



United Kingdom  
Testing and  
Certification

# Test Report

The fire resistance performance of two fully insulated, timber, single acting single door assemblies when tested in accordance with BS EN 1634-1:2014+A1:2018

Project ID 20221031-005714

Revision A

Issue Date 21 December 2022

Date of Test 28 November 2022

Prepared For RAM Extrusion  
Unit 203  
Stonebridge Cross Business Park  
Pionton Way  
Droitwich Spa  
WR9 0LW



21542




Cairnmuir House, Cairnmuir Road,  
East Kilbride, Glasgow G74 4GY  
+44 (0)1355 433 122  
info@uktestcert.com  
uktestcert.com

Trusted to ensure.

## Change History

Issue Date	Revision	Created by	Authorised by	Description of Change
21/12/2022	A	NS	DF	Initial Issue

## Signatories

		
Prepared by <b>Nathan Small*</b> Technical Surveyor	Checked by <b>Daniel Fitzsimmons*</b> Testing Manager	Authorised by <b>Andrew Hutchison*</b> Head of Technical Services

\*For and on behalf of United Kingdom Testing and Certification.

## Table of Contents

<b>1</b>	<b>Executive Summary .....</b>	<b>5</b>
1.1	Specimen Summary .....	5
1.2	Specimen Verification .....	5
1.3	Specimen Installation and Fixity .....	5
1.4	Sampling .....	5
1.5	Expression of Results .....	6
<b>2</b>	<b>Pre-test Examination.....</b>	<b>8</b>
2.1	Closing Force Measurement .....	8
2.2	Specimen Conditioning .....	8
2.3	Gap Measurements .....	9
<b>3</b>	<b>Test Specimen Drawings.....</b>	<b>11</b>
<b>4</b>	<b>Technical Schedule .....</b>	<b>15</b>
4.1	Specimen A .....	15
4.2	Specimen B.....	20
4.3	Supporting Construction.....	24
<b>5</b>	<b>Specimen Photographs .....</b>	<b>26</b>
<b>6</b>	<b>Test Procedure.....</b>	<b>27</b>
6.1	Heating Conditions .....	27
6.2	Pressure Conditions .....	27
6.3	Unexposed Surface Temperature .....	27
6.4	Deflection.....	28
6.5	Observations.....	30
6.6	Test Images .....	32
<b>7</b>	<b>On-going Implications .....</b>	<b>39</b>
7.1	Limitations .....	39
7.2	Accuracy of Results .....	39

7.3 European Group of Organisations for Fire Testing (EGOLF) .....39

**Figures** ..... **40**

**Tables** ..... **44**

# 1 Executive Summary

## 1.1 Specimen Summary

Specimen A had overall nominal dimensions of 1074 mm wide by 2078 mm high, incorporating an equal pair of door leaves both with overall dimensions of 500 mm wide by 2040 mm high by 44 mm thick. The door leaves were formed from multi layered particleboard with 6 mm thick hardwood lippings to all edges. The leaves both had a 3 mm thick door edge guard on the leading edge and were hung in a hardwood frame on three steel hinges, the doors assembly incorporated the following hardware:

Item No.	Description	Reference
11	Door Closer	TS72
12	Door Pin ID Tag	Data ID Tag

Specimen B had overall nominal dimensions of 1080 mm wide by 2080 mm high, incorporating an equal pair of door leaves both with overall dimensions of 500 mm wide by 2040 mm high by 54 mm thick. The door leaves were formed from multi layered particleboard with 6 mm thick hardwood lippings to all edges. The leaves both had a 3 mm thick door edge guard on the leading edge and were hung in a hardwood frame on three steel hinges, the doors assembly incorporated the following hardware:

Item No.	Description	Reference
23	Door Closer	TS72
24	Door Pin ID Tag	Data ID Tag

## 1.2 Specimen Verification

United Kingdom Testing and Certification carried out a comprehensive survey to verify the information provided by the Test Sponsor. This included verifying the materials, dimensions, and manufacturing methodologies of the test specimens, wherever possible. Refer to page 15 for full details of this survey.

## 1.3 Specimen Installation and Fixity

Specimen A was installed into the test construction by United Kingdom Testing and Certification. The specimen was installed such that the door leaf opened towards the heating conditions at the request of the Test Sponsor. The specimen was unlatched and unbolted prior to the commencement of the test at the request of the test sponsor.

Specimen B was installed into the test construction by United Kingdom Testing and Certification. The specimen was installed such that the door leaf opened towards the heating conditions at the request of the Test Sponsor. The specimen was unlatched and unbolted prior to the commencement of the test at the request of the test sponsor.

## 1.4 Sampling

United Kingdom Testing and Certification were not involved in the sampling or selection of the test specimen or any of the components. The results obtained during the test apply to the specimens as received and test by United Kingdom Testing and Certification.

## 1.5 Expression of Results

### 1.5.1 Specimen A

Specimen A satisfied the performance criterion specified in BS EN 1634-1:2014+A1:2018 § 11 for the following intervals:

<b>Integrity (E)<sup>1</sup></b>	Sustained Flaming	41 minutes	No failure*
	Gap Gauge	41 minutes	No failure*
	Cotton Pad	41 minutes	No failure*
<b>Insulation (I<sub>1</sub>)<sup>2</sup></b>	Specimen	41 minutes	No failure*
<b>Insulation (I<sub>2</sub>)<sup>3</sup></b>	Specimen	41 minutes	No failure*

\*The test was discontinued after a period of 62 minutes.

---

<sup>1</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without: a) causing ignition to the cotton pad applied in accordance with BS EN 1363-1:2020 § 10.4.5.2 b) permitting the penetration of a gap gauge as specified in EN 1363-1:2020 § 10.4.5.3 c) resulting in sustained flaming.

<sup>2</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which increase at the locations specified in BS EN 1634-1:2014+A1:2018 § 9.1.2.2, 9.1.2.3, 9.1.2.4 and the roving thermocouple above the initial average temperature by more than 180°C.

<sup>3</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which: a) increase the average temperature above the initial average temperature by more than 140 °C; b) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180°C with the exception that the limit for temperature rise for any frame member or transom member adjacent to the leaf/leaves of the doorset or openable window shall be 360°C.

## 1.5.2 Specimen B

Specimen B satisfied the performance criterion specified in BS EN 1634-1:2014+A1:2018 § 11 for the following intervals:

<b>Integrity (E)<sup>4</sup></b>	Sustained Flaming	53 minutes	
	Gap Gauge	54 minutes	Area blanked off
	Cotton Pad	53 minutes	
<b>Insulation (I<sub>1</sub>)<sup>5</sup></b>	Specimen	53 minutes	Due to integrity failure
<b>Insulation (I<sub>2</sub>)<sup>6</sup></b>	Specimen	53 minutes	Due to integrity failure

\*The test was discontinued after a period of 62 minutes.

<sup>4</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without: a) causing ignition to the cotton pad applied in accordance with BS EN 1363-1:2020 § 10.4.5.2 b) permitting the penetration of a gap gauge as specified in EN 1363-1:2020 § 10.4.5.3 c) resulting in sustained flaming.

<sup>5</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which increase at the locations specified in BS EN 1634-1:2014+A1:2018 § 9.1.2.2, 9.1.2.3, 9.1.2.4 and the roving thermocouple above the initial average temperature by more than 180°C.

<sup>6</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which: a) increase the average temperature above the initial average temperature by more than 140 °C; b) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180°C with the exception that the limit for temperature rise for any frame member or transom member adjacent to the leaf/leaves of the doorset or openable window shall be 360°C.

## 2 Pre-test Examination

### 2.1 Closing Force Measurement

The door closing forces were measured and recorded three times. The results are presented below:

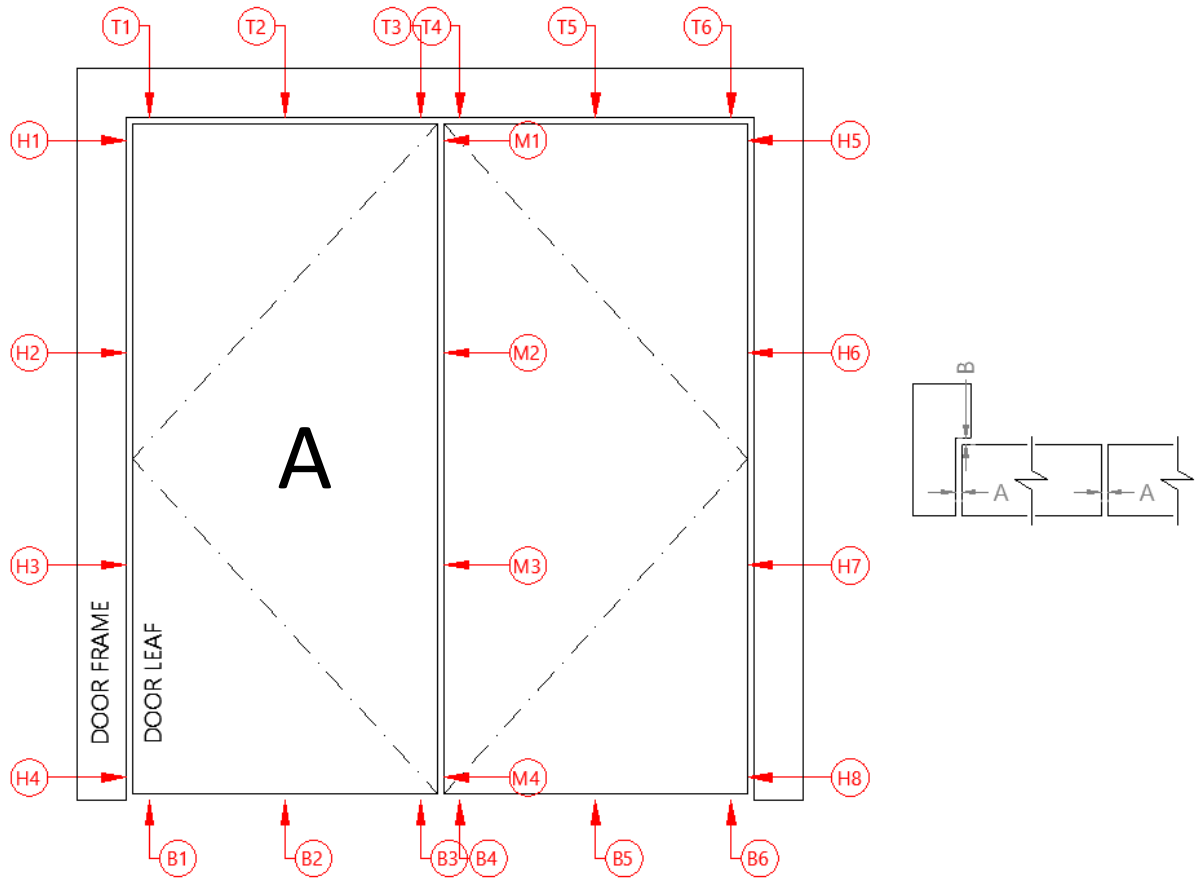
Measurement	Maximum Recorded Force (N)	Distance from Pivot to Measurement Location (m)	Moment (Nm)
Closing Force Specimen A1	46.40	0.40	18.56
Opening Force Specimen A1	75.40	0.40	30.16
Closing Force Specimen A2	41.80	0.40	16.72
Opening Force Specimen A2	76.40	0.40	30.56
Closing Force Specimen B1	43.40	0.40	17.36
Opening Force Specimen B1	80.00	0.40	32.00
Closing Force Specimen B2	39.80	0.40	15.92
Opening Force Specimen B2	79.20	0.40	31.68

### 2.2 Specimen Conditioning

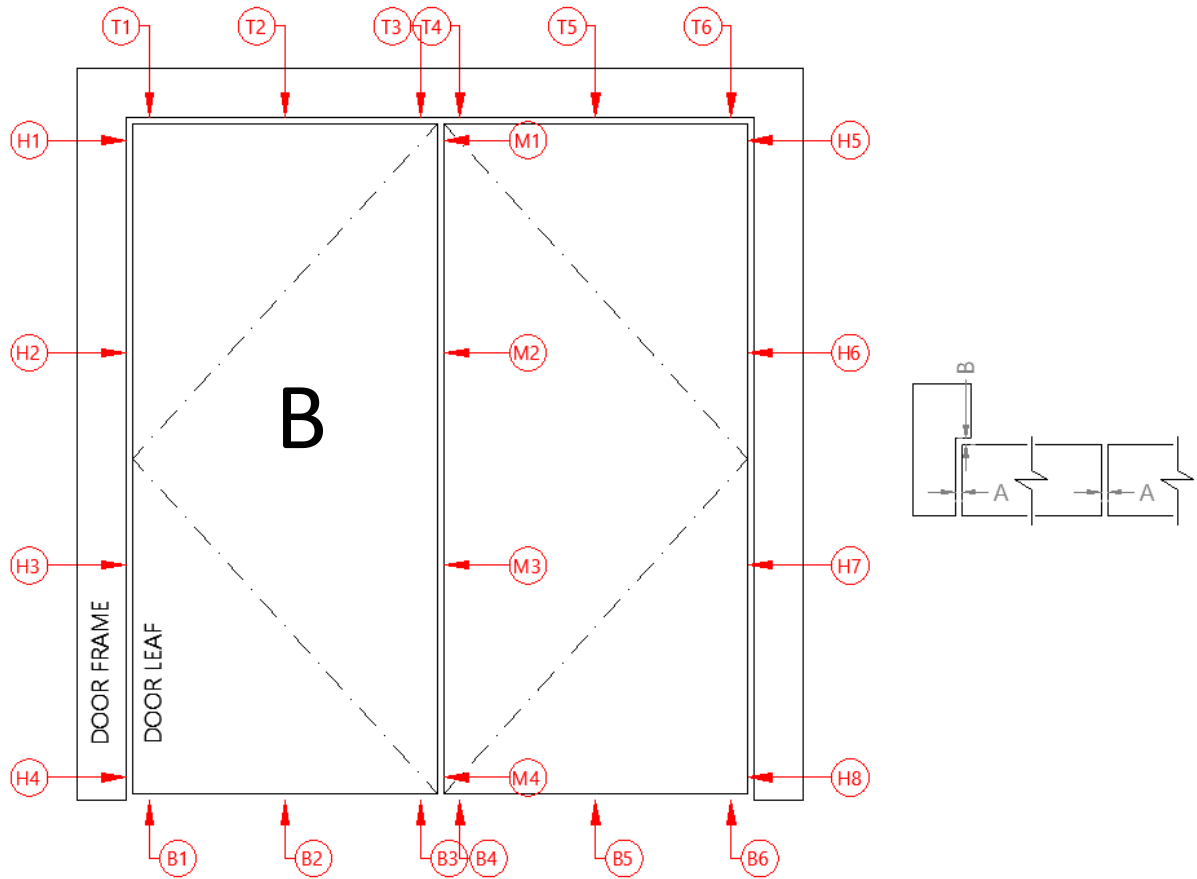
The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of five days. Throughout this period, both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 12.4 °C to 13.0 °C and 60.4 % to 65.3 % respectively.



### 2.3 Gap Measurements



	A	B		A	B		A	B	
H1	1.2	0.1	X	M1	1.6	X	H5	1.3	
H2	2.1	0.1		M2	1.6		H6	2.4	
H3	1.3	0.1		M3	1.5		H7	1.1	
H4	1.8	0.1		M4	1.2		H8	1.7	
<b>Mean</b>	<b>1.6</b>	X	<b>Mean</b>	<b>1.5</b>	X	<b>Mean</b>	<b>1.6</b>	X	
<b>Max</b>	<b>2.1</b>		<b>Max</b>	<b>1.6</b>		<b>Max</b>	<b>2.4</b>		
<b>Min</b>	<b>1.2</b>		<b>Min</b>	<b>1.2</b>		<b>Min</b>	<b>1.1</b>		
	A	B		A	B		A	B	
T1	2.3	0.1	T4	1.5	0.2	B1	4.7	B4	4.2
T2	1.9	0.1	T5	1.4	0.1	B2	3.5	B5	4.9
T3	1.6	0.1	T6	1.4	0.1	B3	3.5	B6	5.9
<b>Mean</b>	<b>1.9</b>	X	<b>Mean</b>	<b>1.4</b>	X	<b>Mean</b>	<b>3.9</b>	<b>Mean</b>	<b>5.0</b>
<b>Max</b>	<b>2.3</b>		<b>Max</b>	<b>1.5</b>		<b>Max</b>	<b>4.7</b>	<b>Max</b>	<b>5.9</b>
<b>Min</b>	<b>1.6</b>		<b>Min</b>	<b>1.4</b>		<b>Min</b>	<b>3.5</b>	<b>Min</b>	<b>4.2</b>



	A	B		A	B		A	B	
H1	1.7	0.1	X	M1	2.5	X	H5	2.2	0.1
H2	1.7	0.1		M2	2.0		H6	1.5	0.2
H3	1.1	0.5		M3	1.7		H7	1.2	0.5
H4	1.3	0.8		M4	1.8		H8	1.5	0.7
<b>Mean</b>	<b>1.4</b>	X	<b>Mean</b>	<b>2.0</b>	X	<b>Mean</b>	<b>1.6</b>	X	
<b>Max</b>	<b>1.7</b>		<b>Max</b>	<b>2.5</b>		<b>Max</b>	<b>2.2</b>		
<b>Min</b>	<b>1.1</b>		<b>Min</b>	<b>1.7</b>		<b>Min</b>	<b>1.2</b>		
	A	B		A	B		A	B	
T1	1.2	1.2	T4	2.2	0.4	B1	3.6	B4	2.1
T2	1.5	0.7	T5	2.4	0.5	B2	2.7	B5	1.0
T3	1.8	0.2	T6	1.9	0.4	B3	2.9	B6	2.8
<b>Mean</b>	<b>1.5</b>	X	<b>Mean</b>	<b>2.2</b>	X	<b>Mean</b>	<b>3.1</b>	<b>Mean</b>	<b>2.0</b>
<b>Max</b>	<b>1.8</b>		<b>Max</b>	<b>2.4</b>		<b>Max</b>	<b>3.6</b>	<b>Max</b>	<b>2.8</b>
<b>Min</b>	<b>1.2</b>		<b>Min</b>	<b>1.9</b>		<b>Min</b>	<b>2.7</b>	<b>Min</b>	<b>1.0</b>

### 3 Test Specimen Drawings

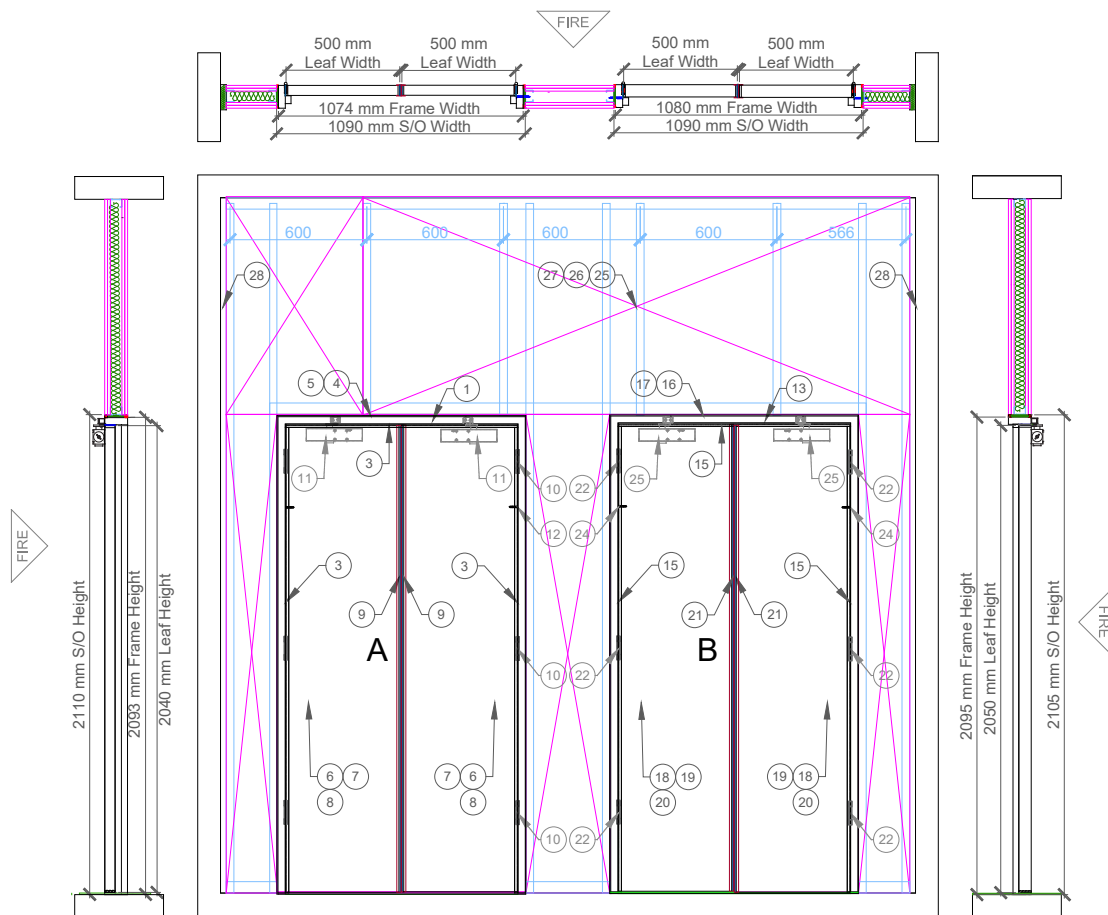


Figure 1 - General arrangement of test construction viewed from the unexposed surface

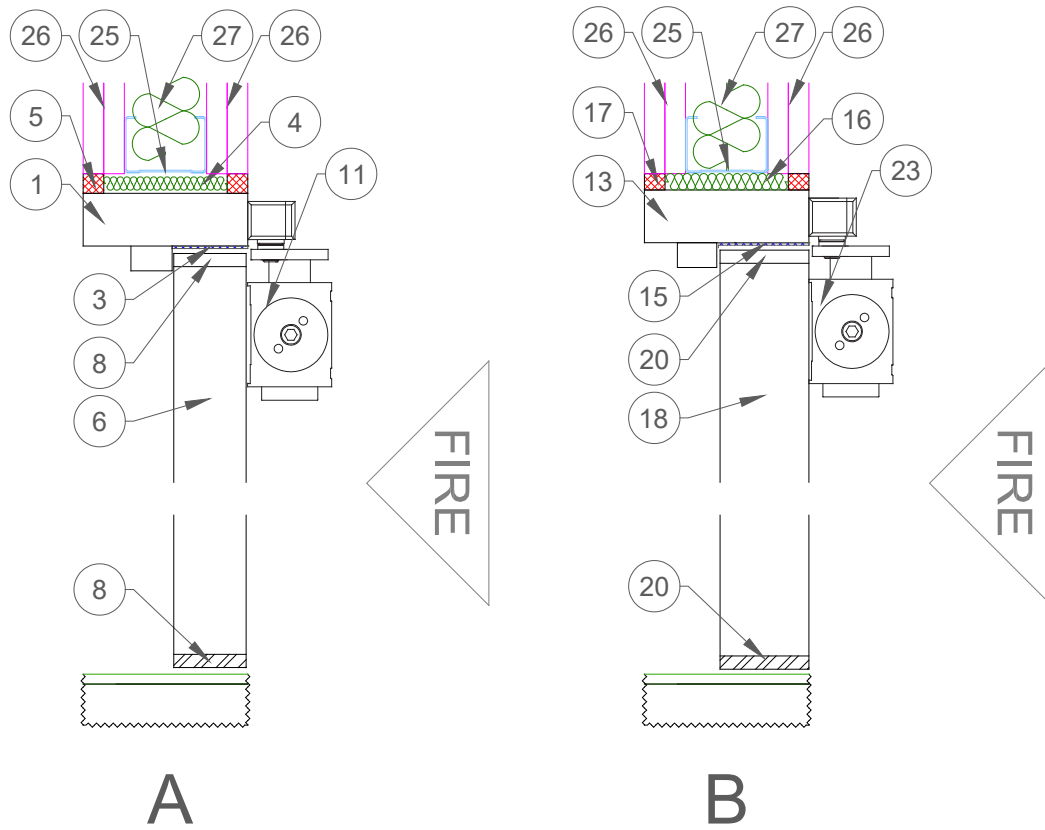


Figure 2 - Typical vertical section through the specimens

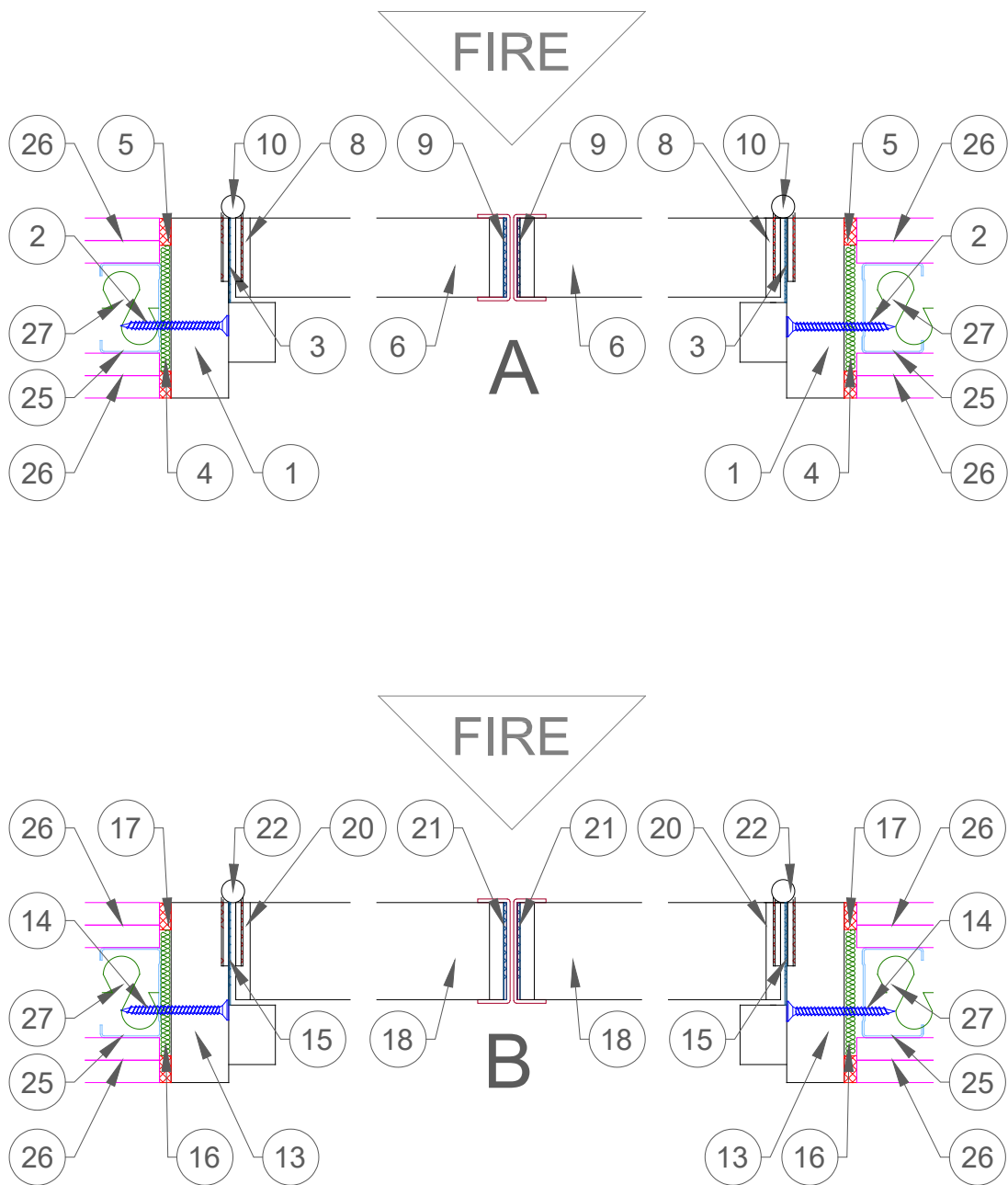


Figure 3 - Typical horizontal section through the specimens

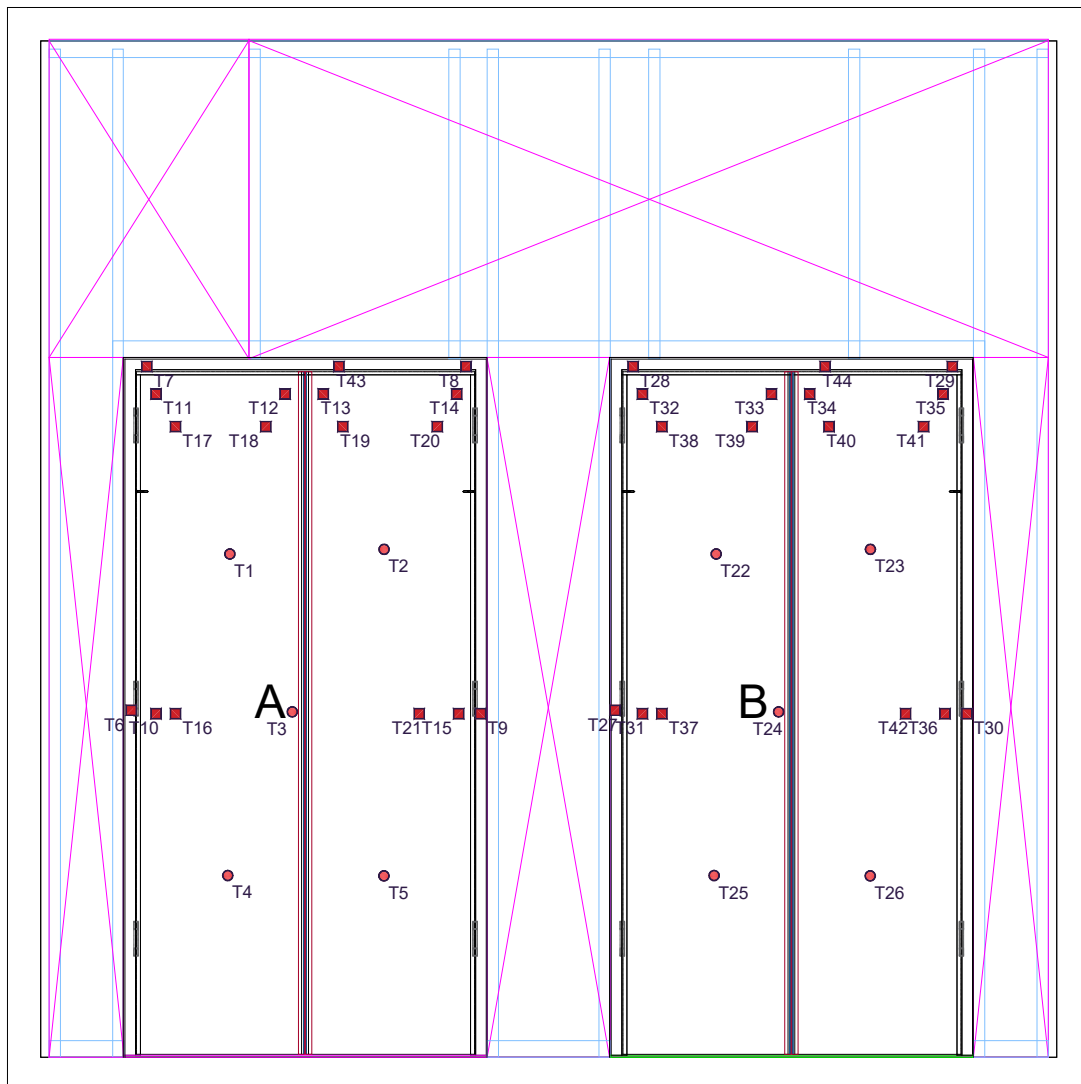


Figure 4 - Layout of instrumentation viewed from the unexposed surface of the test construction

## 4 Technical Schedule

All dimensions are in millimetres (mm) unless otherwise stated.

\* Information provided by the Test Sponsor. Not verified by United Kingdom Testing and Certification.

\*\* Nominal value.

\*\*\* Information is commercial in confidence. Full details are retained on file by United Kingdom Testing and Certification.

### 4.1 Specimen A

1. Frame	
Manufacturer	S A Joinery
Reference	Double Hardwood FD 30 Spec
Material	Sapele
Density	640 kg/m <sup>3</sup> *
Moisture content	10.6 – 11.9 % (laboratory measurement)
a. Overall size	2078 mm high x 1074 mm wide x 100 mm wide
i. Frame (Head)	100 mm wide x 30 mm thick
ii. Frame (Jambs)	100 mm wide x 30 mm thick
iii. Stop	15 mm wide x 25 mm deep
Jamb to Head jointing method, fixing detail and location	Stub Tenon 16 mm 2 no. off Ø 5 mm x 100 mm long wood screw
Stop to Frame jointing method, fixing detail and location	Ø 1.5 mm x 50 mm Gas fired pins @ 200 mm centres
b. Adhesive(s)	
i. Manufacturer	Ever build
ii. Type	D4 PVA
iii. Reference	EN204
iv. Curing method	Air
v. Application method	Squeezed & brushed
2. Frame Fixing Method to Supporting Construction	
Manufacturer	Spax
Reference	3917X
Type & material	Yellow PZ Countersunk Woodscrews

Overall size	Ø 5 mm x 80 mm long
Spacing	150 mm from top corner of jamb, 150 mm from bottom corner of jamb and at no more than 600 mm centres
Does the fixing penetrate intumescent seal within frame reveal	N/a
Packing Material	Certitek DP01 - PVC U Shims
Packing Material Dimension	100 mm x 43 mm assorted thicknesses
Packing Material Location	At each fixing location
<b>3. Intumescent to Frame</b>	
Manufacturer	RAM Extrusion
Reference	Pyrosist FD30 Surface Mounted Intumescent
Material	High Expansion Graphite Intumescent
Overall Size	2100 mm long x 44 mm wide x 1.5 mm thick
Application Method	Self-Adhesive
Location	Spans full depth of frame reveal
<b>4. Frame to supporting construction fire stopping detail</b>	
Manufacturer	Saint-Gobain
Reference	Isover Insulation
Material	Mineral Wool
Overall dimension	80 mm deep x 2 mm to 10 mm wide
Application method	Compression fitted
<b>5. Sealant to fire stopping detail</b>	
Manufacturer	Certitek
Reference	DM-01 Intumescent & Acoustic Acrylic Sealant
Material	Acrylic Sealant
Overall section size	10 mm deep x 2 mm to 15 mm wide
Application method	Using a cartridge gunned
Location	Gaps between the head and jambs and supporting construction



6. Door Leaf	
Supplier	S A Joinery
Reference	Prima
Quantity of leaves on doorset	2
Glazing location relative to the head and closing edge	N/a
Overall leaf size supplied for testing	2040 mm high x 500 mm wide x 44 mm thick
7. Core element	
Manufacturer	Halspan
Reference	Prima
Material	Multi Layered Particleboard
Density	630 kg/m <sup>3</sup> *
Overall thickness	44 mm thick
8. Lippings / Edge banding	
Manufacturer	S A Joinery
Reference	Lipping
Material	Sapele
Density	640 kg/m <sup>3</sup> *
Moisture content	6.4 – 8.2 % (laboratory measurement)
Overall size	6mm x 44mm x length of door
Fixing method	Glued
Location	All Edges
a. Adhesives	
i. Manufacturer	UREKA
ii. Type	PU
iii. Reference	AREO BOND 947
iv. Curing method	Moisture
v. Application method	Roller
b. Presence of Mechanical Fixings	No

9. Door Edge Shield	
Manufacturer	RAM Extrusion
Reference	44 mm FD 30 Door Edge Shield
Material	Rigid PVC with flexible bumper and High Expansion Graphite Intumescent to back.
Intumescent ref	44 mm wide x 1.5 mm thick – Pyrosist
Overall section size	47 mm wide x 19 mm upstand x 1.5 mm thick
Location	1 no attached to each leaf.
Application Method	Pin fixed at 3 locations – 45 mm down from top, 35 mm up from bottom and one 1000 mm up from bottom.
10. Hinges	
Supplier	Royde and Tucker Manufacturing
Reference	H102
Quantity	3 no.
Primary material	Steel
Type	Ball Butt Bearing
a. Size	
i. Knuckle	Ø 14 mm x 104 mm high
ii. Blades	100 mm high x 35 mm wide x 3 mm thick
b. Fixings	
i. Type	Countersunk wood screws
ii. Material	Stainless Steel
iii. Size	Ø 5 mm x 32 mm long
iv. Number off per blade	5 no.
Position of each hinge relative to the head of the leaf	1 <sup>st</sup> - 175 mm, 2 <sup>nd</sup> – 945 mm, 3 <sup>rd</sup> – 1715 mm
Details of intumescent protection	1mm Interdens (VANQUISH)
Interruptions to Intumescent within the frame reveal	Pyrocist Intumescent sits over the hinges.

11. Door Closer	
Manufacturer	DORMA
Reference	TS72
a. Material	
i. Body	Mild Steel
ii. Closer arm	Stainless Steel
iii. Cover	Plastic
Configuration	Cam. Action Slide Arm
b. Overall size	
i. Slide arm	275 mm wide x 22 mm thick x 21 mm deep
ii. Body	57 mm high x 230 mm wide x 40 mm deep
iii. Cover	68 mm high x 232 mm wide x 455 mm deep
Fixing method	Screwed with 4 no Ø 5 mm x 50 mm stainless steel screws
12. Door Pin ID Tag	
Manufacturer	Door Data Systems
Reference	Data ID Tag
Material	Computer chip with dual plastic coating
Overall size	Ø 6 mm x 37.5 mm long
Location	Hinge edge – 865 from top of door and 19 in from hinge face of Each door.
Fixing method	Friction fitted into door edge.

## 4.2 Specimen B

13. Frame	
Manufacturer	S A Joinery
Reference	Double Hardwood FD 60 Spec
Material	Sapele
Density	650 kg/m <sup>3</sup> *
Moisture content	11.4 – 12.6 % (laboratory measurement)
c. Overall size	2080 mm high x 1080 mm wide x 100 mm wide
i. Frame (Head)	100 mm wide x 32 mm thick
ii. Frame (Jambs)	100 mm wide x 32 mm thick
iii. Stop	15 mm wide x 25 mm deep
Jamb to Head jointing method, fixing detail and location	Stub Tenon 16 mm 2 no. off Ø 5 mm x 100 mm long wood screw
Stop to Frame jointing method, fixing detail and location	Ø 1.5 mm x 50 mm Gas fired pins @ 200 mm centres
d. Adhesive(s)	
i. Manufacturer	Ever build
ii. Type	D4 PVA
iii. Reference	EN204
iv. Curing method	Air
v. Application method	Squeezed & brushed
14. Frame Fixing Method to Supporting Construction	
Manufacturer	Spax
Reference	3917X
Type & material	Yellow PZ Countersunk Woodscrews
Overall size	Ø 5 mm x 80 mm long
Spacing	150 mm from top corner of jamb, 150 mm from bottom corner of jamb and at no more than 600 mm centres
Does the fixing penetrate intumescent seal within frame reveal	N/a
Packing Material	Certitek DP01 - PVC U Shims

Packing Material Dimension	100 mm x 43 mm assorted thicknesses
Packing Material Location	At each fixing location
<b>15. Intumescent to Frame</b>	
Manufacturer	RAM Extrusion
Reference	Pyrosist FD60 Surface Mounted Intumescent
Material	High Expansion Graphite Intumescent
Overall Size	2100 mm long x 54 mm wide x 1.5 mm thick
Application Method	Self-Adhesive
Location	Spans full depth of frame reveal
<b>16. Frame to supporting construction fire stopping detail</b>	
Manufacturer	Saint-Gobain
Reference	Isover Insulation
Material	Mineral Wool
Overall dimension	80 mm deep x 2 mm to 10 mm wide
Application method	Compression fitted
<b>17. Sealant to fire stopping detail</b>	
Manufacturer	Certitek
Reference	DM-01 Intumescent & Acoustic Acrylic Sealant
Material	Acrylic Sealant
Overall section size	10 mm deep x 2 mm to 15 mm wide
Application method	Using a cartridge gunned
Location	Gaps between the head and jambs and supporting construction
<b>18. Door Leaf</b>	
Supplier	S A Joinery
Reference	Prima
Quantity of leaves on doorset	2
Glazing location relative to the head and closing edge	N/a
Overall leaf size supplied for testing	2040 mm high x 500 mm wide x 54 mm thick

19. Core element	
Manufacturer	Halspan
Reference	Prima
Material	Multi Layered Particleboard
Density	630 kg/m <sup>3</sup> *
Overall thickness	54 mm thick
20. Lippings / Edge banding	
Manufacturer	S A Joinery
Reference	Lipping
Material	Sapele
Density	640 kg/m <sup>3</sup> *
Moisture content	6.9 – 7.8 % (laboratory measurement)
Overall size	6mm x 54mm x length of door
Fixing method	Glued
Location	All Edges
e. Adhesives	
i. Manufacturer	UREKA
ii. Type	PU
iii. Reference	AREO BOND 947
iv. Curing method	Moisture
v. Application method	Roller
f. Presence of Mechanical Fixings	No
21. Door Edge Shield	
Manufacturer	RAM Extrusion
Reference	54 mm FD 60 Door Edge Shield
Material	Rigid PVC with flexible bumper and High Expansion Graphite Intumescent to back.
Intumescent ref	54 mm wide x 1.5 mm thick – Pyrosist
Overall section size	57 mm wide x 19 mm upstand x 1.5 mm thick
Location	1 no attached to each leaf.

Application Method	Pin fixed at 3 locations – 45 mm down from top, 35 mm up from bottom and one 1000 mm up from bottom.
<b>22. Hinges</b>	
Supplier	Royde and Tucker Manufacturing
Reference	H102
Quantity	3 no.
Primary material	Steel
Type	Ball Butt Bearing
g. Size	
i. Knuckle	Ø 14 mm x 104 mm high
ii. Blades	100 mm high x 35 mm wide x 3 mm thick
h. Fixings	
i. Type	Countersunk wood screws
ii. Material	Stainless Steel
iii. Size	Ø 5 mm x 32 mm long
iv. Number off per blade	5 no.
Position of each hinge relative to the head of the leaf	1 <sup>st</sup> - 175 mm, 2 <sup>nd</sup> – 945 mm, 3 <sup>rd</sup> – 1715 mm
Details of intumescent protection	1mm Interdens (VANQUISH)
Interruptions to Intumescent within the frame reveal	Pyrocist Intumescent sits over the hinges.
<b>23. Door Closer</b>	
Manufacturer	DORMA
Reference	TS72
i. Material	
i. Body	Mild Steel
ii. Closer arm	Stainless Steel
iii. Cover	Plastic
Configuration	Cam. Action Slide Arm
j. Overall size	
i. Slide arm	275 mm wide x 22 mm thick x 21 mm deep

ii. Body	57 mm high x 230 mm wide x 40 mm deep
iii. Cover	68 mm high x 232 mm wide x 455 mm deep
Fixing method	Screwed with 4 no Ø 5 mm x 50 mm stainless steel screws
<b>24. Door Pin ID Tag</b>	
Manufacturer	Door Data Systems
Reference	Data ID Tag
Material	Computer chip with dual plastic coating
Overall size	Ø 6 mm x 37.5 mm long
Location	Hinge edge – 865 from top of door and 19 in from hinge face of Each door.
Fixing method	Friction fitted into door edge.

### 4.3 Supporting Construction

<b>25. Metal Frame</b>	
Supplier	UKTC Provided
k. Supporting Structure	
i. Type & Material	Steel C Stud
ii. Thickness & Size	72 mm wide x 34 mm thick x 3000 mm long
iii. Centres	600 mm Centres 20 mm Space between testing frame and wall frame for insulation.
Additional Wall Construction Requests	N/a
<b>26. Plasterboard</b>	
Supplier	UKTC Provided
Type & Material	Gypsum Plasterboard Tapered Edge
Layer Quantity	2
Thickness & Size	15 mm per layer 25 mm total x 2400 mm x 1200 mm Per Sheet
Fixings	Plasterboard Screw Fixings Ø 5 mm x 25 mm Long Screw
Joints Filled & Taped With	Limestone filler & Butyl rubber



<b>27. Wall Insulation</b>	
Supplier	UKTC Provided
Type & Material	Mineral Wool
Installation Method	Compression Fitted
Thickness	50 mm
Locations	Centrally Located in the wall
Additional Wall Construction Requests	N/a
<b>28. Details of Free Edge Packing Material</b>	
Manufacturer	Morgan Advance Materials
Reference	Superwool HT
Overall size	200 mm wide x 3050 mm high x 25 mm deep
Fixing Method	Compression fitted into the free edges of the wall

## 5 Specimen Photographs



Figure 5 - Item 1, 3, 13 & 15



Figure 6 - Item 9 & 21



Figure 7 - Item 9 & 21



Figure 8 – Item 21



Figure 9 - Item 3, 10, 15, 22



Figure 10 - Item 11 & 23



Figure 11- Item 12 & 24

## 6 Test Procedure

### 6.1 Heating Conditions

The specimens were subject to heating conditions in accordance with BS EN 1363-1:2020 § 5.1. This was monitored and controlled for the duration of the test using type K thermocouples which were distributed across a vertical plane  $100 \pm 50$  mm from the exposed surface of the test construction. The resulting Time-Temperature distribution is presented in Figure 26.

### 6.2 Pressure Conditions

The specimens were subject to a pressure regime in accordance with BS EN 1363-1:2020 § 5.2. The calculated pressure differential relative to the laboratory atmospheric pressure at a height of 365, 1612 and 2850 mm from the furnace floor level was -1.1, 9.4 and 20.0 Pa respectively which equates to 0 Pa at a height of 500 mm from the furnace floor level. The furnace was maintained at these pressures within  $\pm 5$  Pa five minutes after the commencement of the test and  $\pm 3$  Pa ten minutes after the commencement of the test and for the remainder of the test duration. The Time-Pressure distribution is presented in Figure 27.

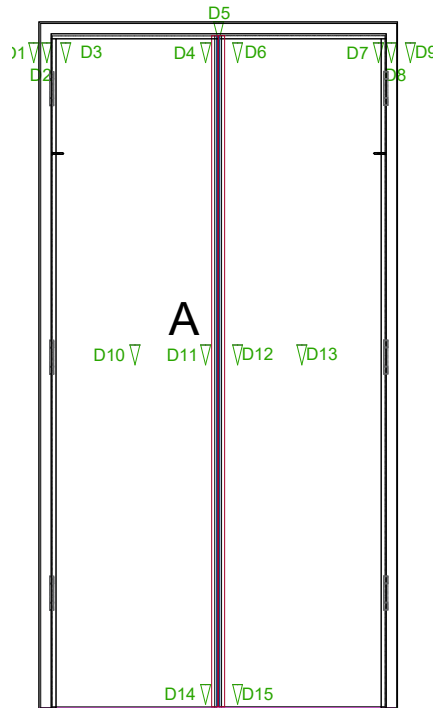
### 6.3 Unexposed Surface Temperature

A roving thermocouple was available for the evaluation of the maximum temperature rise of the unexposed surface of the specimens for the duration of the test. Any measurements using the roving thermocouple are presented on page 30.

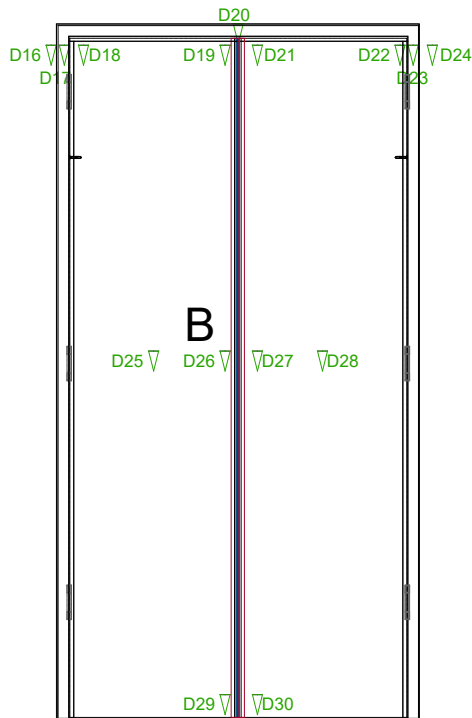
Disc thermocouples were affixed to the unexposed surface of the specimens in accordance with BS EN 1634-1:2014+A1:2018 § 9.1.2 to measure and monitor the maximum and the mean temperature rise of the unexposed surface of the specimens for the duration of the test. A summary of the measurements is presented in Figure 28 and Figure 29 and the locations of these thermocouples is illustrated in Figure 4.

### 6.4 Deflection

All measurements are in millimeters (mm) unless stated otherwise. Positive values indicate movement towards the heating conditions.



Time (mins)	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	4	3	6	7	9	8	9	8	4	4	5	5	3	3
20	2	5	3	3	4	6	5	5	5	0	1	0	0	6	6
25	2	4	4	3	5	7	5	4	5	-2	-2	-1	-1	7	7
30	2	6	3	3	6	9	7	9	6	-2	-3	-2	-2	8	8
40	3	7	5	5	6	9	10	13	10	-7	-8	-6	-6	8	8



Time (mins)	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	7	6	6	7	7	7	4	7	-3	2	0	1	2	0	3
20	3	5	4	5	5	9	-5	7	0	-1	-3	0	3	2	5
25	4	7	6	3	3	8	6	6	6	-1	-2	0	2	2	7
30	8	8	9	11	7	9	9	9	7	2	0	3	5	4	9
40	12	16	15	16	9	17	14	12	14	0	3	6	7	5	11
50	34	38	35	41	35	38	39	35	26	16	20	17	21	4	10
55	43	48	47	49	45	47	52	52	53	19	18	23	29	4	11
60	51	56	55	59	53	56	62	61	60	18	20	26	31	5	12

## 6.5 Observations

Specimen	HH	MM	SS	E <sup>7</sup>	U <sup>8</sup>	Observation
	00	00	00			<b>The test commences.</b>
A + B	00	00	34		X	Steam/Smoke releases down the meeting stile of both sets of doors.
A + B	00	02	25		X	Slight discolouring across the meeting stile of both doors.
A + B	00	05	00		X	Both doors are unrestrained.
A + B	00	10	00		X	No significant visible changes.
A + B	00	14	20		X	Moisture forming along the head of both specimens.
A + B	00	17	00	X		Both closers of doors have fallen off the doors and are resting at the bottom of the doors.
A + B	00	20	00		X	No significant visible changes.
A + B	00	25	00		X	No significant visible changes.
A + B	00	25	34	X		Closers have fully melted and the liquid aluminum rests along bottom of doors.
A + B	00	30	00		X	No significant visible changes.
B	00	31	30		X	Edge protectors are moving away from the face of the doors.
A + B	00	40	00		X	No significant visible changes.
<b>A</b>	<b>00</b>	<b>41</b>	<b>45</b>		<b>X</b>	<b>Specimen sprayed down and observations discontinued no signs of integrity failure around the door edge shield.</b>
<b>A</b>	<b>00</b>	<b>42</b>	<b>00</b>		<b>X</b>	<b>Doorset Blanked over. To allow continuation of test for specimen B.</b>
B	00	48	01		X	Bottom of right-hand door has eroded and melted aluminum rests underneath.

<sup>7</sup> Viewed from exposed surface of the test construction.

<sup>8</sup> Viewed from unexposed surface of the test construction.

Specimen	HH	MM	SS	E <sup>9</sup>	U <sup>10</sup>	Observation
B	00	48	10		X	Occasional flickers from the eroded area of the doorset.
B	00	52	30		X	Top left-hand corner is black and a glowing can be seen.
<b>B</b>	<b>00</b>	<b>53</b>	<b>32</b>			<b>A flame emits from the top left-hand corner of the specimen and sustains for a period greater than 10 seconds. Sustained flame integrity failure and by virtue insulation failure is deemed to have occurred.</b>
<b>B</b>	<b>00</b>	<b>53</b>	<b>52</b>		<b>X</b>	<b>Cotton pad test performed to the top left-hand corner - the cotton pad ignites. Cotton pad integrity failure is deemed to have occurred.</b>
<b>B</b>	<b>00</b>	<b>54</b>	<b>15</b>		<b>X</b>	<b>Mastic is applied to the top left-hand corner. Gap gauge criteria can no longer be performed.</b>
B	01	00	08		X	Left hand leaf Bottom of meeting stile starting to erode.
	<b>01</b>	<b>02</b>	<b>27</b>			<b>The test is discontinued at the request of the Test Sponsor at the time of discontinuation there were no signs of sustained flaming or gaps at the location of the door edge shield.</b>

<sup>9</sup> Viewed from exposed surface of the test construction.

<sup>10</sup> Viewed from unexposed surface of the test construction.



## 6.6 Test Images



Figure 12 – The exposed surface of the test construction prior to commencement of the test



Figure 13 - The unexposed surface of the test construction prior to the commencement of the test





Figure 14 - The unexposed surface of the test construction after a test duration of 10 minutes



Figure 15 - The unexposed surface of the test construction after a test duration of 16 minutes



Figure 16 - The unexposed surface of the test construction after a test duration of 19 minutes



Figure 17 - The unexposed surface of the test construction after a test duration of 30 minutes





Figure 18 - The unexposed surface of the test construction after a test duration of 35 minutes



Figure 19 - The unexposed surface of the test construction after a test duration of 40 minutes



Figure 20 - The unexposed surface of the test construction after a test duration of 46 minutes



Figure 21 - The unexposed surface of the test construction after a test duration of 50 minutes





Figure 22 - The unexposed surface of the test construction after a test duration of 55 minutes



Figure 23 - The unexposed surface of the test construction after a test duration of 60 minutes



Figure 24 - The unexposed surface of the test construction after a test duration of 62 minutes



Figure 25 - The exposed surface of the test construction after the test was discontinued

## 7 On-going Implications

### 7.1 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 procedure outlined in BS EN 1363-1, and where appropriate BS EN 1363-2. 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 and should be the subject to design appraisal by a competent individual.

Guidance on the field of direct application can be found in BS EN 1634-1:2014+A1:2018 § 13 and can be applied following the identification of classification(s).

### 7.2 Accuracy of Results

Due to 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.

No statement of conformity with the testing specifications is made or implied in this report. However, measurement results are reviewed, where applicable, to establish where measurement results exceed the control parameters established in the relevant resistance to fire test standard.

### 7.3 European Group of Organisations for Fire Testing (EGOLF)

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

## Figures

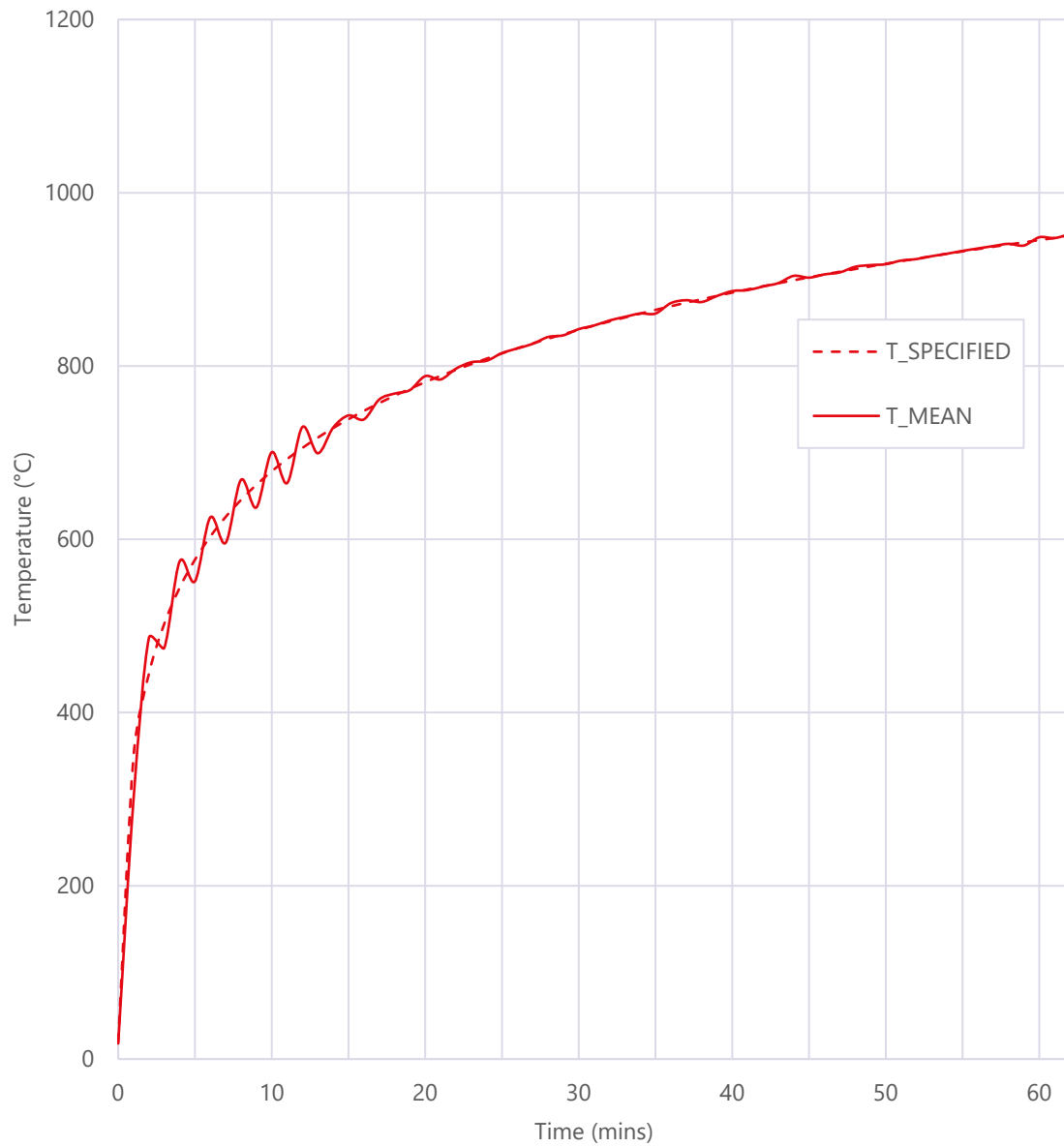


Figure 26 – Graph presenting the Time-Temperature distribution of the furnace



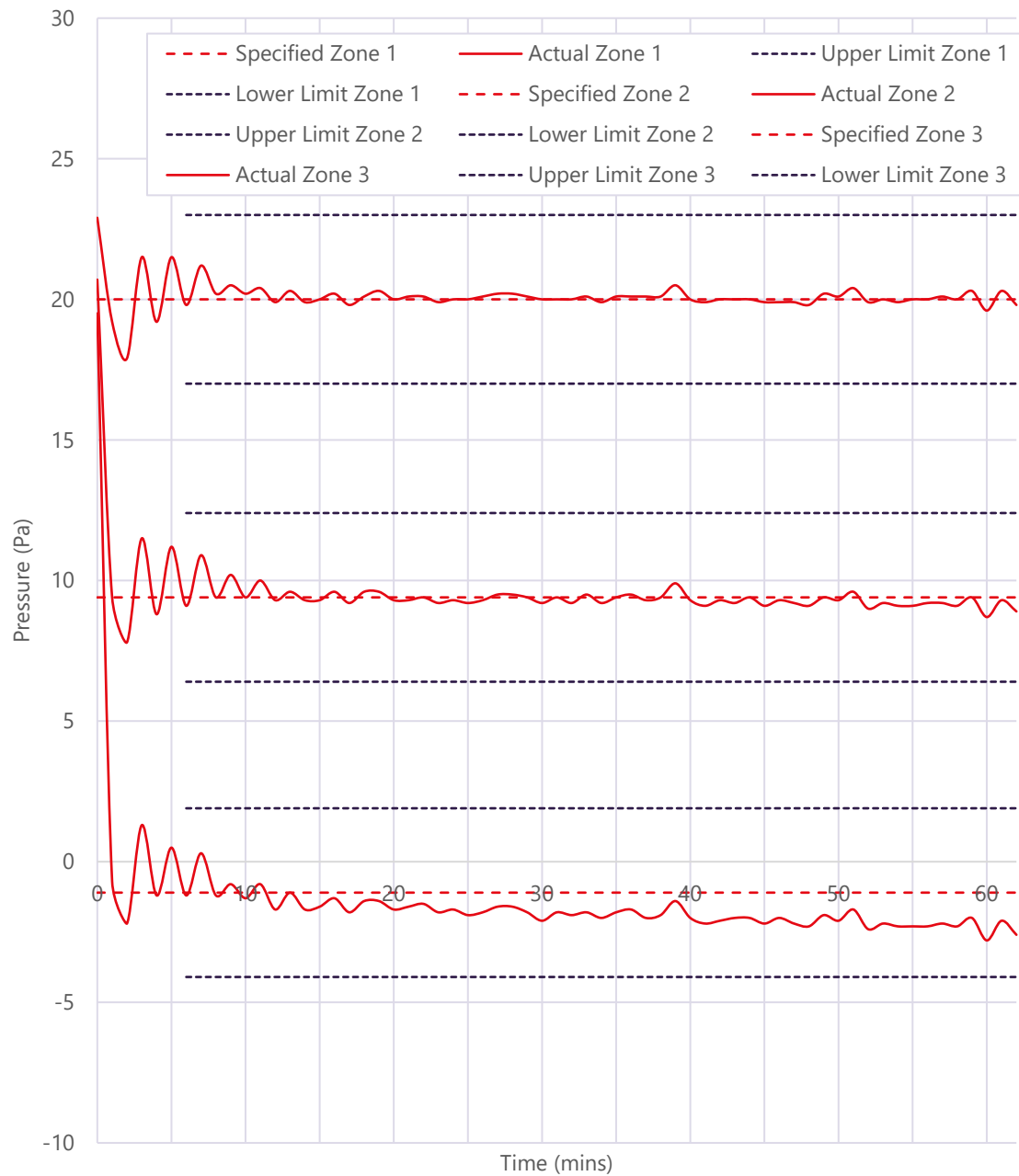


Figure 27 – Graph presenting the Time-Pressure distribution of the furnace

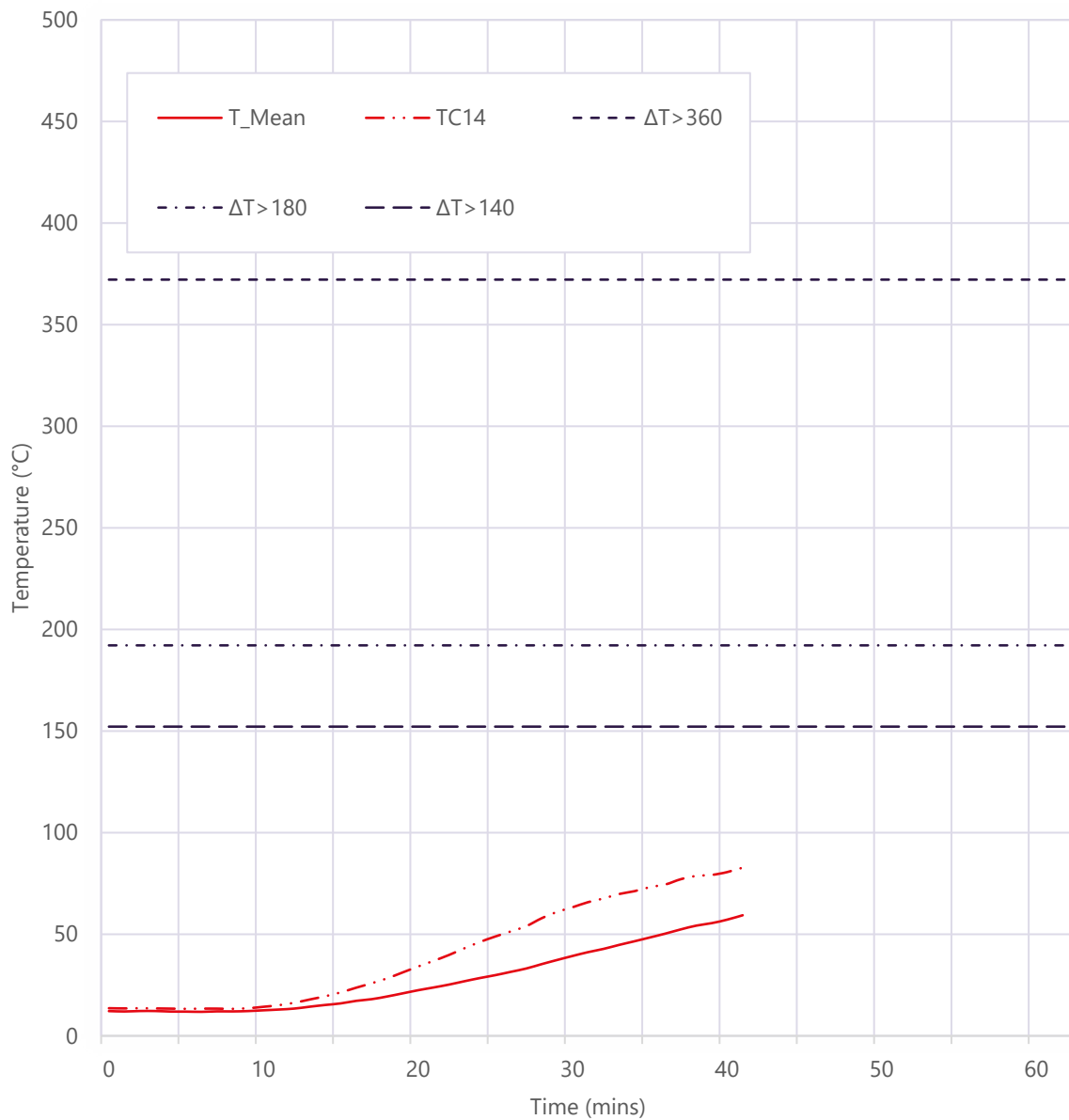


Figure 28 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen A

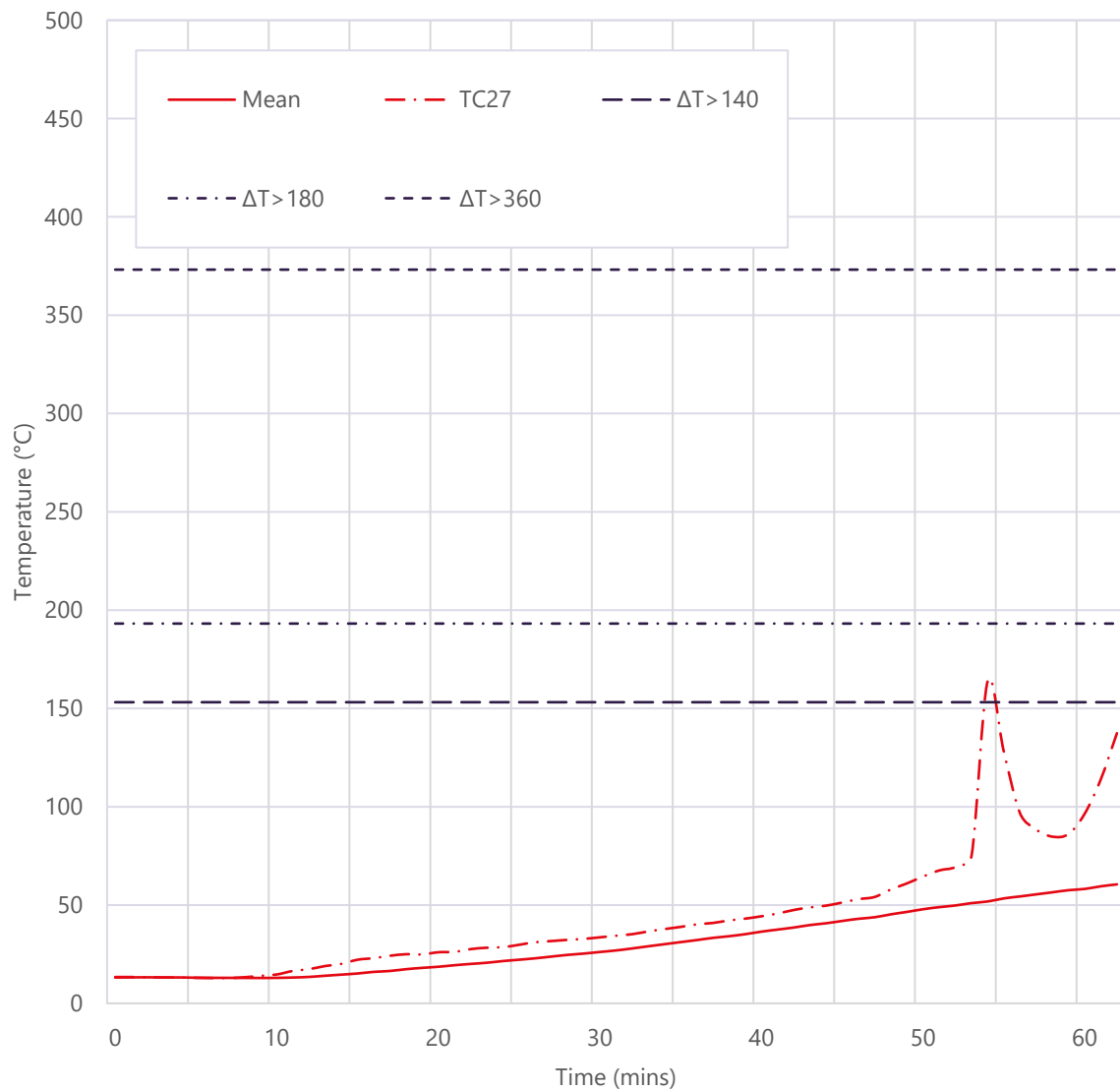


Figure 29 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen B

## Tables

Table 1 – The temperatures recorded by the disc thermocouples used evaluate the mean and maximum temperature rise of the unexposed surface of Specimen A under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC1	TC2	TC3	TC4	TC5
0	12.9	11.8	12.8	11.6	11.8
3	12.8	11.3	13.7	11.5	11.8
6	12.4	10.4	13.0	11.5	11.8
9	12.4	*	12.8	11.7	11.9
12	13.5	*	14.1	13.2	12.9
15	16.0	*	16.6	16.2	15.1
18	19.6	*	20.2	19.7	18.0
21	24.4	*	24.8	24.1	21.9
24	29.5	*	30.0	28.0	26.3
27	34.0	*	35.1	32.1	31.4
30	40.6	*	41.7	37.3	37.7
33	46.0	*	47.6	41.8	43.6
36	51.2	*	54.3	46.4	49.4
39	56.7	*	59.5	50.5	55.2
41	*	*	*	*	*

\* Specimen Blanked Off.

Table 2 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the door leaf of Specimen A under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC16	TC17	TC18	TC19	TC20	TC21
0	11.7	13.7	13.6	13.1	13.7	12.4
3	11.6	13.5	13.1	13.3	13.5	12.4
6	11.5	13.2	12.8	12.7	13.2	12.1
9	11.7	13.1	12.7	12.6	13.4	12.1
12	14.4	15.0	13.8	14.6	15.5	12.8
15	18.5	18.6	15.7	17.9	19.0	14.6
18	23.1	22.4	18.5	22.1	22.7	17.6
21	27.6	26.0	21.9	26.4	26.7	21.6
24	32.1	29.6	26.0	30.9	31.1	26.2
27	36.2	33.0	29.9	34.4	35.3	30.9
30	41.6	38.6	36.5	40.4	41.5	36.3
33	46.2	43.4	42.5	45.1	47.3	42.0
36	50.6	47.8	48.5	49.0	53.0	48.1
39	54.4	52.7	55.5	54.6	59.5	53.9
41	*	*	*	*	*	*

\* Specimen Blanked Off.

Table 3 – The temperatures recorded by the disc thermocouples used evaluate the maximum temperature rise of the door leaf of Specimen A under the supplementary procedure (I<sub>1</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC10	TC11	TC12	TC13	TC14	TC15
0	12.5	13.8	13.6	13.0	13.6	12.3
3	12.3	13.4	13.4	15.6	13.5	12.2
6	12.4	13.3	13.0	14.1	13.4	12.1
9	12.6	13.3	12.8	13.8	13.6	12.6
12	16.8	16.0	14.2	16.7	16.3	15.0
15	25.5	20.3	17.1	21.4	21.4	20.1
18	35.1	25.7	21.6	27.1	28.3	27.7
21	44.3	32.2	27.9	33.6	36.9	37.7
24	51.9	39.9	35.4	40.5	46.2	47.7
27	57.3	47.6	43.3	46.3	54.0	55.6
30	61.1	57.2	53.9	55.3	63.3	61.3
33	63.5	65.2	61.2	60.4	69.8	65.4
36	65.6	70.7	65.9	64.6	74.5	69.3
39	67.2	74.3	70.1	69.5	79.2	71.9
41	*	*	*	*	*	*

\* Specimen Blanked Off.

Table 4 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the frame members adjacent to the door leaf of Specimen A. Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC6	TC7	TC8	TC9
0	13.8	13.0	13.2	12.2
3	13.6	12.7	13.1	12.1
6	13.5	12.3	12.7	11.9
9	13.5	12.3	12.5	11.9
12	13.4	16.8	24.0	12.0
15	12.7	19.7	32.1	13.7
18	+	22.4	34.4	16.8
21	+	24.3	33.2	20.4
24	+	25.6	29.4	23.7
27	+	25.7	27.2	26.4
30	+	27.9	28.0	29.7
33	+	28.9	27.6	31.8
36	+	29.2	29.0	33.2
39	+	29.4	30.7	34.4
41	*	*	*	*

\* Specimen Blanked Off.

+ Thermocouple Malfunction.

Table 5 – The temperatures recorded by the disc thermocouples used evaluate the mean and maximum temperature rise of the unexposed surface of Specimen B under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC22	TC23	TC24	TC25	TC26
0	13.2	13.2	12.9	13.4	13.1
3	13.3	13.6	12.8	13.3	12.9
6	13.0	13.3	12.7	13.3	12.7
9	12.8	13.1	12.7	13.3	12.7
12	12.8	13.1	12.7	13.3	15.4
15	13.3	13.6	13.2	13.9	22.0
18	14.6	14.5	13.9	15.4	28.5
21	16.5	16.0	15.4	17.7	31.4
24	18.7	18.1	17.0	20.2	33.6
27	21.2	20.9	19.0	22.7	35.2
30	23.9	24.2	21.6	25.6	35.4
33	27.3	28.4	24.5	28.6	36.4
36	31.4	32.6	27.6	31.7	37.7
39	35.6	36.8	30.9	34.9	37.8
42	40.6	41.3	34.7	38.5	37.8
45	45.2	45.5	38.1	42.0	38.8
48	49.5	50.0	42.4	45.7	38.8
51	54.6	54.1	46.4	49.3	40.3
54	58.4	58.0	50.3	52.1	40.3
57	62.8	61.7	54.6	55.9	42.2
60	66.5	64.7	57.8	58.3	43.7
62	68.4	66.8	60.7	61.4	45.3



Table 6 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the door leaf of Specimen B under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC37	TC38	TC39	TC40	TC41	TC42
0	13.7	13.9	13.4	13.6	12.5	13.6
3	13.5	13.9	13.5	13.7	12.5	13.5
6	13.3	13.6	13.3	13.5	12.4	12.9
9	13.7	13.4	13.0	13.4	12.4	12.4
12	14.3	13.5	13.1	13.4	12.5	12.7
15	15.2	13.9	13.5	14.1	13.0	14.2
18	15.9	14.6	14.5	15.4	14.2	16.6
21	16.6	15.9	16.4	17.4	16.0	19.5
24	18.1	17.6	19.3	19.6	18.0	22.1
27	20.3	19.7	22.6	22.1	20.4	24.0
30	22.1	22.1	26.4	24.9	23.2	26.8
33	24.9	25.3	30.3	28.0	26.4	28.9
36	28.5	29.0	34.6	31.6	30.1	30.4
39	32.3	32.7	38.8	35.4	33.8	32.0
42	36.2	36.7	43.1	39.4	37.8	28.2
45	40.3	40.8	46.8	43.1	41.7	*
48	44.8	45.0	50.8	46.9	45.9	*
51	49.9	49.9	54.8	51.1	50.0	*
54	56.7	53.9	58.7	54.9	53.8	*
57	59.9	57.9	62.6	58.7	57.9	*
60	63.5	61.6	66.0	62.2	60.9	*
62	66.2	64.2	68.1	64.5	63.7	*

\* Thermocouple Malfunction.

Table 7 – The temperatures recorded by the disc thermocouples used evaluate the maximum temperature rise of the door leaf of Specimen B under the supplementary procedure (I<sub>1</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC31	TC32	TC33	TC34	TC35	TC36
0	12.8	14.4	13.8	14.4	13.2	12.9
3	12.4	14.9	18.2	14.3	13.2	12.8
6	11.9	15.3	20.4	14.5	13.1	12.8
9	*	15.2	18.5	14.2	13.1	12.7
12	*	15.8	18.4	14.6	13.6	12.9
15	*	16.6	19.4	15.3	15.4	13.6
18	*	18.0	22.5	17.2	19.5	14.6
21	*	20.4	28.8	20.3	25.3	16.2
24	*	23.7	38.5	24.5	32.2	17.9
27	*	28.0	46.8	29.9	39.0	19.7
30	*	33.6	48.9	35.4	45.3	21.5
33	*	39.3	50.9	42.4	50.7	24.6
36	*	45.4	51.2	49.0	55.1	28.0
39	*	50.7	51.7	54.1	58.7	31.6
42	*	57.1	53.1	58.9	62.0	35.9
45	*	59.8	54.9	62.6	65.0	40.3
48	*	64.6	57.1	65.1	67.3	45.0
51	*	68.5	62.0	68.0	69.2	49.7
54	*	72.2	65.5	68.7	71.0	54.4
57	*	75.8	72.6	71.0	72.9	58.7
60	*	80.8	85.6	78.0	74.7	62.2
62	*	86.5	88.1	82.5	76.0	64.6

\* Thermocouple Malfunction.

Table 8 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the frame members adjacent to the door leaf of Specimen B. Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC27	TC28	TC29	TC30
0	13.4	14.4	13.0	12.6
3	13.2	14.0	13.0	12.5
6	12.9	13.7	12.8	12.4
9	14.0	13.5	12.8	12.4
12	17.4	14.0	13.0	12.6
15	22.2	16.3	16.4	14.2
18	25.0	18.5	20.2	16.9
21	26.2	21.3	21.4	20.8
24	28.6	23.7	23.1	25.4
27	31.7	26.1	24.7	30.4
30	33.6	27.9	25.6	34.7
33	36.6	30.5	26.0	39.3
36	40.2	32.4	26.3	43.2
39	43.1	33.9	26.2	47.1
42	47.5	35.4	26.3	51.1
45	51.3	36.7	27.2	54.8
48	57.9	37.7	28.2	58.2
51	67.6	39.4	30.4	61.5
54	163.9	40.4	28.5	64.1
57	*	42.1	29.3	67.1
60	*	44.6	28.8	69.0
62	*	46.7	30.3	70.6

\*Thermocouple malfunction