Fire resistance test report

Warringtonfire Testing and Certification Limited

Test standard:	BS 476-20:1987 and BS 476-22:1987 Clause 7
Test sponsor:	RAM Extrusion Limited
Product:	VICPYRO CF218 & HALPYRO CF534
Report number:	WF513890
Test date:	2 February 2022
Version:	1

Warringtonfire, accredited for compliance with ISO/IEC 17025:2017 – Testing

Quality management

Version	Date	Information about the report			
1	Click here to enter a date	Description	Initial issue		
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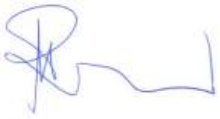
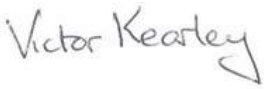
		Signature			

Signed for and on behalf of Warringtonfire Testing and Certification Limited

Executive summary

This report documents the findings of the fire resistance test of doorsets in accordance with BS 476-20:1987 and BS 476-22:1987 Clause 7 determination of fire resistance of partially insulated doorsets and shutter assemblies with deviations as described in Table 3.

Warringtonfire Testing and Certification Limited (Warringtonfire) performed the test on 2 February 2022 at the request of RAM Extrusion Limited.

Table 1 provides a summary of the test specimen, Table 2 gives details of the supporting construction and Table 3 describes the summary of the test results.

Table 1 Test specimen

Item	Detail	Opening direction
Doorset A	Single leaf single acting timber doorset	Towards the furnace
Doorset B	Single leaf single acting timber doorset	Towards the furnace

Table 2 Supporting construction

Item	Detail		
Supporting construction	A plasterboard clad timber stud supporting construction.		
Nominal dimensions	Width	3000 mm	
	Height	3000 mm	
	Thickness	120 mm	
Aperture dimensions		**Width**	**Height**
	Doorset A	1010 mm	2094 mm
	Doorset B	1010 mm	2094 mm
Restraint conditions	Restrained on vertical edges		

Table 3 Summary of test results

Item	Criteria	Results
Doorset A	Integrity	No integrity failure
	Insulation**	No insulation failure
	Radiation	A maximum radiation intensity of 0.7 kW/m^2 was reached after 38 minutes
Doorset B	Integrity	36 (thirty six) minutes
	Insulation**	36 (thirty six) minutes*
	Radiation	A maximum radiation intensity of 0.6 kW/m^2 was reached after 38 minutes
Notes:		
The test results for the specimen only apply to the tested orientation. The test was discontinued after 38 minutes. '*' indicates failure due to integrity failure. '**' in accordance with BS 476-22:1987 Clause 7 the glazing has not been assessed for insulation.		

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Contents

1. Introduction

This report documents the findings of the fire resistance test of doorsets in accordance with BS 476-20:1987 and BS 476-22:1987 Clause 7 determination of fire resistance of partially insulated doorsets and shutter assemblies.

Warringtonfire performed the test on 2 February 2022 at the request of the test sponsor.

Table 4 Test sponsor details

Test sponsor(s)	Address
RAM Extrusion Limited	Unit 203 Pointon Way Stonebridge Cross Droitwich Spa, Worcestershire WR9 0LW United Kingdom

2. Test specimen and supporting construction

2.1 Drawings of test assembly

The leaders in the drawings (Figure 1 - 6) represent the items listed in Section 2.2. All measurements are in millimetres – unless indicated otherwise.

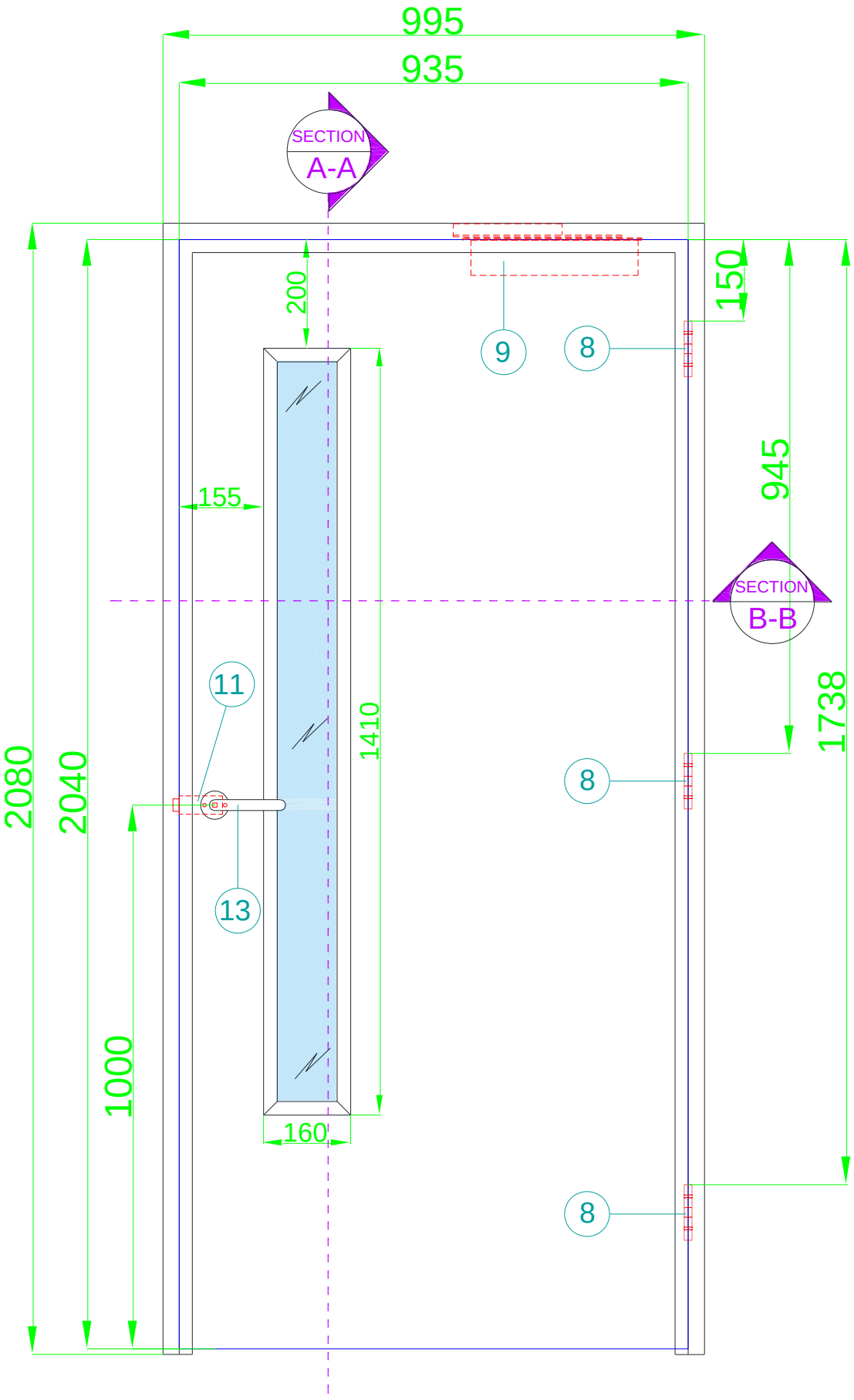

Figure 1 Doorset A - Elevation view of test specimen (unexposed side)

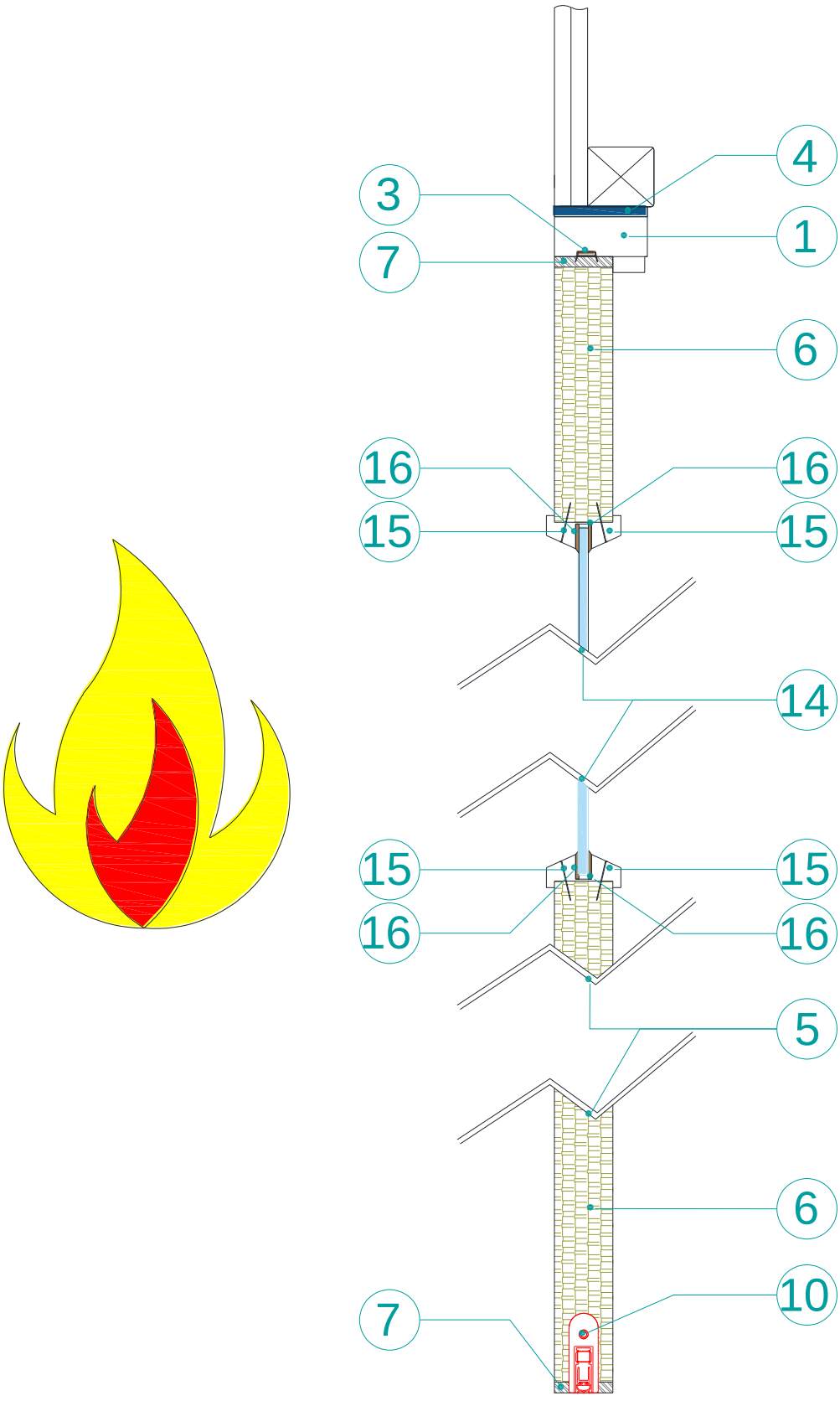

Figure 2 Doorset A – Section A-A

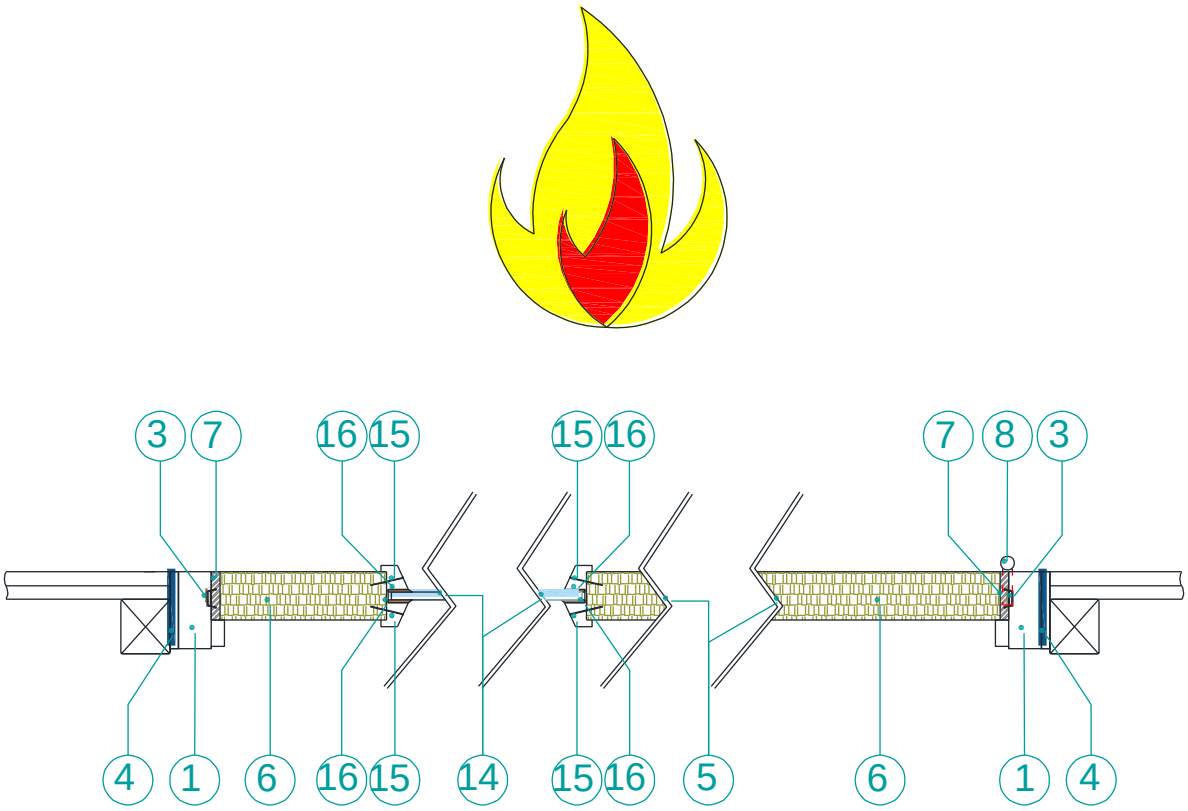

Figure 3 Doorset A – Section B-B

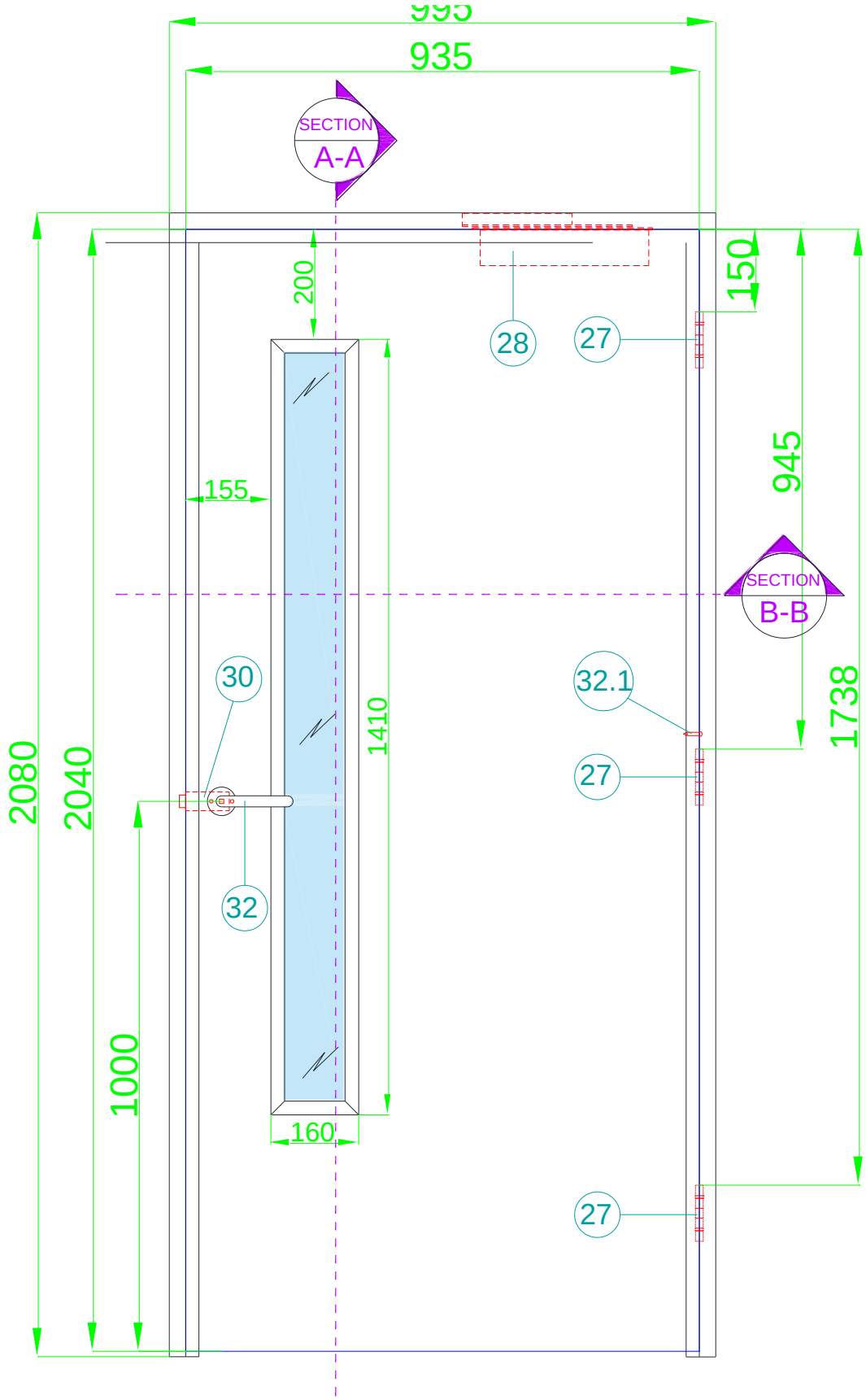

Figure 4 Doorset B - Elevation view of test specimen (unexposed side)

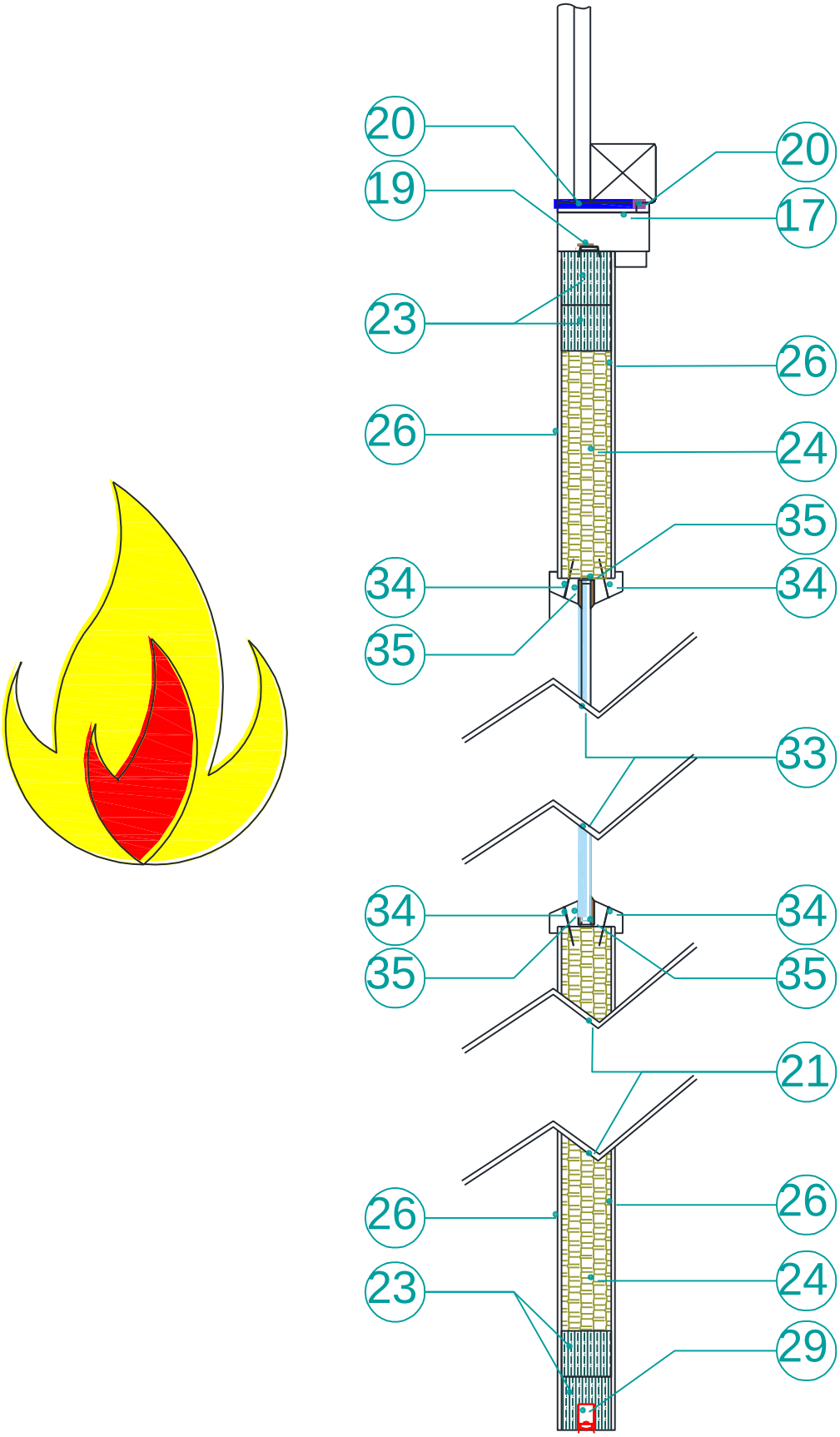

Figure 5 Doorset B – Section A-A

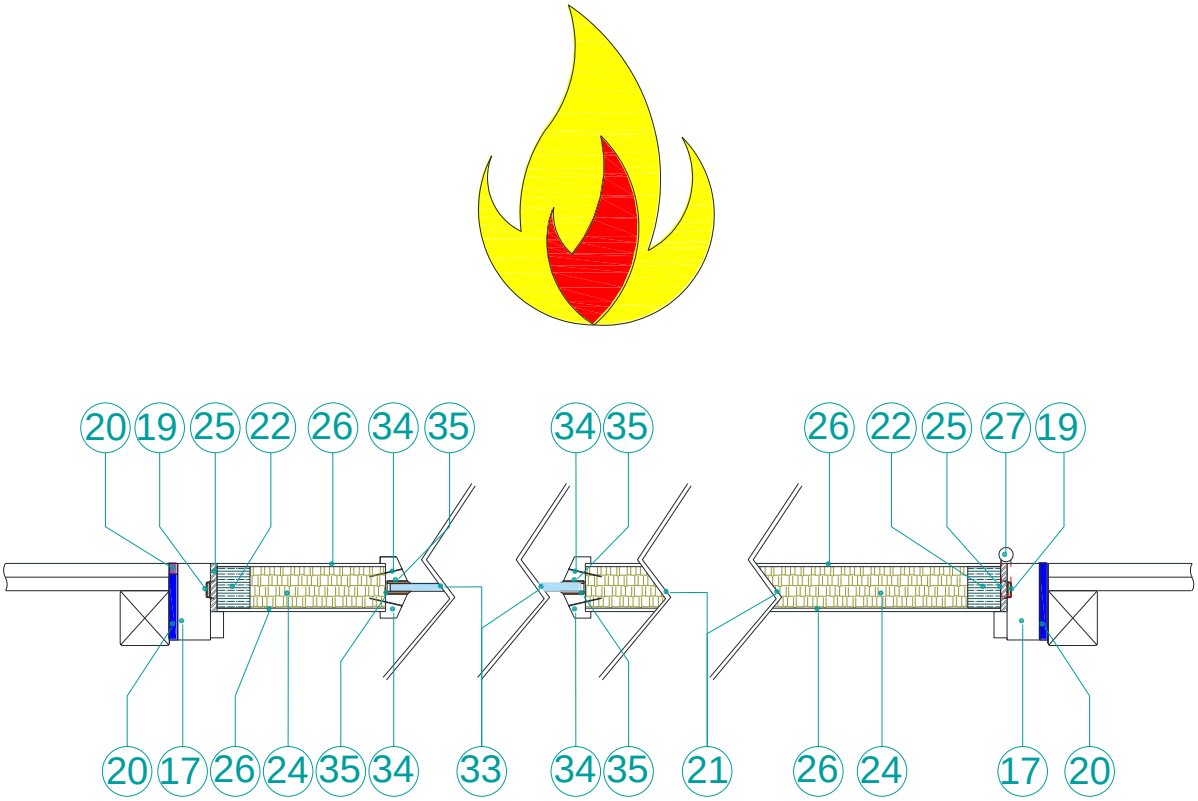

Figure 6 Doorset B – Section B-B

2.2 Schedule of components

Table 5 details the schedule of components which describes the test specimen and lists the components used in the construction of the test specimen. These were provided by the test sponsor and surveyed by Warringtonfire.

All measurements were verified by Warringtonfire unless stated otherwise in the schedule of components. All components marked with an "*" have not been verified by Warringtonfire.

Table 5 Schedule of components

Door frame – Doorset A (HALPYRO CF 534)

1. Door frame	
Manufacturer	Stoke Fire Doors*
Reference	Plain lining*
Material	Softwood Head and Jambs*
Density	450 kg/m^3*
Moisture content	8.4 %
Overall size	2080 mm high x 995 mm wide
i. Frame (Head)	70 mm wide x 30 mm thick
ii. Frame (Jambs)	70 mm wide x 30 mm thick
iii. Stop	24 mm wide x 12 mm deep
Jamb to Head jointing method, fixing detail and location	Housed joint with PVAc glue and 2 no. 5 mm x 80 mm screws per jamb*
Stop to Frame jointing method, fixing detail and location	Pins 1.8x30mm. 100 mm in from edges and 500 mm centres.*
Presence of Adhesives	No
2. Frame Fixing Method to Supporting Construction	
Manufacturer	Gold Screw
Reference	CD0014
Type & material	Carbon steel wood screw
Overall size	5 mm diam x 100 mm long
Spacing	150 mm, 750 mm, 1300 mm and 1900 mm from bottom corner of the jambs
Does the fixing penetrate intumescent seal within frame reveal	No
Packing Material	Blue 60 packers*
Packing Material Dimension	100 mm x 25 mm in 1, 3, 5 mm thicknesses*
Packing Material Location	At fixing locations

3. Intumescent to frame reveal	
Quantity	1 no. strip
Manufacturer	Pyrosist Ltd*
Reference	Pyrosist 9010 10x4 Fire & Smoke
Material	Graphite*
Overall section size	10 mm wide x 4 mm thick
Application method	Self-adhesive tape.*
Location (relative to the opening face of the door leaf)	17mm
Presence of Adhesives	No*

Fire stopping – Doorset A (HALPYRO CF 534)

4. Fire stopping detail	
Manufacturer	Blue 60
Reference	Blue 60 fire rated foam
Material	Polyurethane (see product data sheet in Appendix F)
Application method	Expanding foam cannister
Location	Product applied to whole depth of fire stopping gaps around doorset – see Appendix G

Door leaf – Doorset A (HALPYRO CF 534)

5. Door Leaf	
Manufacturer (blank)	Halspan Optima*
Reference	CF534*
Quantity of leaves on doorset	1
Glazing location relative to the head and closing edge	200 mm from the head of the leaf and 155 mm from the closing edge of the leaf
Overall leaf size prior to trimming	935 mm wide x 2040 mm high x 44 mm thick*
Overall leaf size supplied for testing	935 mm wide x 2040 mm high x 44 mm thick
Location trimming was performed and by how much	N/A*
6. Core element	
Manufacturer	Halspan*
Reference	Optima CF534*
Material	Chipboard*
Location	Entire leaf thickness
Density	590 - 600 kg/m^{3*}
Moisture content	8.4 %
Overall thickness	44 mm thick
7. Lippings	
Manufacturer	Stoke Fire Doors*
Reference	SFDHS FD30*
Material	Sapele*
Density	640 kg/m^{3*}
Moisture content	8.1 %
Overall size	44 mm wide x 8 mm thick
Fixing method	Machine applied*
Location	All leaf edges
Adhesives	
i. Manufacturer	Technomelt*
ii. Type	PU Hot melt*
iii. Reference	PUR270/7*
iv. Curing method	Air*
v. Application method	Nordson Glue Pot*
Presence of Mechanical Fixings	No*

Hardware – Doorset A (HALPYRO CF 534)

8. Hinges	
Supplier	Euro Spec
Reference	Eurograde 13 ball bearing hinge*
Quantity	3 no.
Primary material	Steel*
Type	Bearing guided*
Size	102 mm x 76 mm x 3 mm
i. knuckle	14 mm Ø x 102 mm high
ii. blades	101 mm high x 35 mm wide x 3 mm thick
Fixings	
i. type	Wood screw*
ii. material	Steel*
iii. sizes	5 mm Ø x 30 mm long*
iv. number off per blade	4 no.
Position of each hinge relative to the head of the leaf	150 mm, 945 mm, 1738 mm
Details of intumescent protection	N/A*
Interruptions to Intumescent within the frame reveal	Full interruption of seal
9. Door Closer	
Manufacturer	Hoppe*
Reference	ARRONE AR1500-SSS/SSS*
Material	
Body	Steel*
Closer arm	Steel*
Cover	Steel*
Configuration	“Figure 1”
Overall size	
Body	65 mm high x 248 mm wide x 53 mm deep*
Cover	67 mm high x 255 mm wide x 57 mm deep*
Fixing method	Wood screw*

10. Drop Down Seal	
Manufacturer	Exitex*
Reference	Concealex A8100 pt no: 1.50.0001*
Material	
i. Body	Aluminium*
ii. Seal	Co-extruded tubular seal in self-extinguishing TPE
Overall size	
Body	20 mm high x 926 mm wide x 12.5 mm thick*
Face plate	60 mm high x 22 mm wide
Fixing method, type and locations	Steel wood screws 3 mm x 25 mm located 200 mm in from drop seal ends.*
Location within leaf	Centralised and bottom of leaf.
Maximum operating drop	14 mm*
11. Latch	
Latching status	Latch engaged
Manufacturer	Euro Spec
Reference	Tubular latch*
Material	
i. Lockcase	Steel*
ii. Forend plate	Steel*
iii. Latch bolt	Brass*
Overall sizes	
i. Central Lockcase	66 mm high x 21 mm wide x 21 mm deep*
ii. Forend plate	58 mm high x 40 mm wide x 2 mm thick*
iii. Latch bolt	15 mm high x 15 mm wide x 20 mm projection*
Fixing method	2 no. screws
Operation of latch bolt	Lever handle, (engaged as agreed and signed by A Watts)
Details of intumescent protection	None*
Interruptions to Intumescent within the frame reveal	
i. Forend plate	N/A
Location of centre of the spindle relative to the bottom of the leaf	Centre of the spindle measures 1000 mm from the bottom of the leaf
12. Keep	
Manufacturer	Eurospec
Reference	Tubular latch keep*
Material	Steel*
Overall sizes	57 mm high x 25 mm wide x 1.2 mm thick*
Fixing method	2 no. screws 20 x 3.5 x 2.5 mm Ø*
Details of intumescent protection	None*
Interruptions to Intumescent within the frame reveal	Fully interrupted

13. Lever handles	
Manufacturer	Darcel*
Reference	DCYVE-SN-DEV*
Material	Steel*
Overall size	50 mm high x 20 mm wide x 20 mm thick x 40 mm projection*
Fixing method, fixing material, sizes, quantity and location	2 no. bolt through fixings 4 mm x 50 mm*
Details of intumescent protection	None*
13.1 Door Data Systems Tag	
Manufacturer	Door Data Systems*
Reference	DDS/nxp15693.NT Blk*
Material	ABS + Epoxy Resin*
Overall size	36 mm x 6 mm Ø, head 9 mm Ø, 7 mm taper to point at end*
Fixing method	Tapped into place with a soft head hammer*
Location	Approximately half way up on the hanging edge

Glazing – Doorset A (HALPYRO CF 534)

14. Double glazed unit / Glass	
Manufacturer / Supplier	Fireglass*
Reference (Declaration of Performance)	7mm Pyrobelite*
Unit overall size	1495 mm high x 195 mm wide x 7 mm thick*
Aperture location relative to the head and closing edge of the leaf	200 mm from the head of the leaf and 160 mm from the closing edge of the leaf*
Aperture size (prior to any lining)	1500 mm high x 200 mm wide*
Sight size	1360 mm high x 110 mm wide
Expansion allowance	5 mm Total*
Presence of Timber aperture lining	No*
15. Beading	
Manufacturer	Stoke Fire Doors*
Reference	FD30 Beech*
Material	Beech*
Density	540 kg/m^3*
Moisture content	8.2 %*
Overall size	25 mm x 25 mm*
Fixing method, fixing material and sizes	50 mm x 1.6 mm G18 pins. Gun fired.*
Fixing distances from corners, centres and angle relative to the face of the glass	50 mm from corners, 150 mm centres and at 60° to the face of the glass*
16. Glazing Lining / Intumescent liner / Wet mastic system	
Manufacturer	Pyrosist Ltd*
Reference	Pyrosist 3070 30 minute glazing gasket
Material	Graphite and PVC compound*
Overall size	22 mm x 2.5 mm*
Fixing method	Self adhesive tape*

Door frame – Doorset B (VICPYRO CF 218)

17. Door frame	
Manufacturer	Stoke Fire Doors*
Reference	Plain lining*
Material	Softwood Head and Jambs*
Density	450 kg/m^3*
Moisture content	8.2%
Overall size	2080 mm high x 995 mm wide
i. Frame (Head)	70 mm wide x 30 mm thick
ii. Frame (Jambs)	70 mm wide x 30 mm thick
iii. Stop	24 mm wide x 12 mm deep
Jamb to Head jointing method, fixing detail and location	Housed joint with PVAc glue and 2 no. 5 mm Ø x 80 mm screws per jamb*
Stop to Frame jointing method, fixing detail and location	Pins 1.8 mm x 30 mm. 100 mm in from edges and 500 mm centres*
Presence of Adhesives	No*
18. Frame Fixing Method to Supporting Construction	
Manufacturer	Gold Screw
Reference	CD0014
Type & material	Carbon steel wood screw
Overall size	5 mm Ø x 100 mm long
Spacing	150 mm, 750 mm, 1300 mm and 1900 mm from bottom corner of jambs
Does the fixing penetrate intumescent seal within frame reveal	No
Packing Material	Blue 60 packers*
Packing Material Dimension	100 mm x 25 mm in 1, 3, 5 mm thicknesses*
Packing Material Location	At fixing locations
19. Intumescent to frame reveal	
Quantity	1 no. strip
Manufacturer	Pyrosist Ltd*
Reference	Pyrosist 9010 10 x 4 Fire & Smoke
Material	Graphite*
Overall section size	10 mm wide x 4 mm thick
Application method	Self-adhesive tape*
Location (relative to the opening face of the door leaf)	17 mm in from opening face to start of seal.
Presence of Adhesives	No*

Fire stopping – Doorset B (VICPYRO CF 218)

20. Fire stopping	
Note	See Appendices E, F & G for source material
Manufacturer	
Product 1	Exitex
Product 2	Blue 60
Reference	
Product 1	ExiFire Fire Rated Intumescent Acoustic Acrylic Sealant
Product 2	Blue 60 fire rated foam
Material	
Product 1	Acrylic
Product 2	Polyurethane
Application method	
Product 1	Mastic gun
Product 2	Expanding foam cannister
Application detail A	
Location	At fire stopping gap, from base of hanging jamb to a height of 890 mm*
Fire stopping product	'Product 1'
Application detail B	
Location	At fire stopping gap, abutted to 'Application detail A' from a height of 890 mm to the top of the supporting construction aperture*
Fire stopping product	'Product 2'
Application detail C	
Location	At the fire stopping gap, across the head of the doorset
Fire stopping products	'Product 1' and 'Product 2'
Detail	Nominal 10 mm mastic ('Product 1') cap on the unexposed side and foam ('Product 2') filled from the exposed side*
Application detail D	
Location	At the fire stopping gap, along the height of the closing jamb
Fire stopping product	'Product 1' and 'Product 2'
Detail	Foam ('Product 2') filled from the unexposed face, nominal 10 mm mastic ('Product 1') cap on exposed face

Door leaf – Doorset B (VICPYRO CF 218)

21. Door Leaf	
Manufacturer (blank)	Vicaima*
Reference	CF218*
Quantity of leaves on doorset	1
Glazing location relative to the head and closing edge	200 mm from the head of the leaf and 155 mm from the closing edge of the leaf
Overall leaf size prior to trimming	935 mm wide x 2040 mm high x 44 mm thick*
Overall leaf size supplied for testing	935 mm wide x 2040 mm high x 44 mm thick
Location trimming was performed and by how much	N/A*
22. Stiles	
Manufacturer	Vicaima*
Reference	Stiles*
Material	Softwood*
Density	450 kg/m^3*
Moisture content	10 %*
Overall size	30 mm thick x 38 mm wide
Adhesives	
i. Manufacturer	Wurth Ltd*
ii. Type	PVA*
iii. Reference	Wurth D3*
iv. Curing method	Heat*
v. Application method	Machine roller*
Presence of Mechanical Fixings	No*

23. Rails	
Manufacturer	Vicaima*
Reference	Rails*
Material	
i. Top outer	Softwood*
ii. Top inner	Softwood*
iii. Bottom outer	Softwood*
iv. Bottom inner	Softwood*
Density	
i. Top outer	450 kg/m^3*
ii. Top inner	450 kg/m^3*
iii. Bottom outer	450 kg/m^3*
iv. Bottom inner	450 kg/m^3*
Moisture content	
i. Top outer	10 %*
ii. Top inner	10 %*
iii. Bottom outer	10 %*
iv. Bottom inner	10 %*
Overall size	
i. Top outer	35 mm thick x 38mm wide*
ii. Top inner	35 mm thick x 38mm wide*
iii. Bottom outer	35 mm thick x 38mm wide*
iv. Bottom inner	35 mm thick x 38mm wide*
Adhesives	
i. Manufacturer	Wurth Ltd*
ii. Type	PVA*
iii. Reference	Wurth D3*
iv. Curing method	Heat*
v. Application method	Machine roller*
Presence of Mechanical Fixings	No*

24. Core	
Manufacturer	Vicaima*
Reference	CF218*
Material	Chipboard*
Location	Central to leaf thickness
Density	590 - 600 kg/m^3*
Overall thickness and reduced thickness if door leaf incorporates fielded areas	38 mm
25. Lippings	
Manufacturer	Vicaima*
Reference	Lipping*
Material	Oak*
Density	640 kg/m^3*
Moisture content	9.2 %
Overall size	44 mm wide x 6 mm thick*
Fixing method	Machine applied*
Location	Vertical edges
Adhesives	
i. Manufacturer	Technomelt*
ii. Type	PU Hot melt*
iii. Reference	PUR270/7*
iv. Curing method	Air*
v. Application method	Nordson Glue Pot*
Presence of Mechanical Fixings	No*

26. Facings	
Manufacturer	*No details provided by test sponsor*
Reference	*No details provided by test sponsor*
Material	American White Oak*
Density	640 kg/m3*
Moisture content	12.3 %
Thickness	3 mm
Fixing method	PVA D3*
Location	Opening and closing faces of leaf
Adhesives	
i. Manufacturer	EasybondPVA D3*
ii. Type	PVA D3*
iii. Reference	Easy-Bond D3 Cross-Linking PVA Veneer Glue*
iv. Curing method	Hot press*
v. Application method	Roller applied*
Presence of Mechanical Fixings	No*

Hardware – Doorset B (VICPYRO CF 218)

27. Hinges	
Supplier	Euro Spec
Reference	Eurospec 13 Ball Bearing Hinge*
Quantity	3 no.
Primary material	Steel*
Type	Bearing guided*
Size	
i. knuckle	14 mm Ø x 102 mm high
ii. blades	102 mm high x 35 mm wide x 3 mm thick
Fixings	
i. type	Wood screw*
ii. material	Steel*
iii. sizes	5 mm Ø x 30 mm long*
iv. number off per blade	4 no.
Position of each hinge relative to the head of the leaf	150 mm, 945 mm, 1738 mm
Details of intumescent protection	N/A
Interruptions to Intumescent within the frame reveal	Fully interrupted
28. Door Closer	
Manufacturer	Hoppe*
Reference	ARRONE AR1500-SSS/SSS*
Material	
i. Body	Steel
ii. Closer arm	Steel
iii. Cover	Steel
Configuration	“Figure 1”
Overall size	
i. Body	65 mm high x 248 mm wide x 53 mm deep*
ii. Cover	67 mm high x 255 mm wide x 57 mm deep
Fixing method	Wood screw

29. Drop Down Seal	
Manufacturer	Exitex*
Reference	Concealex A8100 pt no: 1.50.0001*
Material	
i. Body	Aluminium*
ii. Seal	Co-extruded tubular seal in self-extinguishing TPE
Overall size	20 mm high x 926 mm wide x 12.5 mm thick
Fixing method, type and locations	Steel wood screws 3 mm x 25 mm located 200 mm in from drop seal ends*
Location within leaf	Centralised and bottom of leaf
Maximum operating drop	14 mm*
30. Latch	
Latching status	Latch engaged
Manufacturer	Euro Spec*
Reference	Tubular latch*
Material	
i. Lockcase	Steel*
ii. Forend plate	Steel*
iii. Latch bolt	Steel*
Overall sizes	
i. Central Lockcase	66 mm high x 21 mm wide x 21 mm deep*
ii. Forend plate	58 mm high x 40 mm wide x 2 mm thick*
iii. Latch bolt	15 mm high x 15 mm wide x 20 mm projection*
Fixing method	2 no. screws
Operation of latch bolt	Lever handle
Details of intumescent protection	
i. Central lockcase	None*
ii. Forend plate	None*
Interruptions to Intumescent within the frame reveal	N/A
Location of centre of the spindle relative to the bottom of the leaf	Centre of the spindle measures 1000 mm from the bottom of the leaf

31. Keep	
Manufacturer	Eurospec*
Reference	Tubular latch keep*
Material	Steel*
Overall sizes	57 mm high x 25 mm wide x 1.2 mm thick*
Fixing method	2 no. 20 mm x 2.5 mm Ø x 3.5 mm Ø screws
Details of intumescent protection	No protection*
Interruptions to Intumescent within the frame reveal	Fully interrupted
32. Lever handles	
Manufacturer	Darcel*
Reference	DCYVE-SN-DEV*
Material	Steel*
Overall size	50 mm high x 20 mm wide x 20 mm thick x 40 mm projection*
Fixing method, fixing material, sizes, quantity and location	2 no. bolt through fixings 4 mm x 50 mm*
Details of intumescent protection	No protection*
32.1 Door Data Systems Tag	
Manufacturer	Door Data Systems*
Reference	DDS/nxp15693.NT Blk*
Material	ABS + Epoxy Resin*
Overall size	36 mm x 6 mm Ø, head 9 mm Ø, 7 mm taper to point at end*
Fixing method	Tapped into place with a soft head hammer*
Location	Approximately half way up on the hanging edge

Glazing – Doorset B (VICPYRO CF 218)

33. Glass	
Manufacturer / Supplier	Fireglass*
Reference (Declaration of Performance)	7 mm Pyrobelite*
Unit overall size	1495 mm high x 195 mm wide x 7 mm thick*
Aperture location relative to the head and closing edge of the leaf	200 mm from the head of the leaf and 160 mm from the closing edge of the leaf*
Aperture size (prior to any lining)	1500 x 200 mm*
Sight size	1360 x 110 mm*
Expansion allowance	5 mm total*
Presence of Timber aperture lining	No*
34. Beading	
Manufacturer	Stoke Fire Doors*
Reference	FD30 Beech*
Material	Beech*
Density	540 kg/m^3*
Moisture content	8.2 %*
Overall size	25 mm x 25 mm*
Fixing method, fixing material and sizes	50 mm x 1.6 mm G18 pins, gun fired*
Fixing distances from corners, centres and angle relative to the face of the glass	50 mm from corners, 150 mm centres and at 60° to the face of the glass*
35. Glazing Lining / Intumescent liner / Wet mastic system	
Manufacturer	Pyrosist Ltd*
Reference	Pyrosist 30 minute glazing gasket
Material	Graphite and PVC compound*
Overall size	22 mm x 2.5 mm*
Fixing method	Self adhesive tape*

2.3 Supporting construction

Table 6 details the supporting construction used for this fire resistance test.

Table 6 Supporting construction

Item	Detail		
Supporting construction	A plasterboard clad timber stud supporting construction.		
Nominal dimensions	Width	3000 mm	
	Height	3000 mm	
	Thickness	120 mm	
Aperture dimensions		**Width**	**Height**
	Doorset A	1010 mm	2094 mm
	Doorset B	1010 mm	2094 mm
Restraint conditions	Restrained on vertical edges		

3. Test procedure

Table 7 details the test procedure for this fire resistance test.

Table 7 Test procedure

Item	Detail	
Test standard	The test was performed in accordance with BS 476-20:1987 and BS 476-22:1987 Clause 7 determination of fire resistance of partially insulated doorsets and shutter assemblies.	
Fire Test Study Group (FTSG) resolutions	Certain aspects of some fire test specifications are open to different interpretations. FTSG have identified a number of these areas and have agreed on resolutions which define a common agreement of interpretations between fire test laboratories that are members of the group. If such resolutions apply to this test, they have been followed.	
Deviations from test method	During the test, a furnace temperature below limitations specified under Clause 3.1 of BS 476-20: 1987 was recorded for a short duration. As the temperature recorded at those intervals did not represent the conditions throughout the test, their effect on the test results can be disregarded.	
Instrumentation and equipment	The instrumentation was provided in accordance with BS 476-20:1987 and BS 476-22:1987 as follows: • The specimen temperature was measured by eight mineral insulated metal sheathed (MIMS) Type K thermocouples – with wire diameters not greater than 0.5 mm, an overall diameter of 1.5 mm, and the measuring junction insulated from the sheath. The thermocouples protruded a minimum of 25 mm from steel supporting tubes. • The unexposed side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads.	
Pre-test conditioning	The test specimen was subjected to normal laboratory temperatures and conditions between the completion of construction of the test specimen and the start of the test.	
Functionality test	Clearance gap measurements	These measurements were completed before the start of the fire test. They are shown in Figure , Table 20 and Table 21 in Appendix C.
	Opening and closing cycles	According to Clause A.2.2 of BS EN 16034, the door(s) were subjected to a series of 25 opening and closing cycles of at least 90° for side-hung doorset(s).
	Self-closing	According to Clauses A.2.3 and A.4 of BS EN 16034, the door(s) were subjected to 1 cycle which was completed.
	Final setting	According to Clause 10.1.4 of BS EN 1634-1: 2018, the door(s) were subjected to 1 cycle which was completed.
Pre-test measurements		**Doorset A**
	Opening moment	50.0 Nm
	Closing moment	24.2 Nm
	Closing speed	0.1 m/s
		Doorset B
	Opening moment	49.2 Nm
	Closing moment	23.5 Nm
	Closing speed	0.1 m/s

Item	Detail		
Installation details	Delivery date of the test specimen		26 January 2022
	Start date for construction of supporting construction		31/01/2022
	Completion date for construction of supporting construction		31/01/2022
	Start date for installation of test specimen		31/01/22
	Completion date for installation of test specimen		1 February 2022
	Supporting construction constructed by		Representatives of Warringtonfire
	Doorset installed by		Representatives of Warringtonfire
Symmetry	Asymmetrical: • Doorset A opened into the furnace. • Doorset B opened into the furnace. The direction of exposure was decided by the test sponsor.		
Ambient laboratory temperature	Start of the test		13.1 °C
	Minimum temperature		12.0 °C
	Maximum temperature		13.2 °C
Sampling / specimen selection	Appendix E includes the sampling reports. A representative of Warringtonfire sampled and selected the following components of the tested specimen:		
	Pyrosist 9010 10x4 fire and smoke seals	05/08/21	FM505683
	Pyrosist 3070 30 minute glazing gasket	05/08/21	FM505683
	Exi-Sound Concealex A8100 Exi-Sound Concealex A8100 Superior Concealex Facefix Applique	14/10/19	FM417540

4. Test measurements and results

Table 8 summarises the results achieved by the test specimen against the performance criteria listed in BS 476-20:1987 and BS 476-22:1987 Clause 7 determination of fire resistance of partially insulated doorsets and shutter assemblies for the following parameters:

- Integrity – It is required that there is no collapse of the specimen, no sustained flaming on the unexposed surface and no loss of impermeability.
- Insulation – The mean temperature rise of the unexposed surface must not be greater than 140°C and the maximum temperature rise must not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure.
- Radiation – A water-cooled foil heat flux meter was used to record the heat radiation from the doorset, the heat flux meter was positioned at a distance of 1000 mm from the doorset, so that the angle of view circumscribed the diagonal of the doorset.

Appendix A includes observations of any significant behaviour of the specimen and details of the occurrence of the relevant performance criteria.

Appendix B details the location of the instrumentation used during the test.

Appendix C includes details of the measurements taken during the test.

Appendix D includes photographs of the test specimen before and during the test.

Appendix E includes copies of the sampling reports for the products tested.

Appendix F includes product information used as source material.

Appendix G includes a copy of a client drawing of the fire stopping details.

Table 8 Detailed test results

Criteria	Doorset A	Doorset B
Insulation**	**No insulation failure**	**36 (thirty six) minutes***
ΔTm = 140°C	No insulation failure for this criteria at the termination of the test	36 (thirty six) minutes*
ΔTM = 180°C	No insulation failure for this criteria at the termination of the test	36 (thirty six) minutes*
ΔTM = 180°C on the frame	No insulation failure for this criteria at the termination of the test	36 (thirty six) minutes*
Integrity	**No integrity failure**	**36 (thirty six) minutes**
Spontaneous and sustained flaming	No integrity failure for this criteria at the termination of the test	No integrity failure for this criteria at the termination of the test
Failure with gap gauge	No integrity failure for this criteria at the termination of the test	No integrity failure for this criteria at the termination of the test
Cotton pad failure	No integrity failure for this criteria at the termination of the test	36 (thirty six) minutes
Radiation		
Radiation intensity	A maximum radiation intensity of 0.7 kW/m^2 was reached after 38 minutes	A maximum radiation intensity of 0.6 kW/m^2 was reached after 38 minutes
Notes:		
The test results for the specimen only apply to the tested orientation. The test was discontinued after 38 minutes. '*' indicates failure due to integrity failure. '**' in accordance with BS 476-22:1987 Clause 7 the glazing has not been assessed for insulation		

5. Application of test results

5.1 Validity

This document is the original version of this test report and is written in English. In case of doubt, the original version prevails over a translation. This document is issued subject to Warringtonfire's standard terms and conditions, which are available at: *Terms and Conditions | Element*.

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criteria for assessing the potential fire hazard of the product in use, nor can the results be extrapolated and applied to other products.

Reports are statements of fact(s) prepared in accordance with the referenced version of the standard(s) stated in Section 3 of this report. Reports are based upon the information provided to Warringtonfire. Warringtonfire takes no responsibility for the accuracy or completeness of such information.

The results stated in this report apply to the test specimens as received.

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 procedure outlined in BS 476-20: 1987 and BS 476-22: 1987.

Any significant deviation with respect to size, constructional 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.

Any differences in relation to the aforementioned characteristics may significantly affect the performance and will therefore invalidate the application of the test results to the variant product. It is recommended that any proposed variation to the tested configuration or product should be referred to the test sponsor. The test sponsor should then obtain appropriate documentary evidence of compliance from Warringtonfire or another accredited testing authority. The supplier of the product is responsible for ensuring that the product which is supplied for use is identical to the test specimens that were tested.

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5.2 Uncertainty of measurement

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.

Appendix A Test observations

Table 9 shows the observations of any significant behaviour of the specimen during the test.

Table 9 Test observations

Min	Sec	Observation
00	00	Commencement of test
01	15	Doorset A. There is an increase in smoke issuing at the top closing corner
03	00	Doorset A & B. There are cracks in the glass and the intumescent is reacting
03	50	Doorset A. There is an increase in smoke issuing across the head
04	00	Doorset A & B. There is an increase in smoke issuing at the latch position
04	10	Doorset A & B. There is an increase in smoke issuing at the hanging edge from the middle hinge position up
05	50	Doorset A & B. There is an increase in smoke issuing at the cracks in the glass
07	00	Doorset B. There is an increase in smoke issuing at the top closing corner
08	20	Doorset A & B. There is an increase in smoke issuing at the hanging edge
09	00	Doorset A. There is discolouration at the top hanging corner and at the top closing corner
10	20	Doorset B. There is an increase in smoke issuing and discolouration at the latch position, at the middle hinge position, and above the glazing
11	00	Doorset A. There is discolouration at the latch position, at the middle hinge position, above the glazing, and at the top hinge position
13	00	Doorset B. There is moisture at the top closing corner, at the latch position, and at the top hanging corner
15	00	Doorset A & B. There is an increase in smoke issuing around the glazing
16	00	Doorset B. There is an increase in smoke issuing and discolouration at the hanging edge from the middle hinge position up
17	30	Doorset B. There is an increase in smoke issuing and discolouration at the top hinge position
19	00	Doorset A. There is an increase in smoke issuing and discolouration at the top hinge position
21	00	Doorset A & B. There is an increase in smoke issuing at the latch position
21	50	Doorset B. There is discolouration at the top hanging corner and at the top closing corner
27	40	Doorset B. There is a glow visible at the top hinge position
29	02	Doorset B. A cotton pad test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure
29	56	Doorset B. A cotton pad test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure
30	02	Doorset A. There is a glow visible at the top hinge position
30	20	Doorset B. There is intermittent flaming at the latch position
31	42	Doorset B. A cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No failure
32	30	Doorset A. A cotton pad test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure
33	07	Doorset B. A cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No failure
33	47	Doorset B. A cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No failure
34	15	Doorset A. There is an increase in smoke issuing at the threshold
35	05	Doorset B. A cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No failure
35	51	Doorset B. A cotton pad test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure
36	**42**	**Doorset B. A cotton pad test was performed at the top hinge position which resulted in the ignition of the cotton pad therefore constituting integrity failure**
37	44	Doorset A. A cotton pad test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure
38	00	End of test

Appendix B Instrumentation locations

Figure 7 shows the instrumentation locations for this fire resistance test.

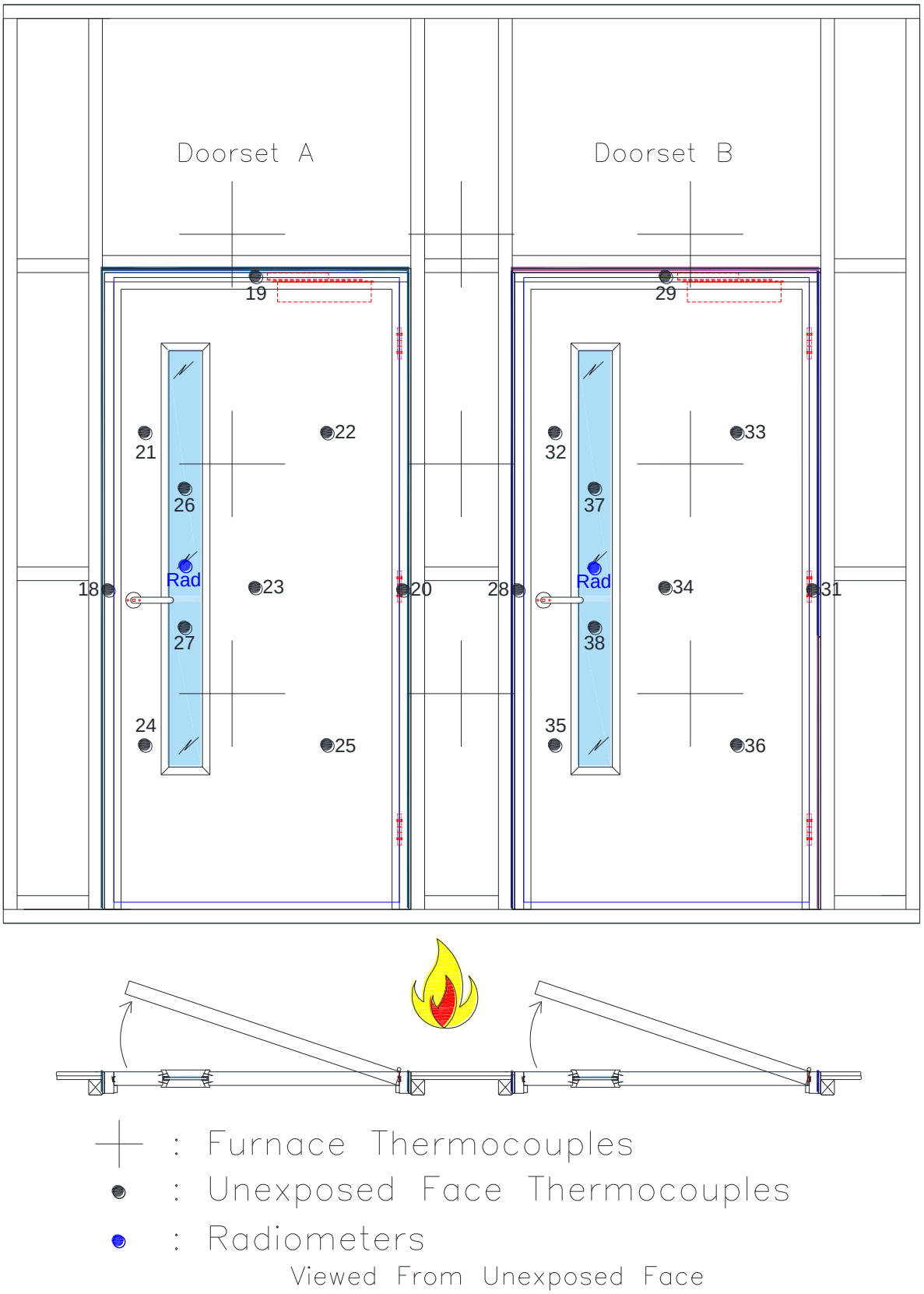

Figure 7 Instrumentation locations

Appendix C Test data

C.1 Furnace temperature and deviation

During the test a furnace temperature in excess of limitations specified under Clause 3.1 of BS 476-20: 1987 was recorded. As this represents more severe conditions than specified, the results achieved may still be accepted as valid – as outlined in Clause 12 and A.2.7 of BS 476-20: 1987.

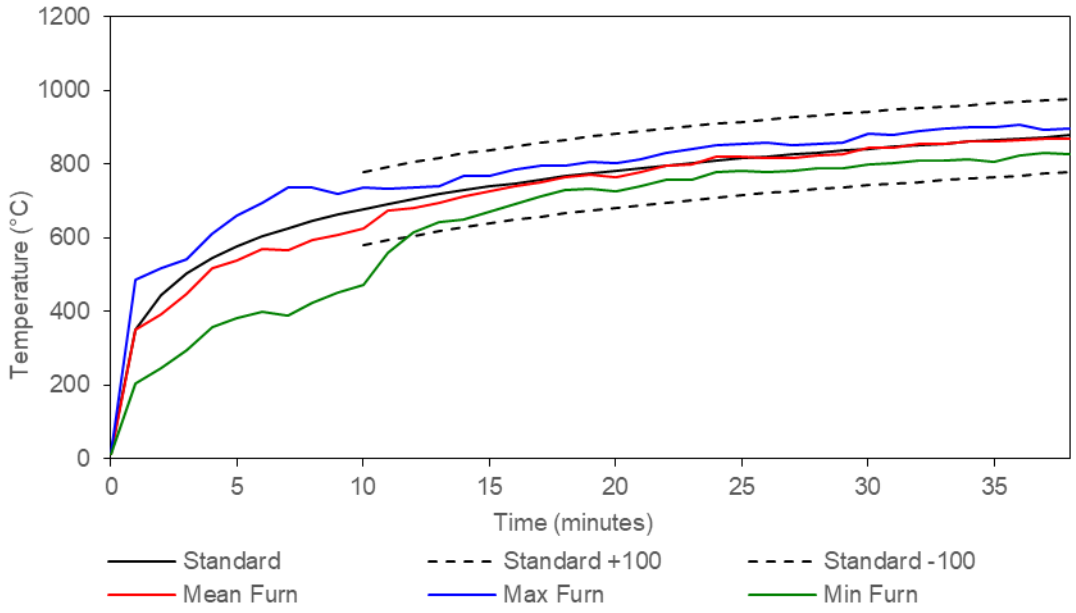

Figure 8 Furnace thermocouple temperature vs time

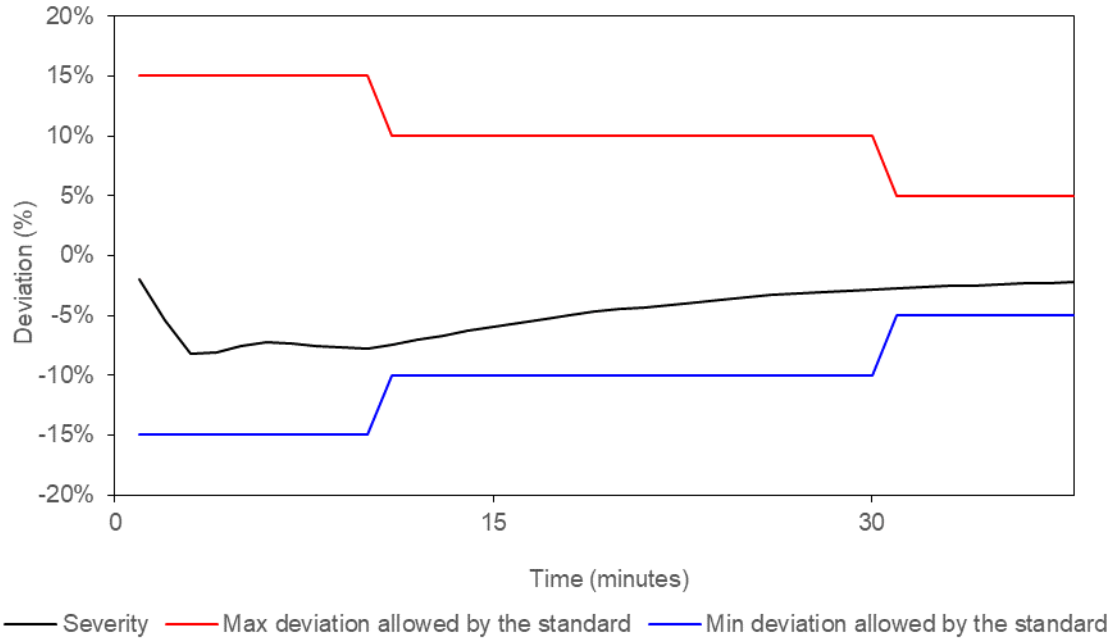

Figure 9 Percentage deviation of exposure severity vs time

C.2 Furnace pressure

The furnace pressure was taken at approximately 500 mm above the sill of the test specimen.

After the first 5 minutes of the test, the furnace pressure was maintained at -4.2 Pa ± 2 Pa with respect to atmosphere, equating to a pressure of 0Pa at 1m above furnace floor level.

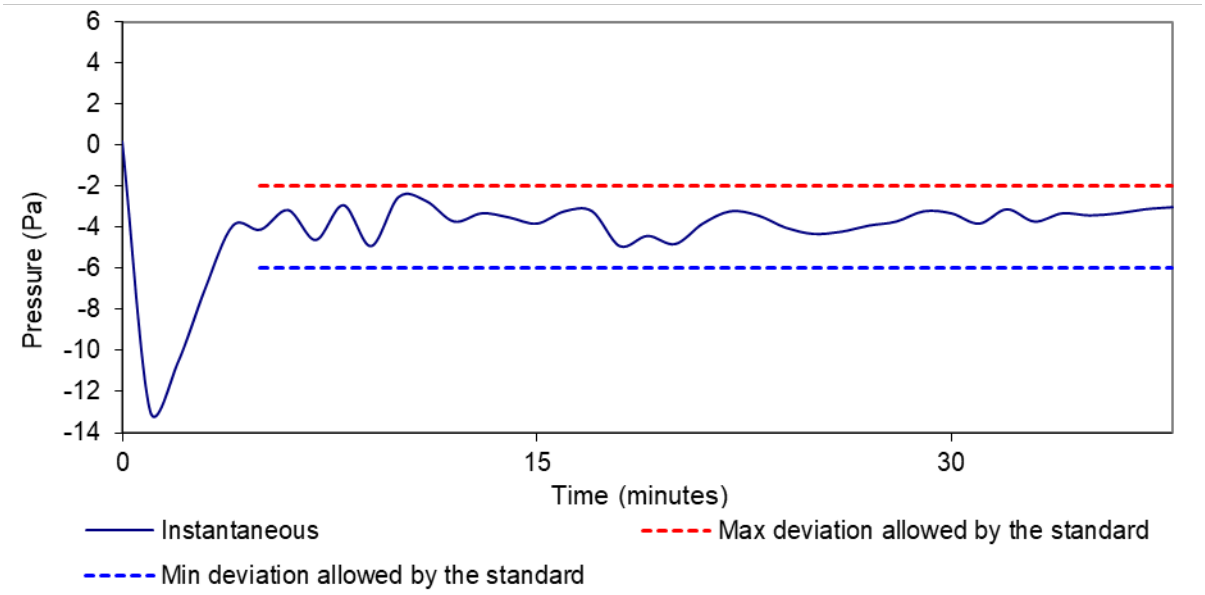

Figure 10 Furnace pressure

C.3 Specimen temperatures

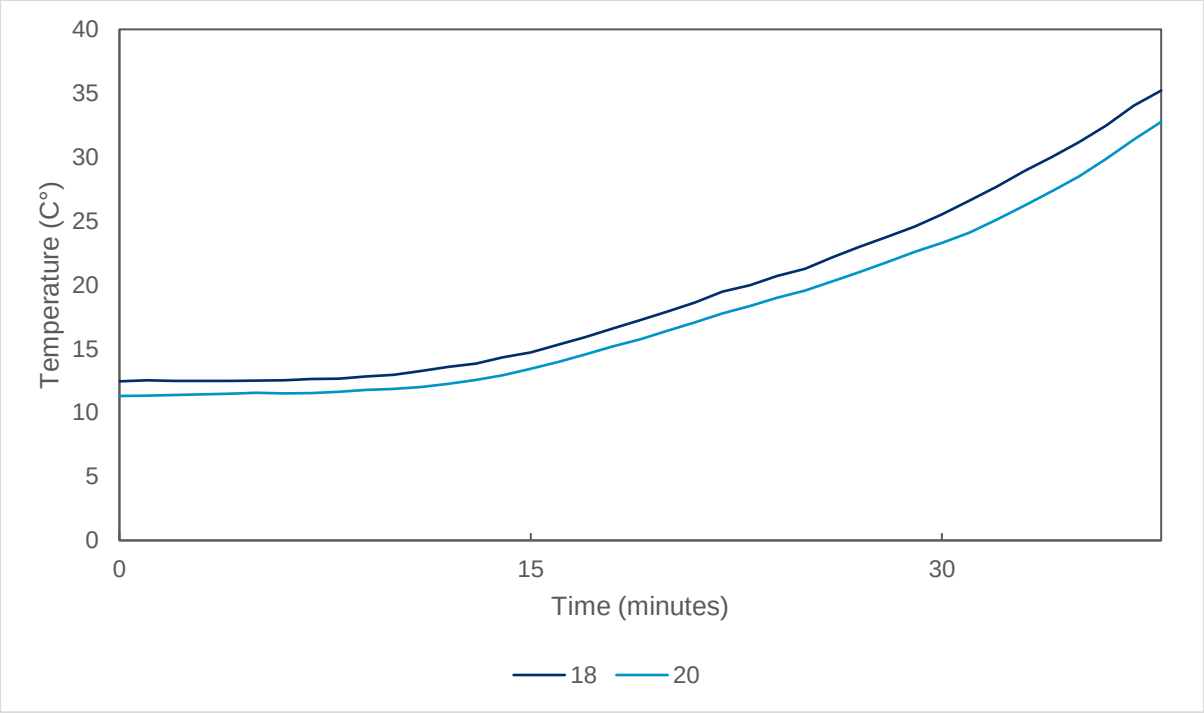

Figure 11 Doorset A - Temperature of the frame

Table 10 Doorset A - Temperature of the frame

Time (mins)	T/C 18 (°C)	T/C 20 (°C)
0	12.5	11.3
1	12.5	11.3
2	12.5	11.4
3	12.5	11.4
4	12.5	11.5
5	12.5	11.5
6	12.5	11.5
7	12.6	11.5
8	12.7	11.6
9	12.8	11.8
10	13.0	11.9
11	13.3	12.0
12	13.6	12.2
13	13.8	12.6
14	14.3	12.9
15	14.7	13.4
16	15.3	14.0
17	15.9	14.6
18	16.6	15.2
19	17.3	15.7

Time (mins)	T/C 18 (°C)	T/C 20 (°C)
20	17.9	16.4
21	18.6	17.1
22	19.5	17.8
23	20.0	18.3
24	20.7	19.0
25	21.3	19.6
26	22.1	20.3
27	23.0	21.0
28	23.8	21.8
29	24.6	22.6
30	25.5	23.3
31	26.6	24.1
32	27.7	25.1
33	28.9	26.2
34	30.0	27.3
35	31.2	28.5
36	32.5	29.9
37	34.0	31.4
38	35.2	32.8

Note: Thermocouple 19 has been removed from the data due to a malfunction

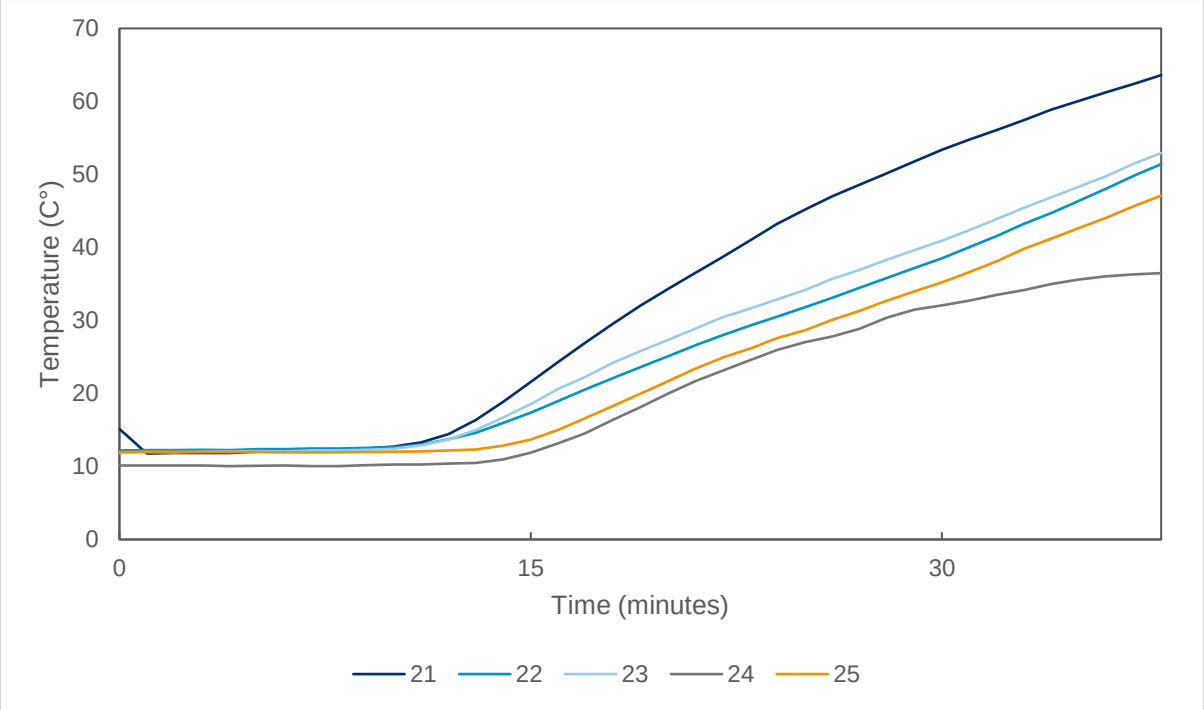

Figure 12 Doorset A - Average temperature of the leaf

Table 11 Doorset A - Average temperature of the leaf

Time (min)	T/C 21 (°C)	T/C 22 (°C)	T/C 23 (°C)	T/C 24 (°C)	T/C 25 (°C)
0	15.1	12.2	11.8	10.1	12.0
1	11.8	12.2	12.0	10.1	12.0
2	11.8	12.2	11.9	10.1	12.0
3	11.8	12.3	12.0	10.1	12.0
4	11.8	12.2	12.1	10.1	12.0
5	12.0	12.4	12.1	10.1	12.0
6	12.1	12.4	12.1	10.1	11.9
7	12.1	12.5	12.2	10.0	11.9
8	12.3	12.5	12.2	10.0	11.9
9	12.5	12.6	12.3	10.2	12.0
10	12.7	12.6	12.4	10.2	12.0
11	13.3	13.0	12.9	10.3	12.1
12	14.5	13.7	13.7	10.4	12.2
13	16.4	14.6	15.0	10.5	12.3
14	18.9	16.0	16.7	11.0	12.8
15	21.6	17.3	18.6	11.9	13.7
16	24.3	19.0	20.6	13.2	15.0
17	27.0	20.6	22.3	14.6	16.6
18	29.5	22.1	24.2	16.4	18.3
19	32.0	23.6	25.8	18.1	19.9

Time (min)	T/C 21 (°C)	T/C 22 (°C)	T/C 23 (°C)	T/C 24 (°C)	T/C 25 (°C)
20	34.3	25.1	27.3	20.0	21.7
21	36.5	26.6	28.9	21.7	23.4
22	38.7	28.0	30.4	23.1	24.9
23	41.0	29.3	31.6	24.6	26.1
24	43.2	30.5	32.9	26.0	27.6
25	45.2	31.8	34.1	27.0	28.6
26	47.0	33.1	35.7	27.8	30.1
27	48.6	34.5	36.9	28.8	31.3
28	50.2	35.8	38.3	30.4	32.7
29	51.8	37.2	39.7	31.5	34.0
30	53.3	38.5	40.9	32.0	35.2
31	54.8	40.1	42.4	32.7	36.6
32	56.1	41.6	43.9	33.5	38.1
33	57.4	43.2	45.4	34.2	39.8
34	58.9	44.8	46.9	35.0	41.2
35	60.1	46.4	48.3	35.6	42.7
36	61.3	48.0	49.8	36.0	44.1
37	62.4	49.8	51.5	36.3	45.6
38	63.6	51.4	52.9	36.5	47.1

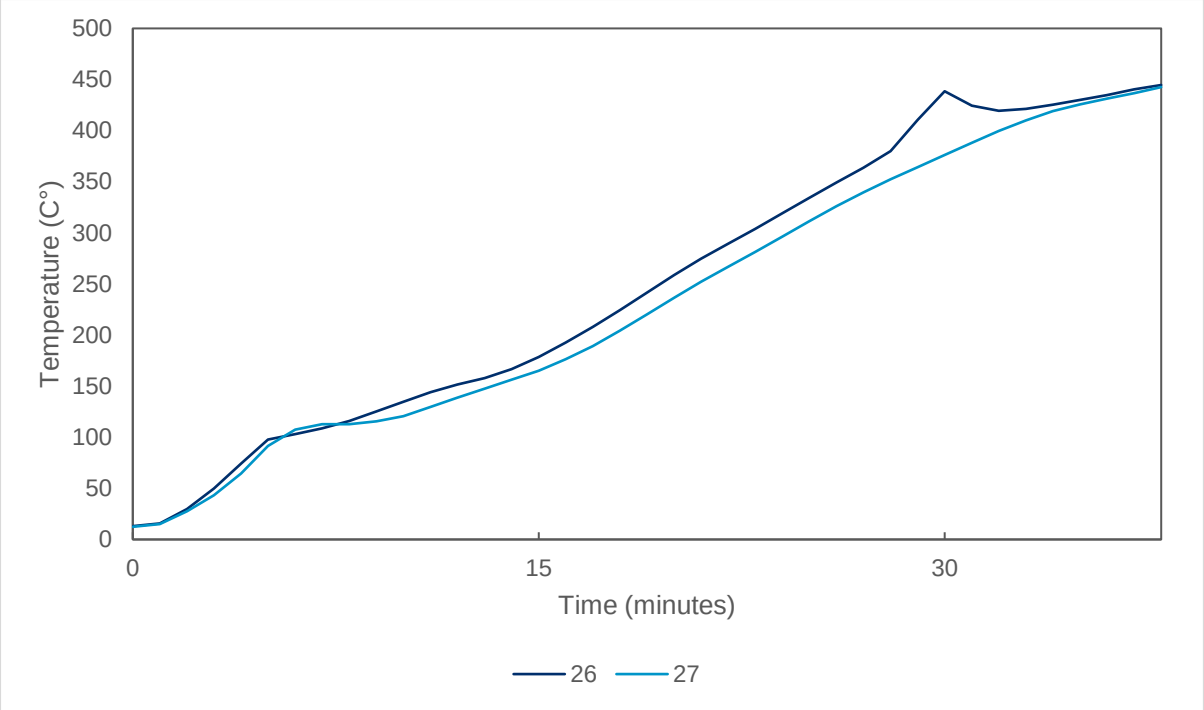

Figure 13 Doorset A - Temperature of the glazing

Table 12 Doorset A - Temperature of the glazing

Time (mins)	T/C 26 (°C)	T/C 27 (°C)
0	13.0	12.4
1	15.6	15.2
2	29.7	27.6
3	49.7	43.2
4	74.3	64.6
5	97.7	91.6
6	103.0	107.4
7	108.6	112.7
8	115.9	112.8
9	125.3	115.7
10	134.7	120.6
11	144.0	129.7
12	151.5	138.7
13	158.0	147.5
14	166.7	156.2
15	178.5	165.0
16	192.6	176.4
17	208.0	189.3
18	224.3	204.3
19	241.6	220.2

Time (mins)	T/C 26 (°C)	T/C 27 (°C)
20	258.8	236.4
21	274.7	252.2
22	289.5	266.8
23	303.7	281.4
24	319.2	296.4
25	334.1	311.3
26	349.2	326.1
27	363.5	339.7
28	380.1	352.5
29	410.6	364.2
30	438.6	376.2
31	424.5	388.0
32	419.3	399.5
33	421.3	410.0
34	425.5	419.0
35	430.0	425.5
36	434.7	431.2
37	440.4	436.5
38	444.6	442.6

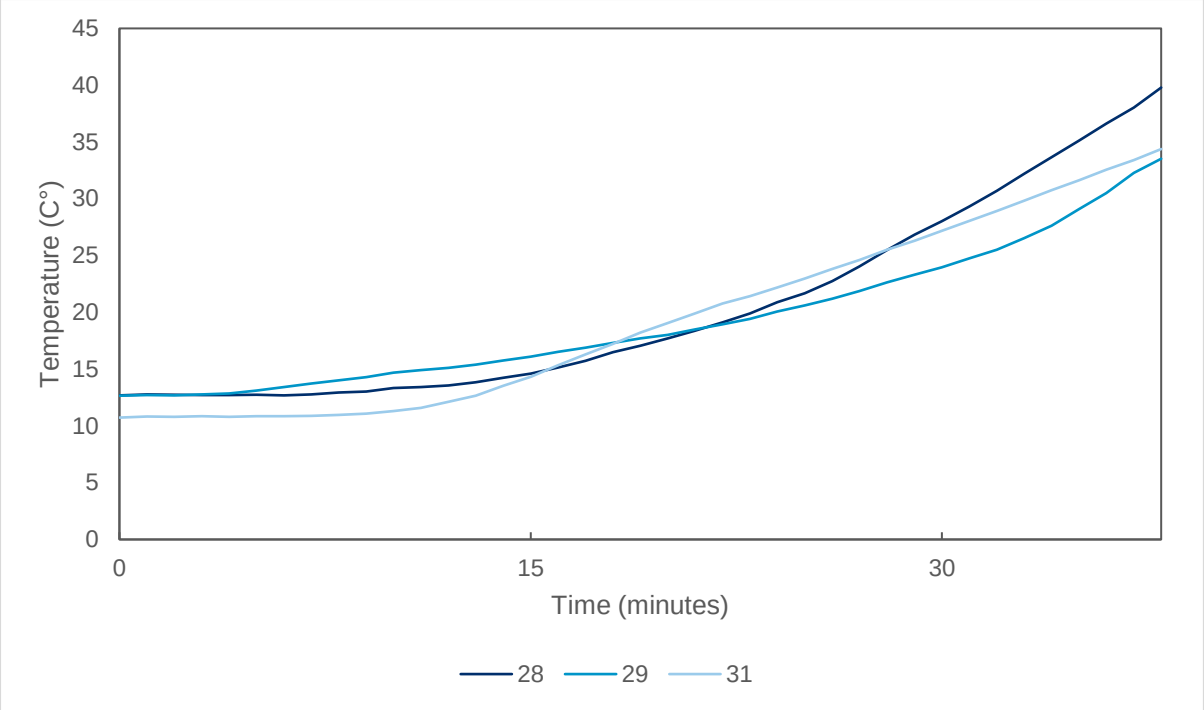

Figure 14 Doorset B - Temperature of the frame

Table 13 Doorset B - Temperature of the frame

Time (min)	T/C 28 (°C)	T/C 29 (°C)	T/C 31 (°C)
0	12.7	12.7	10.7
1	12.8	12.7	10.8
2	12.7	12.7	10.8
3	12.7	12.8	10.9
4	12.7	12.9	10.8
5	12.7	13.1	10.9
6	12.7	13.4	10.8
7	12.8	13.7	10.9
8	12.9	14.0	11.0
9	13.0	14.3	11.1
10	13.3	14.7	11.3
11	13.4	14.9	11.6
12	13.6	15.1	12.1
13	13.8	15.4	12.7
14	14.2	15.8	13.5
15	14.6	16.1	14.3
16	15.1	16.5	15.3
17	15.7	16.9	16.3
18	16.5	17.3	17.2
19	17.1	17.7	18.2

Time (min)	T/C 28 (°C)	T/C 29 (°C)	T/C 31 (°C)
20	17.7	18.0	19.1
21	18.4	18.5	19.9
22	19.1	19.0	20.8
23	19.9	19.4	21.4
24	20.9	20.1	22.2
25	21.7	20.6	23.0
26	22.7	21.2	23.8
27	24.0	21.9	24.6
28	25.5	22.6	25.5
29	26.8	23.3	26.3
30	28.0	24.0	27.2
31	29.3	24.7	28.0
32	30.7	25.5	28.9
33	32.2	26.5	29.8
34	33.6	27.6	30.8
35	35.1	29.1	31.6
36	36.6	30.5	32.6
37	38.0	32.3	33.4
38	39.8	33.5	34.4

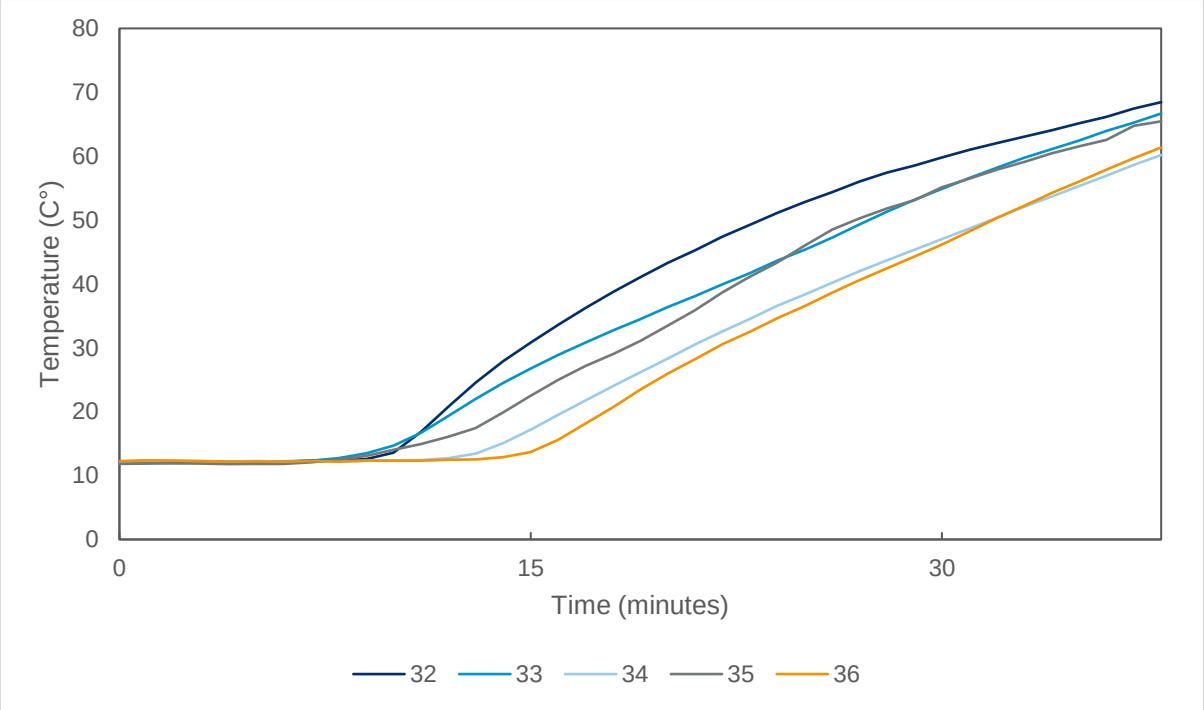

Figure 2 **Doorset B - Average temperature of the leaf**

Table 14 **Doorset B - Average temperature of the leaf**

Time (min)	T/C 32 (°C)	T/C 33 (°C)	T/C 34 (°C)	T/C 35 (°C)	T/C 36 (°C)
0	11.9	12.2	12.2	11.8	12.3
1	12.0	12.3	12.3	11.9	12.4
2	12.0	12.3	12.2	11.9	12.3
3	12.0	12.2	12.2	11.9	12.3
4	12.0	12.2	12.2	11.8	12.2
5	12.1	12.2	12.3	11.8	12.2
6	12.2	12.2	12.2	11.8	12.2
7	12.3	12.3	12.2	12.1	12.3
8	12.4	12.7	12.2	12.5	12.2
9	12.6	13.5	12.3	13.1	12.3
10	13.6	14.7	12.4	14.1	12.3
11	16.8	16.7	12.4	14.9	12.4
12	20.8	19.3	12.7	16.1	12.5
13	24.6	22.0	13.4	17.5	12.5
14	27.9	24.5	15.1	19.9	12.9
15	30.8	26.8	17.2	22.5	13.7
16	33.6	28.9	19.5	25.0	15.6
17	36.2	30.8	21.7	27.2	18.1
18	38.7	32.7	24.0	29.0	20.7
19	41.0	34.5	26.2	31.1	23.5

Time (min)	T/C 32 (°C)	T/C 33 (°C)	T/C 34 (°C)	T/C 35 (°C)	T/C 36 (°C)
20	43.3	36.4	28.3	33.5	26.0
21	45.3	38.1	30.5	35.9	28.2
22	47.4	40.0	32.6	38.7	30.6
23	49.3	41.7	34.5	41.2	32.5
24	51.1	43.6	36.6	43.4	34.6
25	52.8	45.4	38.3	46.0	36.6
26	54.4	47.3	40.2	48.5	38.6
27	56.0	49.3	42.0	50.3	40.6
28	57.4	51.3	43.7	51.8	42.4
29	58.5	53.2	45.4	53.1	44.3
30	59.8	54.9	47.0	55.1	46.1
31	61.0	56.6	48.6	56.5	48.2
32	62.1	58.2	50.4	57.9	50.3
33	63.1	59.7	52.1	59.1	52.2
34	64.1	61.1	53.7	60.5	54.2
35	65.2	62.5	55.3	61.5	56.0
36	66.2	63.9	56.9	62.5	57.9
37	67.5	65.3	58.6	64.8	59.7
38	68.5	66.7	60.2	65.5	61.4

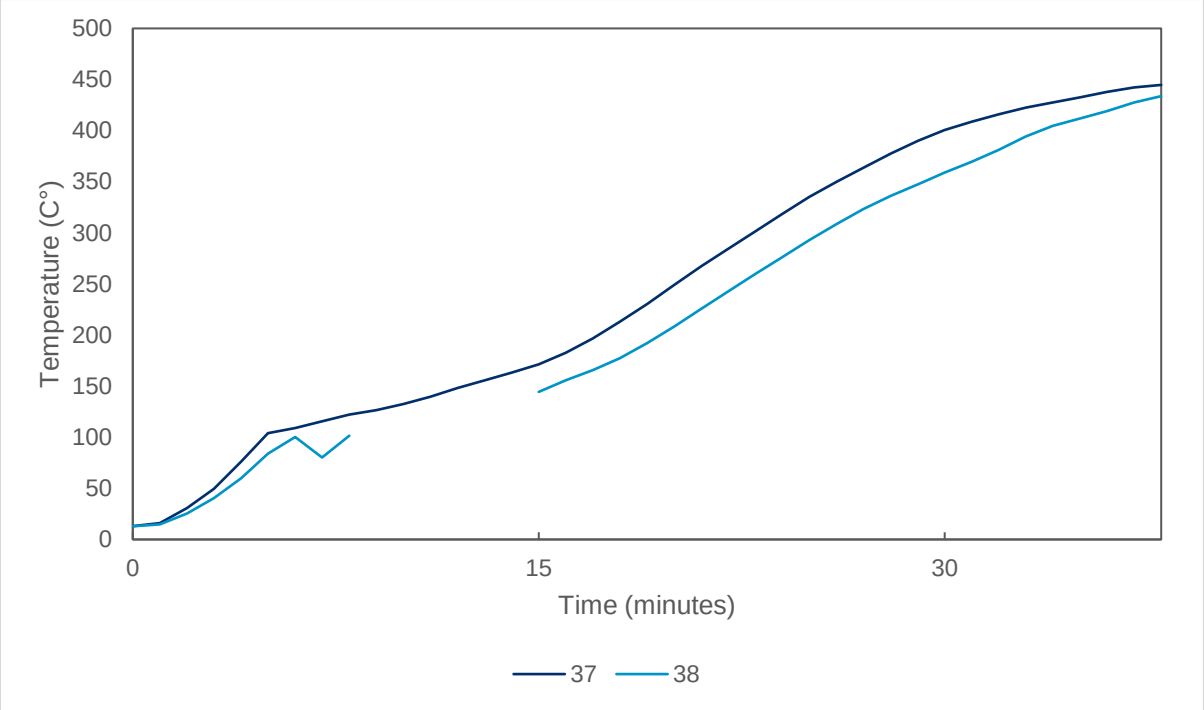

Figure 3 Doorset B - Temperature of the glazing

Table 15 Doorset B - Temperature of the glazing

Time (mins)	T/C 37 (°C)	T/C 38 (°C)
0	13.0	12.9
1	16.1	14.6
2	30.6	25.3
3	49.6	40.5
4	76.2	59.9
5	103.9	84.0
6	109.1	100.2
7	115.6	80.2
8	122.3	101.5
9	126.6	-
10	132.6	-
11	139.8	-
12	148.1	-
13	155.7	-
14	163.3	-
15	171.4	144.5
16	182.7	155.8
17	196.7	165.6
18	212.9	177.2
19	230.2	192.0

Time (mins)	T/C 37 (°C)	T/C 38 (°C)
20	248.9	208.3
21	267.1	225.5
22	284.4	242.6
23	301.4	259.7
24	318.6	276.4
25	335.0	293.0
26	349.9	308.6
27	363.7	323.3
28	377.4	336.1
29	390.0	347.5
30	400.5	359.1
31	408.8	369.5
32	415.9	381.1
33	422.4	394.2
34	427.7	404.8
35	432.5	411.7
36	437.7	419.2
37	442.2	427.4
38	444.7	433.7

Thermocouple number 38 malfunctioned after 8 minutes until minute 15, as such the affected data has been omitted from the results.

C.4 Specimen deflections

Table 16 and

Table 17 detail the deflection measurements of the test specimen at locations given in Figure 17.

Negative measurements show movement of the test specimen away from the furnace. Positive measurements show movement of the test specimen towards the furnace. J, K and L give vertical movement of the door, a negative reading indicates that the door has dropped.

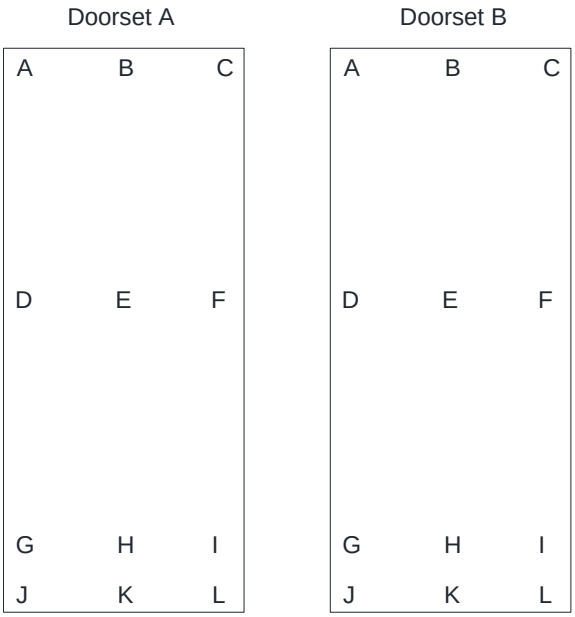

Figure 4 Position of deflection measurements

Table 16 Deflections – Doorset A

	Deflections (mm)											
Time (mins)	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
5	1	1	1	-1	-1	2	0	1	0	-1	-1	0
10	1	1	2	-1	-2	1	0	0	0	-1	-1	0
15	3	1	3	-1	-3	1	0	-1	-1	-2	-2	0
20	7	2	6	-1	-5	2	1	-1	0	-3	-3	-1
25	10	2	8	0	-8	2	1	-1	1	-3	-4	-3
35	14	1	10	1	-16	2	0	-5	4	-3	-4	-3
Max	14	2	10	-1	-16	2	1	-5	4	-3	-4	-3

Table 17 Deflections – Doorset B

	Deflections (mm)											
Time (mins)	A	B	C	D	E	F	G	H	I	J	K	L
5	-2	-1	0	0	0	1	0	-1	-2	0	1	0
10	-1	1	1	1	2	2	0	-1	-1	0	1	0
15	0	1	3	1	3	3	1	0	0	0	1	-1
20	2	2	5	3	5	4	2	1	1	0	0	-1
25	5	6	7	6	9	6	4	3	1	-1	0	-2
35	1	5	8	6	4	6	3	0	1	-1	0	-2
Max	5	6	8	6	9	6	4	3	-2	-1	1	-2

C.5 Heat flux measurements

The heat flux was measured 1000 mm away from the specimen and is based on the maximum levels.

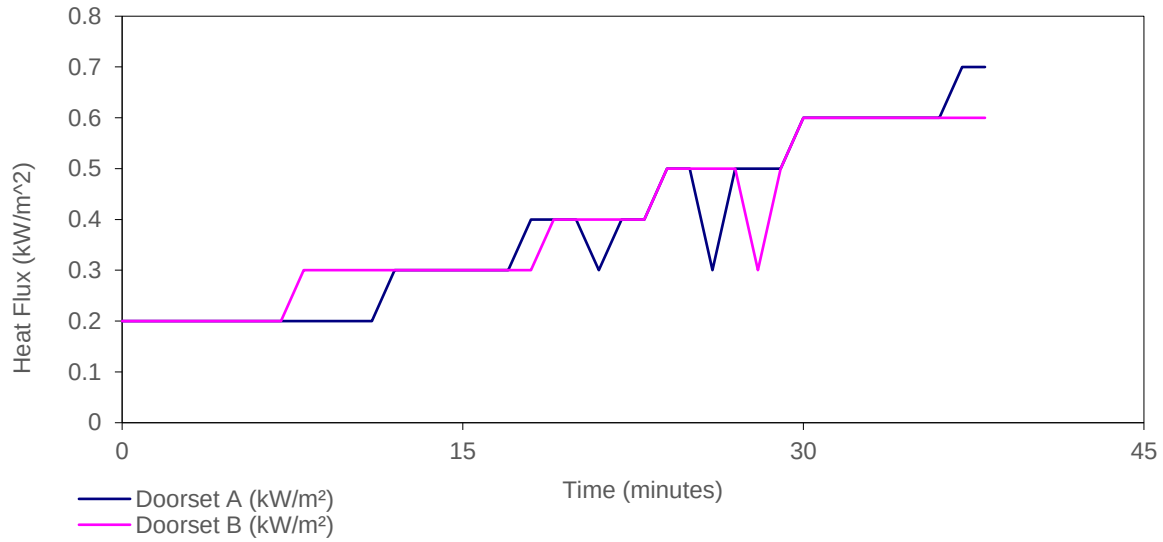

Figure 5 Heat flux measurements of the test specimen vs time

Table 18 Heat flux measurements of the test specimen vs time

Time (min)	Doorset A (kW/m²)	Doorset B (kW/m²)	Time (min)	Doorset A (kW/m²)	Doorset B (kW/m²)	Time (min)	Doorset A (kW/m²)	Doorset B (kW/m²)
0	0.2	0.2	13	0.3	0.3	26	0.3	0.5
1	0.2	0.2	14	0.3	0.3	27	0.5	0.5
2	0.2	0.2	15	0.3	0.3	28	0.5	0.3
3	0.2	0.2	16	0.3	0.3	29	0.5	0.5
4	0.2	0.2	17	0.3	0.3	30	0.6	0.6
5	0.2	0.2	18	0.4	0.3	31	0.6	0.6
6	0.2	0.2	19	0.4	0.4	32	0.6	0.6
7	0.2	0.2	20	0.4	0.4	33	0.6	0.6
8	0.2	0.3	21	0.3	0.4	34	0.6	0.6
9	0.2	0.3	22	0.4	0.4	35	0.6	0.6
10	0.2	0.3	23	0.4	0.4	36	0.6	0.6
11	0.2	0.3	24	0.5	0.5	37	0.7	0.6
12	0.3	0.3	25	0.5	0.5	38	0.7	0.6

Table 19 Heat flux thresholds vs time

Radiation intensity	Doorset A	Doorset B
5 kW/m²	Radiation intensity not reached	Radiation intensity not reached
10 kW/m²	Radiation intensity not reached	Radiation intensity not reached
15 kW/m²	Radiation intensity not reached	Radiation intensity not reached
20 kW/m²	Radiation intensity not reached	Radiation intensity not reached
25 kW/m²	Radiation intensity not reached	Radiation intensity not reached

C.6 Clearance measurements

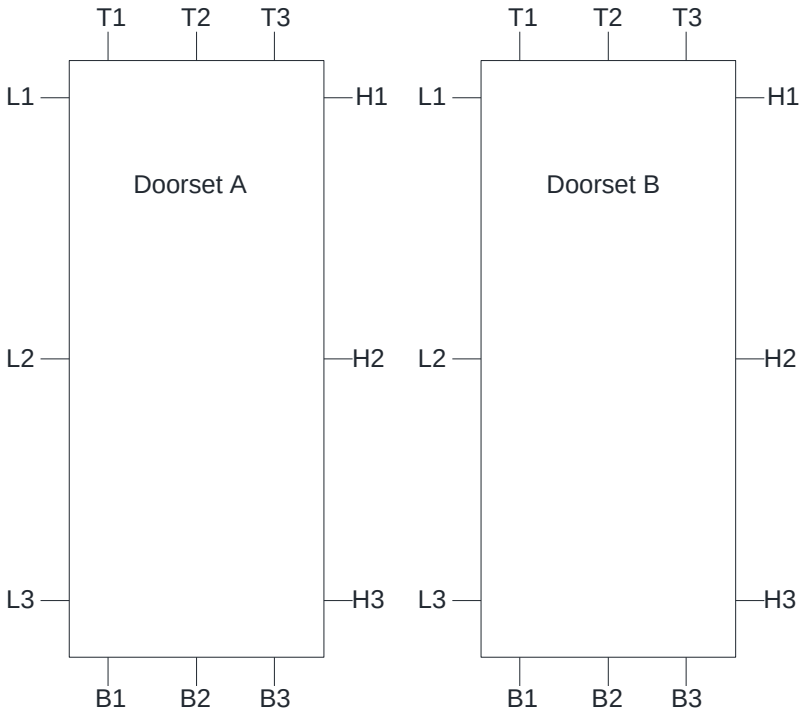

Figure 6 Clearance measurements, Doorset A and B (unexposed side shown)

Table 20 Measured and calculated gap sizes for Doorset A

Doorset A (mm)					
Hinge side	**Primary**	**Leaf to stop**	**Leading edge**	**Primary**	**Leaf to stop**
H1	2.3	1.4	L1	3.4	1.7
H2	2.1	1.8	L2	3.8	1.0
H3	1.9	0.8	L3	4.1	1.1
Mean	2.1		**Mean**	3.8	
Max	2.3		**Max**	4.1	
Min	1.9		**Min**	3.4	
Top edge	**Primary**	**Leaf to stop**	**Threshold**	**Primary**	
T1	4.2	0.8	B1	7.1	
T2	3.3	1.3	B2	6.0	
T3	2.9	1.0	B3	7.0	
Mean	3.5		**Mean**	6.7	
Max	4.2		**Max**	7.1	
Min	2.9		**Min**	6.0	

Table 21 Measured and calculated gap sizes for Doorset B

Doorset B (mm)					
Hinge side	**Primary**	**Leaf to stop**	**Leading edge**	**Primary**	**Leaf to stop**
H1	3.0	1.0	L1	3.3	0.8
H2	3.0	0.2	L2	3.8	0.6
H3	3.1	1.2	L3	2.7	1.3
Mean	3.0		**Mean**	3.3	
Max	3.1		**Max**	3.8	
Min	3.0		**Min**	2.7	
Top edge	**Primary**	**Leaf to stop**	**Threshold**	**Primary**	
T1	2.3	0.9	B1	7.6	
T2	2.3	1.0	B2	7.7	
T3	2.7	0.9	B3	7.9	
Mean	2.4		**Mean**	7.7	
Max	2.7		**Max**	7.9	
Min	2.3		**Min**	7.6	

Appendix D Photographs

Figure 20 Unexposed face of the specimen before the start of the test

Figure 21 Unexposed face of the specimen after a test duration of 10 minutes

Figure 22 Unexposed face of the specimen after a test duration of 20 minutes

Figure 23 Unexposed face of the specimen after a test duration of 30 minutes 36 seconds

Figure 24 Unexposed face of the specimen at the end of the test

Figure 25 Exposed face of doorset A at the end of the test

Figure 26 Exposed face of Doorset B at the end of the test

Figure 27 Drop down seal - Doorset A

Figure 28 Drop down seal - Doorset B

Figure 29 Closer – Both Doorsets

Figure 30 Keep – Both Doorsets

Figure 31 Latch forend – Both Doorsets

Figure 32 Hinge – Both Doorsets

Figure 33 Lever Handle – Both Doorsets

Appendix E Sampling reports

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Sample Report

This report provides a record of the information relating to samples taken by Warringtonfire Testing and Certification Limited trading, or its agent, for certification of the products detailed below.

Job No.	FM505683
Manufacturer	RAM EXTRUSION LTD CERT HOLDER PYROSIST LTD
Manufacturing site	UNIT 203 POINTON WAY STONEBRIDGE CROSS, DROITWICH, WR9 0LW
Place of sampling	EXTRUSION LINE 2
Traceability information	Date/time of production: 5/8/21 Production unit/line: LINE 2 Batch number: REELS TO SW SHEETS Shift: DAY
Product Number/ Description	PYROSIST 9010 10X4 FIRE AND SMOKE SEALS
Marking of the product by the manufacturer e.g. label, batch number and date of manufacture	FM505683 / 1121 / 5/8/21 PYROSIST 10X4
Marking of the samples by Warringtonfire Testing and Certification Limited	Job No: FM505683 Date: 5/8/21 Signature or initials:
Stock/batch quantity from which samples selected and sample quantity	PRODUCED FOR TEST PURPOSES 3 ROLLS x 25M
Results of tests and/or inspections during manufacture	QC CHECKS / EXPANSION TESTING
Essential Characteristics to be tested ie. Test reference	TS 21 / TS 35
Samples to be dispatched by manufacturer to *** within *** weeks/month(s)	SAMPLES TO BE TESTED BY WARRINGTON FIRE.
Date of sampling	5TH AUGUST 2021
Warringtonfire Testing and Certification Limited notified body number	1121

Signed: (for and on behalf of Manufacturer)	Signed: (for and on behalf of Warringtonfire Testing and Certification Limited)
Print: MARK THORNE	Print: GAVIN GUNN
Date: 5th Aug 2021	Date: 5TH AUG 2021

Warringtonfire Testing and Certification Limited
Registered Office: 10 Lower Grosvenor Place, London, United Kingdom, SW1W 0EN.
Company Registration No.11371436

Doc. Ref. EWC-QU-FT-90 (Issue 3 – 29/11/2018)

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Sample Report

This report provides a record of the information relating to samples taken by Warringtonfire Testing and Certification Limited trading, or its agent, for certification of the products detailed below.

Job No.	FM 505683
Manufacturer	RAM EXTRUSION LTD CERT HOLDER - PYROSIST LTD
Manufacturing site	UNIT 203 DONTON WAY STONEBRIDGE CROSS, DROITWICH WR9 0LW
Place of sampling	EXTRUSION LINE 2
Traceability information	Date/time of production: 5/8/21 Production unit/line: LINE 2 Batch number: REFER TO JOB SHEETS Shift: DAY
Product Number/ Description	PYROSIST 3070 30 MINUTE GLAZING GASKET
Marking of the product by the manufacturer e.g. label, batch number and date of manufacture	FM 505683 / 1121 / PYROSIST 3070
Marking of the samples by Warringtonfire Testing and Certification Limited	Job No: FM 505683 Date: 5/8/21 Signature or initials:
Stock/batch quantity from which samples selected and sample quantity	PRODUCED FOR TEST PURPOSES 25 No. 2-1M LENGTHS.
Results of tests and/or inspections during manufacture	QC CHECKS / EXPANSION TEST
Essential Characteristics to be tested ie. Test reference	TS 21 / TS 35
Samples to be dispatched by manufacturer to *** within *** weeks/month(s)	SAMPLES TO BE TESTED BY WARRINGTON FIRE
Date of sampling	5TH AUGUST 2021
Warringtonfire Testing and Certification Limited notified body number	1121

Signed: (for and on behalf of Manufacturer)	Signed: (for and on behalf of Warringtonfire Testing and Certification Limited)
Print: MARK THORNE	Print: DAVID GUNN
Date: 5th AUG 2021	Date: 5TH AUG 2021

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Sample Report

This report provides a record of the information relating to samples taken by Warringtonfire Testing and Certification Limited trading, or its agent, for certification of the products detailed below.

Job No.	FM417540
Manufacturer	Wuhu Gallford Fire Material Co., Ltd
Manufacturing site	No. 59, Longtan Road, Jiujiang District, Wuhu City, Anhui Province, China
Place of sampling	No. 59, Longtan Road, Jiujiang District, Wuhu City, Anhui Province, China
Traceability information	Date/time of production:14 Oct 2019 Production unit/line: Extrusion Line A Batch number: 19014ET, 19012ET, 19016ET Shift: Day Shift only
Product Number/ Description	Exi-Sound Concealex A8100 Exi-Sound Concealex A8100 Superior Concealex Facefix Applique
Marking of the product by the manufacturer e.g. label, batch number and date of manufacture	A sticker which includes Exitex Brand logo, model reference and specification is affixed to product and package.
Marking of the samples by Warringtonfire Testing and Certification Limited	Job No: FM417540 Date: 14th Oct 2019 Signature or initials:
Stock/batch quantity from which samples selected and sample quantity	10 Nos were selected for each model. The batch quantity as below. Exi-Sound Concealex A8100: 6,900 pcs Exi-Sound Concealex A8100 Superior: 3,000 pcs Concealex Facefix Applique: 6,300 pcs
Results of tests and/or inspections during manufacture	With respect to the FPC at manufacturer, it's grant to certification.
Essential Characteristics to be tested ie. Test reference	BS 476 Part 31.1
Samples to be dispatched by manufacturer to *** within *** weeks/month(s)	Samples would be dispatched by manufacturer to Warringtonfire within 3 weeks
Date of sampling	14 Oct 2019
Warringtonfire Testing and Certification Limited notified body number	1121

Signed: (for and on behalf of Manufacturer)	Signed: (for and on behalf of Warringtonfire Testing and Certification Limited)
Print: Julia Lu	Print: Leo Zuo
Date: 14 Oct 2019	Date: 14 Oct 2019

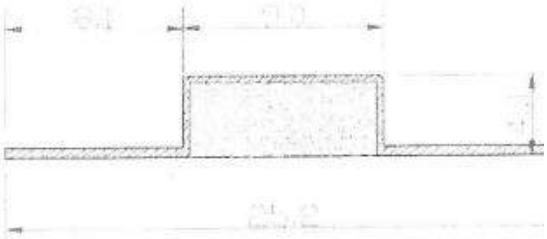
Appendix F Product information

PYROSIST 9010 10X4 FIRE & SMOKE

R0

batch number

MATERIAL:	90% Intumescent CFE16/052 BK	23117
	10% filler XG81255 BK1	AA019901
SKIN:	XA80199WE634	AC041940
COLOUR:	SEE PRODUCTION SHT	
CSA:	44mm²	
WEIGHT:	minimum 6.1 Kgs / 100m	
Signed Off By:	PR Mell	



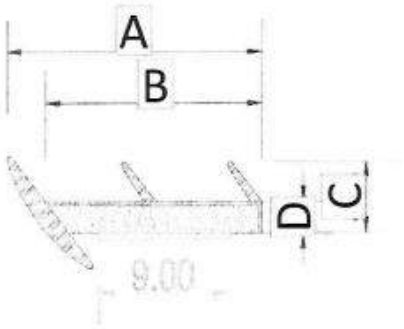
8mm Self Adhesive Tape on bottom centre section. Product to be coiled (tape side out) 25m/coil

DATE	TIME	OP.	A 25.2 +/-0.25	B 0.5 +/-0.2	C 8.1 +/-0.2	D 9.0 +/-0.2	E 4.0 +/-0.2	WEIGHT	LENGTH
5/8/21	7:00 AM								
	7:30 AM								
	8:00 AM								
	8:30 AM								
	9:00 AM								
	9:30 AM		START UP M/C LINE 2						
	10:00 AM								
	10:30 AM	P2	26.42	058	8.84	9.08	4.24		25MT.
	11:00 AM	P2	2639	054	881	904	418		
	11:30 AM								
	12:00 PM		PRODUCTION COMPLETE						
	12:30 PM								
	1:00 PM								
	1:30 PM								
	2:00 PM								
	2:30 PM								
	3:00 PM							8.02kgs	
	3:30 PM								
	4:00 PM								
	4:30 PM								
	5:00 PM								
	5:30 PM								
	6:00 PM								
	6:30 PM								

PYROSIST 3070 30MINUTE GLAZING GASKET

R0

		batch number
MATERIAL:	30% Intumescent CFE16/052 BK	23117
	70% filler XG81255 BK1	AA019901
SKIN:	VA2012/2 BK1	AA019889
COLOUR:	SEE PRODUCTION SHT	
CSA:	41mm²	
WEIGHT:	minimum 5.7 Kgs / 100m	
Signed Off By: PRimell		



8 or 9mm Self Adhesive Tape on bottom centre section. Product to be cut into 2.1m lengths

DATE	TIME	OP.	A 17.0 +/-0.25	B 13.5 +/-0.2	C 4.2 +/-0.2	D 2.2 +/-0.2		WEIGHT	LENGTH
5/8/24	7:00 AM								
	7:30 AM								
	8:00 AM								
	8:30 AM								
	9:00 AM								
	9:30 AM								
	10:00 AM								
	10:30 AM								
	11:00 AM								
	11:30 AM								
	12:00 PM		START UP M/C LINE 2						
	12:30 PM								
	1:00 PM	PR	1717	1338	431	2.10			
	1:30 PM	PR	1722	1344	434	208			
	2:00 PM								
	2:30 PM		END OF PRODUCTION						2.1MTRS
	3:00 PM							6.01 kg	
	3:30 PM								
	4:00 PM								
	4:30 PM								
	5:00 PM								
	5:30 PM								
	6:00 PM								
	6:30 PM								

TECHNICAL DATA SHEET

1 Description

PU Foam is a single component, moisture curing, self expanding, ready to use polyurethane foam with propellants which are completely harmless to the ozone layer. It has a fire rating of up to 60 minutes in Timber Doorsets configuration, when used in conjuction with Blue60 fire rated packers, that are available in 1, 3 and 5mm thicknesses.. High quality PU foam recommended for sealing applications where fire resistance is required.

2 Properties

According to BS EN 1634-1 & BS 476 Part 22 fire retardant up to 60 mins – see table enclosed.
Efficient seal against smoke and gas.
Does not contain CFC's and H-CFC's.
Excellent adhesion & filling capacity.
Excellent mounting capacity and stability.
High yield up to 45 litres depending on temperature and humidity.
Excellent adhesion on most substrates (except Teflon, PE and PP).
High filling capacity.
High thermal & acoustical insulation value.
After cured, it can be painted, cut , trimmed.
No shrinkage
Mould and water resistant.
Temperature resistance -40°C to +90°C

3 Application

Installation of Timber Doorsets. Blue 60 foam should always fully fill the gap between the frame section and the wall and can then be trimmed back flush with the frame section once cured. Blue60 foam should always be used in conjuction with Blue60 Fire Rated packers.

4 Packaging

750ml (12pcs in a box)

5 Colour

Blue

6 Shelf Life

Blue60 foam has a usable life in the can of 2 years from the manufactured date shown on the bottom of the can, if un opened, however some deminishing yield from the can may become appartent after 12 months if not stored in a cool dry storage place at temperatures between +5°C and +25°C.

7 Notes

Keep out of reach of children.
Use in a well ventilated area.
Do not smoke.
Take the usual industrial hygiene precautions.
Wear gloves and safety goggles.
Remove cured foam by mechanical means only – never burn away.

8 Safety

For information and advise on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Product Handling & Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.

9 Technical Properties

Base Polyurethane prepolymer
Curing System Moisture
Skin Formation Approx. 10 minutes
Fully fire rated after full curing 24:48hrs depending on conditions
Specific gravity 23± kg/m3
Temperature resistance -40°C until +90°C (cured)
Fire properties BI (DIN 4102)

10 Performance

30 Minute Timber Doorset

Wall Construction	Frame Material	Frame Depth	Minimum Gap	Maximum Gap	Tested to
Timber Stud Steel Stud Brickwork	MDF Softwood minimum density 450 kg/m3	Minimum Depth 80mm	No minimum gap providing the frame width is fully filled	30mm	BS EN 1634-1 BS 476 Part 22

60 Minute Timber Doorset

Wall Construction	Frame Material	Frame Depth	Minimum Gap	Maximum Gap	Tested to
Timber Stud Steel Stud Brickwork	MDF Hardwood minimum density 610 kg/m3	Minimum Depth 100mm	No minimum gap providing the frame width is fully filled	30mm	BS EN 1634-1 BS 476 Part 22

11 Legal Note

The information, and, in particular, the recommendations relation to the application and end-use of Blue60, are given in good faith based on our current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Blue60 Technical and Safety Data Sheets.

Blue 60
Fire Foam & Accessories

Blue 60 is a specially formulated expanding foam that achieves up to 60 minute fire protection for timber fire doorsets. 30 & 60 minute fire tested to BS EN 1634-1 & BS 476: Part 22.

Blue 60 Fire Rated Frame Foam

- Tested in full size single & double doorsets
- Tested in both metal and timber stud partitionings
- Tested with softwood, MDF & hardwood frame sections
- Tested with gaps between 7mm & 30mm
- Blue in colour for identification purposes
- 1mm, 3mm & 5mm colour co-ordinated fire rated packers available

Gun Grade Ref:	**1.31.0600.0750.01 (750ml)**
Hand Held Ref:	**1.31.0601.0750.01 (750ml)**

Fire Rated Packer
1mm x 15mm x 100mm
Green
Ref: 1.31.0701.0015.20

Fire Rated Packer
3mm x 15mm x 100mm
White
Ref: 1.31.0703.0015.35

Fire Rated Packer
5mm x 15mm x 100mm
Blue
Ref: 1.31.0703.0015.35

Blue 60 Professional Gun Cleaner

Product Ref: 1.31.0605.0000.01 (500ml)

This product has been designed to thoroughly clean mechanised foam gun applicators, to ensure long life and consistent application.

Blue 60 Application Gun

Product Ref: 1.31.0606.0000.01

Heavy duty aluminium bodied PU foam gun with stainless steel nozzle and Teflon coating for easy cleaning. Allows gun grade expanding foam to be applied cleanly and precisely.

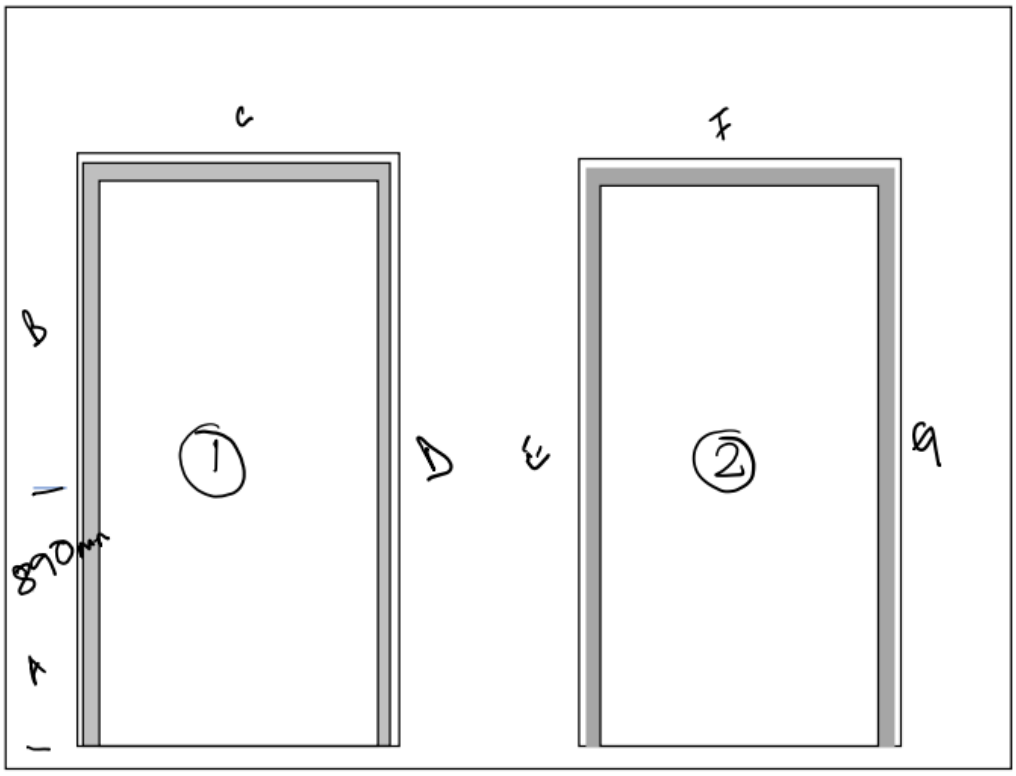
Fire Rated Intumescent Acoustic Acrylic Sealant

For sealing linear gap seals and small floor / wall penetrations. Achieved 55 DB RW.
Fire tested to BS 476: Part 20 & 22 and tested to BSEN ISO 140/3.

Product Ref:	**1.18.0500.0310**
Description	Fire Rated Intumescent Acoustic Acrylic Sealant 310ml
Colours	Brown/White
Fire Rating	240 mins

Appendix G Client drawing of fire stopping details (as viewed from exposed face)

Blue 60 / Fire Mastic combination sealing to Fire test doors



Door 1

A: Mastic with gap running between 3 mm and 4 mm to height of 890mm

B: Abutment of mastic to Blue 60 foam gap at abutment 4mm running to top of frame 7mm

C: Gap at head 6mm sealed with foam on the fire side / Exitex intumescent and acoustic acrylic internal non fire side.

D: 10mm to 15mm gap Blue 60 full fill pushed back 10mm and over mastic with Exitex intumescent and acoustic acrylic. Full height of door.

Pyrosist test

Door 2 - Blue 60

E: Gap at Base 9mm reducing to 4mm at head

G: Gap at base 3mm increasing to 9mm at head

F: 7mm gap to 9mm Foam Blue 60 foam full fill. Push back at curing stage tom face of door frame and wall structure.

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Registered office:

Warringtonfire Testing and Certification Limited
3rd Floor, Davidson Building, 5 Southampton Street, London, WC2E 7HA, United Kingdom
Registered Company No. 11371436

Name & address of issuing laboratory:

Warringtonfire Testing and Certification Limited
Chiltern House, Stocking Lane, Hughenden Valley, High Wycombe, Buckinghamshire, HP14 4ND, United Kingdom

Location of performance of laboratory activities:

Warringtonfire Testing and Certification Limited
Chiltern House, Stocking Lane, Hughenden Valley, High Wycombe, Buckinghamshire, HP14 4ND, United Kingdom

Fire resistance laboratory locations:

High Wycombe, United Kingdom
UKAS accredited laboratory 1762
T - +44 (0) 1494 840 780

Warrington, United Kingdom
UKAS accredited laboratory 0249
T: +44 (0) 1925 655 116

Melbourne, Australia
NATA accredited laboratory 3277
T: +61 3 9767 1000

Gent, Belgium
BELAC accredited laboratory 196-TEST
T: +32 9 243 77 50

Tisselt, Belgium
BELAC accredited laboratory 196-TEST
T: +32 9 243 77 50

Heywood, United Kingdom
UKAS accredited laboratory 0249
T - +44 (0) 1925 655 116

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