United Kingdom Testing and Certification

Test Report

The fire resistance performance of a fully insulated timber, single acting single door, and a fully insulated timber, single acting double door assembly when tested in accordance with BS EN 1634-1:2014+A1:2018 and two cable passthroughs tested with additional of guidance where practicable of BS EN 1366-3: 2021

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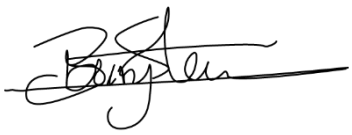
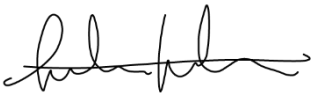
Change History

Issue Date	Revision	Created by	Authorised by	Description of Change
20/03/2023	A	B.S.	D.F.	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 had overall nominal dimensions of 1001 mm wide by 2093 mm high, incorporating a single door leaf with overall dimensions of 930 mm wide by 2040 mm high by 44 mm thick. The door leaf was formed from Multi-Layered Particleboard with 6 mm thick Sapele lippings to the vertical and horizontal edges. The leaf was hung in a soft wood frame on three steel hinges, such that it opened towards the heating conditions of the test. The doorset was latched for the duration of the test. The doors assembly incorporated the following hardware:

Item No.	Description	Reference
9	Hinges	H102
10	Door Closer	TS92B
13	Latch	ZCS230SS
14	Lever handles	ZCS030SS
15	Door Pin ID Tag	Data Tag

Specimen B had overall nominal dimensions of 1085 mm wide by 2095 mm high, incorporating two door leaves, each with overall dimensions of 930 mm wide by 2040 mm high by 44 mm thick. The door leaves were formed from a Multi-Layered Particleboard with 6 mm thick Sapele lippings to the vertical and horizontal edges. The leaves were hung in a softwood frame on three steel hinges, such that they opened towards the heating conditions of the test. The doorset was unlatched for the duration of the test. The doors assembly incorporated the following hardware:

Item No.	Description	Reference
24	Hinges	H102
25	Door Closer	TS72
29	Door Pin ID Tag	Data Tag

Specimen C was a circular steel service hatch and had nominal dimensions of Ø 350 mm x 79 mm flange, incorporating two hatch doors, one on each face with dimensions Ø 350 mm x 2 mm thick. The hatch was hung onto the wall with four screws, such that it opened away from the heating conditions on the unexposed face and into the heating conditions of the exposed face. The through hole in the supporting construction was formed from a UPVC pipe and such that it included cables within a smoke sock.

Specimen D was a circular steel service hatch and had nominal dimensions of Ø 400 mm x 82 mm flange, incorporating two hatch doors, one on each face with dimensions Ø 300 mm x 2 mm thick. The hatch was hung onto the wall with four screws, such that it opened away from the heating conditions on the unexposed face and into the heating conditions of the exposed face. The through hole in the supporting construction was formed from a UPVC pipe and such that it included cables within a smoke sock.

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 20 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 latched but 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 leaves 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:

Integrity (E)[1]	Sustained Flaming	31 minutes	No failure*
	Gap Gauge	31 minutes	No failure*
	Cotton Pad	31 minutes	No failure*
Insulation (I_1)[2]		31 minutes	No failure*
Insulation (I_2)[3]		31 minutes	No failure*

*The specimen was blanked off at 31 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.

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:

Integrity (E)[4]	Sustained Flaming	38 minutes	No failure*
	Gap Gauge	38 minutes	No failure*
	Cotton Pad	38 minutes	No failure*
Insulation (I_1)[5]		38 minutes	No failure*
Insulation (I_2)[6]		38 minutes	No failure*

* The specimen was blanked off at 38 minutes.

[4] 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.

[5] 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.

[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: 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.

1.5.3 Specimen C

Specimen C satisfied the performance criterion specified in BS EN 1366-3 § 11 for the following intervals:

Integrity (E)[7]	Sustained Flaming	89 minutes	No failure*	
	Gap Gauge	89 minutes	No failure*	
	Cotton Pad	89 minutes	No failure*	
Insulation (I)[8]		89 minutes	Exceeded maximum temperature criteria	@TC38

*The specimen was blanked off after 89 minutes.

[7] 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.

[8] 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 at any location (including the roving thermocouple) above the initial individual temperature by more than 180°C. as specified in EN 1366-3:2021 § 11.2

1.5.4 Specimen D

Specimen D satisfied the performance criterion specified in BS EN 1366-3 § 11 for the following intervals:

Integrity (E)[9]	Sustained Flaming	121 minutes	No failure*
	Gap Gauge	121 minutes	No failure*
	Cotton Pad	121 minutes	No failure*
Insulation (I)[10]		121 minutes	No failure*

* The test was discontinued after 121 minutes

[9] 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.

[10] 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 at any location (including the roving thermocouple) above the initial individual temperature by more than 180°C. as specified in EN 1366-3:2021 § 11.2

2 Pre-test Examination

2.1 Closing Force Measurement

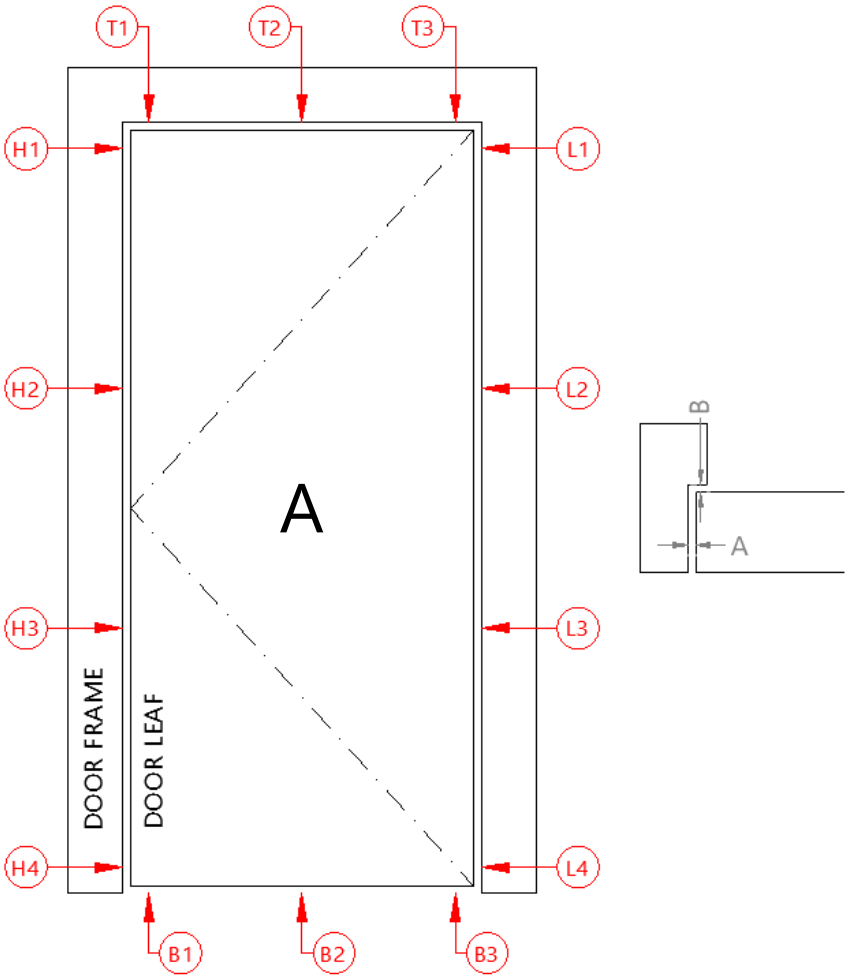
The door closing forces were measured and recorded three times. The results are presented below:

Measurement	Maximum Recorded Force (N)	Distance from Pivot to Measurement Location (m)	Moment (Nm)
Closing Force Specimen A	27.8	0.750	20.85
Opening Force Specimen A	70.2	0.750	52.65
Closing Force Specimen B1	63.4	0.400	25.36
Opening Force Specimen B1	111.7	0.400	44.68
Closing Force Specimen B2	60.1	0.400	24.04
Opening Force Specimen B2	110.2	0.400	44.08

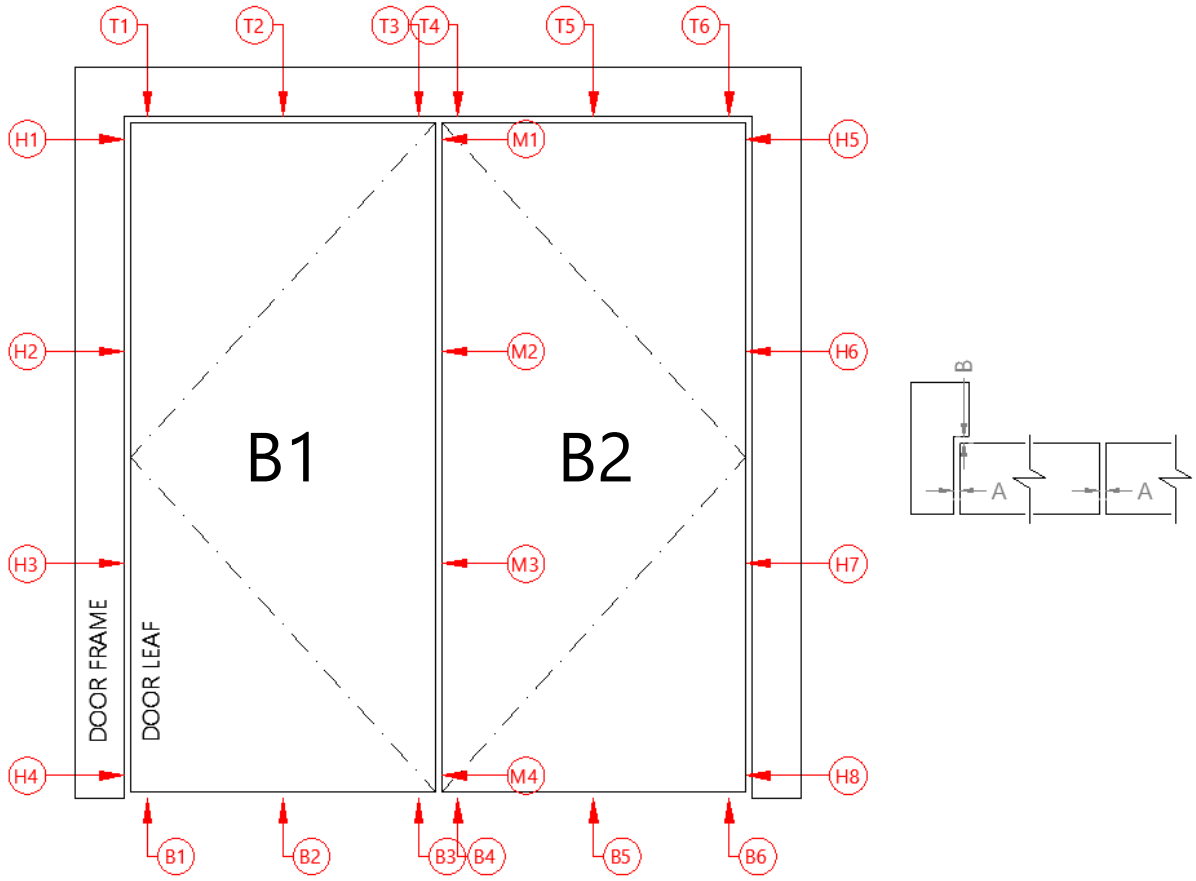
2.2 Specimen Conditioning

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of three days. Throughout this period, both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 14.4 °C to 15.7 °C and 64.3 % to 69.1 % respectively.

2.3 Gap Measurements



Hanging Stile	A	B	Closing Stile	A	B
H1	2.6	0.1	L1	1.8	3.0
H2	3.3	0.1	L2	2.3	1.7
H3	2.8	0.1	L3	2.0	0.9
H4	2.3	0.5	L4	1.8	0.2
Mean	**2.7**		**Mean**	**2.0**	
Max	**3.3**		**Max**	**2.3**	
Min	**2.3**		**Min**	**1.8**	
Max Permitted	**5.0**		**Max Permitted**	**4.1**	
Top Edge	**A**	**B**	**Bottom Edge**	**A**	
T1	2.6	0.1	B1	4.5	
T2	2.6	1.0	B2	4.5	
T3	2.5	3.0	B3	6.6	
Mean	**2.5**		**Mean**	**5.2**	
Max	**2.6**		**Max**	**6.6**	
Min	**2.5**		**Min**	**4.5**	
Max Permitted	**4.6**		**Max Permitted**	**7.9**	



	A	B			A			A	B
H1	1.9	0.1		M1	3.8		H5	2.4	0.1
H2	1.4	0.1		M2	3.4		H6	2.2	0.5
H3	1.8	0.3		M3	3.3		H7	1.8	0.1
H4	2.2	0.2		M4	3.3		H8	2.0	0.1
Mean	**1.8**			**Mean**	**3.5**		**Mean**	**2.1**	
Max	**2.2**			**Max**	**3.8**		**Max**	**2.4**	
Min	**1.4**			**Min**	**3.3**		**Min**	**1.8**	
Max Permitted	**4.0**			**Max Permitted**	**5.7**		**Max Permitted**	**4.3**	
	A	B		A	B		A		A
T1	4.2	0.2	T4	3.5	0.1	B1	3.6	B4	1.0
T2	3.7	0.4	T5	3.5	0.1	B2	2.6	B5	2.3
T3	3.7	0.6	T6	3.8	0.2	B3	2.4	B6	2.0
Mean	**3.9**		**Mean**	**3.6**		**Mean**	**2.8**	**Mean**	**1.8**
Max	**4.2**		**Max**	**3.8**		**Max**	**3.6**	**Max**	**2.3**
Min	**3.7**		**Min**	**3.5**		**Min**	**2.4**	**Min**	**1.0**
Max Permitted	**6.0**		**Max Permitted**	**5.7**		**Max Permitted**	**5.2**	**Max Permitted**	**4.0**

3 Test Specimen Drawings

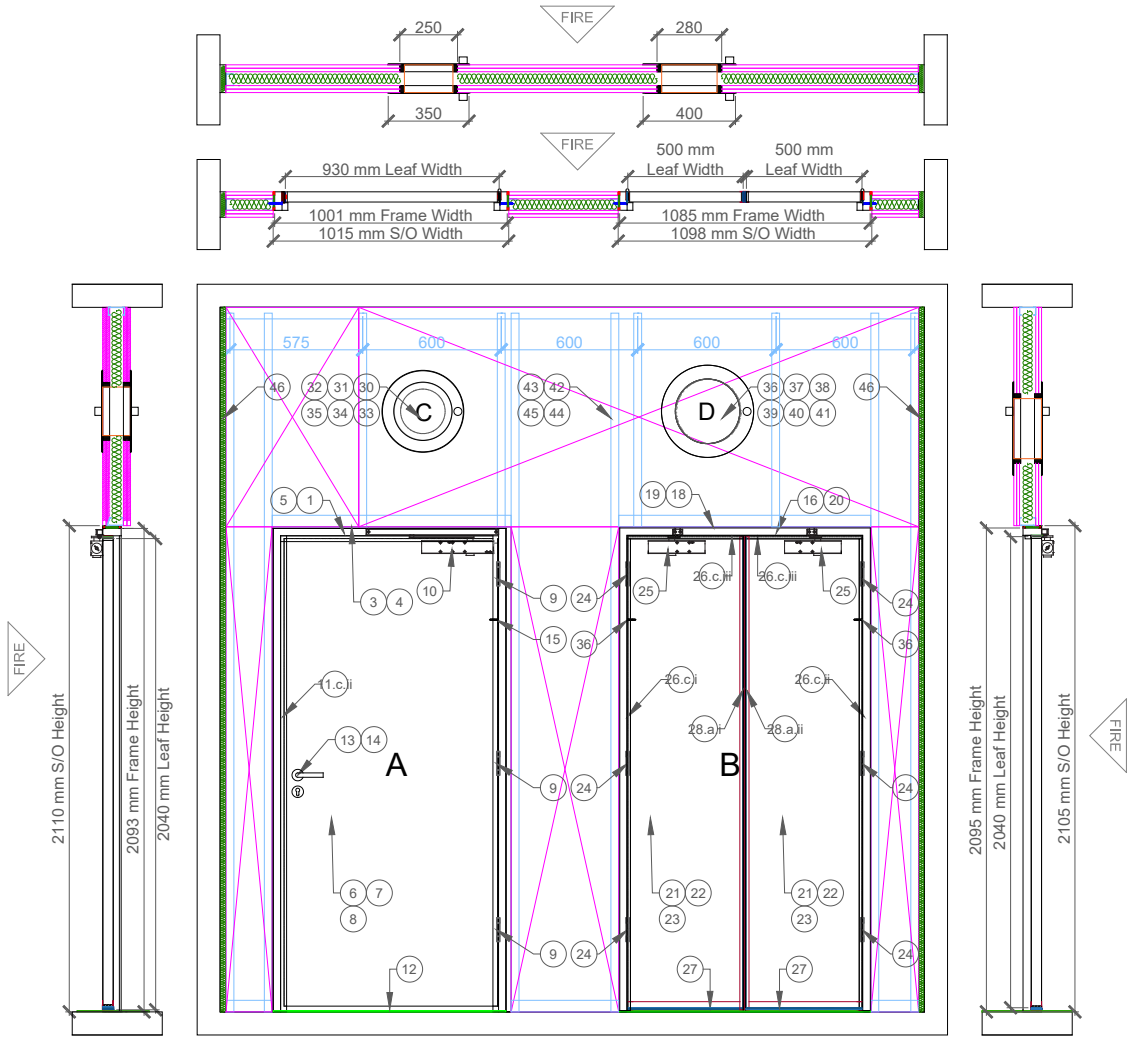


Figure 1 - General arrangement of test construction viewed from the unexposed surface

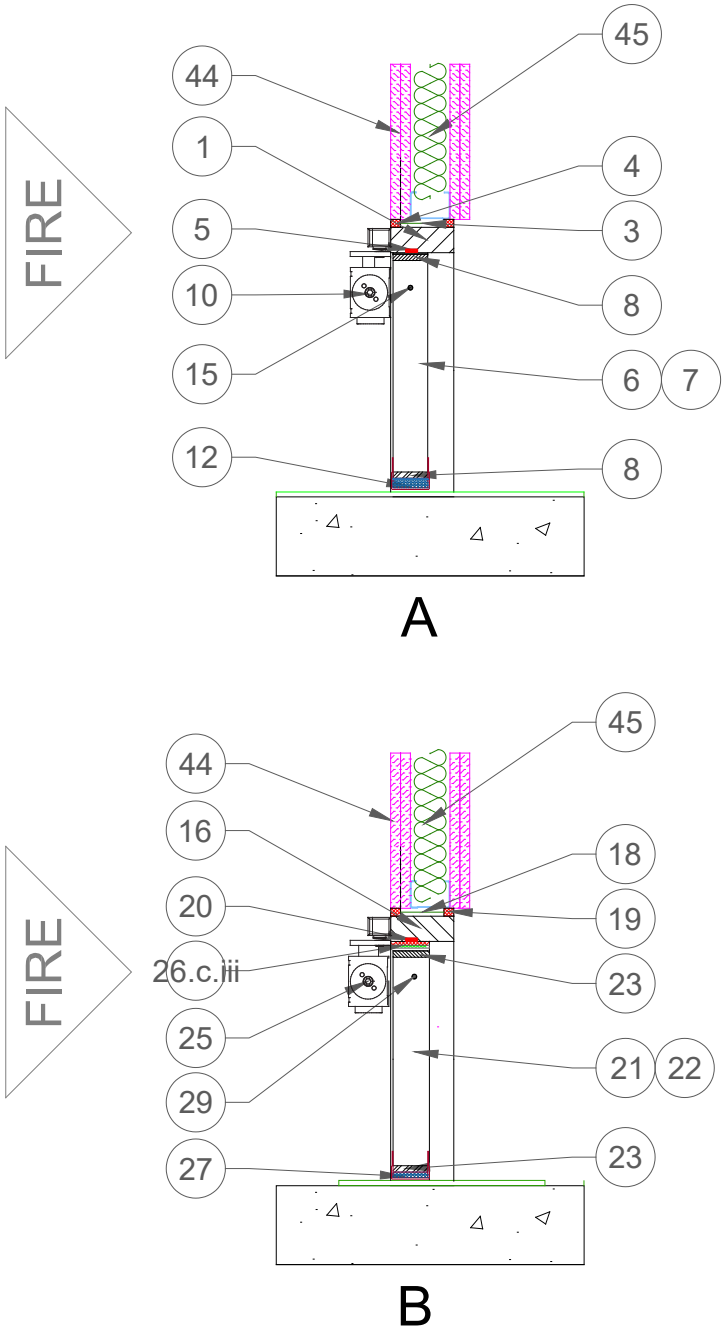


Figure 2 - Typical vertical section through the specimens

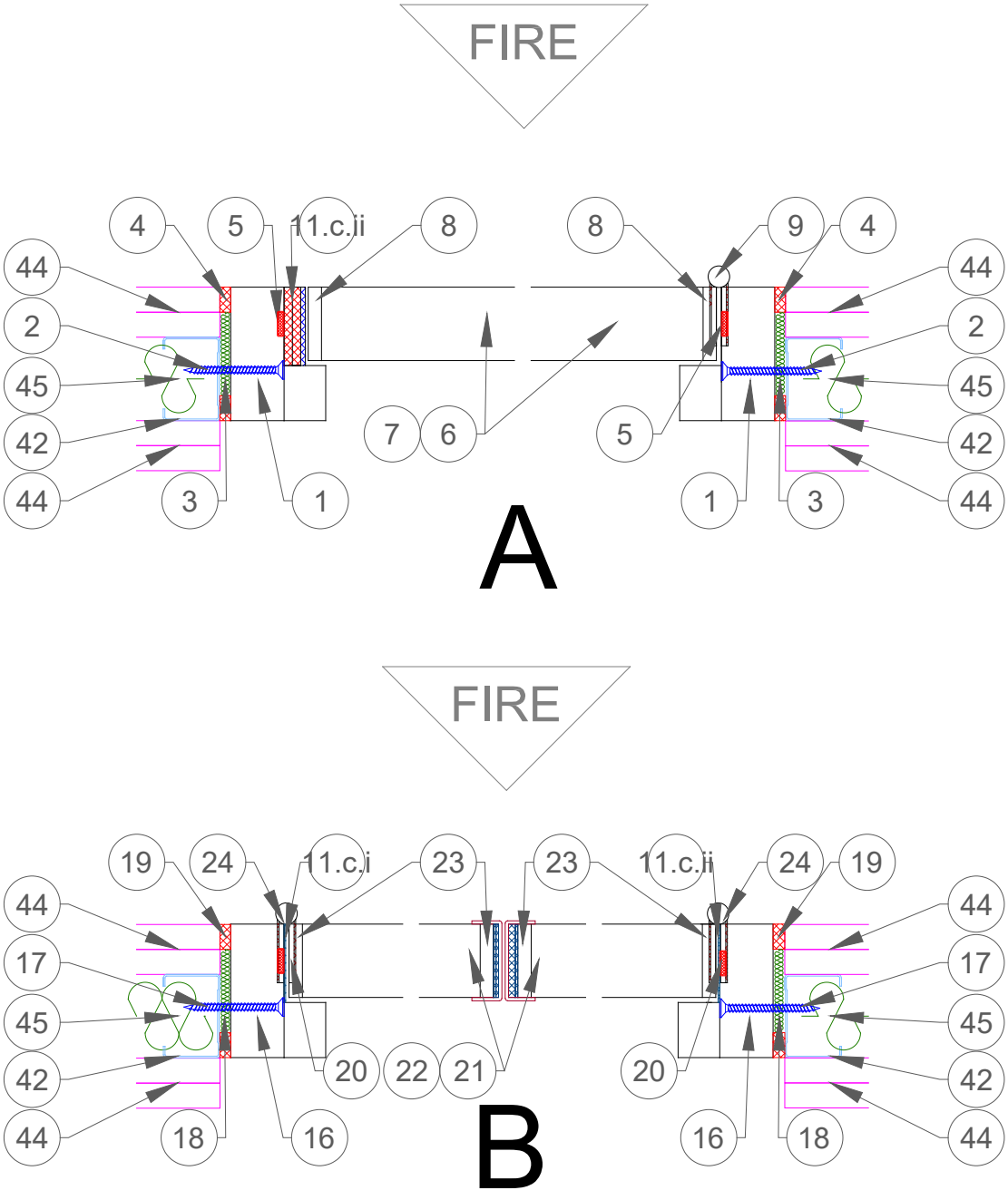


Figure 3 - Typical horizontal section through the specimens

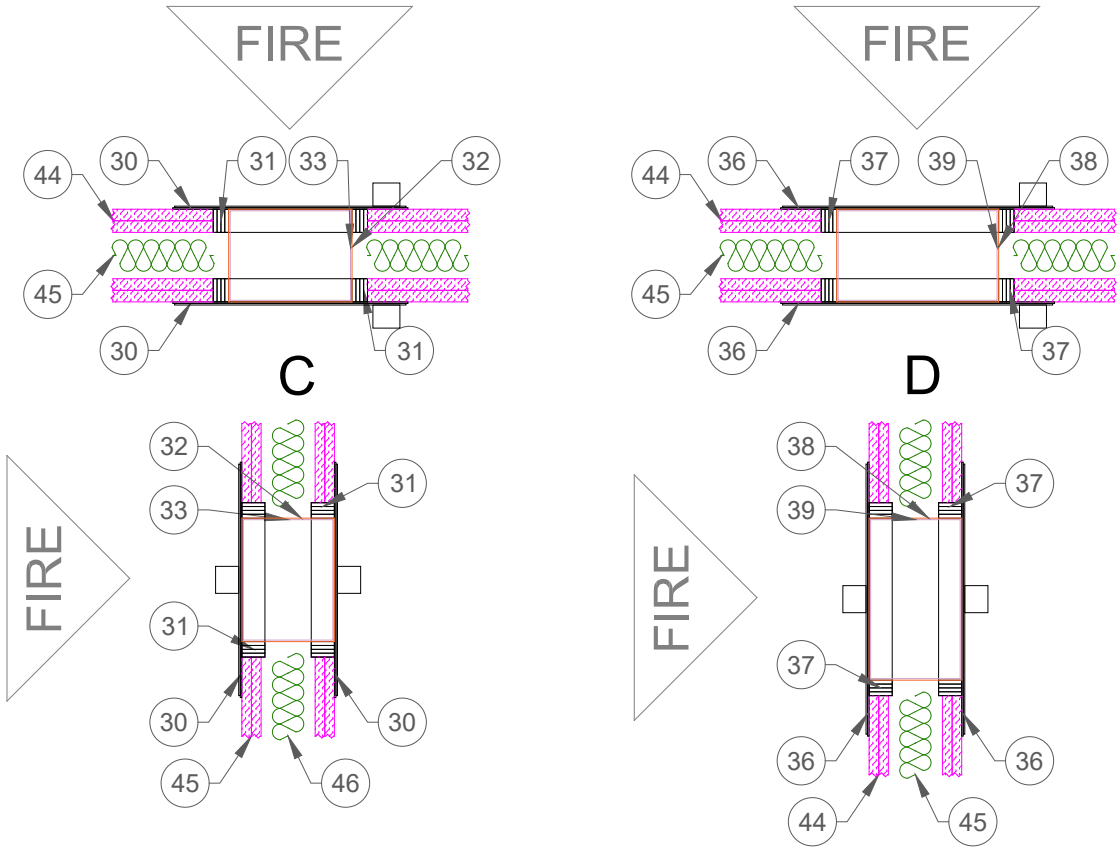
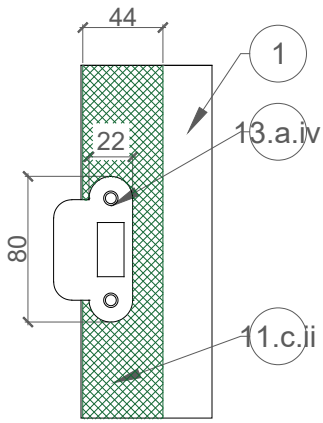
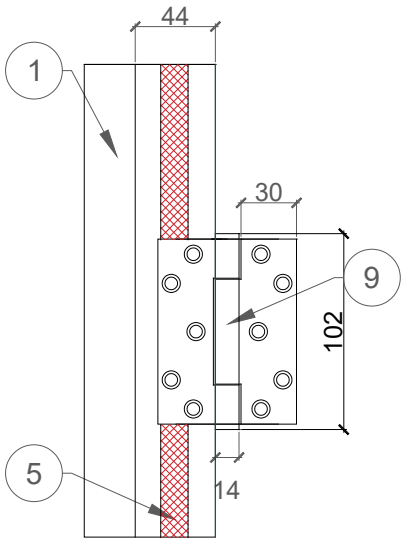


Figure 4 - Typical horizontal section through the access hatch specimens

A

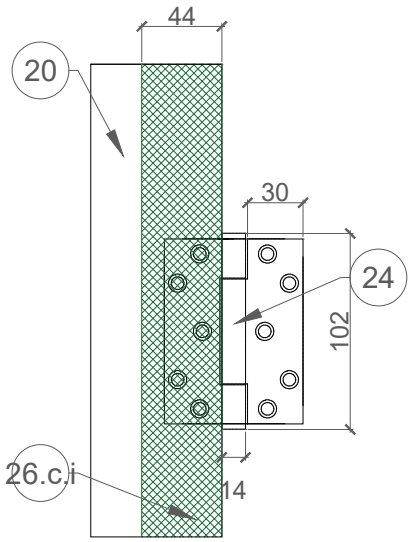


Frame Keeper Interruption

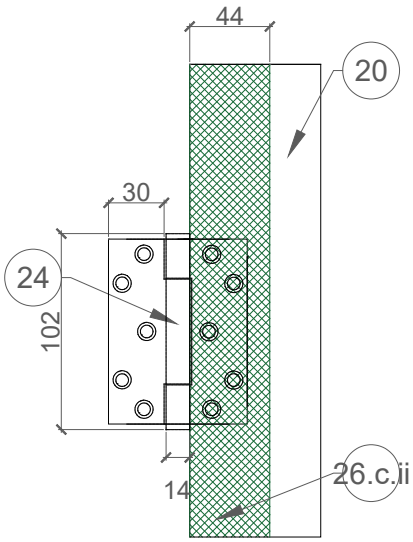


Frame Hinge Interruption

B



Frame Hinge Interruption (Left Side)



Frame Hinge Interruption (Right Side)

Figure 5 - Hardware intumescent interruptions

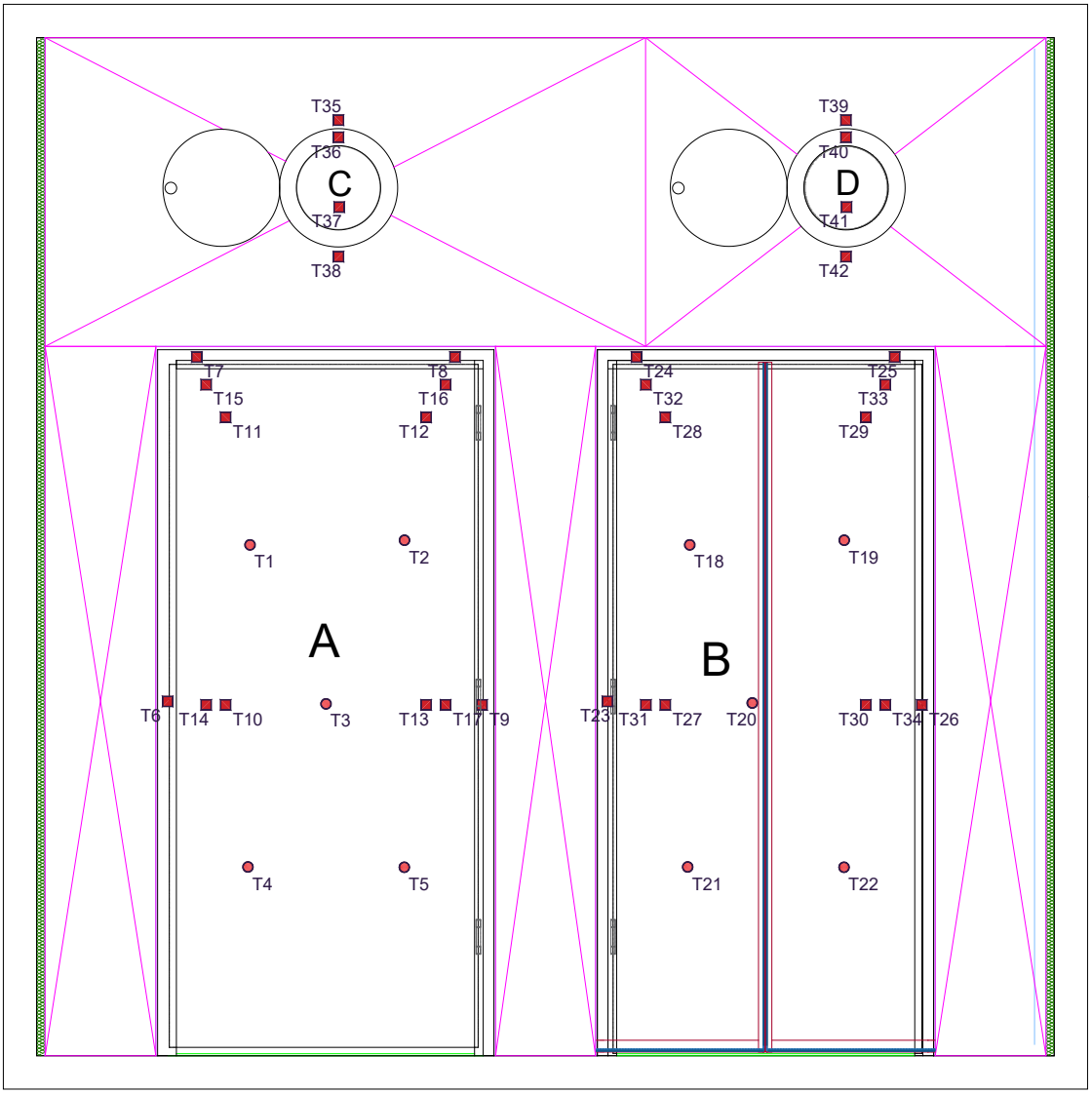


Figure 6 - Layout of instrumentation viewed from the unexposed surface of the test construction

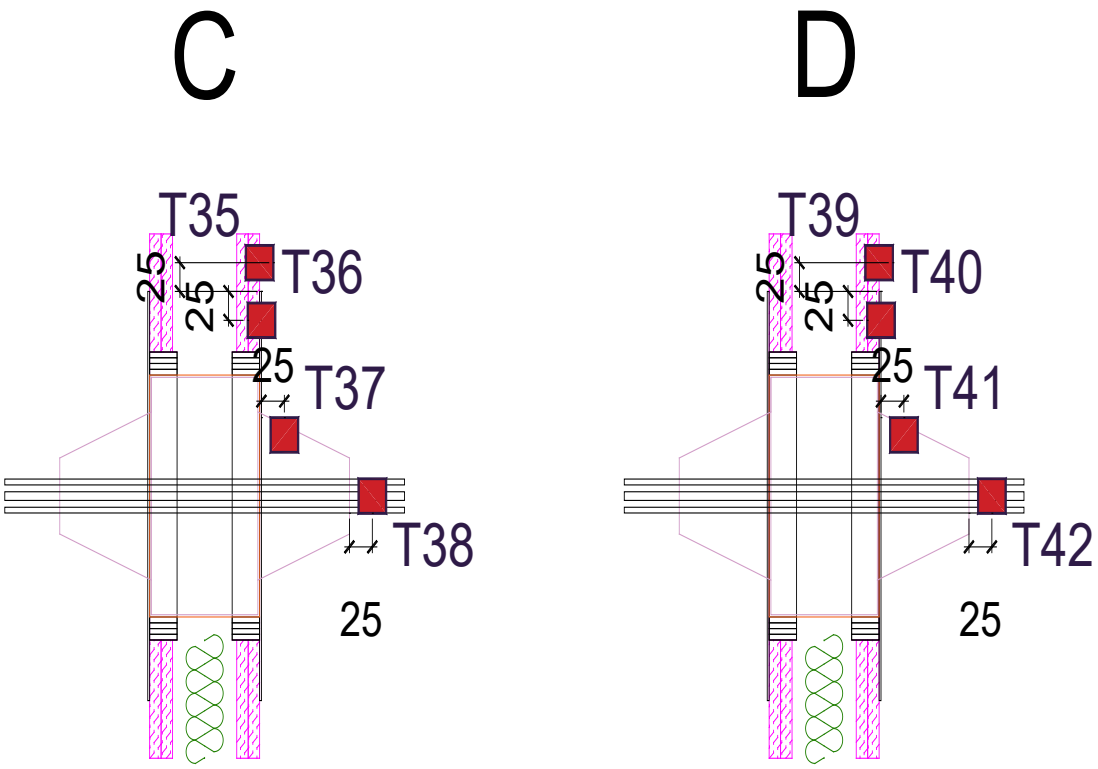


Figure 7 – Vertical Cross Section of unexposed surface thermocouples applied to the hatches

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 Soft wood FD 30 Spec
Material	Joinery Red Deal
Density	540 kg/m^3 *
Moisture content	12.4 – 13.9 % (laboratory measurement)
a. Overall size	998 mm wide x 2093 mm high x 80 mm deep
i. Frame (Head)	80 mm wide x 30 mm thick
ii. Frame (Jambs)	80 mm wide x 30 mm thick
iii. Stop	15 mm wide x 25 mm deep
Jamb to Head jointing method, fixing detail and location	16 mm Stub Tennon with 2 no. off Ø 5 mm x 100 mm long wood screw, Glued D4 PVA
Stop to Frame jointing method, fixing detail and location	Pinned with Ø 1.6 x 38 mm brad nails at 450 mm centres
b. Adhesive(s)	None
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
3. Frame to supporting construction fire stopping detail	
Manufacturer	Saint-Goban Isover
Reference	Acoustic Partition Roll
Material	Glass Mineral Wool
Overall dimension	5 – 13 mm x 60 mm deep
Application method	Friction fitted into gaps between the supporting construction and frame
4. Sealant to fire stopping detail	
Manufacturer	Certitek
Reference	DM-01 Intumescent & Acoustic Acrylic Sealant
Material	Acrylic Sealant
Overall section size	10 mm deep x 5 mm to 13 mm wide
Application method	Using a cartridge gunned
Location	Gaps between the head and jambs and supporting construction
5. Intumescent to frame reveal (1)	
Quantity	1
Manufacturer	Ram Extrusions
Reference	Pyrocist 15x4
Material	Graphite with flexible skin
Overall section size	15 mm wide x 4 mm thick
Application method	Self-adhesive
Location (relative to the opening face of the door leaf)	15 mm

6. Door Leaf	
Supplier	S A Joinery
Reference	FD 30 Strebord
Quantity of leaves on doorset	1
Glazing location relative to the head and closing edge	N/A
Overall leaf size supplied for testing	2040 mm wide x 930 mm high x 44 mm thick
7. Core element	
Manufacturer	Falcon Panel Products
Reference	44 mm Strebord 30
Material	Multi-Layered Particleboard
Density	620 kg/m^3 *
Overall thickness and reduced thickness if door leaf incorporates fielded areas	44 mm thick
Application method	Bonded
a. Adhesives	Not declared
b. Presence of Mechanical Fixings	Not declared
8. Lippings / Edge banding	
Manufacturer	S A Joinery
Material	Sapele
Density	640 kg/m^3 *
Moisture content	8.2 – 9.3 % (laboratory measurement)
Overall size	6 mm x 44 mm 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	N/A
9. 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	1st - 176 mm, 2nd – 946 mm, 3rd – 1715 mm
Details of intumescent protection	1mm Interdens (VANQUISH)
Interruptions to Intumescent within the frame reveal	Fully interrupts.
10. Door Closer	
Manufacturer	DORMA
Reference	TS92B
a. Material	
i. Body	Mild Steel
ii. Closer arm	Stainless Steel
iii. Cover	Stainless Steel
Configuration	Cam. Action Slide Arm
b. Overall size	
i. Slide arm	524 mm wide x 22 mm thick x 33 mm deep

ii. Body	281 mm high x 65 mm wide x 47 mm deep
iii. Cover	56 mm high x 296 mm wide x 0.5 mm deep
Fixing method	Screwed with 4 no Ø 5 mm x 50 mm stainless steel screws
11. Fireplug Framefit System Details	
Manufacturer	Complete Fire Protection Ltd
Reference	Fireplug FrameFit System for 30-minute fire doors - Ref FF30
Material	Low modulus fire retardant graphite intumescent
a. System Components	
i. Gap spacers (LM Range for 30-minute doors)	Low Modulus (LM) fire retardant intumescent Ref: LM1.5/44, LM3/44, LM5/44
ii. Hinge Side (HE44 for 30-minute doors)	High expansion intumescent Ref: HE44
b. Overall Size	
i. LM/44 Range	44 mm wide x 2100 mm long x 1.5/3/5 mm thick
ii. HE44	44 mm wide x 2100 mm long x 1.5 mm thick
iii. Application Method	Fix required LM profiles to the door frame opposite the door edges by using the double-sided adhesive tape found on the reverse side of each profile. Once the correct number of LM profiles are in place, pin fix through all layers into the door frame using a minimum of 20 mm long panel pins at seal ends. The HE44 is generally used on the hinged side only. It is fitted using the double-sided adhesive tape found on the reverse side of each profile.
c. Door Edge Gap sizes	**FrameFit Configurement**
i. Hinge (3 mm Gap)	None
ii. Leading edge (6 mm gap)	1 no. LM1.5/44 + 1 no. HE/44
iii. Top Edge (3 mm)	None

12. Bottom Door Edge Seal	
Manufacturer	Complete Fire Protection Ltd
Reference	Framefit BDS30
Material	Low modulus fire retardant graphite intumescent
Overall section size	As LM Range
Location (relative to the opening face of the door leaf)	Located on the bottom door edge
Application Method	Fix required LM profiles to the bottom door edge by using the double-sided adhesive tape found on the reverse side of each profile. Once the correct number of LM profiles are in place, encase the profiles with the appropriate BDS cover strip. Then screw/pin fix through all layers into the bottom of the door edge using a minimum of 40 mm long screws/panel pins at approximately 350 mm centres ensuring screws/pins penetrate door edge by minimum of 10 mm.
Door Edge Gaps	**FrameFit configurement**
Bottom of leaf (17 mm)	Various LM Range between 15 mm due to the difference in gap at the bottom of the specimen in relation to the restraint frame
13. Latch	
Manufacturer	Zoo
Reference	ZCS230SS (Latch)
a. Material	
i. Lockcase	Mild Steel
ii. Forend plate	Stainless Steel
iii. Lock bolt	Stainless Steel
iv. Keeper	Stainless Steel
b. Overall sizes	
i. Central Lockcase	22 mm high x 15 mm wide x 73 mm deep
ii. Forend plate	60 mm high x 25 mm wide x 1 mm thick
iii. Lock bolt	18.5 mm high x 12 mm wide x 11 mm projection
iv. Keeper	80 mm high x 24 mm wide x 1.5 mm thick with a 60 mm high x 15 mm wide Tongue
Fixing method	2 No. Ø 4 x 25 mm CSK woodscrews
Operation of lock bolt	Engaged
c. Details of intumescent protection	

i. Central Lockcase	1 mm Flexi Fire (VANQUISH)
ii. Forend plate	1 mm Flexi Fire (VANQUISH)
iii. Keeper	1 mm Flexi Fire (VANQUISH)
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
14. Lever handles	
Manufacturer	ZOO
Reference	ZCS030SS
Material	Satin Stainless steel
a. Overall size	
i. Rose	Ø 52 mm x 8 mm thick
ii. Handle	Ø 19 mm x 140 mm long x 55 mm projection
Fixing method, fixing material, sizes, quantity and location	4no. Ø 3.5 mm x 25 mm long wood screws & 2no. Ø 4 mm bolt through fixings.
15. Door Pin ID Tag	
Manufacturer	FrameFit
Reference	Data 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 door.
Fixing method	Friction fitted into door edge.

4.2 Specimen B

16. Frame	
Manufacturer	S A Joinery
Reference	Double Softwood FD 30 Spec
Material	Joinery Red Deal
Density	540 kg/m3 *
Moisture content	13.2 – 14.3 % (laboratory measurement)
a. Overall size	2095 mm high x 1085 mm wide x 80 mm wide

i. Frame (Head)	80 mm wide x 32 mm thick
ii. Frame (Jambs)	80 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
b. Adhesive(s)	
i. Manufacturer	Ever build
ii. Type	D4 PVA
iii. Reference	EN204
iv. Curing method	Air
v. Application method	Squeezed & brushed
17. 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
18. Frame to supporting construction fire stopping detail	
Manufacturer	Saint-Gobain
Reference	Isover Insulation
Material	Mineral Wool
Overall dimension	60 mm deep x 2 mm to 10 mm wide
Application method	Compression fitted

19. Sealant to fire stopping detail	
Manufacturer	Certitek
Reference	DM-01 Intumescent & Acoustic Acrylic Sealant
Material	Acrylic Sealant
Overall section size	10 mm deep x 1 mm to 15 mm wide
Application method	Using a cartridge gunned
Location	Gaps between the head and jambs and supporting construction
20. Intumescent to frame reveal (1)	
Quantity	1
Manufacturer	Ram Extrusions
Reference	IFS154
Material	Graphite in PVC carrier.
Overall section size	15 mm wide x 5 mm thick
Application method	Self-adhesive
Location (relative to the opening face of the door leaf)	15 mm
21. Door Leaf	
Supplier	S A Joinery
Reference	Prima 30
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
22. Core element	
Manufacturer	Halspan
Reference	Prima
Material	Multi Layered Particleboard
Density	630 kg/m^3 *
Overall thickness	44 mm thick

23. Lippings / Edge banding	
Manufacturer	S A Joinery
Reference	Lipping
Material	Sapele
Density	640 kg/m^3 *
Moisture content	7.4 – 8.5 % (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
24. 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	1st - 175 mm, 2nd – 945 mm, 3rd – 1715 mm
Details of intumescent protection	1 mm Interdens (VANQUISH)
Interruptions to Intumescent within the frame reveal	Framefit fireplug sits over the hinges.
25. 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
26. Fireplug Framefit System Details	
Manufacturer	Complete Fire Protection Ltd
Reference	Fireplug FrameFit System for 30-minute fire doors - Ref FF30
Material	Low modulus fire retardant graphite intumescent
a. System Components	
i. Gap spacers (LM Range for 30-minute doors)	Low Modulus (LM) fire retardant intumescent Ref: LM1.5/44, LM3/44, LM5/44
ii. Hinge Side (HE44 for 30-minute doors)	High expansion intumescent Ref: HE44
b. Overall Size	
i. LM/44 Range	44 mm wide x 2100 mm long x 1.5/3/15 mm thick
ii. HE44	44 mm wide x 2100 mm long x 1.5 mm thick
Application Method	Fix required LM profiles to the door frame opposite the door edges by using the double-sided adhesive tape found on the reverse side of each profile. Once the correct number of LM profiles are in place,

	pin fix through all layers into the door frame using a minimum of 20 mm long panel pins at seal ends. The HE44 is generally used on the hinged side only. It is fitted using the double-sided adhesive tape found on the reverse side of each profile.
c. Door Edge Gap sizes	**FrameFit Configurement**
i. Hinge B1 (4 mm Gap)	1 No HE/44
ii. Hinge B2 (4 mm gap)	1 No HE/44
iii. Top Edge (6 mm)	1 No LM/44 (1.5 mm) + 1 No HE/44 (1.5 mm)
27. Bottom Door Edge Seal	
Manufacturer	Complete Fire Protection Ltd
Reference	Framefit BDS30
Material	Low modulus fire retardant graphite intumescent
Overall section size	As LM Range
Location (relative to the opening face of the door leaf)	Located on the bottom door edge
Application Method	Fix required LM profiles to the bottom door edge by using the double-sided adhesive tape found on the reverse side of each profile. Once the correct number of LM profiles are in place, encase the profiles with the appropriate BDS cover strip. Then screw/pin fix through all layers into the bottom of the door edge using a minimum of 40 mm long screws/panel pins @ 200 mm centres ensuring screws/pins penetrate door edge by minimum of 10 mm.
a. Door Edge Gaps	**FrameFit configurement**
i. Bottom of leaf (13 mm)	2 x LM5/44 Range between 9 mm due to the difference in gap at the bottom of the specimen in relation to the restraint frame

28. Meeting Edge Seal	
Manufacturer	Complete Fire Protection Ltd
Reference	Framefit MES30
Material	Low modulus fire retardant graphite intumescent
Overall section size	48 mm wide x 19 mm upstand x 2.5 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.
a. Door Edge Gaps	**FrameFit configurement**
i. Leading edge leaf B1 (6-7 mm)	1 No LM/44 (3 mm) + 1 No HE/44 (1.5 mm)
ii. Leading edge leaf B2 (6-7 mm)	1 No LM/44 (3 mm) + 1 No HE/44 (1.5 mm)
29. Door Pin ID Tag	
Manufacturer	FrameFit
Reference	Data 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 door.
Fixing method	Friction fitted into door edge.

4.3 Specimen C

30. Steel Hatch	
Manufacturer	Complete Fire Protection
Reference	Fire Plug Cable Pass Through System
Model	CPTFRAW190
Material	Mild Steel
a. Overall size	
i. Wall Trim	Ø 350 mm x 79 mm wide x 2 mm thick

ii. Hatch Lid	Ø 350 mm x 2 mm thick
iii. Handle	Ø 35 mm x 25 mm projection
iv. Steel collar	Ø 250 mm x 23 mm wide x 53 mm deep x 2 mm thick
Location	2600 mm up to centre of hatch Ø 305 mm hole
Fixing method	4 No. Ø 4 x 50 mm Screws with
31. Intumescent	
Manufacturer	Tenmat
Reference	FF160
Material	Graphite based intumescent
Overall size / location	4 no. layers wrapped around collar – 30 mm wide x 5 mm thick per layer
Fixing method	Friction fitted between steel collar and UPVC Pipe.
32. UPVC Pipe	
Manufacturer	JDP
Reference	Plain Ended Underground Drainage Pipe
Material	PVC-U
Overall size	Ø 250 mm x 132 mm long
Location	Fitted into steel collars of Steel hatches.
33. Smoke Sock	
Manufacturer	Culimeta-Saveguard Ltd
Reference	FireHalt SF Fire Barrier
Material	Treated Woven Glass Cloth
Overall size	Ø 250 mm x 1000 mm long
Location	Fitted around UPVC Pipe.
Rope in Sock Ends	Ø 8 mm Ceramic Fiber Rope (Braided) - Murugappa

34. Acoustic Bung	
Manufacturer	The Morgan Crucible Company plc
Reference	Superwool® Plus Blanket
Material	Ceramic fiber wool
Overall size	Ø 280 mm x 50 mm thick
Location	Fitted into sock and pipe.
35. Wires	
Manufacturer	Pitacs Ltd
Reference	1.5m m 3-Core Hest Res Flex Ref 3093Y / 1,5mm&2.5mm Twin and EarthRef 6242Y
Type 1 -	1 No. 6 mm wide x 2 mm thick plastic cased Hea t Res Flex 3-C ore 1.5mm 3093Y wires (white)
Type 2 -	1 No. 6 mm wide x 2 mm thick plastic cased 1.5 mm 6242Y wires (grey)
Type 2 -	1 No. 6 mm wide x 2 mm thick plastic cased 2,5 mm 6242Y wires (grey)

4.4 Specimen D

36. Steel Hatch	
Manufacturer	Complete Fire Protection
Reference	Fire Plug Cable Pass Through System
Model	CPTFRAW250
Material	Mild Steel
a. Overall size	
i. Wall Trim	Ø 400 mm x 82 mm wide x 2 mm thick
ii. Hatch Lid	Ø 300 mm x 2 mm thick
iii. Handle	Ø 35 mm x 25 mm projection
iv. Steel Collar	Ø 280 mm x 23 mm wide x 53 mm deep x 2 mm thick
Location	2600 mm up to centre of hatch Ø 205 mm hole
Fixing method	4 No. Ø 4 x 50 mm Screws with

37. Intumescent	
Manufacturer	Tenmat
Reference	FF160
Material	Graphite based intumescent
Overall size / location	4 no. layers wrapped around collar - 5 mm thick per layer
Fixing method	Friction fitted between steel collar and UPVC Pipe.
38. UPVC Pipe	
Manufacturer	JDP
Reference	Plain Ended Underground Drainage Pipe
Material	PVC-U
Overall size	Ø 200 mm x 132 mm long
Location	Fitted into steel collars of Steel hatches.
39. Smoke Sock	
Manufacturer	Culimeta-Saveguard Ltd
Reference	FireHalt SF Fire Barrier
Material	Treated Woven Glass Cloth
Overall size	Ø 250 mm x 1000 mm long
Location	Fitted around UPVC Pipe.
Rope in Sock Ends	Ø 8 mm Ceramic Fiber Rope (Braided) - Murugappa
Manufacturer	The Morgan Crucible Company plc
Reference	Superwool® Plus Blanket
Material	Ceramic fiber wool
Overall size	Ø 280 mm x 50 mm thick
Location	Fitted into sock and pipe.

40. Wires	
Manufacturer	Pitacs Ltd
Reference	1.5m m 3-Core Hest Res Flex Ref 3093Y / 1,5mm&2.5mm Twin and EarthRef 6242Y
Type 1 -	1 No. 6 mm wide x 2 mm thick plastic cased Hea t Res Flex 3-C ore 1.5mm 3093Y wires (white)
Type 2 -	1 No. 6 mm wide x 2 mm thick plastic cased 1.5 mm 6242Y wires (grey)
Type 2 -	1 No. 6 mm wide x 2 mm thick plastic cased 2,5 mm 6242Y wires (grey)

4.5 Supporting Construction

41. Studs	
Supplier	United Kingdom Testing and Certification
Type & Material	Steel
a. Dimensions	3000 mm long x 35 mm wide x 70 mm deep
i. Stud centres	400-625 mm
ii. Fixing(s)	Friction fitted to the head/ floor track
42. **Head/ Floor Track**	
Supplier	United Kingdom Testing and Certification
Type & Material	Steel
Dimensions	3000 mm long x 50 mm wide x 72 mm deep
Fixing(s)	Ø 7.5 mm x 50 mm long self-tapping screws staggered at max 600 mm centres
43. **Lining(s)**	
Supplier	United Kingdom Testing and Certification
Type & Material	Paper faced, gypsum plasterboard type F
Layer Quantity	2
Dimensions	15 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

44. **Wall Insulation**	
Supplier	UKTC Provided
Type & Material	Mineral Wool
Installation Method	Compression Fitted
Thickness	50 mm
Additional Wall Construction Requests	N/a
45. **Free Edge Gasket**	
Manufacturer	Morgan Advanced Materials
Reference	Superwool
Dimensions (w x h x d)	20 mm thick x 3025 mm long x 100 mm wide
Fixing(s)	Compression fitted between the supporting construction & restraint frame

5 Specimen Photographs

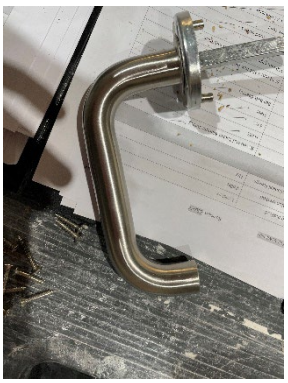


Figure 8 - Item 14

Figure 9 - Item 13

Figure 10 - Item 13

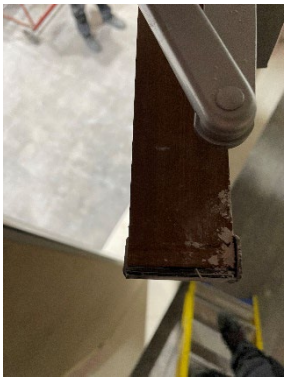


Figure 11 - Item 28

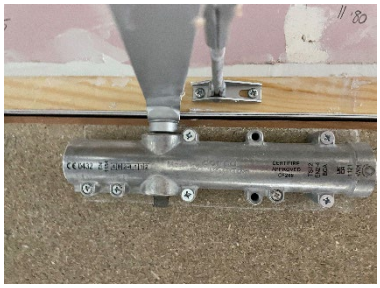


Figure 12 - Item 10 & 25

Figure 13 - Item 28

Figure 14- Item 9 & 24

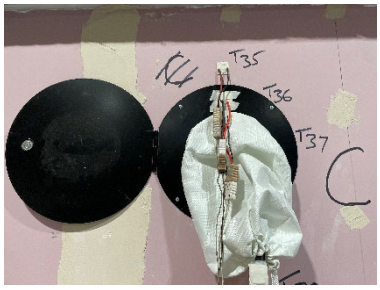


Figure 15 - Item 30

Figure 16 - Item 36

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 29.

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 pressure deviated from the specified conditions on 5 instances throughout the duration of the test. The Time-Pressure distribution is presented in Figure 30.

6.3 Deviation From Required Test Conditions

After a test duration of 89 minutes the furnace conditions deviated from the normal pressure regime due to the collapse of the blanked off door specimens within the furnace chamber. Due to these conditions representing a more severe exposure, the test is still considered valid in accordance with BS EN 1363-1:2020 § 5.7

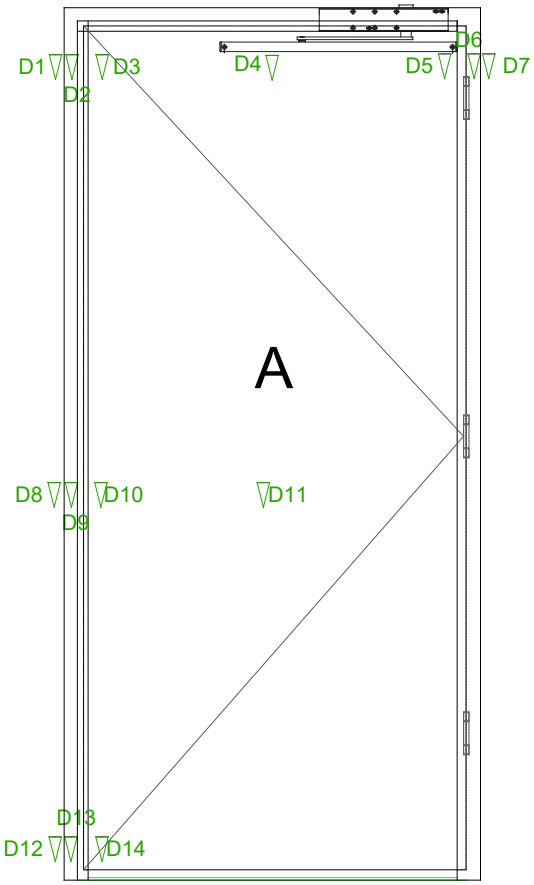
6.4 Unexposed Surface Temperature

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 42.

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 31 and Figure 32

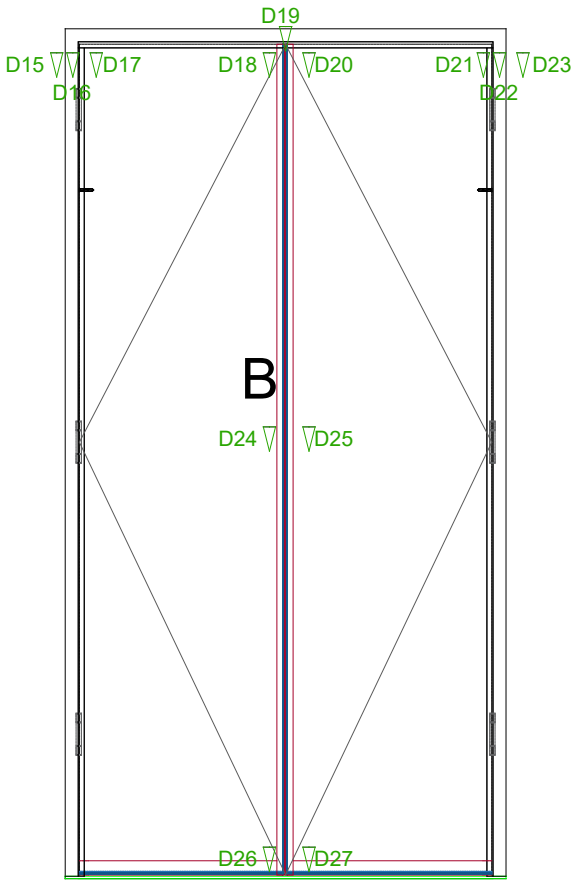
6.5 Deflection

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	5	4	11	9	6	7	6	5	5	4	3	-1	0	3
20	6	4	18	12	6	5	6	5	5	8	3	-2	1	8
25	5	4	24	14	5	4	5	5	5	12	4	-2	0	11
30	7	7	24	8	8	4	7	5	*	*	*	*	*	*

* Specimen was blanked off at 31 minutes to allow the test to continue for other specimens



Time (mins)	D15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27
0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	6	6	7	6	6	4	5	3	0	1	-2	-4	-2
20	3	5	11	3	7	5	5	2	1	-4	-8	-3	-2
25	4	2	9	5	10	5	8	1	2	-5	-15	-4	-3
30	3	3	9	2	10	7	4	1	1	-7	-19	-2	-3
35	3	2	7	2	8	7	4	1	0	-8	-18	-1	-1

* Specimen was blanked off at 38 minutes to allow the test to continue for other specimens

6.6 Observations

Specimen	HH	MM	SS	E[11]	U[12]	Observation
	00	**00**	**00**		**X**	**The test commences.**
A	00	00	40		X	Smoke/steam release along the top edge of specimen A and on the top edge at the meeting stile
C/D	00	02	02			Smoke/steam release along the socks on both specimens
B	00	02	58		X	Discoloration on the meeting stile at ¾ height
A	00	03	58		X	Smoke/steam release at the hinge edge near the bottom
D	00	04	11		X	Moisture release from behind the flange on the latch side
A	00	05	57		X	Discoloration and moisture release along the top edge
B1	00	06	30		X	The meeting stile seal has buckled away 6" from the top of the specimen
A	00	07	40		X	The latch side at the top edge is deflecting towards the heating conditions
C	00	09	58		X	The smoke sock is beginning to discolor brown
B1	00	08	09		X	Discoloration on the top edge near the meeting stile
A	00	10	31		X	Smoke/steam release from the leading edge at the latch
D	00	10	47		X	The smoke sock is beginning to discolor brown
A	00	13	06		X	Discoloration on the top edge
A	00	15	49		X	Discoloration increasing on the frame at the head of the specimen
C/D	00	16	57		X	The smoke socks continue to discolor brown/black
A	00	17	29		X	Smoke/steam release is progressing down the hinge side

[11] Viewed from exposed surface of the test construction.
[12] Viewed from unexposed surface of the test construction.

Specimen	HH	MM	SS	E[13]	U[14]	Observation
B1/B2	00	18	25		X	Discoloration and moisture release the top hinge corners
A/B	00	20	04	X		All the closers on both specimens have now fallen away
A	00	21	22		X	Discoloration down the hinge side is approx. 10" now
C/D	00	21	40		X	Smoke/steam release continues as both bags' discoloration increases
A	00	22	47		X	The Door is pulling towards the heating conditions
A	00	23	29		X	Smoke/steam increasing down the hinge side
B1/B2	00	25	59		X	Top edge is deflecting towards the heat conditions
A	00	26	48		X	Slight glowing at the top corner on the latch side
B1/B2	00	29	43		X	Slight movement at meeting stile
A	00	31	17		X	**Observations on the specimen discontinued and has been hosed down and blanked off so that evaluation may continue specimen B, C & D.**
B1	00	33	19		X	Discoloration at mid-height on the hinge side
C/D	00	33	45		X	Smoke/steam release continues as both bags' discoloration increases
B1	00	35	21		X	Discoloration at on the hinge side near the top corner
C	00	35	37			Discoloration is observed around the outer ring
B2	00	36	55		X	All hinge locations on specimen are showing discoloration
C/D	00	38	00		X	Smoke/steam release increasing
B	**00**	**38**	**21**		**X**	**Observations on the specimen discontinued at the request of the client, specimen hosed down and blanked off to continue test for specimens C & D**

[13] Viewed from exposed surface of the test construction.
[14] Viewed from unexposed surface of the test construction.

Specimen	HH	MM	SS	E[15]	U[16]	Observation
C	01	24	00		X	Intumescent is observed oozing out from the edges of the collar
C	**01**	**30**	**00**		**X**	**Observations on the specimen discontinued at the request of the client, specimen hosed down and blanked off to continue test for specimen D**
D	01	40	00		X	Steam/smoke release increases from the specimen
	02	**01**	**53**		**X**	**The test is discontinued at the request of the Test Sponsor.**

[15] Viewed from exposed surface of the test construction.
[16] Viewed from unexposed surface of the test construction.

6.7 Test Images

Figure 17 – The exposed surface of the test construction prior to commencement of the test

Figure 18 - The unexposed surface of the test construction prior to the commencement of the test

Figure 19 - The unexposed surface of the test construction after a test duration of 20 minutes

Figure 20 - The unexposed surface of the test construction after a test duration of 41 minutes

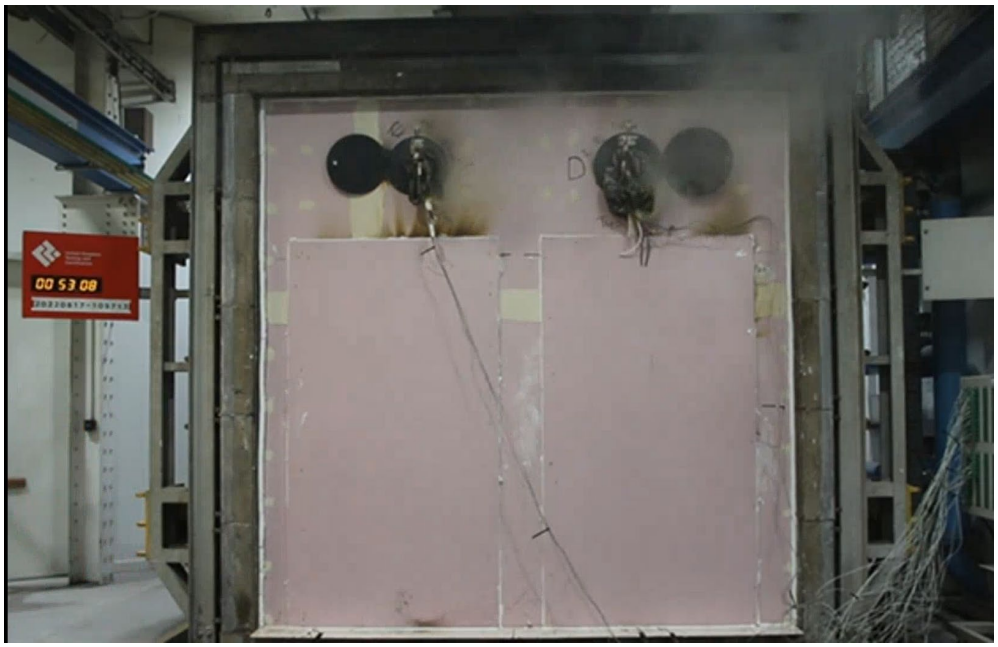


Figure 21 - The unexposed surface of the test construction after a test duration of 53 minutes

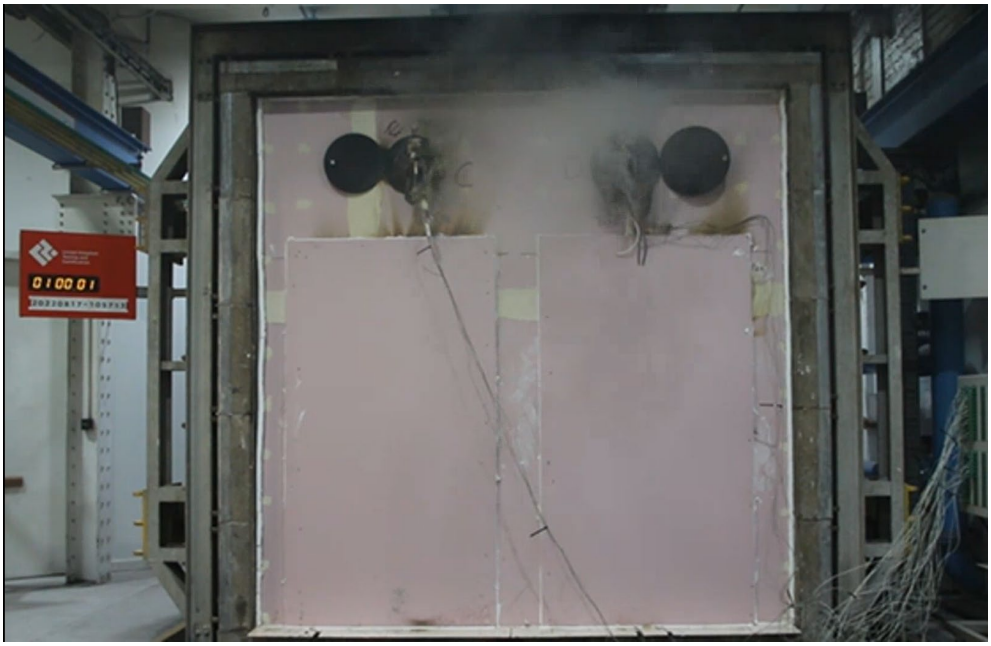


Figure 22 - The exposed surface of the test construction after the test was discontinued

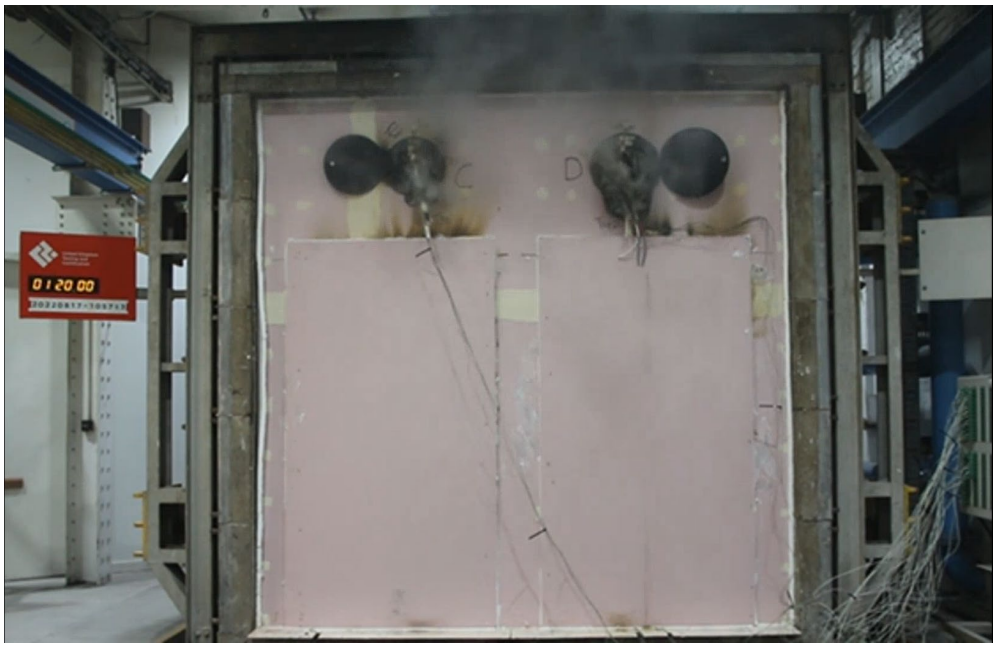


Figure 23 - The unexposed surface of the test construction after a test duration of 80 minutes

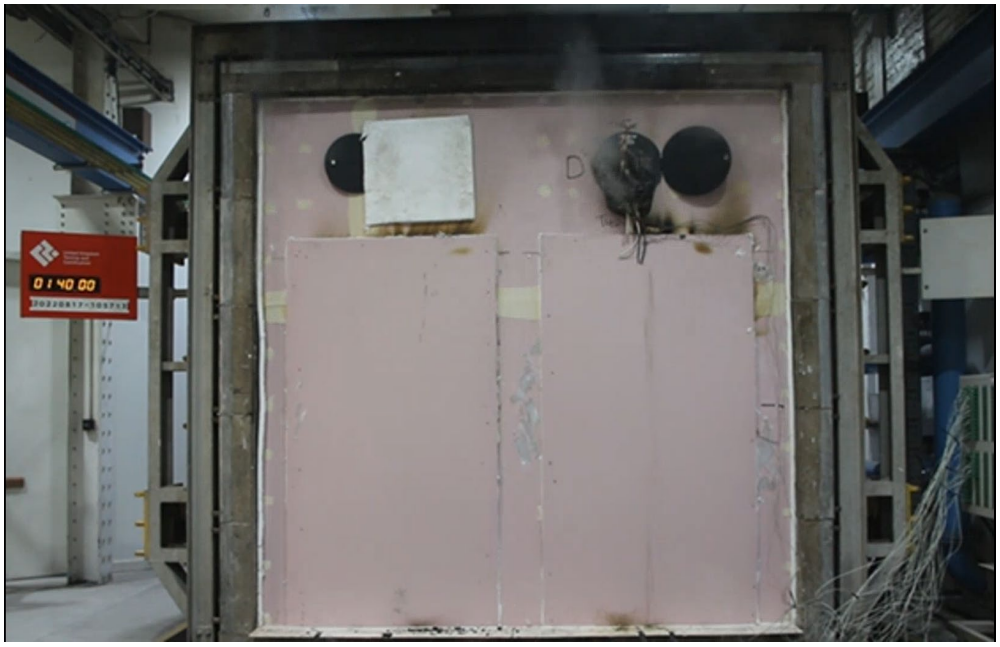


Figure 24 - The unexposed surface of the test construction after a test duration of 100 minutes

Figure 25 - The unexposed surface of the test construction after a test duration of 110 minutes

Figure 26 - The unexposed surface of the test construction after a test duration of 115 minutes

Figure 27 - The unexposed surface of the test construction after a test duration of 120 minutes

Figure 28 - 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.

8 Figures

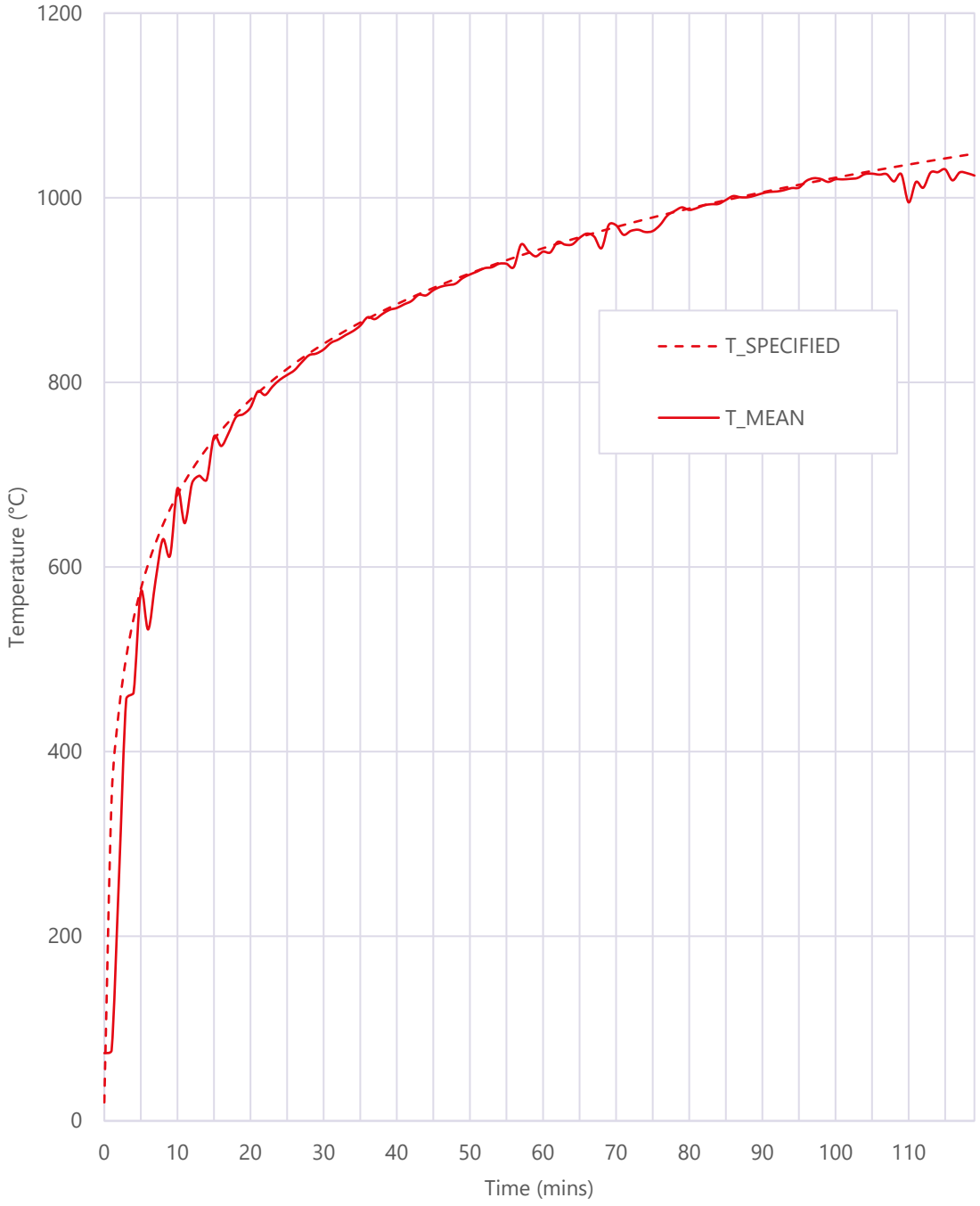


Figure 29 – Graph presenting the Time-Temperature distribution of the furnace

Figure 30 – Graph presenting the Time-Pressure distribution of the furnace

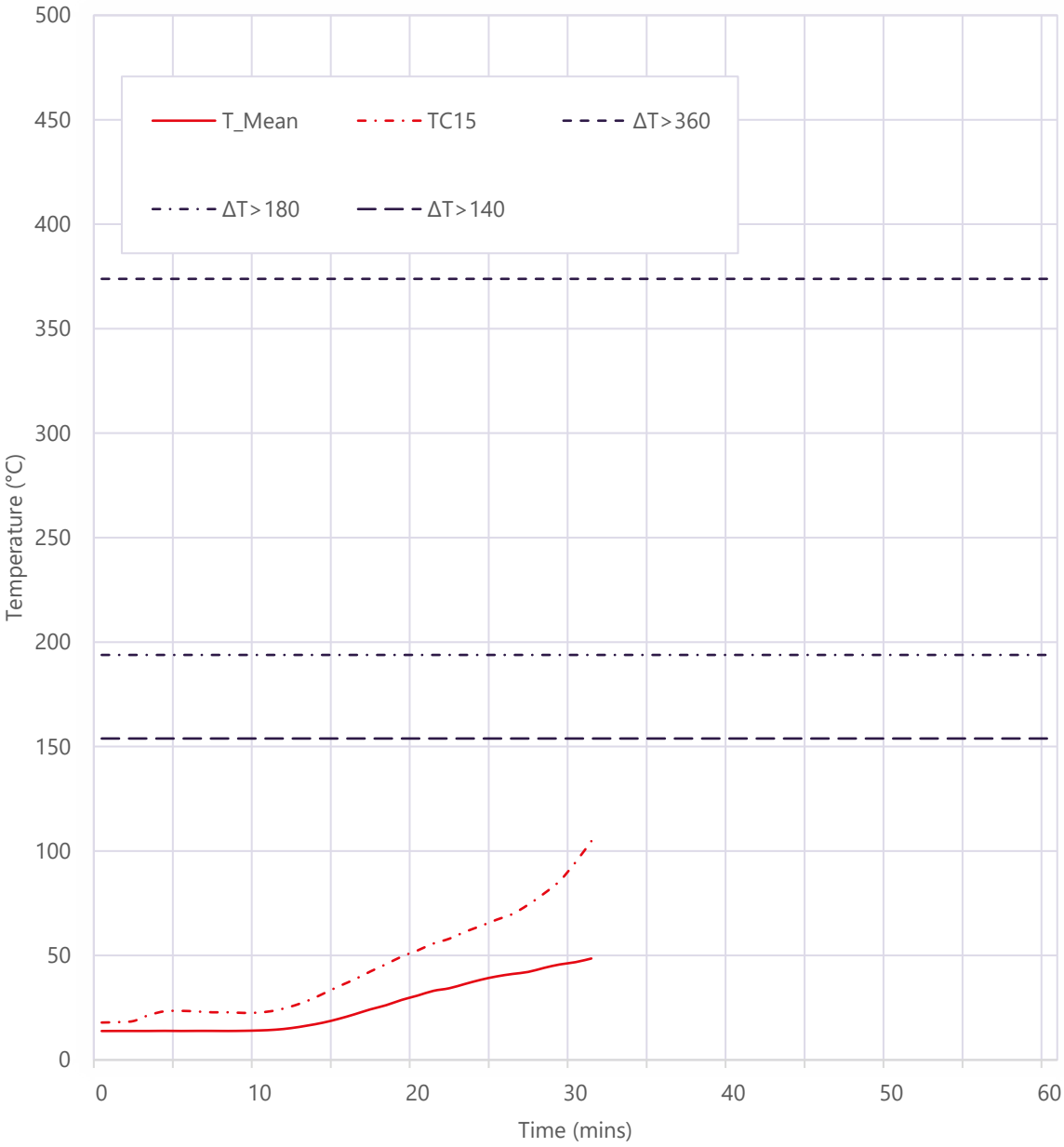


Figure 31 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen A

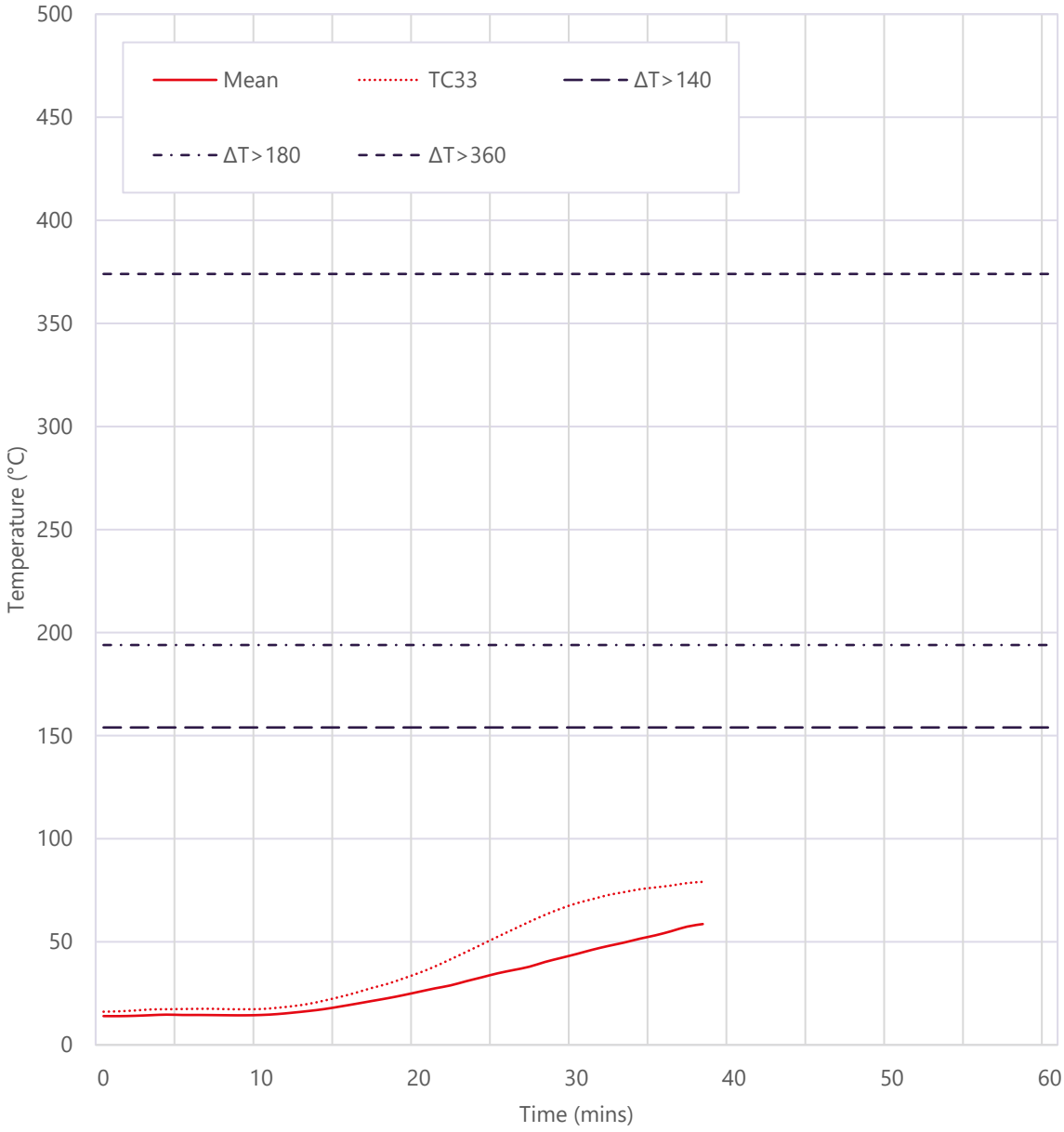


Figure 32 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen B

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	14.0	14.2	13.9	13.6	13.5
2	14.0	14.2	13.9	13.6	13.6
4	13.9	14.3	14.0	13.7	13.7
6	14.0	14.3	14.0	13.6	13.6
8	13.9	14.3	13.9	13.6	13.6
10	14.3	14.7	14.2	13.6	13.8
12	15.9	16.0	15.6	14.2	14.5
14	18.3	18.9	18.9	16.1	16.9
16	22.3	23.0	23.7	19.7	20.4
18	26.4	27.3	29.0	23.8	24.4
20	30.7	32.1	34.3	28.2	28.7
22	33.8	35.6	38.3	31.8	32.0
24	38.0	39.7	42.6	35.7	35.8
26	40.4	42.5	45.5	38.6	38.7
28	43.3	45.9	48.2	41.1	41.7
30	46.2	49.4	51.0	43.2	44.2
31	47.8	51.3	52.7	44.8	46.1

* The specimen was extinguished and blanked off after 31 minutes

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)	TC10	TC11	TC12	TC13
0	14.0	14.5	14.6	14.0
2	14.1	14.3	14.5	14.0
4	14.2	14.1	14.4	14.0
6	14.3	14.2	14.5	14.1
8	14.2	14.0	15.4	14.1
10	14.6	14.4	15.4	14.3
12	15.8	16.5	16.8	15.8
14	18.8	20.1	18.9	18.8
16	22.7	24.6	21.8	23.0
18	27.1	28.9	24.8	27.4
20	31.6	34.0	28.5	31.6
22	34.9	37.7	31.3	34.9
24	39.0	42.2	35.9	38.3
26	41.3	44.9	39.0	41.0
28	43.7	48.0	43.0	43.7
30	45.9	52.5	47.1	46.3
31	47.4	54.4	49.3	47.9

* The specimen was extinguished and blanked off after 31 minutes

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)	TC14	TC15	TC16	TC17
0	13.7	17.9	14.0	14.8
2	13.8	18.6	14.1	14.8
4	13.9	23.3	14.1	14.8
6	14.0	23.2	14.6	14.9
8	14.7	22.8	23.2	15.3
10	17.9	22.7	23.0	16.1
12	22.3	25.6	23.9	18.4
14	24.7	31.6	27.0	22.7
16	30.3	38.5	30.9	28.7
18	35.4	45.8	34.9	35.2
20	40.2	52.4	41.5	42.2
22	43.5	58.0	45.1	47.8
24	48.7	64.1	50.9	53.5
26	52.1	69.8	53.8	57.2
28	56.1	79.6	57.4	60.1
30	59.8	94.6	61.0	62.3
31	62.2	104.7	63.3	63.7

* The specimen was extinguished and blanked off after 31 minutes

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

Time (mins)	TC6	TC7	TC8	TC9
0	13.8	14.1	13.6	14.3
2	13.8	15.1	13.6	14.5
4	13.9	19.0	13.7	14.7
6	13.9	20.5	14.2	14.9
8	14.1	21.6	24.5	14.8
10	14.8	18.6	25.8	15.9
12	16.3	19.4	27.0	20.6
14	19.5	21.6	27.2	26.1
16	25.3	24.8	30.3	36.4
18	32.4	26.8	32.5	43.2
20	37.2	29.9	35.3	51.2
22	39.7	30.1	35.6	48.9
24	42.6	32.7	37.9	52.0
26	44.0	34.6	38.2	52.5
28	44.8	43.2	38.8	53.5
30	45.5	57.3	40.7	54.0
31	46.2	65.1	41.3	54.5

* The specimen was extinguished and blanked off after 31 minutes

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

Time (mins)	TC18	TC19	TC20	TC21	TC22
0	14.0	15.1	13.8	13.5	13.5
3	14.2	15.7	14.9	13.5	13.8
6	14.2	15.3	14.9	13.7	14.5
9	14.3	15.1	14.7	13.7	14.0
12	15.4	16.2	15.7	16.2	14.7
15	18.0	18.9	18.7	20.6	16.9
18	21.8	22.7	22.6	25.4	20.6
21	26.7	27.2	27.8	30.6	24.7
24	32.1	32.5	33.2	36.6	29.6
27	37.6	37.6	38.8	41.6	34.0
30	44.5	43.7	45.5	47.4	39.4
33	51.1	49.0	51.3	52.2	44.5
36	57.5	54.8	56.9	56.8	49.8
38	61.4	57.8	60.7	59.9	53.3

* The specimen was extinguished and blanked off after 38 minutes

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

Time (mins)	TC27	TC28	TC29	TC30
0	14.1	14.5	14.9	13.9
3	14.1	14.3	15.0	14.2
6	14.3	14.2	14.7	14.2
9	14.3	14.3	14.7	14.2
12	15.4	15.5	16.7	15.4
15	17.3	17.6	20.5	19.5
18	20.5	20.5	24.5	24.6
21	24.6	24.2	28.5	29.9
24	29.3	28.5	32.5	35.1
27	34.6	33.3	36.7	40.0
30	41.7	39.5	42.3	45.7
33	49.2	46.2	47.6	51.3
36	57.3	53.0	53.9	57.3
38	62.5	57.5	57.6	60.7

* The specimen was extinguished and blanked off after 38 minutes

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

Time (mins)	TC31	TC32	TC33	TC34
0	13.6	14.6	16.1	14.7
3	13.5	17.1	17.2	14.9
6	13.8	15.0	17.5	15.0
9	13.9	14.9	17.3	15.0
12	15.2	15.7	18.8	17.8
15	18.7	18.2	23.3	26.1
18	25.8	22.5	29.6	35.4
21	35.8	29.4	38.0	44.7
24	45.1	38.3	48.8	52.4
27	52.5	48.0	59.7	58.4
30	59.2	58.0	68.7	62.7
33	64.4	65.3	74.1	65.9
36	69.5	71.6	77.3	68.3
38	72.8	74.7	79.1	69.8

* The specimen was extinguished and blanked off after 38 minutes

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

Time (mins)	TC23	TC24	TC25	TC26
0	13.9	14.1	15.2	14.2
3	13.9	15.1	15.6	14.4
6	14.0	14.3	15.2	14.7
9	14.1	14.1	15.3	14.5
12	15.0	14.9	16.6	15.6
15	17.0	16.9	19.4	19.1
18	21.1	20.0	25.5	22.8
21	25.4	24.4	29.5	27.1
24	29.2	27.3	32.6	30.7
27	32.8	30.4	36.1	33.4
30	36.4	32.3	40.0	36.3
33	39.4	34.5	43.1	38.9
36	43.3	36.2	45.8	41.8
38	45.5	37.3	48.0	43.5

* The specimen was extinguished and blanked off after 38 minutes

Table 9 –The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the Specimen C. Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC35	TC36	TC37	TC38
0	14.9	15.1	14.5	17.2
6	15.3	39.1	24.9	18.5
12	20.4	61.2	42.5	23.7
18	25.8	78.4	45.6	31.6
24	37.1	81.1	53.1	37.6
30	40.2	82.9	55.1	42.8
36	40.7	84.6	55.1	45.7
42	34.8	78.2	46.8	51.2
48	42.1	82.0	41.1	71.0
54	43.5	89.8	38.4	63.5
60	46.5	121.4	38.3	64.7
66	48.9	140.7	38.1	61.6
72	50.1	153.1	38.7	56.6
78	50.5	164.5	41.0	64.4
84	55.1	182.6	48.0	92.0
87	59.0	**194.4**	55.0	169.7
88	58.2	198.4	57.5	**198.1**
89	65.0	212.3	*	233.2

* Faulty thermocouple reading

** The specimen was extinguished and blanked off after 89 minutes

Table 10 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the Specimen D. Values are in Degrees Celsius (°C) unless otherwise stated.

Time (mins)	TC39	TC40	TC41	TC42
0	14.7	14.1	*	14.5
6	16.2	30.8	*	18.0
12	23.1	55.6	*	22.4
18	33.8	75.2	*	27.5
24	42.3	86.1	*	32.8
30	45.7	85.8	*	40.5
36	43.0	82.4	*	44.7
42	38.3	73.3	*	48.7
48	45.8	78.0	*	56.2
54	45.8	88.1	*	57.9
60	46.3	88.3	*	57.3
66	48.9	87.8	*	55.9
72	48.3	85.7	*	55.5
78	46.0	86.3	*	57.1
84	45.2	88.0	*	61.8
90	48.3	91.8	*	66.2
96	52.1	95.4	*	67.8
102	54.2	97.8	*	70.1
108	62.9	104.8	*	79.8
114	63.0	117.8	*	113.4
120	81.0	145.3	*	49.7

* Faulty thermocouple reading