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Fire assessment report

Polymeric laminated GW blanket in accordance with AS ISO 9705:2003 and AS 5637.1:2015

Sponsor: Amalgamated Metal Industries Pty Ltd and Knauf Insulation Pty Ltd

Report number: FAS200197 Revision: R1.1

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Amendment schedule

Version	Date	Information relating to report			
R1.0	Issue: 24/08/2020	Reason for issue	Report issued to Knauf Insulation Pty Ltd and Amalgamated Metal Industries Pty Ltd for review and comment.		
			Prepared by	Reviewed by	Approved by
	Expiry: 31/08/2025	Name	Namrata Moharana	Omar Saad	Omar Saad
		Signature			
R1.1	Issue: 11/09/2020	Reason for issue	Report updated to make typographical amendments across the report.		
			Prepared by	Reviewed by	Approved by
	Expiry: 31/08/2025	Name	Namrata Moharana	Omar Saad	Omar Saad
		Signature			
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General conditions of use

Executive summary

This report documents the findings of the assessment undertaken to determine the likely fire hazard properties of Knauf Insulation glasswool blankets ranging in thickness from 55 mm to 130 mm with Ametalin LD and HD foil facing, if tested in accordance with AS ISO 9705:2003 (R2016) and assessed in accordance with AS 5637.1:2015.

The analysis conducted in sections 5, 6, 7 and 8 of this report found that the tested system described in sections 4.1 and 4.2, if subjected to the proposed variations described in section 4.3, and tested in accordance with the test method described in section 4.4, is likely to achieve a Group 1 classification as shown in Table 1.

The $SMOGRA_{RC}$ of this assessed range of products is likely not to exceed 100.

A summary of the proposed variations and the assessment outcomes is presented in Table 1.

Table 1 Assessment outcome in accordance with AS 5637.1:2015 for NCC applications

Item	Reference test	Description	Variations	Classification
1 – Thickness of blanket	RTF200088 R1.0, EWFA 56297900a.1, EWFA 56297900b.1, Test No. 311313 Issue 1, Test No. 16-002866 and Test No. 7-598590-CS	The tested system consisted of a 130 mm thick Knauf insulation glasswool blanket.	It is proposed that the thickness of the Knauf Insulation glasswool blanket can be varied as below. • 55 mm • 60 mm • 75 mm • 100 mm • 105 mm • 120 mm • 130 mm	• The assessed range of products are likely to achieve a Group 1 rating. • The $SMOGRA_{RC}$ of this assessed range of products is likely not to exceed 100.
2 – Ametalin LD and HD foil facings		The tested glasswool blanket was laminated to an Ametalin HD (heavy duty) polyweave reflective foil.	Either Ametalin LD (light duty) or HD (heavy duty) foil may be used in the proposed systems.	
3 – Alternative fixing arrangements		In the tested system; the blankets were screw fixed directly into the substrate.	• The assessed system may consist of mesh supports without any direct fixing, as shown in Figure 1. The foil tape (item 4) may not be used in this application. • Screw and washer fixing to concrete soffits may be used as shown in Figure 2.	
4 – Foil tape width		The tested system consisted of a 50 mm wide foil tape over the joints of the foil.	It is proposed that 72 mm wide foil tapes can be used in the proposed systems.	

A summary of the classifications achieved in accordance with C/VM2 Verification Method: Framework for Fire Safety Design is provided in Table 2.

Table 2 Assessment outcome in accordance with Classification for C/VM2 – verification method (New Zealand)

Item	Reference test	Description	Variations	Classification
1 – Thickness of blanket	RTF200088 R1.0, EWFA 56297900a.1, EWFA 56297900b.1, Test No. 311313 Issue 1, Test No. 16-002866 and Test No. 7-598590-CS	The tested system consisted of a 130 mm thick Knauf insulation glasswool blanket.	It is proposed that the thickness of the Knauf Insulation glasswool blanket can be varied as below. • 55 mm • 60 mm • 75 mm • 100 mm • 105 mm • 120 mm • 130 mm	• The assessed range of products are likely to achieve a Group 1-S rating. • Average smoke production rate is likely not to exceed 5.0 m^2/s.
2 – Ametalin LD and HD foil facings		The tested glasswool blanket was laminated to an Ametalin HD (heavy duty) polyweave reflective foil.	Either Ametalin LD (light duty) or HD (heavy duty) foil may be used in the proposed systems.	
3 – Alternative fixing arrangements		In the tested system; the blankets were screw fixed directly into the substrate.	• The assessed system may consist of mesh supports without any direct fixing, as shown in Figure 1. The foil tape (item 4) may not be used in this application. • Screw and washer fixing to concrete soffits may be used as shown in Figure 2.	
4 – Foil tape width		The tested system consisted of a 50 mm wide foil tape over the joints of the foil.	It is proposed that 72 mm wide foil tapes can be used in the proposed systems.	

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2, 3 and 9 of this report. The results of this report are valid until 31 August 2025.

Contents

1. Introduction

This report documents the findings of the assessment undertaken to determine the likely fire hazard properties of Knauf Insulation glasswool blankets ranging in thickness from 55 mm to 130 mm with Ametalin LD and HD foil facing, if tested in accordance with AS ISO 9705:2003 (R2016)[1] and assessed in accordance with AS 5637.1:2015[2]. This assessment was carried out at the request of Amalgamated Metal Industries Pty Ltd and Knauf Insulation Pty Ltd. The sponsor details are included in Table 3.

Table 3 Sponsor details

Sponsor	Address
Amalgamated Metal Industries Pty Ltd	9 – 11 Playford Crescent Salisbury North SA 5108 Australia
Knauf Insulation Pty Ltd	23 Corporate Drive Cannon Hill QLD 4170 Australia

2. Framework for the assessment

2.1 Assessment approach

An assessment is an opinion about the likely performance of a component or element of structure if it was subject to a standard 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 ISO 9705:2003 (R2016) and classified in accordance with AS 5637.1:2015.

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 2003, *Fire tests – Full-scale room test for surface products*, AS ISO 9705-2003 (R2016), Standards Australia, NSW

[2] Standards Australia 2015, *Determination of fire hazard properties*, AS 5637.1:2015, 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

For use in Australia , 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 under A.5.2.(1) (d) and 2016 under Specification A2.3, including amendments. This assessment has been written in accordance with the general principles outlined in EN 15725:2010[4] 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 a deemed to satisfy (DTS) provisions of the NCC under, A5.5 for reaction to fire as applicable to the assessed system/s.

2.2 Declaration

The Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal on 11 June 2020, Amalgamated Metal Industries Pty Ltd and Knauf Insulation Pty Ltd 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 the 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 would have been expected if the specific elements of construction described here had been tested in accordance with AS ISO 9705:2003 (R2016) and AS 5637.1:2015.
- The results of this assessment are applicable to Knauf Insulation glasswool blankets with thicknesses and densities in the specified ranged, with Ametalin LD or HD foil facing, exposed only from the side containing the foil facing.
- This report is only valid for the assessed system/s. Any changes with respect to size, 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 drawings and information that form the basis for this report are included 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.

4. Description of the specimen and variations

4.1 System description

The tested products consisted of Knauf Insulation glasswool blankets laminated to the Ametalin HD polyweave foil using a spray applied adhesive.

Knauf Insulation Pty Ltd has confirmed that the density and binder content of the range of products assessed are within those of the products tested to AS 1530.1:1994 (R2016)[5] and BS EN ISO 1182:2010[6].

4.2 Referenced test data

The assessment of the variation to the tested system and the determination of the likely performance is based on the results of the fire tests documented in the reports summarised in Table 4. Further details of the tested system are described in Appendix B.

Table 4 Referenced test data

Report number	Test sponsor	Test date	Testing authority
RTF200088 R1.0	Amalgamated Metal Industries Pty Ltd and Knauf Insulation Pty Ltd	8 July 2020	Warringtonfire Australia
EWFA 56297900a.1	Knauf Insulation Pty Ltd	11 July 2018.	Warringtonfire Australia (formerly Exova Warringtonfire)
EWFA 56297900b.1	Knauf Insulation Pty Ltd	11 July 2018.	Warringtonfire Australia (formerly Exova Warringtonfire)
Test No. 311313 Issue 1	Knauf Insulation Pty Ltd	29 September 2011	Warringtonfire UK (formerly Exova Warringtonfire)
Test No. 16-002866	Amalgamated Metal Industries Pty Ltd	10 June 2016	AWTA Product Testing
Test No. 7-598590-CS	Amalgamated Metal Industries Pty Ltd	24 July 2014	AWTA Product Testing

[5] Standards Australia 1994, *Methods for fire tests on building materials, components and structures Part 1: Combustibility test for materials*, AS 1530.1-1994 (R2016), Standards Australia, NSW

[6] British Standards Institution 2010, Reaction to fire tests for products – Non-combustibility test, BE EN ISO 1182:2010

4.3 Variations to the tested system

An identical system has not been subject to a standard fire test. We have therefore assessed the systems using baseline test information for similar system. The variations to the tested systems together with the referenced baseline standard fire tests are described in Table 5. These variations may be applied simultaneously.

Table 5 Variation to tested systems

Item	Reference test	Description of tested system	Variations
1 – Thickness of blanket	RTF200088 R1.0, EWFA 56297900a.1, EWFA 56297900b.1, Test No. 311313 Issue 1, Test No. 16-002866 and Test No. 7-598590-CS	The tested system consisted of a 130 mm thick Knauf insulation glasswool blanket.	It is proposed that the thickness of the Knauf Insulation glasswool blanket can be varied as below. • 55 mm • 60 mm • 75 mm • 100 mm • 105 mm • 120 mm • 130 mm
2 – Ametalin LD and HD foil facings		The tested glasswool blanket was laminated to an Ametalin HD (heavy duty) polyweave reflective foil.	Either Ametalin LD (light duty) or HD (heavy duty) foil may be used in the proposed systems.
3 – Alternative fixing arrangements		In the tested system, the blankets were screw fixed directly into the substrate.	• The assessed system may consist of mesh supports without any direct fixing, as shown in Figure 1 The foil tape (item 4) may not be used in this application. . • Screw and washer fixing to concrete soffits may be used as shown in Figure 2.
4 – Foil tape width		The tested system consisted of a 50 mm wide foil tape over the joints of the foil.	It is proposed that 72 mm wide foil tapes can be used in the proposed systems.

4.4 Purpose of the test

AS 1530.1:1994 (R2016) specifies a test method for the determination of the combustibility of a building material.

BS EN ISO 1182:2010 specifies a method of test for determining the non-combustibility performance, under specified conditions, of homogeneous products and substantial components of non-homogeneous products. The conditions experienced by the specimen are similar to those experienced by a specimen subjected to an AS 1530.1:1994 (R2016) test. However, a direct comparison between the two standards is not done.

AS ISO 9705:2003 (R2016) specifies a test method that simulates a fire that under well ventilated conditions starts in a corner of a small room with a single open doorway. The method is intended to evaluate the contribution to fire growth provided by a surface product using a specified ignition source.

4.5 Schedule of components

Table 6 outlines the schedule of components for the assessed systems subject to a fire test, as referenced in Appendix B.

Table 6 Schedule of components of assessed systems

Item	Description	
Lining		
1.	Product component	Knauf Insulation glass wool blanket laminated to Ametalin HD or LD polyweave foil
	Thickness	55 mm to 130 mm (R-value ranging from 1.3 m^2K/W to 3.7 m^2K/W)
	Material	Knauf Insulation glasswool laminated on the fire-exposed side with the Ametalin HD or LD Polyweave foil using a spray applied adhesive. The facing is a heavy duty or light duty polyweave reflective foil, with an exposed gloss surface which faces the inside of the room, and an unexposed matt surface which is adhered to the blanket. The Ametelin HD or LD foil facing has a 150 mm overlap along its long edge. The unexposed side is not laminated.
	Nominal density	Ranging between 7 kg/m^3 and 32 kg/m^3
	Specifications	• Blanket thickness: 55 mm – 130 mm • Nominal foil facing thickness – Ametalin HD Polyweave foil: 0.12 mm (AWTA test no. 16-002866) – Ametalin LD Polyweave foil: 0.09 mm (AWTA test no. 7-598590-CS) • Nominal mass per unit area of foil – Ametalin HD Polyweave foil: 103 GSM (AWTA test no. 16-002866) – Ametalin LD Polyweave foil: 85 GSM (AWTA test no. 7-598590-CS)
	Installation	The blanket is screw fixed to the room walls and ceiling, with the foil facing inside in the room, using 150 mm timber screws (item 2) and Ø38 mm washers (item 3). The foil facing of the blankets has a 150 mm overlap on one of the two long edges, that is used to overlap and secure the facing to another blanket. The overlap is screw/washer fixed. The opening of the blanket overlaps for the walls and ceilings faced away from the burner. The 150 mm overlap and the blanket junctions are taped over using foil tape (item 4). Alternative fixing methods are shown in Figure 1 and Figure 2.
Fixings		
2.	Product name	14 g × 150 mm bugle head internal hex drive timber screw
	Installation	Used with Ø38 mm washer (item 3) to fix the blanket (item 1) to the room walls and ceiling.
3.	Product name	Ø38 mm × 1.6 mm thick galvanised washer with inner diameter of 7 mm
	Installation	Used with 150 mm timber screw (item 2) to fix the blanket (item 1) to the room walls and ceiling.
4.	Product name	plain foil insulation tape
	Dimensions	50 mm or 72 mm wide × 0.05 mm thick
	Installation	Used to tape over the 150 mm overlaps and the blanket (item 1) junctions.

Table 7 presents a summary of the R-values of the assessed range of Knauf Insulation glasswool blankets and their corresponding thicknesses.

Table 7 R-value and corresponding Blanket thickness

R-value (m^2K/W)	Thickness (mm)
1.3	55
1.5	60
1.8	75
2.3	100
2.5	105
3.0	120
3.2	130
3.7	130

Figure 1 to Figure 2 were provided by Knauf Insulation Pty Ltd. Figure 3 to Figure 7 were specified in test report RTF200088 R1.0.

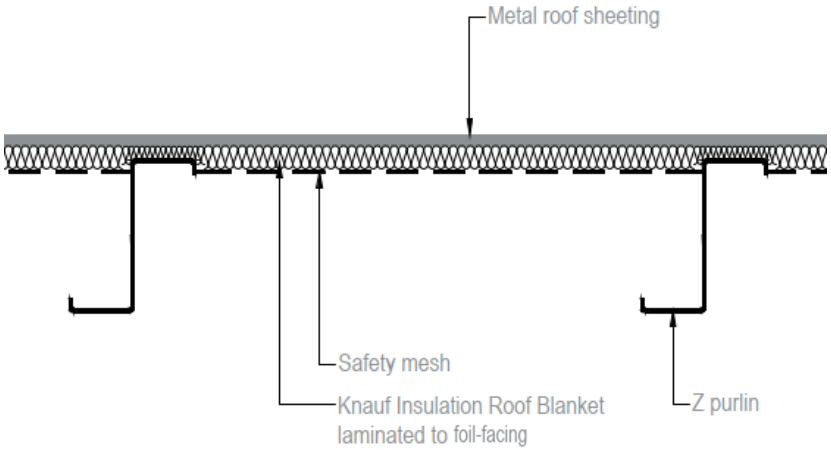

Figure 1 Supporting Knauf Insulation glass wool blanket using a metallic safety mesh on the underside in metal roof applications

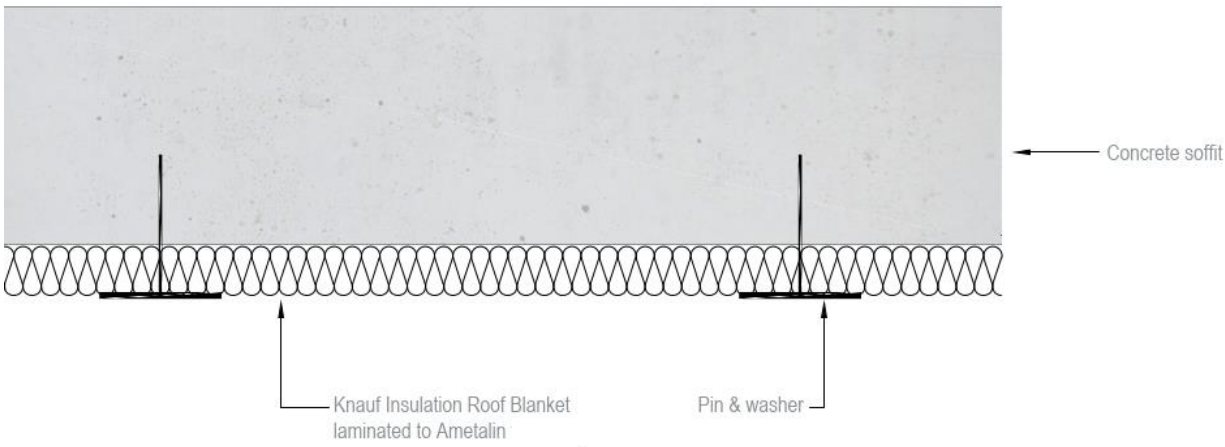

Figure 2 Supporting the Knauf Insulation glass wool blanket using intermittent screws and washers into concrete substrates

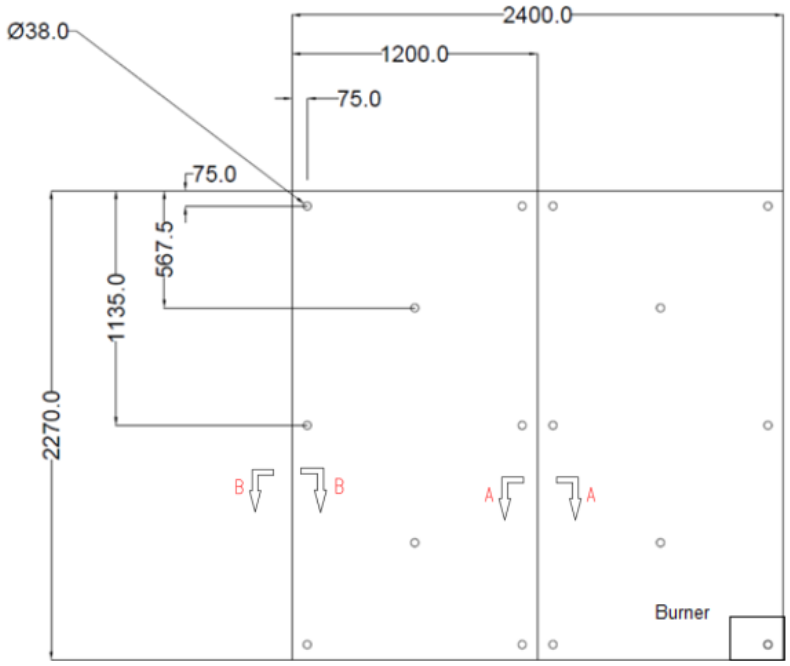

Figure 3 Fixing arrangement of rear wall lining in the tested system described in RTF200088 R1.0

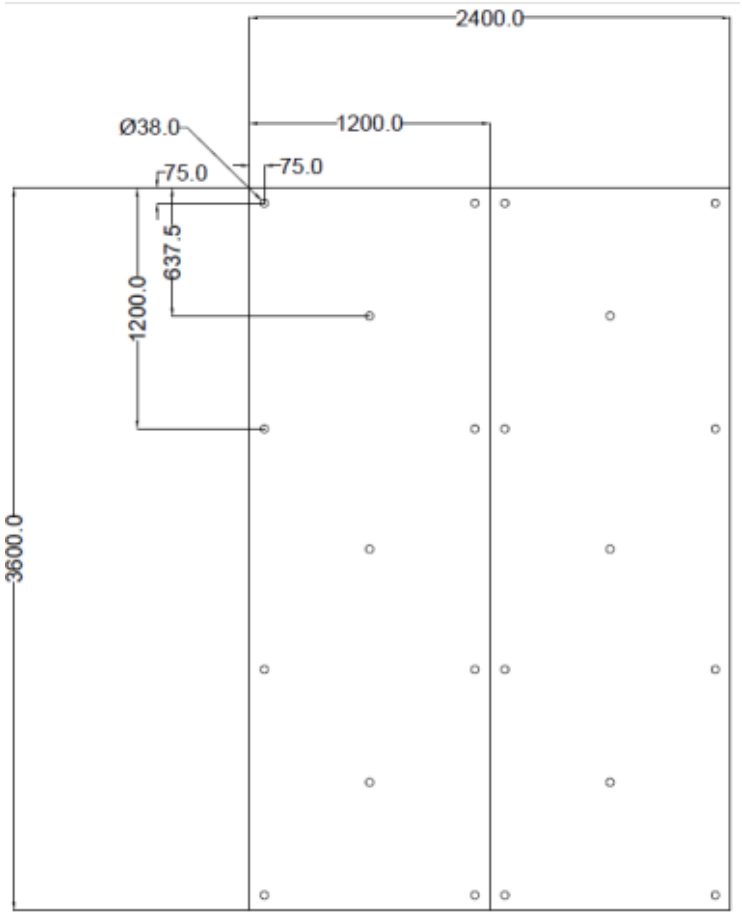

Figure 4 Fixing arrangement of the ceiling lining (from above) in the tested system described in RTF200088 R1.0

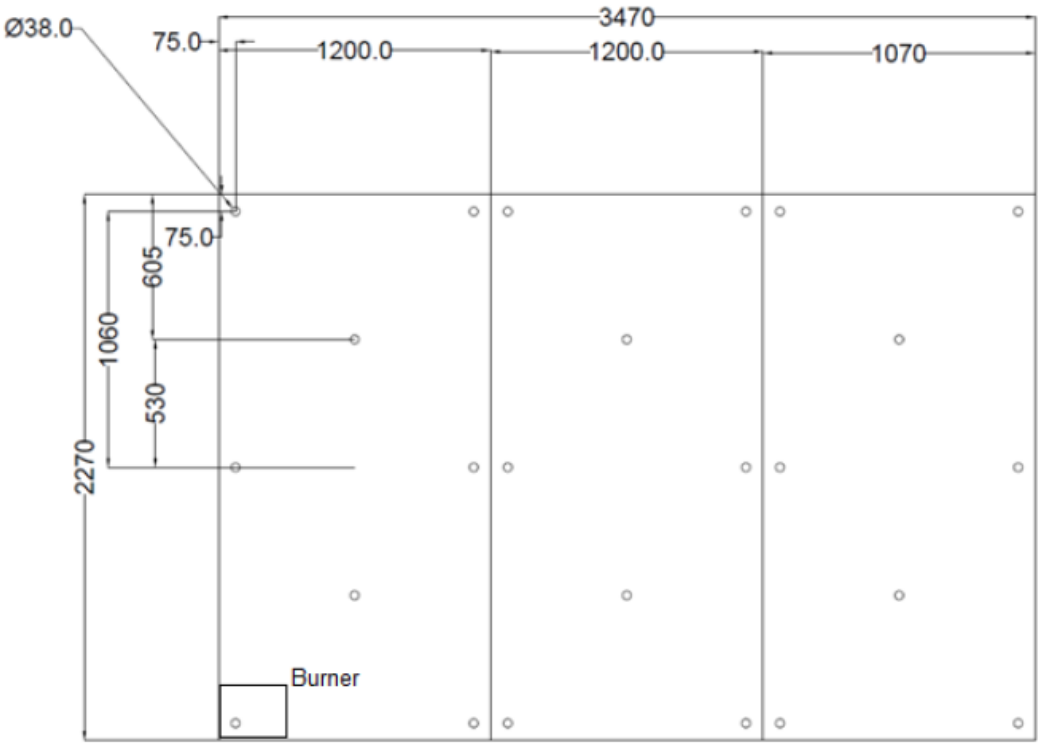

Figure 5 Fixing arrangement of the side wall lining in the tested system described in in RTF200088 R1.0

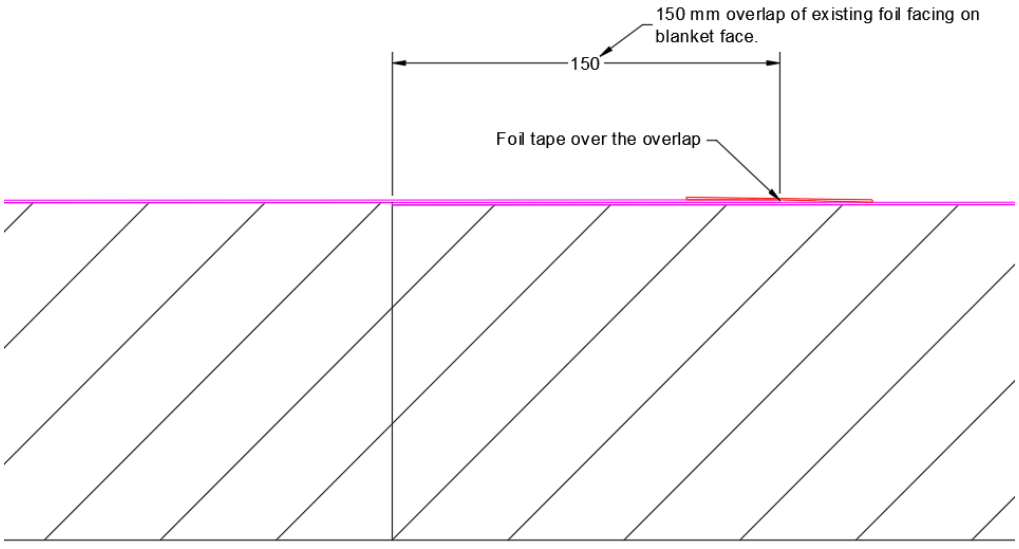

Figure 6 Cross section A-A in the tested system described in RTF200088 R1.0

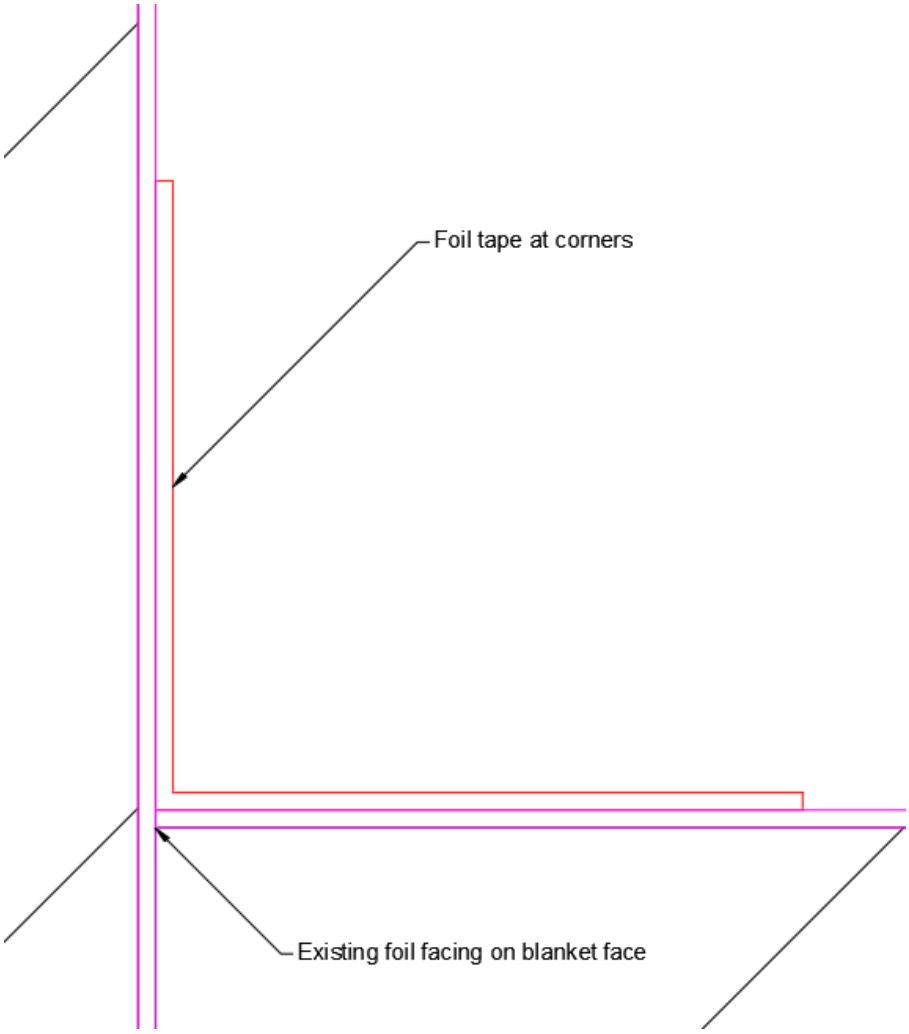

Figure 7 Cross section B-B in the tested system described in in RTF200088 R1.0

5. Assessment 1 – Variations in blanket thickness

5.1 Introduction

AS 5637.1:2015 allows the classification of materials by group number – this indicates the amount of time taken for the material being tested to reach flashover under AS ISO 9705:2003 (R2016) test conditions. AS 5637.1:2015 defines flashover as a heat release rate of 1 MW, so materials are classified by the time taken for the heat release rate to reach 1 MW.

The group classifications are:

- Group 1 – Materials classified as Group 1 do not reach flashover after ten minutes exposure to a heat source delivering 100 kW, immediately followed by a further ten minutes exposure to 300 kW.
- Group 2 – Materials classified as Group 2 reach flashover after ten minutes exposure to a 100 kW heat source.
- Group 3 – Materials classified as Group 3 reach flashover after two minutes, but before ten minutes exposure to a 100 kW heat source.
- Group 4 – Materials classified as Group 4 reach flashover before two minutes exposure to a 100 kW heat source.

New Zealand Ministry of Business, Innovation and Employment's Verification Method "C/VM2 – Verification Method: Framework for Fire Safety Design" provides guidelines on establishing Group Numbers for lining materials. The classification scheme allows the classification of materials by Group Number, which indicates the amount of time taken for the material being tested to reach flashover under ISO 9705:1993 test conditions. The scheme defines flashover to be a Heat Release Rate of 1 MW, so materials are classified, in accordance with Appendix A of C/VM2, by the time taken for the Heat Release Rate, as measured during the ISO 9705:1993 test, to reach 1 MW as per the scheme below:

- Group 1 – Materials classified as Group 1 do not reach flashover after ten minutes exposure to a heat source delivering 100 kW immediately followed by a further ten minutes exposure to 300 kW.
- Group 1 – S – Materials that are classified as Group 1-S do not reach flashover after ten minutes exposure to a heat source delivering 100 kW immediately followed by a further ten minutes exposure to 300 kW and in addition the average smoke production rate for the period between 0 and 20 minutes of the test period does not exceed 5.0 m2/s.
- Group 2 – Materials classified as Group 2 reach flashover after ten minutes of exposure to a 100 kW heat source.
- Group 2 – S – Materials that are classified as Group 2-S do not reach flashover after ten minutes exposure to a heat source delivering 100 kW and in addition the average smoke production rate for the period between 0 and 10 minutes of the test period does not exceed 5.0 m2/s.
- Group 3 – Materials classified as Group 3 reach flashover after 2 minutes, but before 10 minutes of exposure to a 100 kW heat source.
- Group 4 – Materials are classified as Group 4 is they reach flashover before 2 minutes of exposure to a 100 kW heat source.

5.2 Description of variation

The tested system was subjected to a room burn test in accordance with AS ISO 9705:2003 (R2016). The test consisted of 130 mm thick Knauf Insulation glass wool blankets laminated to Ametalin HD polyweave foil fixed using timber screws and washers.

The proposed variation include different blanket thicknesses ranging between 55 mm and 130 mm. Their R-values range between 1.3 m^2K/W to 3.7 m^2K/W.

5.3 Methodology

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

Table 8 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

5.4 Assessment

5.4.1 Group number assessment

The 130 mm thick glasswool blanket was subjected to a room burn test in accordance with AS ISO 9705:2003 (R2016) in RTF200088 R1.0. A summary of the test results is presented in Appendix B.1. The tested system achieved a Group 1 rating in accordance with AS 5637.1:2015.

The foil in the vicinity of the burner started burning immediately after the start of the test. Most of the foil facing of the ceiling had delaminated within the first 7 minutes of the test, where the burner output was maintained at 100 kW. After 10 minutes, a layer of smoke started to form inside the room. Post-test observations revealed that a portion of the blanket on the wall and the ceiling in the immediate vicinity of the burner had fallen off during testing. The foil facing of walls and the ceiling had mostly burned off at the end of the test.

During the first 600 seconds of the test, total measured heat release rate (HRR) of the system remained between 100 kW and 200 kW. The measured HRR increased to around 500 KW after approximately 11 minutes from the start of the test (1 minute after the burner output was increased to 300 kW). However, the measured HRR reduced to around 350 kW by the end of the test (20 minutes from the start of the test). Overall, compared to the 1 MW threshold, the tested system showed a significant margin of safety.

The increase in the measured total HRR beyond during the test period is likely to be the result of the thermal decomposition of the foil facing and the binders within the glasswool blanket. However, the test results have shown that such effects are minimal, and the tested product achieved a Group 1 rating with a large margin of safety.

EWFA 56297900a.1 and EWFA 56297900b.1 describe two tests conducted in accordance with AS 1530.1-1994. The test specimen in EWFA 56297900a.1 was specified to be from a Knauf Earthwool mineral wool blanket which is 175 mm thick in use with a density of 9.5 kg/m^3. The one in EWFA 56297900b.1 was specified to be from a Knauf Earthwool mineral wool blanket which is 90 mm thick in use with a density of 24 kg/m^3. Detailed descriptions of the tested specimens, along with the test results are given in Appendix B.2 and Appendix B.3. Test report no. 311313 describes a comparable test conducted in accordance with BS EN ISO 1182:2010. The thickness and the nominal density of the tested insulation product is specified to be 80 mm and 32 kg/m^3, respectively. A detailed summary is given in Appendix B.4. AS 1530.1-1994 and BS EN ISO 1182:2010 contain some nominal differences. Thus, a direct comparison is not made between the two standards. However, the similarities in the underlying test method allows the test data to BS EN ISO 1182:2010 to be used for the assessment.

The mean mass loss in EWFA 56297900b.1 and Test report no. 311313 were 7.6% and 9.03%, respectively. EWFA 56297900a.1 recorded a higher mean mass loss of 16.9%.

A comparison of the results described in EWFA 56297900a.1, EWFA 56297900b.1 and Test report no. 311313 show that the maximum mean furnace thermocouple temperature rise was 6.8°C. It occurred in the 80 mm thick glass mineral wool insulation with a density of 32 kg/m^3 tested in Test report no. 311313. The maximum mean specimen surface thermocouple temperature rise was 8.1°C and occurred in the 175 mm thick mineral wool insulation with a measured density of 9.5 kg/m^3 as reported in EWFA 56297900a.1. For both these parameters, AS 1530.1-1994 specifies that the criteria for combustibility is exceeding 50°C.

Overall, the mean duration of sustained flaming was 0 s in all three tests.

Despite some mass loss recorded during testing, the mean furnace thermocouple temperature rise and the mean specimen surface thermocouple temperature rise remained well below the 50°C threshold. Furthermore, sustained flaming more than 5 s was not observed in either of the tested specimens. This implies that the thermal decomposition of the test specimens did not dissipate any appreciable quantities of flammable volatiles.

5.4.2 Assessment of group number with respect to blanket thickness

The assessed product range consists of blanket thicknesses ranging from 55 mm to 130 mm. It has been confirmed that the density and binder content of the assessed range of products is within those of the range of products tested to AS 1530.1-1994 (and BS EN ISO 1182:2010). Notably, the assessment includes blanket thicknesses smaller than 80 mm. However, such thinner blankets are likely to consist of less binder content. The assessed range of blankets, if subjected to room burn tests in accordance with AS ISO 9705:2003 (R2016), are not expected to cause a rise in the degree and extent of the flame spread, thermal decomposition, and consequently, the total HRR compared to the tested 130 mm thick blanket.

Based on the above discussion, it is likely that the assessed thickness range of Knauf Insulation glasswool blankets laminated to Ametalin HD polyweave foil will also achieve a Group 1 rating if tested under similar conditions to those in RTF200088 R1.0.

5.4.3 Smoke growth rate index ($SMOGRA_{RC}$)

The $SMOGRA_{RC}$ calculated in accordance with AS 5637.1:2015 for the 130 mm thick blanket tested in RTF200088 R1.0 is 16.1. AS 1530.1-1994 testing showed that the tested range of products are classified as NOT DEEMED COMBUSTIBLE. Thus, the assessed range of blanket thicknesses, if subject to room burn tests in accordance with AS ISO 9705:2003 (R2016), are unlikely to product any substantial increase in the flame spread and consequently, the smoke generation.

However, given that $SMOGRA_{RC}$ is a calculated using the guidelines given in AS 5637.1:2015 using results of the product tested in accordance with AS ISO 9705:2003 (R2016), this assessment does not prescribe a specific $SMOGRA_{RC}$ value to the assessed range of products. Instead, an opinion is provided based on the limiting criterion for the $SMOGRA_{RC}$ specified in the National Construction Code (NCC) Volume 1 Specification C1.10 clause 4 (a) (i). Based on the above discussion, the $SMOGRA_{RC}$ of the assessed range of Knauf Insulation glass wool blankets are likely not to exceed 100 m^2/s^2.

5.5 Conclusion

This assessment demonstrates that the tested system described in sections 4.1 and 4.2, if subjected to the variations in blanket thickness described in section 4.3 (Item 1), and tested in accordance with section 4.4, is likely to achieve a Group 1 classification.

In the context of C/VM2 Verification Method: Framework for Fire Safety Design, the assessed range of products are likely to achieve a Group 1-S rating.

6. Assessment 2 – Variations in Ametalin foil facing

6.1 Description of variation

The tested system subjected to a room burn test in accordance with AS ISO 9705:2003 (R2016) consisted of 130 mm thick Knauf Insulation glass wool blankets laminated to Ametalin HD polyweave foil fixed using timber screws and washers.

The proposed variations include the use of light duty foil instead of the high duty foil, ie. – Ametalin LD polyweave foil instead of Ametalin HD polyweave foil.

6.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 9.

Table 9 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

6.3 Assessment

Observations from RTF200088 R1.0 showed that after 15 minutes from the start of the test, most of the foil facing on the ceiling blankets had delaminated. However, the test continued for the full duration and the tested product still achieved a Group 1 rating.

The LD and HD foil facings have the same composition. The HD foil, however, has a higher density. This high density facing was incorporated in the room burn test. Using the lowere density Ametalin LD polyweave foil is not expected to have a detrimental impact on the test results and the behaviour of the Knauf Insulation glass wool blankets.

Based on the above discussion, it is likely that the assessed range Insulation glass wool blankets laminated with the light duty foil instead of the high duty foil, ie. – Ametalin LD polyweave foil instead of Ametalin HD polyweave foil will also achieve a Group 1 rating if tested under similar conditions to those in RTF200088 R1.0.

6.3.1 Smoke growth rate index ($SMOGRA_{RC}$)

Since the Ametalin LD polyweave has a lower density and thickness than the tested Ametalin HD polyweave foil, it is not expected that the smoke generation during the test period will increase. If tested, Knauf insulation blankets with Ametalin LD polyweave foil facing can be expected to generate less smoke than that observed in RTF200088 R1.0. Consequently, the calculated $SMOGRA_{RC}$ for such test scenarios are unlikely to exceed those calculated in RTF200088 R1.0.

However, given that $SMOGRA_{RC}$ is a calculated using the guidelines given in AS 5637.1:2015 using results of the product tested in accordance with AS ISO 9705:2003 (R2016), this assessment does not prescribe a specific $SMOGRA_{RC}$ value to the assessed range of products. Instead, an opinion is provided based on the limiting criterion for the $SMOGRA_{RC}$ specified in the National Construction Code (NCC) Volume 1 Specification C1.10 clause 4 (a) (i). Based on the above discussion, the $SMOGRA_{RC}$ of the assessed range of Knauf Insulation glass wool blankets are likely not to exceed 100 m^2/s^2.

6.4 Conclusion

This assessment demonstrates that the tested system described in sections 4.1 and 4.2, if subjected to the variations in foil facing described in section 4.3 (Item 2), and tested in accordance with section 4.4, is likely to achieve a Group 1 classification.

In the context of C/VM2 Verification Method: Framework for Fire Safety Design, the assessed range of products are likely to achieve a Group 1-S rating.

The $SMOGRA_{RC}$ of the assessed range of Knauf Insulation glass wool blankets with Ametalin HD or LD foil facing are likely not to exceed 100.

In the context of C/VM2 Verification Method: Framework for Fire Safety Design, the average smoke production rate is likely not to exceed 5.0 m^2/s.

7. Assessment 3 – Variations in the fixing method

7.1 Description of variation

The tested system subjected to a room burn test in accordance with AS ISO 9705:2003 (R2016) consisted of 130 mm thick Knauf Insulation glass wool blankets laminated to Ametalin HD polyweave foil fixed using timber screws and washers.

The tested system consisted of non-combustible metallic screws fixing the glasswool blankets to the substrate. Two alternative fixing details are assessed shown in Figure 1 and Figure 2.

7.2 Methodology

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

Table 10 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

7.3 Assessment

7.3.1 Fixing 1 – Metallic safety mesh

Firstly, it is proposed that the Knauf Insulation glass wool blankets can be supported by metallic safety meshes spanning underneath them, as shown in Figure 1. This detailing is common in metal roof applications. The safety mesh, being metallic, does not produce any flammable volatiles due to thermal degradation. There is a possibility of this mesh causing the fall-off of the ceiling mounted Knauf Insulation glass wool blankets to a higher degree under similar test conditions. However, this behaviour is unlikely to cause any increase in the measured heat release rate or other parameters of the AS ISO 9705:2003 (R2016) room burn system, because it does not increase the degree of exposure of the tested Knauf Insulation glass wool blankets. Thus, the Group rating of Knauf Insulation glass wool blankets with the safety mesh supports is likely to be maintained as Group 1.

7.3.2 Fixing 2 – Screws and washers to concrete slabs

The second fixing arrangement includes using screws and washers to fix Knauf Insulation glass wool blankets to the underside of concrete slabs. The screw and washer sizes must be either similar to or larger than those of the tested system in RTF200088 R1.0. The tested system in RTF200088 R1.0 consisted of a plasterboard substrate. It is recognised that concrete has a tendency for spalling and this behaviour is different from that of plasterboard. However, spalling in concrete does not affect the heat release rate of the system. It, however, increases the possibility of ceiling lining fall-off. As discussed before, the fall-off of the glasswool blankets is unlikely to cause an increase in the heat release rate. The screw spacing and arrangement must be similar to those shown in in Figure 3 to Figure 5. Under these conditions, the Group rating of Knauf Insulation glass wool blankets fixed to concrete soffits using screws and washers is likely to be maintained as Group 1.

7.3.3 Smoke growth rate index ($SMOGRA_{RC}$)

The two alternative fixing conditions shown in Figure 1 and Figure 2 do not introduce any additional components that appreciably contributes to the smoke development of the system.

However, given that $SMOGRA_{RC}$ is a calculated using the guidelines given in AS 5637.1:2015 using results of the product tested in accordance with AS ISO 9705:2003 (R2016), this assessment does not prescribe a specific $SMOGRA_{RC}$ value to the assessed range of products. Instead, an opinion is provided based on the limiting criterion for the $SMOGRA_{RC}$ specified in the National Construction Code (NCC) Volume 1 Specification C1.10 clause 4 (a) (i). Based on the above discussion, the $SMOGRA_{RC}$ of the assessed range of Knauf Insulation glass wool blankets are likely not to exceed 100 m^2/s^2.

7.4 Conclusion

This assessment demonstrates that the tested system described in sections 4.1 and 4.2, if subjected to the fixing detail variations described in section 4.3 (Item 3), and tested in accordance with section 4.4, is likely to achieve a Group 1 classification.

In the context of C/VM2 Verification Method: Framework for Fire Safety Design, the assessed range of products are likely to achieve a Group 1-S rating.

8. Assessment 4 – Variations in foil tape width

8.1 Description of variation

The tested system subjected to a room burn test in accordance with AS ISO 9705:2003 (R2016) consisted of 50 mm wide foil tapes over the joints in the foil facing.

It is proposed that the foil tape width can be increased to 72 mm in the proposed systems. The foil tape may not be used for the fixing method shown in Figure 1.

8.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 11.

Table 11 Method of assessment

Assessment method	
Level of complexity	Simple assessment
Type of assessment	Qualitative and comparative

8.3 Assessment

A 50 mm wide foil tape was used in the tested system described in RTF200088 R1.0. The tested system achieved a Group 1 rating and the $SMOGRA_{RC}$ was calculated to be 16.1. It is proposed that the width of the foil tape can be increased to 72 mm. This marginal increase in the width of the foil tape is unlikely to produce any significant increase in the combustible fuel content within the test room. Consequently, the proposed variation is unlikely to cause any significant variation in the test outcomes.

8.4 Conclusion

This assessment demonstrates that the tested system described in sections 4.1 and 4.2, if subjected to the variation in the foil tape width described in section 4.3 (Item 4), and tested in accordance with section 4.4, is likely to achieve a Group 1 classification. The proposed variation is also unlikely to cause the $SMOGRA_{RC}$ of the system to exceed 100 m^2/s^2.

Overall, based on the discussions presented in sections 5.4, 6.3 , 7.3 and 8.3, it is the opinion of this accredited testing laboratory that the tested system described in section 4.2, if subjected to the variations described in section 4.3, and tested in accordance with the test method described in section 4.4, would achieve a Group 1 classification.

In the context of C/VM2 Verification Method: Framework for Fire Safety Design, the assessed range of products are likely to achieve a Group 1-S rating.

The $SMOGRA_{RC}$ of this assessed range of products is likely not to exceed 100 m^2/s^2.

In the context of C/VM2 Verification Method: Framework for Fire Safety Design, the average smoke production rate is likely not to exceed 5.0 m^2/s.

9. 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 likely to be demonstrated on a test in accordance with AS ISO 9705:2003 (R2016) and assessed in accordance with AS 5637.1:2015, based on the evidence referred to in this report.

This assessment is provided to the Amalgamated Metal Industries Pty Ltd and Knauf Insulation Pty Ltd for its own purposes and we cannot express an opinion on whether it will be accepted by building certifiers or any other third parties for any purpose.

Appendix A Drawings and information

Drawing title	Dwg no	Date	Drawn
Figure 1	Supporting Knauf Insulation glass wool blanket using a metallic safety mesh on the underside in metal roof applications	28/05/2020	Knauf Insulation Pty Ltd
Figure 2	Supporting the Knauf Insulation glass wool blanket using intermittent screws and washers into concrete substrates	28/05/2020	Knauf Insulation Pty Ltd
Figure 3	Fixing arrangement of rear wall lining in the tested system described in RTF200088 R1.0	8/07/2020	Knauf Insulation Pty Ltd/ test report RTF200088 R1.0
Figure 4	Fixing arrangement of the ceiling lining (from above) in the tested system described in RTF200088 R1.0		
Figure 5	Fixing arrangement of the side wall lining in the tested system described in in RTF200088 R1.0		
Figure 6	Cross section A-A in the tested system described in RTF200088 R1.0		
Figure 7	Cross section B-B in the tested system described in in RTF200088 R1.0		

Appendix B Summary of supporting test data

B.1 Test report – RTF200088 R1.0

Table 12 Information about test report

Item	Information about test report
Report sponsor	Amalgamated Metal Industries Pty Ltd and Knauf Insulation 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 08/07/2020.
Test standards	The test was done in accordance with AS ISO 9705:2003 (R2016) and AS 5637.1:2015
Variation to test standards	Smoke obscuration measurements were made using a laser smoke photometer, as outlined in Annex H of ISO 9705-1:2016.
General description of tested specimen	The test specimen consisted of 130 mm thick Knauf Insulation glass wool blankets laminated to the Ametalin HD polyweave foil. This is fixed to the test room walls and ceiling using a combination of 150 mm screws, 38mm washers. The foil facing of the blankets had a 150 mm overlap on one of the two long edges that was used to overlap and secure the facing to another blanket. All joins were taped over using 50 mm wide foil tape. The test assembly consisted of a fire test room whose ceiling and three walls were lined with sample material being tested, leaving the wall with the doorway opening unlined. The fire test room had studwork walls and ceiling lined with particleboard and two layers of 16mm thick fire-grade plasterboard on the internal side. The wall with the doorway was lined with two layers of 25mm thick mineral wool insulation. When unlined with the sample material, the internal wall dimensions of the fire test room were 3600 mm long × 2400 mm wide × 2400 mm high. The short wall opposite the ignition source had a centrally located doorway opening which was 800 mm wide × 2000 mm high.
Instrumentation	The test report states that the instrumentation was in accordance with AS ISO 9705:2003 (R2016).

The test specimen results are shown in Table 13 and Table 14.

Table 13 Classification for AS ISO 9705:2003 (R2016) and AS 5637.1:2015

Criteria	Results
Group number	1
$SMOGRA_{RC}$ (in m^2/s^2 × 1000)	16.1

Table 14 Classification for C/VM2 – Verification Method: Framework for Fire Safety Design

Criteria	Results
Group number	1 – S
Average smoke production rate (0 to 20 minutes) (in m^2/s)	0.4

B.2 Test report – EWFA 56297900a.1

Table 15 Information about test report

Item	Information about test report
Report sponsor	Knauf Insulation Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia
Issue date	The report was issued on 11/07/2018.
Test standards	The test was done in accordance with AS/NZS 1530.1-1994.
General description of tested specimen	The material was described as a mineral wool insulation having an R value of 3.5. It was described to have a thickness of 175 mm and had a density of 9.5 kg/m^3.
Instrumentation	The instrumentation is considered to be in accordance with AS 1530.1-1994.

The test specimen achieved the results shown in Table 16.

Table 16 Test results

Criteria	Results
Mean furnace temperature rise	6.4°C
Mean specimen centre thermocouple temperature rise	17.6°C
Mean specimen surface thermocouple temperature rise	8.1°C
Mean duration of sustained flaming	0 seconds
Mean mass loss	16.9

Consequently, the material was NOT DEEMED COMBUSTIBLE according to the test criteria specified in clause 3.4 of AS 1530.1-1994.

B.3 Test report – EWFA 56297900b.1

Table 17 Information about test report

Item	Information about test report
Report sponsor	Knauf Insulation Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Issue date	The report was issued on 11/07/2018.
Test standards	The test was done in accordance with AS/NZS 1530.1-1994.
General description of tested specimen	The material was described as a mineral wool insulation having an R value of 2.7. It was described to have a thickness of 90 mm and had a density of 24 kg/m^3.
Instrumentation	The instrumentation is considered to be in accordance with AS 1530.1-1994.

The test specimen achieved the results shown in Table 18.

Table 18 Test results

Criteria	Results
Mean furnace temperature rise	5.5°C
Mean specimen centre thermocouple temperature rise	23.8°C
Mean specimen surface thermocouple temperature rise	6.1°C
Mean duration of sustained flaming	0 seconds
Mean mass loss	7.6

Consequently, the material was NOT DEEMED COMBUSTIBLE according to the test criteria specified in clause 3.4 of AS 1530.1-1994.

B.4 Test report – No. 311313

Table 19 Information about test report

Item	Information about test report
Report sponsor	Knauf Insulation Limited
Test laboratory	Warringtonfire UK (formerly Exova Warringtonfire UK)
Issue date	The report was issued on 27/09/2011
Test standards	The test was done in accordance with BS EN ISO 1182:2010.
General description of tested specimen	The material was described as glass mineral wool insulation. It was described to have a thickness of 80 mm and had a density of 32 kg/m^3.
Instrumentation	The instrumentation is considered to be in accordance with BS EN ISO 1182:2010.

The test specimen achieved the results shown in Table 20.

Table 20 Test results

Criteria	Mean results
Furnace thermocouple temperature rise	6.8°C
Specimen centre thermocouple temperature rise	10.6°C
Specimen surface thermocouple temperature rise	6.3°C
Duration of sustained flaming (seconds)	NIL
Mass loss	9.03

B.5 Test No. 7-598590-CS

Table 21 Information about test report

Item	Information about test report
Report sponsor	Ametalin
Test laboratory	AWTA Product Testing
Test date	The test was completed on 24/07/2014.
Test standards	The test was done in accordance with AS 1530.2-1993.
General description of tested specimen	Properties of “Silverwrap – Light duty” • Nominal composition: Aluminium face, polypropylene back • Nominal weight 85g/m^2 • Nominal thickness: 0.09mm

The test specimen achieved the results shown in Table 22.

Table 22 Test results

Regulatory indices	Results
Flammability Index	1