



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 20220428-004633

Revision A\_B

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## Change History

Issue Date	Revision	Created by	Authorised by	Description of Change
18/11/2022	A	N.S	D.F	Initial Issue
18/11/2022	A_B	N.S	D.F	This test report is additional to that issued as Test Report No. 20220428-004633 and dated 18/11/2022. The original test report remains valid and is not replaced by this additional test report

## 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 is subject to report TR20220428-004633A and all references to this specimen have been removed from this report at the request of the test sponsor.

Specimen B had overall nominal dimensions of 1010 mm wide by 2110 mm high, incorporating a single door leaf with overall dimensions of 926 mm wide by 2040 mm high by 44 mm thick. The door leaf was formed from a softwood stile and rail construction with a particleboard core, there were then 6mm lippings to the vertical edges and MDF Facings applied. The leaf was hung in a softwood frame on three steel hinges. The doors assembly incorporated the following hardware:

Item No.	Description	Reference
31	Hinge	Hi-load 102
32	Door closer	TS 92 BEN1-4
33	Lockset	ZTLKA76

## 1.2 Specimen Verification

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

## 1.3 Specimen Installation and Fixity

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

## 1.4 Sampling

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

## 1.5 Expression of Results

### 1.5.1 Specimen A

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

<b>Integrity (E)<sup>1</sup></b>	Specimen A is subject to report TR20220428-004633A
<b>Insulation (I<sub>1</sub>)<sup>2</sup></b>	Specimen A is subject to report TR20220428-004633A
<b>Insulation (I<sub>2</sub>)<sup>3</sup></b>	Specimen A is subject to report TR20220428-004633A

\*The test was discontinued after a period of 34 minutes.

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

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

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

## 1.5.2 Specimen B

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

Integrity (E) <sup>4</sup>	Sustained Flaming	34 minutes	No failure*
	Gap Gauge	34 minutes	No failure*
	Cotton Pad	34 minutes	No failure*
Insulation (I <sub>1</sub> ) <sup>5</sup>		34 minutes	No failure*
Insulation (I <sub>2</sub> ) <sup>6</sup>	Specimen	34 minutes	No failure*

\*The test was discontinued after a period of 34 minutes.

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

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

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

## 2 Pre-test Examination

### 2.1 Closing Force Measurement

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

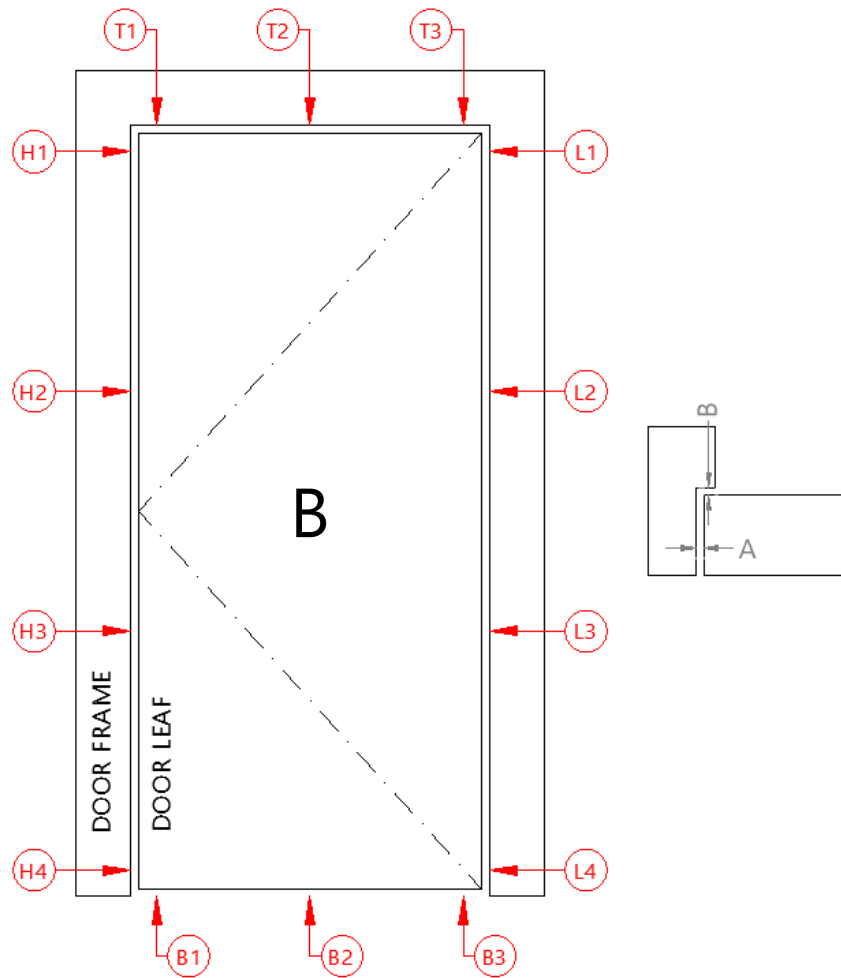
Measurement	Maximum Recorded Force (N)	Distance from Pivot to Measurement Location (m)	Moment (Nm)
Closing Force Specimen B	22.8	0.75	17.10
Opening Force Specimen B	128.8	0.75	96.60

### 2.2 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 13.6 °C to 14.6 °C and 60.5 % to 65.7 % respectively.



### 2.3 Gap Measurements



Hanging Stile	A	B	Closing Stile	A	B
H1	2.1	0.1	L1	1.7	0.3
H2	1.4	0.1	L2	1.3	0.4
H3	1.7	0.1	L3	1.3	0.4
H4	1.2	0.1	L4	2.4	0.4
<b>Mean</b>	<b>1.6</b>	X	<b>Mean</b>	<b>1.7</b>	X
<b>Max</b>	<b>2.1</b>		<b>Max</b>	<b>2.4</b>	
<b>Min</b>	<b>1.2</b>		<b>Min</b>	<b>1.3</b>	
<b>Max Permitted</b>	<b>3.9</b>		<b>Max Permitted</b>	<b>4.0</b>	
<b>Top Edge</b>	<b>A</b>		<b>B</b>	<b>Bottom Edge</b>	
T1	1.5	0.1	B1	2.0	
T2	1.3	0.1	B2	2.5	
T3	1.6	0.3	B3	2.4	
<b>Mean</b>	<b>1.5</b>	X	<b>Mean</b>	<b>2.3</b>	
<b>Max</b>	<b>1.6</b>		<b>Max</b>	<b>2.5</b>	
<b>Min</b>	<b>1.3</b>		<b>Min</b>	<b>2.0</b>	
<b>Max Permitted</b>	<b>3.5</b>		<b>Max Permitted</b>	<b>4.4</b>	

### 3 Test Specimen Drawings

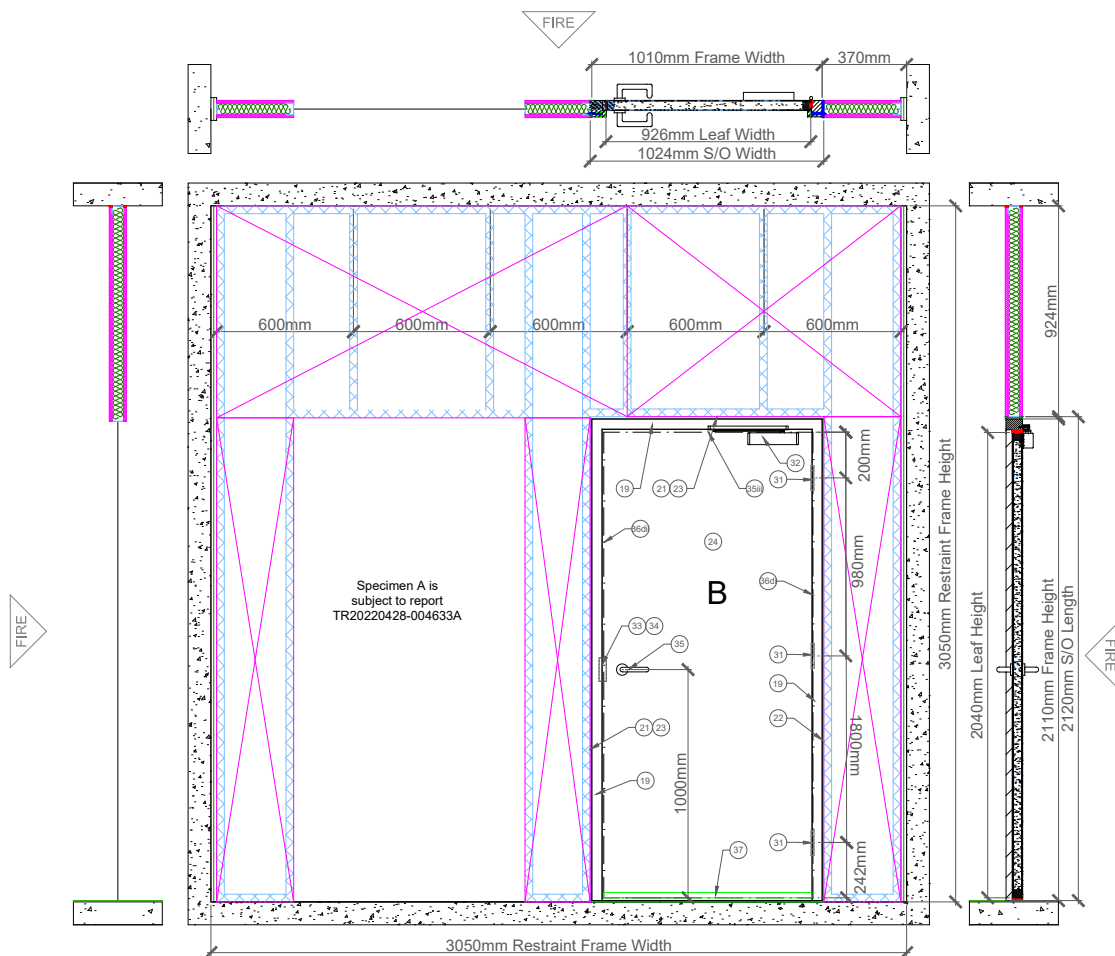
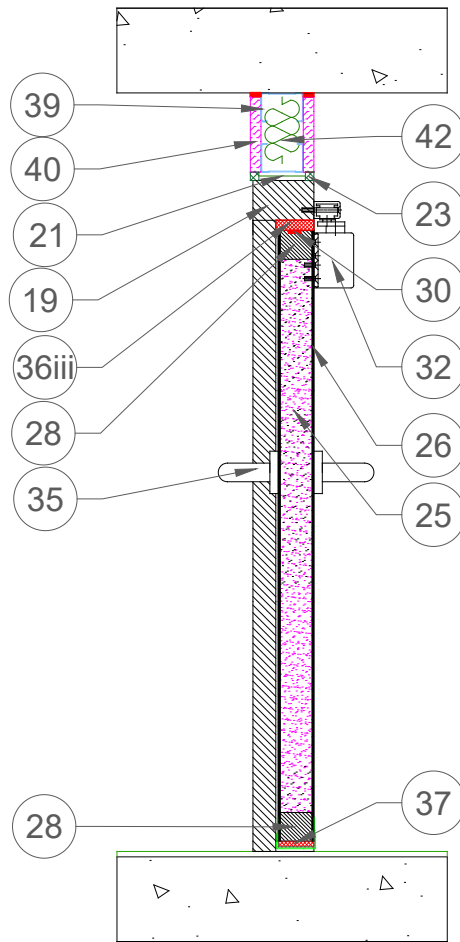


Figure 1 - General arrangement of test construction viewed from the unexposed surface



**B**

Figure 2 - Typical vertical section through the specimens

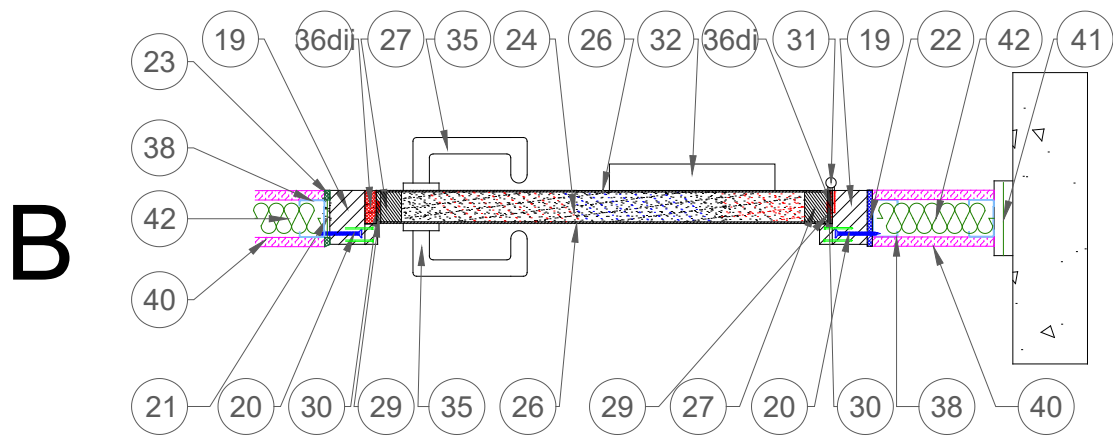


Figure 3 - Typical horizontal section through the specimens

**B**

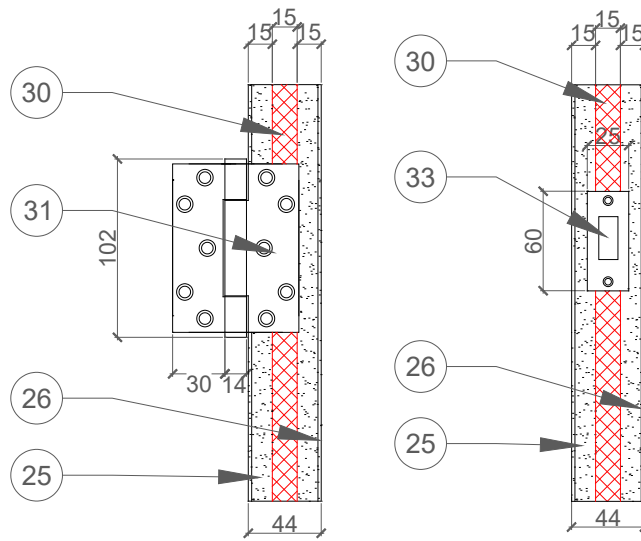


Figure 4 - Hardware intumescent interruptions

# Specimen B

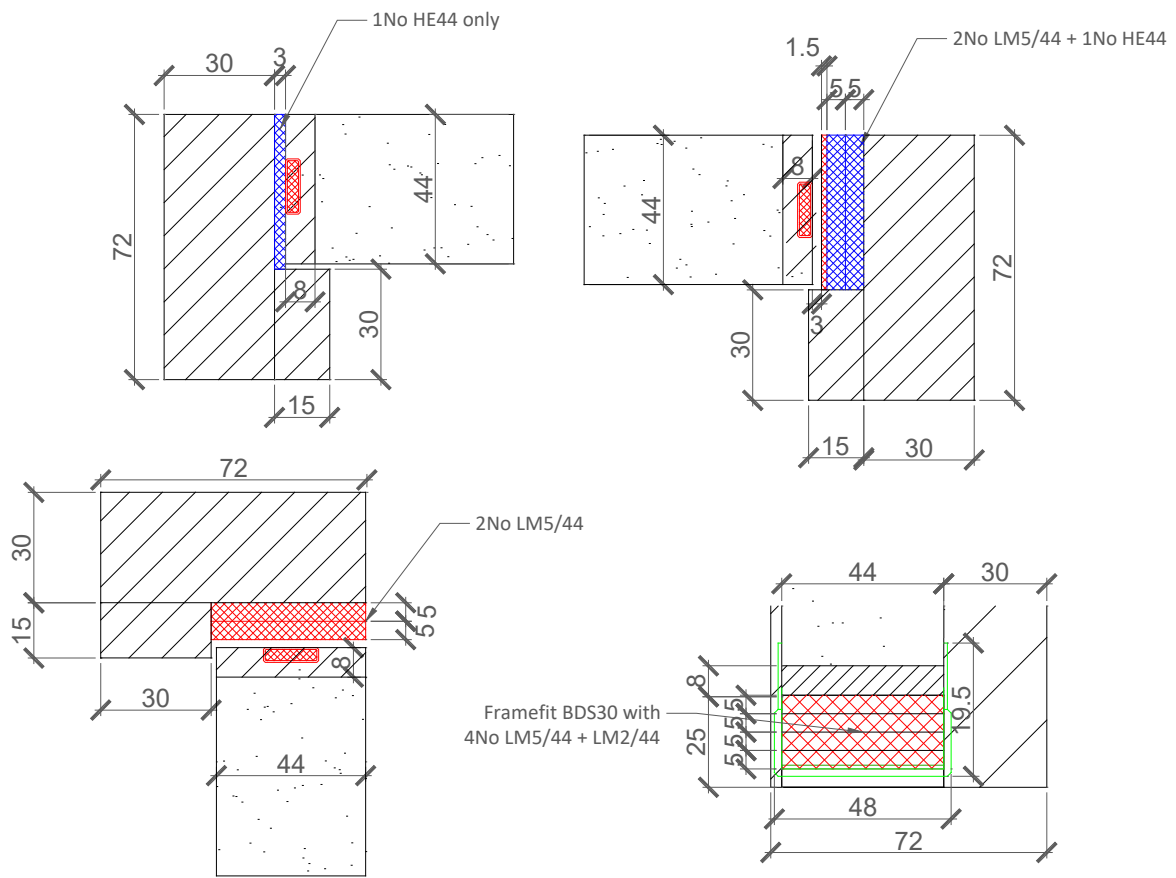


Figure 5 – FrameFit Detail

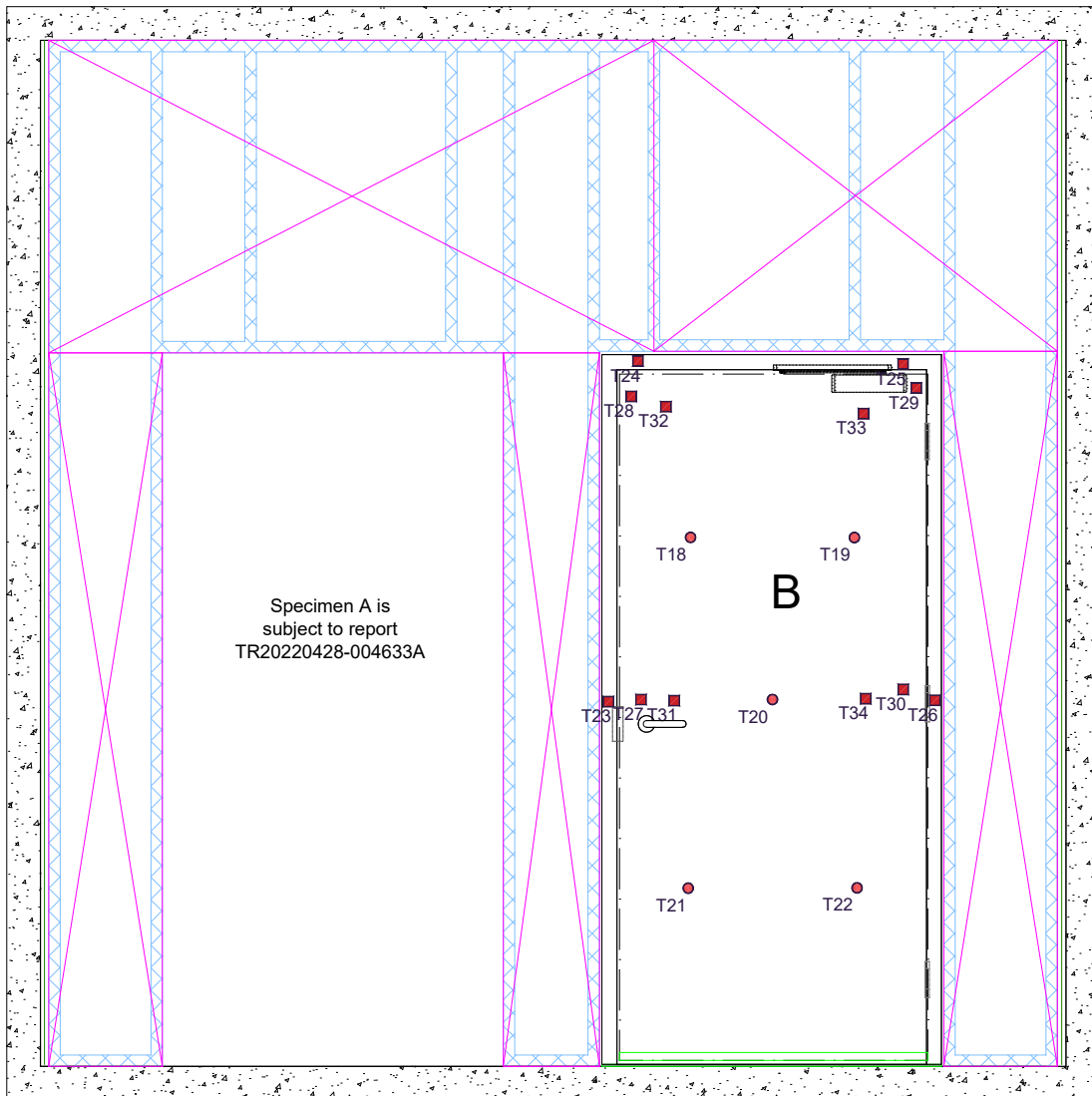


Figure 6 - Layout of instrumentation viewed from the unexposed surface of the test construction

## 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 B

19. Frame	
Manufacturer	S A Joinery Ltd
Reference	FD30
Material	RED DEAL
Density	550 kg/m <sup>3</sup>
Moisture content	10.2 % (for laboratory use only)
a. Overall size	
i. Frame (Head)	72 mm wide x 47 mm thick
ii. Frame (Jambs)	72 mm wide x 47 mm thick
iii. Stop	27 mm wide x 17 mm deep
Jamb to Head jointing method, fixing detail and location	Mortice & Tenon, Screwed with 100mm x 5 Screws (Width)
Stop to Frame jointing method, fixing detail and location	Solid
b. Adhesive(s)	N/a
20. Frame Fixing Method to Supporting Construction	
Manufacturer	Turbo Outdoor
Reference	3208X
Type & material	Steel Double countersunk screws
Overall size	Ø 5 mm x 80 mm
Spacing	150 mm top and bottom, 600 centres
Does the fixing penetrate intumescent seal within frame reveal	No, the fixing was placed underneath the intumescent seal
Packing Material	Blue 60 Fire rated Packers



Packing Material Dimension	100mm long, 15mm wide, 1/3/5mm thick
Packing Material Location	In the gaps between the supporting frame and specimen's frame
<b>21. Frame to supporting construction fire stopping detail (1)</b>	
Manufacturer	Rockwool
Reference	RWA 45
Material	Mineral fibre wool
Overall dimension	4 mm – 10 mm x 20 mm deep
Application method	Friction fitted into gaps between the supporting construction and frame
<b>22. Frame to supporting construction fire stopping detail (2)</b>	
Manufacturer	Blue 60
Reference	1.31.0601.0750.01
Material	Blue 60 Fire Rated
Overall dimension	10 mm – 15 mm wide x 20 mm deep
Application method	Foamed into gaps between the supporting construction and frame on specimen B hanging Jamb only
<b>23. Sealant to fire stopping detail (1)</b>	
Manufacturer	Blue 60
Reference	Green 240
Material	Acrylic
Overall section size	4 mm – 10 mm
Application method	Cartridge gunned
Location	Between the wall construction & door frame into gaps between the supporting construction and frame on specimen B closing jamb and header.
<b>24. Door Leaf</b>	
Manufacturer	VICAIMA
Reference	Solid Core 44 mm FD30
Quantity of leaves on doorset	1
Overall leaf size prior to trimming	926 mm wide x 2040 mm high x 44 mm thick
Overall leaf size supplied for testing	926 mm wide x 2040 high x 44 mm thick

25. Core element	
Manufacturer	VICAIMA
Reference	Solid Core 44 mm FD30
Material	Particleboard variant Chipboard
Density	500 kg/m <sup>3</sup> *
Overall thickness	37 mm thick
a. Adhesives	N/a
b. Presence of Mechanical Fixings	N/a
26. Facing	
Manufacturer	VICAIMA
Reference	Solid Core 44 mm FD30
Material	MDF
Density	730 kg/m <sup>3</sup> *
Overall thickness	3.2 mm thick
Application method	Not declared
a. Adhesives	Not declared
b. Presence of Mechanical Fixings	Not declared
27. Stiles	
Manufacturer	VICAIMA
Reference	Solid Core 44 mm FD30
a. Material	
i. Hanging edges	Whitewood
i. Meeting edges	Whitewood
a. Density	
i. Hanging edges	420-470 kg/m <sup>3</sup> *
ii. Meeting edges	420-470 kg/m <sup>3</sup> *
b. Moisture content	
i. Hanging edges	18%
ii. Meeting edges	18%

c. Overall size	
i. Hanging edge (Outer)	33 mm wide x 37 mm thick
ii. Hanging edge (Inner)	37 mm wide x 37 mm thick
iii. Meeting edge (Outer)	33 mm wide x 37 mm thick
iv. Meeting edge (Inner)	37 mm wide x 37 mm thick
d. Adhesives	n/a
e. Presence of Mechanical Fixings	
i. Type, size, Material, location and Frequency	Metal Staples – 16g 23 mm x 14 mm 2nr to each corner.
<b>28. Rails</b>	
Manufacturer	VICAIMA
Reference	Solid Core 44 mm FD30
a. Material	
i. Top	Whitewood
ii. Bottom	Whitewood
b. Density	
i. Top	420-470 kg/m <sup>3</sup> *
ii. Bottom	420-470 kg/m <sup>3</sup> *
c. Moisture content	
i. Top	18%
ii. Bottom	18%
d. Overall size	
i. Top	33 mm wide x 37 mm thick
ii. Bottom	33 mm wide x 37 mm thick
e. Adhesives	n/a
f. Presence of Mechanical Fixings	
i. Type, size, Material, location and Frequency	Metal Staples – 16g 23 mm x 14 mm 2nr to each corner.

<b>29. Lippings / Edge banding</b>	
Manufacturer	VICAIMA
Reference	Solid Core 44 mm FD30
Material	Sapele
Density	640 kg/m <sup>3</sup> *
Moisture content	8.1 – 10.4 %
Overall size	6 mm thick
Fixing method	Not declared
Location	Both long edges
a. Adhesives	Not declared
<b>30. Intumescent to leaf reveal</b>	
Quantity	1
Manufacturer	Pyroplex
Reference	8700
Material	Graphite based
Overall section size	15 mm wide x 3 mm thick
Application method	Self-adhesive backing
Location (relative to the opening face of the door leaf)	Centrally located on the leaf reveal on all 4 edges
Adhesive(s)	N/a other than self-adhesive
<b>31. Hinges</b>	
Supplier	Royde & Tucker
Reference	Hi load 102
Quantity	3
Primary material	Steel
Type	Hi load 102
a. Size	
i. Knuckle	Ø 14 mm x 102 mm high
ii. Blades	100 mm high x 30 mm wide x 3 mm thick

b. Fixings	
i. Type	Screws
ii. Material	Stainless Steel
iii. Size	Ø 10 mm x 32 mm long
iv. Number off per blade	5
Position of each hinge relative to the head of the leaf	200 mm, 980 mm, and 1800 mm
Details of intumescent protection	1 mm interdens
Interruptions to Intumescent within the frame reveal	Interrupts the blue 60 packers
<b>32. Door Closer</b>	
Manufacturer	DORMA-KABA
Reference	TS 92 BEN1-4
a. Material	
i. Body	Polished Brass
ii. Closer arm	Polished Brass
iii. Cover	Polished Brass
Configuration	Slide Channel
b. Overall size	
i. Body	281 mm wide x 65 mm high x 65 mm deep
ii. Closer arm	498 mm wide x 23 mm high x 31 mm deep
iii. Cover	281 mm wide x 65 mm high x 65 mm deep
Fixing method	To door No.4 at Ø 4.8 mm x 30 mm, to cover, No.4 closer Ø 4.8 x 40 mm. Cover is a Ø2.8 x 9 mm screw
<b>33. Lockset</b>	
Manufacturer	ZOO
Reference	ZTLKA76
a. Material	
i. Forend plate	Stainless steel
ii. Latch bolt	Stainless steel

b. Overall sizes	
i. Central Lockcase	60 mm high x 20 mm wide x 76 mm deep
ii. Forend plate	60 mm high x 25 mm wide x 3 mm
iii. Latch bolt	40 mm high x 15 mm wide x 20 mm projection
Fixing method	2 No Ø 4.5 mm x 25 mm long screws
Operation of latch bolt	Disengaged
c. Details of intumescent protection	
i. Central Lockcase	1mm Interdens Kit Supplied by Vanquish
ii. Forend plate	1mm Interdens Kit Supplied by Vanquish
Interruptions to Intumescent within the frame reveal	Fully interrupts
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
<b>34. Keeps</b>	
Manufacturer	Zoo
Reference	ZTLKA76
Material	Stainless steel
Overall sizes	60 mm high x 40 mm wide x 3 mm thick
Fixing method	2 No Ø 4.5 mm x 25 mm long screws
Details of intumescent protection	1mm Interdens Kit by Vanquish
Interruptions to Intumescent within the frame reveal	N/a
<b>35. Lever handles</b>	
Manufacturer	Zoo
Reference	ZCS2080SS
Material	Satin Stainless Steel
Overall size	Ø 52 mm x 8 mm backplate x 72 mm projection x 125 mm lever x
Fixing method, fixing material, sizes, quantity and location	No.2 Through bolts Ø 3.8 mm x 45 mm + No. 4 at Ø 3.8 mm x 18 mm
Details of intumescent protection	N/a

36. 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: LM2/44, LM3/44, LM4/44, 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 2/3/4/5 mm thick
ii. HE44	44 mm wide x 2100 mm long x 1.5 mm thick
c. 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 20mm long panel pins @ 400mm centres. 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.
d. Door Edge Gap sizes	<b><u>FrameFit Configuration</u></b>
i. Hinge (3 mm Gap)	1No HE44 only
ii. Leading edge ( 15 mm gap)	2No LM5/44 + 1No HE44
iii. Top Edge (12 mm)	2No LM5/44
37. Fireplug Framefit BDS30	
Manufacturer	Complete Fire Protection Ltd
Reference	Fireplug Framefit BDS30 - for 30-minute doors
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.
<b>Door Edge Gaps</b>	<b>FrameFit configuration</b>
Bottom of leaf (25 mm)	Framefit BDS30 with 4No LM5/44 + LM2/44

## 4.2 Supporting Construction

<b>38. Studs</b>	
Supplier	United Kingdom Testing and Certification
a. Type & Material	Steel
i. Dimensions	50 mm deep x 35 mm wide x 3000 mm long
ii. Stud centres	400-625 mm
iii. Fixing(s)	Friction fitted to the head/ floor track
<b>39. Head/ Floor Track</b>	
Supplier	United Kingdom Testing and Certification
Type & Material	Steel
Dimensions	52 mm deep x 35 mm wide x 3000 mm long
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 self-tapping screws staggered at max 600 mm centres
<b>40. Lining(s)</b>	
Supplier	United Kingdom Testing and Certification
Type & Material	Paper faced, gypsum plasterboard type F
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
<b>41. Free Edge Gasket</b>	
Manufacturer	Morgan Advanced Materials



Reference	Superwool
Dimensions (w x h x d)	20 mm x 3025 x 100 mm
Fixing(s)	Compression fitted between the supporting construction & restraint frame
<b>42. Wall Insulation</b>	
Supplier	United Kingdom Testing and Certification
Type & Material	Mineral Wool
Installation Method	Compression Fitted
Thickness	50 mm
Additional Wall Construction Requests	N/a

## 5 Specimen Photographs



Figure 7 - Item 37,39 & 41



Figure 8 - Item 24



Figure 9 - Item 19 & 30



Figure 10 - Item 29 & 35



Figure 11 - Item 22

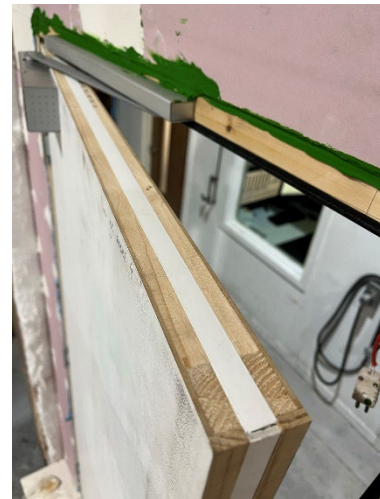


Figure 12 - Item 29

## 6 Test Procedure

### 6.1 Heating Conditions

The specimens were subject to heating conditions in accordance with BS EN 1363-1:2020 § 5.1. This was monitored and controlled for the duration of the test using type K thermocouples which were distributed across a vertical plane  $100 \pm 50$  mm from the exposed surface of the test construction. The resulting Time-Temperature distribution is presented in Figure 20.

### 6.2 Pressure Conditions

The specimens were subject to a pressure regime in accordance with BS EN 1363-1:2020 § 5.2. The calculated pressure differential relative to the laboratory atmospheric pressure at a height of 365, 1612 and 2850 mm from the furnace floor level was -1.1, 9.4 and 20.0 Pa respectively which equates to 0 Pa at a height of 500 mm from the furnace floor level. The furnace was maintained at these pressures within  $\pm 5$  Pa five minutes after the commencement of the test and  $\pm 3$  Pa ten minutes after the commencement of the test and for the remainder of the test duration. The pressure did not deviate from specified conditions throughout the duration of the test. The Time-Pressure distribution is presented in Figure 21.

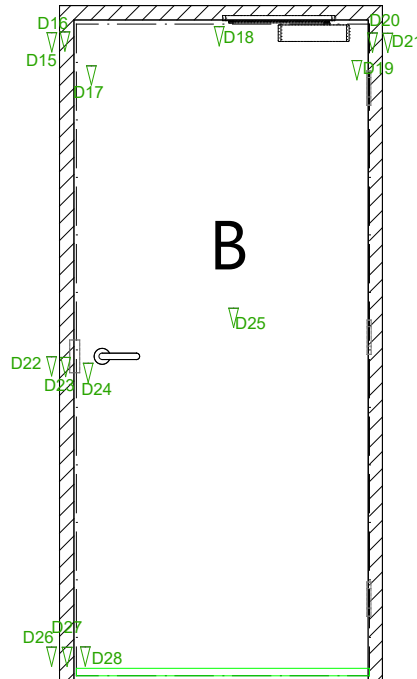
### 6.3 Unexposed Surface Temperature

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 28.

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 22 and the locations of these thermocouples is illustrated in Figure 6.

### 6.4 Deflection

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



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	6	10	10	9	8	9	4	7	8	7	12	-1	3	7
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*
30	71	75	78	55	34	31	27	48	45	46	31	2	7	20

\*Unable to take readings due to blanking off specimen

## 6.5 Observations

Specimen	HH	MM	SS	E <sup>7</sup>	U <sup>8</sup>	Observation
	00	00	00			<b>The test commences.</b>
B	00	00	33		X	Smoke/steam release down leading edge.
B	00	03	30	X		Door ignited.
B	00	08	30		X	Discolouration at latch position on door edge.
B	00	11	35	X		The closer channel has detached.
B	00	15	30	X		Door closer detaches.
B	00	25	40		X	No significant visible changes
B	00	28	22		X	Perimeter sealant smoking $\frac{3}{4}$ up hinge edge.
B	00	29	25		X	Cotton pad test performed at sealant $\frac{3}{4}$ up hinge edge. - Discolored
B	00	31	30		X	Intumescent mastic applied around doorset to structural opening.
	<b>00</b>	<b>34</b>	<b>30</b>			<b>The test is discontinued at the request of the Test Sponsor.</b>

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

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

## 6.6 Test Images



Figure 13 – The exposed surface of the test construction prior to commencement of the test



Figure 14 - The unexposed surface of the test construction prior to the commencement of the test





Figure 15 - The unexposed surface of the test construction after a test duration of 10 minutes



Figure 16 - The unexposed surface of the test construction after a test duration of 20 minutes



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



Figure 18 - The unexposed surface of the test construction after a test duration of 30 minutes





Figure 19 - 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 of results is presented in Appendix A.

### 7.2 Accuracy of Results

Due to the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

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

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

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

## Figures

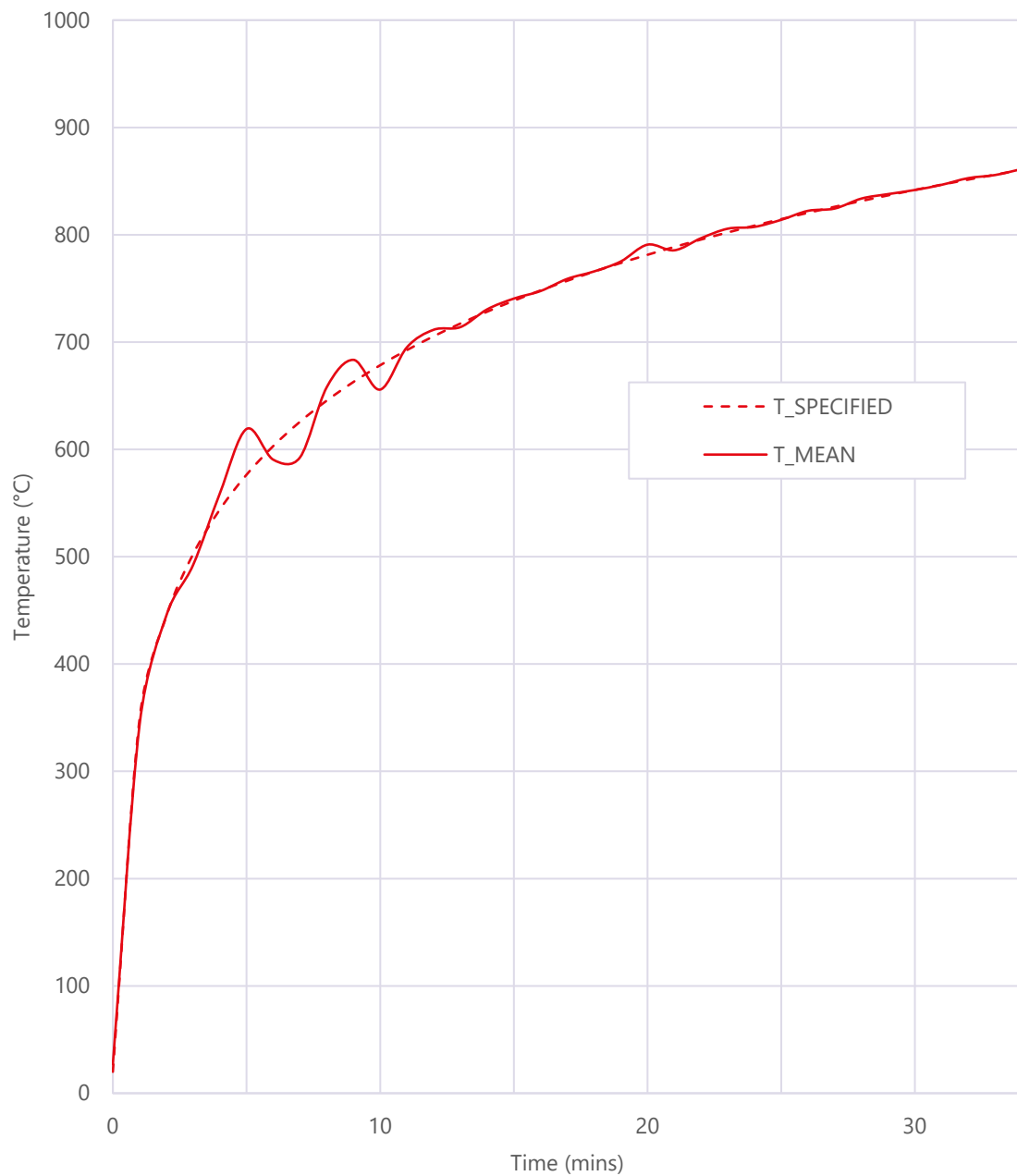


Figure 20 – Graph presenting the Time-Temperature distribution of the furnace

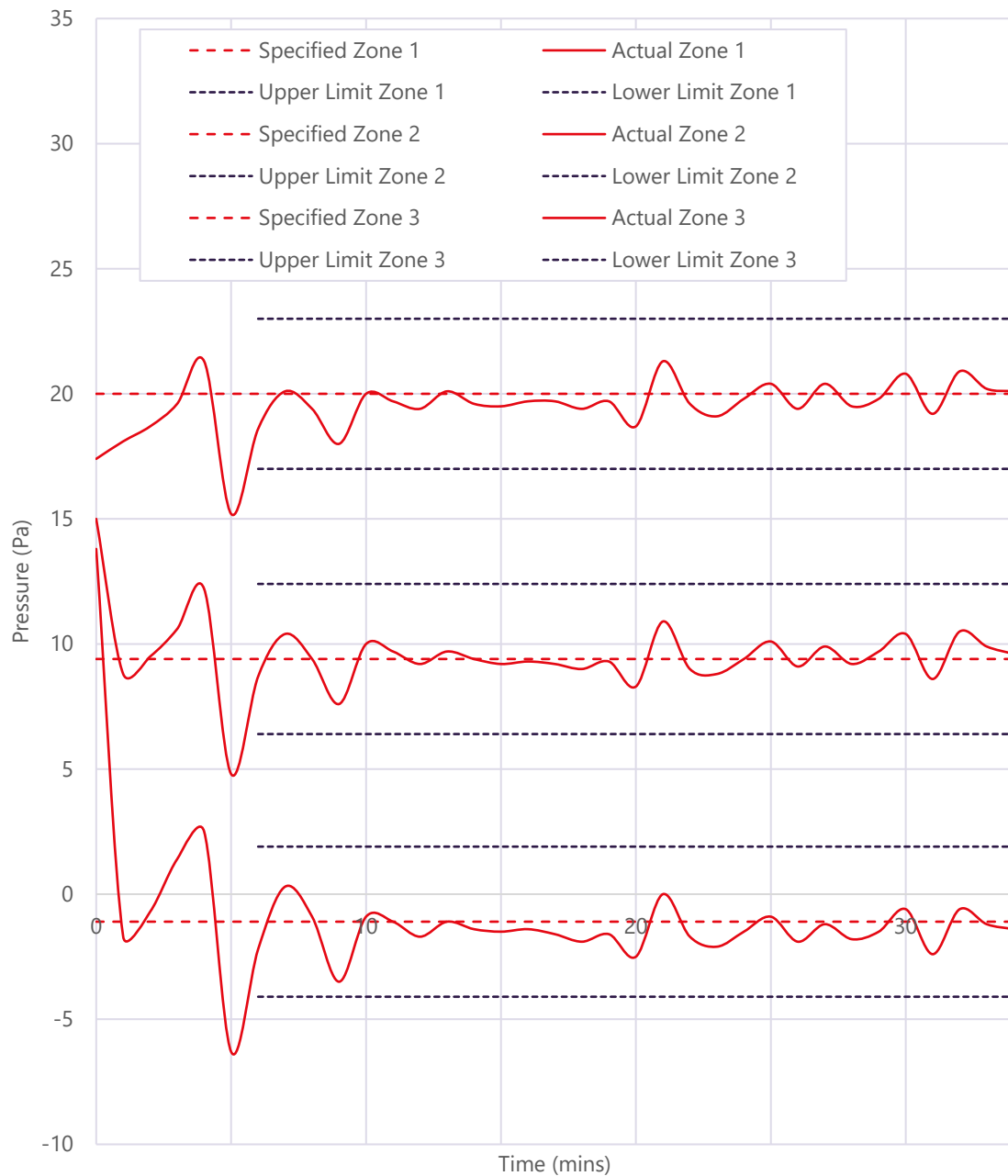


Figure 21 – Graph presenting the Time-Pressure distribution of the furnace

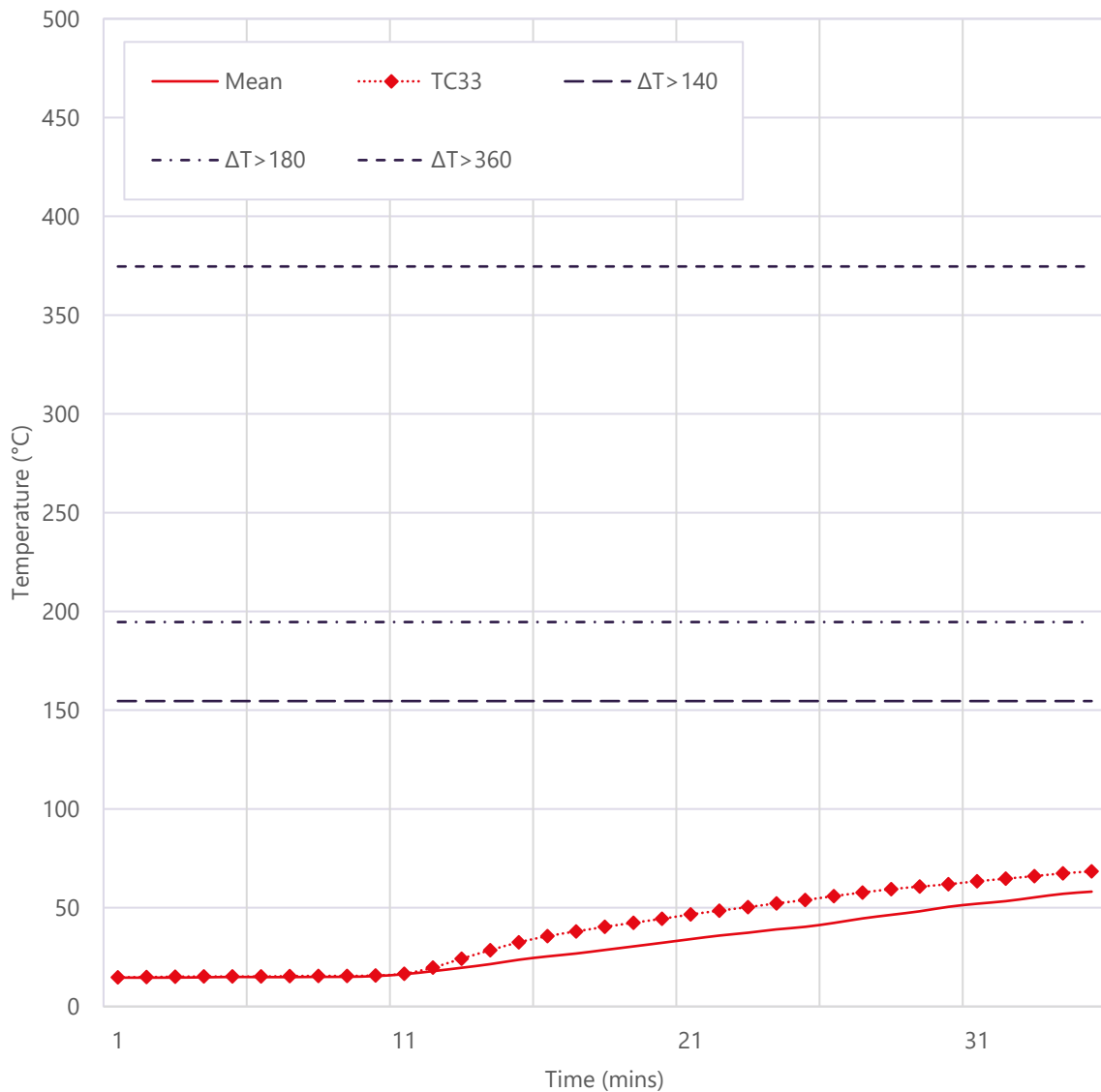


Figure 22 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen B

## Tables

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

Time (mins)	TC18	TC19	TC20	TC21	TC22
0	15.0	15.1	14.8	14.1	14.1
2	14.9	15.1	14.8	14.2	14.2
4	15.3	15.4	15.3	14.6	14.2
6	15.5	15.8	14.8	14.2	14.1
8	15.8	15.8	15.1	14.1	14.3
10	17.7	16.2	16.8	16.2	14.9
12	22.1	17.6	20.7	19.4	18.2
14	27.1	19.9	25.1	23.5	22.7
16	30.8	22.2	28.5	26.8	25.8
18	34.7	25.3	32.0	30.8	29.3
20	38.4	28.6	35.8	34.8	32.9
22	41.7	32.2	39.0	37.9	35.9
24	44.4	35.8	42.0	40.7	38.8
26	48.4	40.4	46.3	45.0	42.8
28	51.0	45.1	49.9	48.7	46.3
30	54.0	49.5	54.0	52.4	50.2
32	57.2	54.0	57.4	54.8	52.7
34	59.6	58.4	59.8	57.1	55.8

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

Time (mins)	TC31	TC32	TC33	TC34
0	14.8	14.9	14.8	14.8
2	15.1	14.9	15.1	14.8
4	15.1	14.8	15.2	14.9
6	15.8	15.0	15.4	14.9
8	16.5	15.3	15.5	15.1
10	17.7	17.0	16.6	17.3
12	20.7	20.9	24.2	24.2
14	25.3	26.8	32.5	30.0
16	29.6	32.1	38.0	33.5
18	34.4	37.2	42.4	37.1
20	39.0	42.0	46.6	40.9
22	43.0	46.6	50.3	44.1
24	45.8	49.8	53.9	47.1
26	50.2	60.3	57.7	50.7
28	53.3	59.3	60.7	54.0
30	56.7	61.3	63.4	57.3
32	59.5	63.1	66.0	59.6
34	61.6	65.1	68.4	62.6

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

Time (mins)	TC27	TC28	TC29	TC30
0	16.6	16.7	15.6	15.2
2	17.1	16.9	15.8	15.3
4	16.9	16.8	16.3	15.5
6	19.3	16.8	19.8	15.5
8	21.2	18.0	29.6	15.8
10	22.7	19.2	31.3	16.6
12	27.0	20.9	31.5	21.1
14	32.0	23.2	32.5	27.1
16	35.0	26.2	33.7	32.4
18	39.1	29.7	35.5	37.7
20	43.2	33.3	37.9	42.9
22	46.8	37.4	40.5	47.8
24	49.0	40.8	43.3	52.3
26	53.3	49.2	46.5	56.3
28	56.6	51.4	49.3	60.0
30	60.0	60.7	52.4	63.4
32	63.4	66.6	55.4	66.1
34	66.1	73.3	59.0	69.0



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

Time (mins)	TC23	TC24	TC25	TC26
0	13.9	12.3	15.5	14.7
2	14.1	12.7	15.6	14.8
4	14.2	12.5	15.6	14.8
6	14.7	12.9	15.8	14.9
8	16.2	13.6	16.3	15.1
10	17.8	14.2	17.7	15.8
12	19.5	14.7	19.1	16.6
14	20.6	16.6	20.7	17.9
16	22.2	16.1	22.5	19.1
18	22.9	16.8	24.5	20.7
20	24.0	18.0	26.6	22.1
22	25.6	19.1	28.1	23.6
24	27.4	20.6	30.1	25.2
26	29.6	31.6	32.5	27.4
28	29.1	24.8	34.5	29.6
30	30.3	23.1	37.6	32.8
32	31.8	23.8	40.8	34.1
34	33.4	22.8	44.8	36.3

## Appendix A Field of Direct Application of Results

### A.1 General

The field of direct application defines the allowable changes to the test specimen following a successful fire resistance test. These variations can be applied automatically without the need for the sponsor to seek additional evaluation, calculation or approval.

### A.2 Materials And Construction

#### A.2.1 General

Unless otherwise stated in the following text, the materials and construction of the doorset or openable window shall be the same as that tested. The number of leaves and the mode of operation (e.g. sliding, single action or double action) shall not be changed.

##### A.2.1.1 Specific Restrictions on Materials and Construction (Timber Constructions)

The thickness of the door panel(s) shall not be reduced but may be increased.

The door panel thickness and/or density may be increased provided the total increase in weight is not greater than 25%.

For timber-based board products (e.g. particle board, blockboard, etc), the composition (e.g. type of resin) shall not change from that tested. The density shall not be reduced but may be increased.

The cross-sectional dimensions and/or the density of the timber frames (including rebates) shall not be reduced but may be increased.

#### A.2.2 Decorative Finishes

##### A.2.2.1 Paint

Where the paint finish is not expected to contribute to the fire resistance of the door, alternative paints are acceptable and may be added to door leaves or frames for which unfinished test specimens were tested. Where the paint finish contributes to the fire resistance of the door (e.g. intumescent paints) then no change shall be permitted.

##### A.2.2.2 Decorative Laminates

Decorative laminates and timber veneers up to 1,5 mm thickness may be added to the faces (but not the edges) of doors that satisfy the insulation criteria (normal or supplementary procedure).

Decorative laminates and timber veneers applied to door leaves that do not satisfy the insulation criteria (normal or supplementary procedure) and/or those in excess of 1,5 mm thickness shall be tested as part of the test specimen. For all doorsets tested with decorative laminate faces, the only variations possible shall be within similar types and thicknesses of material (e.g. for colour, pattern, supplier).

#### A.2.3 Fixings

The number of fixings per unit length used to attach doorsets to supporting constructions may be increased, but shall not be decreased and the distance between fixings may be reduced but shall not be increased.

#### A.2.4 Building Hardware

The number of hinges and dog bolts may be increased but shall not be decreased.

NOTE 1 The number of movement restrictors such as locks and latches is not covered by direct application.

Where a doorset has been tested with a door closing device fitted, but with the retention force released in accordance with 10.1.4, the doorset may be provided either with or without that closing device, i.e. where self closing characteristics are not required.

NOTE 2 Interchange of building hardware is not covered by the field of direct application.

## A.3 Permissible Size Variations

### A.3.1 General

Doorsets of sizes different from those of tested specimens are permitted within certain limitations, but the variations are dependent on product type and the length of time that the performance criteria are fulfilled.

The increase and decrease of dimensions permitted by the field of direct application are applicable to the overall size and to each door leaf, each side panel and each over panel independently.

In accordance with 13.2.2.3, the dimensions (width and height) of any glass pane cannot be increased.

### A.3.2 Test Periods

The amount of variation of size permitted is dependent on whether the classification time was just reached (Category 'A') or whether an extended time (Category 'B') in accordance with the values shown in Table 5 were fulfilled before the test was concluded.

Table 5 - Category B overrun requirements

Classification time (min)	Performance criteria fulfilled for at least (min)
15	18
20	24
30	36
45	52
60	68
90	100
120	132
180	196
240	260

### A.3.3 Size variation related to product type

#### A.3.3.1 General

The rules to cover increase or decrease of size without additional considerations are applicable only to six main product groups:

- a) hinged and pivoted doorsets and openable windows;
- b) horizontally sliding and vertically sliding doorsets including sectional doorsets;

- c) steel single skin folding shutters doorsets (uninsulated);
- d) other sliding and folding doorsets (insulated);
- e) rolling shutter doorsets;
- f) openable fabric curtains.

No increases in size are permitted for doorsets which are required to satisfy radiation control levels unless the insulation criteria are also satisfied. This is because any increase in size will increase the radiation received at a fixed distance away from the door. There are calculation methods which can be used to determine acceptable size increases for such doors; however, these are beyond the scope of direct application. Doors that satisfy both the radiation control levels and insulation criteria may have their sizes increased as outlined in Annex B. This is accepted because the increase in radiation resulting from a size increase allowed under this section, for an insulated door, will be such that it will still satisfy the required radiation control levels. Size decreases are permitted for both doors which satisfy radiation control levels and those which satisfy insulation criteria and radiation control levels.

Permissible variations for each product group are detailed in Annex B which also contains some examples relating to hinged/pivoted doorsets.

Size increases for doorsets which do not fall into one of the six groups given above are the subject of extended application.

#### **A.3.3.2 Hinged and pivoted doorsets and openable windows**

For Category 'A' tests with no overrun of classification period, no increase is allowed. Unlimited reductions from the tested specimen are permitted with the exception of insulated metal doors where the size reduction is limited.

For Category 'B' tests (with specified overrun of classification period) all smaller sizes are permitted and increases in height and width are permitted as stated in Annex B.

#### **A.3.3.3 Other Changes**

For smaller doorset sizes the relative positioning of movement restrictors (e.g. hinges and latches) shall remain the same as tested or any change to the distances between them will be limited to the same percentage reduction as the decrease of test specimen size.

For larger doorset sizes the following shall also apply:

- a) the height of the latch above floor level shall be equal to or greater than the tested height, and such increase in height shall be at least proportional to the increase in door height;
- b) the distance of the top hinge from the top of door leaf shall be equal to or less than that tested;
- c) the distance of the bottom hinge from bottom of door leaf shall be equal to or less than that tested;
- d) where three hinges or distortion preventers are used, the distance between the bottom of the door leaf and centre restraint shall be equal to or greater than that tested.

#### **A.3.3.4 Timber Constructions**

The number, size, location and orientation of any joints in the timber framing shall not be changed. Where decorative veneers of 1,5 mm or greater thickness, or other claddings which themselves provide constructive benefits, are part of the test specimen, they shall not be substituted with alternatives of lesser thickness or strength.

#### A.3.3.5 Gaps

The maximum size of the primary gaps presented on page 8 is restricted to the following sizes in practice:

$$x = (a + b)/2 + 2 \text{ mm}$$

where

x is the maximum permitted gap size;

a is the maximum measured gap size;

b is the mean measured gap size.

The minimum size of the primary gaps may be reduced.

The permitted gap size may be different for different parts of the door or window.

## A.4 Asymmetrical Assemblies

### A.4.1 General

BS EN 1363-1 states that for separating elements required to be fire resisting from both sides, two test specimens shall be tested (one from each direction) unless the element is fully symmetrical, i.e. the construction of the doorset is identical on both sides of the centre line when viewed in plan (from above). However, in some cases it is possible to develop rules whereby the fire resistance of an asymmetrical door assembly tested in one direction can apply when the fire exposure is from the other direction. The possibility to develop such rules increases if the consideration is limited to certain types of door assembly and on the criteria being applicable (e.g. integrity only doors). The following rules represent the minimum level of common agreement which shall be followed. The rationale behind the rules is given in BS EN 1634-1:2014+A1:2018 § Annex C.

### A.4.2 Specific Rules

The rules governing the applicability of tests carried out in one direction to other directions are given in Table 6 and are based on the following premises:

- 1) that each of the door leaves are themselves of symmetrical construction with the exception of the edges (e.g. lock/leading edge and hinge edge or double rebated doors);
- 2) that any restraining/supporting elements of building hardware has been included in a test to BS EN 1634-1 when exposed in both directions so that they will retain their function when exposed to the heat of the test;
- 3) that there is no change in the number of leaves or the mode of operation (e.g. sliding, swinging, single action or double action);
- 4) that side, over and transom panels are excluded from Table 6 unless they are fully symmetrical.

Table 6 lists the type of door assembly for which rules can be generated and gives the direction in which it should be tested to cover the opposite direction. The separate columns for the integrity and insulation criteria reflect the different ability to make rules for integrity only doors as opposed to those which satisfy both criteria. A 'Yes' means that it is possible to identify the direction of test which covers the opposite direction. A 'No' indicates that it is not possible to identify the direction which will cover the opposite direction.

Table 6 - Type of doorset and direction to be tested to cover the opposite direction

Type of doorset	Direction to be tested to cover opposite direction	Integrity	Insulation	Radiation
Hinged or pivoted, timber leaf, timber frame	Opening into the furnace	yes	yes	yes
Hinged or pivoted, timber leaf, metal frame (no transom)	Opening into the furnace	yes	no	yes
Hinged, metal leaf, metal frame (not pivoted)	Opening away from Furnace	yes*	no	yes
Rolling shutter	Barrel and supporting components fixed on the face of the supporting wall on the fire side	yes	no	no
Sliding/folding	Sliding/folding supporting components fixed on the face of the supporting wall on the fire side	yes	no	no
Operable fabric curtains	Not possible to define a scenario			
*This only applies to doors without insulation in the core and with a movement restrictor at approximately mid-height on the hinge side.				

## A.5 Supporting Constructions

### A.5.1 General

The fire resistance of a door assembly tested in one form of standard supporting construction may or may not apply when it is mounted in other types of construction. Generally, the rigid and flexible types are not interchangeable and rules governing the direct application within each group are given in 13.5.2 to 13.5.4. However, in some cases it is possible for the result of a test on a particular type of door assembly tested in one form of standard supporting construction to be applicable to that door assembly when mounted in a different type of standard supporting construction. Specific rules governing the situation for hinged and pivoted door assemblies are given in 13.5.4. The rationale behind the rules is given in BS EN 1634-1:2014+A1:2018 § Annex C.

### A.5.2 Flexible Standard Supporting Constructions

The fire resistance of a door tested in one of the flexible standard supporting constructions specified in BS EN 1363-1:2020 can be applied to a door mounted in the same manner in a wall or partition which is of the board covered type with studs made from metal or timber. The fire resistance of the door is only applicable to a door mounted in a partition with a fire resistance equal to or greater than the partition in which it was tested.

The fire resistance of the door is only applicable to a door mounted in a partition with a fire resistance equal to or greater than the partition in which it was tested.

The fire resistance of the partition shall have been established separately in a previous test.

### A.5.3 Specific Rules for Hinged or Pivoted Doorsets

- a) For timber door leaves hung in timber frames, the result of a test in a rigid standard supporting construction is applicable to that door assembly mounted in a flexible construction.
- b) For timber door leaves hung in timber frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction.
- c) For timber door leaves hung in metal frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction but not vice versa.
- d) For insulated metal door leaves hung in metal frames, there is no applicability of results in rigid standard supporting construction to flexible constructions or vice versa; to cover rigid and flexible types, tests shall be undertaken in each type of standard supporting construction.
- e) For uninsulated metal doors, the result of a test in a rigid standard supporting construction is applicable to that door assembly mounted in a flexible construction, but not vice versa.

The rules above assume that the fixing methods used in each type of supporting construction are appropriate to that construction. Thus for example in a), the test on the timber door leaf in a timber frame will have been carried out with appropriate fixings for timber frames in rigid constructions. The result is applicable to a timber door leaf in a timber frame mounted into a flexible construction with appropriate fixings for timber frames in flexible constructions.