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Title:

The fire resistance performance of 5no. Vertical and 5no. Horizontal linear joint seals (with a associated supporting construction elements), when tested in accordance with BS EN 1366-4:2021 (National Annex) and BS EN 1363-1: 2020

Date Of Test:

16/05/2023

Version No. 2 Issue Date:

26/01/2024

WF Report No:

WF 532889

Prepared for:

Soudal UK Ltd

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Approved Body No: 1314

This report is a revision to that issued as 532889 Version 1 and dated 18/01/2024. The details of the test report 532889 Version 1 are held on file by Warringtonfire. The original report and any previous revisions are replaced by this revised report 532889 Version 2.

Test Specimen

Summary of Tested Specimen

The supporting construction was a plasterboard clad EI 30 steel stud supporting construction with steel 'C' studs meeting the specification of Group A within table 1 of BS EN 1366-4:2021. It incorporated 10no. apertures (two clusters of 5). For the purposes of this test, the specimens were named A1, A2, A3, A4, A5 (horizontal orientation) and B1, B2, B3, B4, B5 (vertical orientation). The overall specimen size was 3000mm high x 3000mm wide x 75mm thick.

Each specimen consisted of a timber door frame sections of varying sizes and wall flushness, with a gap of varying thickness between it and the supporting construction, each filled with 'Soudal Soudafoam FR HY' fire stopping.

Detailed drawings of the test specimen and a comprehensive description of the test construction based on a detailed survey of the specimen and information supplied by the sponsor of the test are included in the Test Specimen and Schedule of Components sections of this report.

Performance Criteria and Test Results

This section summarises the results achieved by the test specimens against the performance criteria listed in BS EN 1366-4:2021 and BS EN 1363-1:2020 for the following parameters:

Integrity: The specimen must retain its separating function, without causing either ignition of a cotton pad when applied, or resulting in sustained flaming on the unexposed surface.

Insulation: It is required that the maximum temperature rise at any individual location on the unexposed surface shall not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure as specified in BS EN 1363-1:2020.

The test results only apply to the tested orientation.

Test results – Specimen A1

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		No failure occurred for this criteria prior to the test being discontinued
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen A2

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		No failure occurred for this criteria prior to the test being discontinued
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen A3

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		No failure occurred for this criteria prior to the test being discontinued
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen A4

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		**35 (thirty five) minutes**
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen A5

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		**25 (twenty five) minutes**
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen B1

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	**28 (twenty eight) minutes**
Insulation		**16 (sixteen) minutes**
The test was discontinued for this specimen after 30 (thirty) minutes.		

Test results – Specimen B2

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		No failure occurred for this criteria prior to the test being discontinued
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen B3

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		No failure occurred for this criteria prior to the test being discontinued
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen B4

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		**31 (thirty one) minutes**
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Test results – Specimen B5

Performance criteria		Results
Integrity	Ignition of a cotton pad	No failure occurred for this criteria prior to the test being discontinued
	Sustained flaming	No failure occurred for this criteria prior to the test being discontinued
Insulation		No failure occurred for this criteria prior to the test being discontinued
The test was discontinued for this specimen after 36 (thirty six) minutes.		

Quality Management

Version	Date	Information about the report		
1	18 January 2024	Description	Initial issue	
2	26 January 2024	Description	Version 1 contained an error whereby details of the Annex A: Field of Direct Application, Specimens A2, A3, B3 & B4, clause NA.5.4, Page 69, referred to Hardwood timber elements. These details have been corrected to refer to Softwood timber elements.	
			Prepared by	Authorised by
		Name	Adriano Montanino	Rob Axe
		Signature	DocuSigned by: 0612F5967A5B4AA...	DocuSigned by: A16C1E7E36D44A0...

Signed for and on behalf of Warringtonfire Testing and Certification Limited

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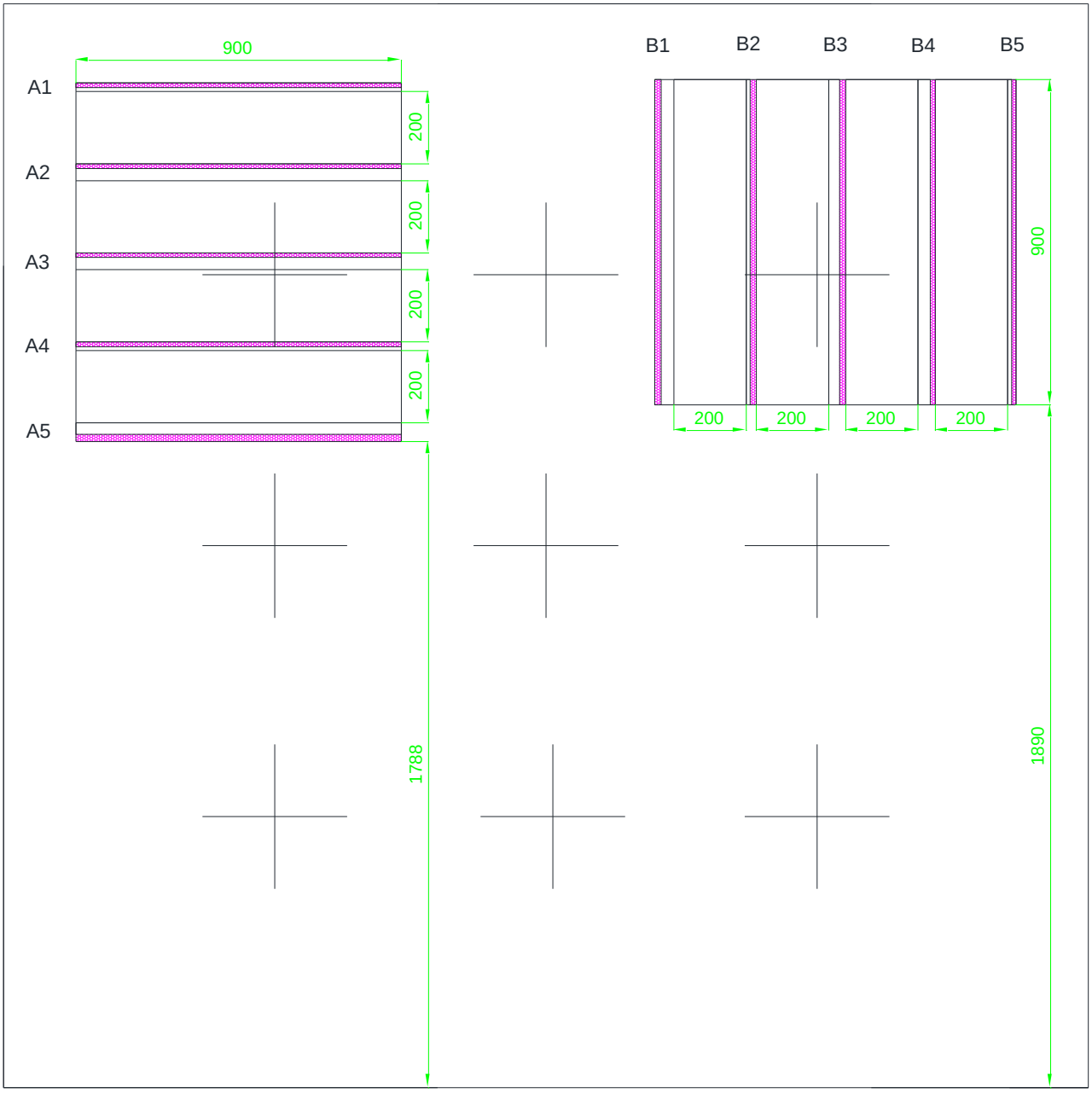
Test Conditions

Standard	BS EN 1366-4: 2021 (with BS National Annex), Fire resistance tests for service installations Part 4: Linear Joint Seals and BS EN 1363-1: 2020, Fire resistance tests Part 1: General requirements.
Deviations from test method	For specimen A5, the furnace pressure was recorded below requirements at four occasions during the test, 10, 13, 15 and 20 minutes. Specimens A4, A5, B1 and B2 were installed with plastic packers.
Sampling	Warringtonfire was not involved in factory sampling of the products and materials used for the test specimen described in this report, and as such the results of this test apply to the sample as received.
Supporting Construction	Warringtonfire provided a plasterboard clad EI 30 steel stud supporting construction with steel 'C' studs meeting the specification of Group A within table 1 of BS EN 1366-4:2021.
Installation	The components were received during the month of May 2023. The specimens were installed directly into the supporting construction by representatives of the client with the assistance of **Warringtonfire**, as necessary.
Induced Movement	The scope of this test did not include an induced movement to the installed sample, and hence it was not conducted.
Conditioning	Warringtonfire stored the specimens in climatic conditions approximate to those expected in normal service, and used the guidelines of Annex F.1 of BS EN 1363 – 1: 2020 to establish a suitable conditioned level where possible.
Ambient Temperature	The ambient air temperature in the vicinity of the test construction was 16ºC without variation during the test.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2020 Clause 5.1 using nine plate thermometers, distributed over a plane 100±50 mm from the surface of the test construction.
Thermocouples	Thermocouples were provided to monitor the unexposed surface of the specimen at the positions described in BS EN 1366-4:2021. The output of all instrumentation was recorded at no less than one minute intervals. The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1. A roving thermocouple was available to monitor any positions suspected of being at a greater temperature than indicated by fixed position thermocouples.
Furnace Pressure	After the first 5 minutes of the test, the furnace pressure was maintained at -0.2±5Pa and after 10 minutes was maintained at -0.2±3Pa with respect to atmosphere, equating to 15Pa at the centre of the lowest positioned seal (Specimen A5) 1813mm above the furnace floor.

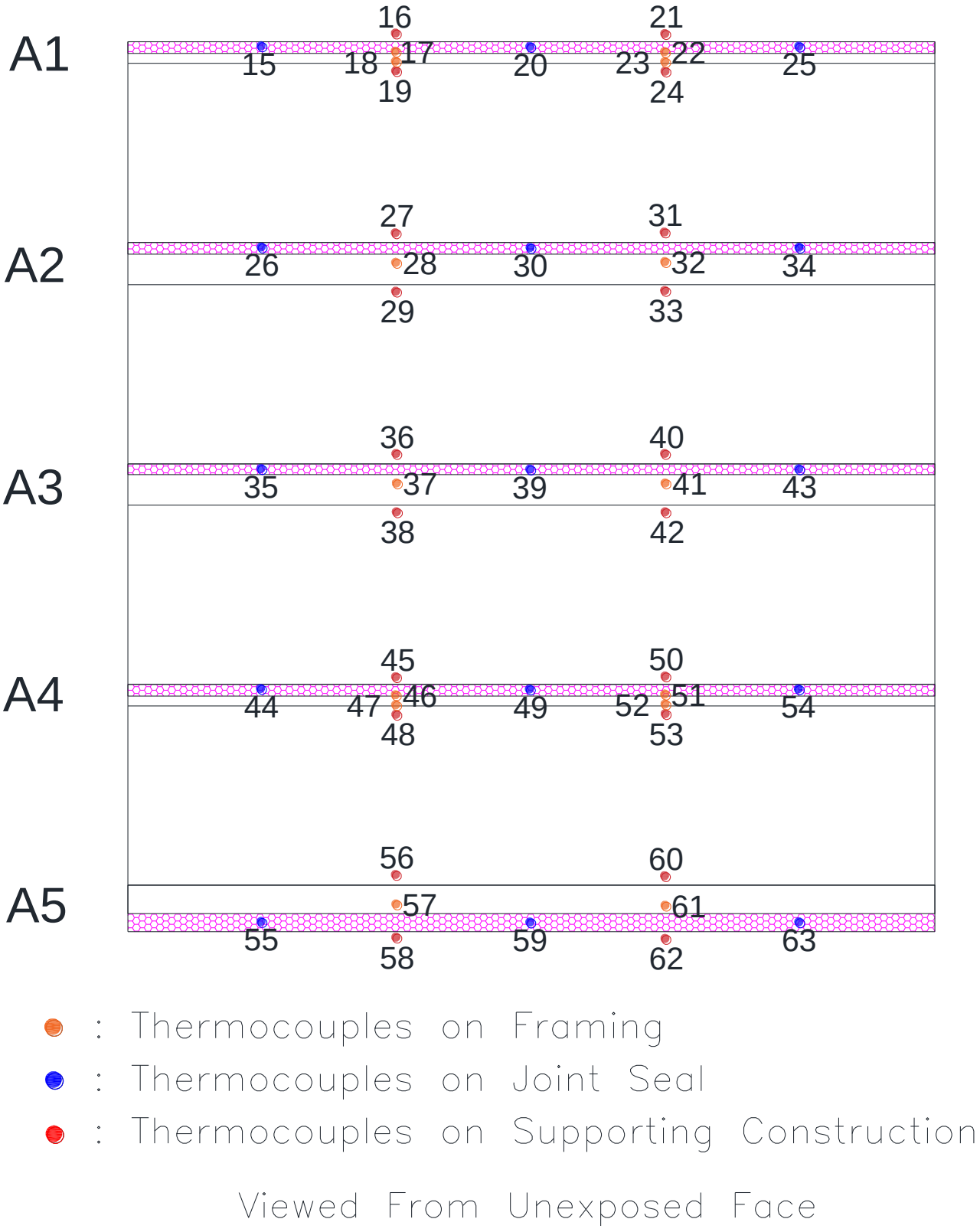
Test Specimen Drawings

Figure 1 – General elevation of the test construction



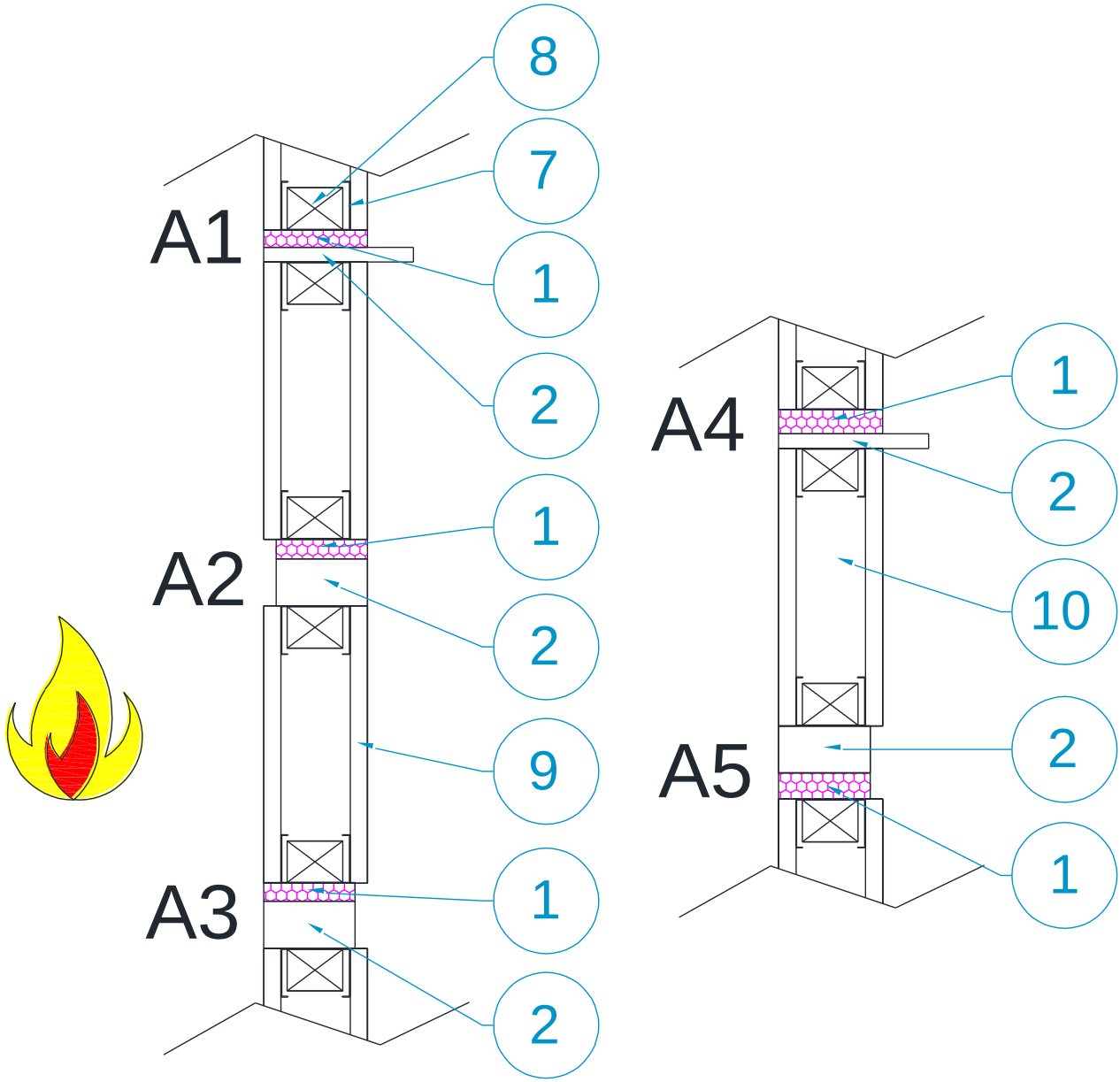
Do not scale. All dimensions are in mm

Figure 2 – Unexposed face elevation of the specimens A1 to A5 with thermocouple locations



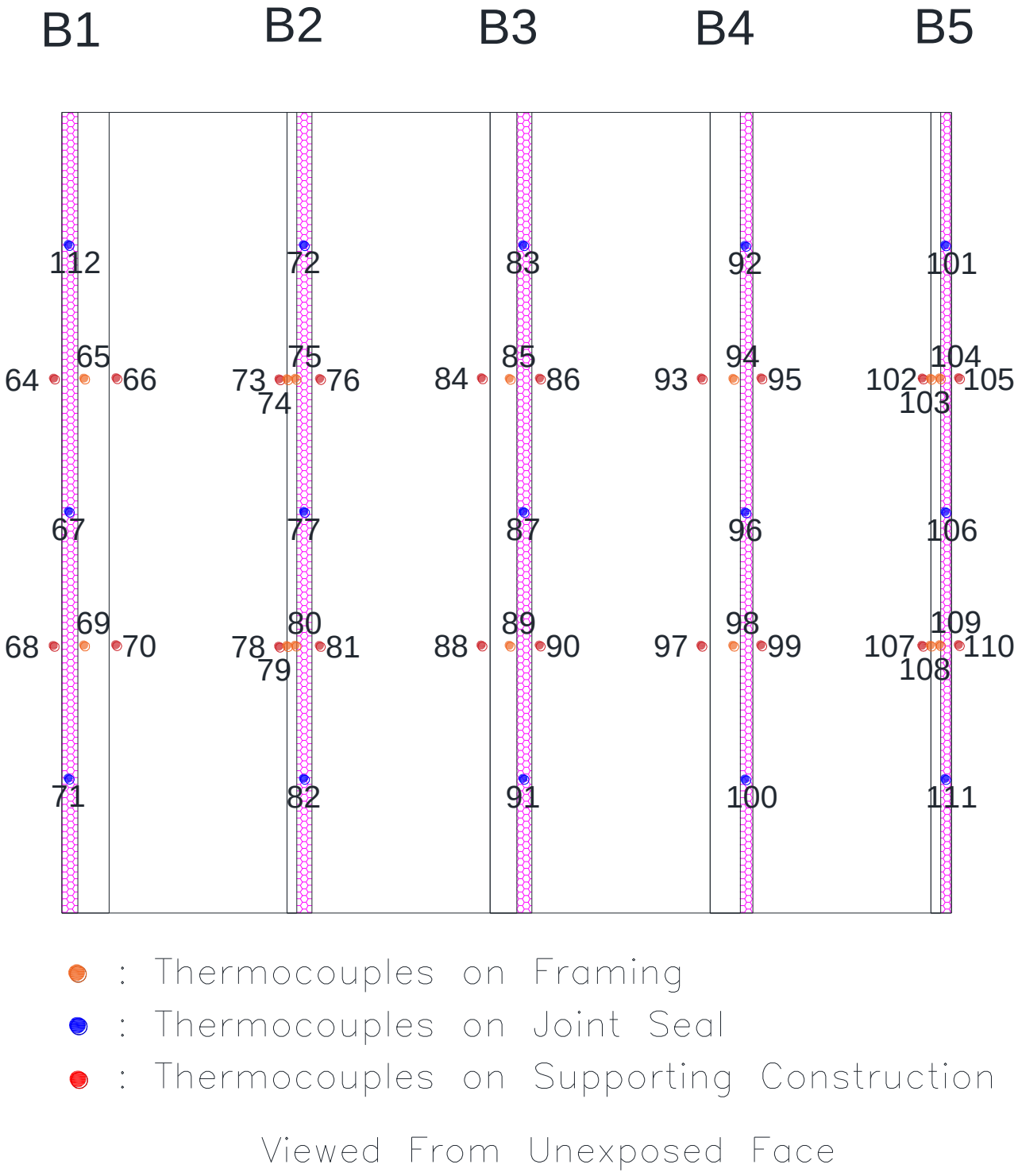
Do not scale.

Figure 3 – Cross-section of specimens A1 to A5



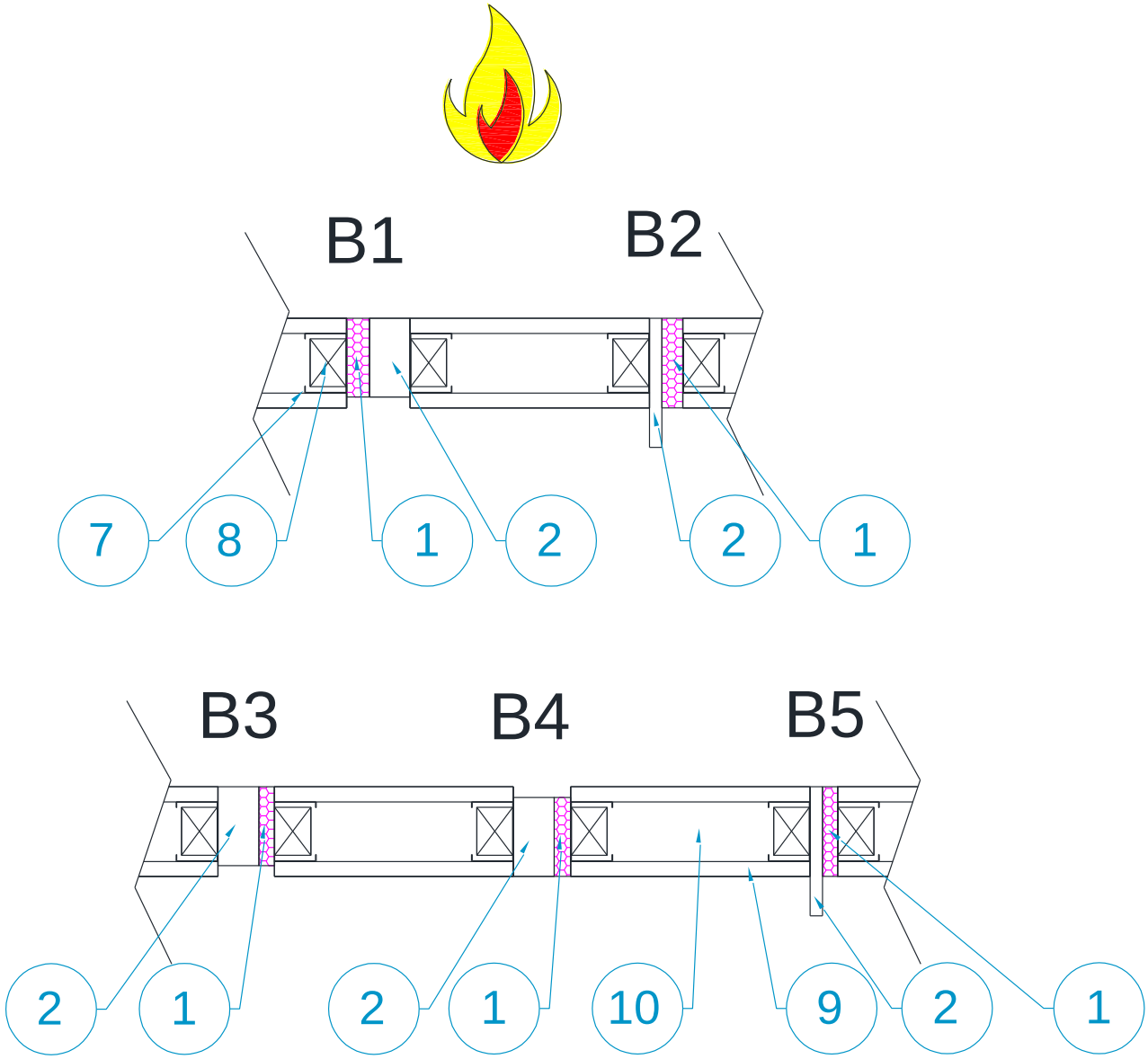
Do not scale.
Figures referenced in drawings refer to component numbers within ‘Schedule of Components’

Figure 4 – Unexposed face elevation of the specimens B1 to B5 with thermocouple locations



Do not scale.

Figure 5 – Cross-section of specimens B1 to B5



Do not scale.
Figures referenced in drawings refer to component numbers within ‘Schedule of Components’

Schedule of Components

(Refer to Figures 1 to 5)
(All values are nominal unless stated otherwise)
* Stated by sponsor, not verified by laboratory

Specimen A1 (Sample No. 1)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 75mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the both faces
2. Framing Material		**Description**
Material	:	Solid Softwood*
Density	:	447kg/m^3
Moisture content	:	Nominally 18%*
Overall size	:	108mm deep x 10.5mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Promat
Reference	:	Supalux
Material	:	Calcium silicate boards separated by a bead of mastic
Size	:	6mm boards, cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen A2 (Sample No. 3a)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 66mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the unexposed face
2. Framing Material		**Description**
Manufacturer	:	Jeld-Wen UK Melton*
Reference	:	DFR1050, DFR1051,DFR1052*
Material	:	Laminated & Finger Jointed Softwood (Redwood)*
Density	:	558kg/m^3
Moisture content	:	Nominally 10-14%*
Overall size	:	66mm deep x 34mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Promat
Reference	:	Supalux
Material	:	Calcium silicate boards separated by a bead of mastic
Overall size	:	6mm boards, cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen A3 (Sample No. 3b)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 66mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the exposed face
2. Framing Material		**Description**
Manufacturer	:	Jeld-Wen UK Melton*
Reference	:	DFR1050, DFR1051,DFR1052*
Material	:	Laminated & Finger Jointed Softwood (Redwood)*
Density	:	557kg/m^3
Moisture content	:	Nominally 10-14%*
Overall size	:	66mm deep x 34mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Promat
Reference	:	Supalux
Material	:	Calcium silicate boards separated by a bead of mastic
Overall size	:	6mm boards, cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen A4 (Sample No. 5)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 75mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the both faces
2. Framing Material		**Description**
Material	:	Solid Softwood*
Density	:	479kg/m^3
Moisture content	:	Nominally 18%*
Overall size	:	108mm deep x 10.5mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Screwfix
Material	:	Plastic
Overall size	:	1.6mm thick cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen A5 (Sample No. 7)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 66mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the exposed face
2. Framing Material		**Description**
Manufacturer	:	Jeld-Wen UK Melton*
Reference	:	DFR1050, DFR1051,DFR1052*
Material	:	Laminated & Finger Jointed Softwood (Redwood)*
Density	:	558kg/m^3
Moisture content	:	Nominally 10-14%*
Overall size	:	66mm deep x 34mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Screwfix
Material	:	Plastic
Overall size	:	1.6mm thick cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen B1 (Sample No. 8)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 66mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the exposed face
2. Framing Material		**Description**
Manufacturer	:	Jeld-Wen UK Melton*
Reference	:	DFR1050, DFR1051,DFR1052*
Material	:	Laminated & Finger Jointed Softwood (Redwood)*
Density	:	559kg/m^3
Moisture content	:	Nominally 10-14%*
Overall size	:	66mm deep x 34mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Supplier	:	Screwfix
Material	:	Plastic
Size	:	1.6mm thick cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen B2 (Sample No. 6)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 75mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the both faces
2. Framing Material		**Description**
Material	:	Solid Softwood*
Density	:	478kg/m^3
Moisture content	:	Nominally 18%*
Overall size	:	108mm deep x 10.5mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Screwfix
Material	:	Plastic
Overall size	:	1.6mm thick cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen B3 (Sample No. 4b)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 66mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the exposed face
2. Framing Material		**Description**
Manufacturer	:	Jeld-Wen UK Melton*
Reference	:	DFR1050, DFR1051,DFR1052*
Material	:	Laminated & Finger Jointed Softwood (Redwood)*
Density	:	559kg/m^3
Moisture content	:	Nominally 10-14%*
Overall size	:	66mm deep x 34mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Promat
Reference	:	Supalux
Material	:	Calcium silicate boards separated by a bead of mastic
Overall size	:	6mm boards, cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen B4 (Sample No. 4a)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 66mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the unexposed face
2. Framing Material		**Description**
Manufacturer	:	Jeld-Wen UK Melton*
Reference	:	DFR1050, DFR1051,DFR1052*
Material	:	Laminated & Finger Jointed Softwood (Redwood)*
Density	:	558kg/m^3
Moisture content	:	Nominally 10-14%*
Overall size	:	66mm deep x 34mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Promat
Reference	:	Supalux
Material	:	Calcium silicate boards separated by a bead of mastic
Overall size	:	6mm boards, cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Specimen B5 (Sample No. 2)

1. Seal		Description
Manufacturer	:	Soudal
Reference	:	Soudafoam FR HY
Material	:	Polyurethane foam
Overall section size	:	Nominally 15mm wide x 75mm deep
Application method	:	Foam cannister
Flushness to partition	:	Flush to the both faces
2. Framing Material		**Description**
Material	:	Solid Softwood*
Density	:	479kg/m^3
Moisture content	:	Nominally 18%*
Overall size	:	108mm deep x 10.5mm wide x 900mm
Details of fixings to supporting construction		
Manufacturer	:	Held on fille by Warringtonfire
Reference	:	Held on fille by Warringtonfire
Type & material	:	Carbon steel woodscrew
Overall size	:	5mm Ø x 100mm
Locations	:	Adjacent to packers
3. Sealant		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied between the supporting construction and framing material
4. Packing Material		**Description**
Manufacturer	:	Promat
Reference	:	Supalux
Material	:	Calcium silicate boards separated by a bead of mastic
Overall size	:	6mm boards, cut back 10mm from face of partition for foam application
Location	:	100mm from both ends of seal

Supporting Construction

Item	Detail			
Supporting construction type	A plasterboard clad EI 30 steel stud supporting construction with steel 'C' studs meeting the specification of Group A within table 1 of BS EN 1366-4:2021.			
Orientation	Vertical			
Overall construction dimensions	Width	3000mm		
	Height	3000mm		
	Depth	75mm		
Aperture dimensions (Add or delete apertures as appropriate)	**Specimen**	**Width**	**Height**	**Depth**
	A1	900mm	25.5mm	100mm
	A2	900mm	49mm	100mm
	A3	900mm	49mm	100mm
	A4	900mm	25.5mm	100mm
	A5	900mm	49mm	100mm
	B1	49mm	900mm	100mm
	B2	25.5mm	900mm	100mm
	B3	49mm	900mm	100mm
	B4	49mm	900mm	100mm
	B5	25.5mm	900mm	100mm

5. Head track		Description
Manufacturer or supplier	:	Speedline
Reference	:	SPT52
Material	:	Galvanised steel
Overall size		
Width	:	52mm
Flange	:	25mm
Length	:	3000mm
Sheet thickness	:	0.5mm
Details of fixings to restraint frame		
Manufacturer	:	EASYDRIVE
Reference	:	TX COUNTERSUNK CONCRETE SCREWS
Type & material	:	Carbon steel zinc plated
Overall size	:	7.5mm x 80mm
Spacing	:	50mm from edges and 600mm centres

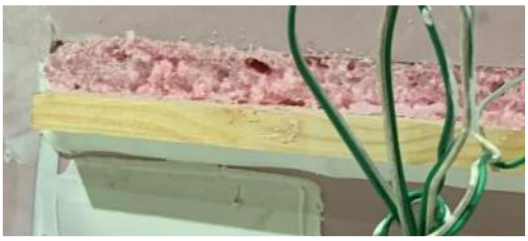
6. Base track		Description
Manufacturer or supplier	:	Speedline
Reference	:	SPT52
Material	:	Galvanised steel
Overall size		
Width	:	52mm
Flange	:	25mm
Length	:	3000mm
Sheet thickness	:	0.5mm
Fixing Method to restraint frame and centres	:	
Details of fixings to restraint frame		
Manufacturer	:	EASYDRIVE
Reference	:	TX COUNTERSUNK CONCRETE SCREWS
Type & material	:	Carbon steel zinc plated
Overall size	:	7.5mm x 80mm
Spacing	:	50mm from edges and 600mm centres
7. Vertical / horizontal studs		**Description**
Manufacturer or supplier	:	Speedline
Reference	:	SPS50
Material	:	Galvanised steel
Spacing	:	600mm centres
Overall size		
Width	:	50mm
Flange	:	32mm
Length	:	3000mm for full height studs
Sheet thickness	:	0.5mm
Fixing method to head and base track		Friction fitted or fixed at specimen aperture locations edges
Manufacturer	:	EASYDRIVE
Reference	:	PHILLIPS WAFER UNCOLLATED DRYWALLSCREWS
Type & material	:	Carbon steel zinc plated
Overall size	:	4.2mm x 13mm

8. Timber inserts		Description
Manufacturer or Supplier	:	GK
Material	:	Softwood
Location	:	Inserted within C-studs around all apertures
Overall section size		
Width	:	50mm
Thickness	:	25mm
Length	:	3000
Fixing Method to vertical studs	:	Friction fitted
9. Layer of board applied to the internal framing both face		**Description**
Manufacturer	:	British Gypsum
Reference	:	Gyproc FireLine 12.5mm
Material	:	Gypsum core with paper liners
No. of layers per face	:	1
Individual board dimension	:	3000mm long x 1200mm wide x 12.5mm thick
Overall dimension	:	3000mm high x 3000mm wide
Details of fixings to internal framing		
Manufacturer	:	EASYDRIVE
Reference	:	Phillips Bugle Uncollated Drywall Screws
Type & material	:	Carbon Steel zinc plated
Overall size	:	3.5mmx 25mm
Spacing	:	50mm from board edges and 300mm centres
10. Insulation		**Description**
Manufacturer	:	Rockwool
Reference	:	Flexi
Material	:	Mineral wool
Density	:	33kg/m^3
Overall dimension	:	1200mm long x 600mm wide x 50mm thick
Location	:	Sandwiched between all board on the partition
Application method	:	Friction fitted
11. Sealant 1		**Description**
Manufacturer	:	Mann McGowan
Reference	:	Pyromas A
Material	:	Intumescent mastic
Location	:	Applied underneath the head track, base track, fixed stud and around the perimeter of the partition
Nominal application thickness	:	Nominally 5mm

12. Jointing tape		Description
Manufacturer	:	Diall
Reference	:	FIBREGLASS MESH TAPE WHITE
Material	:	Fiberglass Mesh Tape
Location	:	Applied to all exposed board joints
13. Jointing compound		**Description**
Manufacturer	:	British Gypsum
Reference	:	Gyproc Ready Mix Joint Cement
Material	:	Gyproc filler
Location	:	Applied to all exposed board joints

Photographs of Components

Specimen A1

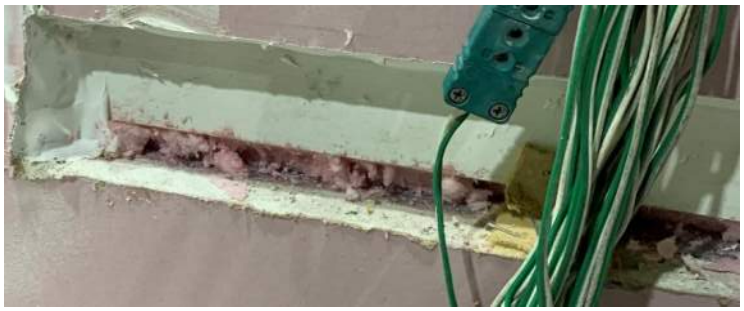


Specimen A2

Specimen A3

Specimen A4

Specimen A5



Specimen B1

Specimen B2

Specimen B3

Specimen B4

Specimen B5

Test Observations

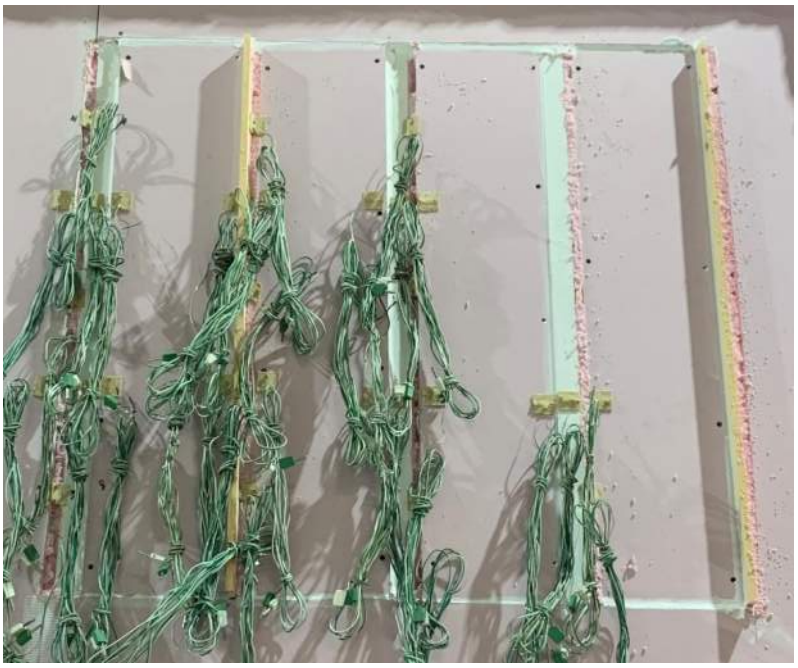
Time		All observations are from the unexposed face unless noted otherwise.
Mins	secs	
00	00	The test has started.
01	32	B1. There is smoke issuing 300mm down.
02	50	A1. There is smoke issuing from the left hand side.
03	23	A4. There is smoke issuing from the left hand side.
03	35	B2. There is smoke issuing at the bottom of the specimen.
04	05	B5. There is smoke issuing 100mm down.
05	52	A3. There is smoke issuing at the bottom 50mm from the left hand side.
07	19	B1. There is discolouration at the seal 300mm down.
07	46	A1. There is smoke issuing from the right hand side.
08	22	B2. There is smoke issuing at 200mm down.
11	03	B1. There is discolouration at the seal 250mm down.
12	10	B1. There is discolouration on the timber 300-350mm down.
15	08	A1. There is an increase in smoke issuing from the left hand side.
15	35	B1. There is discolouration at the seal 500mm down.
16	41	A2. There is smoke issuing from the left hand side.
19	30	B1. A cotton pad test was performed 300mm down which did not result in the ignition of the cotton pad. No failure.
20	48	A5. There is smoke issuing and discolouration.
21	08	B1. There is glow visible at 400mm down.
22	30	B1. A cotton pad test was performed 300mm down which did not result in the ignition of the cotton pad. No failure.
23	04	A5. There is an increase in smoke issuing across the specimen.

Time		All observations are from the unexposed face unless noted otherwise.
Mins	**secs**	
24	30	B1. A cotton pad test was performed 300mm down which did not result in the ignition of the cotton pad. No failure.
25	50	B1. There is glow visible at the top.
25	57	A5. There is an increase in discolouration.
26	40	B1. A cotton pad test was performed at the top which did not result in the ignition of the cotton pad. No failure.
28	35	B1. A cotton pad test was performed 200mm down which did not result in the ignition of the cotton pad. The cotton pad test was aborted after 25 seconds due to continuous flaming.
28	**35**	**B1. There is continuous flaming for 10 seconds therefore constituting integrity failure.**
30	43	A5. A cotton pad test was performed on the right corner which did not result in the ignition of the cotton pad. No failure.
33	30	A5. A cotton pad test was performed on the right corner which did not result in the ignition of the cotton pad. No failure.
34	12	A2. There is discolouration.
35	00	B5. There is glow visible 100-300mm up.
35	54	A3. There is discolouration.
35	54	A4. There is discolouration and glow visible from the right hand side.
36	00	Test terminated.

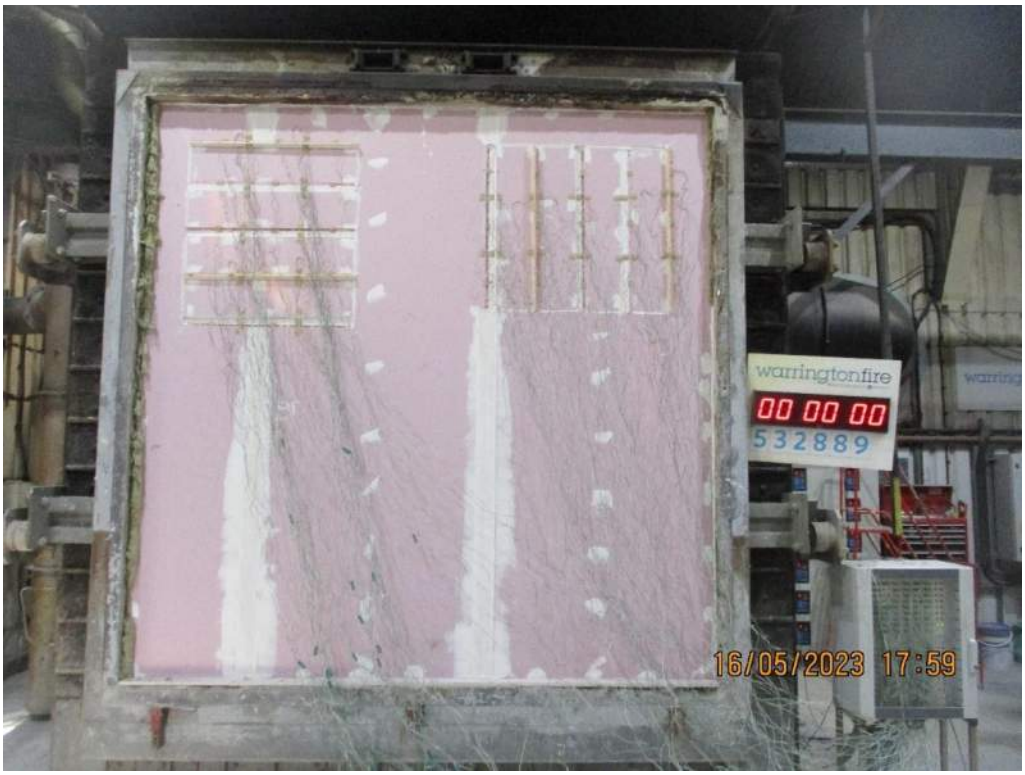
Test Photographs

The unexposed face of specimens Ax prior to testing

The unexposed face of specimens Bx prior to testing



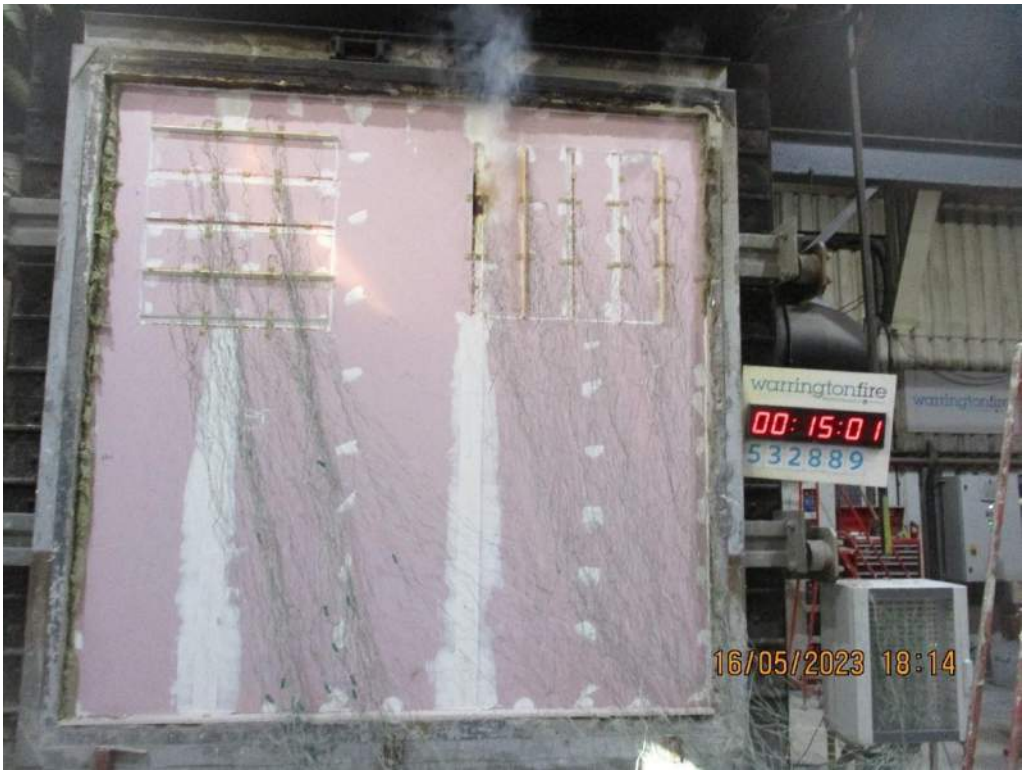
The unexposed face prior to testing



The unexposed face after a test duration of 5 minutes 19 seconds

The unexposed face after a test duration of 10 minutes

The unexposed face after a test duration of 15 minutes 1 second

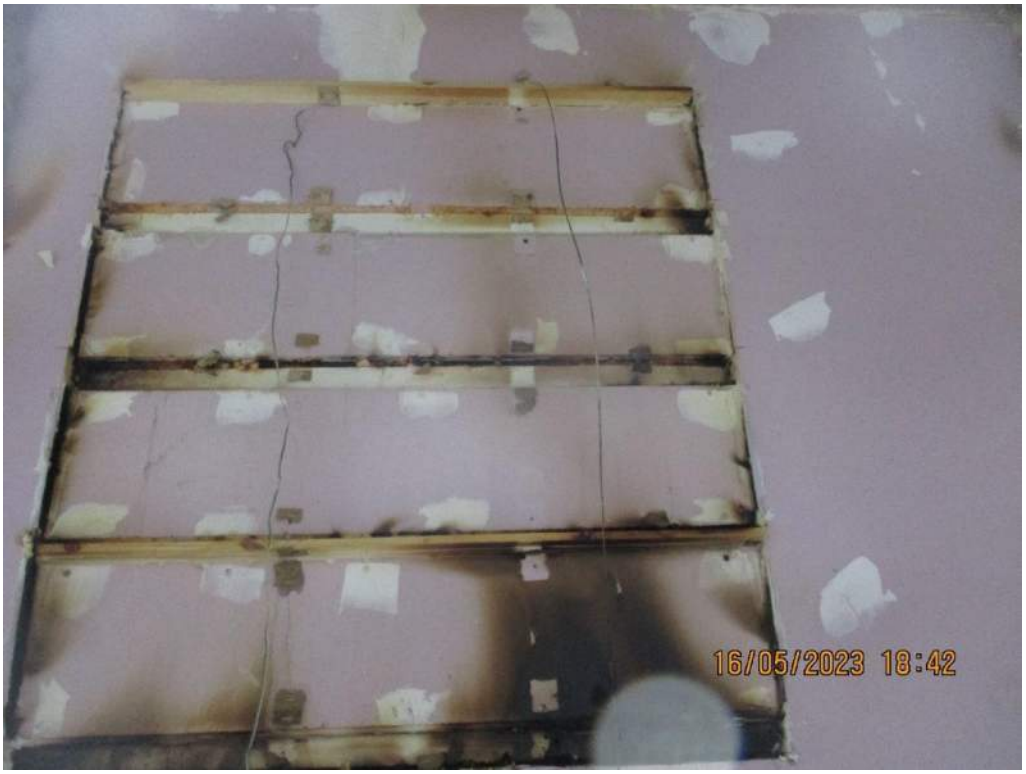


The unexposed face after a test duration of 20 minutes

The unexposed face showing flaming on specimen B1

The unexposed face after a test duration of 35 minutes 3 seconds

The unexposed face after a test duration of specimens Ax after the completion of the test



The unexposed face after a test duration of specimens Bx after the completion of the test

The exposed face after a test duration of specimens Ax after the completion of the test

The exposed face after a test duration of specimens Bx after the completion of the test

Thermocouple positions

The temperature of the unexposed face was monitored by means of the following thermocouples.

Test specimen	T/C number	Description of location
A1	15	On the seal.
	16	On the supporting construction 15mm from the seal.
	17	On the timber frame section seal side, 15mm from face of the seal.
	18	On the timber frame section supporting construction side, 15mm from face of the partition.
	19	On the supporting construction 15mm from the timber frame section.
	20	On the seal.
	21	On the supporting construction 15mm from the seal.
	22	On the timber frame section seal side, 15mm from face of the seal.
	23	On the timber frame section supporting construction side, 15mm from face of the partition.
	24	On the supporting construction 15mm from the timber frame section..
	25	On the seal.
A2	26	On the seal.
	27	On the supporting construction 15mm from the seal.
	28	On the timber frame section, 15mm from the seal.
	29	On the supporting construction 15mm from the timber frame section.
	30	On the seal.
	31	On the supporting construction 15mm from the seal.
	32	On the timber frame section, 15mm from the seal.
	33	On the supporting construction 15mm from the timber frame section.
	34	On the seal.

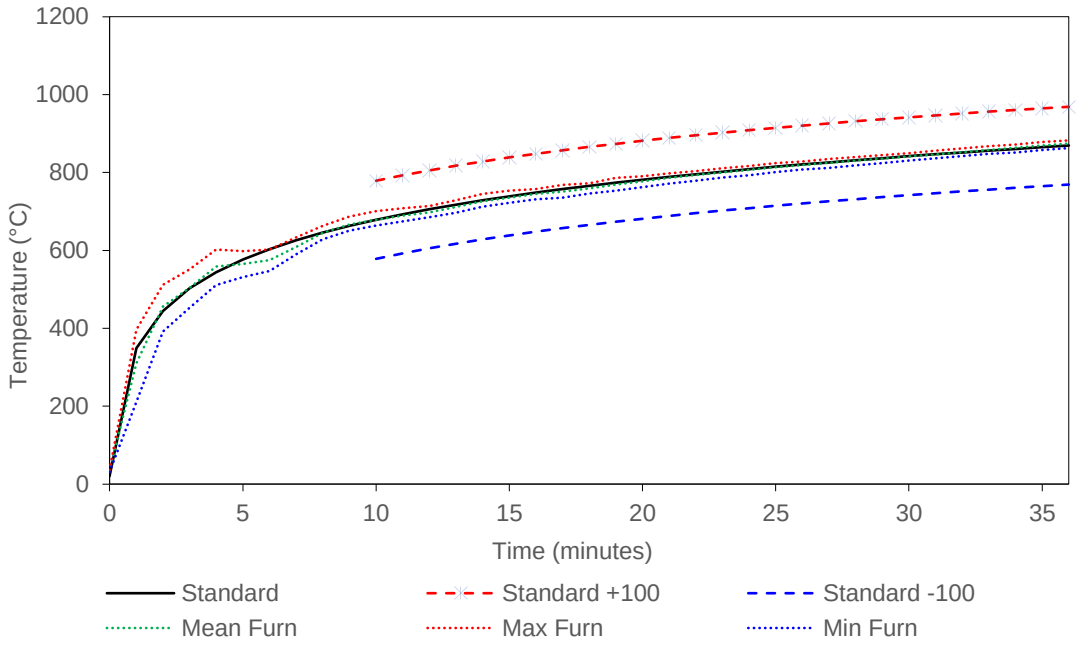
Test specimen	T/C number	Description of location
A3	35	On the seal.
	36	On the supporting construction 15mm from the seal.
	37	On the timber frame section, 15mm from the seal.
	38	On the supporting construction 15mm from the timber frame section.
	39	On the seal.
	40	On the supporting construction 15mm from the seal.
	41	On the timber frame section, 15mm from the seal.
	42	On the supporting construction 15mm from the timber frame section.
	43	On the seal.
A4	44	On the seal.
	45	On the supporting construction 15mm from the seal.
	46	On the timber frame section seal side, 15mm from face of the seal.
	47	On the timber frame section supporting construction side, 15mm from face of the partition.
	48	On the supporting construction 15mm from the timber frame section.
	49	On the seal.
	50	On the supporting construction 15mm from the seal.
	51	On the timber frame section seal side, 15mm from face of the seal.
	52	On the timber frame section supporting construction side, 15mm from face of the partition.
	53	On the supporting construction 15mm from the timber frame section..
	54	On the seal.
A5	55	On the seal.
	56	On the supporting construction 15mm from the timber frame section.
	57	On the timber frame section, 15mm from the seal.
	58	On the supporting construction 15mm from the seal.
	59	On the seal.
	60	On the supporting construction 15mm from the timber frame section.
	61	On the timber frame section, 15mm from the seal.
	62	On the supporting construction 15mm from the seal.
	63	On the seal.

Test specimen	T/C number	Description of location
B1	112	On the seal.
	64	On the supporting construction 15mm from the seal.
	65	On the timber frame section, 15mm from the seal.
	66	On the supporting construction 15mm from the timber frame section.
	67	On the seal.
	68	On the supporting construction 15mm from the seal.
	69	On the timber frame section, 15mm from the seal.
	70	On the supporting construction 15mm from the timber frame section.
	71	On the seal.
B2	72	On the seal.
	73	On the supporting construction 15mm from the timber frame section.
	74	On the timber frame section supporting construction side, 15mm from face of the partition.
	75	On the timber frame section seal side, 15mm from face of the seal.
	76	On the supporting construction 15mm from the seal.
	77	On the seal.
	78	On the supporting construction 15mm from the timber frame section.
	79	On the timber frame section supporting construction side, 15mm from face of the partition.
	80	On the timber frame section seal side, 15mm from face of the seal.
	81	On the supporting construction 15mm from the seal.
	82	On the seal.
B3	83	On the seal.
	84	On the supporting construction 15mm from the timber frame section.
	85	On the timber frame section, 15mm from the seal.
	86	On the supporting construction 15mm from the seal.
	87	On the seal.
	88	On the supporting construction 15mm from the timber frame section.
	89	On the timber frame section, 15mm from the seal.
	90	On the supporting construction 15mm from the seal.
	91	On the seal.

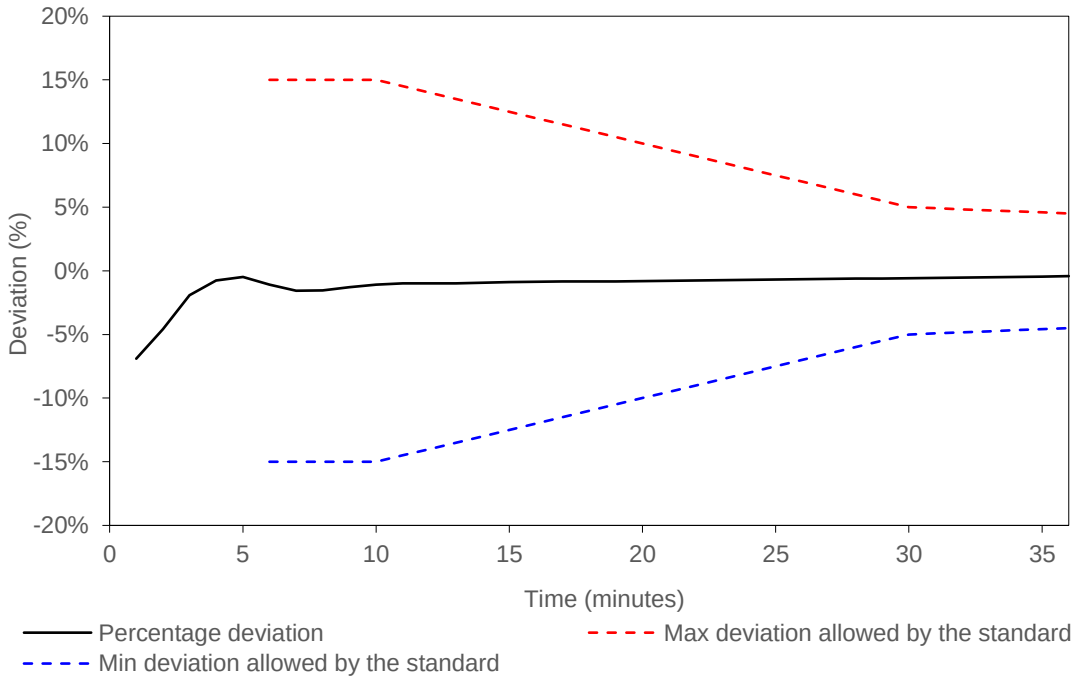
Test specimen	T/C number	Description of location
B4	92	On the seal.
	93	On the supporting construction 15mm from the timber frame section.
	94	On the timber frame section, 15mm from the seal.
	95	On the supporting construction 15mm from the seal.
	96	On the seal.
	97	On the supporting construction 15mm from the timber frame section.
	98	On the timber frame section, 15mm from the seal.
	99	On the supporting construction 15mm from the seal.
	100	On the seal.
B5	101	On the seal.
	102	On the supporting construction 15mm from the timber frame section.
	103	On the timber frame section supporting construction side, 15mm from face of the partition.
	104	On the timber frame section seal side, 15mm from face of the seal.
	105	On the supporting construction 15mm from the seal.
	106	On the seal.
	107	On the supporting construction 15mm from the timber frame section.
	108	On the timber frame section supporting construction side, 15mm from face of the partition.
	109	On the timber frame section seal side, 15mm from face of the seal.
	110	On the supporting construction 15mm from the seal.
	111	On the seal.

Furnace Temperature

Graph showing mean furnace temperature, together with the temperature/time relationship and associated tolerances specified in BS EN 1363-1: 2020

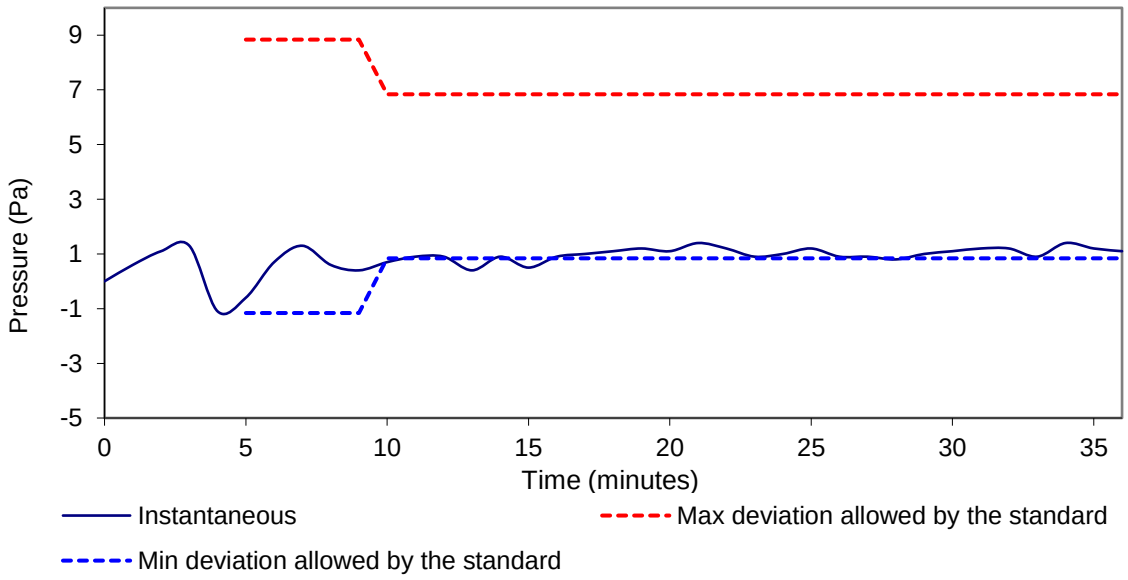


Graph showing percentage temperature deviation, together with the associated tolerances specified in BS EN 1363-1: 2020



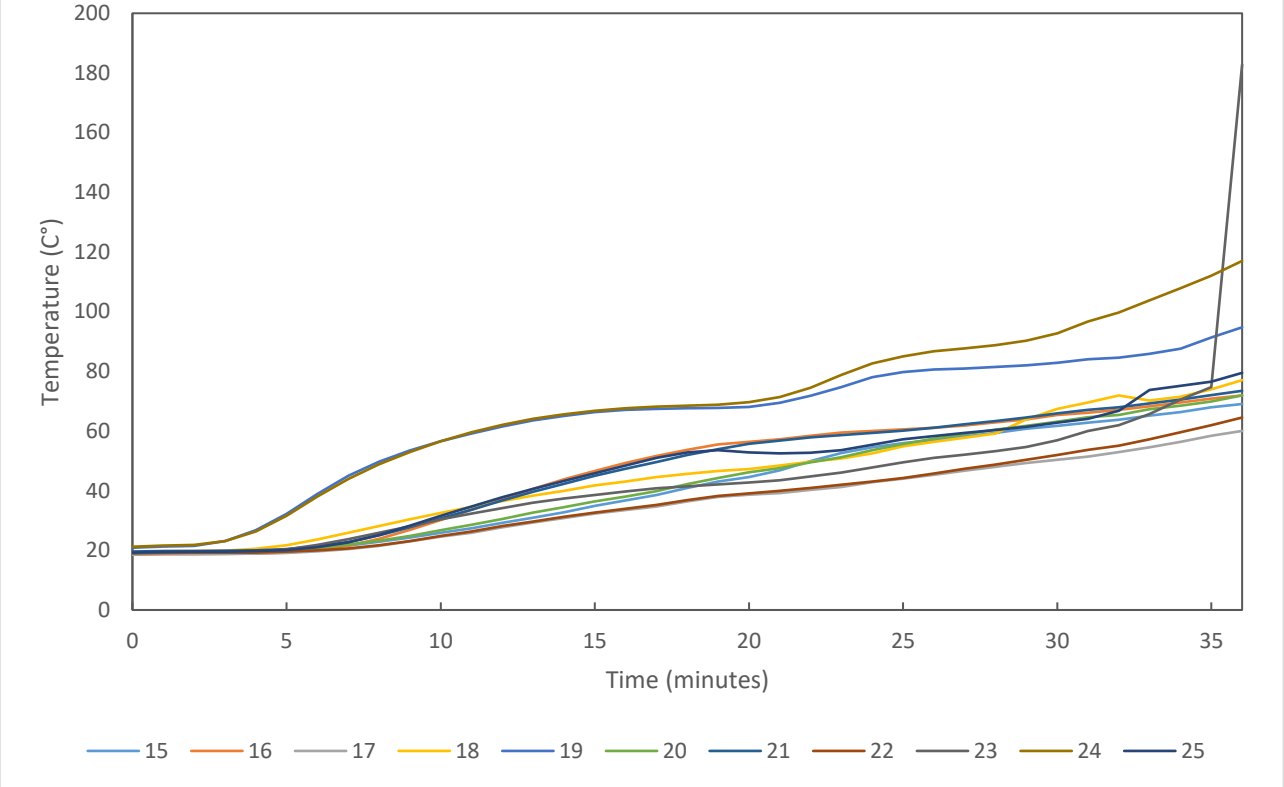
Furnace Pressure

Graph showing recorded furnace pressure at 0.5m from the furnace floor



Specimen Temperature Data

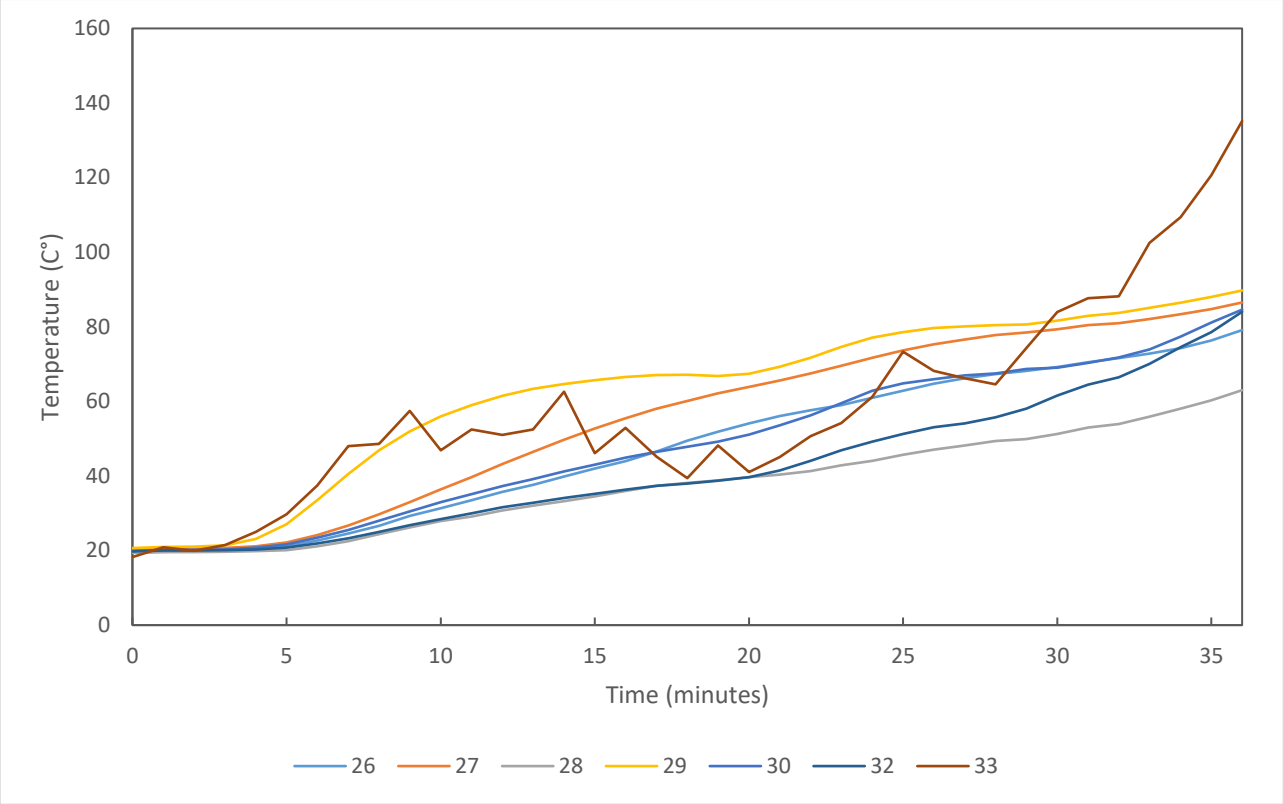
Graph showing individual temperatures recorded on the unexposed face of Specimen A1



Individual temperatures recorded on the unexposed face of Specimen A1

Time (mins)	T/C 15 (°C)	T/C 16 (°C)	T/C 17 (°C)	T/C 18 (°C)	T/C 19 (°C)	T/C 20 (°C)	T/C 21 (°C)	T/C 22 (°C)	T/C 23 (°C)	T/C 24 (°C)	T/C 25 (°C)
0	19	18	19	19	21	19	20	19	19	21	19
1	19	19	19	20	21	19	20	19	19	22	19
2	20	19	19	20	21	19	20	19	19	22	19
3	20	19	19	20	23	19	20	19	19	23	20
4	20	19	19	21	27	20	20	19	20	26	20
5	20	19	19	22	32	20	20	19	20	32	20
6	21	20	20	24	39	21	21	20	22	38	21
7	22	22	20	26	45	22	23	21	24	44	23
8	23	24	22	28	50	23	25	22	26	49	25
9	24	27	23	30	53	25	28	23	28	53	28
10	26	30	25	33	57	27	31	25	30	57	32
11	27	34	26	35	59	29	34	26	32	60	35
12	29	37	28	36	62	31	37	28	34	62	38
13	31	41	29	38	64	33	40	30	36	64	41
14	33	44	31	40	65	34	42	31	37	66	43
15	35	47	32	42	66	36	45	33	39	67	46
16	37	49	34	43	67	38	47	34	40	68	48
17	39	52	35	45	67	40	50	35	41	68	51
18	41	54	36	46	68	42	52	37	41	68	53
19	43	55	38	47	68	44	54	38	42	69	54
20	45	56	39	47	68	46	56	39	43	70	53
21	47	57	39	48	69	48	57	40	43	71	52
22	50	58	40	50	72	49	58	41	45	74	53
23	53	59	41	51	75	51	59	42	46	79	54
24	55	60	43	53	78	54	59	43	48	83	55
25	56	60	44	55	80	56	60	44	49	85	57
26	57	61	45	56	81	57	61	46	51	87	58
27	58	62	47	58	81	59	62	47	52	88	59
28	59	63	48	59	81	60	63	49	53	89	60
29	61	64	49	64	82	62	64	50	55	90	61
30	62	65	50	67	83	63	66	52	57	93	63
31	63	66	51	70	84	65	67	54	60	97	64
32	64	67	53	72	85	65	68	55	62	100	67
33	65	68	55	70	86	67	69	57	66	104	74
34	66	70	56	71	88	68	70	60	70	108	75
35	68	71	58	74	91	70	72	62	75	112	76
36	69	72	60	77	95	72	73	65	183	117	79

Graph showing individual temperatures recorded on the unexposed face of Specimen A2

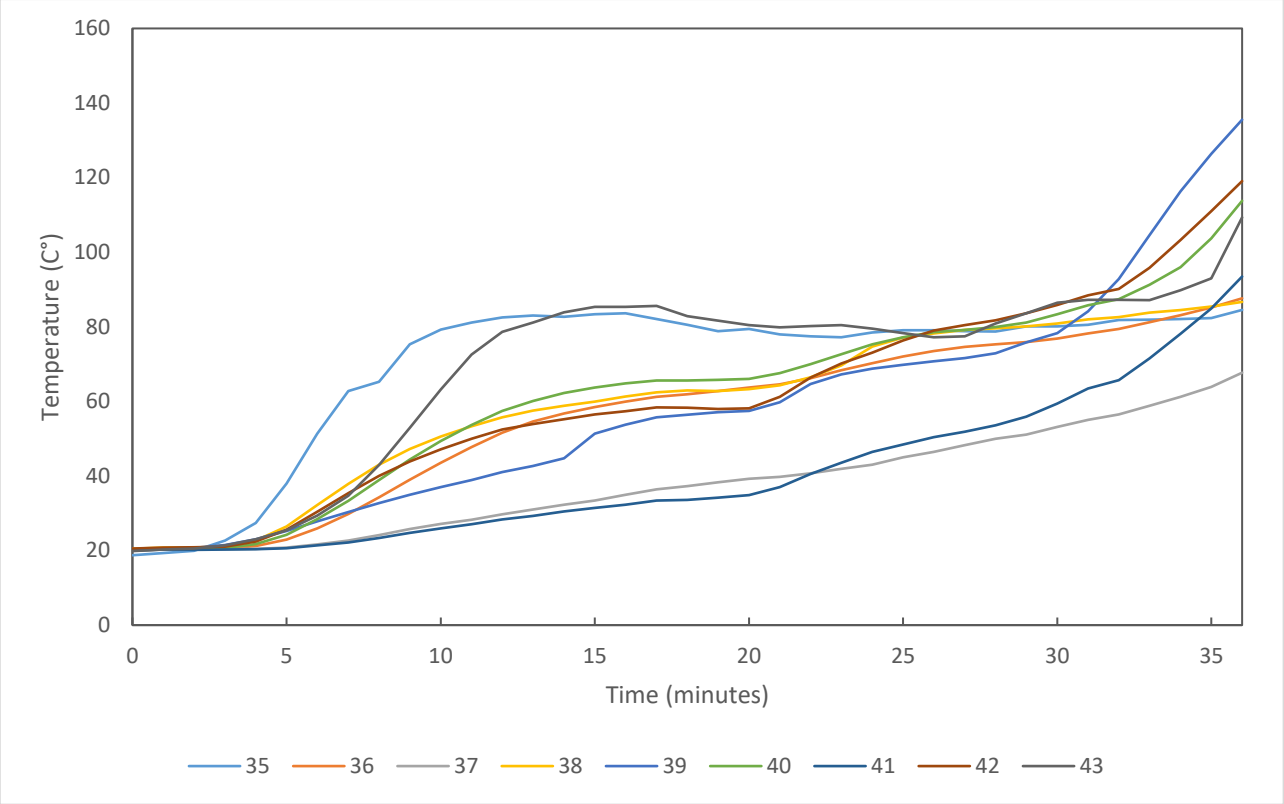


Individual temperatures recorded on the unexposed face of Specimen A2

Time (mins)	T/C 26 (°C)	T/C 27 (°C)	T/C 28 (°C)	T/C 29 (°C)	T/C 30 (°C)	T/C 31 (°C)	T/C 32 (°C)	T/C 33 (°C)	T/C 34 (°C)
0	20	20	19	21	20	#	20	18	#
1	20	20	20	21	20	#	20	21	#
2	20	21	20	21	20	#	20	20	#
3	20	21	20	21	20	#	20	21	#
4	20	21	20	23	21	#	20	25	#
5	21	22	20	27	22	#	21	30	#
6	23	24	21	34	23	#	22	37	#
7	25	27	23	41	26	#	23	48	#
8	27	30	24	47	28	#	25	49	#
9	29	33	26	52	31	#	27	57	#
10	31	36	28	56	33	#	28	47	#
11	33	40	29	59	35	#	30	52	#
12	36	43	31	61	37	#	32	51	#
13	38	46	32	63	39	#	33	52	#
14	40	50	33	65	41	#	34	63	#
15	42	53	35	66	43	#	35	46	#
16	44	55	36	67	45	#	36	53	#
17	47	58	37	67	46	#	37	45	#
18	49	60	38	67	48	#	38	39	#
19	52	62	39	67	49	#	39	48	#
20	54	64	40	67	51	#	40	41	#
21	56	66	40	69	54	#	41	45	#
22	58	67	41	72	56	#	44	51	#
23	59	70	43	75	60	#	47	54	#
24	61	72	44	77	63	#	49	61	#
25	63	74	46	79	65	#	51	73	#
26	65	75	47	80	66	#	53	68	#
27	66	77	48	80	67	#	54	66	#
28	67	78	49	80	67	#	56	65	#
29	68	78	50	81	69	#	58	74	#
30	69	79	51	82	69	#	62	84	#
31	71	80	53	83	70	#	64	88	#
32	72	81	54	84	72	#	66	88	#
33	73	82	56	85	74	#	70	103	#
34	74	83	58	86	77	#	75	109	#
35	76	85	60	88	81	#	79	121	#
36	79	87	63	90	85	#	84	135	#

Thermocouple malfunction, data omitted.

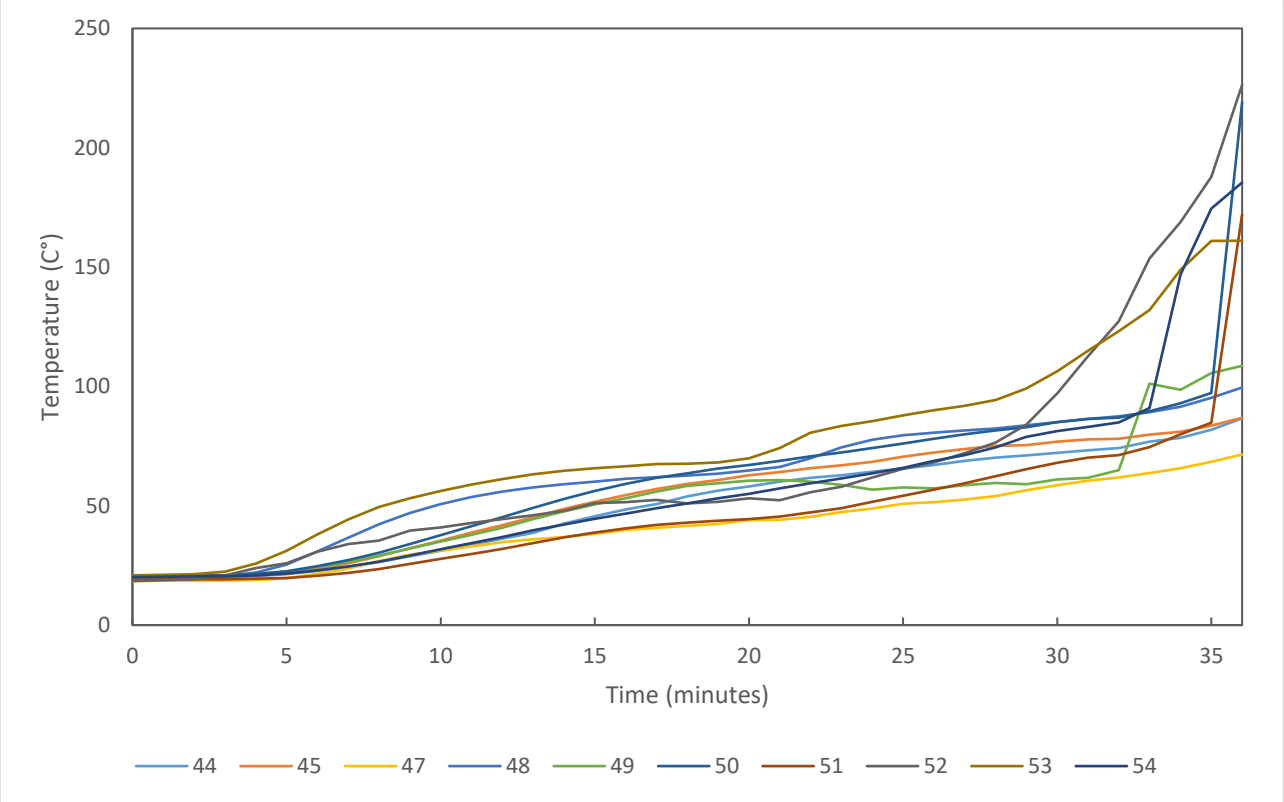
Graph showing individual temperatures recorded on the unexposed face of Specimen A3



Individual temperatures recorded on the unexposed face of Specimen A3

Time (mins)	T/C 35 (°C)	T/C 36 (°C)	T/C 37 (°C)	T/C 38 (°C)	T/C 39 (°C)	T/C 40 (°C)	T/C 41 (°C)	T/C 42 (°C)	T/C 43 (°C)
0	19	20	20	20	20	20	20	21	20
1	19	20	20	21	21	20	20	21	20
2	20	20	20	21	21	20	20	21	21
3	23	21	20	21	21	21	20	21	21
4	27	21	20	23	23	22	20	22	23
5	38	23	21	26	25	24	21	26	25
6	51	26	22	32	28	28	21	30	29
7	63	30	23	38	30	33	22	35	35
8	65	34	24	43	33	39	23	40	43
9	75	39	26	47	35	44	25	44	53
10	79	44	27	51	37	49	26	47	63
11	81	48	28	53	39	54	27	50	73
12	82	52	30	56	41	57	28	52	79
13	83	55	31	58	43	60	29	54	81
14	83	57	32	59	45	62	30	55	84
15	83	58	33	60	51	64	31	56	85
16	84	60	35	61	54	65	32	57	85
17	82	61	36	62	56	66	33	58	86
18	81	62	37	63	56	66	34	58	83
19	79	63	38	63	57	66	34	58	82
20	79	64	39	63	57	66	35	58	80
21	78	65	40	64	60	68	37	61	80
22	77	66	41	66	65	70	41	66	80
23	77	68	42	70	67	73	44	70	80
24	79	70	43	75	69	75	46	73	80
25	79	72	45	77	70	77	48	76	78
26	79	73	46	78	71	79	50	79	77
27	79	75	48	79	72	79	52	80	77
28	79	75	50	80	73	80	54	82	81
29	80	76	51	80	76	81	56	84	84
30	80	77	53	81	78	83	59	86	86
31	81	78	55	82	84	86	63	88	87
32	82	79	57	83	93	87	66	90	87
33	82	81	59	84	105	91	72	96	87
34	82	83	61	84	116	96	78	103	90
35	82	85	64	85	126	104	85	111	93
36	85	88	68	87	136	114	93	119	109

Graph showing individual temperatures recorded on the unexposed face of Specimen A4

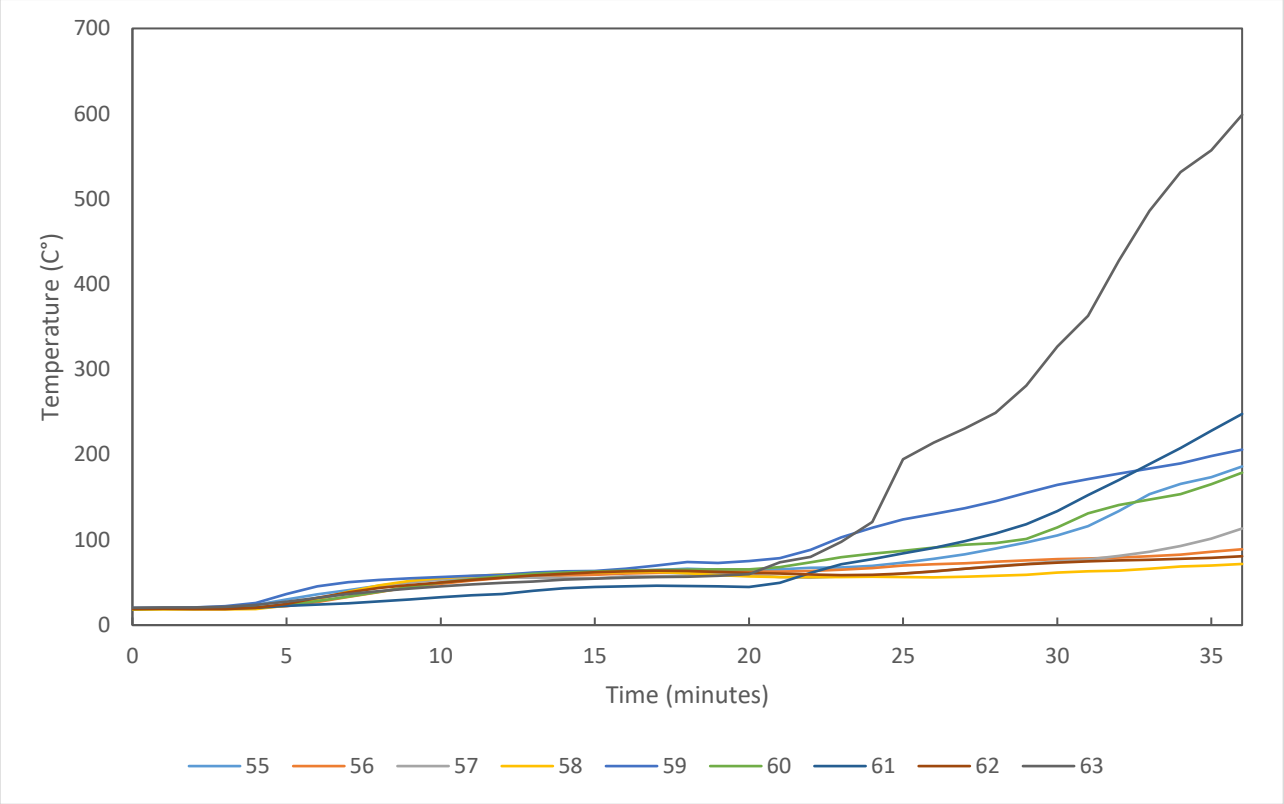


Individual temperatures recorded on the unexposed face of Specimen A4

Time (mins)	T/C 44 (°C)	T/C 45 (°C)	T/C 46 (°C)	T/C 47 (°C)	T/C 48 (°C)	T/C 49 (°C)	T/C 50 (°C)	T/C 51 (°C)	T/C 52 (°C)	T/C 53 (°C)	T/C 54 (°C)
0	20	20	#	18	20	20	21	19	18	21	20
1	20	20	#	19	20	20	21	19	19	21	20
2	20	20	#	19	20	21	21	19	19	21	20
3	20	20	#	19	21	21	21	19	21	22	20
4	21	21	#	19	22	21	22	19	24	26	21
5	21	22	#	20	25	22	23	20	26	31	22
6	23	24	#	21	31	24	25	21	31	38	23
7	24	26	#	24	37	26	27	22	34	44	25
8	26	29	#	27	42	29	30	24	35	50	27
9	29	32	#	29	47	32	34	26	40	53	29
10	31	35	#	31	51	35	38	28	41	56	32
11	34	39	#	33	54	38	41	30	43	59	34
12	36	42	#	35	56	41	45	32	44	61	37
13	39	45	#	36	58	44	49	34	46	63	40
14	42	49	#	37	59	48	53	37	48	65	42
15	46	52	#	38	60	51	56	39	51	66	45
16	48	54	#	40	61	53	59	41	51	67	47
17	51	57	#	41	62	56	62	42	52	68	49
18	54	59	#	42	63	58	64	43	51	68	51
19	56	61	#	42	63	59	66	44	52	68	53
20	58	63	#	44	65	60	67	44	53	70	55
21	60	64	#	44	66	61	69	45	52	74	57
22	62	66	#	45	70	60	71	47	56	81	59
23	63	67	#	47	74	59	72	49	58	83	61
24	64	68	#	49	78	57	74	52	62	85	64
25	66	71	#	51	80	58	76	54	65	88	66
26	67	72	#	52	81	57	78	57	68	90	69
27	69	74	#	53	82	59	80	60	72	92	71
28	70	75	#	54	82	60	82	62	76	94	74
29	71	75	#	57	84	59	83	65	84	99	79
30	72	77	#	59	85	61	85	68	97	106	81
31	73	78	#	60	86	62	86	70	113	115	83
32	74	78	#	62	88	65	87	71	127	123	85
33	77	80	#	64	89	101	90	75	154	132	91
34	78	81	#	66	92	99	93	80	169	149	147
35	82	84	#	68	95	106	97	85	188	161	175
36	87	87	#	71	100	109	219	172	226	161	185

Thermocouple malfunction, data omitted.

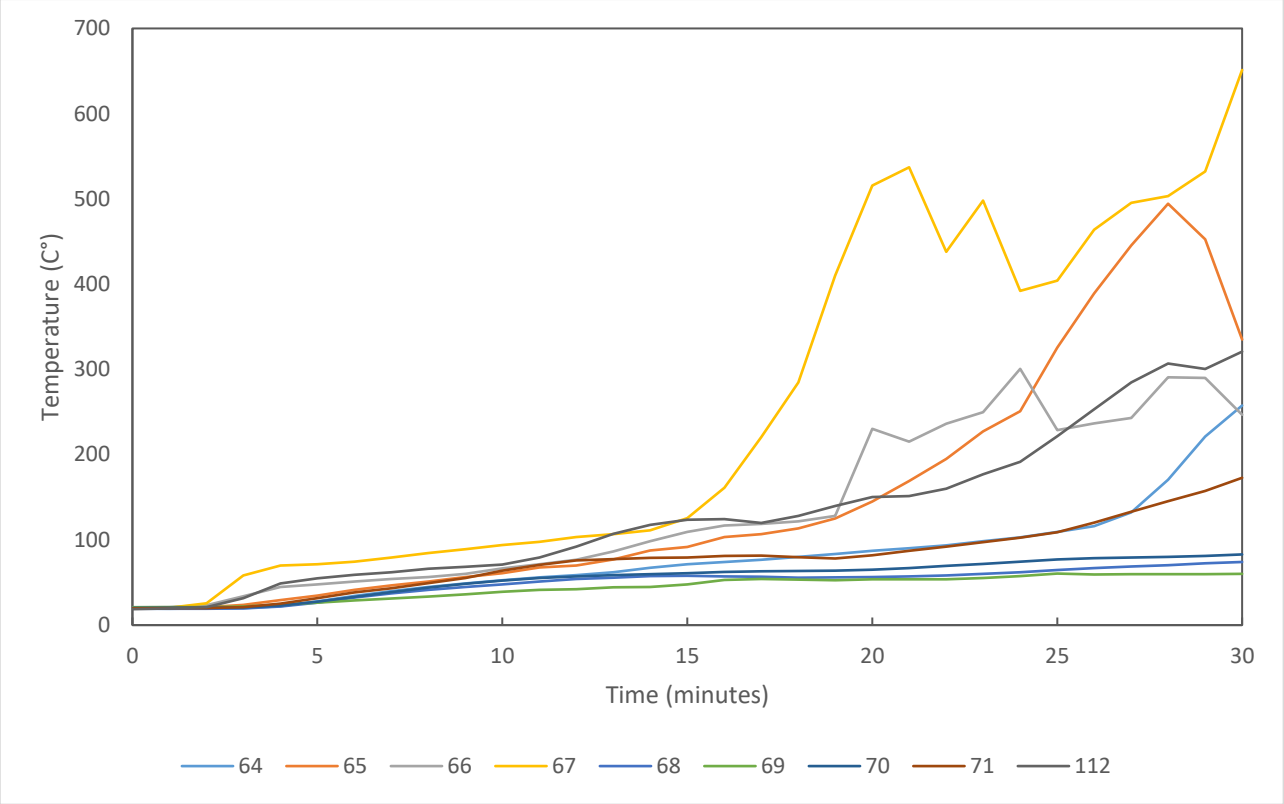
Graph showing individual temperatures recorded on the unexposed face of Specimen A5



Individual temperatures recorded on the unexposed face of Specimen A5

Time (mins)	T/C 55 (°C)	T/C 56 (°C)	T/C 57 (°C)	T/C 58 (°C)	T/C 59 (°C)	T/C 60 (°C)	T/C 61 (°C)	T/C 62 (°C)	T/C 63 (°C)
0	20	19	19	18	20	19	19	19	20
1	20	19	19	18	20	19	20	19	21
2	20	19	20	18	21	19	20	19	21
3	21	19	20	18	22	19	20	19	21
4	24	20	21	19	26	21	20	20	24
5	30	22	23	23	37	24	22	25	27
6	36	27	31	30	45	28	24	32	32
7	41	33	39	39	50	34	26	39	36
8	46	39	44	47	53	39	28	43	40
9	50	45	50	52	55	45	30	47	43
10	54	48	53	55	56	50	33	50	46
11	56	52	55	58	58	54	35	53	48
12	58	55	56	59	59	57	37	56	50
13	60	57	56	61	61	60	40	58	51
14	61	58	55	61	63	62	43	60	53
15	62	59	55	62	64	63	45	62	55
16	63	60	57	62	66	64	45	63	56
17	65	61	57	62	70	65	46	64	56
18	66	62	58	61	74	65	46	64	57
19	65	63	60	59	73	65	46	62	58
20	64	63	59	57	75	65	45	61	60
21	66	63	56	56	79	68	50	61	74
22	67	64	56	56	88	74	61	60	80
23	68	65	57	56	103	80	71	59	98
24	70	67	58	57	114	84	77	59	121
25	73	70	61	57	124	87	84	60	195
26	78	71	63	56	130	91	91	63	214
27	83	73	66	57	137	94	99	66	231
28	90	74	69	58	145	96	107	69	249
29	97	76	72	59	155	101	118	71	281
30	105	77	75	62	164	115	134	73	327
31	116	78	77	63	171	131	153	75	363
32	134	79	81	64	178	141	170	76	427
33	154	81	86	66	184	147	189	77	486
34	166	83	93	69	190	154	208	78	531
35	174	86	101	70	198	165	228	79	557
36	186	89	113	72	206	179	248	81	599

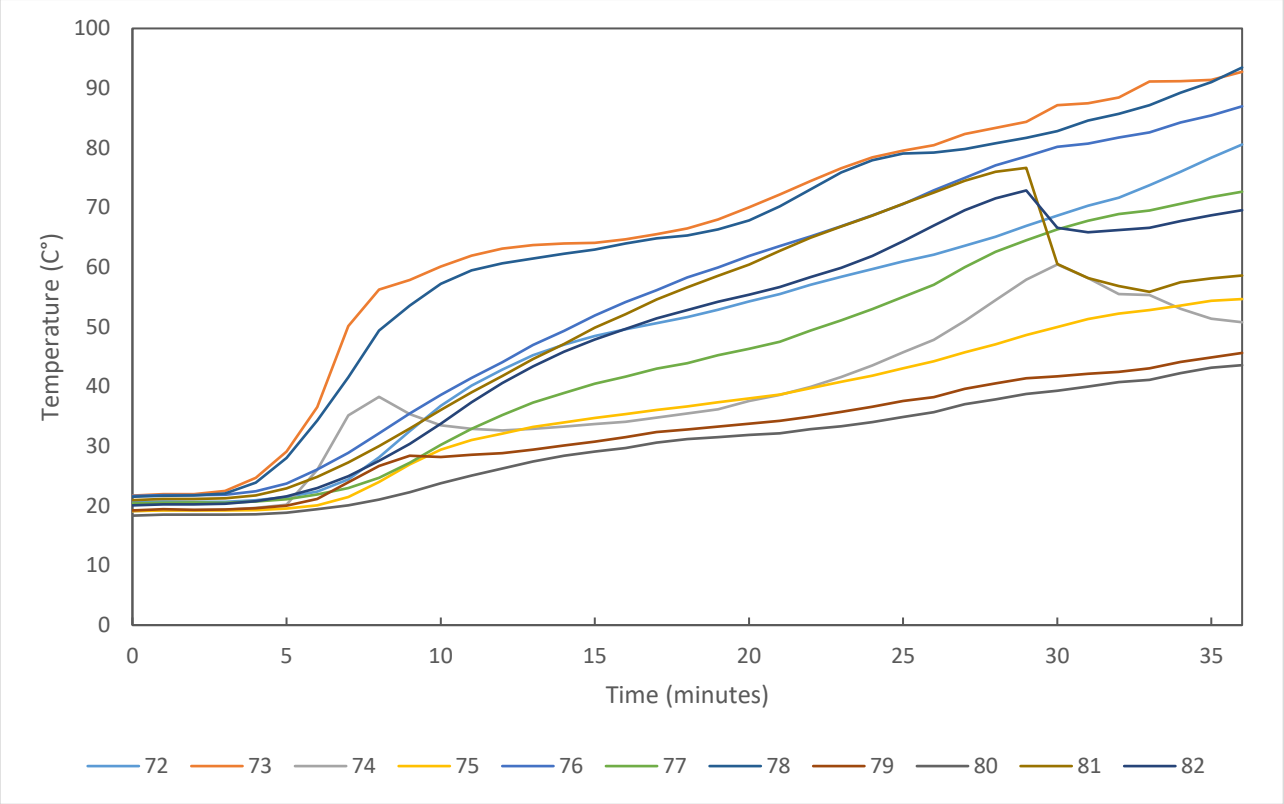
Graph showing individual temperatures recorded on the unexposed face of Specimen B1



Individual temperatures recorded on the unexposed face of Specimen B1

Time (mins)	T/C 64 (°C)	T/C 65 (°C)	T/C 66 (°C)	T/C 67 (°C)	T/C 68 (°C)	T/C 69 (°C)	T/C 70 (°C)	T/C 71 (°C)	T/C 112 (°C)
0	19	20	21	19	19	21	20	20	19
1	19	21	21	20	19	21	20	20	19
2	19	21	23	26	19	21	20	20	21
3	20	24	34	58	20	22	21	21	32
4	22	29	45	70	22	24	23	25	49
5	28	34	48	72	26	26	27	32	55
6	34	42	51	74	32	29	33	38	59
7	40	47	54	79	37	31	39	43	62
8	45	51	56	85	41	34	44	49	66
9	49	56	60	89	45	36	49	55	68
10	53	61	67	94	48	39	52	64	71
11	56	68	71	98	51	41	55	71	79
12	59	70	76	103	54	42	57	76	92
13	62	77	86	107	56	44	59	77	107
14	67	88	99	111	58	45	60	79	118
15	72	92	109	125	58	48	61	79	124
16	74	103	117	161	57	53	62	81	124
17	77	107	119	220	57	54	63	82	120
18	80	114	122	285	56	53	64	80	128
19	83	125	128	410	56	53	64	78	140
20	87	145	230	516	56	54	65	82	150
21	90	169	215	537	57	54	67	87	151
22	94	195	236	438	58	54	69	92	160
23	99	227	250	498	60	55	72	97	177
24	103	251	301	392	62	57	74	102	192
25	109	326	229	404	65	60	77	109	222
26	116	389	237	464	67	59	78	120	253
27	132	446	243	495	69	60	79	133	285
28	170	494	291	503	70	60	80	145	307
29	221	453	290	532	72	60	81	157	301
30	258	335	247	651	74	60	83	173	321

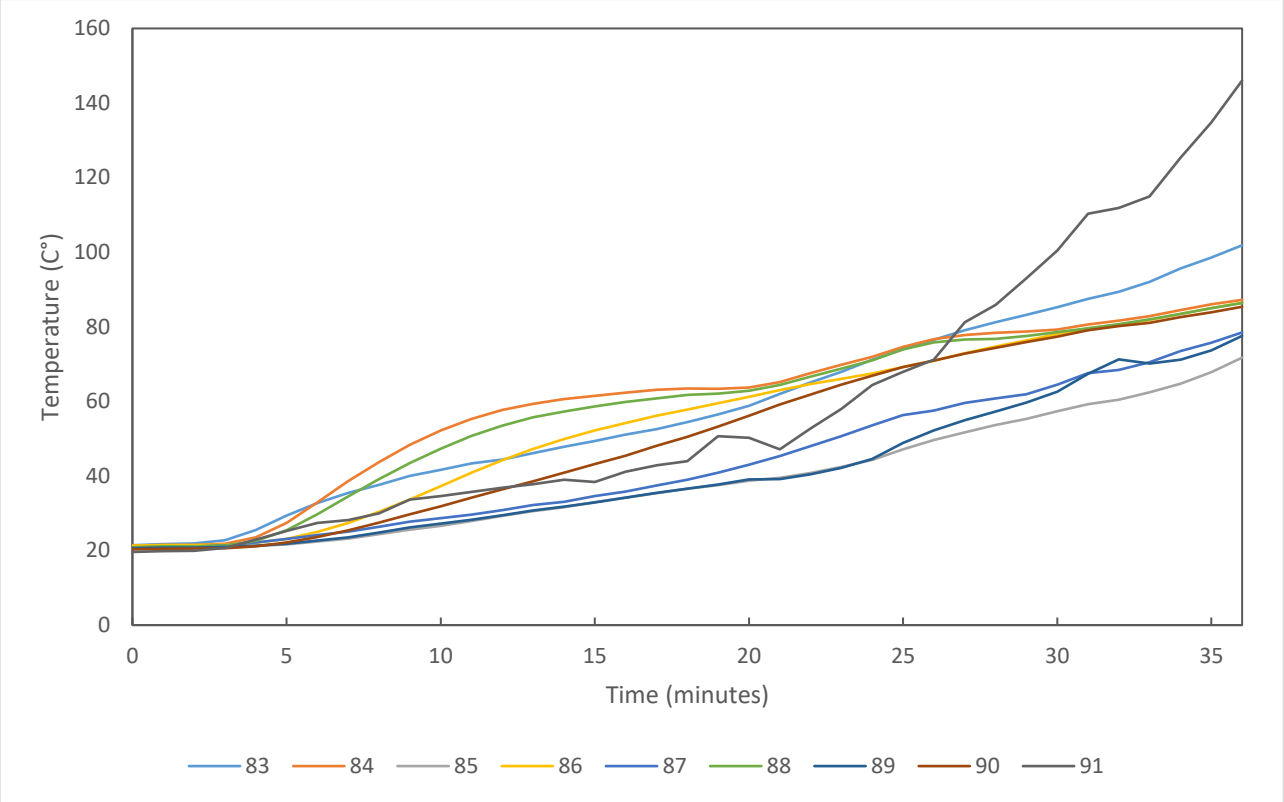
Graph showing individual temperatures recorded on the unexposed face of Specimen B2



Individual temperatures recorded on the unexposed face of Specimen B2

Time (mins)	T/C 72 (°C)	T/C 73 (°C)	T/C 74 (°C)	T/C 75 (°C)	T/C 76 (°C)	T/C 77 (°C)	T/C 78 (°C)	T/C 79 (°C)	T/C 80 (°C)	T/C 81 (°C)	T/C 82 (°C)
0	21	22	19	19	22	20	22	19	18	21	20
1	21	22	19	19	22	21	22	19	19	21	20
2	21	22	19	19	22	21	22	19	18	21	20
3	21	23	19	19	22	21	22	19	18	21	20
4	21	25	20	19	22	21	24	20	19	22	21
5	21	29	20	20	24	21	28	20	19	23	22
6	22	37	26	20	26	22	34	21	19	25	23
7	24	50	35	21	29	23	42	24	20	27	25
8	28	56	38	24	32	25	49	27	21	30	28
9	32	58	35	27	35	27	54	28	22	33	30
10	37	60	33	29	39	30	57	28	24	36	34
11	40	62	33	31	41	33	59	29	25	39	37
12	43	63	33	32	44	35	61	29	26	42	41
13	45	64	33	33	47	37	61	29	27	45	43
14	47	64	33	34	49	39	62	30	28	47	46
15	48	64	34	35	52	40	63	31	29	50	48
16	50	65	34	35	54	42	64	31	30	52	50
17	51	66	35	36	56	43	65	32	31	55	51
18	52	66	35	37	58	44	65	33	31	57	53
19	53	68	36	37	60	45	66	33	32	59	54
20	54	70	38	38	62	46	68	34	32	60	55
21	55	72	39	39	64	47	70	34	32	63	57
22	57	74	40	40	65	49	73	35	33	65	58
23	58	77	42	41	67	51	76	36	33	67	60
24	60	78	44	42	69	53	78	37	34	69	62
25	61	80	46	43	71	55	79	38	35	71	64
26	62	80	48	44	73	57	79	38	36	72	67
27	64	82	51	46	75	60	80	40	37	74	70
28	65	83	54	47	77	63	81	40	38	76	72
29	67	84	58	49	79	64	82	41	39	77	73
30	69	87	60	50	80	66	83	42	39	61	67
31	70	87	58	51	81	68	85	42	40	58	66
32	72	88	55	52	82	69	86	42	41	57	66
33	74	91	55	53	83	69	87	43	41	56	67
34	76	91	53	54	84	71	89	44	42	57	68
35	78	91	51	54	85	72	91	45	43	58	69
36	81	93	51	55	87	73	93	46	44	59	70

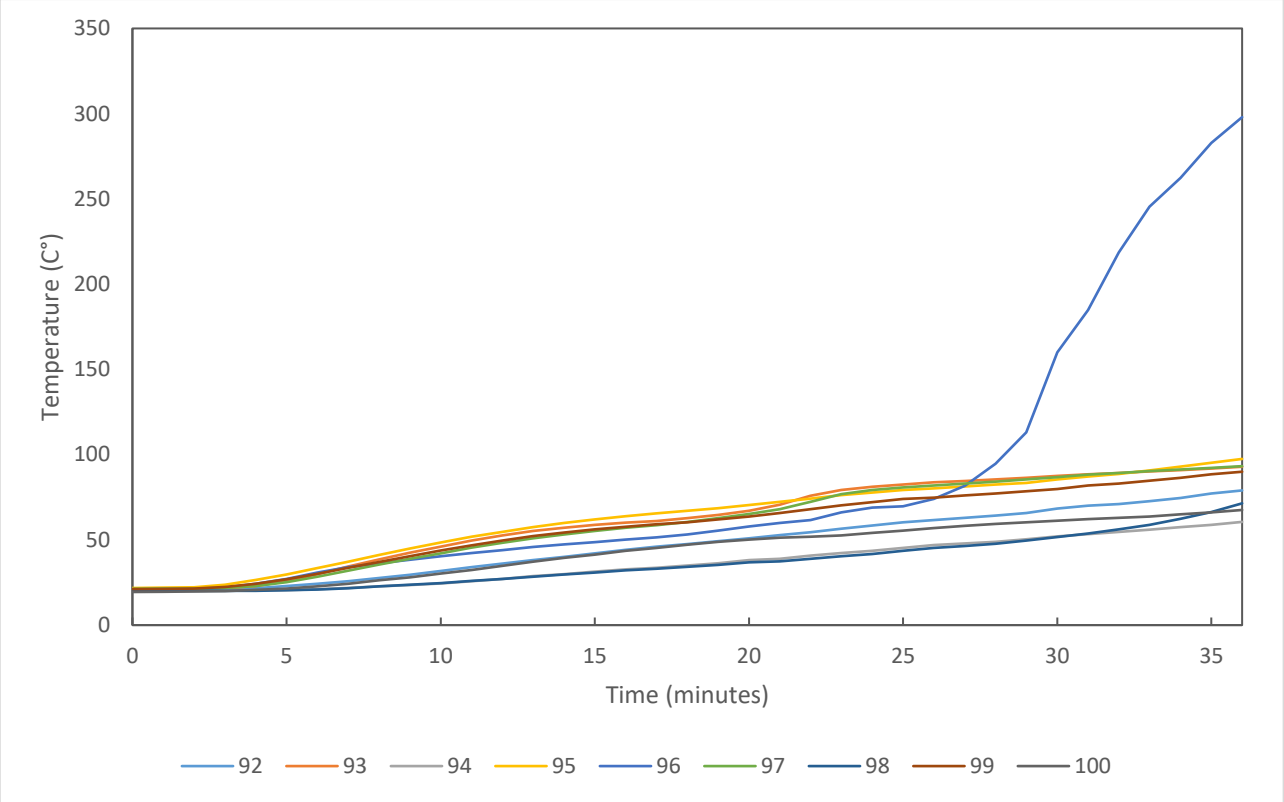
Graph showing individual temperatures recorded on the unexposed face of Specimen B3



Individual temperatures recorded on the unexposed face of Specimen B3

Time (mins)	T/C 83 (°C)	T/C 84 (°C)	T/C 85 (°C)	T/C 86 (°C)	T/C 87 (°C)	T/C 88 (°C)	T/C 89 (°C)	T/C 90 (°C)	T/C 91 (°C)
0	21	21	21	21	21	21	21	20	20
1	22	21	21	21	21	21	21	20	20
2	22	21	21	21	21	21	21	21	20
3	23	22	21	22	21	21	21	21	21
4	26	24	21	22	22	23	21	21	23
5	29	27	22	23	23	25	22	22	25
6	33	33	22	25	24	30	23	24	27
7	35	39	23	27	25	35	24	25	28
8	38	44	24	30	26	39	25	28	30
9	40	48	26	34	28	43	26	30	34
10	42	52	27	37	29	47	27	32	35
11	43	55	28	41	30	51	28	34	36
12	44	58	29	44	31	54	29	36	37
13	46	59	31	47	32	56	31	39	38
14	48	61	32	50	33	57	32	41	39
15	49	62	33	52	35	59	33	43	38
16	51	62	34	54	36	60	34	45	41
17	53	63	35	56	37	61	35	48	43
18	54	63	37	58	39	62	37	50	44
19	56	63	38	60	41	62	38	53	51
20	59	64	39	61	43	63	39	56	50
21	62	65	39	63	45	64	39	59	47
22	65	68	41	65	48	67	40	62	53
23	68	70	42	66	51	69	42	64	58
24	71	72	44	68	54	71	45	67	64
25	74	75	47	69	56	74	49	69	68
26	76	77	50	71	58	76	52	71	71
27	79	78	52	73	60	77	55	73	81
28	81	78	54	75	61	77	57	74	86
29	83	79	55	76	62	78	60	76	93
30	85	79	57	78	64	79	63	77	100
31	87	81	59	80	68	80	67	79	110
32	89	82	60	81	68	81	71	80	112
33	92	83	62	82	71	82	70	81	115
34	96	84	65	83	73	83	71	83	125
35	99	86	68	85	76	85	74	84	135
36	102	87	72	86	78	86	78	85	146

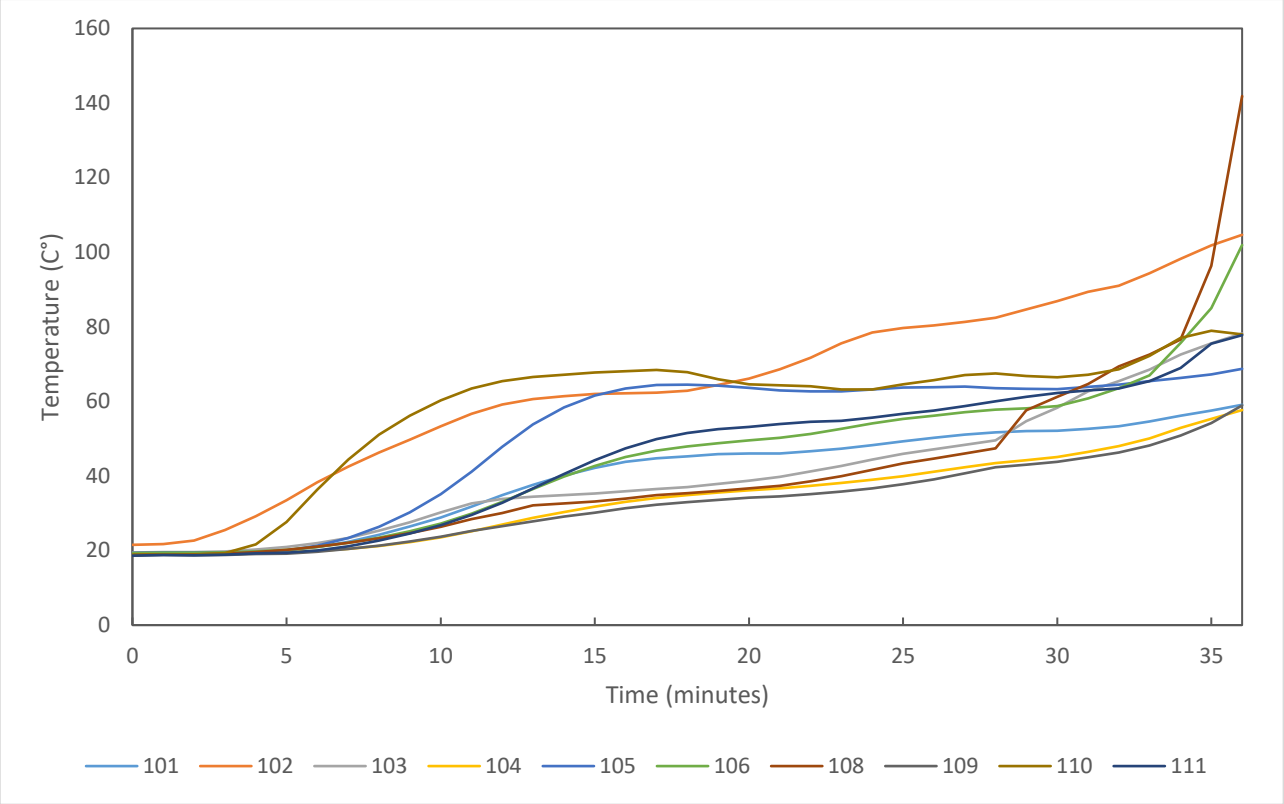
Graph showing individual temperatures recorded on the unexposed face of Specimen B4



Individual temperatures recorded on the unexposed face of Specimen B4

Time (mins)	T/C 92 (°C)	T/C 93 (°C)	T/C 94 (°C)	T/C 95 (°C)	T/C 96 (°C)	T/C 97 (°C)	T/C 98 (°C)	T/C 99 (°C)	T/C 100 (°C)
0	20	21	20	22	20	21	20	21	19
1	20	21	20	22	20	22	20	21	20
2	20	21	20	22	21	21	20	21	20
3	21	22	20	24	22	22	20	22	20
4	22	23	20	26	24	23	20	24	21
5	23	26	21	30	27	25	20	27	21
6	24	30	21	33	31	28	21	30	23
7	26	34	22	37	34	32	22	34	24
8	28	38	23	41	36	36	23	37	26
9	30	42	23	45	38	39	24	40	28
10	32	46	24	49	40	42	25	44	30
11	34	50	26	52	42	45	26	47	32
12	36	53	27	55	44	48	27	50	35
13	38	55	29	58	46	51	28	52	37
14	40	57	30	60	47	53	30	54	40
15	42	59	31	62	49	55	31	56	41
16	44	60	33	64	50	57	32	58	44
17	46	61	34	66	51	59	33	59	45
18	48	63	35	67	53	61	34	60	47
19	49	65	36	69	55	63	35	62	49
20	51	67	38	70	58	65	37	64	50
21	53	71	39	72	60	68	37	66	51
22	55	76	41	74	62	72	39	68	52
23	57	79	42	76	66	77	40	70	53
24	58	81	44	78	69	79	42	72	54
25	60	83	45	79	70	81	44	74	55
26	62	84	47	80	74	82	45	75	57
27	63	85	48	81	82	83	46	76	58
28	64	85	49	82	95	84	48	77	59
29	66	86	50	83	113	86	50	79	60
30	68	88	52	85	160	87	52	80	61
31	70	88	53	87	185	88	54	82	62
32	71	89	55	89	219	89	56	83	63
33	73	90	56	91	245	90	59	85	64
34	75	91	57	93	262	91	62	86	65
35	77	92	59	95	283	92	66	88	66
36	79	93	61	97	298	93	71	90	68

Graph showing individual temperatures recorded on the unexposed face of Specimen B5



Individual temperatures recorded on the unexposed face of Specimen B5

Time (mins)	T/C 101 (°C)	T/C 102 (°C)	T/C 103 (°C)	T/C 104 (°C)	T/C 105 (°C)	T/C 106 (°C)	T/C 107 (°C)	T/C 108 (°C)	T/C 109 (°C)	T/C 110 (°C)	T/C 111 (°C)
0	19	22	19	19	19	19	#	19	19	19	19
1	19	22	20	19	20	19	#	19	19	19	19
2	19	23	20	19	19	19	#	19	19	19	19
3	19	26	20	19	19	20	#	19	19	19	19
4	19	29	20	19	20	20	#	20	19	22	19
5	20	34	21	20	20	20	#	20	19	28	19
6	21	38	22	20	21	21	#	21	20	36	20
7	22	43	23	20	23	22	#	22	20	44	21
8	24	46	25	21	26	23	#	23	21	51	23
9	26	50	28	22	30	25	#	25	22	56	25
10	29	53	30	24	35	27	#	26	24	60	27
11	32	57	33	25	41	30	#	28	25	63	30
12	35	59	34	27	48	33	#	30	27	65	33
13	38	61	34	29	54	37	#	32	28	67	37
14	40	61	35	30	58	40	#	33	29	67	40
15	42	62	35	32	62	43	#	33	30	68	44
16	44	62	36	33	63	45	#	34	31	68	47
17	45	62	37	34	64	47	#	35	32	68	50
18	45	63	37	35	64	48	#	35	33	68	52
19	46	64	38	36	64	49	#	36	34	66	53
20	46	66	39	36	64	50	#	37	34	65	53
21	46	69	40	37	63	50	#	37	35	64	54
22	47	72	41	37	63	51	#	39	35	64	55
23	47	76	43	38	63	53	#	40	36	63	55
24	48	78	44	39	63	54	#	42	37	63	56
25	49	80	46	40	64	55	#	43	38	65	57
26	50	80	47	41	64	56	#	45	39	66	58
27	51	81	48	42	64	57	#	46	41	67	59
28	52	82	50	43	64	58	#	47	42	67	60
29	52	85	55	44	63	58	#	58	43	67	61
30	52	87	58	45	63	59	#	61	44	66	62
31	53	89	63	46	64	61	#	65	45	67	63
32	53	91	65	48	65	64	#	69	46	69	63
33	55	94	69	50	65	67	#	73	48	72	65
34	56	98	73	53	66	76	#	77	51	77	69
35	58	102	76	55	67	85	#	96	54	79	75
36	59	105	78	58	69	102	#	142	59	78	78

Thermocouple malfunction, data omitted.

On-going Implications

Limitations

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedures outlined in BS EN 1363-1, using the test method stated in BS EN 1366-4: 2021, Fire resistance test for service installations – Part 4: Linear joint seals.

Any significant deviation with respect to size, construction details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. Warringtonfire will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

EGOLF

Certain aspects of some fire test specifications are open to different interpretations. EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.

Field of Direct Application

BS EN 1363-1:2020, Fire resistance tests - Part 1: General requirements, states within Section 12.1, Clause v) that “The field of direct application of the results taken from the appropriate standard (or the test method) for the specimen being evaluated, either in the form of the full text from the appropriate standard or only those clauses which are relevant for the specimen tested” shall be included within the test report. The full text of the field of direct application for the results of the specimen being evaluated herein, can be found within the appropriate test standard, which is referenced on the front cover of this report. The field of direct application has been applied for the tested elements referenced as A1, A2, A3, B3, B4 & B5 and can be found within Annex A of this report. Specimens A4, A5, B1 & B2 deviate from the requirements of the test standard and therefore, no direct field of application is applicable.

Annex A: Field of Direct Application

For the purpose of this Annex (A) the field of direct application for each of the tested elements have been grouped as appropriate in order to apply the rules found within clause NA.5 of BS EN 1366-4: 2021. The grouping includes identical seals applied in both horizontal and vertical arrangements and dual orientation where required, totalling up to 4No. specimens to each group.

Specimens A1 & B5

Specimens A1 & B5 consisted of the same linear joint sealing material proposed to be used to seal the gap between the back of timber fire doorset frames and the supporting construction.

Soudal (UK) Ltd, Soudafoam FR HY

In order to maximise the scope of the field of direct application the tested specimens were arranged as detailed below:

Specimen Reference	Orientation	Length of Seal (mm)	Nominal width of Seal (mm)	Depth of Seal (mm)	Flushness	Integrity Performance (minutes)	Insulation Performance (minutes)
A1	Horizontal	900	15	75	Exposed face	36	36
B5	Vertical	900	15	75	Exposed face	36	36
Supporting construction thickness: 75mm							
Timber element section size: 108mm x 10.5mm							

(Full information on the tested elements and their associated performance is detailed within the main body of the report)

The following table provides information on the field of direct application which is applicable to the tested construction and provides information on the scope of the application in accordance with each of the rules found within BS EN 1366-4: 2021, specifically the national annex (NA).

As defined in BS EN 1366-4: 2021 (NA.3), this test methodology is only intended to evaluate the linear joint seal materials and not the packer and fixing materials. For this reason the DIAP below is based upon the use of non-combustible packers only.

Clause No.	Clause Text	Field of Direct Application
NA.5.1	The seal length may be increased and used around the perimeter of fire doorset frames, provided successful results from both the vertical and horizontal (in a vertical test construction) tests are achieved in terms of both integrity and insulation performance.	The tested arrangements included horizontal and vertical arrangements and achieved in excess of 30 minutes integrity and insulation performance. Therefore, the tested Soudal (UK) Ltd, Soudafoam FR HY as installed may be increased and utilised around the perimeter of fire doorset frames for up to 30 minutes performance.
NA.5.2	The seal width may be reduced provided the linear joint seal design and depth remains as tested. The seal width should not be increased.	The tested width of the Soudal (UK) Ltd, Soudafoam FR HY was nominally 15mm, dimensions smaller than 15mm are therefore permitted, providing the depth remains no less than 75mm. The seal width shall not exceed 15mm.

Clause No.	Clause Text	Field of Direct Application
NA.5.3	The timber door frame section size and supporting construction thickness may be increased but not reduced, provided the linear joint seal material is also increased to suit. In the case where the linear joint seal material is applied from each side separately with an air gap present at the centre, the timber door frame section and supporting construction may be increased and the linear joint seals remain as tested, with only the air gap increasing in size.	The tested door frame section size was 108mm x 10.5mm, while the supporting construction thickness was 75mm. An increase in the thickness of the door frame section and/or the supporting construction thickness is therefore permissible, providing that the linear joint seal material is also increased to suit.
NA.5.4	The type/density of the timber door frame may be increased in accordance with Table A.1 of BS EN 15269-3, but not reduced.	The elements were tested with a softwood framing material with a density of 478kg/m^3. Alternative solid wood may therefore be used with the Soudal (UK) Ltd, Soudafoam FR HY in accordance with Table A.1 of BS EN 15269-3 as detailed below: Softwood with a density ≥478kg/m^3 Beech (Fagus species) of all densities Hardwood with a density ≥450kg/m^3
NA.5.5	Tests carried out with a flexible supporting construction cover rigid constructions of the same or greater thickness, but not vice versa.	The elements were tested in a flexible supporting construction 75mm thick. A rigid supporting construction as defined in BS EN 1363-1:2020 with a thickness of 75mm or greater is therefore permissible.
NA.5.6	Tests carried out on an unlined flexible supporting construction may – in practice – be used with a lined aperture, but not vice versa.	The elements were tested in a flexible supporting construction with an unlined aperture around the tested element. In practice therefore a lined aperture may be used around the tested elements.
NA.5.7	Any timber or alternative solid cellulose-based architrave material may be fitted over a linear joint seal that has been tested without architrave and achieved integrity and insulation performance.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals. Therefore, any timber or alternative solid cellulose-based architrave may be used with the tested elements.
NA.5.8	Tested architraves, along with the overlap dimension, can be increased in width and/or thickness, but not reduced.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals; therefore, this clause is not applicable.
NA.5.9	NA.5.9 The density of tested architrave may be increased in accordance with Table A.1 of BS EN 15269-3, but not decreased.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals; therefore, this clause is not applicable.
NA.5.10	Tested architrave cannot be removed.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals; therefore, this clause is not applicable.

Clause No.	Clause Text	Field of Direct Application
NA.5.11	For seals that use backing materials, test results on backing material made of Polyethylene/Polyurethane may be replaced with backing material made of glass wool, slag wool, stone wool or ceramic wool. In cases where mineral wool is used in the test as backing material, the density of the mineral wool in practice may be increased but not decreased.	The tested arrangements did not use backing materials due to the properties of the linear joint seal; therefore, this clause is not applicable.
NA.5.12	Symmetrical seal systems tested from one side only may be used in both directions.	The linear joint seal system tested is symmetrical; therefore, the result is applicable from both directions.
NA.5.13	Tested asymmetrical seal systems may only be used if they have been tested in both directions.	The linear joint seal system tested is symmetrical and therefore this clause is not applicable.

Specimens A2, A3, B3 & B4

Specimens A2, A3, B3 & B4 consisted of the same linear joint sealing material proposed to be used to seal the gap between the back of timber fire doorset frames and the supporting construction. Due to the dimensions of the timber element the seal has been identified as asymmetric and therefore, two additional samples are included within this group.

Soudal (UK) Ltd, Soudafoam FR HY

In order to maximise the scope of the field of direct application the tested specimens were arranged as detailed below:

Specimen Reference	Orientation	Length of Seal (mm)	Nominal width of Seal (mm)	Depth of Seal (mm)	Flushness	Integrity Performance (minutes)	Insulation Performance (minutes)
A2	Horizontal	900	15	66	Unexposed face	36	36
A3	Horizontal	900	15	66	Exposed face	36	36
B3	Vertical	900	15	66	Exposed face	36	36
B4	Vertical	900	15	66	Unexposed face	36	31
Supporting construction thickness: 75mm							
Timber element section size: 66mm x 34mm							

(Full information on the tested elements and their associated performance is detailed within the main body of the report)

The following table provides information on the field of direct application which is applicable to the tested construction and provides information on the scope of the application in accordance with each of the rules found within BS EN 1366-4: 2021, Specifically the national annex (NA).

Clause No.	Clause Text	Field of Direct Application
NA.5.1	The seal length may be increased and used around the perimeter of fire doorset frames, provided successful results from both the vertical and horizontal (in a vertical test construction) tests are achieved in terms of both integrity and insulation performance.	The tested arrangements included horizontal and vertical arrangements and achieved in excess of 30 minutes integrity and insulation performance. Therefore, the tested Soudal (UK) Ltd, Soudafoam FR HY as installed may be increased and utilised around the perimeter of fire doorset frames for up to 30 minutes performance.
NA.5.2	The seal width may be reduced provided the linear joint seal design and depth remains as tested. The seal width should not be increased.	The tested width of the Soudal (UK) Ltd, Soudafoam FR HY was nominally 15mm, dimensions smaller than 15mm are therefore permitted, providing the depth remains no less than 66mm. The seal width shall not exceed 15mm.

Clause No.	Clause Text	Field of Direct Application
NA.5.3	The timber door frame section size and supporting construction thickness may be increased but not reduced, provided the linear joint seal material is also increased to suit. In the case where the linear joint seal material is applied from each side separately with an air gap present at the centre, the timber door frame section and supporting construction may be increased and the linear joint seals remain as tested, with only the air gap increasing in size.	The tested door frame section size was 66mm x 34mm, while the supporting construction thickness was 75mm. An increase in the thickness of the door frame section and/or the supporting construction thickness is therefore permissible, providing that the linear joint seal material is also increased to suit.
NA.5.4	The type/density of the timber door frame may be increased in accordance with Table A.1 of BS EN 15269-3, but not reduced.	The elements were tested with a softwood framing material with a density of 559kg/m^3. Alternative solid wood may therefore be used with the Soudal (UK) Ltd, Soudafoam FR HY in accordance with Table A.1 of BS EN 15269-3 as detailed below: Softwood with a density ≥559kg/m^3 Beech (Fagus species) of all densities Hardwood with a density ≥450kg/m^3
NA.5.5	Tests carried out with a flexible supporting construction cover rigid constructions of the same or greater thickness, but not vice versa.	The elements were tested in a flexible supporting construction 75mm thick. A rigid supporting construction as defined in BS EN 1363-1:2020 with a thickness of 75mm or greater is therefore permissible.
NA.5.6	Tests carried out on an unlined flexible supporting construction may – in practice – be used with a lined aperture, but not vice versa.	The elements were tested in a flexible supporting construction with an unlined aperture around the tested element. In practice therefore a lined aperture may be used around the tested elements.
NA.5.7	Any timber or alternative solid cellulose-based architrave material may be fitted over a linear joint seal that has been tested without architrave and achieved integrity and insulation performance.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals. Therefore, any timber or alternative solid cellulose-based architrave may be used with the tested elements.
NA.5.8	Tested architraves, along with the overlap dimension, can be increased in width and/or thickness, but not reduced.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals; therefore, this clause is not applicable.
NA.5.9	NA.5.9 The density of tested architrave may be increased in accordance with Table A.1 of BS EN 15269-3, but not decreased.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals; therefore, this clause is not applicable.
NA.5.10	Tested architrave cannot be removed.	The tested arrangements did not include architraves over the Soudal (UK) Ltd, Soudafoam FR HY linear joint seals; therefore, this clause is not applicable.

Clause No.	Clause Text	Field of Direct Application
NA.5.11	For seals that use backing materials, test results on backing material made of Polyethylene/Polyurethane may be replaced with backing material made of glass wool, slag wool, stone wool or ceramic wool. In cases where mineral wool is used in the test as backing material, the density of the mineral wool in practice may be increased but not decreased.	The tested arrangements did not use backing materials due to the properties of the linear joint seal; therefore, this clause is not applicable.
NA.5.12	Symmetrical seal systems tested from one side only may be used in both directions.	The linear joint seal system has been tested from both directions with regards to fire exposure; therefore, this clause is not applicable.
NA.5.13	Tested asymmetrical seal systems may only be used if they have been tested in both directions.	The linear joint seal system has been tested in both directions with regards to symmetry and therefore is permitted in either orientation.