SOUDAL NV

FIRE ASSESSMENT REPORT

Soudal NV linear gap seal systems in aerated concrete and lightweight wall systems in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016)

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Quality management

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R1.0	Issue:30 Jun 2026	Initial issue		
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Executive summary

This report documents the findings of the assessment undertaken to determine the fire resistance level (FRL) of Soudal NV linear gap seal systems in lightweight wall, and aerated concrete wall and floor systems in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

The Soudal linear gap seal systems assessed include Soudafoam FR, Soudafoam FR HY, Soudaseal FR, Firecryl 4H, Firecryl FR and Fire Silicone B1 FR with backer materials comprising of Soudafoam FR HY, polyethylene (PE) backer rod and polyurethane (PU) backer rod.

The analysis in section 5.0 of this report found that the proposed system, together with the described variations, will achieve the FRLs as shown in Table 1 to Table 4 – in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

The variations and outcome of this assessment are subject to the limitations and requirements described in sections 2.0, 3.0 and 6.0 of this report. The results of this report are valid until 30 June 2031.

Table 1 FRLs of linear gap seal systems in aerated concrete walls

Minimum wall thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
100	11	100	Soudafoam FR	None	Full depth	-	-/90/90	9297C
100	31	100	Soudafoam FR	None	Full depth	-	-/-/-	9297C
100	11	10	Firecryl 4H	PE backer rod	Both	2 × 15	-/240/180	9297C
100	21	20	Firecryl 4H	PE backer rod	Both	2 × 25	-/240/180	9297C
100	10	100	Soudafoam FR HY	None	Full depth	-	-/120/120	19658A
100	20	100	Soudafoam FR HY	None	Full depth	-	-/60/60	19658A
100	30	100	Soudafoam FR HY	None	Full depth	-	-/45/45	19658A
100	10	20	Soudaseal FR	Soudafoam FR HY	Exposed	80	-/120/120	19658A
100	20	20	Soudaseal FR	Soudafoam FR HY	Exposed	80	-/120/90	19658A
100	30	20	Soudaseal FR	Soudafoam FR HY	Both	60	-/120/120	19658A
100	20	20	Soudaseal FR	Soudafoam FR HY	Unexposed	80	-/120/120	19658A
100	10	20	Firecryl FR	Soudafoam FR HY	Exposed	80	-/120/120	19658A
100	20	20	Firecryl FR	Soudafoam FR HY	Exposed	80	-/120/90	19658A
100	20	20	Firecryl FR	Soudafoam FR HY	Unexposed	80	-/120/90	19658A
100	30	3	Firecryl FR	Soudafoam FR HY	Both	94	-/120/90	19658A
100	10	20	Fire Silicone B1 FR	Soudafoam FR HY	Exposed	80	-/120/120	19658A
100	20	20	Fire Silicone B1 FR	Soudafoam FR HY	Exposed	80	-/120/90	19658A
100	30	20	Fire Silicone B1 FR	Soudafoam FR HY	Both	60	-/120/120	19658A
100	10	20	Fire Silicone B1 FR	PU foam backer rod	Exposed	1 × 10	-/120/120	19658A
100	10	20	Fire Silicone B1 FR	PU foam backer rod	Unexposed	1 × 10	-/120/90	19658A

Minimum wall thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
100	10	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 10	-/120/120	19658A
100	20	20	Fire Silicone B1 FR	PU foam backer rod	Unexposed	1 × 20	-/120/30	19658A
100	20	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 20	-/120/90	19658A
100	30	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 30	-/120/120	19658A
200	11	200	Soudafoam FR	None	Full depth	-	-/180/180	9297C
200	41	200	Soudafoam FR	None	Full depth	-	-/90/90	9297C
200	20	20	Firecryl 4H	PE backer rod	Both	2 × 25	-/240/240	9297C
200	10	200	Soudafoam FR HY	None	Full depth	-	-/240/240	19659A
200	20	200	Soudafoam FR HY	None	Full depth	-	-/180/180	19659A
200	30	200	Soudafoam FR HY	None	Full depth	-	-/120/120	19659A
200	40	200	Soudafoam FR HY	None	Full depth	-	-/120/120	19659A
200	20	20	Soudaseal FR	Soudafoam FR HY	Exposed	180	-/240/240	19659A
200	30	20	Soudaseal FR	Soudafoam FR HY	Exposed	180	-/120/120	19659A
200	40	20	Soudaseal FR	Soudafoam FR HY	Exposed	180	-/180/180	19659A
200	40	20	Soudaseal FR	Soudafoam FR HY	Both	160	-/240/180	19659A
200	20	20	Firecryl FR	Soudafoam FR HY	Exposed	180	-/240/240	19659A
200	30	20	Firecryl FR	Soudafoam FR HY	Exposed	180	-/240/240	19659A
200	20	20	Fire Silicone B1 FR	Soudafoam FR HY	Exposed	180	-/240/240	19659A
200	30	20	Fire Silicone B1 FR	Soudafoam FR HY	Exposed	180	-/240/240	19659A
200	40	20	Fire Silicone B1 FR	Soudafoam FR HY	Exposed	180	-/240/240	19659A
200	10	20	Fire Silicone B1 FR	PU foam backer rod	Exposed	1 × 10	-/240/180	19659A
200	10	20	Fire Silicone B1 FR	PU foam backer rod	Unexposed	1 × 10	-/240/240	19659A

Minimum wall thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
200	10	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 10	-/240/240	19659A
200	20	20	Fire Silicone B1 FR	PU foam backer rod	Unexposed	1 × 20	-/240/90	19659A
200	20	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 20	-/240/240	19659A
200	30	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 30	-/240/240	19659A
200	40	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 40	-/240/240	19659A
200	10	200	Soudafoam FR	None	Full depth	-	-/240/240	13492A
200	30	200	Soudafoam FR	None	Full depth	-	-/120/120	13492A
200	40	20	Soudaseal FR	Soudafoam FR and Firecryl FR	Unexposed	Soudafoam FR: 150 Firecryl FR: 30	-/240/240	13492A
200	25	20	Soudaseal FR	Soudafoam FR	Unexposed	180	-/240/240	13492A
200	30	20	Soudaseal FR	Soudafoam FR	Unexposed	180	-/240/240	13492A
200	15	15	Soudaseal FR	PE- Backer Rod	Exposed	1 × 30	-/240/240	13492A
200	30	20	Soudaseal FR	PE- Backer Rod	Both	2 × 40	-/240/240	13492A
200	15	15	Firecryl FR	Soudafoam FR	Unexposed	185	-/240/240	13492A
200	25	25	Firecryl FR	Soudafoam FR	Exposed	175	-/240/240	13492A
200	15	15	Firecryl FR	PE- Backer Rod	Exposed	1 × 30	-/240/240	13492A

Note:

- The aerated concrete wall must be designed in accordance with AS 3600:2018 or tested in accordance with AS 1530.4:2014 to achieve the required FRL.
- For fire-stopping protection that is symmetrical, the FRL applies from both sides of the separating element. If the protection is not symmetrical, the FRL is limited to one way. In such case, the location of sealant indicates the applicable direction of exposure.

Table 2 FRLs of linear gap seal systems in aerated concrete floors

Minimum floor thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
150	10	150	Soudafoam FR HY	None	Full depth	-	-/120/120	19660A
150	20	150	Soudafoam FR HY	None	Full depth	-	-/120/120	19660A
150	30	150	Soudafoam FR HY	None	Full depth	-	-/90/90	19660A
150	30	20	Soudaseal FR	Soudafoam FR HY	Bottom side	130	-/120/120	19660A
150	30	20	Soudaseal FR	Soudafoam FR HY	Top side	130	-/120/120	19660A
150	40	20	Soudaseal FR	Soudafoam FR HY	Bottom side	130	-/120/120	19660A
150	40	20	Soudaseal FR	Soudafoam FR HY	Top side	130	-/120/120	19660A
150	50	20	Soudaseal FR	Soudafoam FR HY	Top side	130	-/120/120	19660A
150	30	20	Firecryl FR	Soudafoam FR HY	Bottom side	130	-/240/240	19660A
150	30	20	Firecryl FR	Soudafoam FR HY	Top side	130	-/240/240	19660A
150	50	3	Firecryl FR	Soudafoam FR HY	Both	144	-/90/60	19660A
150	30	20	Fire Silicone B1 FR	Soudafoam FR HY	Bottom side	130	-/120/120	19660A
150	30	20	Fire Silicone B1 FR	Soudafoam FR HY	Top side	130	-/90/90	19660A
150	40	20	Fire Silicone B1 FR	Soudafoam FR HY	Bottom side	130	-/120/120	19660A
150	40	20	Fire Silicone B1 FR	Soudafoam FR HY	Top side	130	-/120/120	19660A
150	50	20	Fire Silicone B1 FR	Soudafoam FR HY	Top side	130	-/120/120	19660A
150	50	20	Fire Silicone B1 FR	Soudafoam FR HY	Both	110	-/90/30	19660A
150	20	20	Fire Silicone B1 FR	PU foam backer rod	Top side	1 × 20	-/120/60	19660A
150	30	20	Fire Silicone B1 FR	PU foam backer rod	Top side	1 × 30	-/120/30	19660A
150	30	20	Fire Silicone B1 FR	PU foam backer rod	Both	2 × 30	-/120/120	19660A

Minimum floor thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
Note: + The aerated concrete floor must be designed in accordance with AS 3600:2018 or tested in accordance with AS 1530.4:2014 to achieve the required FRL.								

Table 3 FRLs of vertical linear gap seal systems in plasterboard wall systems

Minimum wall thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
75	20	12.5	Soudaseal FR	None	Both	-	-/60/60	18776A
75	0	12.5	Soudaseal FR	None	Both	-	-/60/60	18776A
75	20	12.5	Firecryl FR	None	Both	-	-/60/60	18776A
75	0	12.5	Firecryl FR	None	Both	-	-/60/30	18776A
100	20	25	Soudaseal FR	None	Both	-	-/120/120	18787A
100	0	25	Soudaseal FR	None	Both	-	-/120/90	18787A
100	20	25	Firecryl FR	None	Both	-	-/120/120	18787A
100	0	25	Firecryl FR	None	Both	-	-/120/90	18787A
Note: + The plasterboard wall system must be tested or assessed in accordance with AS 1530.4:2014 to achieve the required FRL.								

Table 4 FRLs of horizontal linear gap seal systems in plasterboard wall systems

Minimum wall thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
75	20	12.5	Soudaseal FR	None	Both	-	-/60/60	18776A
75	0	12.5	Soudaseal FR	None	Both	-	-/60/60	18776A
75	20	12.5	Firecryl FR	None	Both	-	-/60/60	18776A

Minimum wall thickness (mm)	Maximum gap width (mm)	Minimum sealant depth (mm)	Sealant	Backing material	Sealant location	Minimum backfill depth (mm)	FRL	Reference test
75	0	12.5	Firecryl FR	None	Both	-	-/60/60	18776A
100	20	25	Soudaseal FR	None	Both	-	-/120/120	18787A
100	0	25	Soudaseal FR	None	Both	-	-/120/120	18787A
100	20	25	Firecryl FR	None	Both	-	-/120/120	18787A
100	0	25	Firecryl FR	None	Both	-	-/120/120	18787A

Note:

+ The plasterboard wall system must be tested or assessed in accordance with AS 1530.4:2014 to achieve the required FRL.

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1.0 Introduction

This report documents the findings of the assessment undertaken to determine the fire resistance level (FRL) of Soudal NV linear gap seal systems in lightweight wall, and aerated concrete wall and floor systems including Soudafoam FR, Firecryl FR and Soudalseal FR sealants in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

This report may be used as evidence of suitability in accordance with the requirements of the relevant National Construction Code (NCC) to support the use of the material, product, form of construction or design as given within the scope of this assessment report. It also references test evidence for meeting deemed-to-satisfy (DTS) provisions of the NCC that apply to the assessed systems.

This assessment was carried out at the request of Soudal NV. The sponsor details are included in Table 5.

Table 5 Sponsor details

Sponsor	Address
Soudal NV	Everdongenlaan 18-20 Turnhout 2300 Belgium

2.0 Framework for the assessment

2.1 Assessment approach

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

No specific framework, methodology, standard or guidance documents exists in Australia for undertaking these assessments. We have therefore followed the 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the Passive Fire Protection Forum (PFPF) in the UK in 2021[1].

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

This assessment uses established empirical methods and our experience of fire testing similar products to extend the scope of application by determining the limits for the design and performance based on the

[1] Passive Fire Protection Forum (PFPF), 2021, Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence, Passive Fire Protection Forum (PFPF), UK.

tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance of the elements in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

This assessment has been written in accordance with the general principles outlined in EN 15725:2023[2] for extended application on the fire performance of construction products and building elements: Principle of EXAP standards and EXAP reports.

The performance of the systems with the variations documented in this assessment report has been determined by assessing the performance of tested systems against the impact of each variation. The systems tested in accordance with AS 1530.4:2014, and detailed within Appendix A, are generally considered to be more onerous than the listed system variations which are generally expected to yield a performance equivalent to the tested systems.

2.2 Compliance with the National Construction Code

This assessment report has been prepared to meet the evidence of suitability requirements of the NCC 2022 Amendment 1[3] under A5G3(1)(d). It references test evidence for meeting deemed-to-satisfy (DTS) provisions of the NCC under A5G5 for fire resistance level that apply to the assessed systems based on Specifications 1 and 2 for fire resistance for building elements.

The proposed details and systems (building elements) in this report are confirmed to be assessed, without the aid of an active fire suppression system, based on prototype tests that are equivalent to or more severe than a standard fire test as specified in section 4.4, in accordance with NCC 2022 S1C2(b). It is also confirmed that the differences between the proposed systems and details compared to the tested prototypes are considered minor in accordance with NCC 2022 S1C2(c).

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

2.3 Declaration

The ‘Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence’ prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal on 17 February 2026, Soudal NV confirmed that:

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

[2] European Committee for Standardization, 2023, Extended application on the fire performance of construction products and building elements: Principle of EXAP standards and EXAP reports, EN 15725:2023, European Committee for Standardization, Brussels, Belgium.

[3] National Construction Code Volumes One and Two - Building Code of Australia 2022 Amendment 1, Australian Building Codes Board, Australia.

3.0 Requirements and limitations of this assessment

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

4.0 Description of the specimen and variations

4.1 Description of assessed systems

The assessed systems include Soudal NV linear gap seal systems in aerated concrete and lightweight wall systems. The Soudal linear gap seal systems assessed include Soudafoam FR, Soudafoam FR HY, Soudaseal FR, Firecryl 4H, Firecryl FR and Fire Silicone B1 FR with backer materials comprising of Soudafoam FR HY, polyethylene (PE) backer rod and polyurethane (PU) backer rod.

4.2 Referenced test data

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

Table 6 Referenced test data

Report number	Test sponsor	Test date	Testing authority
18776A	Soudal NV	9 January 2018	WFGENT NV
18787A	Soudal NV	9 January 2018	WFGENT NV
19658A	Soudal NV	15 May 2019	WFGENT NV
19659A	Soudal NV	17 May 2019	WFGENT NV
19660A	Soudal NV	14 May 2019	WFGENT NV
9297C	Soudal NV	7 December 2019	Universiteit Gent
13492A	Soudal NV	25 November 2008	WFGENT NV

4.3 Variations to the tested systems

The tested systems and variations to those tested systems – together with the referenced standard fire tests – are described in Table 7.

Table 7 Variations to tested systems

No	Variation	Reference test	Test standard	Evidence of suitability	Governing requirements	FRL
1.	It is proposed to assess the likely performance of the following linear gap seals in aerated concrete and plasterboard wall systems if tested in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016): + Soudafoam FR + Soudafoam FR HY + Soudaseal FR + Firecryl FR	18776A 18787A 13492A	EN 1363-1:1999 EN 1366-4:2006	A5G3(1)(d)	S1C2(b)	Refer to **Error! Reference source not found.** to **Error! Reference source not found.**
		19658A 19659A 19660A	EN 1363-1:1912 EN 1366-4:2006			

No	Variation	Reference test	Test standard	Evidence of suitability	Governing requirements	FRL
	+ Firecryl 4H + Fire Silicone B1 + Fire Silicone B1 FR With the following backer materials: + Soudafoam FR HY + PE backer rod + PU backer rod	9297C	NBN 713.020 (1968) EN 1366-4:1999			

4.4 Test standard

AS 1530.4:2014 sets out procedures and methods for fire tests on building materials, components, structures, and fire-resistance tests for elements of construction. Section 10 discusses the procedures and methods for service penetrations and control joints.

4.5 Reference standard

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

4.6 Schedule of components

Table 8 outlines the schedule of components for the assessed systems. We have based this schedule of component from the reference test reports shown in Table 6.

Table 8 Schedule of components of assessed systems

Item	Description	
Substrate	Rigid aerated concrete wall (density: 550 kg/m^3; thickness: ≥100 mm) in accordance with AS 3600:2018	
	Rigid aerated concrete wall (density: 550 kg/m^3; thickness: ≥200 mm) in accordance with AS 3600:2018	
	Rigid aerated concrete wall (density: 550 kg/m^3; thickness: ≥150 mm) in accordance with AS 3600:2018	
	Flexible partition wall with metal framework lined with a single layer of 13 mm thick fire-rated plasterboard on both sides (thickness: ≥ 75 mm). The wall cavity is insulation with rockwool (density: 35 kg/m^3, thickness: 50 mm)	
	Flexible partition wall with metal framework lined with 2 × 13 mm thick fire-rated plasterboard on both sides (thickness: ≥100 mm). The wall cavity is insulation with rockwool (density: 35 kg/m^3, thickness: 50 mm)	
Sealants	Foam sealant	Soudafoam® FR HY made of 1-component polyurethane foam. Applied over the whole joint and cut as required after the foam is solidified.
	Mastic sealant	Soudaseal® FR Grey made of SMX polymer. Applied on the foam sealant in the voids of the joints after the cutting away of the foam sealant.

Item	Description	
		Finished flush with the surface of the separating element.
	Acrylic sealant	Firecryl® FR made of acrylate dispersion. Applied on the foam sealant in the voids of the joints after the cutting away of the foam. Finished flush with the surface of the separating element.
	Silicone sealant	Fire Silicone® B1 FR made from polysiloxane. Applied on a. the foam sealant in the voids of the joints after the cutting away of the foam sealant OR b. the backer rod(s) in the voids after positioning the backer rod(s) at the right installation depth Finished flush with the surface of the separating element
Backer rod	Made of soft polyurethane (PU) foam with a diameter to fit the joint width. It is pushed gently inside the joint until the required depth is reached. The backfilling is covered by silicone sealant.	

5.0 Assessment 1 – Applicability of results to AS 1530.4:2014 and AS 4072.1:2005 (R2016)

5.1 Description of variation / background

Reference tests 18776A, 18787A, 13492A, 19658A, 19659A, 19660A and 9297C include Soudal NV linear gap seal systems in aerated concrete and lightweight wall systems. The Soudal linear gap seal systems assessed include Soudafoam FR, Soudafoam FR HY, Soudaseal FR, Firecryl 4H, Firecryl FR and Fire Silicone B1 FR with backer materials comprising of Soudafoam FR HY, polyethylene (PE) backer rod and polyurethane (PU) backer rod.

Reference tests 18776A, 18787A, 13492A, 19658A, 19659A and 19660A were conducted in accordance with EN 1366-4:1999 / EN 1366-4:2006 and EN 1363-1:2012. Reference test 9297C was conducted in accordance with NBN 713.020 (1968) and EN 1366-4:1999. It has been proposed to assess the expected fire resistance performance of linear seals in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

5.2 Methodology

The method of assessment used is summarised in Table 9.

Table 9 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
NCC procedure for determining fire performance	Equivalent and more severe from a tested prototype S1C2(b)
Type of assessment	Qualitative and comparative

5.3 Assessment

5.3.1 Applicability of EN 1366-4:2006, EN1363-1:1999 and EN 1363-1:2012 test results in accordance with AS 1530.4:2014

5.3.1.1 General

Referenced fire test reports 18776A, 18787A, 13492A, 19658A, 19659A and 19660A were conducted in accordance with EN 1366-4:2006, with instrumentation and heating and furnace conditions provided in accordance with either EN 1363-1:1999 or EN 1363-1:2012, as prescribed by EN 1366-4:2006.

The requirements of these standards differ in some respects from those prescribed in AS 1530.4:2014 and AS 4072.1:2005 (R2016). The effect that these differences have on the fire resistance performance of the tested linear seals is discussed in sections 5.3.1.2 to 5.3.1.7.

5.3.1.2 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 diameter of less than 1.0 mm and an overall diameter of 3.0 mm. The measuring junction protrudes at least 25 mm from the supporting heat resistant tube.

The furnace thermocouples specified in EN1363-1:1999 and EN 1363-1:2012 are made from a folded steel plate that faces the furnace chamber. A thermocouple is fixed to the side of the plate facing the specimen, with the thermocouple's 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 made of nickel chromium/nickel aluminium (Type K) wire as defined in IEC 60584-1, contained within mineral insulation in a heat-resisting steel alloy sheath that has a nominal diameter of 1 mm, the hot junctions being electrically insulated from the sheath.

The furnace control thermocouples required by EN 1363-1:2012 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 1363-1:2012, particularly when the furnace temperature is changing quickly in the early stages of the test.

As required by AS 1530.4:2014, furnace thermocouples must be arranged so that they are initially 100 ± 10 mm from the exposed face of the specimen and maintained, where practicable, at a distance of 50 mm to 150 mm during the test. The furnace thermocouples are not to be installed closer than 100 mm to the furnace wall or the burner flames. For EN 1363-1:2012, it is required that furnace thermocouples are placed 100 ± 50 mm from the nearest point of the exposed face of the test construction, and they must be maintained at this distance during the test. In addition, thermocouples are not to be installed closer than 450 mm from any wall, floor or roof of the furnace.

With regards to the positioning of the furnace thermocouples, the differences between the standards are in the required distance from the exposed face of the specimen at the commencement of the test and the location of the thermocouples relative to the walls of the furnace. These differences are expected to delay the time taken for the plate thermocouples of EN 1363-1:1999 and EN 1363-1:2012 to heat and accurately measure the furnace temperature when compared to the thermocouples in AS 1530.4:2014, and therefore will likely present a more onerous condition.

The distance to be maintained from the specimen during the test is relatively the same and is not expected to affect the results obtained following the two standards.

5.3.1.3 Furnace pressure regime

It is a requirement of AS 1530.4:2014 that, for vertical elements with a height of more than 1 m, a furnace pressure of 20 ± 3 Pa must be established at the top of the separating element, and all the penetration services must have a pressure greater than 10 Pa.

Similarly, EN 1366-4:2006 requires that a vertical furnace be operated so that a minimum pressure of 15 Pa exists in the centre of the test specimen mounted in the lowest position. Therefore, linear seals in walls subjected to furnace pressure of 15 Pa as per EN 1366-4:2006 will be compliant with the requirements of AS 1530.4:2014.

It is a requirement of both AS 1530.4:2014 and EN 1366-4:2006 that for horizontal elements, a furnace gauge pressure of 20 Pa be established at a position of 100 ± 10 mm below the floor soffit level. Therefore, there are no differences between the requirements of the two standards for horizontal elements such as floors.

Furthermore, the parameters outlining the accuracy of control of the furnace pressure in AS 1530.4:2014, EN 1363-1:1999 and EN 1363-1:2012 are also not appreciably different.

5.3.1.4 Specimen size

EN 1366-4:2006 states that a linear joint seal shall be of uniform design cross sectional area, and for non-movement joints, a length of not less than 900 mm can be used. AS 1530.4:2014 states that the length of the control joint exposed to the furnace chamber must not be less than 1 m.

The linear seals tested in the referenced test reports all have a length of 1 m. Therefore, they are compliant with the requirements of AS 1530.4:2014.

5.3.1.5 Integrity performance criterion

Both EN 1366-4:2006 and AS 1530.4:2014 state that gap gauges are not to be used to evaluate integrity for linear seals, and therefore, integrity criteria in EN 1363-1:2012 can generally be applied in a comparable manner.

In accordance with AS 1530.4:2014, while a specimen maintains its insulation performance, the specimen shall be deemed to have failed the integrity criterion if it collapses or sustains flaming or other conditions on the unexposed face that ignite the cotton pad when applied for up to 30 seconds.

Specimens shall be deemed to have failed the integrity criterion in accordance with AS 1530.4:2014 when any of the following occurs:

- A gap forms that allows the passage of hot gases to the unexposed face and ignites a 100 mm × 100 mm × 20 mm cotton pad when applied for up to 30 seconds.
- Sustained flaming for 10 seconds.

EN 1366-4:2006 states that the integrity of the specimen must be assessed as described in EN 1363-1. According to EN 1363-1:2012, integrity performance is breached when any of the following occurs (excluding gaps that allow gap gauges to be used as applicable to this assessment):

- A gap forms that allows the passage of hot gases to the unexposed face and ignites a 100 mm × 100 mm × 20 mm cotton pad when applied for up to 30 seconds. During measurements, a clearance of at least 30 mm must be maintained between the cotton pad and the surface of the specimen that is parallel to it. There must also be at least a 10 mm clearance between the periphery of the pad and the specimen.
- Sustained flaming.

Other than the sustained flaming criterion, the requirements for integrity failure in AS 1530.4:2014 and EN 1363-1:2012 are not appreciably different. As such, EN 1363-1:2012 can be considered more onerous than AS 1530.4:2014 with regards to the criterion of sustained flaming, as sustained flaming of less than 10 seconds may also be captured as a failure in a test in accordance with EN 1363-1.

5.3.1.6 Insulation performance criterion and specimen temperature measurement

Both EN 1366-4:2006 and AS 1530.4:2014 denote that insulation failure is deemed to occur when a maximum temperature rise of 180 ºC is recorded by the thermocouples placed on the unexposed surface of the specimen or by a roving thermocouple.

For linear seals, AS 1530.4:2014 clause 10.5.1 (f) specifies the following requirements when placing thermocouples on the unexposed face:

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

Furthermore, clause 10.5.3 of AS 1530.4:2014 specifies that thermocouples used for the evaluation of the insulation performance of linear 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 12 mm, and the size of the pad may be reduced to facilitate the fitting of the thermocouple.

Similar to AS 1530.4:2014, EN 1366-4:2006 specifies that thermocouples must be placed at the centre line of the linear joint seals. It is noted that in test reports 18776A, 18787A, 13492A, 19658A, 19659A and 19660A, three thermocouples were placed on the surface of the seal, with one located at the centre of the seal. Therefore, the requirements of AS 1530.4:2014, which stipulate that at least three thermocouples should be placed on the surface of the seal, are fulfilled in the tests.

However, one key difference between the requirements of the two standards is that in EN 1366-4:2006, the thermocouples placed on the separating element are to be installed 15 mm away from the linear joint, whereas AS 1530.4: 2014 requires thermocouples to be placed 25 mm from the edge of the seal. Therefore, as EN 1366-4:2006 locations are more onerous, if these thermocouples were to be placed as per AS 1530.4:2014, then the insulation performance is expected to be similar to or better than the achieved test results in reference tests 18776A, 18787A, 13492A, 19658A, 19659A and 19660A.

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

5.3.1.7 Application of test data to AS 1530.4:2014

The variations in furnace pressure, furnace thermocouples, and specimen thermocouple locations are not expected to have a significant effect on the outcome of the referenced fire resistance tests as described in sections 5.3.1.2 to 5.3.1.3. Therefore, based on the above discussion and the discussions presented in sections 5.3.1.2 to 5.3.1.6, it is considered that the results relating to the integrity and insulation performance of the reference tests 18776A, 18787A, 13492A, 19658A, 19659A and 19660A can be used as a basis to assess the FRL of the specimens in accordance with AS 1530.4:2014 and AS 4072.1:2005.

5.3.2 Applicability of NBN 713.020 (1968 edition) test results in accordance with AS 1530.4:2014

5.3.2.1 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 1.0 mm and an overall diameter of 3 mm. The measuring junction protrudes at least 25 mm from the supporting heat resistant tube.

The furnace thermocouple types in NBN 713.020 (1968) are specified as follows:

"*The length of the part exposed to the heat of the refracting sheath fitted with a thermocouple is not less than 170 mm. The thermocouple wires are exposed over a length of 25 mm measured from the hot weld and its minimal diameter is 0.75 mm*".

The location of the furnace thermocouples relative to the exposed face of the specimen for AS 1530.4:2014 is 100 mm ± 10 mm, maintained where practical at a distance of 50 mm to 150 mm during the test, while NBN 713.020 (1968) specifies a distance of 100 mm without a tolerance – which must be maintained as constant as possible during the test.

For a test in a 3 m × 3 m furnace, AS 1530.4:2014 requires five furnace thermocouples, arranged symmetrically, and distributed so as to give a reliable indication of the average temperature in the vicinity of the test specimen. NBN 713.020 (1968) requires at least 10 thermocouples evenly distributed on the exposed surface of the test sample. The requirements for the distribution of furnace thermocouples are considered to be sufficiently similar and the increased number of thermocouples for NBN 713.020 (1968) is considered to be sufficient to cover the locations as required by AS 1530.4:2014.

Thus, it is considered that the minor differences in the requirements of furnace thermocouples and their locations would not significantly affect the test results.

5.3.2.2 Temperature regime

The furnace heating regime in fire resistance tests conducted in accordance with AS 1530.4:2014 is specified by the following s heating rate.
$T = 345log_{10}(8t + 1) + 20$

Where:

T = furnace temperature at time t, in degrees Celsius

t = the time into the test, measured in minutes from the ignition of the furnace

The heating regime described in NBN 713.020 (1968) is similar to AS 1530.4:2014. However, AS 1530.4:2014 assumes initial temperature to be 20°C and NBN 713.020-1968 specifies that the initial ambient temperature can be between 5°C to 30°C. A test conducted in accordance with NBN 713.020 (1968) on a warm day (ambient temperature above 20°C) would therefore be slightly more onerous than that in accordance with AS1530.4:2014. However, on a cold day, AS 1530.4:2014 would be slightly more onerous. Nevertheless, with the allowed tolerance for the furnace temperature control accuracy specified in AS 1530.4:2014, the referenced test considered in this assessment is considered to have been exposed to a very similar heating regime to that in accordance with AS 1530.4:2014.

5.3.2.3 Furnace pressure regime

The furnace pressure required in AS 1530.4:2014 at the top of a vertical separating element is similar to that required in NBN 713.020 (1968). It is a requirement of AS 1530.4:2014 that for vertical elements, a furnace gauge pressure of zero (0) Pa is established at a height 500 mm above the notional floor level. Therefore, the pressure at the top of a vertical specimen of 3000 mm high – based on a pressure gradient of 8.0 Pa/m – could potentially be 20.0 Pa.

In NBN 713.020 (1968), the required average overpressure in the furnace is specified as 19.6 Pa, with the overpressure in the range of 14.7 Pa and 24.5 Pa during the test. Therefore, the differences in specified furnace pressure between the test standards is considered to be minor and thus not expected to be significant.

5.3.2.4 Specimen temperature measurement

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

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

Furthermore, Clause 10.5.3 of AS 1530.4:2014 specifies that thermocouples used for the evaluation of the insulation performance of linear 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 12 mm. Under such circumstances, the size of the pad may be reduced to facilitate the fitting of the thermocouple.

With reference to the Nr. 9297C test report, four thermocouples were placed on each vertical linear seal. The four thermocouples per the linear seal comply with AS 1530.4:2014, but the requirement of one thermocouple per 500 mm of the perimeter and 25 mm from the edge is not satisfied. It is however considered acceptable to apply the test results to AS 1530.4:2014 as none of the tested joints are within 20 ºC of failure for the insulation rating they are given in accordance with AS 1530.4:2014. In addition, added confidence is gained by the fact that the observations for the test were considered to be sufficiently detailed and no localised areas of failure (which were not adequately covered by the thermocouples) were observed.

5.3.2.5 AS 1530.4:2014 criteria of failure

AS 1530.4:2014 specifies the following performance criteria for linear gap sealing systems:

Structural adequacy

Not applicable

Integrity

Failure in relation to integrity shall be deemed to have occurred if the specimen:

- Collapses.
- Sustained flaming on the non-fire side in excess of 10 seconds.
- Ignition of a cotton pad within 30 seconds when applied.

Insulation

Failure in relation to insulation shall be deemed to have occurred when the temperature of any of the relevant thermocouples attached to the unexposed face of the test specimen rises by more than 180°C above the initial temperature.

5.3.2.6 NBN 713.020 (1968) criteria of failure

The criteria of classification specified in NBN 713.020 (1968) are as follows:

Stability

Stability is considered adequate when the construction sub-assembly:

- retains its condition, that is to say, the qualities necessary for the maintenance of its own stability and the fulfilment of its function.
- does not show any distortion incompatible with its function with regard to the stability of the construction.
- where necessary, bears without any failure, during a given period of time after the test, the load applied to it during the test.

Imperviousness to flames

The construction sub-assembly is no longer considered impervious to flames when a layer of cotton which has moved slowly a distance of 2 to 3 cm from a crack or any other opening that may have occurred on the side of the non-exposed surface of the test sample ignites spontaneously when the overpressure in the heated chamber is 2 kg/m^2.

Thermal insulation

A construction sub-assembly is considered to have an adequate degree of thermal insulation when the average and maximum temperatures are less than 140ºC and 180ºC above the initial temperature respectively. The insulation criterion is considered to be less onerous for AS 1530.4:2014 as the average temperature is not considered in the criteria of failure. The integrity criteria vary between the standards, however the observations noted during the test appear to be sufficient for the determination of the integrity result.

5.3.2.7 Application of test data from Nr. 9297C to AS 1530.4:2014

The variations in furnace heating regimes, 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 tests. Based on the above discussion, it is considered that the results relating to the integrity performance of the tested penetrations in Nr. 9297C can be used to assess the FRL in accordance with AS 1530.4:2014 and AS 4072.1:2005 (R2016).

5.4 Conclusion

This assessment demonstrates that the linear gap seal systems in aerated concrete and lightweight wall systems are capable of achieving the FRLs shown in Table 1**Error! Reference source not found.** to Table 4**Error! Reference source not found.** in accordance with AS 1530.4:2014.

6.0 Validity

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

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

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

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

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

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

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

Appendix A Summary of supporting test data

A.1 Test report – 18776A

Table 10 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, 2300 Turnhout, Belgium
Test laboratory	WFGENT NV
Test date	The fire resistance test was done on 9 January 2018.
Test standards	The test was done in accordance with EN 1366-4:2006+A1:2010.
Variation to test standards	None
General description of tested specimen	The test specimens are joint seals between a lightweight partition wall and the adjacent solid wall and solid floor plate. The supporting constructions with the test specimens are mounted into a concrete frame with inner dimensions 3 meters x 3 meters. The whole unit was placed up against the furnace so that it constitutes one of the outer walls thereof. The dimensions of the concrete frame are invariable regardless of the actions of the test specimens during the test.
Instrumentation	The test report states that the instrumentation was in accordance with EN 13501-2.

The test specimen achieved the following results – see Table 11.

Table 11 Results summary for this test report

Description					FRL (MINUTES)		
Position	**Orientation**	**Type**	**Width × Thickness [mm]**	**Thermal insulation $I^{(*)}$**	***Integrity – E*$^{(*)}$**		
				ΔTM = 180°C	**Ignition cotton pad**	**continuous flames**	***Failure gap gauge***
1	Horizontal	Soudaseal® FR	20×12,5	66 (1)	66 (1)	66 (1)	*66* (1)
2	Horizontal	-	0×12,5	66 (1)			
3	Vertical	Soudaseal® FR	20×12,5	66 (1)			
4	Vertical	-	0×12,5	60			
5	Horizontal	Firecryl® FR	20×12,5	66 (1)			
6	Horizontal	-	0×12,5	66 (1)			
7	Vertical	Firecryl® FR	20×12,5	66 (1)			
8	Vertical	-	0×12,5	57			

(*) Classification according to EN 13501-2.

(1) The test was stopped after 66 minutes at the test sponsor's request.

A.2 Test report – 18787A

Table 12 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, 2300 Turnhout, Belgium
Test laboratory	WFGENT NV
Test date	The fire resistance test was done on 9 January 2018.
Test standards	The test was done in accordance with EN 1366-4:2006+A1:2010.
Variation to test standards	None
General description of tested specimen	The test specimens are joint seals between a lightweight partition wall and the adjacent solid wall and solid floor plate. The supporting constructions with the test specimens are mounted into a concrete frame with inner dimensions 3 meters × 3 meters. The whole unit was placed up against the furnace so that it constitutes one of the outer walls thereof. The dimensions of the concrete frame are invariable regardless of the actions of the test specimens during the test.
Instrumentation	The test report states that the instrumentation was in accordance with EN 13501-2.

The test specimen achieved the following results – see Table 13.

Table 13 Results summary for this test report

	Description			*FRL (minutes)*			
Position	**Orientation**	**Type**	**Width x Thickness [mm]**	**Thermal insulation – I(*)**	***Integrity – E(*)***		
				ΔTM = 180°C	**Ignition cotton pad**	**Continuous flames**	**Failure gap gauge**
1	Horizontal	Firecryl® FR	20×25	132 (1)	132 (1)	132 (1)	132 (1)
2	Horizontal	-	0×25	132 (1)			
3	Vertical	Firecryl® FR	20×25	130			
4	Vertical	-	0×25	104			
5	Horizontal	Soudaseal® FR	20×25	132 (1)			
6	Horizontal	-	0×25	132 (1)			
7	Vertical	Soudaseal® FR	20×25	132 (1)			
8	*Vertical*	-	*0×25*	*115*			

(*) Classification according to EN 13501-2.

(1) The test was stopped after 66 minutes at the test sponsor's request.

A.3 Test report – 19658A

Table 14 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, 2300 Turnhout, Belgium
Test laboratory	WFRGENT NV, Ottergemsesteenweg-Zuid 711, B-9000 Gent, België
Test date	The fire resistance test was completed on 15/05/2019.
Test standards	The test was done in accordance with BS EN 1366-4:2006, EN 1363-1:2012 and where appropriate EN 1363-2:1999.
Variation to test standards	None
General description of tested specimen	The test specimen comprised of twenty vertical 1000 mm long linear joints in a rigid aerated concrete wall with dimensions of 3000 mm in height × 3000 mm in width × 100 mm in thickness. The linear joint seals comprised of foam sealant Soudafoam® FR HY made of a 1-component polyurethane foam and applied in widths of 10 mm, 20 mm, 30 mm. The foam sealant is applied over the whole joint and cut as required after solidification. Soudaseal® FR Grey Mastic sealant, Firecryl® FR Acrylic sealant and Fire Silicone® B1 FR silicone sealants were applied on the foam sealant in the voids of the joints after the cutting away of the foam sealant and finished flush with the wall surface. These were applied at either the exposed, unexposed or both sides of the supporting construction.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-4:2006 and BS EN 1363-1:2012.

The test specimen achieved the following results – see Table 15 and Table 16.

Table 15 Results summary for this test report

Orientation	Ref	Linear joint seal					
		Sealant				Backfilling	
		Type	Width (mm)	Layer thickness (mm)	Application side (exp./unexp./symm.)	Type	∅ or thickness (mm)
Vertical	1	Soudafoam® FR HY	10	100	Symmetrical	-	
	2	Soudafoam® FR HY	20	100	Symmetrical	-	
	3	Soudafoam® FR HY	30	100	Symmetrical	-	
	4	Soudaseal® FR	10	20	Exposed	Soudafoam® FR HY	80
	5	Soudaseal® FR	20	20	Exposed	Soudafoam® FR HY	80
	6	Soudaseal® FR	20	20	Unexposed	Soudafoam® FR HY	80
	7	Soudaseal® FR	30	20	Symmetrical	Soudafoam® FR HY	60
	8	Firecryl® FR	10	20	Exposed	Soudafoam® FR HY	80
	9	Firecryl® FR	20	20	Exposed	Soudafoam® FR HY	80
	10	Firecryl® FR	20	20	Unexposed	Soudafoam® FR HY	80

Orientation	Linear joint seal						
	Ref	Sealant				Backfilling	
		Type	Width (mm)	Layer thickness (mm)	Application side (exp./unexp./symm.)	Type	∅ or thickness (mm)
	11	Firecryl® FR	30	3	Symmetrical	Soudafoam® FR HY	94
	12	Fire Silicone® B1 FR	10	20	Exposed	Soudafoam® FR HY	80
	13	Fire Silicone® B1 FR	20	20	Exposed	Soudafoam® FR HY	80
	14	Fire Silicone® B1 FR	30	20	Symmetrical	Soudafoam® FR HY	60
	15	Fire Silicone® B1 FR	10	20	Exposed	Backer rod	1 × 10
	16	Fire Silicone® B1 FR	10	20	Unexposed	Backer rod	1 × 10
	17	Fire Silicone® B1 FR	10	20	Symmetrical	Backer rod	2 × 10
	18	Fire Silicone® B1 FR	20	20	Unexposed	Backer rod	1 × 20
	19	Fire Silicone® B1 FR	20	20	Symmetrical	Backer rod	2 × 20
	20	Fire Silicone® B1 FR	30	20	Symmetrical	Backer rod	2 × 30

Table 16 Results summary for this test report

Ref	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flaming	
1	129 (2)	129	129 (2)
2	71 (2)	71	71 (2)
3	50 (2)	50	50 (2)
4	132 (1)	132 (1)	132 (1)
5	132 (1)	132 (1)	114
6	132 (1)	132 (1)	124
7	132 (1)	132 (1)	132 (1)
8	132 (1)	132 (1)	132 (1)
9	132 (1)	132 (1)	114
10	132 (1)	132 (1)	100
11	132 (1)	132 (1)	105
12	132 (1)	132 (1)	132 (1)
13	132 (1)	132 (1)	132 (1)
14	132 (1)	132 (1)	132 (1)
15	132 (1)	132 (1)	132 (1)

Ref	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flaming	
16	132 (1)	132 (1)	101
17	132 (1)	132 (1)	132 (1)
18	132 (1)	132 (1)	34
19	132 (1)	132 (1)	110
20	132 (1)	132 (1)	132 (1)

(1) 132 minutes, no failure. The test was stopped after 132 minutes at the request of the sponsor

(2) Not failed until the moment of spontaneous and sustained flaming

A.4 Test report – 19659A

Table 17 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, 2300 Turnhout, Belgium
Test laboratory	WFRGENT NV, Ottergemsesteenweg-Zuid 711, B-9000 Gent, België
Test date	The fire resistance test was completed on 17/05/2019.
Test standards	The test was done in accordance with BS EN 1366-4:2006, EN 1363-1:2012 and where appropriate EN 1363-2:1999.
Variation to test standards	None
General description of tested specimen	The test specimen comprised of twenty vertical 1000 mm long linear joints in a rigid aerated concrete wall with dimensions of 3000 mm in height × 3000 mm in width × 200 mm in thickness. The linear joint seals comprised of foam sealant Soudafoam® FR HY made of a 1-component polyurethane foam and applied in widths of 10 mm, 20 mm, 30 mm. The foam sealant is applied over the whole joint and cut as required after solidification. Soudaseal® FR Grey Mastic sealant, Firecryl® FR Acrylic sealant and Fire Silicone® B1 FR silicone sealants were applied on the foam sealant in the voids of the joints after the cutting away of the foam sealant and finished flush with the wall surface. These were applied at either the exposed, unexposed or both sides of the supporting construction.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-4:2006 and BS EN 1363-1:2012.

The test specimen achieved the following results – see Table 18 and Table 19.

Table 18 Results summary for this test report

Orientation	Ref	Linear joint seal					
		Sealant				Backfilling	
		Type	Width (mm)	Layer thickness (mm)	Application side (exp./unexp./symm.)	Type	∅ or thickness (mm)
Vertical	1	Soudafoam® FR HY	10	200	Symmetrical	-	
	2	Soudafoam® FR HY	20	200	Symmetrical	-	

Orientation	Linear joint seal						
	Ref	Sealant				Backfilling	
		Type	Width (mm)	Layer thickness (mm)	Application side (exp./unexp./symm.)	Type	∅ or thickness (mm)
	3	Soudafoam® FR HY	30	200	Symmetrical	-	
	4	Soudafoam® FR HY	40	200	Symmetrical	-	
	5	Soudaseal® FR	20	20	Exposed	Soudafoam® FR HY	180
	6	Soudaseal® FR	30	20	Exposed	Soudafoam® FR HY	180
	7	Soudaseal® FR	40	20	Exposed	Soudafoam® FR HY	180
	8	Soudaseal® FR	40	20	Symmetrical	Soudafoam® FR HY	160
	9	Firecryl® FR	20	20	Exposed	Soudafoam® FR HY	180
	10	Firecryl® FR	30	20	Exposed	Soudafoam® FR HY	180
	11	Fire Silicone® B1 FR	20	20	Exposed	Soudafoam® FR HY	180
	12	Fire Silicone® B1 FR	30	20	Exposed	Soudafoam® FR HY	180
	13	Fire Silicone® B1 FR	40	20	Exposed	Soudafoam® FR HY	180
	14	Fire Silicone® B1 FR	10	20	Exposed	Backer rod	1 × 10
	15	Fire Silicone® B1 FR	10	20	Unexposed	Backer rod	1 × 10
	16	Fire Silicone® B1 FR	10	20	Symmetrical	Backer rod	1 × 10
	17	Fire Silicone® B1 FR	20	20	Unexposed	Backer rod	2 × 10
	18	Fire Silicone® B1 FR	20	20	Symmetrical	Backer rod	2 × 20
	19	Fire Silicone® B1 FR	30	20	Symmetrical	Backer rod	2 × 30
	20	Fire Silicone® B1 FR	40	20	Symmetrical	Backer rod	2 × 40

Table 19 Results summary for this test report

Ref	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flaming	
1	252 (1)	252 (1)	252 (1)
2	185 (2)	185	185 (2)

Ref	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flaming	
3	170 (2)	170	170 (2)
4	124 (2)	124	124 (2)
5	250 (2)	250	250 (2)
6	142 (2)	142	142 (2)
7	185 (2)	185	185 (2)
8	252 (1)	252 (1)	216
9	252 (1)	252 (1)	252 (1)
10	252 (1)	252 (1)	252 (1)
11	252 (1)	252 (1)	252 (1)
12	252 (1)	252 (1)	252 (1)
13	252 (1)	252 (1)	252 (1)
14	252 (1)	252 (1)	203 (1)
15	252 (1)	252 (1)	252 (1)
16	252 (1)	252 (1)	252 (1)
17	237	252 (3)	90
18	252 (1)	252 (1)	252 (1)
19	252 (1)	252 (1)	252 (1)
20	252 (1)	252 (1)	250

(1) 252 minutes, no failure. The test was stopped after 252 minutes at the request of the sponsor

(2) Not failed until the moment of spontaneous and sustained flaming

(3) No failure until the moment of failure of the criterion with the cotton pad

A.5 Test report – 19660A

Table 20 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, 2300 Turnhout, Belgium
Test laboratory	WFRGENT NV, Ottergemsesteenweg-Zuid 711, B-9000 Gent, België
Test date	The fire resistance test was completed on 14/05/2019.
Test standards	The test was done in accordance with BS EN 1366-4:2006, EN 1363-1:2012 and where appropriate EN 1363-2:1999.
Variation to test standards	None

Item	Information about test report
General description of tested specimen	The test specimen comprised of twenty vertical 1000 mm long linear joints in a 150 mm rigid aerated concrete floor. The linear joint seals comprised of foam sealant Soudafoam® FR HY made of a 1-component polyurethane foam and applied in widths of 10 mm, 20 mm, 30 mm. The foam sealant is applied over the whole joint and cut as required after solidification. Soudaseal® FR Grey Mastic sealant, Firecryl® FR Acrylic sealant and Fire Silicone® B1 FR silicone sealants were applied on the foam sealant in the voids of the joints after the cutting away of the foam sealant and finished flush with the wall surface. These were applied at either the exposed, unexposed or both sides of the supporting construction.
Instrumentation	The test report states that the instrumentation was in accordance with BS EN 1366-4:2006 and BS EN 1363-1:2012.

The test specimen achieved the following results – see Table 21 and Table 22.

Table 21 Results summary for this test report

		Linear joint seal					
Orientation	Ref	Sealant Type	Width (mm)	Layer thickness (mm)	Application side (exp./unexp./symm.)	Backfilling Type	∅ or thickness (mm)
Floor	1	Soudafoam® FR HY	10	150	Symmetrical	-	
	2	Soudafoam® FR HY	20	150	Symmetrical	-	
	3	Soudafoam® FR HY	30	150	Symmetrical	-	
	4	Soudaseal® FR	30	20	Exposed	Soudafoam® FR HY	130
	5	Soudaseal® FR	30	20	Unexposed	Soudafoam® FR HY	130
	6	Soudaseal® FR	40	20	Exposed	Soudafoam® FR HY	130
	7	Soudaseal® FR	40	20	Unexposed	Soudafoam® FR HY	130
	8	Soudaseal® FR	50	20	Unexposed	Soudafoam® FR HY	130
	9	Firecryl® FR	30	20	Exposed	Soudafoam® FR HY	130
	10	Firecryl® FR	30	20	Unexposed	Soudafoam® FR HY	130
	11	Firecryl® FR	50	3	Symmetrical	Soudafoam® FR HY	144
	12	Fire Silicone® B1 FR	30	20	Exposed	Soudafoam® FR HY	130
	13	Fire Silicone® B1 FR	30	20	Unexposed	Soudafoam® FR HY	130
	14	Fire Silicone® B1 FR	40	20	Exposed	Backer rod	130

Orientation	Ref	Linear joint seal					
		Sealant				Backfilling	
		Type	Width (mm)	Layer thickness (mm)	Application side (exp./unexp./symm.)	Type	∅ or thickness (mm)
	15	Fire Silicone® B1 FR	40	20	Unexposed	Backer rod	130
	16	Fire Silicone® B1 FR	50	20	Unexposed	Backer rod	130
	17	Fire Silicone® B1 FR	50	20	Symmetrical	Backer rod	110
	18	Fire Silicone® B1 FR	20	20	Unexposed	Backer rod	1 × 20
	19	Fire Silicone® B1 FR	30	20	Unexposed	Backer rod	1 × 30
	20	Fire Silicone® B1 FR	30	20	Symmetrical	Backer rod	2 × 30

Table 22 Results summary for this test report

Ref	Integrity (minutes)		Insulation (minutes)
	Cotton pad	Sustained flaming	
1	132 (1)	132 (1)	132 (1)
2	132 (1)	132 (1)	132 (1)
3	117 (2)	117	117 (2)
4	132 (1)	132 (1)	132 (1)
5	132 (1)	132 (1)	132 (1)
6	120 (2)	120	120 (2)
7	132 (1)	132 (1)	132 (1)
8	132 (1)	132 (1)	132 (1)
9	132 (1)	132 (1)	132 (1)
10	132 (1)	132 (1)	132 (1)
11	94 (2)	94	89
12	132 (1)	132	132 (1)
13	107 (2)	107	107
14	132 (1)	132 (1)	132 (1)
15	132 (1)	132 (1)	132 (1)
16	132 (1)	132 (1)	132 (1)
17	93 (2)	93	52
18	132 (1)	132 (1)	69
19	132 (1)	132 (1)	35
20	132 (1)	132 (1)	124

(1) 132 minutes, no failure. The test was stopped after 132 minutes at the request of the sponsor

(2) Not failed until the moment of spontaneous and sustained flaming

A.6 Test report – 9297C

Table 23 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, B-2300 Turnhout, Belgium.
Test laboratory	University of Gent, St.-Pieternieuwstraat 41, B-9000 Gent.
Test date	The fire resistance test was completed on 07/12/1999.
Test standards	The test was conducted in accordance NBN 713.020 (edition 1968).
Variation to test standards	None
General description of tested specimen	The tested specimen consisted of 11 vertically orientated gaps in an aerated concrete block wall. Six of the specimens were in 100 mm thick section and the other five were in 200 mm thick wall section. The linear seals were sealed with different sealing systems as shown in Table 24.
Instrumentation	The test report states that the instrumentation was in accordance with EN 1366-4:1999.

Table 24 Tested sealant configurations

ID	Wall thickness (mm)	Gap width (mm)	Seal depth (mm)	Sealant	Backing material	Seal location
Joint I	200	11	200	Soudafoam FR	None	Both faces
Joint II	200	41	200	Soudafoam FR	None	Both faces
Joint III	200	20	20	Soudal Firecyl 4H	25 mm diameter Polyethylene	Both faces
Joint VIII	100	21	20	Soudal Firecyl 4H	25 mm diameter Polyethylene	Both faces
Joint IX	100	11	10	Soudal Firecyl 4H	15 mm diameter Polyethylene	Both faces
Joint X	100	31	100	Soudafoam FR	None	Both faces
Joint XI	100	11	100	Soudafoam FR	None	Both faces

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

Table 25 Results summary for this test report

ID	Time to failure in minutes		
	Thermic Insulation	Flame resistance	Stability
Joint I	229	229	≥ 240
Joint II	110	110	116
Joint III	≥ 240	≥ 240	≥ 240
Joint IV	≥ 240	≥ 240	≥ 240
Joint V	225	≥ 240	≥ 240
Joint VI	116	187	189
Joint VII	146	202	≥ 240

ID	Time to failure in minutes		
	Thermic Insulation	Flame resistance	Stability
Joint VIII	210	≥ 240	≥ 240
Joint IX	187	≥ 240	≥ 240
Joint X	50	50	63

A.7 Test report – 13492AC

Table 26 Information about test report

Item	Information about test report
Report sponsor	Soudal NV, Everdongenlaan 18-20, B-2300 Turnhout, Belgium.
Test laboratory	WFRGENT NV, Ottergemsesteenweg- Zuid 711, B- 9000 Gent, Belgium.
Test date	The fire resistance test was completed on 25/11/2008.
Test standards	The test was done in accordance with EN 1363-1:1999 and EN 1366-4:2006.
Variation to test standards	None
General description of tested specimen	The tested specimen consisted of nine vertically orientated and two horizontally oriented linear seals in a 200 mm thick aerated concrete wall. The linear seals were sealed with different sealing systems as shown in Table 27.
Instrumentation	The test report states that the instrumentation was in accordance with EN 1366- 4:2006.

Table 27 Tested sealant configurations

ID	Wall thickness (mm)	Gap width (mm)	Seal depth (mm)	Sealant	Backing material	Seal location
A	200	30	200	Soudafoam FR	None	Both faces
B	200	25	25	Firecryl FR	Soudaform FR	Exposed
C	200	15	15	Soudaseal FR	PE-Backer Rod	Exposed
D	200	15	15	Firecryl FR	PE-Backer Rod	Exposed
E	200	10	200	Soudafoam FR	None	Both faces
G	200	40	20	Soudaseal FR	Soudafoam FR and Firecryl FR	Exposed
H	200	30	20	Soudaseal FR	PE-Backer Rod	Both faces
I	200	30	20	Soudaseal FR	Soudafoam FR	Exposed
J	200	15	15	Firecryl FR	Soudafoam FR	Exposed
K	200	25	20	Soudaseal FR	Soudafoam FR	Exposed

The test specimen achieved the following results – see Table 28.

Table 28 Results summary for this test report

ID	Integrity (min)		Insulation (min)
	Cotton pad	Sustained flaming	
A	158	162	163*
B	240*	240*	240*

C	240*	240*	240*
D	240*	240*	240*
E	240*	240*	240*
G	240*	240*	240*
H	240*	240*	240*
I	240*	240*	240*
J	240*	240*	240*
K	240*	240*	240*
* No failure observed during the test duration.			