete walls.

In practical application, the FRL of the joints will be dictated by the separating element they are installed into. As per AS/NZS 3600:2018, 120 mm, 150 mm and 175 mm concrete walls and floors are stipulated to achieve FRL of -/120/120, -/180/180 and -/240/240 respectively if appropriate design conditions are meet. Based on the above the sealant and their relevant FRL's are shown in Table 12.

Table 12 Double caulked control joints in concrete walls and floors

Control joint width	Local fire-stopping protection	First layer sealant depth	Second layer sealant depth	Distance between sealant	FRL		
					Minimum separating element thickness		
					120 mm	150 mm	175 mm
35 mm	HB Fuller Firesound ™ with	30 mm	20 mm	Minimum 45 mm with an airgap	-/120/120	-/180/180	-/240/240*

Control joint width	Local fire-stopping protection	First layer sealant depth	Second layer sealant depth	Distance between sealant	FRL		
					Minimum separating element thickness		
					120 mm	150 mm	175 mm
25 mm wide	open cell backing rod	30 mm	20 mm				
10 mm wide		10 mm	10 mm	Applied back-to-back or with an air gap	-/120/120	-/180/180	-/240/240
*Distance between the face of the exposed separating element and first layer of sealant must not be more than 40 mm. Refer to Figure 4 for details.							

It is proposed that the sealant depth of 25 mm wide double caulked joint will be varied to be 30 mm and 15 mm when installed in 120 mm concrete wall and floor. The tested 25 mm joint with 25 mm and 15 mm sealant depth achieved -/240/90. It is noted that, the insulation failure at 115 minutes was recorded at the centre of the control joint. As discussed above, the insulation failure at 115 minutes is attributed to the back-to-back installation of the sealant which facilitates additional heat transfer through conduction. In the proposed system, the sealant will be applied with a 45 mm air gap effectively eliminating the heat transfer through conduction. Additionally, the first layer sealant depth is being increased from 25 mm to 30 mm which is expected to offer increased fire resistance. Based on the above, it is concluded that the proposed variations to the construction of 25 mm wide joint is sufficient for an insulation performance of at least 120 minutes.

It is further proposed that the intermediate sizes between 35 mm, 25 mm and 10 mm joints – specifically, 11 mm – 25 mm and 26 mm – 35 mm – are assessed. The proposal includes replicating the sealant depth of the widest joint of the range which is either tested or assessed for an FRL up to -/240/240. As the widest joint with the same sealant depth has achieved an FRL up to -/240/240, it is reasonable to conclude that the narrower joint of the range will also achieve the same FRL. Based on the above, the joints listed in Table 13 are positively assessed for the shown FRL.

Table 13 Double caulked control joints in concrete walls and floors

Control joint width	Local fire-stopping protection	First layer sealant depth	Second layer sealant depth	Distance between sealant	FRL		
					Minimum separating element thickness		
					120 mm	150 mm	175 mm
26 mm – 35 mm	HB Fuller Firesound with open cell backing rod	30 mm	20 mm	Minimum 45 mm with an airgap as shown in Figure 4	-/120/120	-/180/180	-/240/240**
11 mm – 25 mm wide		30 mm	20 mm*				
10 mm wide		10 mm	10 mm	Applied back-to-back or with an air gap as shown in Figure 4	-/120/120	-/180/180	-/240/240
*Can be reduced to 15 mm if installed in 120 mm concrete wall and floor for -/120/120. **Distance between the face of the separating element and first layer of sealant must not be more than 40 mm.							

5.6 Applicable separating element

It is proposed that the applicability of the separating element will be extended including solid block masonry, light weight concrete and hollow core masonry constructions. In principle, such assessment is possible provided the proposed separating elements can achieve the required period of fire resistance. Solid block masonry is expected to achieve the same fire resistance performance as solid block concrete, and hence is positively assessed. It is stipulated that the lightweight concrete is either tested or assessed for the required period of FRL by others.

In case of hollow core masonry block, it is stipulated that the separating element is either tested or assessed for the required period of FRL by others. With consideration to the baseline test data on solid concrete blocks, it is further stipulated that the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.

5.7 Assessment outcomes

Based on the above discussions, it is the opinion of this testing laboratory that, the systems and the variations listed in Table 14 – Table 17 are expected to achieve the FRLs as shown – if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005.

Table 14 Control joints with sealant on both sides in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
50 mm	HB Fuller Firesound applied with open cell backing rod	25 mm	Applied on both sides as illustrated in Figure 1	-/120/120	-/180/180	-/240/240
40 mm		20 mm				
30 mm		15 mm				
20 mm		10 mm				
10 mm		10 mm				
*The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.						

Table 15 Control joints with sealant on fire side in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
35 mm	HB Fuller Firesound applied with open cell backing rod	25 mm	Applied on the exposed side as illustrated in Figure 2	-/120/60	-/180/60	-/240/60
20 mm		15 mm		-/120/30	-/180/30	-/240/30
10 mm		10 mm		-/120/120	-/180/180	-/240/240
*The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.						

Table 16 Control joints with sealant on non-fire side in concrete walls and floors

Control joint width	Local fire-stopping protection	Sealant depth	Sealant application	FRL		
				Minimum separating element thickness*		
				120 mm	150 mm	175 mm
35 mm	HB Fuller Firesound applied with open cell backing rod	25 mm	Applied on the unexposed side as illustrated in Figure 3	-/120/90	-/180/90	-/240/90
20 mm		15 mm		-/120/90	-/180/120	-/240/120
10 mm		10 mm		-/120/120	-/180/180	-/240/240
*The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.						

Table 17 Double caulked control joints in concrete walls and floors

Control joint width	Local fire-stopping protection	First layer sealant depth	Second layer sealant depth	Distance between sealant	FRL		
					Minimum separating element thickness***		
					120 mm	150 mm	175 mm
26 mm – 35 mm	HB Fuller Firesound with open cell backing rod	30 mm	20 mm	Minimum 45 mm with an airgap as shown in Figure 4	-/120/120	-/180/180	-/240/240**
11 mm – 25 mm wide		30 mm	20 mm*				
10 mm wide		10 mm	10 mm	Applied back-to-back or with an air gap as shown in Figure 4	-/120/120	-/180/180	-/240/240
*Can be reduced to 15 mm if installed in 120 mm concrete wall and floor for -/120/120. **Distance between the face of the exposed separating element and first layer of sealant must not be more than 40 mm. ***The stipulated separating element thickness is applicable to solid block concrete or masonry construction. The separating element may be varied to lightweight concrete or hollow core masonry. In such case, the separating element must be tested or assessed to achieve the required FRL. For hollow core masonry, the joints must not overlap the hollow core. The backing rod and the sealant must be sandwiched between rigid surfaces only.							

6. Validity

Warringtonfire Australia does not endorse the tested or assessed product in any way. The conclusions of this assessment may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all 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 information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are subject to constant review and improvement. It 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 expected to be demonstrated on a test in accordance with AS 1530.4:2014, based on the evidence referred to in this report.

This assessment is provided to HB Fuller Aust Co P/L for their own specific purposes. This report may be used as Evidence of Suitability in accordance 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 – FRT200213 R1.0

Table 18 Information about test report

<table>
<tr><th>Item</th><th>Information about test report</th></tr>
<tr><td>Report sponsor</td><td>H B Fuller Australia Pty Ltd</td></tr>
<tr><td>Test laboratory</td><td>Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.</td></tr>
<tr><td>Test date</td><td>The fire resistance test was done on 25 August 2020.</td></tr>
<tr><td>Test standards</td><td>The test was done in accordance with AS 1530.4:2014.</td></tr>
<tr><td>Variation to test standards</td><td>The pressure was up to 3 Pa below the limits prescribed in the standard during the 90-100-minute periods. The pressure and temperature were within the limits for rest of the test duration. This under pressure is unlikely to have affected the outcome of the test.</td></tr>
<tr><td>General description of tested specimen</td><td>A 20 mm and 40 mm wide control joints protected with HB Fuller Firesound in 175 mm thick concrete wall were tested. The construction details of the tested specimenss are given below:
<table>
<tr><th>Penetration system</th><th>Service</th><th>Local fire-stopping protection</th><th>Aperture size (mm)</th><th>Sealant depth (mm)</th></tr>
<tr><td>A</td><td>Control joint</td><td>H B Fuller Firesound</td><td>30 × 1000</td><td>15 mm</td></tr>
<tr><td>B</td><td>Control joint</td><td>H B Fuller Firesound</td><td>50 × 1000</td><td>25 mm</td></tr>
</table></td></tr>
<tr><td>Instrumentation</td><td>The test report states that the instrumentation was in accordance with AS 1530.4:2014.</td></tr>
</table>

The test specimen achieved the following results – see Table 19.

Table 19 Results summary for this test report

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/240/180**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 215 minutes	
B	Structural adequacy	Not applicable	**-/240/180**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 213 minutes	

A.2 Test report – FRT190135 R1.0

Table 20 Information about test report

<table>
<tr><th>Item</th><th>Information about test report</th></tr>
<tr><td>Report sponsor</td><td>HB Fuller Aust Co P/L</td></tr>
<tr><td>Test laboratory</td><td>Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.</td></tr>
<tr><td>Test date</td><td>The fire resistance test was done on 26 June 2019.</td></tr>
<tr><td>Test standards</td><td>The test was done in accordance with AS 1530.4:2014.</td></tr>
<tr><td>Variation to test standards</td><td>The pressure was up to 2 Pa below the limits prescribed in the standard during the 215–220-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 result.</td></tr>
<tr><td>General description of tested specimen</td><td>A 30 mm and 50 mm wide control joints protected with HB Fuller Firesound in 150 mm thick concrete floor were tested. The construction details of the tested specimens are given below:
<table>
<tr><th>Control joint</th><th>Service</th><th>Local fire-stopping protection</th><th>Aperture size (mm)</th><th>Sealant depth (mm)</th></tr>
<tr><td>A</td><td>Control joint</td><td>HB Fuller Firesound</td><td>20 × 1000</td><td>10</td></tr>
<tr><td>B</td><td>Control joint</td><td>HB Fuller Firesound</td><td>40 × 1000</td><td>20</td></tr>
</table></td></tr>
<tr><td>Instrumentation</td><td>The test report states that the instrumentation was in accordance with AS 1530.4:2014.</td></tr>
</table>

The test specimen achieved the following results – see Table 21 .

Table 21 Results summary for this test report

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/240/240**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 241 minutes	
B	Structural adequacy	Not applicable	**-/240/240**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 241 minutes	

A.3 Test report – FRT200323 R1.1

Table 22 Information about test report

<table>
<tr><th>Item</th><th>Information about test report</th></tr>
<tr><td>Report sponsor</td><td>HB Fuller Aust Co P/L</td></tr>
<tr><td>Test laboratory</td><td>Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.</td></tr>
<tr><td>Test date</td><td>The fire resistance test was done on 21 June 2021.</td></tr>
<tr><td>Test standards</td><td>The test was done in accordance with AS 1530.4:2014.</td></tr>
<tr><td>Variation to test standards</td><td>None</td></tr>
<tr><td>General description of tested specimen</td><td>A series of single sided and double caulked control joints protected with HB Fuller Firesound were tested in a 150 mm thick concrete floor. The tested construction details are given below:
<table>
<tr><th>Control joint</th><th>Joint width</th><th>Local fire-stopping protection</th><th>First layer backing rod depth</th><th>First layer sealant thickness</th><th>Second layer backing rod depth</th><th>Second layer sealant thickness</th></tr>
<tr><td>A</td><td>35 mm</td><td rowspan="6">• HB Fuller Firesound
• Open cell backing rod</td><td>95 mm from the exposed side</td><td>30 mm</td><td>20 mm from the exposed side</td><td>20 mm</td></tr>
<tr><td>B</td><td>25 mm / 20 mm</td><td>60 mm from the exposed side</td><td>25 mm</td><td>15 mm from the exposed side</td><td>15 mm</td></tr>
<tr><td>C</td><td>10 mm</td><td>35 mm from the exposed side</td><td>10 mm</td><td>10 mm from the exposed side</td><td>10 mm</td></tr>
<tr><td>D</td><td>10 mm</td><td>10 mm from the exposed side</td><td>10 mm</td><td>-</td><td>-</td></tr>
<tr><td>E</td><td>20 mm</td><td>15 mm from the exposed side</td><td>15 mm</td><td>-</td><td>-</td></tr>
<tr><td>F</td><td>35 mm</td><td>25 mm from the exposed side</td><td>25 mm</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>Instrumentation</td><td>The test report states that the instrumentation was in accordance with AS 1530.4:2014.</td></tr>
</table>

The test specimen achieved the following results – see Table 23 .

Table 23 Results summary for this test report

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/240/240**
	Integrity	No failure at 241 minutes	
	Insulation	No failure at 241 minutes	
B	Structural adequacy	Not applicable	**-/240/90**
	Integrity	No failure at 241 minutes	

Control joint	Criteria	Results	Fire resistance level (FRL)
	Insulation	Failure at 115 minutes	
C	Structural adequacy	Not applicable	**-/240/240**
	Integrity	No failure at 241 minutes	
	Insulation	No failure at 241 minutes	
D	Structural adequacy	Not applicable	**-/240/240**
	Integrity	No failure at 241 minutes	
	Insulation	No failure at 241 minutes	
E	Structural adequacy	Not applicable	**-/240/30**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 42 minutes	
F	Structural adequacy	Not applicable	**-/240/60**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 65 minutes	

A.4 Test report – FRT200212 R1.0

Table 24 Information about test report

<table>
<tr><th>Item</th><th>Information about test report</th></tr>
<tr><td>Report sponsor</td><td>HB Fuller Australia Pty Ltd</td></tr>
<tr><td>Test laboratory</td><td>Warringtonfire Australia, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.</td></tr>
<tr><td>Test date</td><td>The fire resistance test was done on 26 August 2020.</td></tr>
<tr><td>Test standards</td><td>The test was done in accordance with AS 1530.4:2014.</td></tr>
<tr><td>Variation to test standards</td><td>None</td></tr>
<tr><td>General description of tested specimen</td><td>A series of control joints protected with HB Fuller Firesound in 150 mm thick concrete floor was tested. The construction details of the tested specimens are given below:
<table>
<tr><th>Control joint</th><th>Service</th><th>Local fire-stopping protection</th><th>Aperture size (mm)</th><th>Sealant depth (mm)</th></tr>
<tr><td>A</td><td>Control joint</td><td>HB Fuller Firesound</td><td>35 × 1000</td><td>25 mm on the unexposed side</td></tr>
<tr><td>B</td><td>Control joint</td><td>HB Fuller Firesound</td><td>20 × 1000</td><td>15 mm on the unexposed side</td></tr>
<tr><td>C</td><td>Control joint</td><td>HB Fuller Firesound</td><td>10 × 1000</td><td>10 mm on the unexposed side</td></tr>
<tr><td>D</td><td>Control joint</td><td>HB Fuller Firesound</td><td>10 × 1000</td><td>10 mm on the exposed side</td></tr>
</table></td></tr>
<tr><td>Instrumentation</td><td>The test report states that the instrumentation was in accordance with AS 1530.4:2014.</td></tr>
</table>

The test specimen achieved the following results – see Table 25.

Table 25 Results summary for this test report

Control joint	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/240/90**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 105 minutes	
B	Structural adequacy	Not applicable	**-/240/120**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 124 minutes	
C	Structural adequacy	Not applicable	**-/240/180**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 183 minutes	
D	Structural adequacy	Not applicable	**-/240/120**
	Integrity	No failure at 241 minutes	
	Insulation	Failure at 149 minutes	

warringtonfire

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