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Fire assessment report

Assessment of Sika Boom®-420 Fire linear seals in walls & floors

Client: Sika Services AG

Product: Sika Boom®-420 Fire

Job number: FAS190306 Revision: R1.0

Issue date: 28 November 2019 Expiry date: 30 November 2024

Amendment schedule

Version	Date	Information relating to report			
R1.0	Issue: 28/11/2019	Reason for issue	Report issued to Sika Services AG for review and comment.		
			Prepared by	Reviewed by	Approved by
	Expiry: 30/11/2024	Name	Rami Al darwish	Mahmoud Akl	Omar Saad
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General conditions of use

Executive summary

This report documents the findings of the assessment undertaken to determine the likely fire resistance level (FRL) of various linear seals protected with Sika Boom®-420 Fire if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1-2005. The analysis conducted in Section 5 & 6 of this report found that the proposed variations are likely to achieve the FRLs shown in Table 1 and Table 2, if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1-2005.

Table 1 Assessment outcome for Sika Boom®-420 Fire in Rigid walls (thickness ≥ 150mm)

Wall type	Sealing system	Application	Linear Gap width (mm)	Linear Gap depth (mm)	FRL
AAC/AAC	Sika Boom®-420 Fire	Gun & adapter	0-20	≥ 150	-/60/60
			0-10		-/180/180
AAC/Softwood			0-20		-/120/120
AAC/Softwood with 50×18 mm wood architrave on both sides			0-20		-/90/90

Table 2 Assessment outcome for Sika Boom®-420 Fire in Rigid Floors (thickness ≥ 200mm)

Wall type	Sealing system	Application	Linear Gap width (mm)	Linear Gap depth (mm)	FRL
AAC/AAC	Sika Boom®-420 Fire	Gun & adapter	0-20	≥ 200	-/90/90
			0-10		-/120/120
		Adapter only	0-20		-/120/120
AAC/Softwood		Gun & adapter	0-20		-/120/120
AAC/Softwood with 50x18 mm wood architrave on both sides			0-20		-/120/120

The variations and outcome of this assessment are subject to the limitations and requirements described in Section 2 of this report. The results of this report are valid until 30 November 2024.

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1. Introduction

This report documents the findings of the assessment undertaken to determine the likely fire resistance level (FRL) of various linear seals protected with Sika Boom®-420 Fire if tested in accordance with AS 1530.4:2014[1] and assessed in accordance with AS 4072.1-2005[2]. This assessment was carried out at the request of Sika Services AG. The sponsor details are included in Table 3

Table 3 Sponsor details

Client	Address
Assessment sponsor	Sika Services AG Tueffenwies 16 Zurich 8048 Switzerland

2. Framework for the assessment

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

No specific framework, methodology, standard or guidance documents exists in Australia for doing these assessments. Therefore, we have followed the Guide to Undertaking Assessments In Lieu of Fire Tests prepared by the Passive Fire Protection Forum (PFPF) in the UK[3].

This guide provides a framework to undertake 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
- *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.

3. Description of the specimen and variations

3.1 System description

The assessment report references fire test reports WF 413746, WF 410988,& WF 410990 which comprise of various linear seals within 150mm thick autoclaved aerated concrete (AAC) walls and 200mm thick floors protected with Fire Foam " Known to Warringtonfire Australia Pty Ltd" that has been confirmed to be identical to Sika Boom®-420 Fire.

[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.

[2] Standards Australia (2005) Components for the protection of openings in fire-resistant separating elements Part 1: Service penetrations and control joints, AS 4072.1-2005.

[3] Guide to Undertaking Assessments In Lieu of Fire Test - The Passive Fire Protection Forum (PFPF), June 2019, UK.

3.2 Referenced test data

The assessment of the variation to the tested system and the determination of the likely fire resistance 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 A.

Table 4 Referenced test data

Report number	Test sponsor	Test date	Testing authority
WF 410988	Report sponsor is known to Warringtonfire Australia Pty Ltd	09/04/2019	Exova Warringtonfire , UK
WF 410990		10/04/2019	Exova Warringtonfire , UK
WF 413746		24/05/2019	Exova Warringtonfire , UK

3.3 Purpose of the test method

Sections 2 of AS 1530.4:2014 specify the general requirements for conducting fire resistance tests. Section 10 of AS 1530.4:2014 give guidelines for determining the fire resistance of elements of construction penetrated by services such as control joints. As per Section 10.3 of AS 1530.4:2014, the purpose of the test covering service penetrations and control joints is to assess-

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

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

AS 4072.1-2005 sets out the minimum requirements for the construction, installation and application of fire resistance tests to sealing systems. These include control joints between building elements that are required to have a fire resistance level (FRL).

3.4 Variations to tested systems

Identical linear sealing systems have not been subject to a standard fire test in accordance with AS 1530.4:2014. We have therefore assessed the different systems using baseline test information for the systems tested in accordance with BS EN 1366-4:2006 and EN1363-1:1999 Standards. The variations to the tested systems, together with the referenced baseline standard fire tests, are described in Table 5.

Table 5 Variation to tested systems

Assessment no	Reference test	Description	Variations
1	WF 413746, WF 410988, & WF 410990	The referenced tests were conducted in accordance with BS BS EN 1366-4:2006[4] and EN 1363-1:1999[5].	The proposed variation is to assess the likely fire resistance performance of linear seals if tested in accordance with AS 1530.4:2014 & and assessed in accordance with AS 4072.1-2005.
2		The foam in the referenced tests were applied using “Nozzle applicator” or “Gun applicator”.	The proposed varation is to assess the fire resistance performance of linear gaps protected with Sika Boom®-420 Fire when installed using different applicator systems

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

[5] British Standards Institute (2006) *Fire resistance tests for service installations*, Linear joint seals, BS EN 1366.4:2006.

3.5 Schedule of components

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

Table 6 Schedule of components of assessed walls and floor systems

Item	Description
Sealant	Sika Boom®-420 Fire Nozzle or gun applied into linear seals to various widths and depths as given in Table 8 and Table 9. Sika Boom®-420 Fire can be positioned at various configurations as illustrated in Figure 1 to Figure 6 and, and their corresponding fire resistance performance is given in Table 8 and Table 9.
Substrate	Substrates shall be AAC / AAC, AAC / Softwood, and AAC/ softwood with 50×18 mm wood architrave on both sides with a density greater or equal to 760 kg/m^3 for wall and floor systems. Refer to Table 8 and Table 9. .

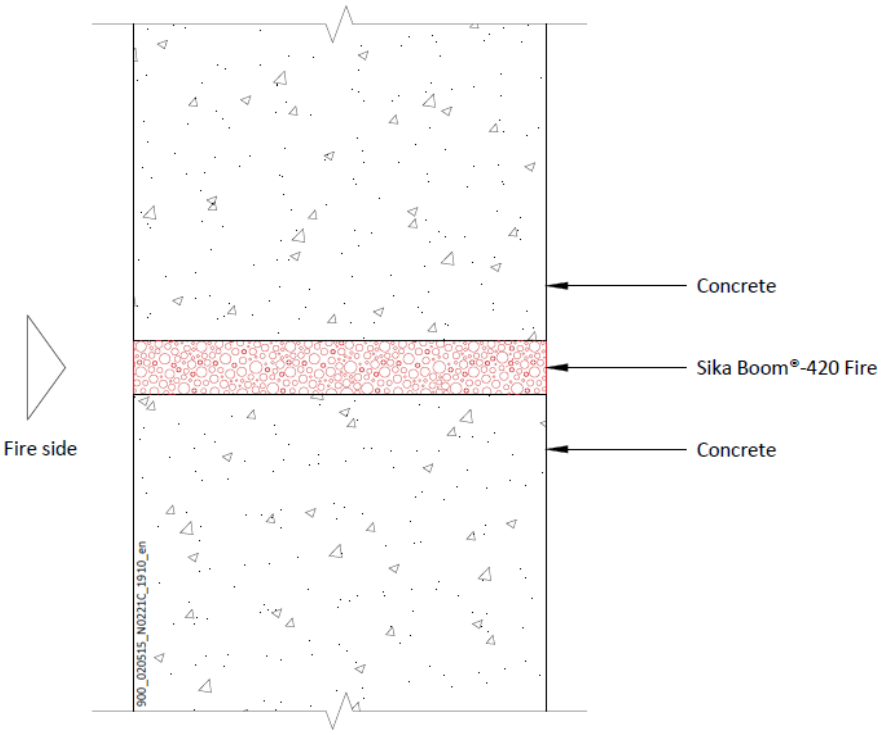

Figure 1 Installation on concrete wall 150mm thick

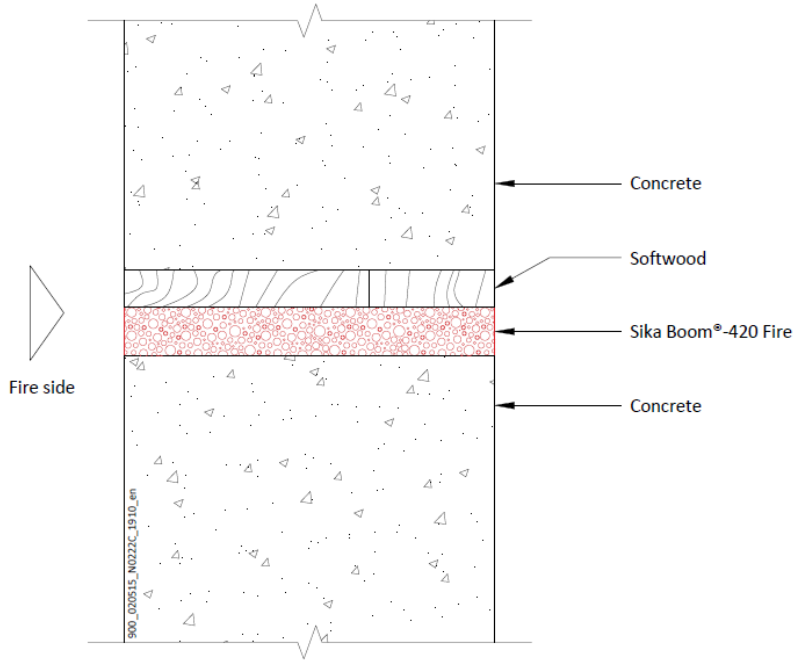

Figure 2 **Installation on concrete wall 150mm thick with 15mm softwood insert at one side**

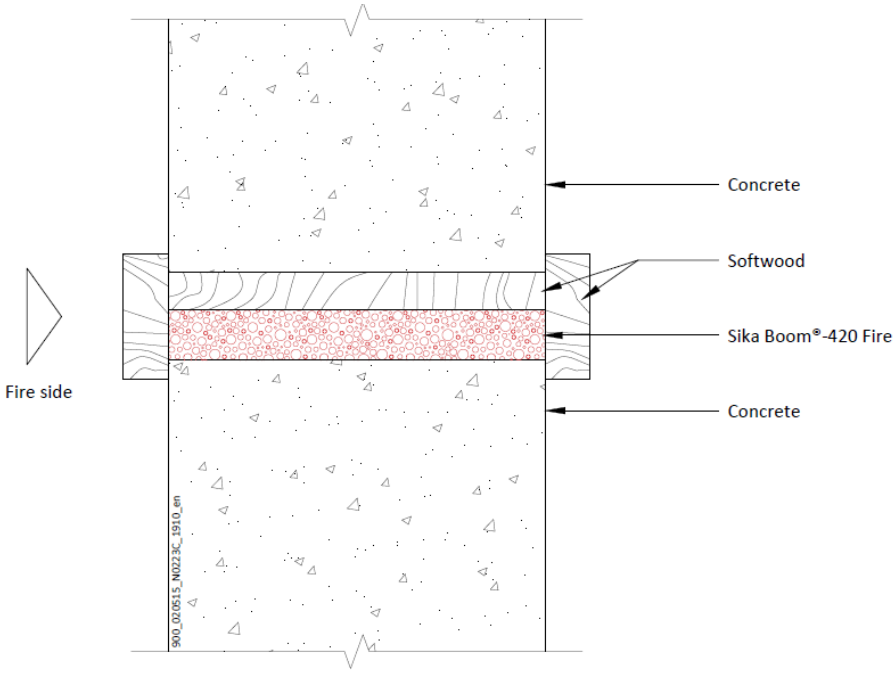

Figure 3 **Installation on concrete wall 150mm thick with 15mm softwood insert at one side and covered on both sides with a 50×18mm softwood architrave**

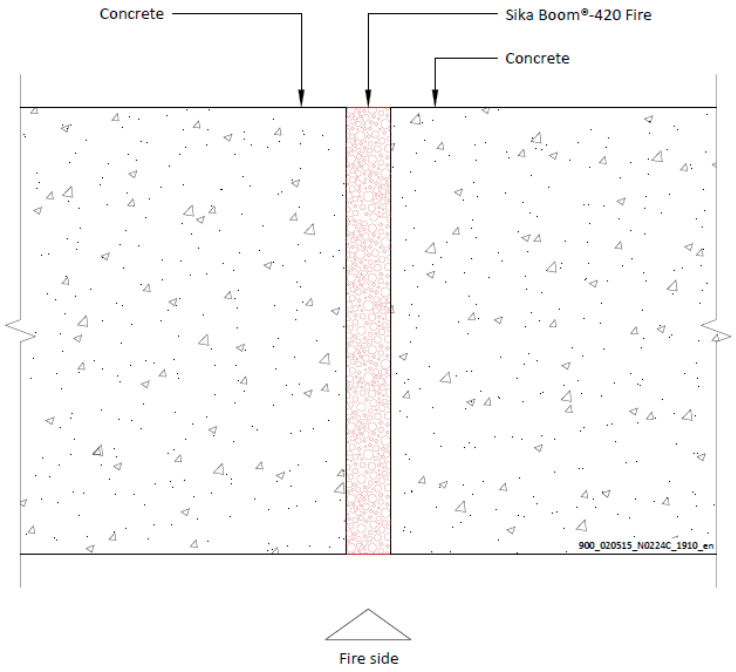

Figure 4 Installation on concrete floor 200mm thick

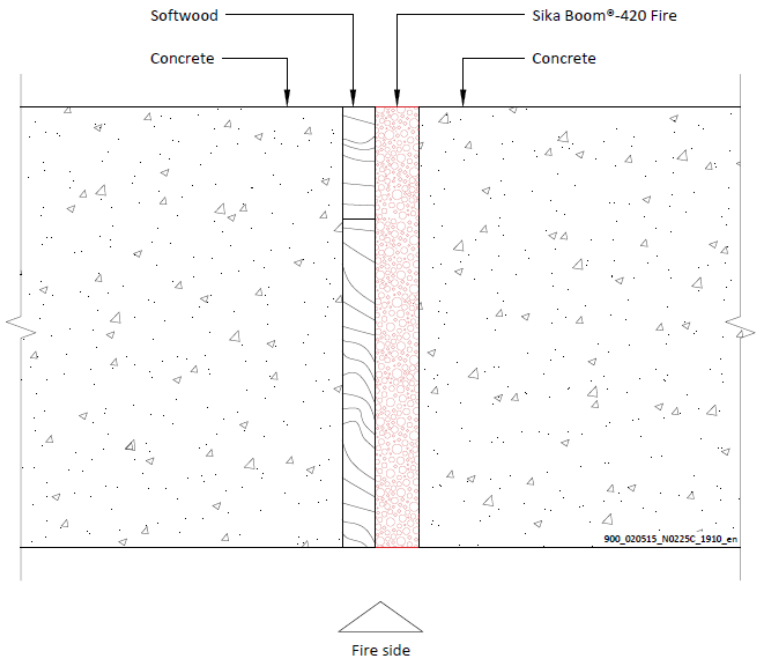

Figure 5 Installatioon on concrete floor 200mm thick with 15mm softwood insert at one side

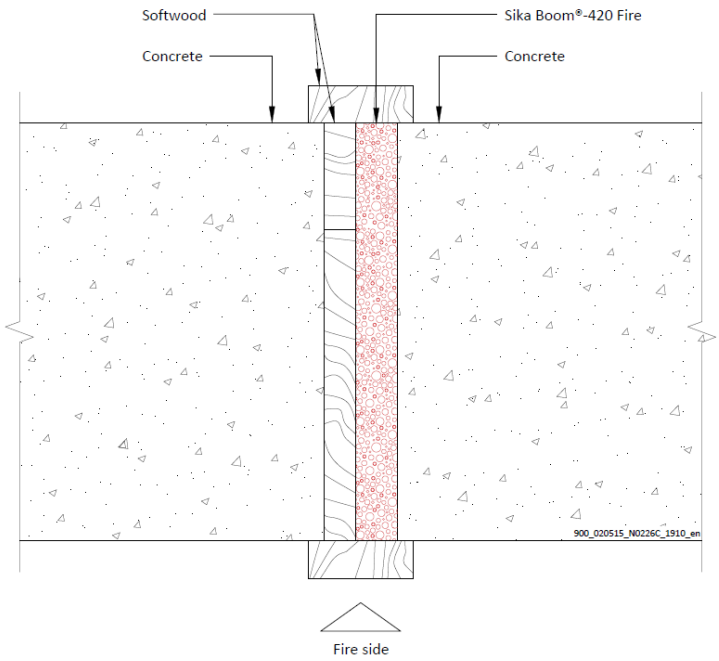

Figure 6 Installation on concrete floor 200mm thick with 15mm softwood insert at one side and covered on both sides with a 50×18mm softwood architrave

3.6 Declaration

The guide to undertaking assessments in lieu of fire tests prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal dated 27 September 2019, Sika Services AG 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.

4. Scope, objective and assumptions

4.1 Scope and objective

- The scope of this report is limited to an assessment of the variations to the tested systems described in section 3.4.
- 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 1530.4:2014 and AS 4072.1-2005.
- The results of this assessment are applicable to fire from both sides for walls, but not simultaneously, and to fire from below for floors.
- This report is only valid for the assessed systems. Any changes with respect to size, construction details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the findings of this assessment. If there are changes to the system, a reassessment will be needed to verify consistency with the assessment in this report.
- The data, methodologies, calculations and conclusions documented in this report specifically relate to the assessed systems and must not be used for any other purpose.
- 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.

5. Assessment 1 – Assessment of likely fire performance with respect to AS 1530.4:2014 and AS 4072.1-2005

5.1 Description of variation

Assessment 1 refers to fire test reports WF 413746, WF 410988, & WF 410990, which consisted of various linear seals in AAC walls and floors protected with Fire Foam. A confirmation was received from the report sponsor that the tested product is identical to Sika Boom®-420 Fire made from the same material and using the same manufacturing processes with the main difference being the name of the product.These tests were conducted in accordance with BS EN 1366-4:2006 and EN 1363-1:1999 and it has been proposed to assess the likely fire resistance performance of linear seals if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1-2005

5.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 7.

Table 7 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Comparative

5.3 Assessment

The referenced fire test reports WF 413746, WF 410988, & WF 410990 were conducted in accordance with BS EN 1366-4:2006 & EN 1363-1:1999 and these standards slightly differ from AS 1530.4:2014. The effect of these differences has on the fire resistance performance of tested linear seals are discussed below.

Furnace Temperature Measurement

- The furnace thermocouples specified in AS 1530.4:2014 are type K, mineral insulated metal sheathed (MIMS) with a stainless-steel sheath having a wire of diameter of less than 1.0mm and an overall diameter of 3mm. The measuring junction protrudes at least 25mm from the supporting heat resistant tube.
- The furnace thermocouple specified in EN 1363.1:1999 is made from folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen with the thermocouple hot junction protected by a pad of insulating material. The plate part is to be constructed from 150 ±1 mm long by 100 ±1 mm wide by 0.7 ±0.1 mm thick nickel alloy sheet strips.
- The measuring junction is to consist of nickel chromium/nickel aluminium (Type K) wire as defined in IEC 60584-1[6], contained within mineral insulation in a heat-resisting steel alloy sheath of nominal diameter 1 mm, the hot junctions being electrically insulated from the sheath.
- The thermocouple hot junction is to be fixed to the geometric centre of the plate, by a small steel strip made from the same material as the plate. The steel strip can be welded to the plate or may be screwed to it to facilitate replacement of the thermocouple. The strip should be approximately 18 mm by 6 mm if it is spot-welded to the plate, and nominally 25 mm by 6 mm if it is to be screwed to the plate. The screw is to be 2 mm in diameter.
- The assembly of plate and thermocouple should be fitted with a pad of inorganic insulation material 97 ±1 mm by 97 ±1 mm by 10 ±1 mm thick with a density of 280 ±30 kg/m^3.
- The relative location of the furnace thermocouples for the exposed face of the specimen, for AS 1530.4:2014 and EN 1363.1:1999, is 100mm +10mm and 100mm +50mm respectively.

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

- The furnace control thermocouples required by EN 1363.1:1999 are less responsive than those specified by AS 1530.4:2014. This variation in sensitivity can produce a potentially more onerous heating condition for specimens tested to EN 1363.1:1999, particularly when the furnace temperature is changing quickly in the early stages of the test.

Furnace Pressure Regime

- It is a requirement of AS 1530.4:2014 that for vertical elements with more than 1m height, a furnace pressure of 20 ± 3 Pa shall be established at the top of the separating element and all the penetration services shall have a pressure greater than 10 Pa.
- Similarly, as per BS EN 1366-4:2006, a vertical furnace shall be operated so that a minimum pressure of 15 Pa exists in the centre of the test specimen mounted in the lowest position
- It is a requirement of AS 1530.4:2014 and for EN 1363-1:1999 that for horizontal elements, a furnace gauge pressure of 20 Pa is established at a height 100mm below the floor soffit level.
- The parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014 and EN 1363-1:1999 are also not appreciably different.

Specimen Size

- BS EN 1366-4:2006 states that a linear joint seal shall be of uniform design cross sectional area and for non-movement joints, a shorter length of not less than 900mm can be used.
- AS 1530.4:2014 states that the length of the control joint exposed to the furnace chamber shall not be less than 1m.
- The linear seals tested in the reference test reports all have a length of 1m. Therefore, they are compliant with the Australian Standards' requirements.

Integrity Performance Criteria

- The specimen shall be deemed to have failed the integrity criterion in accordance with AS 1530.4:2014 if it collapses or sustains flaming or other conditions on the unexposed face, which ignite the cotton pad when applied for up to 30 seconds. Gap gauges are not used to evaluate integrity.
- Except for minor technical variations, the integrity criteria in EN 1363-1:1999 are generally applied in a comparable manner.

Specimen Temperature Measurement and insulation performance criteria

- For linear seals , AS 1530.4:2014 specifies the following requirements when placing thermocouples on the unexposed face in Clause 10.5.1 (f).
    a. At least three on the surface of the seal, with one thermocouple for each 0.3m^2 of surface area, up to a maximum of five, uniformly distributed over the area (one thermocouple being located at the centre of the seal)
    b. On the surface of the seal, 25mm from the edge of the opening, with one thermocouple for each 500mm of the perimeter.
    c. On the surface of the separating element, 25mm from the edge of the opening, with one thermocouple for each 500mm of the perimeter.
- Furthermore, Clause 10.5.3 of AS 1530.4:2014 specifies that thermocouples used for the evaluation of the insulation performance of linear seals shall be positioned on the unexposed face of the sealing system and the separating element, except where the unexposed face of the seal is recessed within the separating element. Where this occurs, thermocouples shall only be fitted to the seal when the joint width is greater than or equal to 12mm. Under such circumstances, the size of the pad may be reduced to facilitate the fitting of the thermocouple.
- A review of BS EN 1366-4:2006 thermocouple requirements show that while the unexposed surface thermocouple locations specified are in agreement with those specified in AS 1530.4:2014, the former is more onerous in certain aspects.

- Apart from slight variation in the thermocouple location, the general insulation criteria of AS 1530.4:2014 and BS EN 1366-4:2006 are not appreciably different.

Application of Test Data to AS 1530.4:2014

- The variations in furnace pressure, furnace thermocouples and the responses of the different thermocouple types to the furnace conditions are not expected to have significant effect on the outcome of the referenced fire resistance test.
- It is noted that in some of the referenced test reports, thermocouples on the unexposed surface sealant was not placed at the bottom end of the control joint specimens. Hence, it is not in strict accordance with AS 1530.4: 2014 which stipulates that at least 3 thermocouples should be placed on the surface of the seal. However, the bottom end of the vertical seal is subjected to a lower pressure from the exposed side. Therefore, the outcome of the test is unlikely to have significantly been altered due to the presence of these thermocouples. In addition, the insulation criteria exceeded in most of the linear seals with respect to the thermocouple placed 15mm away from the separating element. In contrast, AS 1530.4: 2014 requires thermocouples to be placed 25mm from the edge of the opening. Therefore, as BS EN 1366-4:2006 locations can be considered to be more onerous, if these thermocouples were to be placed as per the AS 1530.4: 2014, the insulation performance is expected to be similar or better than the test results.
- Based on the above discussion, it is considered that the results relating to the integrity and insulation performance of the referenced tests can be used as a basis to assess the FRL of the specimens if tested in accordance with AS 1530.4:2014.

5.4 Conclusion

This assessment demonstrates that the linear seals assessed are likely to achieve the FRLs shown in Table 8 and

Table 9, if tested in accordance with AS 1530.4:2014.

Table 8 Assessment outcome for Sika Boom®-420 Fire in Rigid walls (thickness ≥ 150mm)

Wall type	Sealing system	Application	Linear Gap width (mm)	Linear Gap depth (mm)	FRL
AAC/AAC	Sika Boom®-420 Fire	Gun & adapter	0-20	≥ 150	-/60/60
			0-10		-/180/180
AAC/Softwood			0-20		-/120/120
AAC/Softwood with 50×18 mm wood architrave on both sides			0-20		-/90/90

Table 9 Assessment outcome for Sika Boom®-420 Fire in Rigid Floors (thickness ≥ 200mm)

Wall type	Sealing system	Application	Linear Gap width (mm)	Linear Gap depth (mm)	FRL
AAC/AAC	Sika Boom®-420 Fire	Gun & adapter	0-20	≥ 200	-/90/90
			0-10		-/120/120
		Adapter only	0-20		-/120/120
AAC/Softwood		Gun & adapter	0-20		-/120/120

AAC/Softwood with 50x18 mm wood architrave on both sides					-/120/120

6. Assessment 2 – Assessment of likely fire performance of linear gaps protected with Sika Boom®-420 Fire when installed using different applicator systems

6.1 Description of variation

Assessment 2 refers to fire test reports WF 413746, WF 410988, & WF 410990, which consisted of various linear seals in AAC walls and floors protected with a Fire Foam product which is confirmed to be identical to Sika Boom®-420 Fire. It is proposed to assess the new 'Nozzle Applicator' against the Fire Resistance test results obtained from installing Sika Boom®-420 Fire using a 'Gun Applicator'.

6.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 7.

Table 10 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Comparative

6.3 Assessment

It is possed to assess the fire resistance performance of two installation methods for installing Sika Boom®-420 Fire. The assessment considers the new 'Nozzle Applicator' against the Fire Resistance test results obtained from installing Sika Boom®-420 Fire using a 'Gun Applicator'.
Fire Resistance tests have been conducted in accordance with EN 1366-4: 2006 +A1:2010, during which the alternative 'Nozzle Applicator' was used. The tests included identical joint seal configurations that were the same width, had the same Sika Boom®-420 Fire sealant, which was installed to the same depth. All aspects the specimens were identical except for the change of the applicator type.
The testes specimens were made up of 3 sets of identical joints that were installed in both wall and floor orientations. A review of the results from the tests show Integrity and insulation failure between the corresponding joints as follows:

Table 11 integrity and insulation results for tested seals in walls

Wall type	Sealing system	Application	Reference test	Insulation (Minutes)	Intergiry (Minutes)
AAC/AAC (Vertical joints)	Sika Boom®-420 Fire	Gun	WF 413746–Specimen C	71	71
		Nozzle	WF 410988–Specimen B	75	75
		Gun	WF 410990–Specimen A	62	62
		Nozzle	WF 410990–Specimen B	89	89

The results from these comparison samples show that the nozzle applied specimens achieved a small increase in overall Insulation performance than the gun applied specimens in walls. It can therefore be concluded that the alternative 'Nozzle Applicator' installation does not have any detrimental effect on the integrity and insulation performance of the seal.

Table 12 integrity and insulation results for tested seals in floors

Wall type	Sealing system	Application	Reference test	Insulation (Minutes)	Intergiry (Minutes)
AAC/AAC (Horizontal joints)	Sika Boom®-420 Fire	Gun	WF 410988–Specimen F	109	107
		Nozzle	WF 410988–Specimen G	120	120

The results from the above comparison samples show that the nozzle applied specimens achieved a small increase in overall Insulation performance than the gun applied specimens in floors. It can therefore be concluded that the alternative 'Nozzle Applicator' installation does not have any detrimental effect on the integrity and insulation performance of the seal.

The results from the comparison specimens clearly show that changing the applicator type from the original 'Gun Applicator' to the 'Nozzle Applicator' does not have a negative impact on the performance of the Sika Boom®-420 Fire product.

6.4 Conclusion

It can be concluded that installing Sika Boom®-420 Fire foam using the 'Nozzle Applicator' will offer the same Fire Resistance performance as a foam installation conducted using the 'Gun Applicator'.

7. 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 1530.4:2014 and AS 4072.1-2005, based on the evidence referred to in this report.

This assessment is provided to the Sika Services AG 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
Sika-Linear-joint-fire-foam-concrete-wall	900_020515_N0221C_1910_en	[01/11/2019]	Sika Services AG
Sika-Linear-joint-fire-foam-concrete-wall-softwood	900_020515_N0222C_1910_en	[01/11/2019]	Sika Services AG
Sika-Linear-joint-fire-foam-concrete-wall-softwood-architrave	900_020515_N0223C_1910_en	[01/11/2019]	Sika Services AG
Sika-Linear-joint-fire-foam-concrete-floor	900_020515_N0224C_1910_en	[01/11/2019]	Sika Services AG
Sika-Linear-joint-fire-foam-concrete-floor-softwood	900_020515_N0225C_1910_en	[01/11/2019]	Sika Services AG
Sika-Linear-joint-fire-foam-concrete-floor-softwood-architrave	900_020515_N0226C_1910_en	[01/11/2019]	Sika Services AG

Appendix B Summary of supporting test data

B.1 Test report – 410988

Table 13 Information about test report

Item	Information about test report
Report sponsor	Report sponsor is known to Warringtonfire Australia Pty Ltd
Test laboratory	Bodycote Warringtonfire Testing, Holmesfield Road, Warrington, Cheshire WA1 2DS United Kingdom
Test date	The fire resistance test was completed on 09/04/2019.
Test standards	The test was done in accordance with BS EN 1366-4:2006+A1:2010.
Variation to test standards	None
General description of tested specimen	A fire resistance test comprised of five vertical specimens of linear gap sealing systems in an autoclaved aerated concrete blockwork wall and six specimens of linear gap sealing systems in an aerated concrete floor, The section of wall had overall dimensions of 1500 mm high by 1500 mm wide by 150 mm thick and was made up of autoclaved aerated concrete lintels arranged to provide five linear gaps of varying widths which were all 1000 mm in length.Details of each seal is given in Table 14
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-4:2006+A1:2010.

Table 14 Description of tested specimen

Specimen	Linear seal details
A	20 mm wide linear gap, sealed with a 150 mm deep Fire Foam “known to Warringotnfire Australia Pty Ltd” , gun applied into the cavity.
B	20 mm wide linear gap, sealed with a 150 mm deep Fire Foam “Known to Warringtonfire Australia Pty Ltd” , nozzle applied into the cavity.
C	20 mm wide linear gap, sealed with a 150 mm deep Fire Foam “ known to Warringtonfire Australia Pty Ltd”, gun applied into the cavity. The cavity was lined with 30 mm softwood down one edge.
D	20 mm wide linear gap, sealed with a 150 mm deep Fire Foam “ known to Warringtonfire Australia Pty Ltd”, gun applied into the cavity. The cavity was lined with 30 mm softwood down one edge.
E	20 mm wide linear gap, sealed with a 150 mm deep Fire Foam “ known to Warringotnfire Australia Pty Ltd”, gun applied into the cavity. The cavity was lined with 30 mm softwood down one edge and 18 mm thick x 50 mm wide softwood was fixed over both faces of the linear gap.
F	20 mm wide linear gap, sealed with a 200 mm deep Fire Foam “ known to Warringotnfire Australia Pty Ltd”, gun applied into the cavity.
G	20 mm wide linear gap, sealed with a 200 mm deep Fire Foam “known to Warringtonfire Australia Pty Ltd” ,nozzle applied in to the cavity.
H	10 mm wide linear gap, sealed with a 200 mm depth of Fire Foam “known to Warringotnfire foam, gun applied into the cavity.
I	20 mm wide linear gap, sealed with a 200 mm depth of Fire Foam “known to Warringotnfire Australia Pty Ltd” gun applied into the cavity. The cavity was lined with 30 mm softwood down one edge.
J	20 mm wide linear gap, sealed with a 200 mm depth of Fire Foam “known to Warringotnfire Australia Pty Ltd”, gun applied into the cavity. The cavity was lined with 30 mm softwood down one edge and 18 mm thick × 50 mm wide softwood was fixed over both faces of the linear gap.
K	20 mm wide linear gap, sealed with a 200 mm depth of Fire Foam” Known to Warringtonfire Australia Pty Ltd” , gun applied into the cavity .

The test specimen achieved the results shown in Table 15:

Table 15 Results summary

Reference	Integrity (min)		Insulation (min)
	Cotton pad	Sustained flaming	
A	59	59	57
B	75	76	75
C	51	54	51
D	140	140	140
E	106	106	106
F	109	109	107
G	120	120	120
H	130	130	130
I	135	135	135
J	171	171	171
K	94	94	94

B.2 Test report – WF 413746

Table 16 Information about test report

Item	Information about test report
Report sponsor	Report sponsor is known to Warringtonfire Australia Pty Ltd
Test laboratory	Bodycote Warringtonfire Testing, Holmesfield Road, Warrington, Cheshire WA1 2DS United Kingdom
Test date	The fire resistance test was completed on 24/05/2019.
Test standards	The test was done in accordance with BS EN 1366-4:2006+A1:2010.
Variation to test standards	None
General description of tested specimen	A fire resistance test comprised of five vertical specimens of linear gap sealing systems in an autoclaved aerated concrete blockwork wall and six specimens of linear gap sealing systems in an aerated concrete floor. The section of wall had overall dimensions of 1800 mm high by 1800 mm wide by 150 mm thick and was made up of autoclaved aerated concrete lintels arranged to provide five linear gaps of varying widths which were all 1000 mm in length. Details of each seal is given in Table 17
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-4:2006+A1:2010.

Table 17 Description of tested specimen

Specimen	Linear seal details
A	20 mm wide linear gap, sealed with a 150 mm depth of Fire Foam “known to Warringtonfire Australia Pty Ltd” , gun applied into the cavity.
B	20 mm wide linear gap, sealed with a 150 mm depth of Fire Foam “ known to Warringtonfire Australia Pty Ltd” gun applied into the cavity.
C	20 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity.
D	10 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity.
E	10 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity.
F	20 mm wide linear gap, sealed with a 70 mm depth of known to Warringtonfire Foam, nozzle applied in to the cavity flush with the unexposed face.
G	30 mm wide linear gap, sealed with a 70 mm depth of ‘known to Warringtonfire Foam’, nozzle applied in to the cavity flush with the unexposed face.
H	30 mm wide linear gap, sealed with a 100 mm depth of ‘known to Warringtonfire Foam’, nozzle applied in to the cavity flush with the unexposed face.
I	50 mm wide linear gap, sealed with a 100 mm depth of ‘known to Warringtonfire, nozzle applied in to the cavity flush with the unexposed face.
J	30 mm wide linear gap, sealed with a 150 mm depth of ‘known to Warringtonfire’, nozzle applied in to the cavity flush with the unexposed face.
K	50 mm wide linear gap, sealed with a 150 mm depth of ‘known to Warringtonfire’, nozzle applied in to the cavity flush with the unexposed face.

The test specimen achieved the results shown in Table 18:

Table 18 Results summary

Reference	Integrity (min)		Insulation (min)
	Cotton pad	Sustained flaming	
A	76	76	75
B	77	78	73
C	72	76	71
D	187	188	187
E	155	156	155
F	136	138	124
G	98	98	98
H	159	160	157
I	51	53	40
J	253	254	230
K	189	189	184

B.3 Test report – WF 410990

Table 19 Information about test report

Item	Information about test report
Report sponsor	Report sponsor is known to Warringtonfire Australia Pty Ltd
Test laboratory	Exova Warringtonfire, Holmesfield Road, Warrington, Cheshire WA1 2DS United Kingdom
Test date	The fire resistance test was completed on 10/04/2019.
Test standards	The test was done in accordance with BS EN 1366-4:2006 +A1:2010.
Variation to test standards	None
General description of tested specimen	A fire resistance test comprised of five horizontal specimens of linear gap sealing systems in an autoclaved aerated concrete blockwork walls. The section of wall had overall dimensions of 1500 mm high by 1500 mm wide by 150 mm thick and was made up of autoclaved aerated concrete lintels arranged to provide five linear gaps of varying widths which were all 1000 mm in length.Details of each seal is given in Table 20.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-4:2006 +A1:2010.

Table 20 Description of tested specimen

Specimen	Linear seal details
A	20 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity.
B	20 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, nozzle applied into the cavity.
C	10 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity.
D	20 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity. The cavity was lined with 30 mm softwood along one edge.
E	20 mm wide linear gap, sealed with a 150 mm depth of known to Warringtonfire foam, gun applied into the cavity. The cavity was lined with 30 mm softwood along one edge and 18 mm thick x 50 mm wide softwood was fixed over both faces of the linear gap.

The test specimen achieved the results shown in Table 21:

Table 21 Results summary

Reference	Integrity (min)		Insulation (min)
	Cotton pad	Sustained flaming	
A	62	62	62
B	89	90	89
C	167	168	167
D	171	172	145
E	123	123	123