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	20230612-003815
Report ID	TR20230612-003815
Revision	A
Issue Date	31 August 2023
Prepared For	Vistamatic Ltd Unit 4 62-70 Fowler Road Hainault Essex

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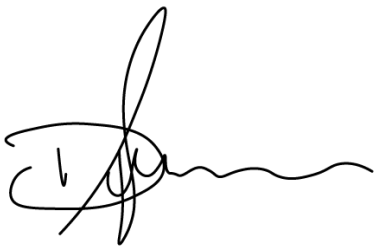
Change History

Issue Date	Revision	Created by	Authorised by	Description of Change
31/08/2023	A	NS	DF	Initial Issue

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

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1 Executive Summary

1.1 Specimen Summary

Specimen A and B had overall nominal dimensions of 985 mm wide by 2073 mm high, incorporating a single door leaf with overall dimensions of 915 mm wide by 2040 mm high by 54 mm thick. The door leaf was formed from graduated density chipboard with 8 mm thick hardwood lippings to all edges of the core. The leaf featured a vision panel with overall dimensions of 528 mm wide by 1528 mm high. The leaf was hung in a hardwood frame on three steel hinges and incorporated the following hardware:

Item No.	Description	Reference
11	Door Closer	TS9205
12	Lockset	ZDL7255RSS

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 16 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 away from 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 Specimen Conditioning

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of four days. Throughout this period, both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 16.4 °C to 18.1 °C and 62.0 % to 78.7 % respectively.

1.5 Instruction to Test

The test was conducted on 04 August 2023 at the request of the Test Sponsor. The test was remotely witnessed by Mr Mark Nash, a representative of the Test Sponsor.

1.6 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.

1.7 Expression of Results

1.7.1 Specimen A

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

Integrity (E)[1]	Sustained Flaming		30 minutes		
	Gap Gauge		31 minutes	Area blanked off	
	Cotton Pad		30 minutes		
Insulation (I_1)[2]	Specimen		30 minutes	Due to integrity failure	
Insulation (I_2)[3]	Specimen		30 minutes	Due to integrity failure	
	Vision panel		30 minutes	Due to integrity failure	
Radiation[4]	5 kW/m^2	10 kW/m^2	15 kW/m^2	20 kW/m^2	25 kW/m^2
	39 minutes *	39 minutes *	39 minutes *	39 minutes *	39 minutes *

*The test was discontinued after a period of 39 minutes.

[1] 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.

[2] 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.

[3] 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.

[4] BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m2 is reported.

1.7.2 Specimen B

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

Integrity (E)[5]	Sustained Flaming		39 minutes	No failure*	
	Gap Gauge		39 minutes	No failure*	
	Cotton Pad		39 minutes	No failure*	
Insulation (I_1)[6]	Specimen		39 minutes	No failure*	
Insulation (I_2)[7]	Specimen		39 minutes	No failure*	
	Vision panel		39 minutes	No failure*	
Radiation[8]	5 kW/m^2	10 kW/m^2	15 kW/m^2	20 kW/m^2	25 kW/m^2
	39 minutes *	39 minutes *	39 minutes *	39 minutes *	39 minutes *

*The test was discontinued after a period of 39 minutes.

[5] 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.

[6] 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.

[7] 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.

[8] BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m2 is reported.

2 Pre-test Examination

2.1 Operability Test

Sample A was opened from fully closed to maximum opening and back again 25 times prior to the commencement of the test in accordance with BS EN 16034:2014 § A.2.2.

Sample B was opened from fully closed to maximum opening and back again 25 times prior to the commencement of the test in accordance with BS EN 16034:2014 § A.2.2.

2.2 Self-Closing Test

Sample A was opened to 30° ± 2°, held for 20 ± 2 seconds and released without shock and allowed to close at a maximum mean average speed of 300 mm/s to ensure that a closed position was achieved in accordance with BS EN 16034:2014 § A.4.1.

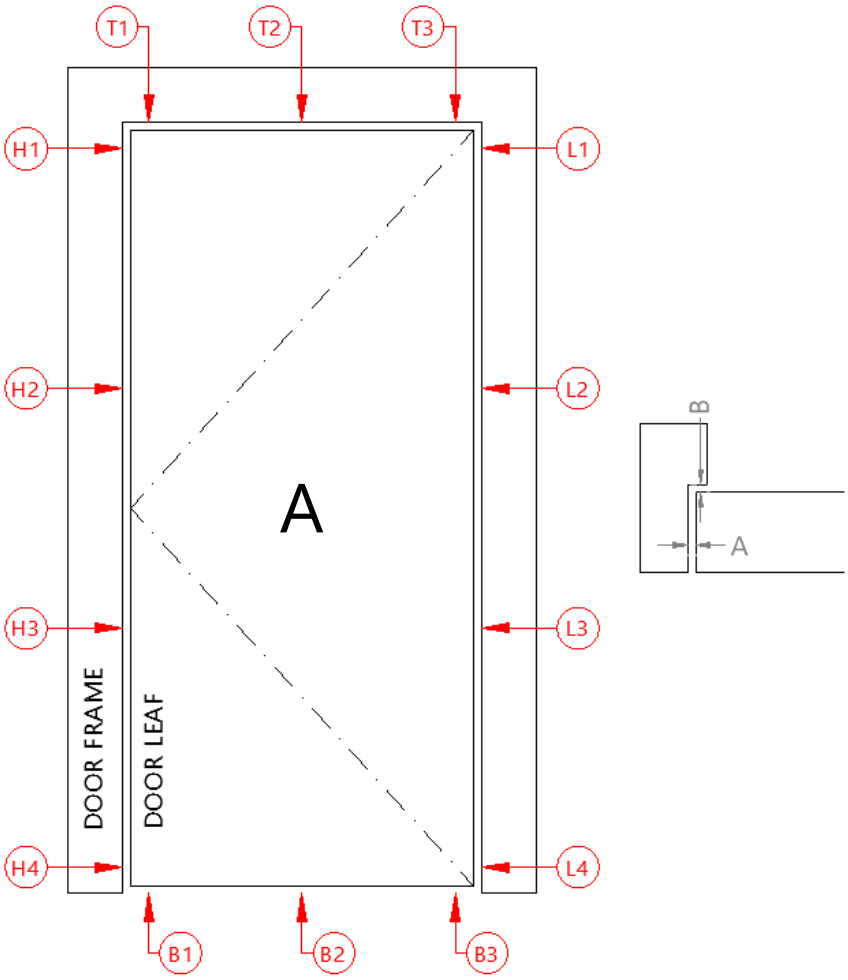
Sample B was opened to 30° ± 2°, held for 20 ± 2 seconds and released without shock and allowed to close at a maximum mean average speed of 300 mm/s to ensure that a closed position was achieved in accordance with BS EN 16034:2014 § A.4.1.

2.3 Closing Force Measurement

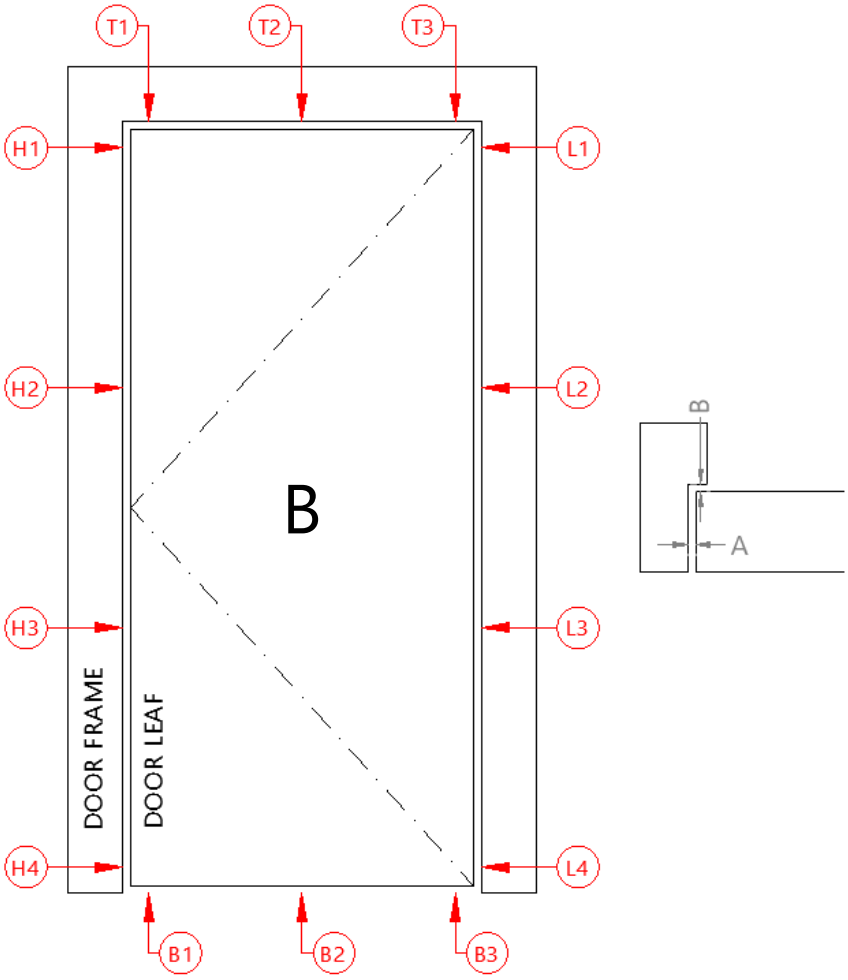
The door closing forces were measured and recorded three times. The results are presented below:

Measurement	Maximum Recorded Force (N)	Distance from Pivot to Measurement Location (m)	Moment (Nm)
Closing Force Specimen A	27.00	0.85	22.95
Opening Force Specimen A	58.90	0.85	*50.07*
Closing Force Specimen B	25.20	0.85	21.42
Opening Force Specimen B	57.00	0.85	48.45

2.4 Gap Measurements



Hanging Stile	A	B	Closing Stile	A	B
H1	3.2	0.1	L1	2.4	0.1
H2	3.1	0.1	L2	3.1	0.1
H3	3.1	0.1	L3	2.7	0.1
H4	3.0	0.1	L4	3.0	0.1
Mean	**3.1**		**Mean**	**2.8**	
Max	**3.2**		**Max**	**3.1**	
Min	**3.0**		**Min**	**2.4**	
Max Permitted	**5.2**		**Max Permitted**	**4.9**	
Top Edge	**A**	**B**	**Bottom Edge**	**A**	
T1	2.6	0.1	B1	1.9	
T2	2.5	0.1	B2	3.0	
T3	3.1	0.2	B3	2.9	
Mean	**2.7**		**Mean**	**2.6**	
Max	**3.1**		**Max**	**3.0**	
Min	**2.5**		**Min**	**1.9**	
Max Permitted	**4.9**		**Max Permitted**	**4.8**	



Hanging Stile	A	B	Closing Stile	A	B
H1	4.0	0.1	L1	2.5	0.1
H2	3.6	0.1	L2	2.6	0.1
H3	3.1	0.1	L3	3.0	0.1
H4	2.3	0.1	L4	3.4	0.1
Mean	**3.2**		**Mean**	**2.9**	
Max	**4.0**		**Max**	**3.4**	
Min	**2.3**		**Min**	**2.5**	
Max Permitted	**5.6**		**Max Permitted**	**5.1**	
Top Edge	**A**	**B**	**Bottom Edge**	**A**	
T1	3.0	0.1	B1	7.2	
T2	3.2	0.1	B2	1.7	
T3	2.5	0.1	B3	1.0	
Mean	**2.9**		**Mean**	**3.3**	
Max	**3.2**		**Max**	**7.2**	
Min	**2.5**		**Min**	**1.0**	
Max Permitted	**5.0**		**Max Permitted**	**7.2**	

3 Test Specimen Drawings

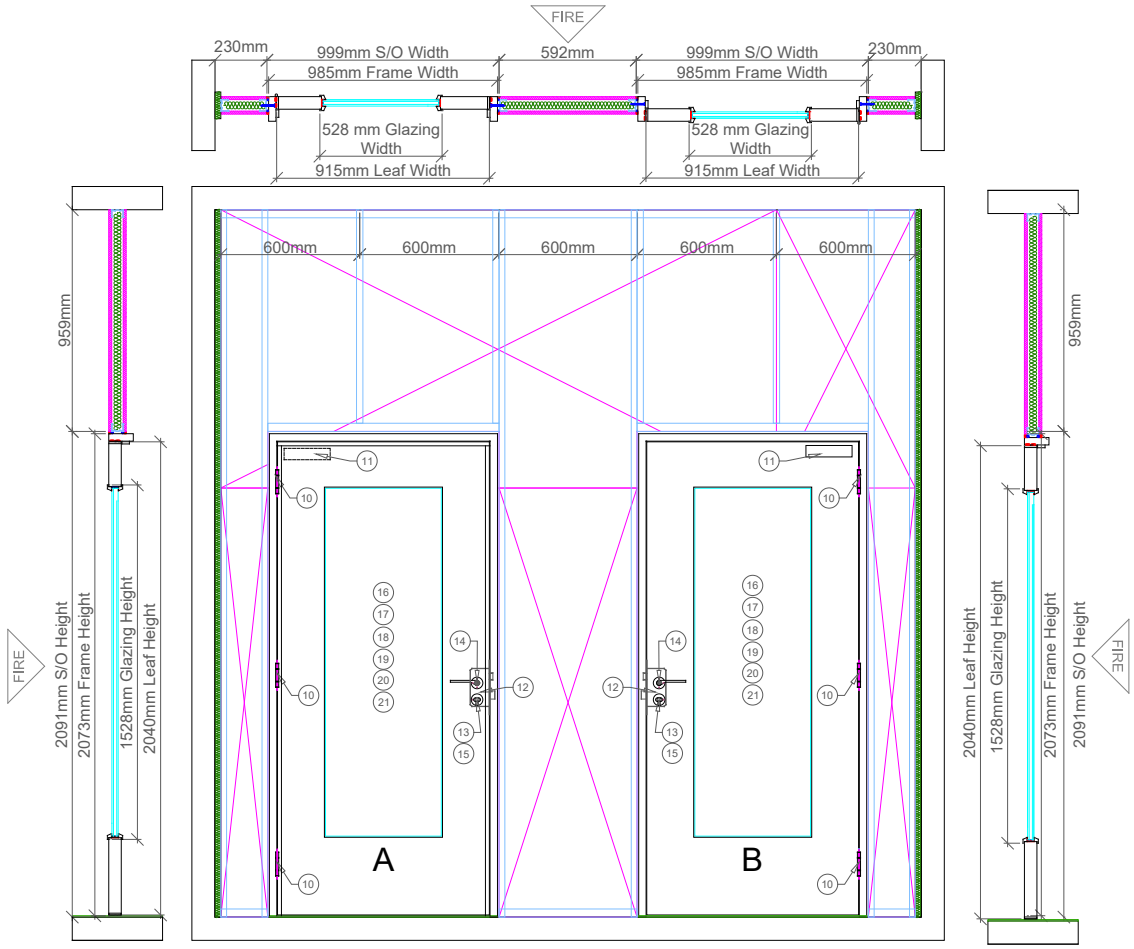


Figure 1 - General arrangement of test construction viewed from the unexposed surface

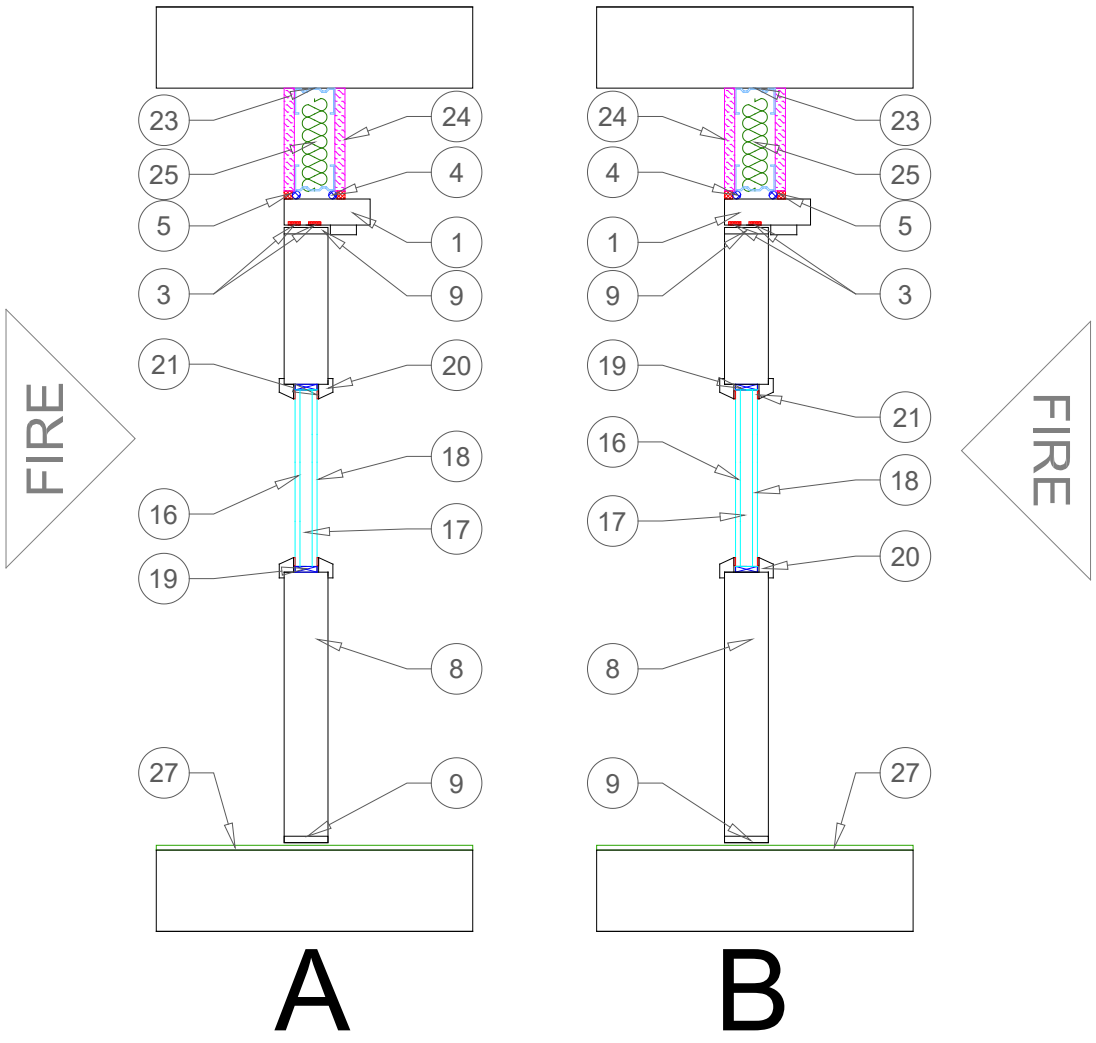


Figure 2 - Typical vertical section through the specimens

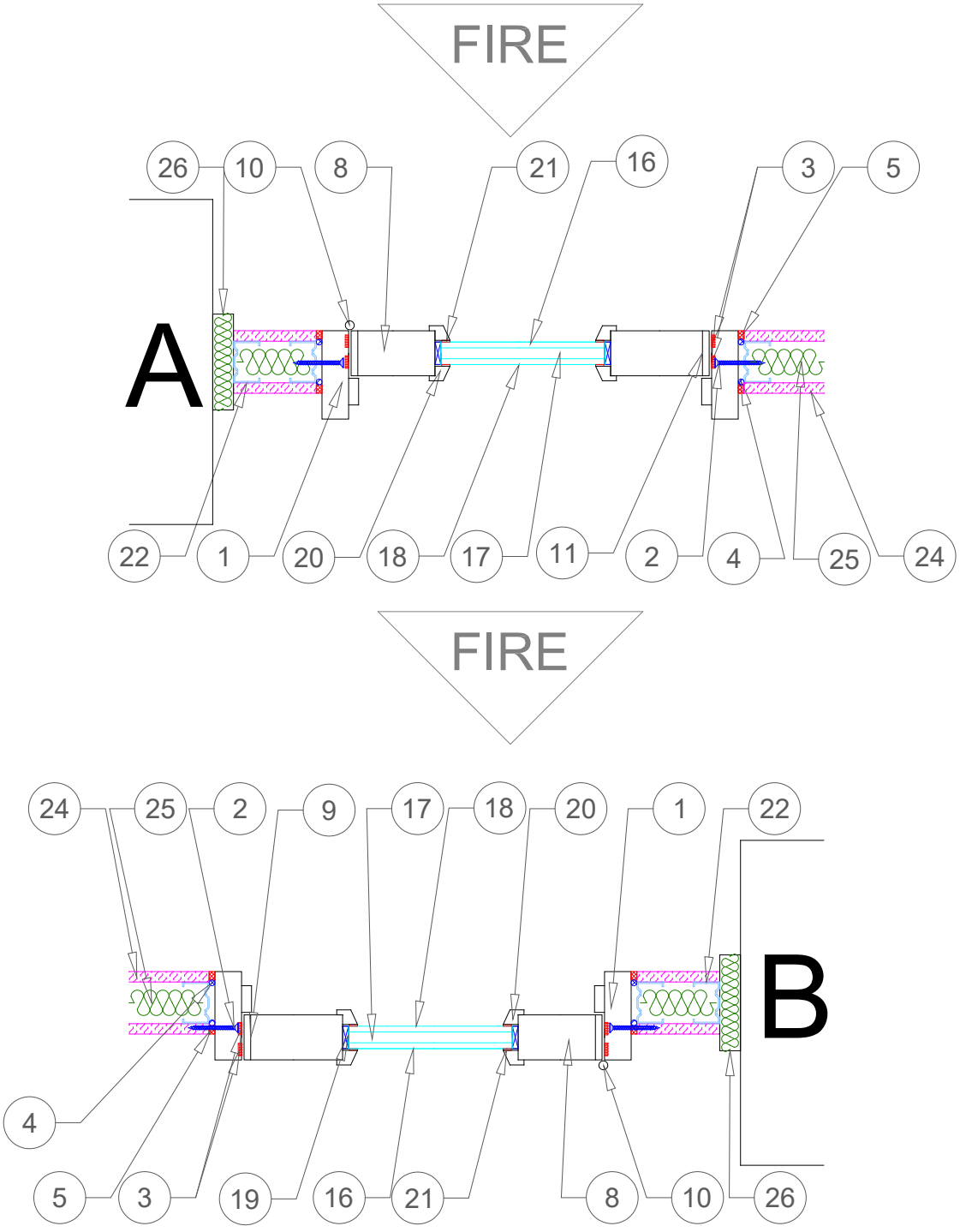


Figure 3 - Typical horizontal section through the specimens

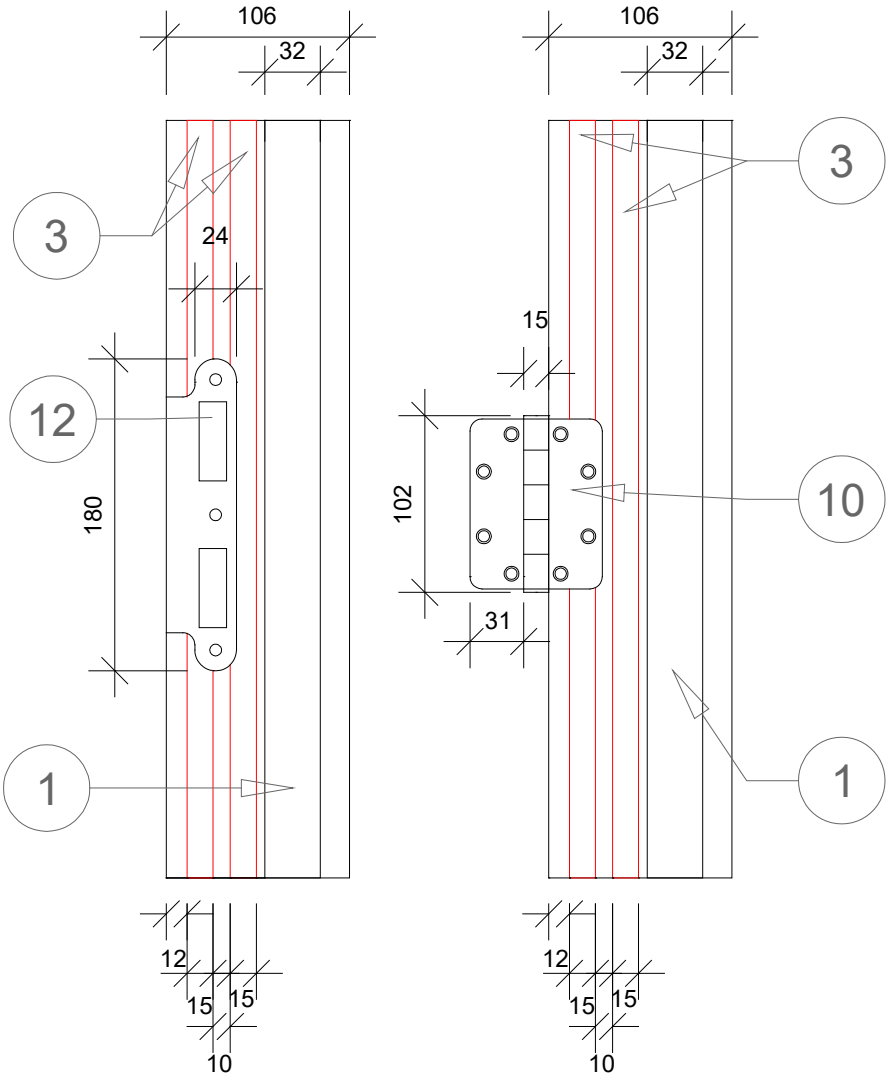


Figure 4 - Hardware intumescent interruptions

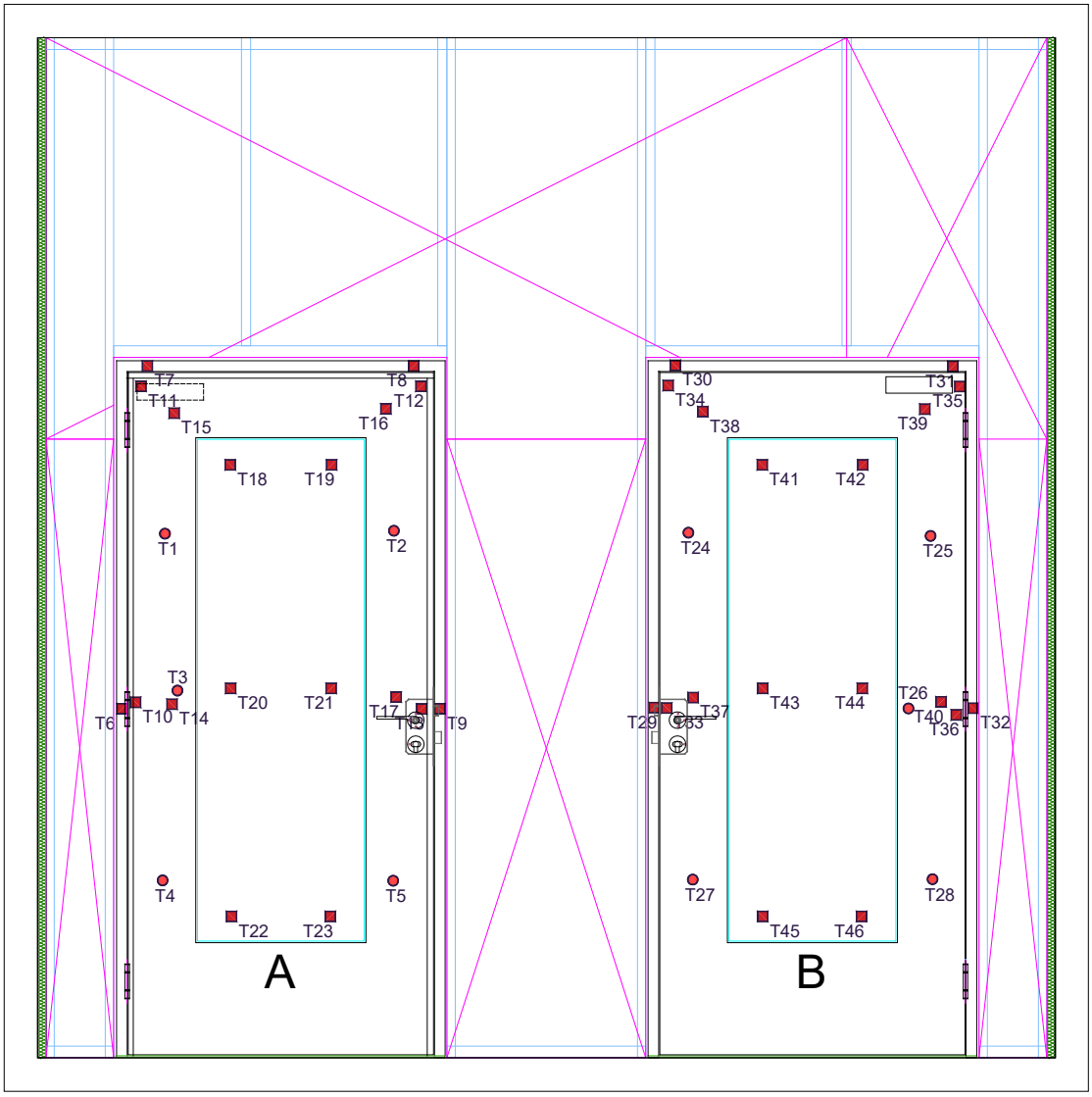


Figure 5 - Layout of instrumentation viewed from the unexposed surface of the test construction

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 + B

1. Frame	
Manufacturer	DorSuite
Reference	Redwood jambs and Head
Material	Redwood Head and Redwood Jambs
Density	520 kg/m^3
Moisture content	7.5% -8.3 % (Laboratory Measured Value)
Orientation to heating conditions	Specimen A: Opening towards Specimen B: Opening away
a. Overall size	985 mm wide x 2073 mm high x 106 mm deep
i. Frame (Head)	106 mm wide x 32 mm thick
ii. Frame (Jambs)	106 mm wide x 32 mm thick
iii. Stop	MDF 32 mm wide x 12 mm deep
Jamb to Head jointing method, fixing detail and location	Housed butt joint with PVA & 2 No. Ø 0.5 mm x 60 mm long wood screws.
Stop to Frame jointing method, fixing detail and location	Pinned with 1.8 mm gauge x 50 mm long steel pins @ 300 mm centres.
Adhesive(s)	N/a
2. Frame Fixing Method to Supporting Construction	
Manufacturer	Spax
Reference	4Cut
Type & material	Passivated Steel
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	No
Packing Material	Certitek DP-01
Packing Material Dimension	100 mm long x 30 mm Wide x Various thicknesses (1 mm, 2 mm, 3 mm, 5 mm)
Packing Material Location	At each fixing location up frame
3. Intumescent to frame reveal	
Quantity	2
Manufacturer	Pyroplex
Reference	8700
Material	PVC encapsulated Graphite
Overall section size	15 mm wide x 4 mm thick
Application method	Adhesive strip to back
Location (relative to the opening face of the door leaf)	12 mm in from face of frame with a 10 mm space between the first line of intumescent and the second one
Adhesive(s)	N/a
4. Frame to supporting construction fire stopping detail	
Manufacturer	Certitek
Reference	Certirod
Material	Closed Cell Backer rods
Overall dimension	10 mm and 6 mm
Application method	Friction fitted
5. Sealant to fire stopping detail	
Manufacturer	Certitek
Reference	DM-01
Material	Acrylic Intumescent Mastic
Overall section size	7-12 mm wide x 10 mm deep
Application method	Cartridge gunned
Location	Both Faces of Doorset
6. Architrave	
Manufacturer	DorSuite

Reference	MDF Architraves
Material	MDF
Overall section size	70 mm wide x 15 mm thick
Location	Each side of frame
Application method, fixings and fixing frequency required	Pinned with 1.8 mm gauge x 50 mm long steel pins @ 300 mm centres.
7. Door Leaf	
Manufacturer (blank)	DorSuite
Reference	Epicore 54
Quantity of leaves on doorset	1
Glazing location relative to the head and closing edge	200 mm from the head of the leaf and 207 mm from the closing edge of the leaf
Overall leaf size supplied for testing	915 mm wide x 2040 mm high x 54 mm thick
Door Undercut (Top of cill / bottom of frame)	3 mm
8. Core element	
Manufacturer	Halspan
Reference	Optima 54
Material	Chipboard
Density	620 kg/m3
Overall thickness	54 mm thick
Application method	N/a
9. Lippings / Edge banding	
Manufacturer	DorSuite
Reference	LIP-0000
Material	Sapele
Density	640 kg/m3
Moisture content	7.4% -7.9 % (Laboratory Measured Value)
Overall size	8 mm deep x 54 mm wide
Fixing method	Edge bander
Location	All edges of the door leaf
a. Adhesives	

i. Manufacturer	Henkel
ii. Type	PUR
iii. Reference	Technomelt PUR 270/7G
iv. Curing method	Moisture Cured
v. Application method	Roller applied
b. Presence of Mechanical Fixings	
i. Type, size, Material, location and Frequency	No
10. Hinges	
Supplier	ZOO
Reference	ZOO Hinge Stainless Steel
Quantity	3
Primary material	Satin Stainless Steel
Type	Butt Hinge
a. Size	
i. Knuckle	Ø 14.5 mm x 102 mm high
ii. Blades	102 mm high x 31 mm wide x 3 mm thick
b. Fixings	
i. Type	Countersunk Screws
ii. Material	Stainless Steel
iii. Size	Ø 4.7 mm x 31 mm long
iv. Number off per blade	4
Position of each hinge relative to the head of the leaf	Top: 120 mm Middle: 934 mm Bottom: 1748 mm
Details of intumescent protection	1 mm interdens intumescent
Interruptions to Intumescent within the frame reveal	Partly interrupted
11. Door Closer	
Manufacturer	Rutland

Reference	TS9205
a. Material	
i. Body	Mild Steel
ii. Closer arm	Mild Steel
iii. Cover	Stainless Steel
Configuration	Figure 1
b. Overall size	
i. Body	67 mm high x 220 mm wide x 44 mm deep
ii. Cover	68 mm high x 225 mm wide x 45 mm deep
Fixing method	4No. Ø 4.8 mm x 50 mm on body and 2No. Ø 4.8 mm x 50 mm on bracket into frame
12. Lockset	
Supplier	DorSuite
Supplier reference	Euro Profile Sashlock
Reference	ZDL7255RSS
a. Material	
i. Lockcase	Stainless Steel
ii. Forend plate	Stainless Steel
iii. Latch bolt	Stainless Steel
iv. Lock bolt	Stainless Steel
v. keeper	Stainless Steel
b. Overall sizes	
i. Central Lockcase	165 mm high x 15 mm wide x 80 mm deep
ii. Forend plate	235 mm high x 22 mm wide x 3 mm thick
iii. Latch bolt	30 mm high x 12 mm wide x 12 mm projection
iv. Lock bolt	35 mm high x 9 mm wide x 20 mm single projection
v. Keeper	180 mm high x 24 mm wide x 3 mm thick
Fixing method	5No. Ø 3.8 mm x 25 mm steel screws
Operation of latch bolt	Engaged

Operation of lock bolt	Disengaged
c. Details of intumescent protection	
i. Central Lockcase	1 mm interdens
ii. Forend plate	1 mm interdens
iii. Keeper	1 mm interdens
Interruptions to Intumescent within the frame reveal	N/A
Interruptions to Intumescent at meeting stile / leading edge.	Fully
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
13. Cylinder	
Manufacturer	ARC
Reference	30/30
Material	Stainless Steel
Overall size	33 mm high x 18 mm wide x 60 mm long
14. Lever handles	
Manufacturer	DorSuite
Reference	PP11030907 Distinct
Material	Stainless Steel
Overall size	Ø 19 mm x 52 mm x 8 mm & Spindle 80 mm x 8 mm x 8 mm
Location	1020 mm from bottom of door
Fixing method, fixing material, sizes, quantity and location	4No Ø 4 mm x 30 mm steel screws, 2 No 4 mm x 60 mm bolt through fixings
Details of intumescent protection	N/A
15. Escutcheon	
Manufacturer	DorSuite
Reference	PP13010907
Material	Mild Steel
Overall size	Ø 50 mm x 8 mm thick
Location	Applied to both faces

Fixing method	2No. wood screws Ø 3.2 mm x 25 mm
Details of intumescent protection	N/A
16. Triple Glazed Unit (Pane 1)	
Manufacturer	Express Toughening
Reference	6 mm Toughened Glass
a. Specimen A	Exposed face
b. Specimen B	Unexposed face
Thickness	6 mm
17. Triple Glazed Unit (Pane 2)	
Manufacturer	Vistamatic
Reference	4 mm Clear Glass
a. Specimen A	Central Pane
b. Specimen B	Central Pane
Thickness	4 mm thick
18. Triple Glazed Unit (Pane 3)	
Manufacturer	Pilkington
Reference	15 mm Pyrostop
a. Specimen A	Unexposed face
b. Specimen B	Exposed face
Thickness	15 mm thick
19. Glass spacer	
Manufacturer	Vistamatic
Reference	MAX-XL – Lever operation
Material	Aluminium Spacer Bar – 5.5 mm
Overall size	1500 mm high x 500 mm wide x 27 mm thick
Fixing method	N/a
a. Presence of Adhesives to seal unit	Yes
i. Location	Hot Melt – perimeter seal
ii. Manufacturer	Bostik

iii. Type	Butyl
iv. Reference	N/a
v. Curing method	N/a
vi. Application method	N/a
20. Beading	
Manufacturer	DorSuite
Reference	Bolection bead
Material	Beech CND
Density	520 kg/m^3 *
Moisture content	7.1% -7.7 % (Laboratory Measured Value)
Overall size	528 mm wide x 1528 mm high
Cross Section Size	17.5 mm wide x 25 mm high
Fixing method, fixing material and sizes	Senco 50 mm x Ø 1.8 mm Pins 50 mm in from corners and at Max 150mm centres inserted at 25-30° to the plane of glass.
21. Glazing Intumescent	
Manufacturer	Seal Tight Solutions
Reference	STS 103GT
Material	Closed Cell foam tape
Overall size	10x3 mm
Fixing method	Adhesive strip to back

4.2 Supporting Construction

22. Studs	
Supplier/ Manufacturer	United Kingdom Testing and Certification
a. Type & Material	Rolled steel C-Stud
i. Dimensions	50 mm deep x 34 mm wide x 3000 mm long x 0.5 mm thick
ii. Stud centres	400-625 mm
iii. Fixing(s)	Friction fitted to the head/ floor track
Timber Inserts to Studs	No
23. Head/ Floor Track	
Supplier/ Manufacturer	United Kingdom Testing and Certification
Type & Material	Rolled steel U-Track
Dimensions	72 mm deep x 25 mm wide x 3000 mm long x 0.5 mm thick
Centres	600 mm Centres 20 mm Space between testing frame and wall frame for insulation.
Fixing(s)	Ø 7.5 x 50 mm long self-tapping screws staggered at max 600 mm centres
24. Lining(s)	
Supplier/ Manufacturer	United Kingdom Testing and Certification
Type & Material	Paper faced, gypsum plasterboard type F
Density	760 Kg/m^3
Layer Quantity	1
Dimensions	12.5 mm thick x 1200 mm wide x 2400 mm high
Fixings	Plasterboard Screw Fixings Ø 5 mm x 25 mm
Joints Filled & Taped With	No nonsense
25. Wall Insulation	
Supplier	United Kingdom Testing and Certification
Type & Material	Mineral Wool
Density	33 Kg/m^3
Installation Method	Compression Fitted

Thickness	50 mm
Locations	Centrally Located in the wall
Additional Wall Construction Requests	N/a
26. Free Edge Gasket	
Manufacturer	Morgan Advanced Materials
Reference	Superwool
Density	128 Kg/m^3
Dimensions	20 mm thick x 3025 mm long x 100 mm wide
Fixing(s)	Compression fitted between the supporting construction & restraint frame
27. Board for Simulated Floor Level	
Manufacturer	British Gypsum
Reference	Glasroc F MultiBoard 6mm
Density	833 Kg/m^3
Dimensions	6 mm thick x Opening width + 400 mm long x Wall Depth + 500 mm wide
Fixing(s)	Compression fitted between restraint frame and specimen.

5 Specimen Photographs

Figure 6 - Item 15 - 17

Figure 7 - Item 14 & 15

Figure 8 - Item 12

Figure 9 - Item 12

Figure 10 - Item 13

Figure 11 - Item 12

Figure 12- Item 21

Figure 13 - Item 9

Figure 14 - Item 15 - 17

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 ± 50 mm from the exposed surface of the test construction. The resulting Time-Temperature distribution is presented in Figure 24.

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 ± 5 Pa five minutes after the commencement of the test and ± 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 25.

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.

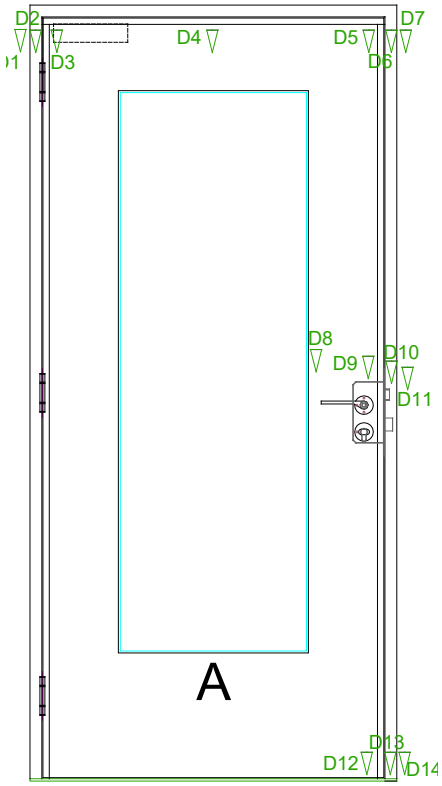
Disc thermocouples were affixed to the unexposed surface of the specimens in accordance with BS EN 1634-1:2014+A1:2018 § 9.1.2 to measure and monitor the maximum and the mean temperature rise of the unexposed surface of the specimens for the duration of the test. A summary of the measurements is presented in Figure 26 and Figure 27 and the locations of these thermocouples is illustrated in Figure 5.

6.4 Radiation

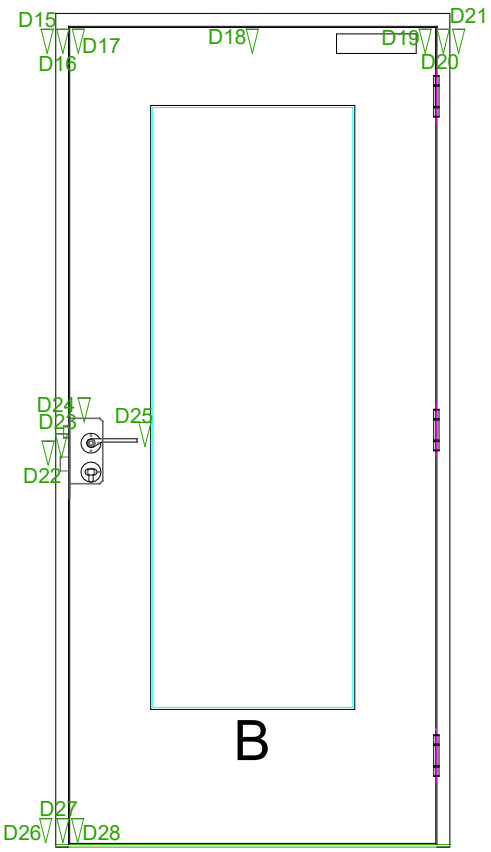
The Radiant Heat of the specimens was measured using 180º field of view, water cooled heat flux meters that were positioned at the geometric center of each specimen at a distance of 1000 mm from the unexposed surface. Measurements were recorded for the duration of the test and a summary of the recorded measurements is presented in Figure 28.

6.5 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
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	1	5	9	2	3	3	2	-5	2	2	-1	0	-1
20	4	5	15	15	6	10	8	5	7	5	4	-2	-2	-3
25	19	15	25	26	20	20	17	11	12	10	10	-2	0	-4
30	26	25	32	24	34	26	25	15	21	17	18	1	1	-3
35	30	32	36	40	41	39	30	20	24	22	21	1	1	-3



Time (mins)	D15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	2	4	2	1	1	-3	4	-1	3	-1	-2	2	-5
20	15	16	21	18	16	15	10	10	9	5	6	0	0	-9
25	22	26	35	26	26	24	19	16	16	9	9	-1	-1	-9
30	29	36	39	35	31	29	23	26	26	19	15	0	1	-9
35	37	51	56	46	38	38	32	29	26	25	18	0	3	-8

6.6 Observations

Specimen	HH	MM	SS	E[9]	U[10]	Observation
	00	**00**	**00**			**The test commences.**
A+B	00	01	05		X	Smoke/steam releases from leading edges of doors.
A+B	00	01	35		X	Glass cracking.
B	00	01	54		X	Smoke/steam at head and top of door.
A	00	02	10		X	Glass mid layer shatters mechanism at bottom.
A	00	04	13		X	Smoke/steam filling into glass cavity.
A	00	04	45		X	Exposed pane breaks and falls away at top right.
A	00	06	15		X	Glass intumescent reacting down from top right.
A	00	09	15		X	Glass intumescent turning brown.
A	00	12	35		X	Outer pane starting to shatter.
A	00	23	38		X	Piece of outer glass pops off.
A+B	00	25	53	X		Architraves starting to fall away.
A	**00**	**30**	**32**		**X**	**A flame emits and sustains for a period greater than 10 seconds, sustained flame failure is deemed to occur.**
A	**00**	**30**	**52**		**X**	**Cotton pad test applied to top left of the vision panel, cotton pad ignites. Cotton pad failure has occurred.**
A	**00**	**31**	**25**		**X**	**Mastic applied to vision panel. Gap gauge criteria is no longer applicable.**
B	00	35	42		X	Cotton pad test to top left of the vision panel, pad has no discolouring.
	00	**39**	**14**			**The test is discontinued at the request of the Test Sponsor.**

[9] Viewed from exposed surface of the test construction.
[10] Viewed from unexposed surface of the test construction.

6.7 Test Images

Figure 15 – The exposed surface of the test construction prior to commencement of the test

Figure 16 - The unexposed surface of the test construction prior to the commencement of the test

Figure 17 - The unexposed surface of the test construction after a test duration of 10 minutes

Figure 18 - The unexposed surface of the test construction after a test duration of 20 minutes

Figure 19 - The unexposed surface of the test construction after a test duration of 25 minutes

Figure 20 - The unexposed surface of the test construction after a test duration of 30 minutes

Figure 21 - The unexposed surface of the test construction after a test duration of 35 minutes

Figure 22 - The unexposed surface of the test construction after a test duration of 39 minutes

Figure 23 - 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. The following resolutions have been followed when conducting this test:

1. EGOLF AGREEMENT 034-2018 – Use of cotton pad in fire resistance tests.
2. EGOLF AGREEMENT 036-2018 – Discontinuity-different interpretations.

8 Figures

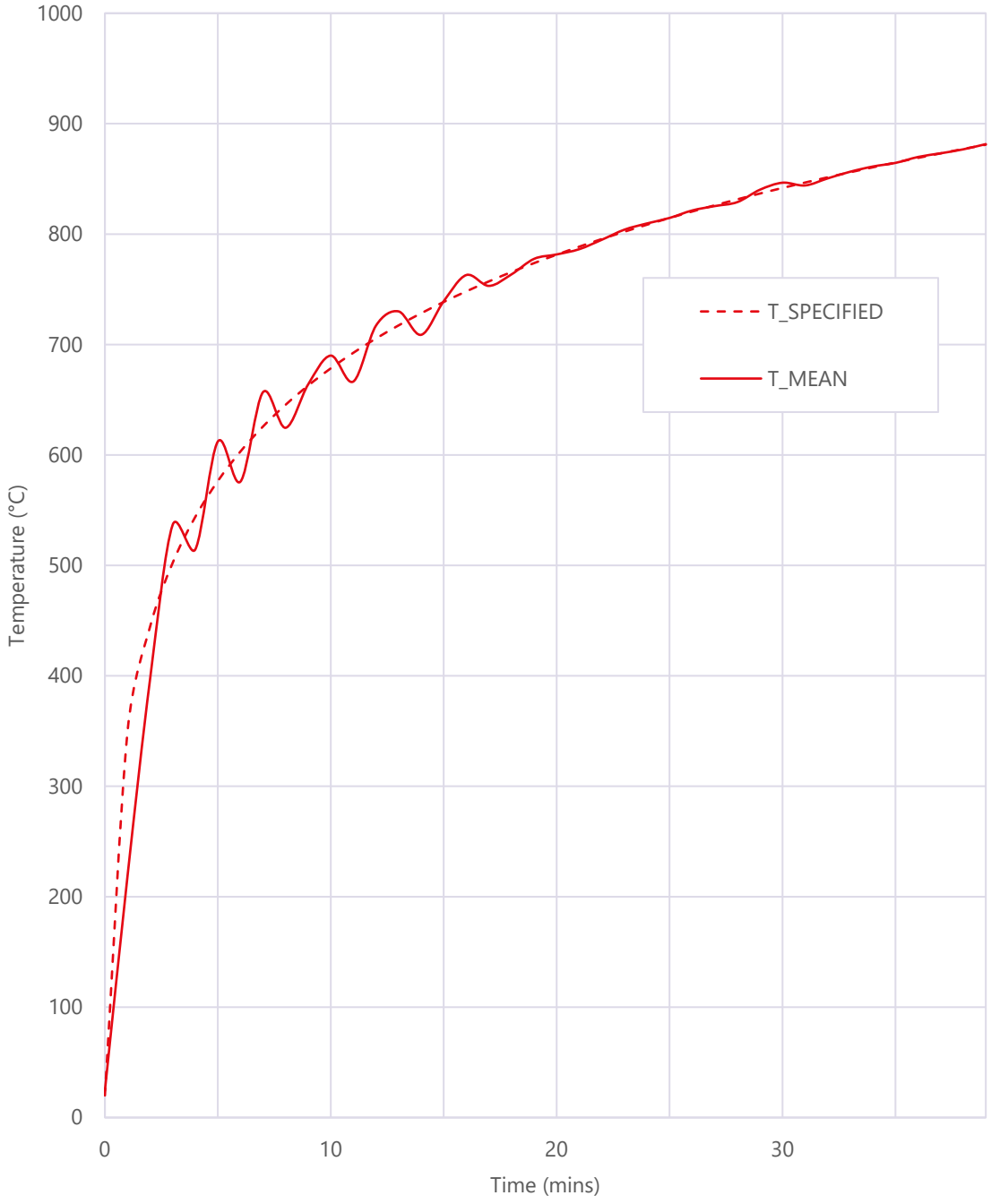


Figure 24 – Graph presenting the Time-Temperature distribution of the furnace

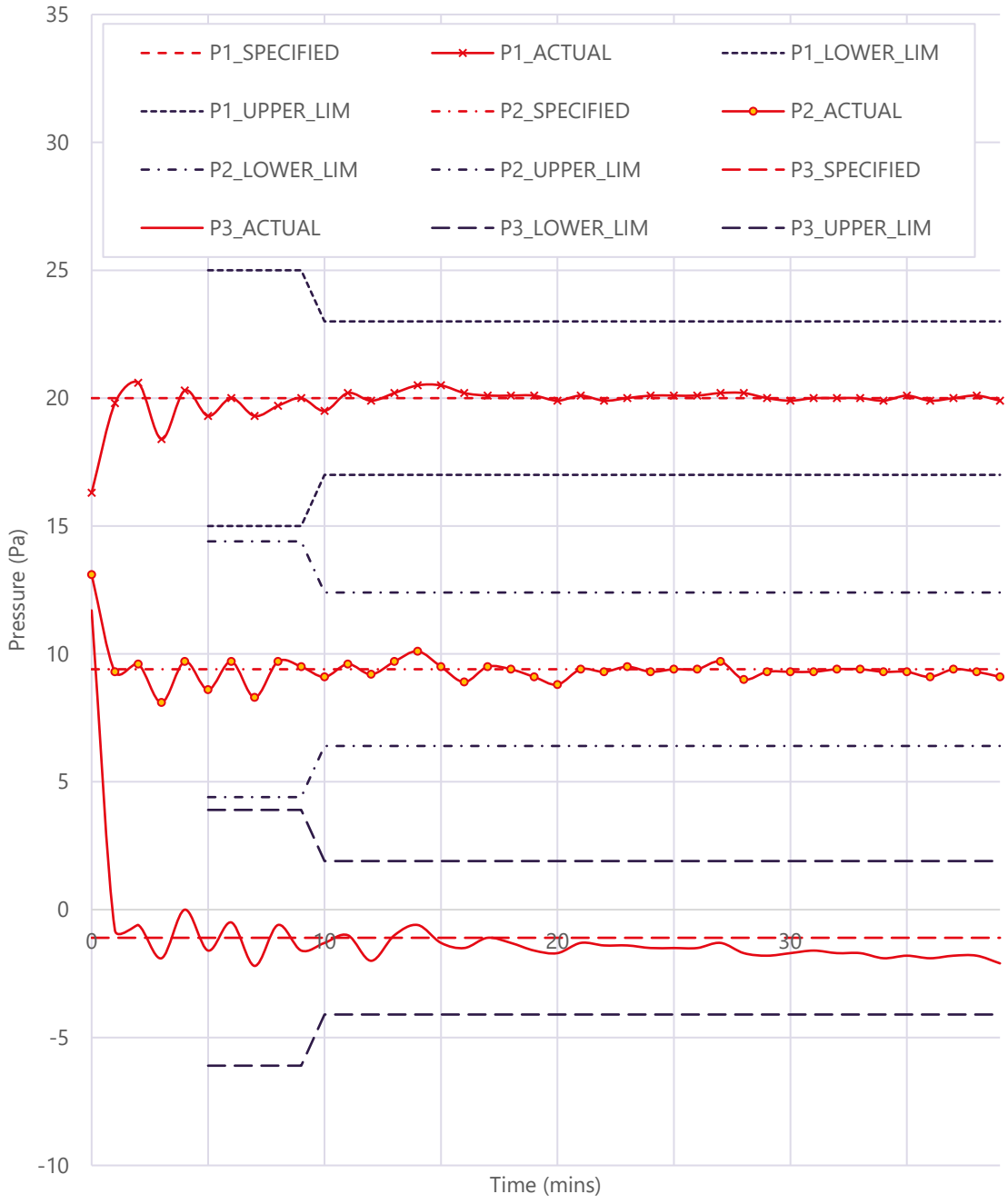


Figure 25 – Graph presenting the Time-Pressure distribution of the furnace

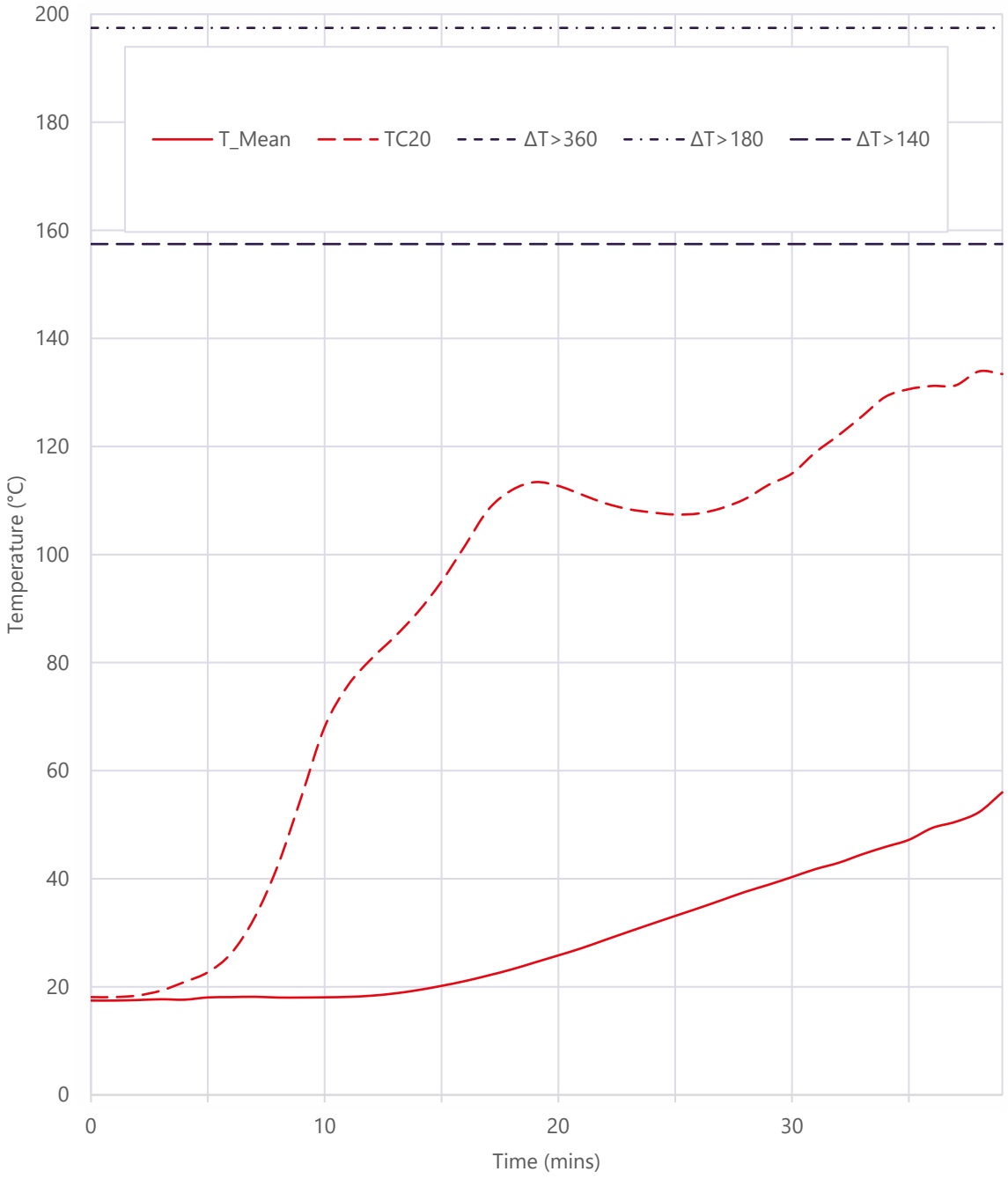


Figure 26 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen A

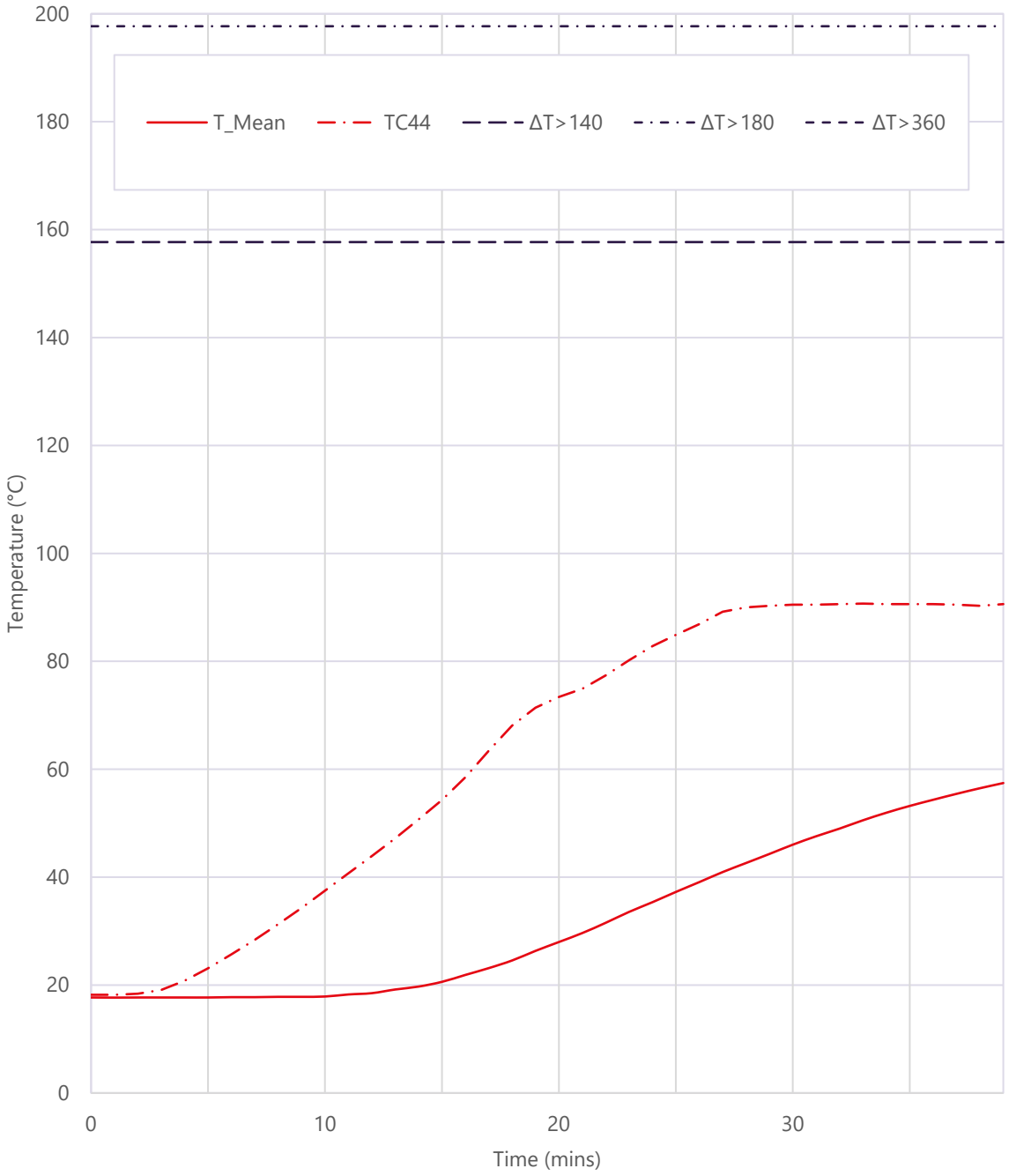


Figure 27 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen B

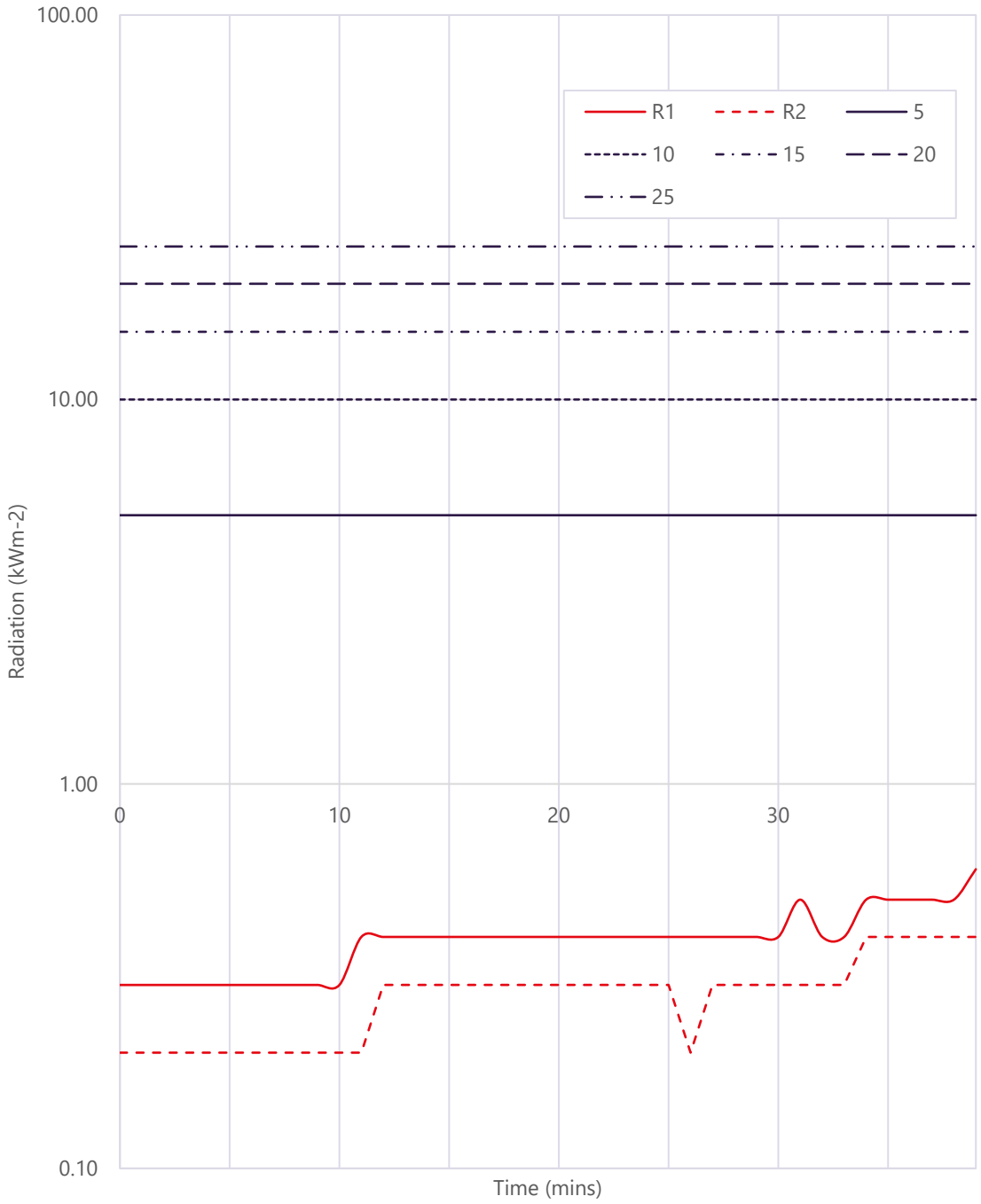


Figure 28 - Graph presenting Time-Radiation distribution of the unexposed surface of the specimens

9 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_2). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC1	TC2	TC3	TC4	TC5
0	17.6	17.7	17.4	17.4	17.2
2	17.6	18.1	17.4	17.4	17.3
4	17.6	18.1	17.6	17.4	17.4
6	17.7	18.2	19.8	17.5	17.3
8	18.2	18.2	18.7	17.6	17.4
10	18.3	18.4	18.5	17.7	17.4
12	18.4	19.2	18.7	17.8	17.7
14	19.5	20.3	19.9	18.7	18.6
16	21.5	22.2	21.6	20.1	19.9
18	23.9	24.5	23.8	22.2	21.7
20	26.8	27.1	26.5	24.7	24.0
22	30.1	29.8	29.6	27.3	26.6
24	33.3	32.7	32.7	30.2	29.4
26	36.6	35.3	35.8	33.0	32.1
28	40.2	38.0	39.4	35.7	34.6
30	43.7	40.6	42.5	37.5	37.3
32	46.2	43.9	44.7	40.1	39.9
34	50.2	46.1	47.7	42.8	42.7
36	54.1	48.8	53.3	45.5	45.3
38	57.0	51.5	56.7	48.5	47.9
39	61.8	52.4	67.0	49.8	49.0

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_2). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC14	TC15	TC16	TC17
0	17.3	17.4	17.2	18.2
2	17.3	17.4	17.3	18.5
4	17.3	17.4	17.9	18.7
6	17.6	17.5	18.0	18.9
8	17.6	17.7	17.8	18.8
10	17.5	17.8	17.9	19.8
12	17.7	17.8	18.2	21.8
14	18.6	18.2	18.8	24.3
16	20.1	19.1	19.6	27.2
18	22.0	20.3	21.0	30.6
20	24.4	21.9	22.6	34.0
22	27.0	23.9	24.4	37.1
24	29.7	25.7	26.5	40.7
26	32.5	28.0	28.8	43.8
28	35.4	30.4	31.1	46.8
30	38.0	33.0	33.5	50.0
32	40.1	35.0	37.0	53.5
34	42.9	38.1	39.0	56.8
36	45.5	41.3	41.6	60.4
38	47.7	43.9	44.7	64.3
39	50.1	47.0	46.6	66.1

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_1). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC10	TC11	TC12	TC13
0	17.9	17.7	17.9	17.4
2	17.9	17.7	28.0	22.2
4	17.9	17.8	35.0	30.3
6	18.1	18.0	35.6	38.3
8	18.2	18.7	42.7	31.8
10	18.4	20.2	39.6	32.3
12	19.0	28.4	37.1	34.8
14	20.3	46.0	36.1	38.4
16	22.1	51.1	35.9	43.6
18	24.4	51.6	37.5	54.9
20	27.1	55.2	39.0	59.1
22	30.3	55.6	39.9	59.2
24	33.9	59.8	43.3	61.5
26	37.7	61.1	52.1	65.6
28	41.6	65.9	57.0	70.8
30	45.4	69.3	59.2	74.9
32	49.4	74.6	60.2	79.4
34	53.0	74.1	63.2	83.1
36	56.6	73.8	65.8	86.0
38	60.3	76.1	69.7	87.3
39	62.2	71.8	73.1	87.7

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	16.9	17.2	17.4	17.5
2	16.9	17.2	17.3	17.5
4	16.9	17.2	17.3	17.6
6	17.0	17.2	17.4	17.6
8	17.0	17.5	17.4	17.8
10	17.1	17.8	17.3	18.0
12	17.2	18.2	17.3	18.4
14	17.4	18.7	17.3	18.8
16	17.6	19.9	17.3	19.1
18	18.0	21.0	17.2	19.6
20	18.2	22.6	17.2	19.8
22	18.5	22.7	17.1	20.5
24	18.8	25.1	17.1	20.7
26	19.0	25.1	17.1	21.3
28	19.5	26.7	17.0	22.0
30	19.9	28.2	17.4	22.4
32	20.5	32.1	17.3	23.1
34	20.9	34.1	17.4	23.7
36	21.6	36.2	17.3	24.4
38	22.4	38.7	17.4	25.2
39	22.7	41.7	17.4	25.5

Table 5 – Table presenting the temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the vision panel incorporated into Specimen A. Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC18	TC19	TC20	TC21	TC22	TC23
0	18.6	18.3	18.1	16.8	17.7	17.7
2	19.3	18.9	18.4	16.8	18.4	18.7
4	23.3	22.3	20.9	16.9	23.2	25.4
6	35.8	33.7	26.2	17.3	31.4	35.6
8	70.2	62.4	42.5	18.0	44.5	53.2
10	89.5	79.3	68.1	19.7	67.5	79.0
12	105.0	91.3	80.7	22.5	85.1	92.5
14	119.6	79.2	89.4	25.5	100.2	105.3
16	124.1	57.4	101.6	28.3	103.1	104.4
18	121.4	*	111.9	30.7	100.7	102.4
20	116.4	*	112.7	32.7	99.0	100.8
22	113.8	*	109.5	34.2	98.5	100.1
24	114.2	*	107.8	35.8	98.8	101.1
26	118.5	*	107.6	37.1	99.3	103.8
28	125.3	*	110.3	38.2	101.2	109.0
30	132.9	*	115.0	39.5	102.8	117.6
32	130.2	*	122.1	41.1	102.4	121.4
34	125.6	*	129.2	41.3	107.4	123.7
36	120.5	*	131.2	41.9	110.1	122.8
38	118.0	*	133.9	42.6	108.8	122.2
39	119.3	*	133.4	43.0	109.1	122.5

*Thermocouple malfunction.

Table 6 – 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_2). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC24	TC25	TC26	TC27	TC28
0	17.2	18.1	17.9	17.8	17.5
2	17.3	18.1	17.9	17.7	17.5
4	17.3	18.1	17.9	17.7	17.5
6	17.5	18.1	17.9	17.8	17.5
8	17.6	18.2	18.0	17.8	17.5
10	17.7	18.3	18.0	17.9	17.5
12	18.6	19.1	18.6	18.3	17.9
14	19.8	20.6	19.6	19.7	18.9
16	22.6	22.9	21.5	21.4	21.0
18	25.0	26.0	24.2	24.1	23.5
20	28.6	29.9	27.6	27.3	26.5
22	31.8	34.1	31.5	30.6	29.7
24	35.6	38.4	35.6	34.2	33.0
26	38.9	42.6	39.9	37.7	36.3
28	42.1	46.5	44.1	41.1	39.3
30	45.3	50.1	47.8	44.3	42.6
32	48.1	53.1	51.4	47.2	45.2
34	51.0	55.9	54.7	50.2	47.9
36	53.2	58.0	57.2	52.8	50.5
38	55.0	59.9	59.6	55.1	52.8
39	56.0	60.6	60.5	56.2	53.9

Table 7 – 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_2). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC37	TC38	TC39	TC40
0	17.7	17.5	17.4	17.0
2	17.7	21.2	17.5	17.1
4	17.8	19.2	17.5	17.1
6	18.1	18.7	17.6	17.1
8	18.4	18.5	17.7	17.2
10	19.3	19.0	18.1	17.3
12	21.6	19.2	18.7	17.9
14	23.5	19.5	19.6	18.9
16	26.1	21.3	21.1	20.6
18	28.8	23.0	23.1	23.1
20	31.8	25.4	25.7	25.8
22	35.0	27.1	28.8	29.3
24	38.4	30.2	32.3	33.1
26	41.9	32.4	35.9	36.9
28	45.5	35.0	39.6	40.7
30	48.8	37.9	42.9	44.6
32	52.1	40.5	46.3	48.0
34	55.1	43.3	49.7	51.2
36	58.1	45.8	52.6	54.0
38	61.5	47.9	55.3	56.2
39	63.0	49.3	56.5	57.3

Table 8 – 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_1). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC33	TC34	TC35	TC36
0	18.0	17.9	17.9	17.7
2	18.3	24.7	19.0	17.7
4	18.6	25.5	19.9	17.7
6	22.3	26.9	35.6	17.7
8	27.0	26.6	58.6	17.8
10	35.4	27.6	78.9	19.1
12	38.6	28.0	77.5	20.7
14	38.3	28.6	70.2	24.9
16	44.0	30.1	62.3	32.9
18	43.9	32.0	57.8	27.8
20	44.3	34.6	53.0	28.2
22	45.9	37.4	50.9	30.4
24	48.6	41.0	51.2	33.5
26	51.8	44.9	52.4	37.2
28	55.8	49.4	55.4	41.6
30	60.0	54.3	58.0	45.8
32	64.4	59.7	62.5	50.7
34	67.8	64.2	64.5	55.3
36	72.6	67.5	66.1	59.9
38	75.5	70.0	68.3	63.9
39	77.3	71.1	68.8	65.0

Table 9 – 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)	TC29	TC30	TC31	TC32
0	17.3	17.2	17.2	16.7
2	17.5	32.3	17.5	16.7
4	19.0	31.4	17.3	16.7
6	23.3	30.1	17.6	16.7
8	28.5	31.8	18.8	17.0
10	36.4	38.8	25.9	20.2
12	42.2	49.5	53.6	30.0
14	44.2	64.3	55.5	33.2
16	45.6	48.2	45.0	35.0
18	51.9	45.5	39.2	34.2
20	52.9	45.2	41.5	32.6
22	51.7	44.5	42.8	32.6
24	51.2	44.3	44.3	33.2
26	53.9	44.0	44.8	34.6
28	56.6	43.5	43.9	36.1
30	60.9	46.1	44.0	41.2
32	63.7	45.0	44.9	44.0
34	66.7	45.7	45.9	46.6
36	69.2	47.1	47.5	47.9
38	72.4	48.8	50.0	48.7
39	74.6	49.4	50.8	50.0

Table 10 – Table presenting the temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the Vision Panel incorporated into Specimen B. Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC41	TC42	TC43	TC44	TC45	TC46
0	18.6	18.9	18.5	18.2	17.8	17.8
2	18.7	19.0	18.7	18.4	18.0	18.0
4	19.6	19.7	20.7	20.8	20.1	19.9
6	21.8	22.5	25.1	25.7	24.7	24.7
8	25.6	26.9	30.8	31.3	29.9	30.2
10	29.4	32.2	37.3	37.5	35.9	36.0
12	34.7	38.3	43.5	43.9	42.1	41.7
14	40.7	45.6	49.9	50.7	47.2	46.7
16	46.6	52.5	56.6	58.5	51.3	50.9
18	51.9	59.2	61.4	68.1	54.8	55.2
20	56.4	64.1	65.9	73.4	57.5	61.5
22	59.9	68.4	71.8	77.4	60.3	64.0
24	63.8	72.8	78.5	82.8	67.6	69.2
26	68.7	77.2	86.5	86.9	71.3	76.2
28	71.5	79.6	89.0	90.0	76.9	83.3
30	73.3	80.8	89.4	90.5	90.4	88.9
32	74.2	81.6	89.4	90.6	91.8	89.3
34	74.8	82.3	89.6	90.6	91.9	89.4
36	75.0	82.8	89.3	90.6	92.1	89.6
38	75.3	83.3	89.0	90.3	92.1	89.7
39	75.6	83.7	89.2	90.6	92.3	89.6