United Kingdom Testing and Certification

Test Report

The fire resistance performance of one timber, single acting double door assembly when tested in accordance with BS EN 1634-1:2014+A1:2018.

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Prepared For	Vistamatic Ltd Unit 4 62-70 Fowler Road Hainault Essex

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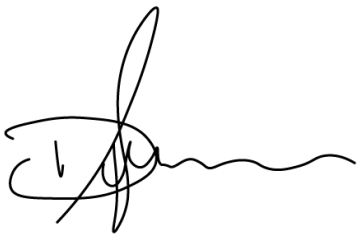
Change History

Issue Date	Revision	Created by	Authorised by	Description of Change
29/02/2024	A	NS	DF	Initial Issue

Signatories

	
Prepared by **Nathan Small*** Technical Officer	Authorised by **Daniel Fitzsimmons*** Head of Testing

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

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1 Executive Summary

1.1 Specimen Summary

The Specimen had overall nominal dimensions of 1926 mm wide by 2081 mm high, incorporating a single door leaf with overall dimensions of 924 mm wide by 2040 mm high by 58 mm thick. The door leaf was formed from graduated density chipboard with 8 mm thick hardwood lippings to all edges of the construction this was then encapsulated in 2mm PVC facings. The leaves were hung in a hardwood frame each on three steel hinges, both leaves featured a glazed area with overall dimensions of 413 mm wide by 808 mm high.

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

The Specimen 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 Specimen Conditioning

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of two days. Throughout this period, both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 9.2 °C to 11.5 °C and 50.5 % to 64.1 % respectively.

1.5 Instruction to Test

The test was conducted on 13 February 2024 at the request of the Test Sponsor. The test was witnessed by Mark Nash and Achilleas Sarrigiannidis, representatives 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

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

Integrity (E)[1]	Sustained Flaming		64 minutes		
	Gap Gauge		64 minutes	Area blanked off	
	Cotton Pad		63 minutes		
Insulation (I_1)[2]	Specimen		50 minutes	Exceeded maximum temperature criteria	@ TC27
Insulation (I_2)[3]	Specimen		63 minutes	Due to integrity failure	
	Glazed Area		50 minutes	Exceeded maximum temperature criteria	@ TC27
Radiation[4]	5 kW/m^2	10 kW/m^2	15 kW/m^2	20 kW/m^2	25 kW/m^2
	64 minutes**	64 minutes**	64 minutes**	64 minutes**	64 minutes**

*The test was discontinued after a period of 66 minutes.

**Area of the specimen was blanked off at 64 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.

2 Pre-test Examination

2.1 Operability Test

The Specimen 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

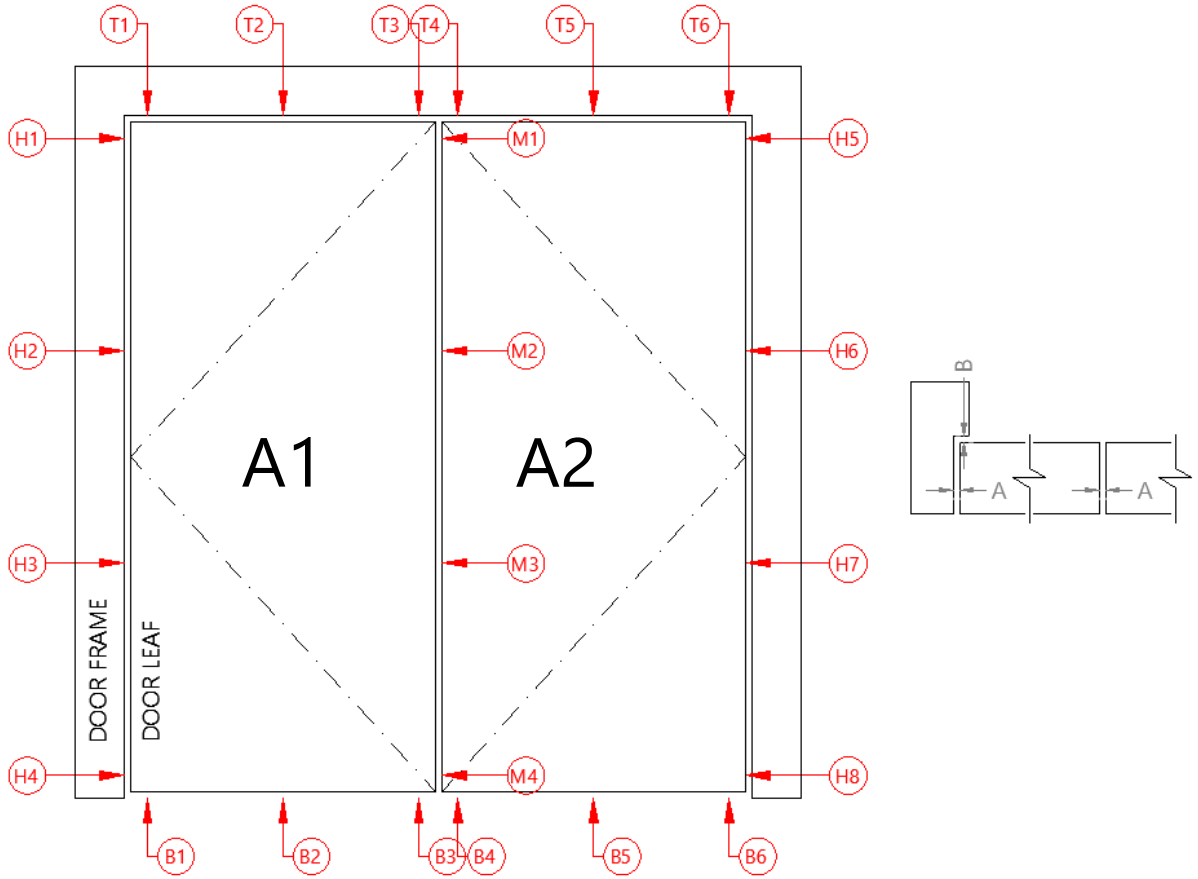
The Specimen was opened to 30° ± 2°, held for 20 ± 2 seconds and released without shock and allowed to close at a maximum mean average speed of 300 mm/s to ensure that a closed position was achieved in accordance with BS EN 16034:2014 § A.4.1.

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 A1	33.8	0.800	27.04
Opening Force Specimen A1	59.3	0.800	47.44
Closing Force Specimen A2	27.8	0.800	22.24
Opening Force Specimen A2	58.8	0.800	47.04

2.4 Gap Measurements



	A	B			A			A	B
H1	3.2	0.5		M1	3.2		H5	2.9	0.1
H2	3.4	0.5		M2	3.6		H6	3.4	0.1
H3	3.2	0.4		M3	3.3		H7	3.0	0.1
H4	2.3	0.4		M4	3.1		H8	2.7	0.1
Mean	**3.0**			**Mean**	**3.3**		**Mean**	**3.0**	
Max	**3.4**			**Max**	**3.6**		**Max**	**3.4**	
Min	**2.3**			**Min**	**3.1**		**Min**	**2.7**	
	A	B		A	B		A		A
T1	4.0	3.9	T4	3.2	3.3	B1	3.4	B4	4.8
T2	3.4	3.4	T5	3.0	3.1	B2	3.9	B5	3.7
T3	3.2	3.3	T6	3.4	3.4	B3	4.8	B6	3.4
Mean	**3.5**		**Mean**	**3.2**		**Mean**	**4.0**	**Mean**	**4.0**
Max	**4.0**		**Max**	**3.4**		**Max**	**4.8**	**Max**	**4.8**
Min	**3.2**		**Min**	**3.0**		**Min**	**3.4**	**Min**	**3.4**

3 Test Specimen Drawings

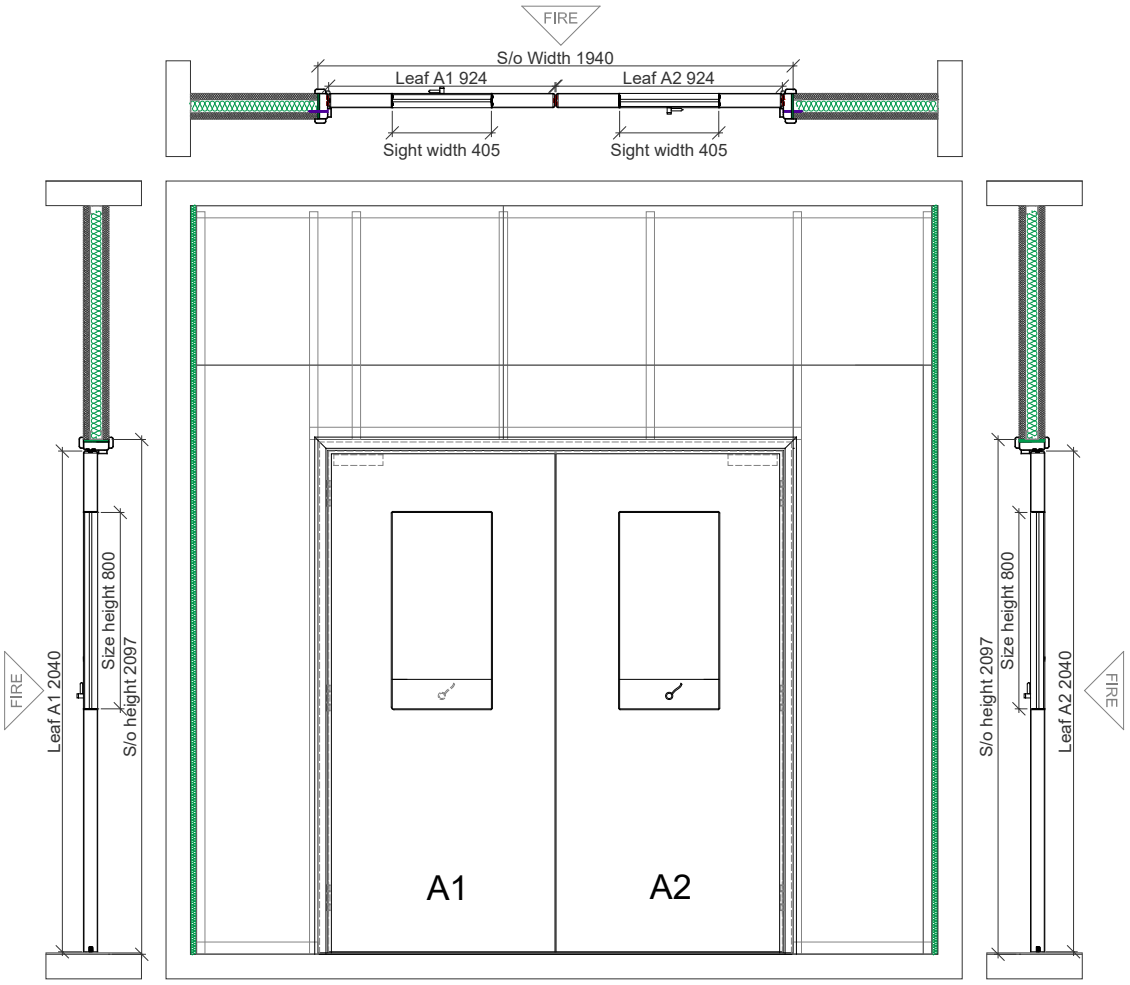


Figure 1 - General arrangement of test construction viewed from the unexposed surface

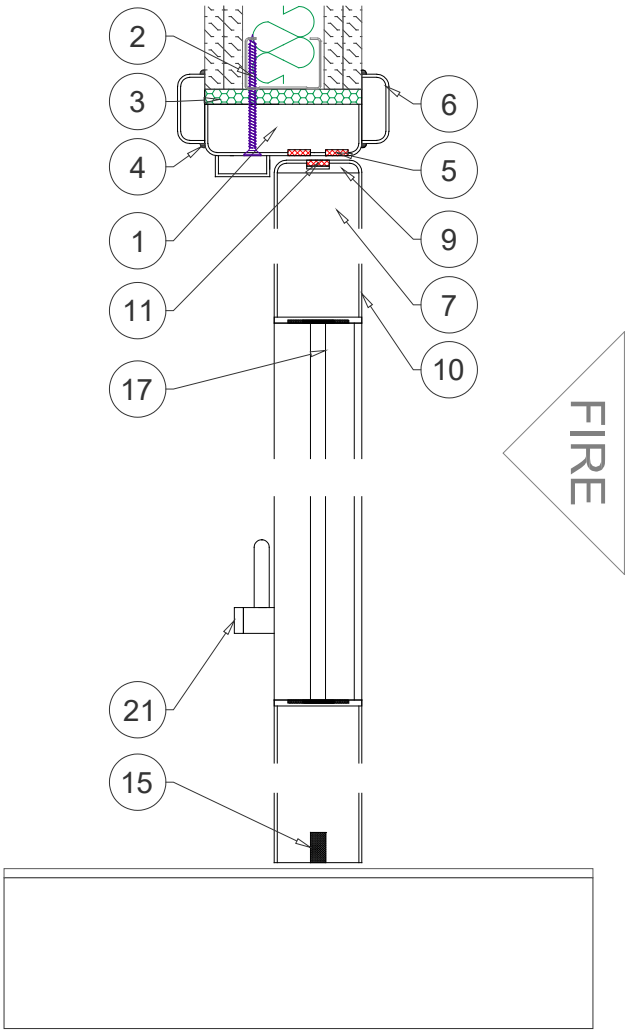


Figure 2 - Typical vertical section through The Specimen

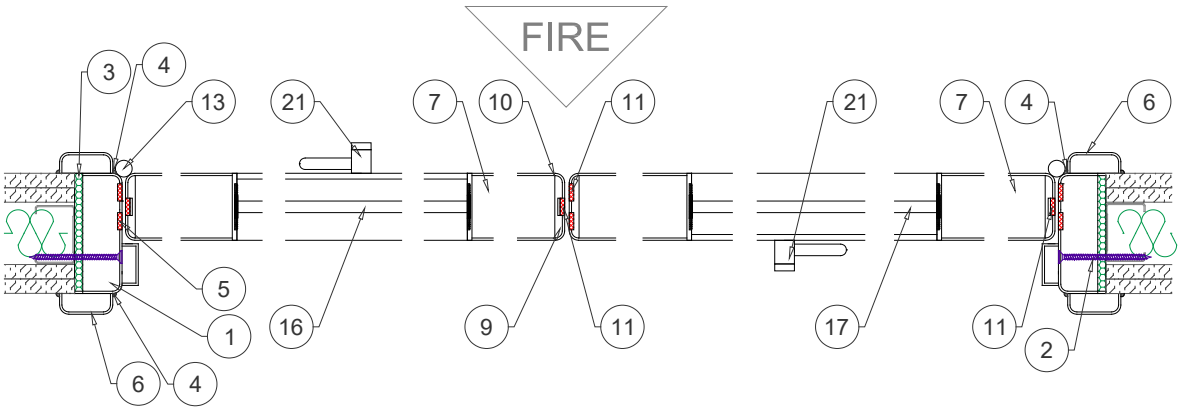


Figure 3 - Typical horizontal section through The Specimen

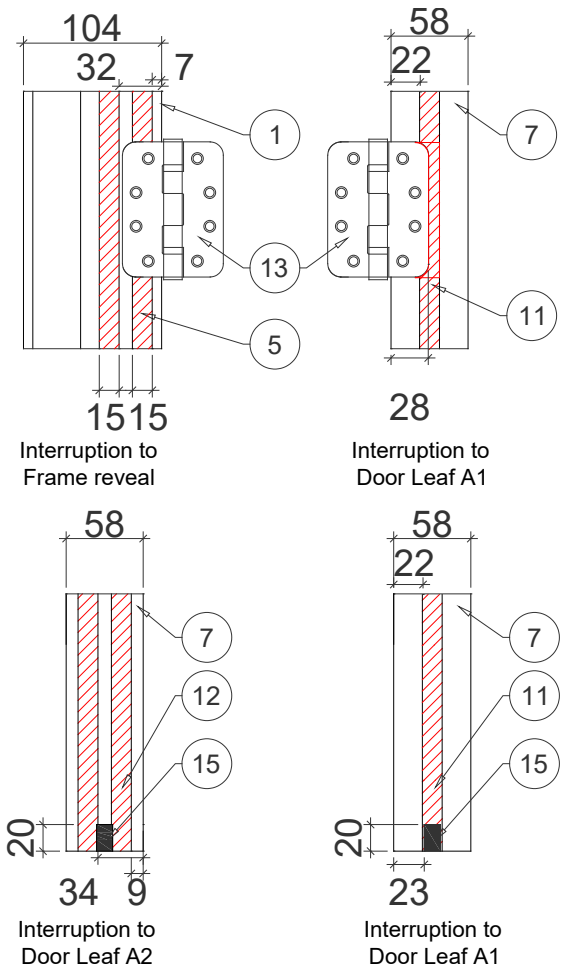


Figure 4 - Hardware intumescent interruptions

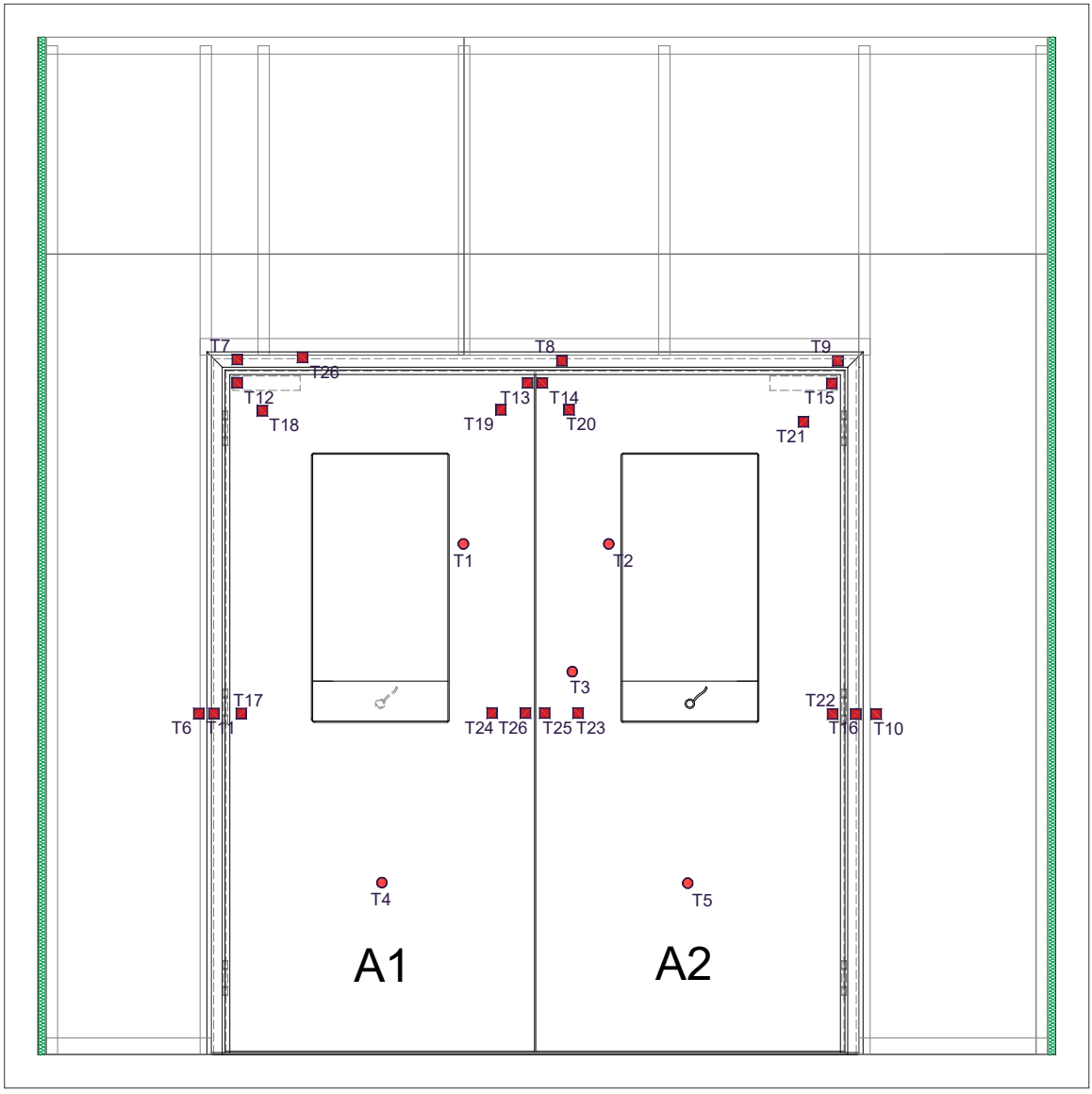


Figure 5 - Layout of instrumentation viewed from the unexposed surface of the test construction

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

1. Frame	
Manufacturer	DorSuite Ltd
Reference	Sapele PVC encapsulated frames
Material	Sapele Head and Sapele Jambs
Density	640 kg/m^3
Orientation to heating conditions	Opening towards
a. Overall size	1926 mm wide x 2081 mm high
i. Frame (Head)	100 mm wide x 32 mm thick with +2mm PVC facing
ii. Frame (Jambs)	100 mm wide x 32 mm thick +2mm PVC facing
iii. Stop	34 mm wide x 12 mm deep +2mm PVC facing
Jamb to Head jointing method, fixing detail and location	Housed butt joint with PVC & 2 no Ø 5 mm x 60mm Long wood screws.
Stop to Frame jointing method, fixing detail and location	Pinned with 1.6 mm gauge x 38 mm long steel pins @ 300 mm centres
b. Adhesive(s)	N/A
2. Frame Fixing Method to Supporting Construction	
Manufacturer	Spax
Type & material	Double-Countersunk Head, stainless Stee
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 x long 30 mm Wide x Various thicknesses (1mm, 2mm, 3mm, 5mm)
Packing Material Location	At each fixing location up frame
3. Frame to supporting construction fire stopping detail	
Manufacturer	Rockwool
Reference	RWA 45
Material	Mineral Fiber wool
Overall dimension	7-12 mm wide x 75 mm deep
Application method	Friction fitted
4. Sealant to fire stopping detail	
Manufacturer	Certitek
Reference	DM-01
Material	Acrylic Intumescent Mastic
Overall section size	7-20 mm wide x 10 mm deep
Application method	Cartridge gunned
Location	Both Faces of Doorset
5. Intumescent Frame	
Quantity	2
Manufacturer	Pyroplex
Reference	Fire only
Material	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)	9 mm 34 mm
6. Architrave	
Manufacturer	DorSuite Ltd
Reference	PVC Encapsulated Architraves
Material	PVC Encapsulated MDF
Overall section size	74 mm wide x 20 mm thick

Location	Both Faces of Doorset
Application method, fixings and fixing frequency required	15-gauge x 50 mm long pins @ 200 mm centres
7. Door Leaf	
Manufacturer (blank)	DorSuite Ltd
Reference	(PVC encapsulated) Epicore 54
Quantity of leaves on doorset	2
Glazing 1 location relative to the head and closing edge	250 mm from the head of the leaf and 250 mm from the closing edge of the leaf
Glazing 2 location relative to the head and closing edge	250 mm from the head of the leaf and 250 mm from the closing edge of the leaf
Overall leaf size supplied for testing	924 x 2040 mm x 58 mm
Door Undercut (Top of cill / bottom of frame)	3mm / 4mm
Glazing orientation	Glazing on Active leaf: Facing into the furnace Glazing on Inactive leaf: Facing Away
8. Core element 1	
Manufacturer	Halspan
Reference	Optima 54
Material	Chipboard
Location	Core
Density	620 kg/m3
Overall thickness and reduced thickness if door leaf incorporates fielded areas	54 mm thick +2 mm facing
Application method	N/A
9. Lippings / Edge banding	
Manufacturer	DorSuite Ltd
Reference	LIP-000
Material	Sapele
Density	640 kg/m3
Moisture content	9 - 11%
Overall size	8 mm deep x 54 mm wide
Fixing method	

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	No
10. Facings	
Manufacturer	DorSuite Ltd
Reference	PVC Encapsulated
Material	Polyvinyl Chloride
Density	1400 kg/m3
Location	Encapsulated to both faces of the doorset returning over the vertical edges
Overall thickness	2 mm
Application method	Spray
a. Adhesives	
i. Manufacturer	Tensogrip
ii. Type	Fire Rated Contact Adhesive
iii. Reference	L17
iv. Curing method	Spray both surfaces then leave for up to 5 minutes before bonding together
v. Application Method	Spray
11. Intumescent Leaf Edge (1)	
Quantity	1
Manufacturer	Man McGowan
Reference	Pyrostrip 100P
Material	Palusol
Overall section size	15 mm wide x 4 mm thick

Application method	Adhesive strip to back
Location	Leaf A1: Meeting edge, Hang edge, Head. Leaf A2: Hang edge, Head.
Location (relative to the opening face of the door leaf)	22 mm
12. Intumescent Leaf Edge (2)	
Quantity	2
Manufacturer	Man McGowan
Reference	Pyrostrip 100P
Material	Palusol
Overall section size	15 mm wide x 4 mm thick
Application method	Adhesive strip to back
Location	Leaf A2: Meeting edge
Location (relative to the opening face of the door leaf)	9 mm 34 mm
13. Hinges	
Supplier	ZOO
Reference	ZOO Hinge Stainless Steel
Quantity	3 per door leaf
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 76 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	2mm Graphite based intumescent
Interruptions to Intumescent within the frame reveal	1st Intumescent fully interrupted. 2nd Intumescent uninterrupted.
14. Door Closer	
Manufacturer	Rutland
Reference	TS9205
a. Material	
i. Body	Mild Steel
ii. Closer arm	Mild Steel
iii. Cover	Stainless Steel
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	4 No. Ø 5 mm x 25 mm long screws to closer body to door leaf
15. Drop Down Seal	
Manufacturer	Seal Tight Solutions
Reference	STS 422
a. Material	
i. Body	Steel
ii. Seal	Neoprene/Butyl
iii. Face plate	Aluminium
b. Overall size	
i. Body	20 mm high x 908 mm wide x 12 mm thick
Fixing method, type and locations	Screw fixed
Location within leaf	Centrally located
16. Glazing unit LH	
Manufacturer	Vistamatic Ltd
Reference	Vista Flush

Overall size	405 mm x 800 mm x 58 mm
Location	250 mm From Top of Door Leaf
Aperture size	413 mm x 808 mm
Expansion Allowance	4mm
Presence of Aperture lining	No
Presence of Intumescent lining	No
Glazing Configuration – Layer 1 (Exposed face)	6 mm Pyro-EX modified toughened glass with lever handle operation (with 6 mm cavity including 4 mm annealed glass central moving pane)
Glazing Configuration – Layer 2 (Middle Pane)	12 mm Pyrobelite Laminated Fire Glass (plus 20 mm hollow cavity)
Glazing Configuration – Layer 3 (Unexposed face)	10 mm Pyro-EX modified toughened glass
17. Glazing unit RH	
Supplier	Vistamatic Ltd
Reference	Vista Flush
Overall size	405mm x 800mm x 58mm
Location	250mm From Top of Door Leaf
Aperture size	413mm x 808mm
Expansion Allowance	4mm
a. Presence of Intumescent lining	No
Glazing Configuration – Layer 1 (Exposed face)	10 mm Pyro-EX modified toughened glass
Glazing Configuration – Layer 2 (Middle Pane)	12 mm Pyrobelite Laminated Fire Glass (plus 20 mm hollow cavity)
Glazing Configuration – Layer 3 (Unexposed face)	6 mm Pyro-EX modified toughened glass with lever handle operation (with 6 mm cavity including 4 mm annealed glass central moving pane)
18. Glazing System Intumescent 1	
Quantity	1
Manufacturer	Certitek
Reference	PL 202
Material	Palusol
Overall section size	20 mm wide x 2 mm thick
Application method	Adhesive strip to back

Location (relative to the opening face of the door leaf)	Centre of Glazing Unit
19. Glazing System Intumescent 2	
Quantity	2
Manufacturer	Certitek
Reference	GT 102
Material	Graphite
Overall section size	10 mm wide x 2 mm thick
Application method	Adhesive strip to back
Location (relative to the opening face of the door leaf)	Either side of Palusol Intumescent
20. Fire Rated Sealant	
Quantity	1
Manufacturer	Certitek
Reference	Certitek FR H1
Material	Fire Rated Sealant
Overall section size	Seal the 4 mm between Glazing unit and aperture
Application method	Cartridge gun
Location (relative to the opening face of the door leaf)	Gap between Glazing unit and aperture.
21. Integrated pane lever	
Quantity	2
Manufacturer	Vistamatic
Reference	Standard Vistamatic Lever / VS1
Material	Chrome
Overall size	Ø 18 mm x 21 mm deep x 60 mm long lever
Fixing metho	Attached to Integrated Spindle/Cam Mechanism
Location (relative to the glazing unit)	52 mm from the bottom of the unit, horizontally centred, 1 no on the exposed side of Leaf A1 and 1 no on unexposed side of Leaf A2

4.2 Supporting Construction

22. Studs	
Supplier	United Kingdom Testing and Certification
Type & Material	Rolled steel C-Stud
Dimensions	50 mm deep x 34 mm wide x 3000 mm long x 0.5 mm thick
Stud centres	400-625 mm
Fixing(s)	Friction fitted to the head/ floor track
Timber Inserts to Studs	No
23. Head/ Floor Track	
Supplier	United Kingdom Testing and Certification
Type & Material	Rolled steel U-Track
Dimensions	52 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 mm x 50 mm long concrete screws staggered at max 600 mm centres
Timber Inserts to head of opening	Yes
24. Lining(s)	
Supplier	United Kingdom Testing and Certification
Type & Material	Paper faced, gypsum plasterboard type F
Density	760 Kg/m^3
Layer Quantity	2
Dimensions	12.5 mm thick x 1200 mm wide x 2400 mm high
Fixings	Plasterboard Screw Fixings Ø 3.5 mm x 25 mm & 38 mm
Joints Filled & Taped With	BG Promix lite
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
26. Free Edge Gasket	
Manufacturer	Morgan Advanced Materials
Reference	Superwool
Density	128 Kg/m^3
Dimensions	25 mm thick x 3050 mm long x 200 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 2

Figure 7 - Item 5

Figure 8 - Item 6

Figure 9 - Item 11

Figure 10 - Item 12

Figure 11 - Item 13

Figure 12- Item 14

Figure 13 – Item 15

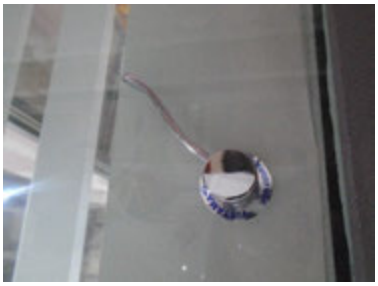


Figure 14 - Item 21

6 Test Procedure

6.1 Ambient Temperature

The ambient air temperature in the vicinity of the test construction was 10.7 ºC at the start of the test with a maximum variation of +0.8 ºC during the test.

6.2 Heating Conditions

The Specimen 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 26.

6.3 Pressure Conditions

The Specimen 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 pressure deviated from the specified conditions on one instance throughout the duration of the test. The Time-Pressure distribution is presented in Figure 27.

6.4 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 29.

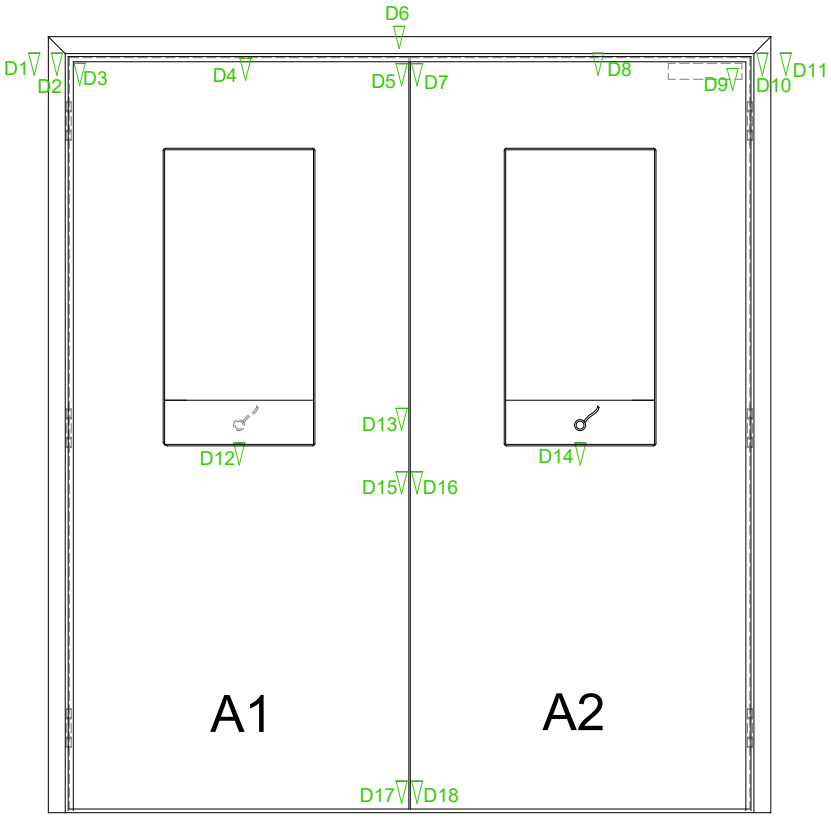
Disc thermocouples were affixed to the unexposed surface of The Specimen in accordance with BS EN 1634-1:2014+A1:2018 § 9.1.2 to measure and monitor the maximum and the mean temperature rise of the unexposed surface of The Specimen for the duration of the test. A summary of the measurements is presented in Figure 28 and the locations of these thermocouples is illustrated in Figure 5.

6.5 Radiation

The Radiant Heat of The Specimen was measured using 180º field of view, water cooled heat flux meters that were positioned at the geometric center of The 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 29.

6.6 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	D16	D17	D18
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	6	5	6	7	0	7	3	9	6	7	5	5	3	5	4	4	-2	0
20	2	3	4	4	3	4	2	3	4	3	4	0	-8	0	-2	-1	-3	-1
30	2	1	3	0	3	1	1	-1	3	2	2	-5	-6	-5	-6	-5	-1	-1
40	0	-2	4	0	4	0	-2	-2	4	2	0	-14	-13	-15	-14	-16	2	2
50	5	5	6	-1	6	5	3	-1	7	2	2	-28	-22	-25	-24	-26	8	6
55	10	11	16	3	13	9	11	3	16	7	6	-34	-27	-28	-29	-25	8	11

60	19	23	27	15	27	20	21	11	23	12	11	-35	-26	-30	-29	-24	7	18
65	24	26	27	28	*	*	*	*	*	*	*	*	*	*	*	*	*	*

* Test discontinued.

6.7 Observations

HH	MM	SS	E[5]	U[6]	Observation
00	**00**	**00**			**The test commences.**
00	00	52		X	Steam/smoke releases from the perimeter and meeting stile.
00	04	48		X	Glass on left vision panel falls into the furnace.
00	05	42		X	Middle pane of both the glazing unit is reacting and going opaque.
00	08	32		X	Discolouring up the hanging edge of the left leaf and meeting stile.
00	10	48		X	Moisture running down the face of the door from the head of the door/frame.
00	14	32	X		Facing materials has melted and rest along the bottom of the doors, the closer of the right leaf has fully detached.
00	26	31		X	Glass middle layer of both units is discolouring brown.
00	31	12	X		Closer has fully detached from the left leaf.
00	32	25		X	Steam/smoke has decreased from door perimeters.
00	41	32		X	Black liquid running down the face of the left leaf vision panel.
00	43	52		X	Architraves have fallen away from the perimeter of the specimen.
01	02	54		X	A flame flickers from the meeting stile at approximately mid height.
01	**03**	**55**		**X**	**Cotton pad test is applied to the mid height of the meeting stile. The cotton pad ignites. Cotton pad failure and by virtue insulation failure are deemed to occur.**
01	**04**	**01**		**X**	**A flame emits and sustains at the meeting stile for a duration greater than 10 seconds. Sustained flame failure is deemed to occur.**
01	**64**	**15**		**X**	**Mastic applied to the meeting stile gap gauge criteria can no longer be evaluated.**
01	06	15		X	A flame emits and sustains at the top left corner of the specimen for a duration longer than 10 seconds.
01	**06**	**31**			**The test is discontinued at the request of the Test Sponsor.**

[5] Viewed from exposed surface of the test construction.
[6] Viewed from unexposed surface of the test construction.

6.8 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 30 minutes

Figure 20 - The unexposed surface of the test construction after a test duration of 40 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 66 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. 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

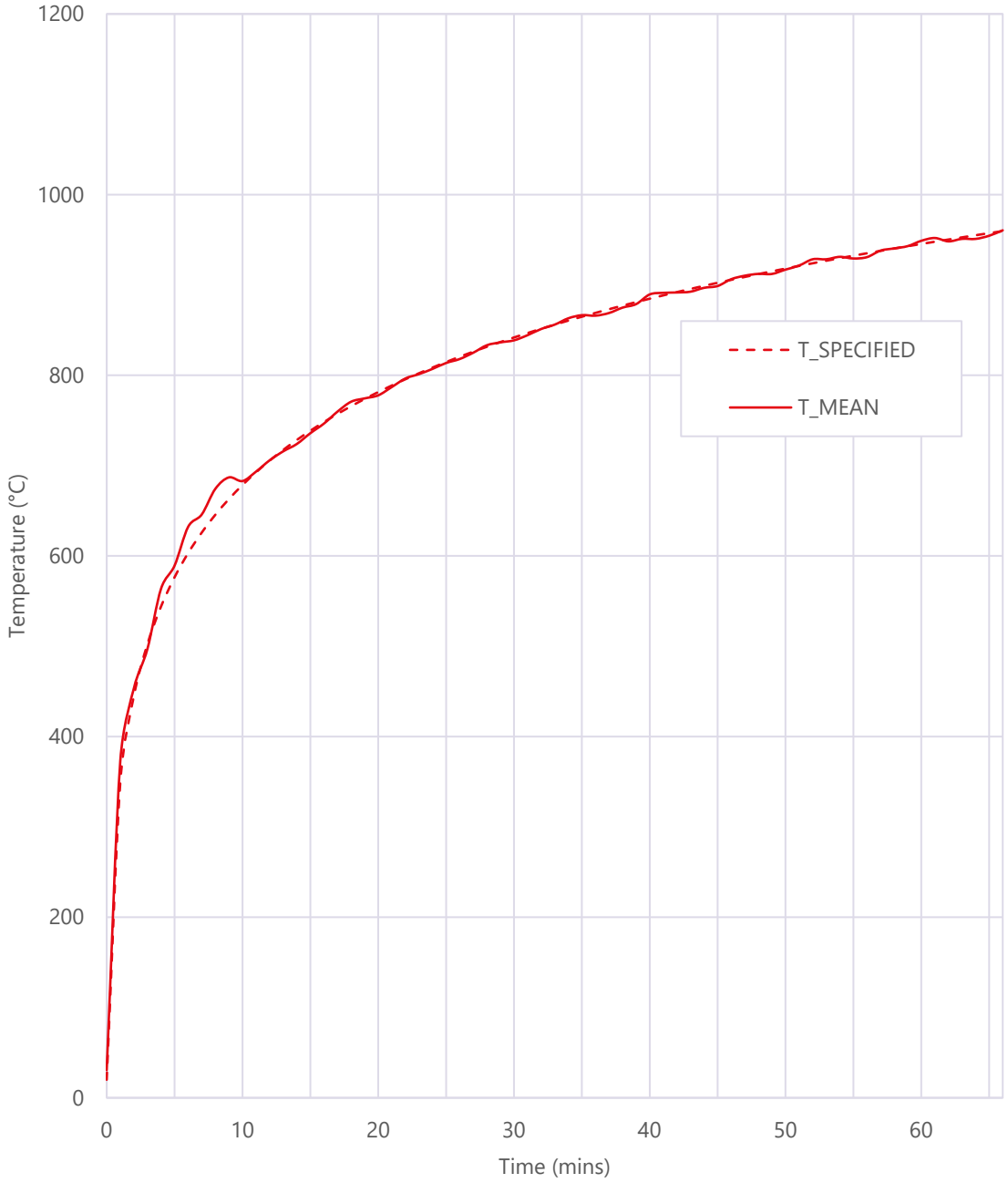


Figure 26 – Graph presenting the Time-Temperature distribution of the furnace

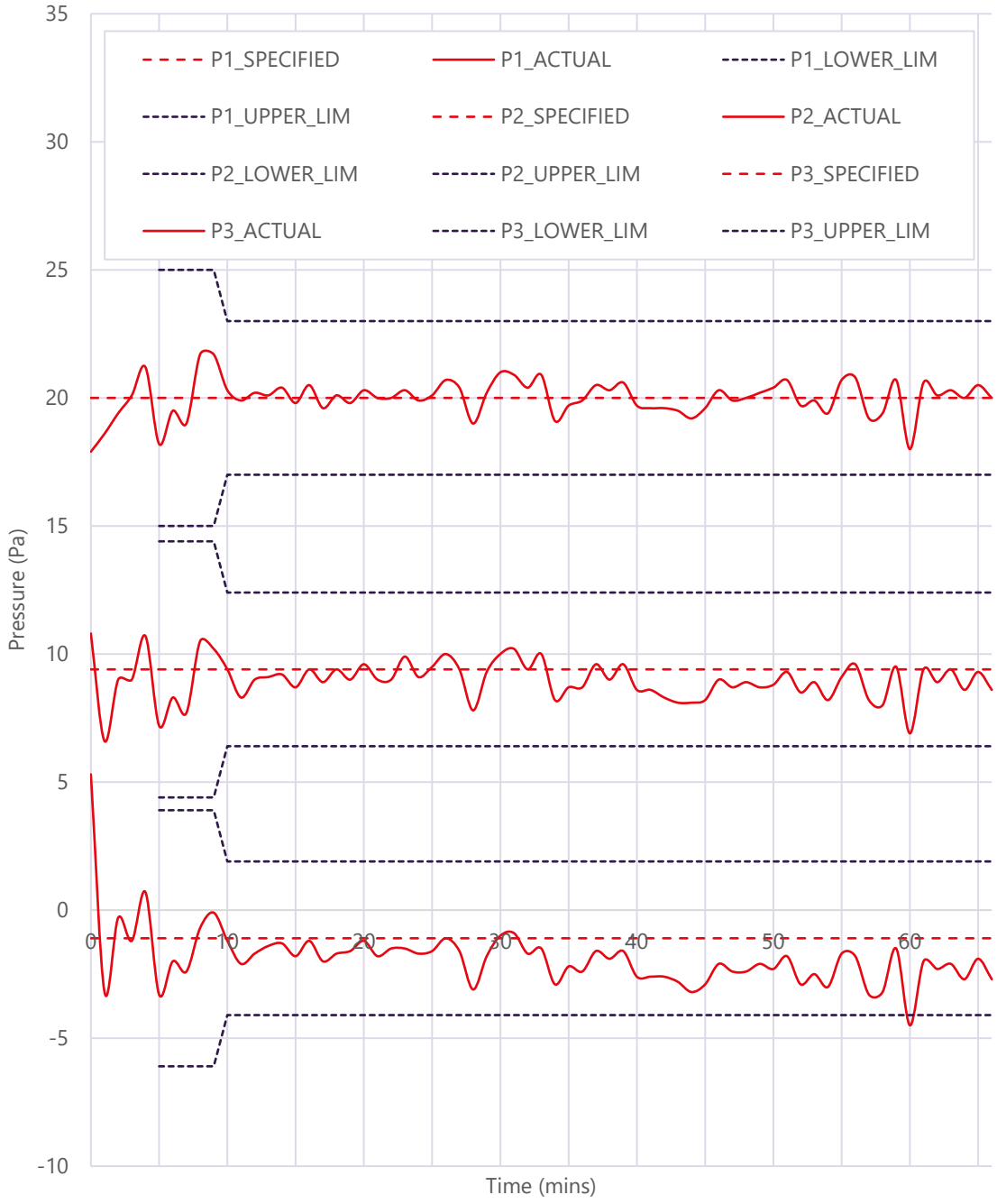


Figure 27 – Graph presenting the Time-Pressure distribution of the furnace

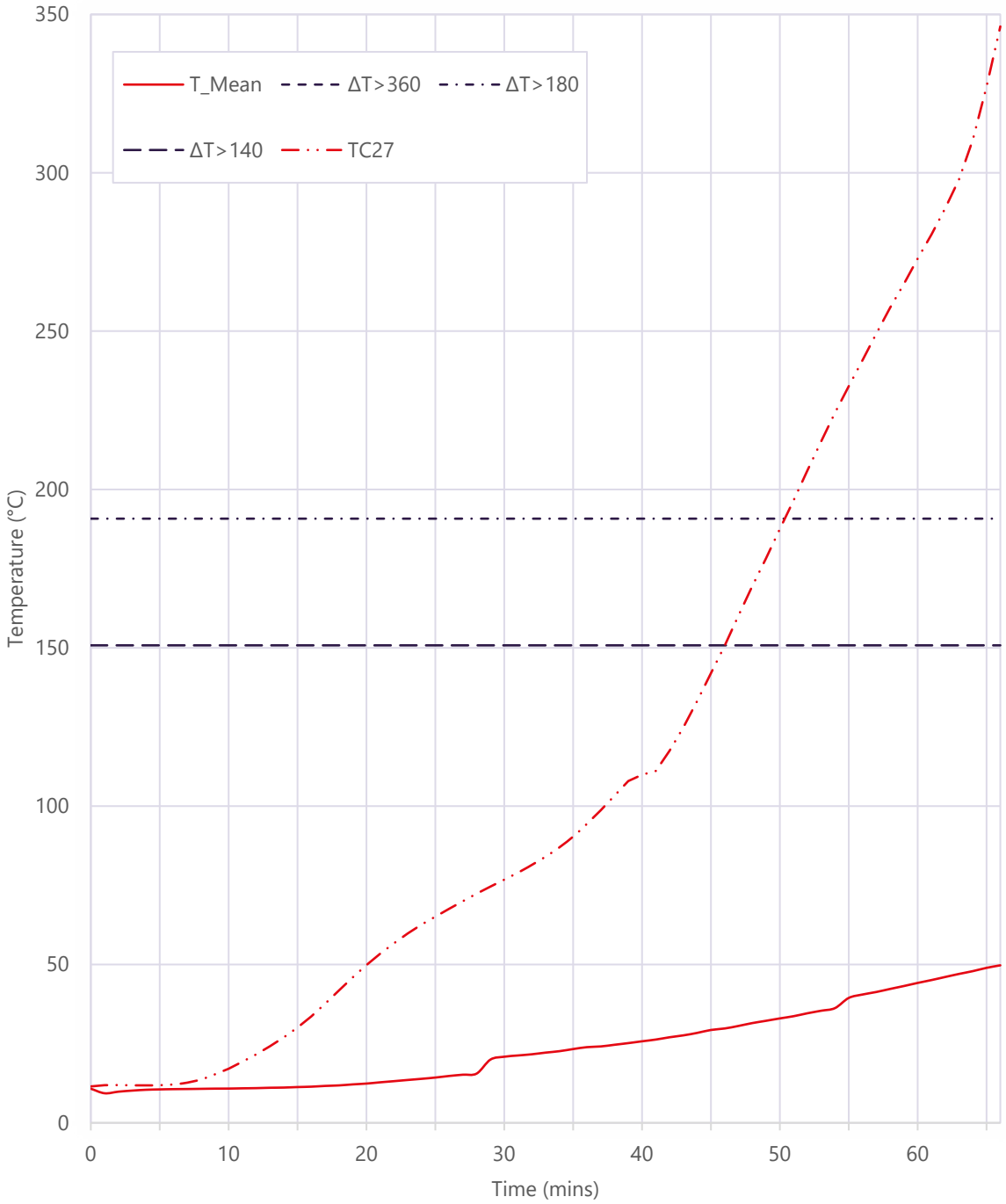


Figure 28 - Graph presenting the Time-Temperature distribution of the unexposed surface of The Specimen

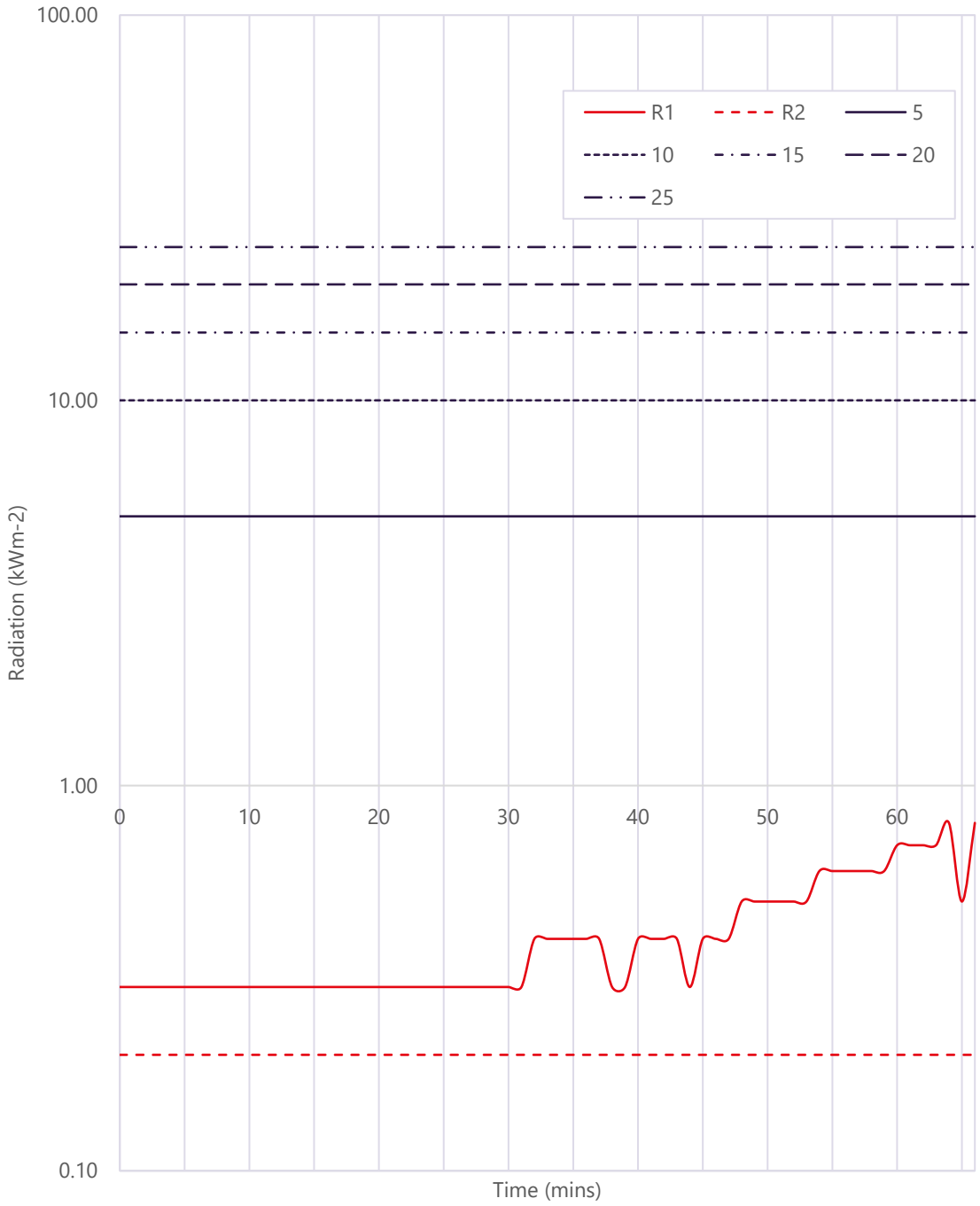


Figure 29 - Graph presenting Time-Radiation distribution of the unexposed surface of The Specimen

9 Tables

Table 1 – The temperatures recorded by the disc thermocouples used evaluate the mean and maximum temperature rise of the unexposed surface of The Specimen under the normal procedure (I_2). Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC1	TC2	TC3	TC4	TC5
0	10.4	11.1	10.6	11.0	10.8
3	6.9	11.4	10.7	11.1	10.8
6	8.8	11.4	10.8	11.4	10.8
9	9.3	11.5	10.9	11.4	10.9
12	9.6	11.7	11.0	11.5	11.0
15	9.2	12.8	11.5	11.8	11.2
18	*	15.0	12.6	12.8	11.2
21	*	18.0	14.5	14.4	11.3
24	*	21.4	16.7	16.3	11.4
27	*	24.7	19.3	18.7	11.7
30	*	28.7	22.0	21.1	11.7
33	*	28.1	24.8	24.2	11.6
36	*	28.7	27.8	27.5	11.6
39	*	28.2	30.8	30.1	11.6
42	*	28.7	34.1	33.7	11.6
45	*	30.1	37.5	38.0	11.7
48	*	31.8	41.0	41.3	11.9
51	*	32.9	44.8	44.9	12.1
54	*	34.4	48.8	49.9	11.8
57	50.7	36.2	53.3	54.4	12.0
60	53.9	37.9	57.9	59.0	12.2
63	57.1	39.9	62.9	63.4	11.8
66	60.5	42.0	67.4	67.0	11.8

*Thermocouple malfunction.

Table 2 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the door leaf of The Specimen under the normal procedure (I_2). Values are in Degrees Celsius (°C) unless otherwise stated.

Time	TC17	TC18	TC19	TC20	TC21	TC22	TC23	TC24
0	12.0	9.6	11.3	11.1	11.0	10.7	10.6	10.5
3	13.3	18.3	15.2	13.0	11.2	10.8	11.1	14.1
6	12.9	19.0	13.7	12.6	11.4	10.8	11.0	12.6
9	12.7	16.6	13.4	12.7	11.5	11.0	11.1	12.1
12	12.7	14.5	13.3	12.7	11.5	11.1	11.2	12.1
15	13.2	12.5	15.3	13.3	11.6	11.8	11.9	12.7
18	14.5	*	16.1	14.6	12.2	13.3	13.5	14.1
21	16.2	*	17.9	16.4	13.7	15.5	15.9	16.0
24	18.1	*	20.0	18.5	16.1	17.8	18.9	18.2
27	20.3	*	21.9	20.8	18.5	20.4	22.1	20.6
30	22.9	*	24.4	23.4	21.0	23.0	25.5	23.4
33	25.8	*	26.0	26.2	23.5	25.7	28.8	26.1
36	28.8	*	29.0	29.3	26.1	28.7	32.1	29.5
39	32.4	*	32.3	32.7	28.9	31.0	35.4	33.0
42	36.1	*	35.5	36.2	32.1	34.3	38.3	36.6
45	40.3	*	39.1	40.2	35.2	37.0	41.7	40.0
48	44.5	*	42.5	43.3	38.5	40.2	44.9	44.7
51	49.0	*	46.3	47.2	42.1	43.5	48.3	49.0
54	53.9	35.3	50.5	51.6	45.4	168.8	52.1	53.6
57	58.9	35.0	55.0	56.5	49.3	51.5	56.5	58.2
60	63.7	35.1	59.6	61.6	53.4	55.7	60.8	62.6
63	67.9	35.8	64.0	66.7	57.3	59.2	65.4	66.5
66	72.6	38.3	69.0	72.0	61.5	62.7	73.7	70.8

*Thermocouple malfunction.

Table 3 – The temperatures recorded by the disc thermocouples used evaluate the maximum temperature rise of the door leaf of The Specimen under the supplementary procedure (I_1). Values are in Degrees Celsius (°C) unless otherwise stated.

Time	TC11	TC12	TC13	TC14	TC15	TC16	TC25	TC26
0	12.0	11.1	10.9	10.7	10.9	10.4	11.4	11.1
3	34.2	18.0	18.4	29.5	19.2	10.6	13.4	19.7
6	25.6	20.3	24.7	34.5	27.5	11.5	13.1	16.6
9	21.3	27.7	30.5	42.6	19.2	11.5	13.6	16.2
12	19.5	31.2	30.8	37.1	20.5	11.5	14.2	16.4
15	18.9	35.7	33.7	33.0	24.0	12.1	15.3	17.5
18	19.8	38.2	35.2	30.6	27.8	13.4	16.3	18.1
21	21.6	37.8	36.2	30.3	33.8	15.6	17.9	18.8
24	23.9	38.7	39.1	31.0	43.6	18.9	20.1	19.5
27	26.1	39.2	39.4	32.4	46.6	22.5	22.5	20.5
30	28.0	40.1	40.5	34.4	45.2	26.2	25.3	21.9
33	29.5	42.0	42.2	36.7	49.6	29.8	28.2	23.4
36	30.7	47.9	45.6	39.9	54.0	33.4	30.0	25.4
39	30.8	49.4	47.4	41.9	56.5	37.6	32.8	28.2
42	33.4	52.5	48.9	44.8	72.3	42.0	35.9	31.2
45	35.7	56.5	55.6	49.1	78.8	46.1	39.3	32.2
48	38.1	60.1	60.3	54.2	77.4	50.8	43.4	34.1
51	40.5	55.9	61.9	62.3	68.2	55.5	48.3	37.0
54	43.2	59.3	96.4	68.7	38.9	59.8	53.5	39.9
57	45.9	61.9	60.0	68.9	*	63.6	59.2	43.7
60	48.1	74.4	58.6	72.0	*	67.7	64.1	47.1
63	50.9	64.5	57.1	77.9	*	69.9	68.4	50.6
66	53.8	121.4	100.3	87.7	*	72.8	89.9	61.9

*Thermocouple malfunction.

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

Time (mins)	TC6	TC7	TC8	TC9	TC10
0	10.4	10.3	10.5	11.3	10.9
3	12.3	14.8	19.1	11.5	10.8
6	12.1	15.5	18.8	13.6	10.9
9	11.8	14.5	18.0	14.3	10.9
12	11.6	14.4	16.8	14.1	11.0
15	11.5	15.2	15.4	14.4	11.0
18	11.4	17.5	14.6	16.5	11.2
21	11.4	20.6	14.5	20.3	11.7
24	11.6	23.7	14.8	25.3	12.7
27	11.8	26.2	15.5	27.4	13.7
30	12.3	28.3	16.5	28.8	14.9
33	12.7	30.0	17.7	30.9	15.9
36	13.4	31.9	19.1	36.7	17.1
39	14.2	32.8	20.3	37.9	18.8
42	14.9	33.8	21.7	42.2	19.8
45	15.9	34.9	23.3	42.5	21.1
48	17.1	35.9	24.9	47.3	21.7
51	17.7	36.4	25.7	44.6	22.4
54	18.4	37.3	26.4	42.4	23.6
57	19.4	38.2	27.8	43.3	24.6
60	20.4	40.9	29.0	43.5	25.3
63	21.2	46.8	30.6	43.4	26.3
66	22.3	64.5	33.8	43.8	27.2

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

Time (mins)	TC27	TC28	TC29	TC30
0	11.5	11.4	11.3	10.9
3	11.9	11.7	11.3	11.1
6	12.1	12.5	11.6	11.7
9	15.3	15.0	12.3	12.8
12	21.6	20.8	15.9	17.1
15	30.1	30.0	25.7	25.6
18	41.8	40.6	38.0	34.9
21	53.4	48.4	52.0	45.6
24	62.6	55.0	61.9	54.0
27	70.0	62.2	68.0	59.1
30	76.8	70.6	73.1	63.1
33	84.1	78.8	78.7	66.4
36	94.4	86.2	84.3	70.8
39	107.9	97.0	90.8	77.3
42	117.5	110.5	101.6	85.8
45	142.0	125.4	109.0	97.7
48	169.5	146.6	125.4	109.3
51	**196.6**	175.9	150.5	117.9
54	224.2	205.8	176.3	146.4
57	249.2	233.9	200.2	179.3
60	272.9	260.8	221.5	209.8
63	297.9	288.1	243.1	238.2
66	346.2	313.4	265.9	263.9