

TEST REPORT

FIRE RESISTANCE TEST OF CONSTRUCTION ASSEMBLIES

Test Sponsor:

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Test Assembly:

Doorset A: Latched, single-acting, single leaf wooden doorset with two equal-sized air transfer grilles.

Doorset B: Latched, single-acting, single leaf wooden doorset with two unequal-sized air transfer grilles.

Test Standards:

EN 1363-1:2012; Fire resistance tests - Part 1: General requirements

EN 1363-2:1999; Fire resistance tests - Part 2: Alternative and additional procedures

EN 1634-1:2014+A1:2018; Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows.



**THOMAS BELL-WRIGHT
INTERNATIONAL CONSULTANTS**

Test Date: 16-Jan-20
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Test Reference No: TA087-9&10

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Accreditation

ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories with:

United Kingdom Accreditation Service (UKAS) - Testing Laboratory: **4439**
www.ukas.com



GCC Accreditation Center (GAC) – Testing Laboratory: **ATL-0017**
www.GCC-accreditation.org



Memberships

Members of European Group of Organization for Fire Testing, Inspection and Certification

www.egolf.org.uk

Member of International Trade Council

www.thetradecouncil.com

Member of Association for Specialist Fire Protection

www.asfp.org.uk

Member of Centre for Window and Cladding Technology

www.cwct.co.uk



The work which is the subject of this report falls under the accreditations of **ISO 17025 UKAS** and **ISO 17025 GAC**.



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1. INTRODUCTION

Determination of the fire resistance of a latched, single-acting, single leaf wooden doorset with two equal-sized air transfer grilles, and a latched, single-acting, single leaf wooden doorset with two unequal-sized air transfer grilles according to:

EN 1363-1:2012; Fire resistance tests - Part 1: General requirements

EN 1363-2:1999; Fire resistance tests - Part 2: Alternative and additional procedures

EN 1634-1:2014+A1:2018; Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows.

This report has been written to encompass the results of two separate specimens which were tested simultaneously in the same test frame, at the same time. For the purpose of the report, the latched, single-acting, single leaf wooden doorset with two equal-sized air transfer grilles is referred to as doorset A, and the latched, single-acting, single leaf wooden doorset with two unequal-sized air transfer grilles is referred to as doorset B.

2. SPONSOR

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3. TESTING LABORATORY

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4. DATE OF TEST

Fire Test Date: 16-Jan-20

The test has been witnessed by:

Name	Company	Contact Number
Mr. Russell Smith	Mann McGowan Ltd.	+44 7760 176432
Ms. Tamara Arafat	Warringtonfire	+971 50 557 8354

5. CONSTRUCTION

5.1. General Description of the Assembly

The test specimens were latched, single-acting, single leaf wooden doorset with two equal-sized air transfer grills, and it is referred to as doorset A, and a latched, single-acting, single leaf wooden doorset with two unequal-sized air transfer grills, and it is referred to as doorset B. Both test specimens were installed within a rigid supporting construction.

The overall dimensions of doorset A were 996 x 2241 x 140mm (w x h x jamb depth), and the overall dimensions of doorset B were 996 x 2438 x 145mm (w x h x jamb depth).

For full details of the test specimen, refer to Appendix 1 & 2.



5.2.Supporting Construction

Both test specimens were installed within a rigid supporting construction made of solid masonry blocks with a nominal density of 2350 kg/m^3 and a structural opening of size $1016 \times 2253 \times 200\text{mm}$ (w x h x thk.) for doorset A, and $1016 \times 2450 \times 200\text{mm}$ (w x h x thk.) for doorset B.

Doorset A supporting construction was made at a nominal height of 300mm above the sill of the furnace, and doorset B supporting construction was made at a nominal height of 100mm above the furnace sill, as decided by the test sponsor. A 150mm thick unified reinforced concrete lintel was used along the head of the structural openings of both doorsets. Autoclaved Aerated Concrete (AAC) blocks of 150mm thickness and a nominal density of 550kg/m^3 were used to fill the void between the unified concrete lintel and the head of the test frame.

The supporting construction was in turn installed within a rigid test frame made of steel and dense refractory castable with a density of 2000 kg/m^3 and opening size of $3050 \times 3050 \times 300\text{mm}$ (w x h x thk.).

5.3.Conditions and Test Situation

Both doorsets were installed with the leaves opening towards the furnace, as decided by the sponsor. Note that the doors may perform differently depending on which side is exposed to fire.

Both test specimens were installed at an offset of 10mm from the exposed face of the rigid supporting construction.

Door A was latched but not locked with a single point latch. The latch had a total throw of 8.25mm and engaged at 5.67mm into the catch. A door lever handle was installed on both exposed and unexposed faces of door A leaf. No lock cylinder was installed on doorset A.

Door B was latched but not locked with a single point latch. The latch had a total throw of 8.87mm and engaged at 5.48mm into the catch. A door lever handle was installed on both exposed and unexposed faces of door B leaf. No lock cylinder was installed on doorset B.

The moisture content, prior to the test, of the door A frame was measured as 9%, door A leaf as 6.4%, door A lipping as 8.9%, door A frame stop at both vertical jambs as 8.5%, and door A frame stop at top horizontal edge as 8.4%.

The moisture content, prior to the test, of the door B frame was measured as 8%, door B leaf as 6.4%, door B lipping as 7.5%, and door B frame stop as 8.1%.

A concealed overhead door closer was installed on doorset A, as decided by the test sponsor. The average value of retention force measured on door A leaf was 64.8N.

A concealed overhead door closer was installed on doorset B, as decided by the test sponsor. The average value of retention force measured on door B leaf was 65.2N.

Pre-test mechanical conditioning for operability, as prescribed in section 5 of EN 1634-1:2014+A1 2018, was completed in accordance with section A.2.2 of EN 16034:2014. Prior to the test, the leaf of both doorsets were opened from fully-closed position to maximum possible opening, and allowed to return to the closed position over 25 cycles using the self-closing device.

In accordance with section 10.1.4 of EN 1634-1:2014+A1:2018, after cycling the door remained in its final closed position after cycling.

Gaps between the fixed and movable parts of the specimen have been measured (see Appendix 4).



6. SPECIMEN VERIFICATION

6.1. Specimen Definition & Verification of the Test Specimen.

The choice and design and the definition of the specimen have been made by Mann McGowan Group, and TBWIC testing laboratory has not been involved in the selection or design of the specimen. Similarly, the results of the test apply only to the samples as received.

Note: There are contexts where information has been provided by the sponsor and verification of information has been done through either technical datasheet or other document submission, or as indicated directly by the sponsor. For this reason, materials have been tested in an as-received condition and TBWIC bears no liability for the legitimacy of the submitted information.

6.2. Specimen Installation

Installation of the specimen: Mann McGowan Group

The specimen was delivered on 5-Jan-20 and installed between 14-Jan-20 and 16-Jan-20. The specimens were stored in ambient conditions at temperatures ranging between 16°C and 23°C and 40% to 67% humidity.

7. METHOD OF TEST

7.1. Performance Criteria

Integrity failure of the specimen shall be deemed to have occurred if the specimen collapses, if sustained flaming for more than 10 seconds is observed on the unexposed face, a positive cotton pad test is taken, or permitting the penetration of gap gauges through the specimen, as specified in section 11.1 of EN 1634-1:2014+A1:2018.

Insulation failure shall be deemed to have occurred if the mean unexposed face temperature exceeds 140°C above its initial value and maximum unexposed face temperature, if any regular thermocouple exceeds 180°C above the initial mean unexposed face temperature, if any thermocouple immediately adjacent to the edge of the leaf opening exceeds 360°C, or if integrity failure occurs, as per section 11.2 of EN 1634-1:2014+A1:2018.

7.2. Measurements (for graphs and data, refer to Appendix 3 & 4)

The time-temperature curve has been controlled using nine thermocouples distributed in the furnace, and the thermocouples were placed at 100mm from the exposed face of the specimens.

The ambient temperature at the commencement of the test was 18°C.

The pressure in the furnace was controlled at 15a at its relative position 2400mm above the sill of the furnace, in accordance with paragraph 5.2.1 and 5.2.2 of EN 1363-1:2012.

Unexposed face temperatures & radiation at a distance of 1m from the center of the specimen have been measured (see Appendix 3). Deflection has been measured at several locations (see Appendix 4).



8. OBSERVATION

8.1.Pre-Test Observations

The specimen was found satisfactory and fit to be tested.

8.2.Test Observations

Time (mm:ss)	Doorset	Test Observations <i>(All observations are from the unexposed face unless specified otherwise)</i>
0:00	A&B	The test was started.
00:39	A	Dense smoke was observed to be issuing from the upper air transfer grille.
00:41	A	Light smoke was observed to be issuing from the latch stile edge of the door leaf near the door lever handle.
00:42	B	Dense smoke was observed to be issuing from the upper air transfer grille
00:53	A	Moisture was observed to be collecting along the height of the door leaf latch stile edge.
01:02	A&B	Dense smoke was observed to be issuing from the lower air transfer grilles of both doorsets.
01:46	A&B	The intumescent grid in the upper air transfer grilles had started to react and form a char layer inside the aperture.
02:34	A&B	Dense smoke stain was observed to be issuing from the above of the top horizontal edge of the upper air transfer grilles of both doorsets.
05:51	A	Dense smoke was observed to be issuing from the upper right corner of the door leaf.
06:31	B	Dense smoke was observed to be issuing from the top horizontal edge of the door leaf.
07:01	A	Light intermittent flaming was observed to be issuing from the intumescent grid of the lower air transfer grille inside the aperture.
07:23	B	Light intermittent flaming was observed to be issuing from the intumescent grid of the lower air transfer grille inside the aperture.
10:00	A&B	The specimens were stable.
20:00	A&B	The specimens were stable.
22:43	B	Internal flaming was observed on the intumescent grid from the exposed face of the specimen only when viewed from air transfer grille behind the furnace.
23:41	A&B	Dense smoke stain was observed to be issuing from the above of the top horizontal edge of the lower air transfer grilles of both doorsets.
30:00	A&B	The specimens were stable.
43:15	A	A temperature of 263°C was recorded on TC-26 at, crossing the maximum allowable limit, and causing the insulation failure of the specimen under the criterion of the maximum temperature rise of the door leaf - Supplementary Procedure I1. [Max = Initial Mean (17°C) + 180 = 197°C]
44:25	A	A negative cotton pad test was conducted on the upper right corner of the door leaf.
45:00	A&B	The specimens were stable.
46:00	A	A negative cotton pad test was conducted on the upper left corner of the door leaf.
46:30	A	Sustained flaming of more than 10 seconds was observed on the door leaf top horizontal edge, causing the integrity failure of doorset A.



47:00	A	The doorset was covered with a gypsum board and the test was continued further for doorset B only.
60:00	B	The specimens were stable.
70:00	A&B	Doorset B was stable. End of test as agreed with the test sponsor.

8.3.After-Test Observations

8.3.1. UNEXPOSED FACE OBSERVATIONS

Doorset A: Door leaf was completely burned. Door frame was still in place though badly burned. All ironmongeries and air transfer grilles framing had fallen onto the ground.
Doorset B: Door leaf and frame were still intact. All ironmongeries were still intact.

8.3.2. EXPOSED FACE OBSERVATIONS

Doorset A: Door leaf was completely burned. Door frame was still in place though badly burned. All ironmongeries had fallen onto the furnace sill.
Doorset B: Door leaf and frame were still intact. All ironmongeries were still intact. Framing of air transfer grilles had fallen onto the furnace sill.



9. SUMMARY OF RESULTS

The latched, single-acting, single leaf wooden doorset with two equal-sized air transfer grilles, referred to as doorset A, and the latched, single-acting, single leaf wooden doorset with two unequal-sized air transfer grilles, referred to as doorset B have been evaluated in accordance with:

EN 1363-1:2012; Fire resistance tests - Part 1: General requirements

EN 1363-2:1999; Fire resistance tests - Part 2: Alternative and additional procedures

EN 1634-1:2014+A1:2018; Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows.

The requirements of the standards were satisfied for:

Criterion	Results	
Integrity	Doorset A	Doorset B
Sustained Flaming	46 Minutes ^a	70 Minutes ^a
Cotton Pad	46 Minutes ^a	70 Minutes ^a
Gap Gauge (6 mm Diameter)	46 Minutes ^a	70 Minutes ^a
Gap Gauge (25 mm Diameter)	46 Minutes ^a	70 Minutes ^a
Insulation	Doorset A	Doorset B
Normal Procedure (I₂)	46 Minutes	70 Minutes
Supplementary Procedure (I₁)	43 Minutes	70 Minutes
Heat Radiation^b	Doorset A Flux Meter	Doorset B Flux Meter
Last Value Recorded	0.55kW/m ²	6.47kW/m ²
Maximum Value Recorded	0.74kW/m ² at 39 minutes	6.47kW/m ² at 70 minutes
^a Test was discontinued after 70 minutes at the request of the sponsor and no failure was observed under the indicated criteria.		
^b The time values for radiation were taken at the first instance a value was recorded over the given thresholds.		



10. FIELD OF DIRECT APPLICATION OF TEST RESULTS

The following calculations govern allowances in expanding the dimensions of the tested specimen, and the calculations are taken from the rules prescribed in Section 13 and Annex B of EN 1634-1:2014, which are also given in Appendix 6 of this report.

Note: These calculations do not provide an E, W, I, or any other classification under EN 13501-2 or other classification scheme. They provide size variations outlined in the EN 1634-1:2014 standard, and are not part of an external assessment.

10.1. Overall Permitted Size Variations for doorset A

Doorset A had achieved an integrity rating of 46 minutes, which qualifies for Category 'B' overrun allowances for a 30-minute door. Therefore, in context where this door is used to satisfy a 30-minute integrity rating, and in accordance with Annex B of EN 1634-1, the overall dimensions may be increased in 15% width, 15% height, and 20% area.

Door Leaf A Size Variations		
	Tested	Allowable Extension
Height	2200mm	2530mm
Width	926mm	1064.9mm
Area	2.037m ²	2.444m ²

Notes:

- i. See section 13.3.3.2 of EN 1634-1:2014+A1:2018, as well as Annex B of EN 1634-1:2014 for clarification.

10.2. Overall Permitted Size Variations for doorset B

Doorset B had achieved an integrity rating of 70 minutes, which qualifies for Category 'B' overrun allowances for a 60-minute door. Therefore, in context where this door is used to satisfy a 60-minute integrity rating, and in accordance with Annex B of EN 1634-1, the overall dimensions may be increased in 15% width, 15% height, and 20% area.

Door Leaf A Size Variations		
	Tested	Allowable Extension
Height	2400mm	2760mm
Width	926mm	1064.9mm
Area	2.222m ²	2.666m ²

Notes:

- ii. See section 13.3.3.2 of EN 1634-1:2014+A1:2018, as well as Annex B of EN 1634-1:2014 for clarification.



11. LIMITATION

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 EN 1634-1:2014+A1:2018, EN 1363-1:2012, and where appropriate EN 1363-2:1999. Any significant deviation with respect to size, construction details, load, stresses, or edge or end conditions other than those allowed under the field of application in the relevant test method is not covered by this report.

Because of 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.

TBWIC is wholly responsible for data and information provided in this report, except where indicated by the limitations specified in section 6.1 of this report. This report and all records of the test to which it relates may not be retained by TBWIC beyond 5 years from the date of testing.

This test report is respectfully submitted by: Thomas Bell-Wright International Consultants

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Report Revision Tracking		
Report Reference	Date Issued	Notes & Amendments
Rev. 00	03-Feb-21	This is the first issue of the report. No revisions are included.



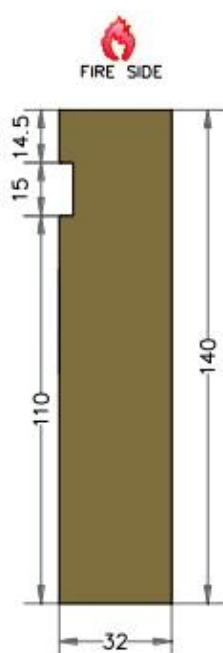
12. APPENDIX 1 – DESCRIPTION OF SPECIMEN

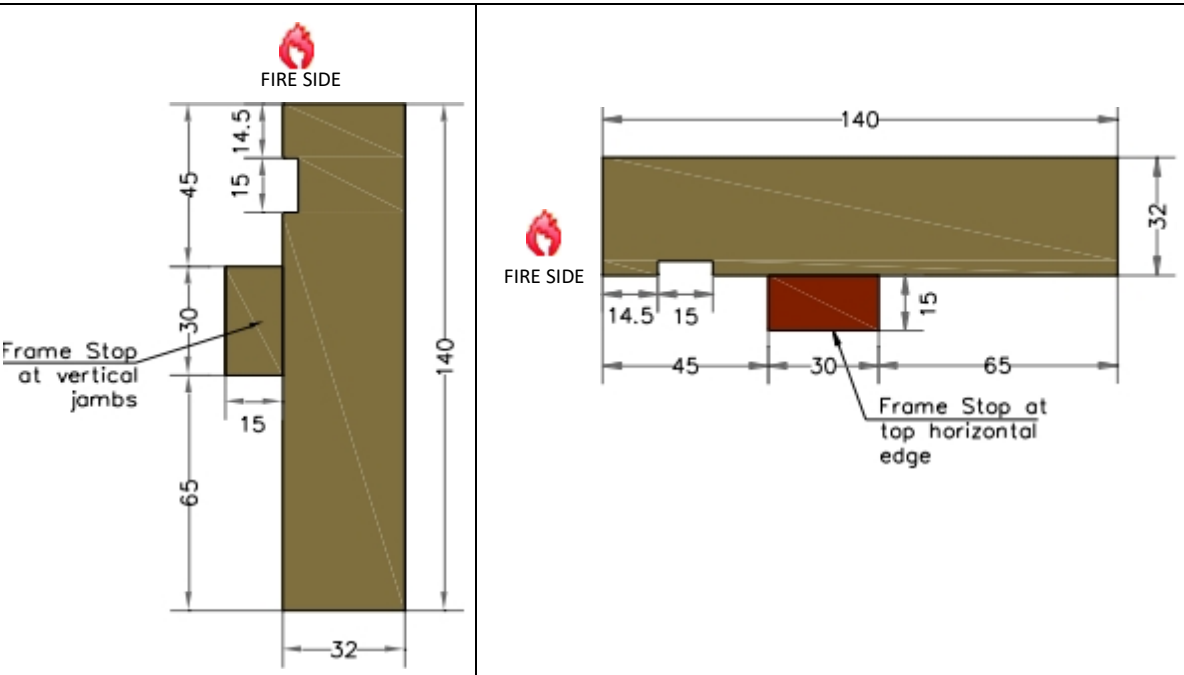
Note: All information provided herein Appendix 1 has been provided either by TBWIC or Test Sponsor. Information marked with a single asterisk indicates information provided by the Test Sponsor which has been checked against the materials used in the test where appropriate, however does not fall under the responsibility of TBWIC. All dimensions are expressed in millimeters (mm), unless otherwise specified.

DOORSET A: LATCHED, SINGLE-ACTING, SINGLE LEAF WOODEN DOORSET WITH TWO EQUAL-SIZED AIR TRANSFER GRILLS

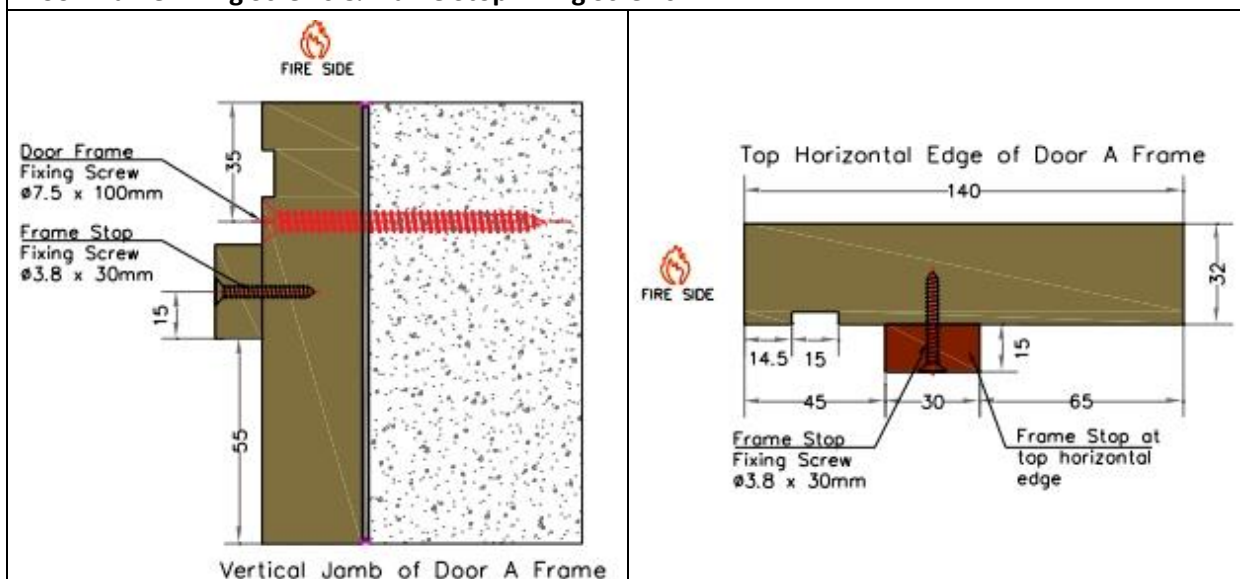
Overall	
Type	Latched, single-acting, single leaf wooden doorset with two equal-sized air transfer grills.
Dimensions	996 x 2241 x 140mm (w x h x jamb depth)

A. Door Frame (Doorset A)

Door Frame	
	
Material	European Redwood*
Manufacturer	AJB Ltd – Corby – UK
Reference	Door Frame*
Density	510kg/m ³ (stated)*
Moisture	9% (measured)
Dimension	As shown above
Fixing Method & Application	The door frame was fixed into the supporting construction from its both vertical jambs only using 12 nos. of concrete fixing screws of size Ø7.5 x 100mm; 06 nos. on either vertical jamb of door A frame. An intumescent acrylic sealant (ref: Intumescent Acrylic Sealant PYROMAS A Mann McGowan) was applied above the head of the concrete fixing screws after being fixed in place.

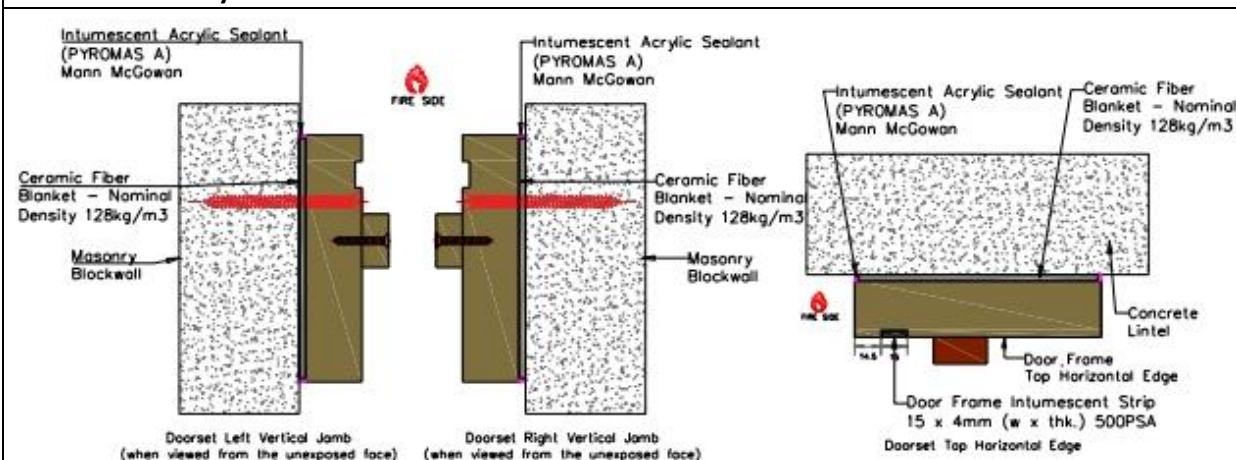
Frame Stop		
		
	Frame Stop at Vertical Jambs	Frame Stop at Top Horizontal Edge
Material	European Redwood*	Sapele*
Manufacturer	AJB Ltd – Corby – UK	AJB Ltd – Corby – UK
Reference	Door Stop*	Door Stop*
Density	510kg/m ³ (stated)*	640kg/m ³ (stated)*
Moisture	8.5% (measured)	8.4% (measured)
Dimensions	As shown above	As shown above
Fixing Method & Application	Two types of frame stops were fixed onto door A frame; European redwood frame stop was used on both vertical jambs of door A frame, and sapele frame stop was used on the top horizontal edge of door A frame. The frame stops at both vertical jambs and to horizontal edge of door A frame were fixed onto door A frame profile using fixing screws of size Ø3.8 x 30mm long.	

Door Frame Fixing Screws & Frame Stop Fixing Screws



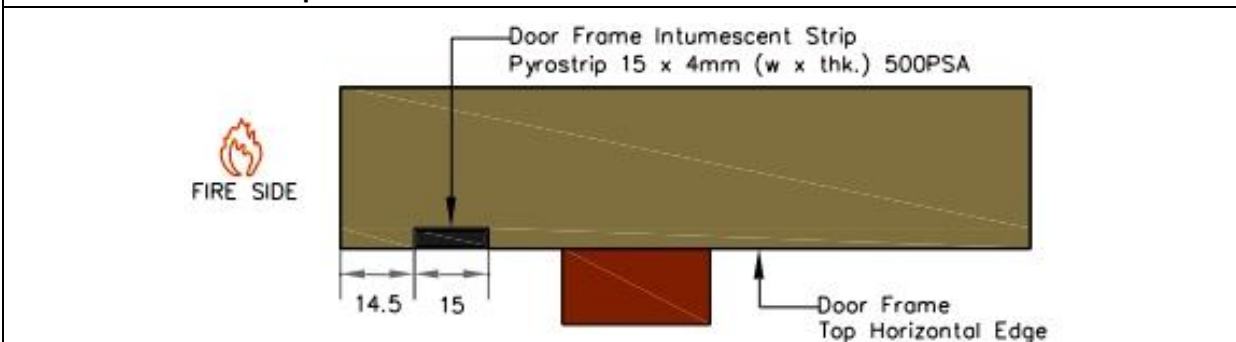
	Door Frame Fixing Screws	Frame Stop Fixing Screws
Material	Steel*	Steel*
Manufacturer	Speciality Easy Drive	Turbo Gold
Reference	Concrete Screws*	Wood Screws*
Dimensions	Ø7.5 x 100mm	Ø3.8 x 30mm
Fixing Method & Application	<p>12 nos. of fixing screws of size Ø7.5 x 100mm long were used to fix door A frame into the supporting construction at its both vertical jambs only; 06 nos. on either vertical jamb of door A frame nominally spaced at 50mm above the sill, 280mm C/C, 450mm C/C, and 75mm from the frame rebate on the top horizontal edge of the frame. An intumescent acrylic sealant (ref: Intumescent Acrylic Sealant PYROMAS A Mann McGowan) was applied above the head of the concrete fixing screws after being fixed in place. Door frame stop was screw-fixed onto the door frame using 18 nos. of fixing screws of size Ø3.8 x 30mm long; 07 nos. on either vertical jamb nominally spaced at 20mm from the bottom edge of the frame, 24mm from the frame rebate on the top horizontal edge, and a minimum of 270mm C/C, and a maximum of 515mm C/C.</p>	

Intumescent Acrylic Sealant



Material	Intumescent Acrylic Sealant*
Manufacturer	Mann McGowan
Reference	PYROMAS A
Fixing Method & Application	Ceramic fibre blanket having a nominal density of 128kg/m³ and a standard thickness of 25mm was firmly packed in the nominal 10mm gap that was maintained between door A frame and the supporting construction from both vertical jambs and top horizontal edge. An intumescent acrylic sealant (Ref: Intumescent Acrylic Sealant PYROMAS A Mann McGowan) was then applied above the ceramic fibre blanket to seal the nominal 10mm gap as shown above.

Frame Intumescent Strip

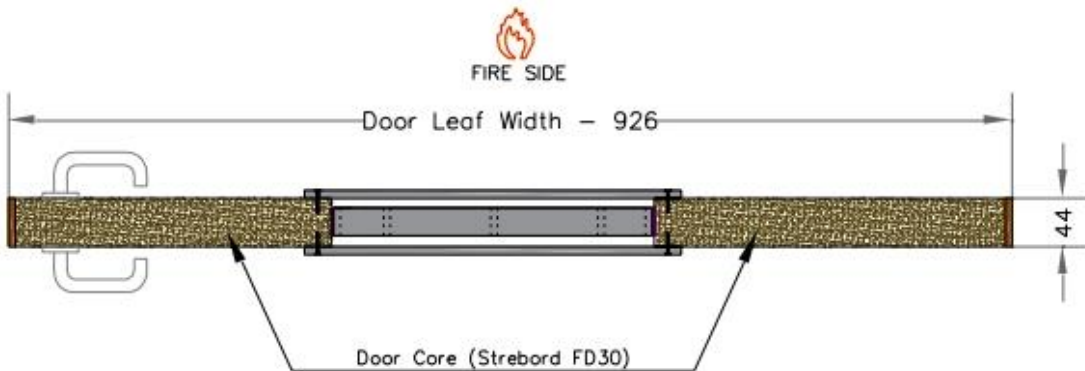


Material	Dark grey graphite intumescent in a purpose-designed uPVC sleeve*
Manufacturer	Mann McGowan
Reference	Pyrostrip 500PSA
Dimensions	15 x 4mm (w x thk.) – 01 nos.
Fixing Method & Application	Door A frame intumescent strip was self-adhered into the groove provided on the door frame rebate along the entire height of the frame vertical jambs and the width of the frame top horizontal edge. The intumescent strip was nominally spaced as shown above.

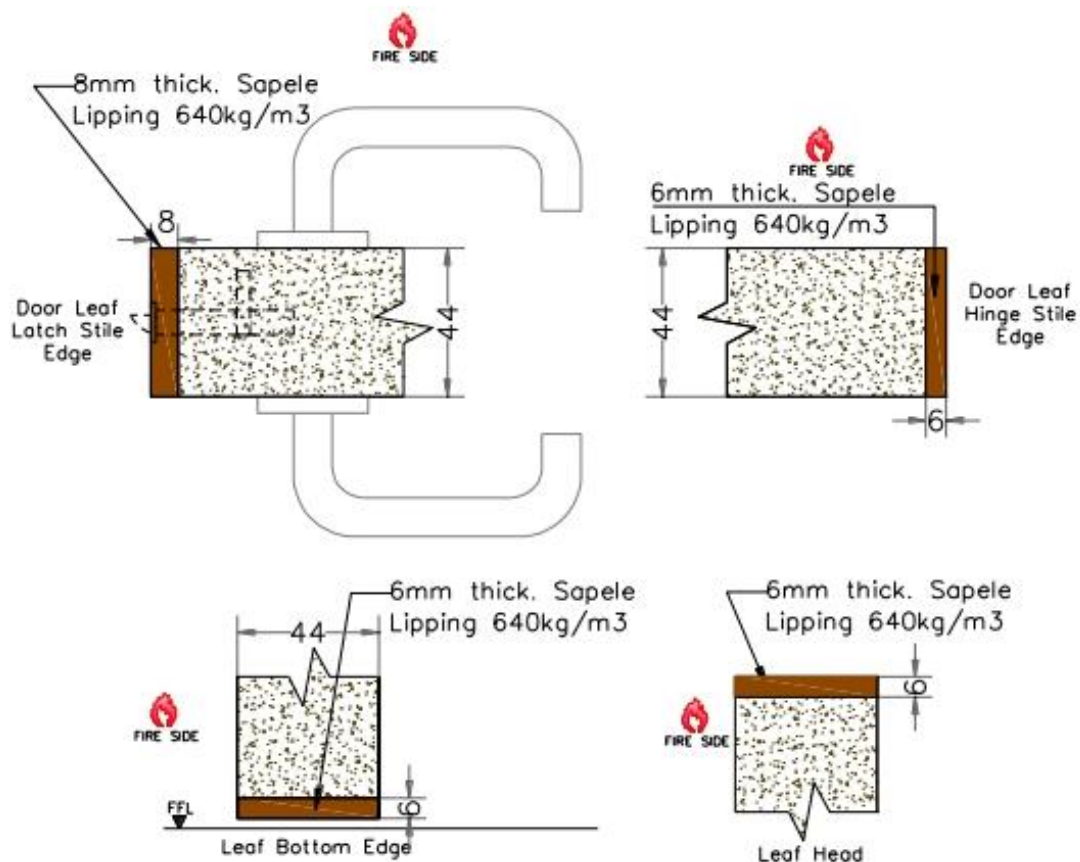


B. Door Leaf (Doorset A)

Overall	
Material	European Redwood*
Dimensions	926 x 2200 x 45mm (w x h x thk.)

Leaf Core	
	
Material	Particle Board*
Manufacturer	Falcon Panel Products
Reference	Strebord FD30*
Density	540kg/m ³ (stated)*
Moisture	6.4% (measured)
Dimension	44mm
Fixing Method & Application	Strebord FD30 Board was used as a leaf core. The door leaf was fixed into the frame using 03 nos. of butt hinges (Ref: Royde & Tucker RT HI-LOAD H102).

Leaf Lipping

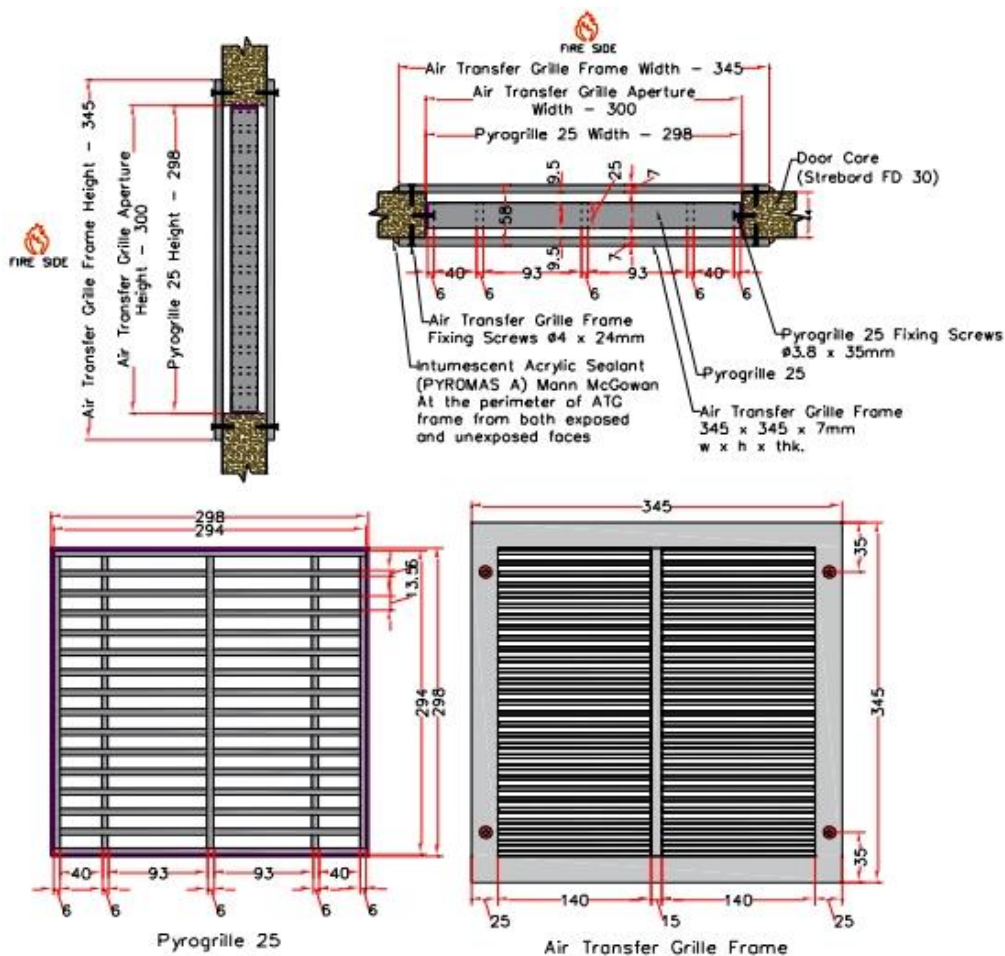


	Bottom Edge, Leaf Head & Hinge Stile Edge Lipping	Latching Stile Edge Lipping
Material	Sapele*	Sapele*
Manufacturer	AJB Ltd – Corby – UK	AJB Ltd – Corby – UK
Reference	Lipping*	Lipping*
Density	8.9% (measured)	8.9% (measured)
Moisture	640kg/m ³ (stated)*	640kg/m ³ (stated)*
Thickness	6mm thick	8mm thick
Fixing Method & Application	<p>6mm thick Sapele lipping was fixed along the width of door leaf head, bottom edge, and along the height of the hanging stile edge of the door leaf.</p> <p>8mm thick Sapele lipping was fixed along the height of the latching stile edge of the door leaf. The lipping on all afore-said locations was fixed using Urea Formaldehyde adhesive.</p>	

Leaf Lipping Adhesive (glue)

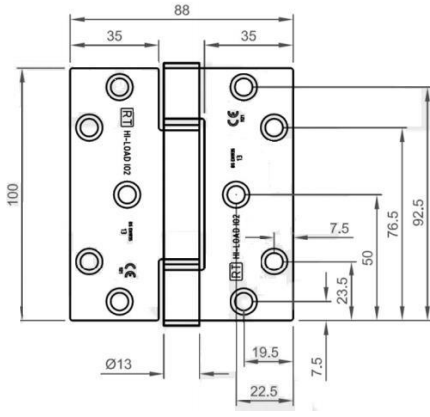
Material	Urea Formaldehyde Resin*
Manufacturer	Construction Chemicals (UK) Ltd
Reference	Fastform Cascamite*
Fixing Method & Application	Cascamite adhesive used to fix the lipping onto the perimeter of the door leaf as prescribed in the above lipping table.


Door Leaf Upper and Lower Air Transfer Grilles




	Air Transfer Grilles Intumescent Grid	Air Transfer Grilles Metal Frame
Material	Palusol 104 inside uPVC Sleeves*	Mild steel with white-powder coating*
Manufacturer	Mann McGowan (Ventilation Products)	Gilberts Ltd
Reference	Pyrogrille 25*	Pressed Steel Cover Grille*
Dimension	298 x 298 x 25mm (w x h x thk.)	345 x 345 x 7 x 1mm (w x h x depth x thk.)
Quantity	02 nos.	02 nos.
Fixing Method & Application	2 numbers Air Transfer Grilles were incorporated within Door Leaf A. The aperture of lower air transfer grille was made at a nominal height of 300mm above the sill, and the aperture of the upper air transfer grille was made at a nominal distance of 446mm from the leaf head. Both air transfer grille apertures were made at the mid width aligned with the vertical centreline of the door leaf. Each air transfer grille had incorporated an intumescent grid fixed into the vertical jambs of the aperture only using 04 nos. of fixing screws of size $\varnothing 3.8 \times 35\text{mm}$ long; 02 nos. on either vertical jamb of the aperture nominally spaced at 35mm from either end. A steel frame was installed on the door leaf covering the aperture of the air transfer grilles, and it was fixed onto the door leaf using 04 nos. of fixing screws of size $\varnothing 4 \times 24\text{mm}$ long; 02 nos. on either vertical jamb of the steel frame nominally spaced at 35mm from either end of the steel frame.	

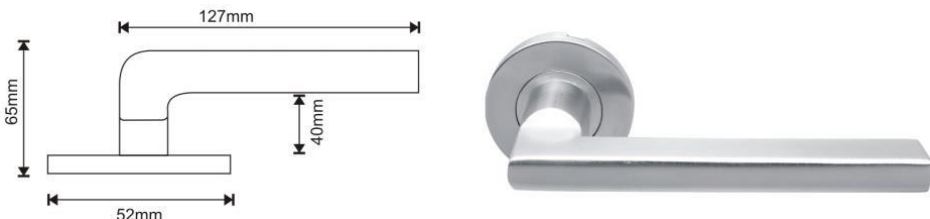
C. Ironmongery (Doorset A)

Door Butt Hinges	
	
Manufacturer	Royde & Tucker
Reference	RT HI-LOAD H102
Fixing Method & Application	03 nos. of butt hinges were installed on doorset A, and screw-fixed into both frame and hinge stile edge of door A leaf using 5 nos. of fixing screws of size Ø4.7 x 32mm per hinge blade. The hinges were nominally spaced at 250mm above the sill, 875mm C/C, and 200mm from the leaf head.

Concealed Door Closer	
	
Manufacturer	Rutland
Reference	Rutland ITS. 11204 Concealed Cam Action Door Closer. *
Fixing Method & Application	One overhead, concealed door closer was installed on doorset A. The door closer body was fixed into the groove provided on the door leaf head, and the door closer arm was fixed into the groove provided on the frame rebate at the top horizontal. A 2mm thick ironmongery protection kit (Ref: IP.114 – Sheet Graphite) was installed around the rail of the door closer arm and above the door closer body on the leaf head.



Lockset & Strike Plate	
	
Manufacturer	Laidlaw
Reference	Tubular Latch 51.01.65.NP
Fixing Method & Application	The lockset was installed within the groove provided on door A leaf latch stile edge at a nominal height of 1000mm above the sill. The lockset was fixed into the latch stile edge of door A leaf using 2 nos. of fixing screws of size Ø4 x 25mm. Strike plate was fixed onto the latch stile edge of door A frame rebate using 02 nos. of fixing screws of size Ø4 x 25mm.

Door Lever Handle	
	
Manufacturer	Euroart Architectural Hardware
Reference	LRS202+EES001(2)/SSS*
Fixing Method & Application	Door lever handle was installed on door A leaf from both exposed and unexposed faces at a nominal height of 1000mm above the sill. It was fixed onto the leaf using 2 nos. of fixing screws of size Ø4 x 20mm. Acrylic sealant (ref: Intumescent Acrylic Sealant PYROMAS A) was applied on the door handle rose at the contact surface with the door leaf, and on the door handle shaft as well.

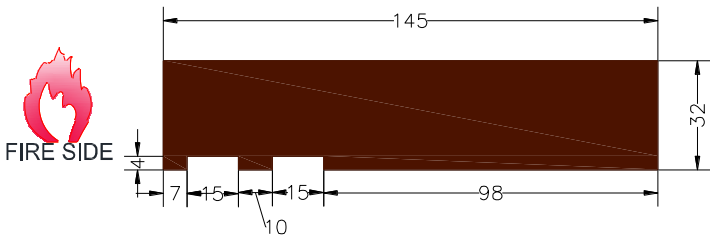
Ironmongery Protection Kit	
Material	Phosphate-based*
Manufacturer	Mann McGowan Ltd
Reference	Interdens® SA*
Dimensions	1mm
Fixing Method & Application	1mm thick protection kit was fixed beneath the strike plate and door hinge blades and around the lockset.

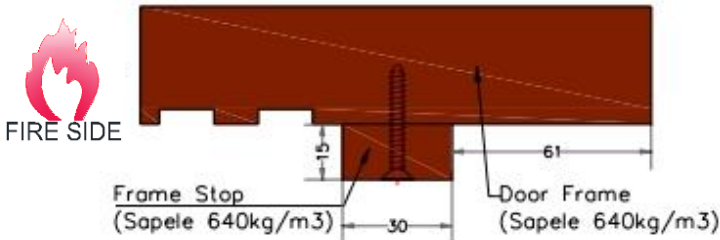


DOORSET B: LATCHED, SINGLE-ACTING, SINGLE LEAF WOODEN DOORSET WITH TWO UNEQUAL-SIZED AIR TRANSFER GRILLES

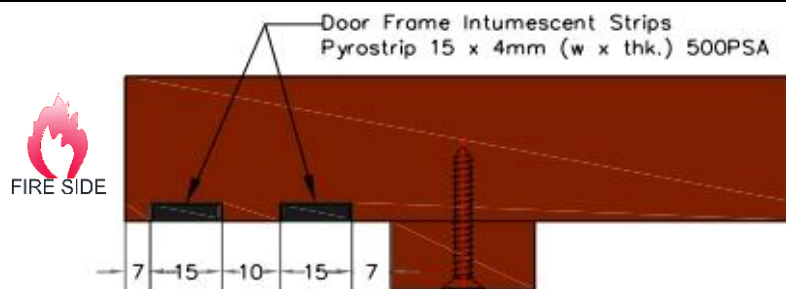
Overall	
Material	Latched, single-acting, single leaf wooden doorset with two unequal-sized air transfer grilles.
Dimensions	996 x 2438 x 145mm (w x h x jamb depth)

D. Door Frame (Doorset B)

Door Frame	
	
Material	Sapele*
Manufacturer	AJB Ltd - Corby - UK
Reference	Door Frame*
Density	640kg/m ³ (stated)*
Moisture	8% (measured)
Dimension	As shown above
Fixing Method & Application	The door frame was fixed into the supporting construction at its both vertical jambs only using 12 nos. of concrete fixing screws of size Ø7.5 x 100mm; 06 nos. on either vertical jamb of door B frame. An intumescent acrylic sealant (ref: Intumescent Acrylic Sealant PYROMAS A Mann McGowan) was applied above the head of the concrete fixing screws after being fixed in place.

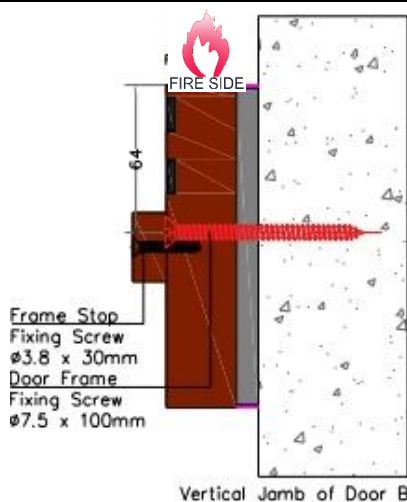
Frame Stop	
	
Material	Sapele*
Manufacturer	AJB Ltd – Corby – UK
Reference	Door Stop*
Density	640kg/m ³ (stated)*
Moisture	8.1% (measured)
Dimensions	As shown above
Fixing Method & Application	Frame stop was fixed onto the door frame at both vertical jambs and top horizontal edge of door B frame using fixing screws of size Ø3.8 x 30mm long.

Frame Intumescent Strip



Material	Dark grey graphite intumescent in a purpose-designed uPVC sleeve*
Manufacturer	Mann McGowan
Reference	Pyrostrip 15 x 4mm 500PSA
Dimensions	15 x 4mm (w x thk.) – 02 nos.
Fixing Method & Application	Door B frame intumescent strips were self-adhered into the grooves provided on the door frame rebate along the entire length of the frame vertical jambs and the width of the frame top horizontal edge. The intumescent strips were nominally spaced as shown above.

Door Frame Fixing Screws & Frame Stop Fixing Screws

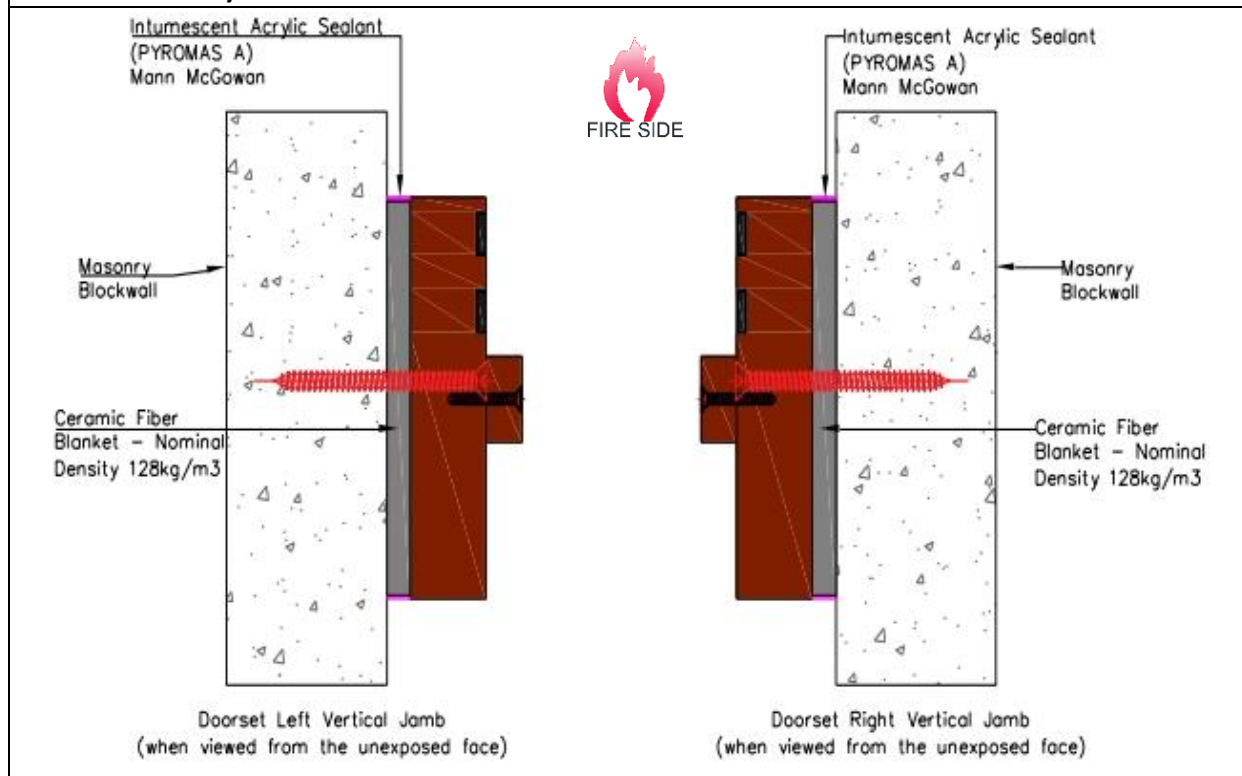


	Door Frame Fixing Screws	Frame Stop Fixing Screws
Material	Steel*	Steel*
Manufacturer	Speciality Easy Drive	Turbo Gold
Reference	Concrete Screws*	Wood Screws*
Dimensions	Ø7.5 x 100mm	Ø3.8 x 30mm
Fixing Method & Application	12 nos. of concrete fixing screws of size Ø7.5 x 100mm long were used to fix door B frame into the supporting construction at its both vertical jambs only; 06 nos. on either vertical jamb of door D frame nominally spaced at 50mm above the sill, 260mm C/C, 460mm C/C, and 640mm, 500mm C/C, 425mm C/C, and 70mm from the frame rebate on the top horizontal edge of the frame. An intumescent acrylic sealant (ref: Intumescent Acrylic Sealant PYROMAS A Mann McGowan) was applied above the head of the concrete fixing screws after being fixed in place. Door frame stop was screw-fixed onto the door frame using 23 nos. of fixing screws of size Ø3.8 x 30mm	



long; 09 nos. on either vertical jamb nominally spaced at 40mm from the bottom edge of the frame, 30mm from the frame rebate on the top horizontal edge, and a minimum of 275mm C/C and a maximum of 350mm C/C.

Intumescent Acrylic Sealant

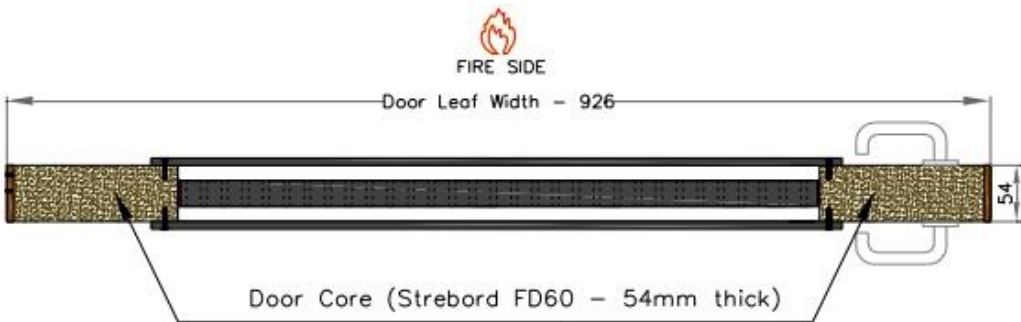


Material	Intumescent Acrylic Sealant*
Manufacturer	Mann McGowan
Reference	PYROMAS A
Fixing Method & Application	Ceramic fibre blanket having a nominal density of 128kg/m ³ and a standard thickness of 25mm was firmly packed in the nominal 10mm gap that was maintained between doorset A frame and the supporting construction from both vertical jambs and top horizontal edge. An intumescent acrylic sealant (Ref: Intumescent Acrylic Sealant PYROMAS A Mann McGowan) was then applied above the ceramic fibre blanket as shown above at a nominal depth of 10mm from either side.



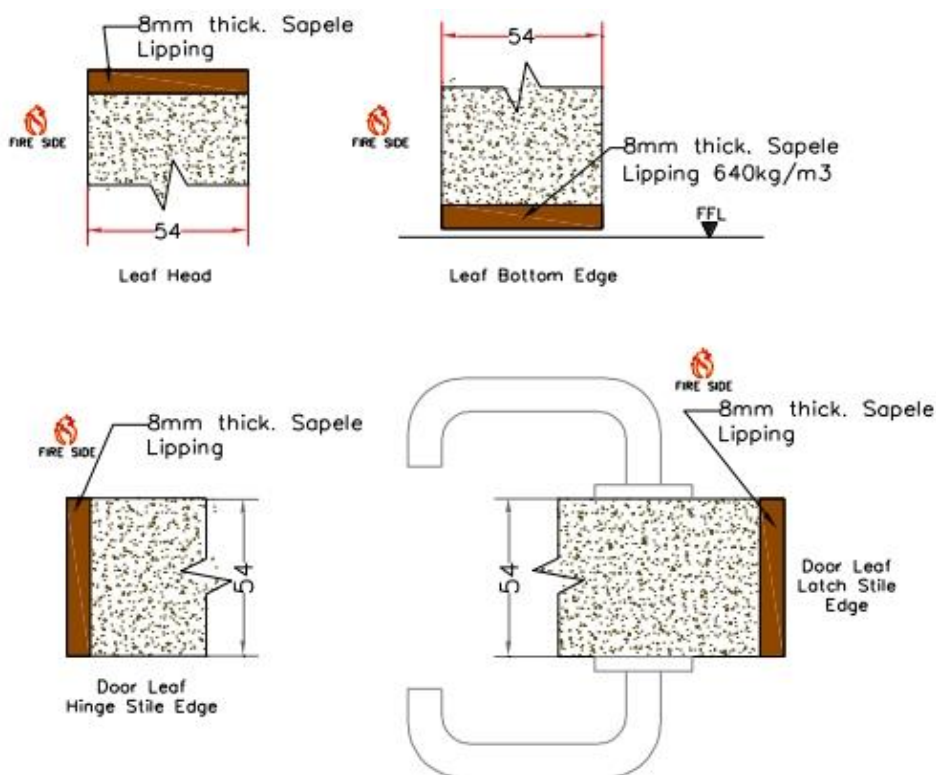
E. Door Leaf (Doorset B)

Overall	
Material	Sapele*
Dimensions	926 x 2200 x 54mm (w x h x thk.)

Leaf Core	
	
Material	Particle Board*
Manufacturer	Falcon Panel Products
Reference	Strebord FD60*
Density	540kg/m ³ (stated)*
Moisture	6.4% (measured)
Dimension	54mm
Fixing Method & Application	Strebord FD60 board was used as a leaf core. The door leaf was fixed into the frame using 04 nos. of butt hinges (Ref: Royde & Tucker RT HI-LOAD H207).



Leaf Lipping

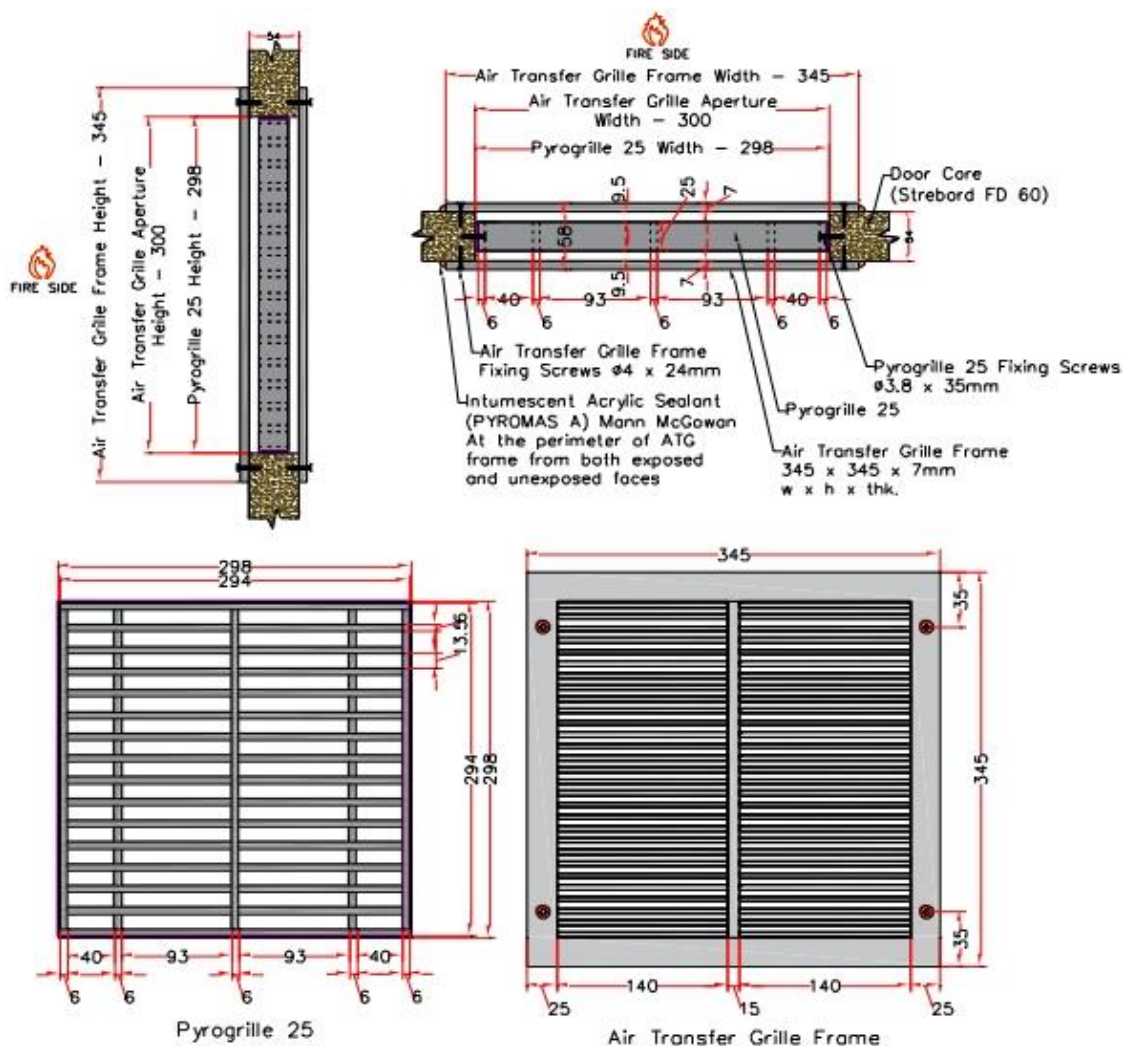


Material	Sapele*
Manufacturer	AJB Ltd – Corby – UK
Reference	Lipping*
Density	8.9% (measured)
Moisture	640kg/m ³ (stated)*
Thickness	As shown above
Fixing Method & Application	8mm thick Sapele lipping was fixed at the perimeter of the door leaf, and it was fixed using Urea Formaldehyde adhesive.

Leaf Lipping Adhesive (glue)

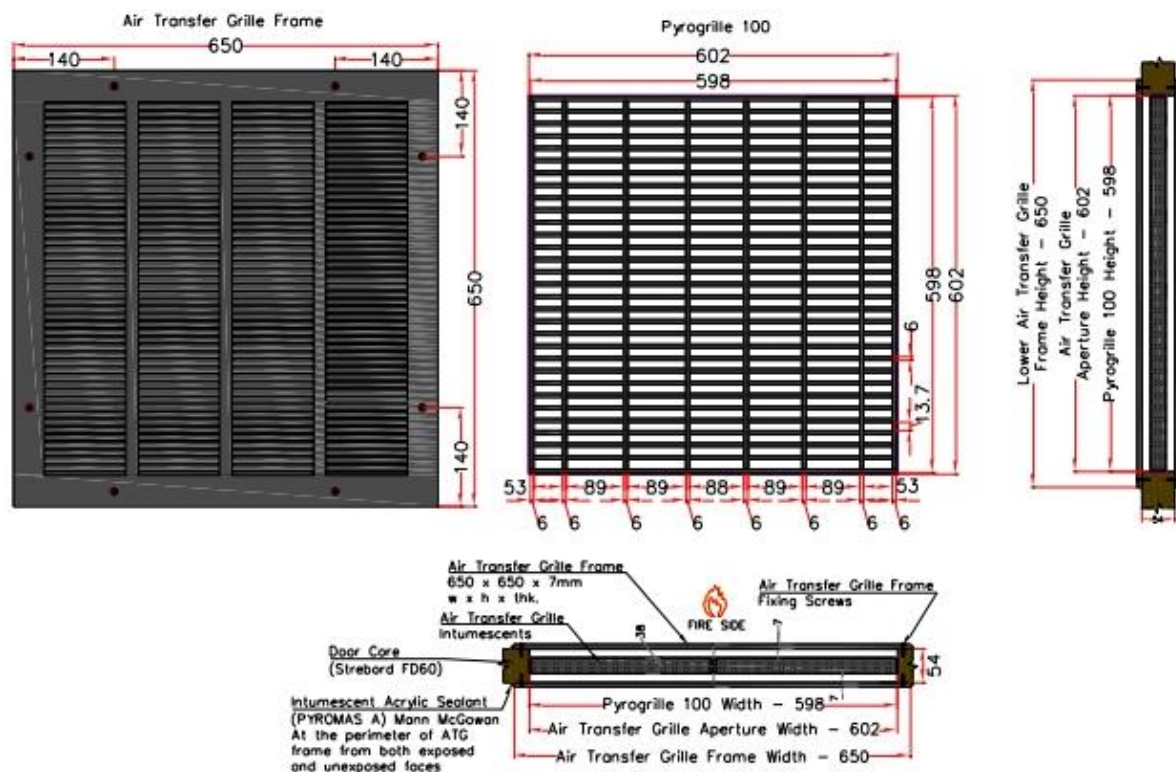
Material	Urea Formaldehyde Resin*
Manufacturer	Construction Chemicals (UK) Ltd
Reference	Fastform Cascamite*
Fixing Method & Application	Cascamite adhesive used to fix the lipping onto the perimeter of the door leaf as prescribed in the above lipping table.

Door Leaf Upper Air Transfer Grille



	Air Transfer Grilles Intumescent Grid	Air Transfer Grille Metal Frame
Material	Palusol 104 inside uPVC Sleeves*	Mild steel with white-powder coating*
Manufacturer	Mann McGowan (Ventilation Products)	Gilberts Ltd
Reference	Pyrogrille 25*	Pressed Steel Cover Grille*
Dimension	298 x 298 x 25mm (w x h x thk.)	345 x 345 x 7 x 1mm (w x h x depth x thk.)
Quantity	01 nos.	01 nos.
Fixing Method & Application	<p>Door Leaf B incorporated a top air transfer grille. The aperture of the air transfer grille was made at a nominal distance of 446mm from the leaf head, and at the mid width aligned with the vertical centreline of the door leaf. The air transfer grille had incorporated an intumescent grid fixed into the vertical jambs of the aperture only using 04 nos. of fixing screws of size $\phi 3.8 \times 35\text{mm}$ long; 02 nos. on either vertical jamb of the aperture nominally spaced at 35mm from either end. A steel frame was installed on the door leaf covering the aperture of the air transfer grille, and it was fixed onto the door leaf using 04 nos. of fixing screws of size $\phi 4 \times 24\text{mm}$ long; 02 nos. on either vertical jamb of the steel frame nominally spaced at 35mm from either end of the steel frame.</p>	


Door Leaf Lower Air Transfer Grille




	Air Transfer Grilles Intumescent Grid	Air Transfer Grille Metal Frame
Material	Palusol 104 inside uPVC Sleeves*	Mild steel with white-powder coating*
Manufacturer	Mann McGowan (Ventilation Products)	Gilberts Ltd
Reference	Pyrogrille 100 Air Transfer Grille*	Pressed Steel Cover Grille*
Dimension	602 x 602 x 38mm (w x h x thk.)	650 x 650 x 7 x 1mm (w x h x depth x thk.)
Quantity	01 nos.	01 nos.
Fixing Method & Application	Door Leaf B incorporated an air transfer grille to the lower aperture. The aperture of the air transfer grille was made at a nominal distance of 200mm from the bottom edge of the door leaf, and at the mid width aligned with the vertical centreline of the door leaf. The air transfer grille had incorporated an intumescent grid fixed into the vertical jambs of the aperture only using 04 nos. of fixing screws of size Ø3.8 x 35mm long; 02 nos. on either vertical jamb of the aperture nominally spaced at 55mm from either end. A steel frame was installed on the door leaf covering the aperture of the air transfer grille, and it was fixed onto the door leaf using 04 nos. of fixing screws of size Ø4 x 24mm long; 02 nos. on either vertical jamb of the steel frame nominally spaced at 140mm from either end of the steel frame.	




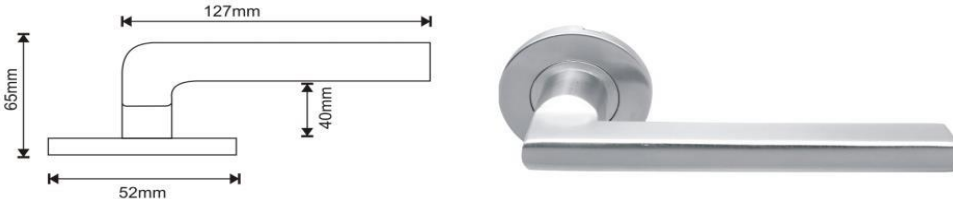
A. Ironmongery (Doorset B)

Door Butt Hinges	
	
Manufacturer	Royde & Tucker
Reference	RT HI-LOAD H207
Fixing Method & Application	04 nos. of butt hinges were installed on doorset B, and screw-fixed into both frame and hinge stile edge of door B leaf using 4 nos. of fixing screws of size Ø4.7 x 32mm per hinge blade. The hinges were nominally spaced at 250mm above the sill, 650mm C/C, and 200mm from the leaf head.

Concealed Door Closer	
	
Manufacturer	Rutland
Reference	Rutland ITS. 11204 Concealed Cam Action Door Closer.*
Fixing Method & Application	One overhead, concealed door closer was installed on doorset B. The door closer body was fixed into the groove provided on the door leaf head, and the door closer arm was fixed into the groove provided on the frame rebate at the top horizontal. A 2mm thick ironmongery protection kit (Ref: IP.114 – Sheet Graphite) was installed around the rail of the door closer arm and above the door closer body on the leaf head.



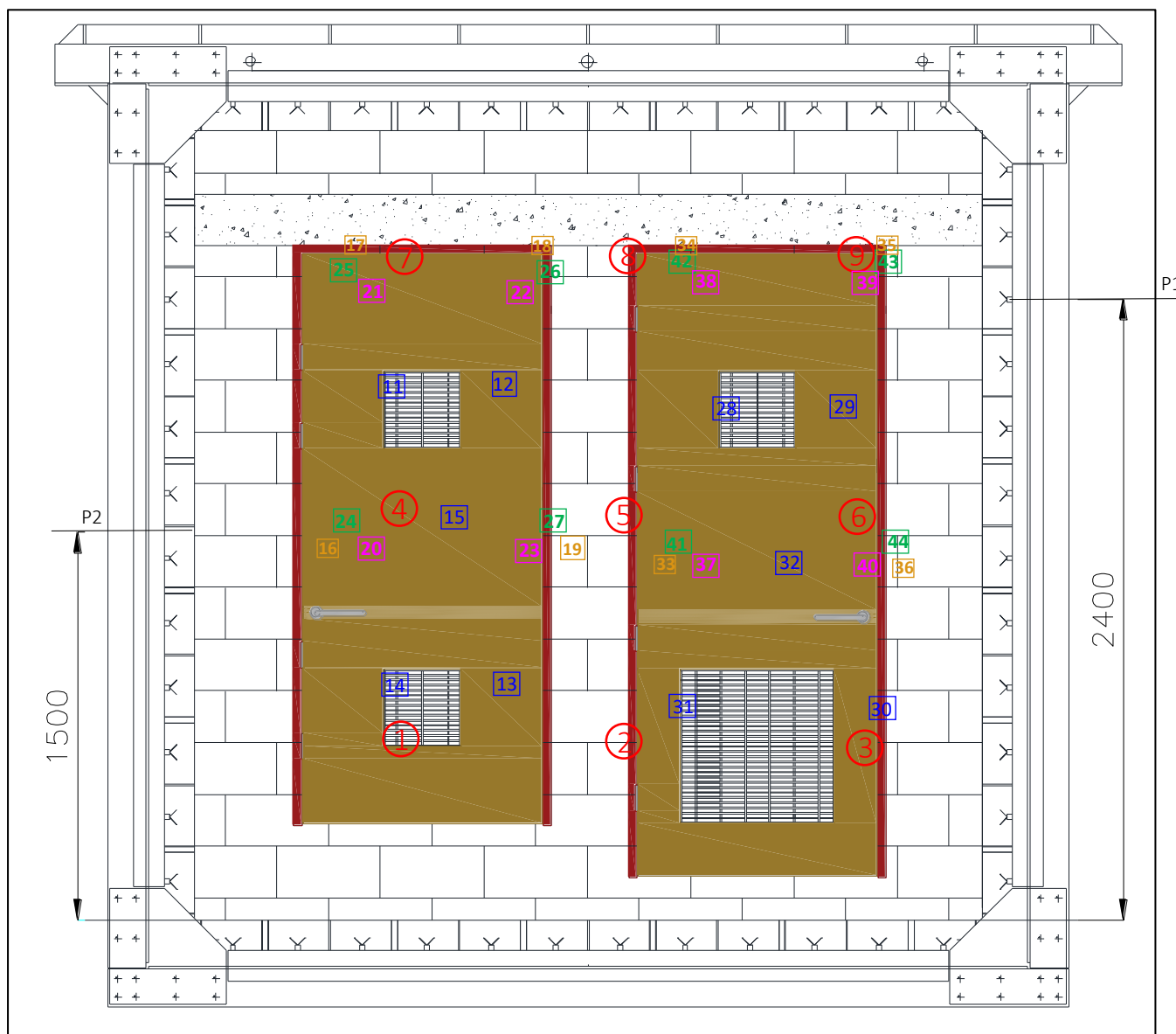
Lockset & Strike Plate	
	
Manufacturer	Laidlaw
Reference	Tubular Latch 51.01.65.NP
Fixing Method & Application	The lockset was installed within the groove provided on door B leaf latch stile edge at a nominal height of 1000mm above the sill. The lockset was fixed into the latch stile edge of door B leaf using 2 nos. of fixing screws of size Ø4 x 25mm. Strike plate was fixed onto the latch stile edge of door B frame rebate using 02 nos. of fixing screws of size Ø4 x 25mm.

Door Lever Handle	
	
Manufacturer	Euroart Architectural Hardware
Reference	LRS202+EES001(2)/SSS
Fixing Method & Application	Door lever handle was installed on door B leaf from both exposed and unexposed faces at a nominal height of 1000mm above the sill. It was fixed onto the leaf using 2 nos. of fixing screws of size Ø4 x 20mm. Acrylic sealant (ref: Intumescent Acrylic Sealant PYROMAS A) was applied on the door handle rose at the contact surface with the door leaf, and on the door handle shaft as well.

Ironmongery Protection Kit	
Material	Phosphate-based*
Manufacturer	Mann McGowan Ltd
Reference	Interdens® SA*
Dimensions	2mm
Fixing Method & Application	2mm thick protection kit was fixed beneath the strike plate and door hinge blades and around the lockset.

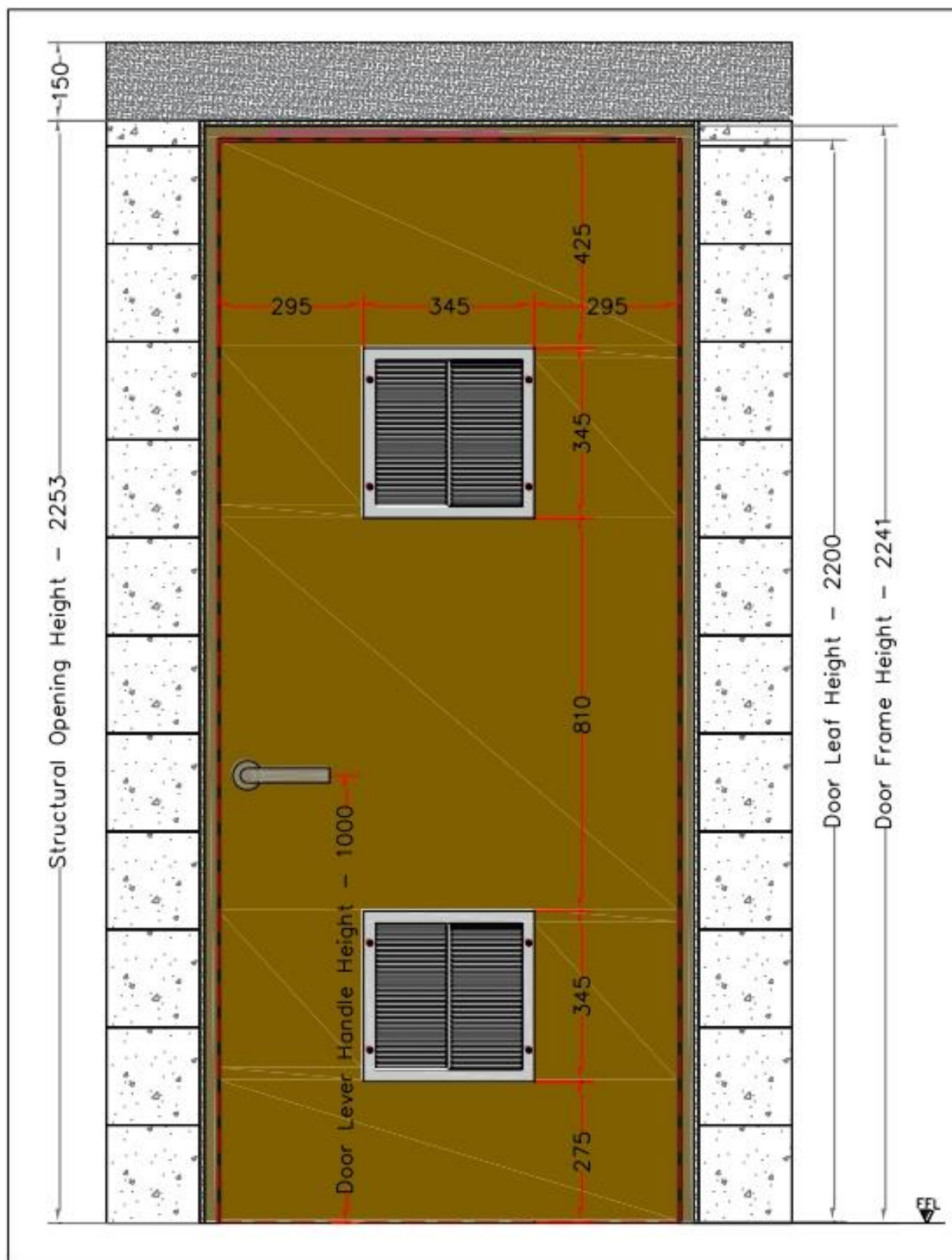


13. APPENDIX 2 – DRAWINGS

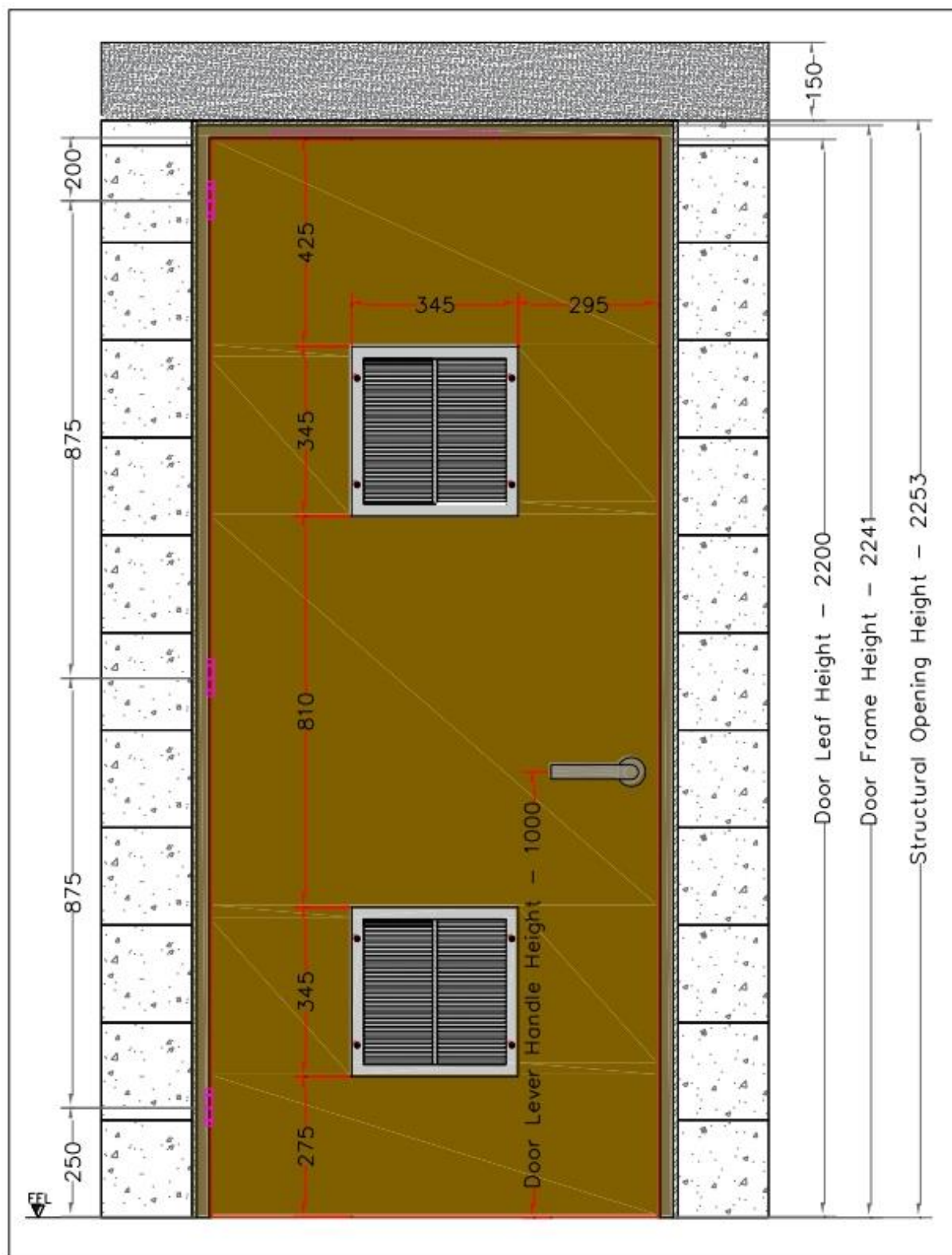


Drawing 1: Overall Instrumentation
(Drawing provided by TBWIC)

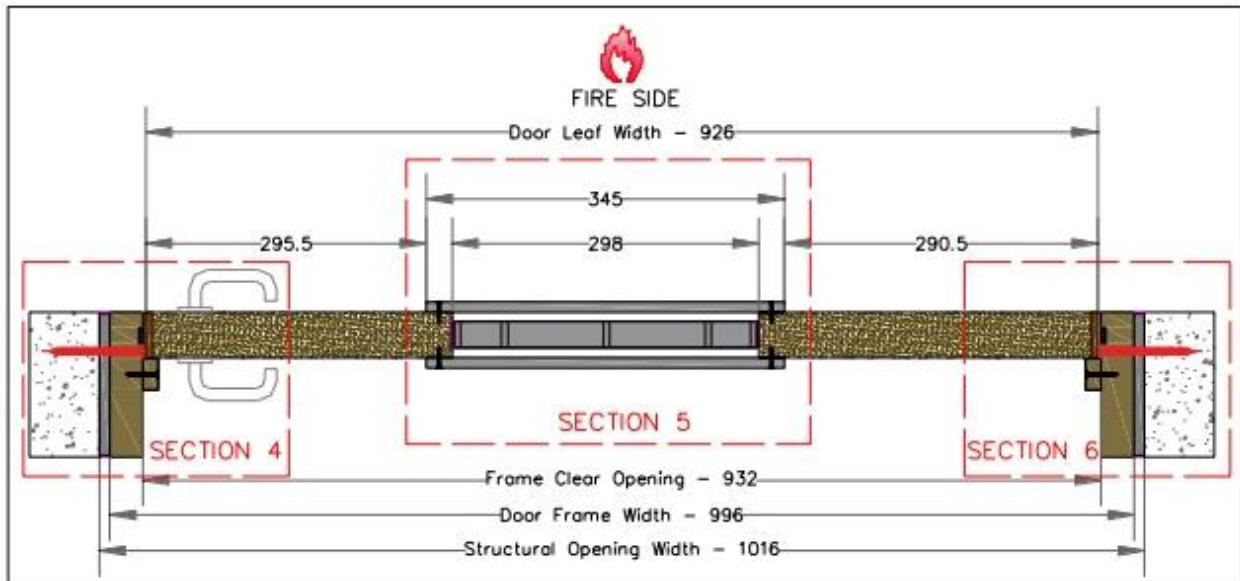
INSTRUMENTATION	
P1	Furnace pressure probe 01 – Located at 2400mm above the sill and maintained at 15Pa.
P2	Furnace pressure probe 02 – Located at 1500mm above the sill for reference only.
Tc1 - Tc9	Thermocouples to measure furnace temperature
Tc11 – Tc15	Thermocouples to measure the mean unexposed surface temperature of doorset A.
Tc16 – Tc19	Thermocouples to measure doorset A frame temperature – Normal Procedure I2.
Tc20 – Tc23	Thermocouples to measure the unexposed temperature of door A leaf - Normal Procedure – I2.
Tc24 – Tc27	Thermocouples to measure the unexposed temperature of door A leaf - Supplementary Procedure – I1.
Tc28 – Tc32	Thermocouples to measure the mean unexposed surface temperature of doorset B.
Tc33 – Tc30	Thermocouples to measure doorset B frame temperature – Normal Procedure I2.
Tc37 – Tc40	Thermocouples to measure the unexposed temperature of door B leaf - Normal Procedure – I2.
Tc41 – Tc44	Thermocouples to measure the unexposed temperature of door B leaf - Supplementary Procedure – I1.



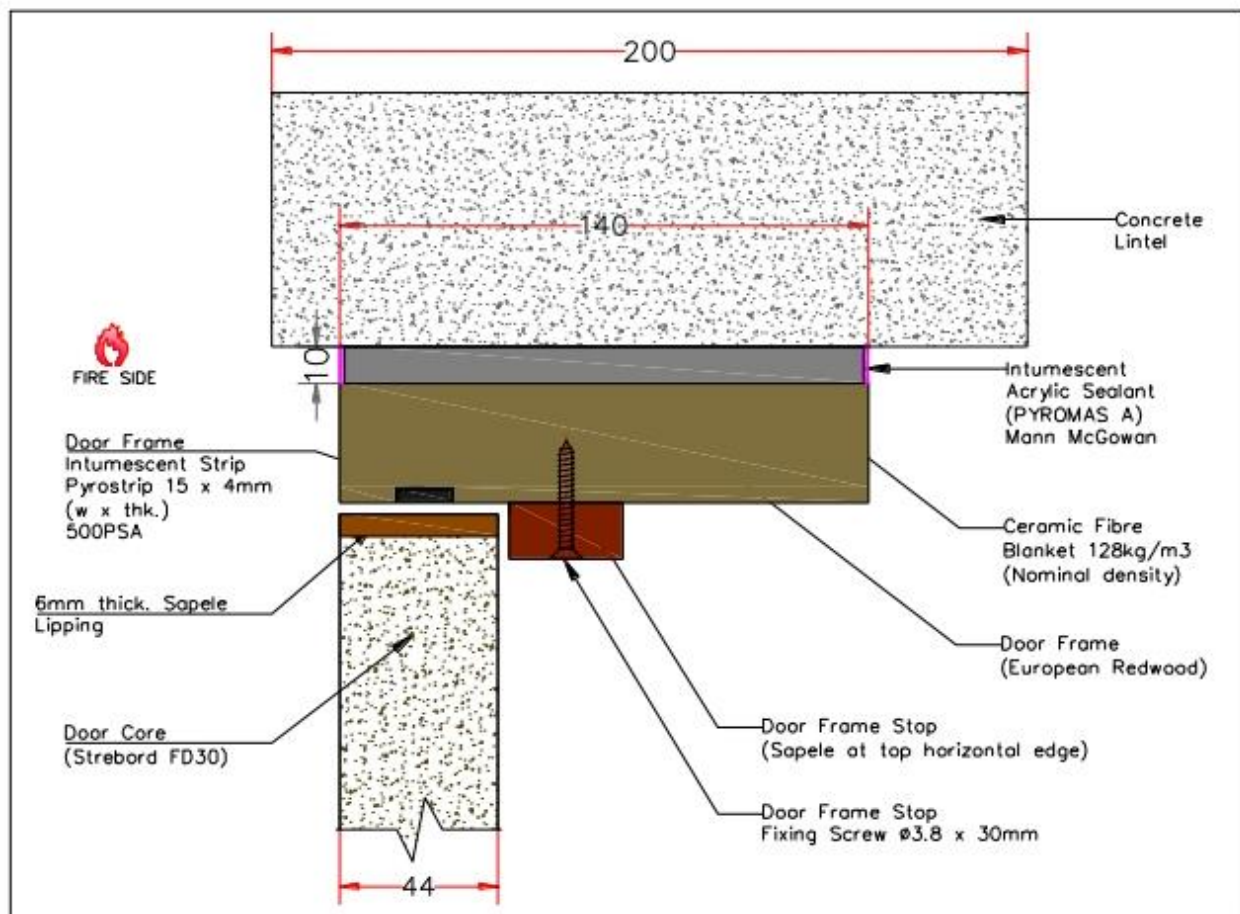
Drawing 2: Elevation view of doorset A from the unexposed face.
(Drawing provided by test sponsor)



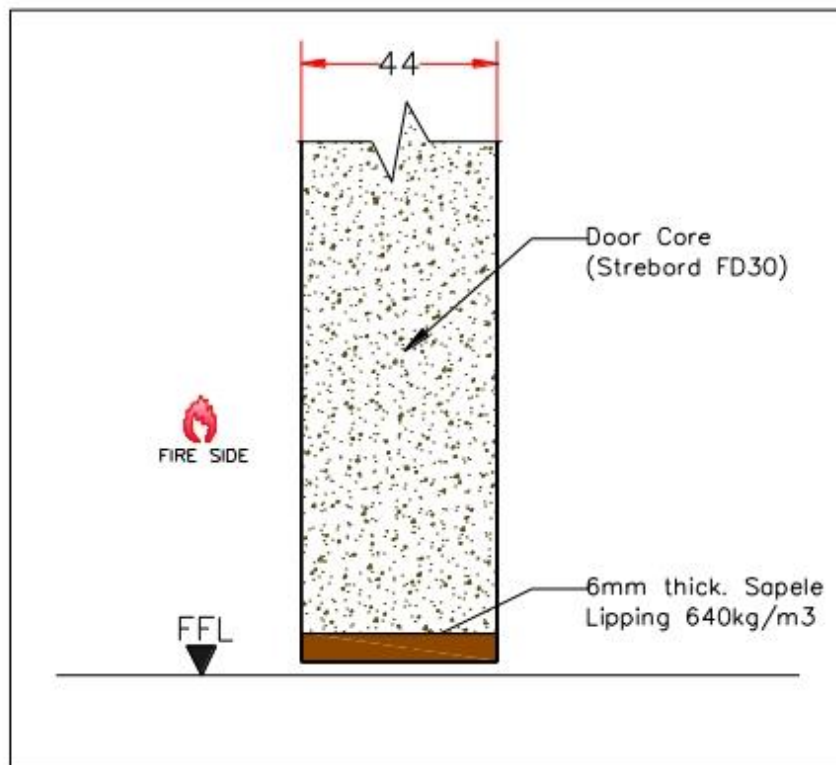
Drawing 3: Elevation view of doorset A from the exposed face.
(Drawing provided by test sponsor)



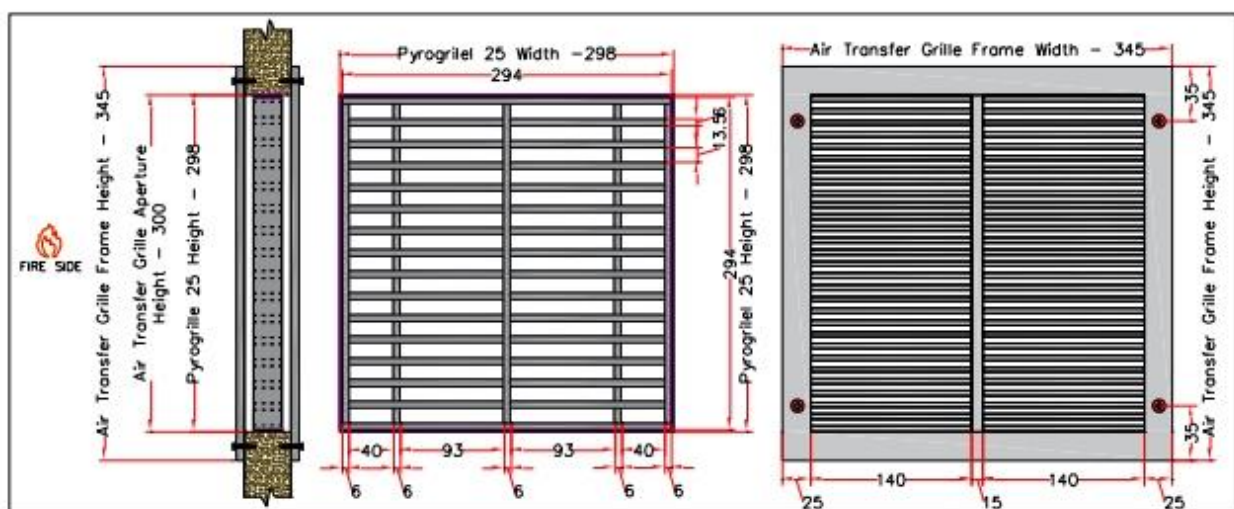
Drawing 5: Horizontal section of doorset A.
(Drawing provided by test sponsor)



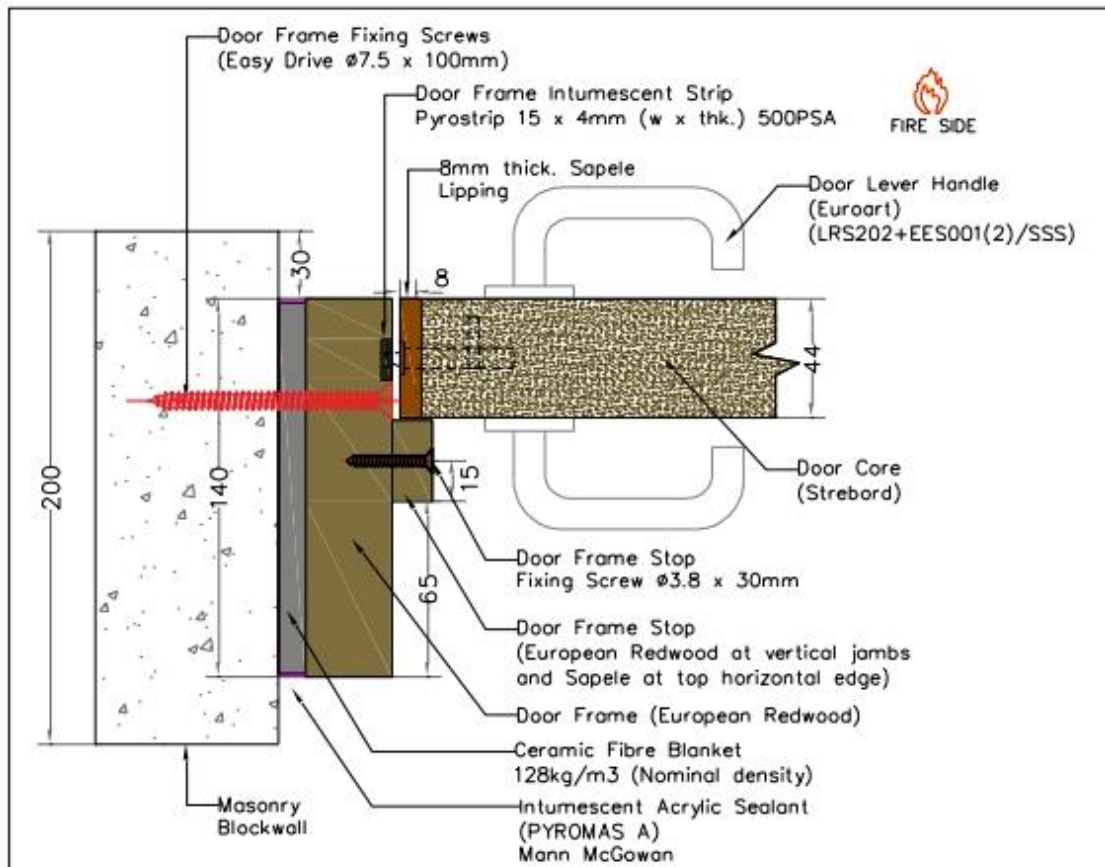
Drawing 6: Sectional detail of the top horizontal edge of doorset A (Section 1 from Drawing 4).
(Drawing provided by test sponsor)



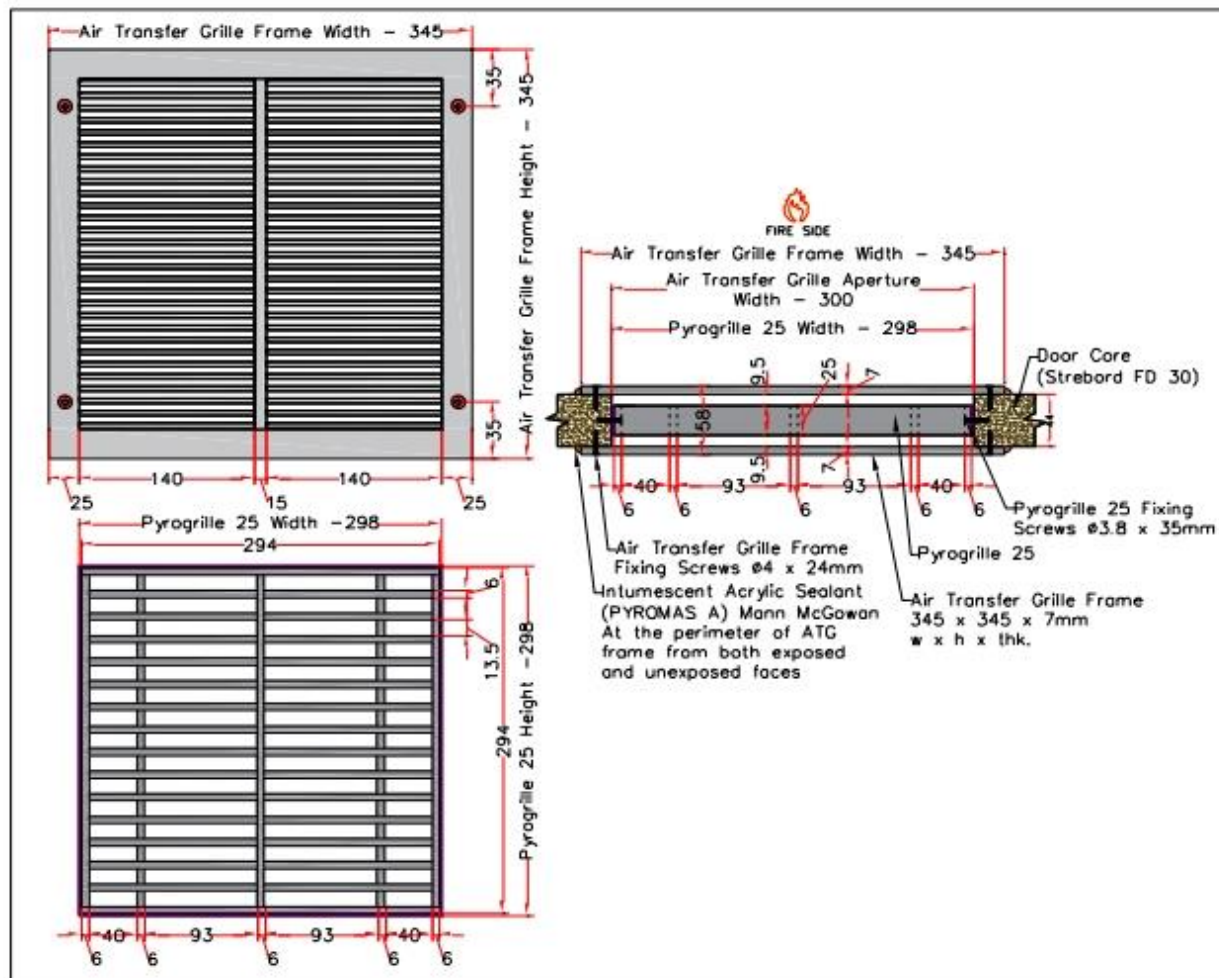
Drawing 7: Sectional detail of the bottom edge of door A leaf (Section 3 from Drawing 4).
(Drawing provided by test sponsor)



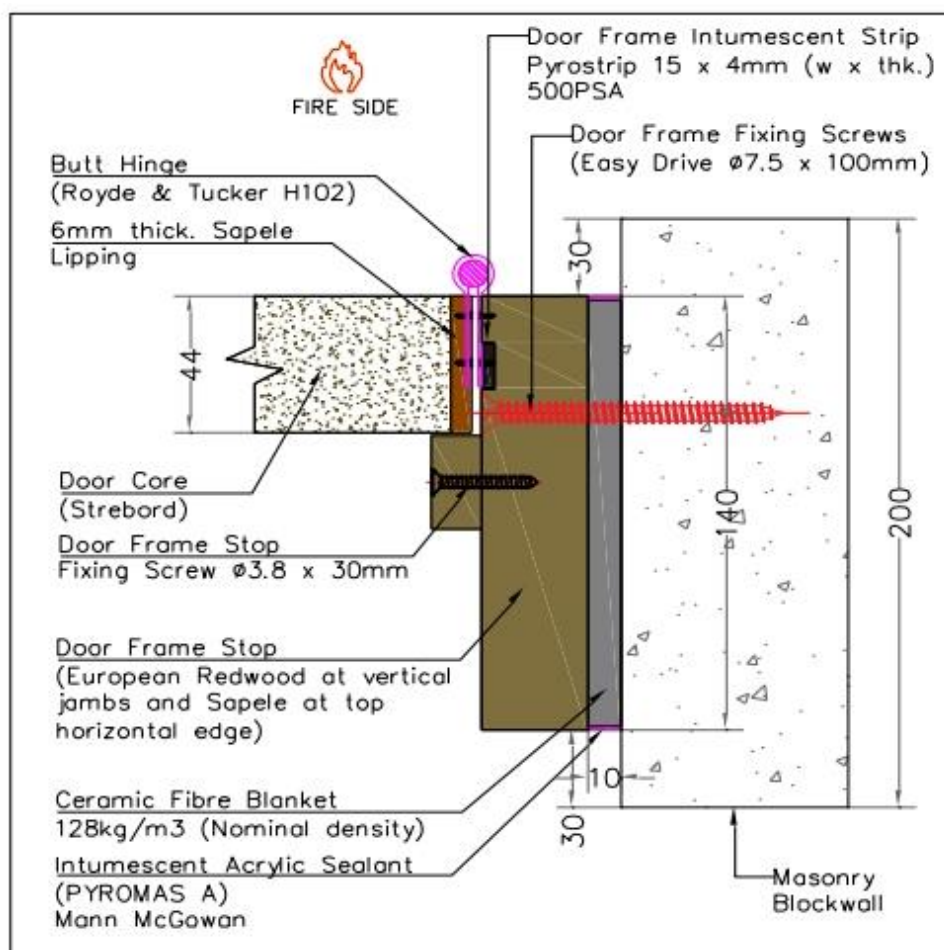
Drawing 8: Vertical Section of the upper and lower Air Transfer Grilles of doorset A (Section 2 from Drawing 4).
(Drawing provided by test sponsor)



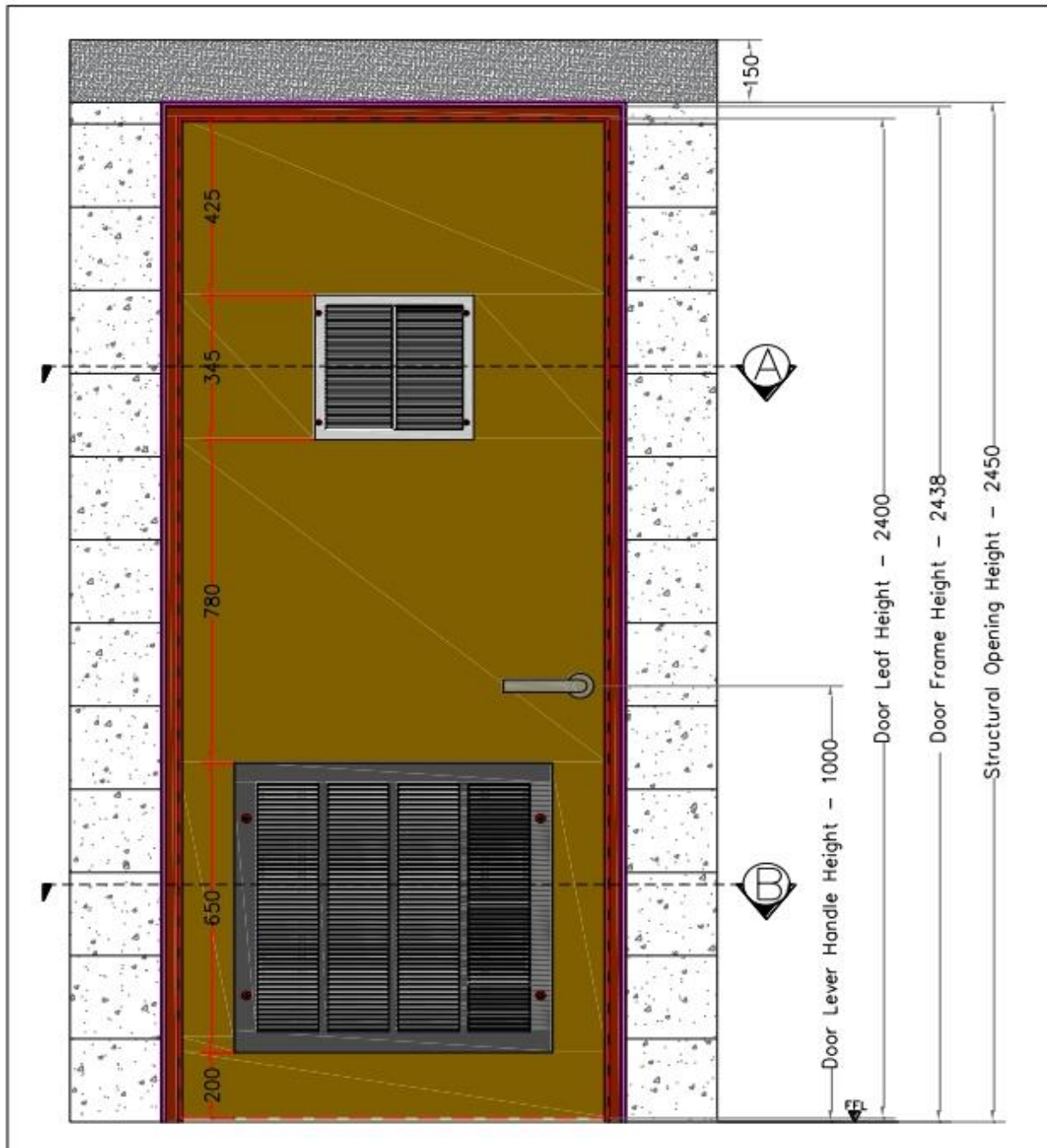
Drawing 9: Sectional detail of the latch stile edge of doorset A (Section 4 from Drawing 5).
(Drawing provided by test sponsor)



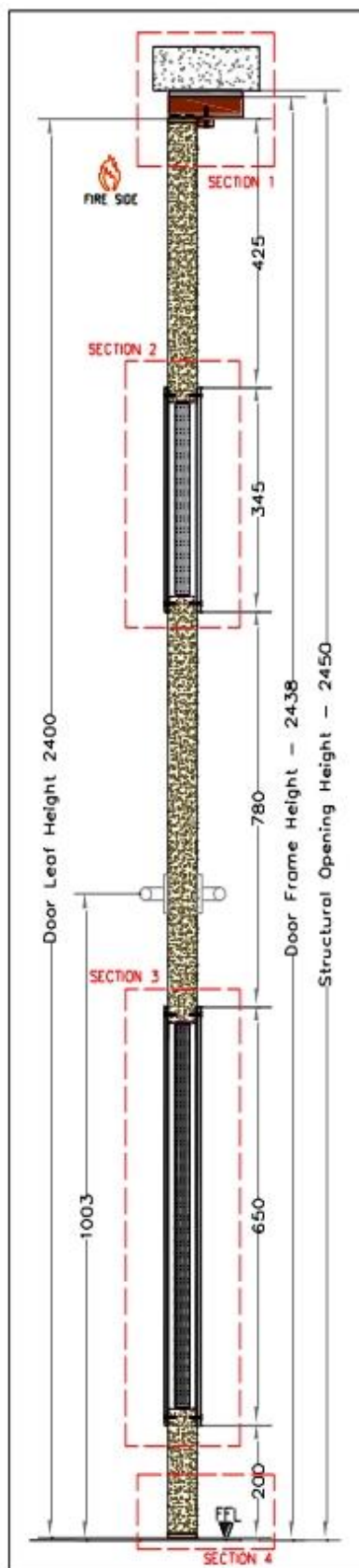
Drawing 10: Horizontal section of doorset A upper and lower Air Transfer Grilles (Section 5 from Drawing 5).
(Drawing provided by test sponsor)



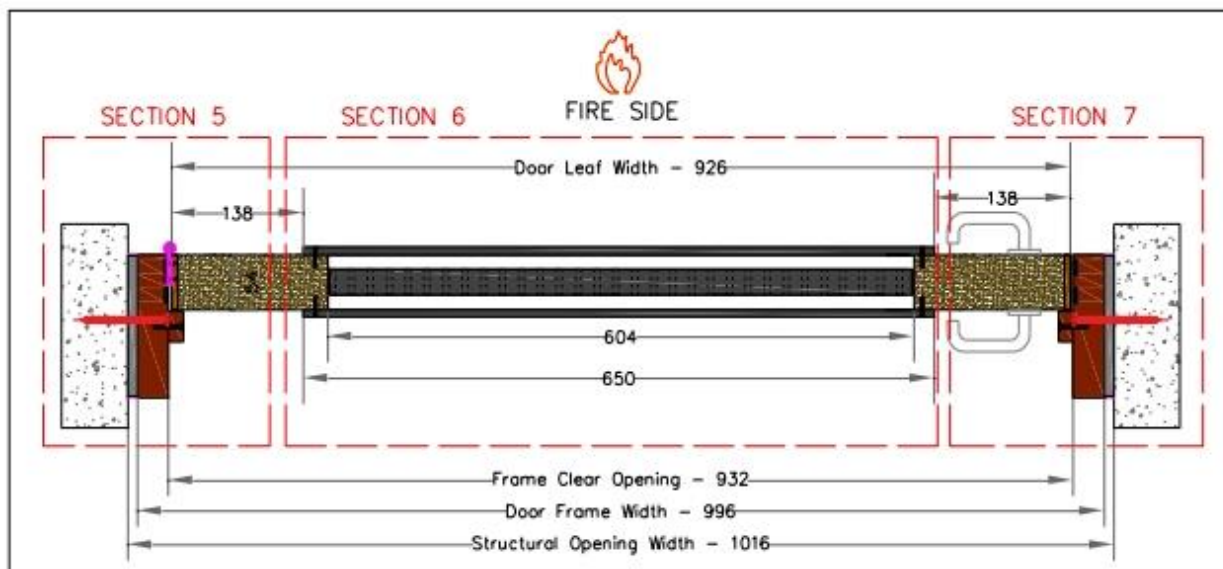
Drawing 11: Sectional detail of the hinge stile edge of doorset A (Section 6 from Drawing 5).
(Drawing provided by test sponsor)



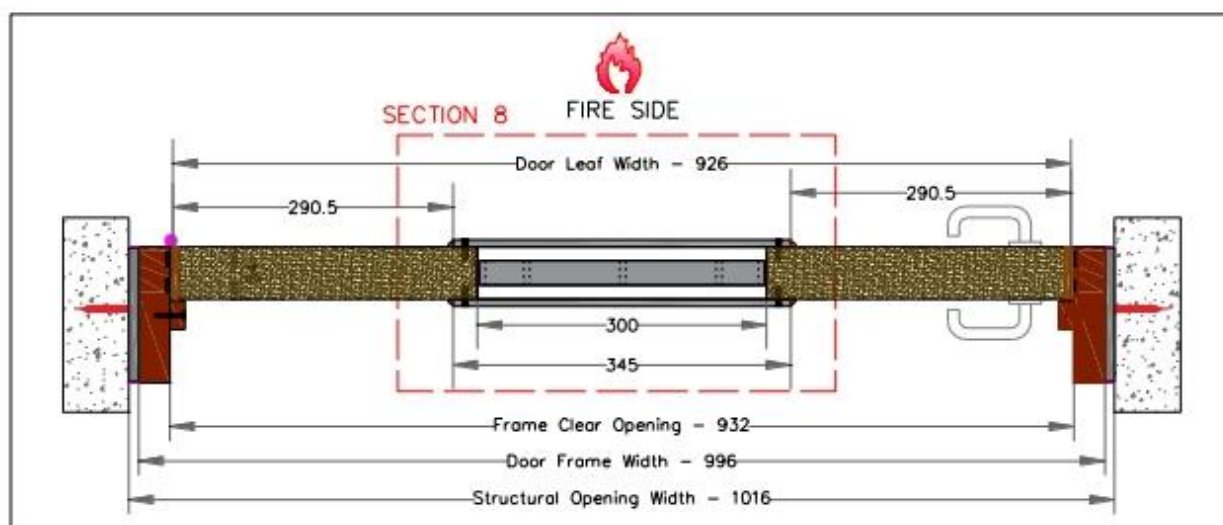
Drawing 12: Elevation view of doorset B from the unexposed face.
(Drawing provided by test sponsor)



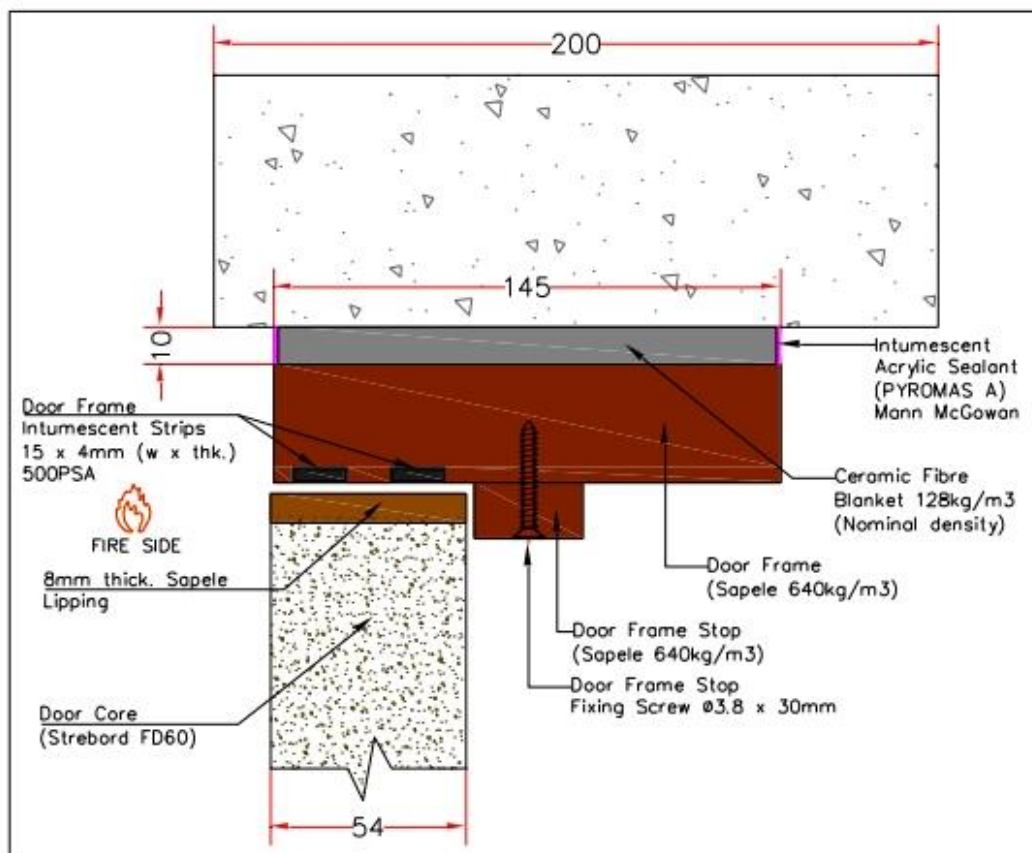
Drawing 14: Vertical section of doorset B.
(Drawing provided by test sponsor)



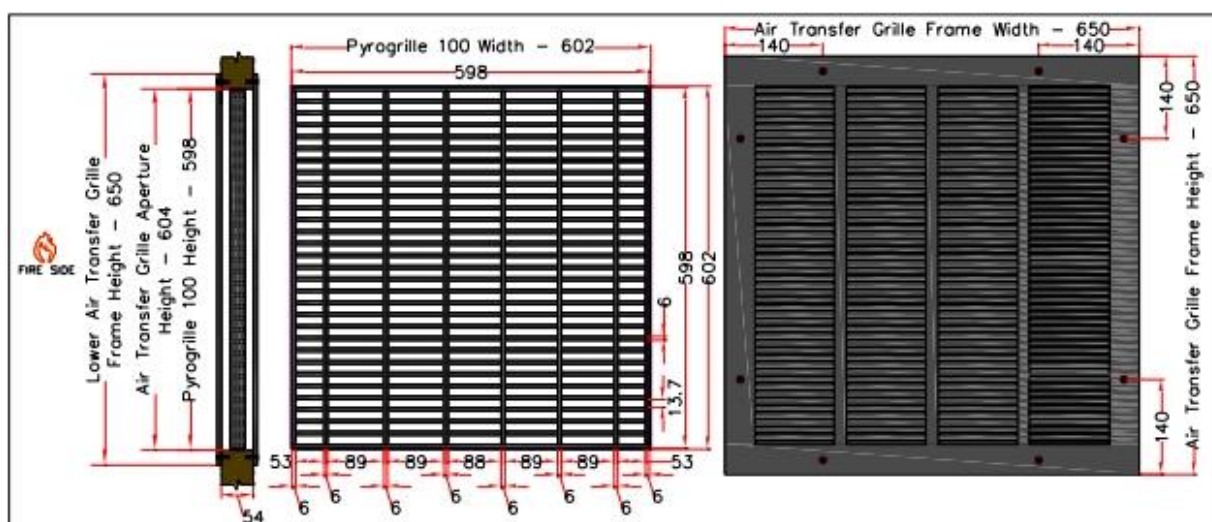
Drawing 15: Horizontal section of doorset B (Section B from Drawing 12).
(Drawing provided by test sponsor)



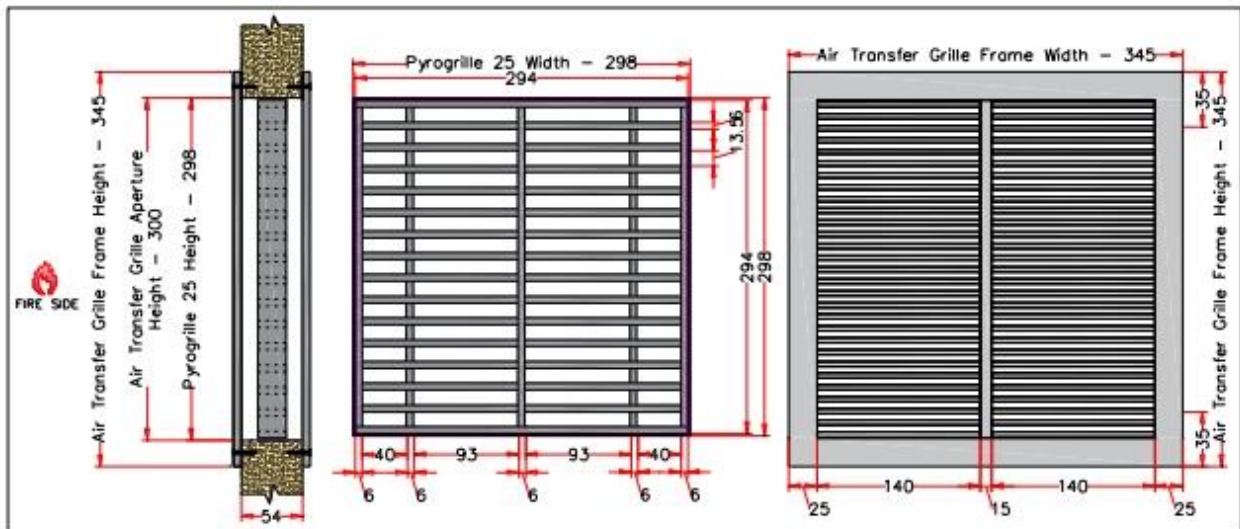
Drawing 16: Horizontal section of doorset B (Section A from Drawing 12).
(Drawing provided by test sponsor)



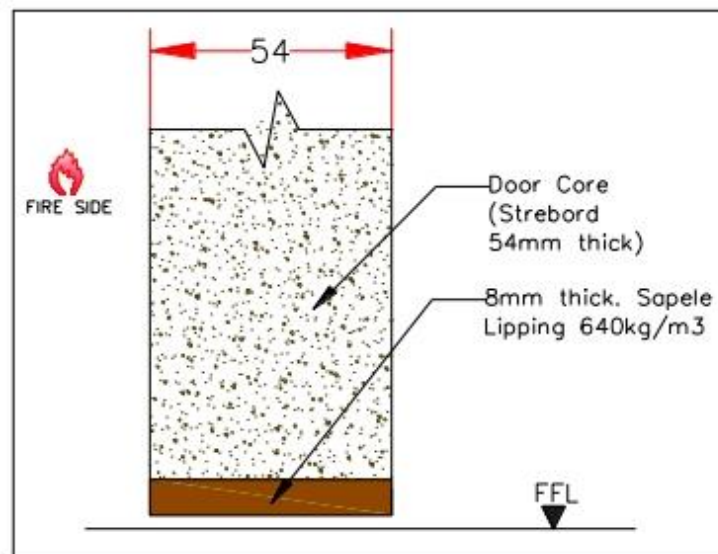
Drawing 17: Sectional detail of the top horizontal edge of doorset B (Section 1 from Drawing 14).
(Drawing provided by test sponsor)



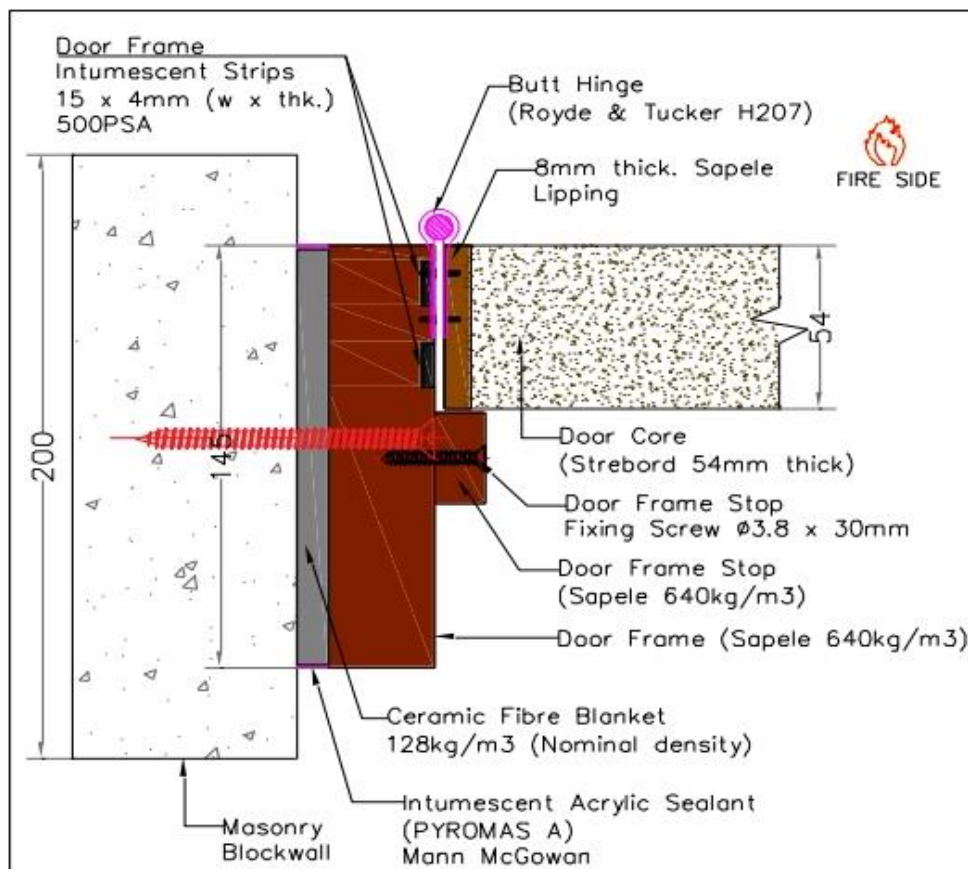
Drawing 18: Vertical section of the lower Air Transfer Grille of doorset B (Section 3 from Drawing 14).
(Drawing provided by test sponsor)



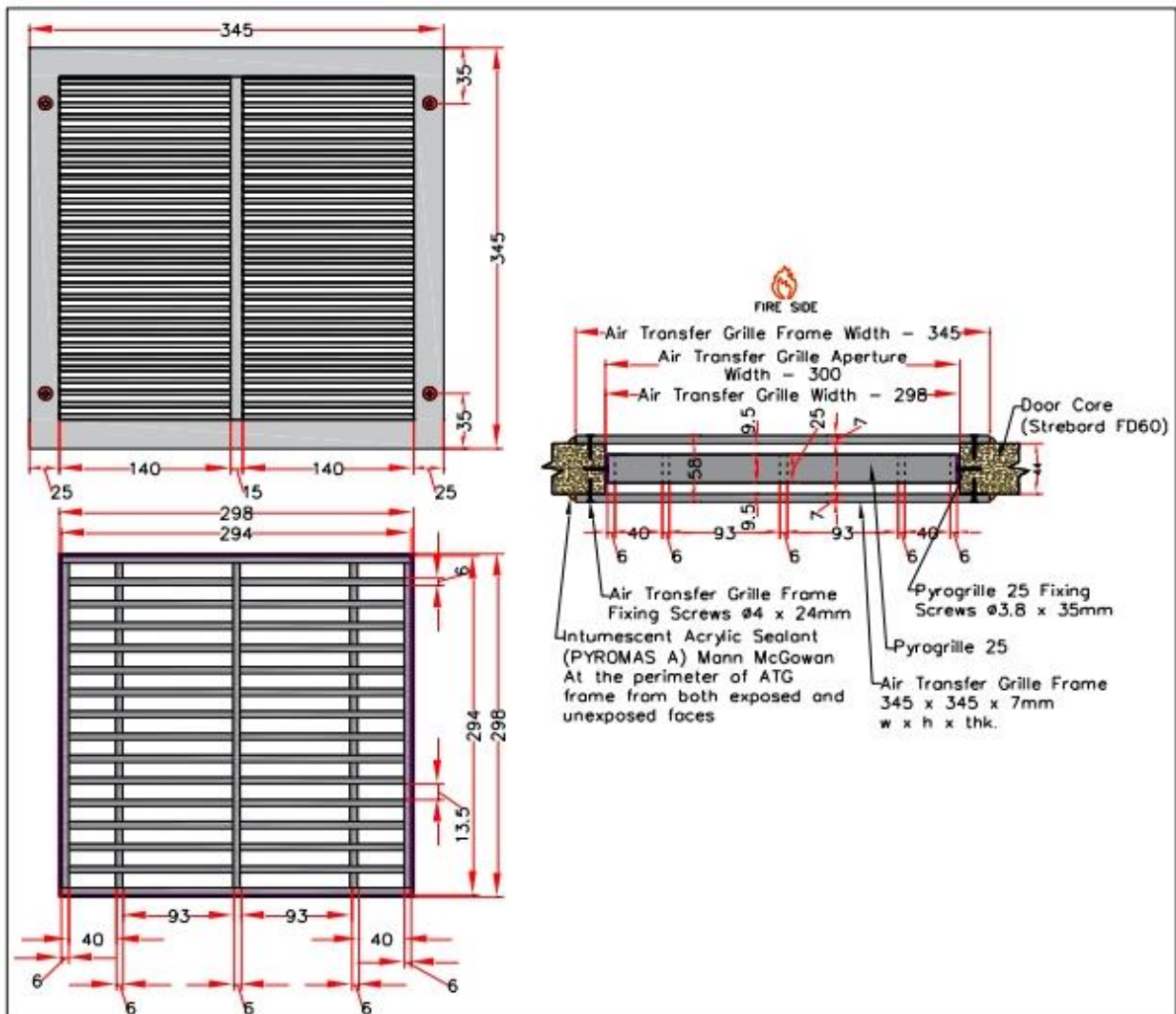
Drawing 19: Vertical section of the upper Air Transfer Grille of doorset B (Section 2 from Drawing 14).
(Drawing provided by test sponsor)



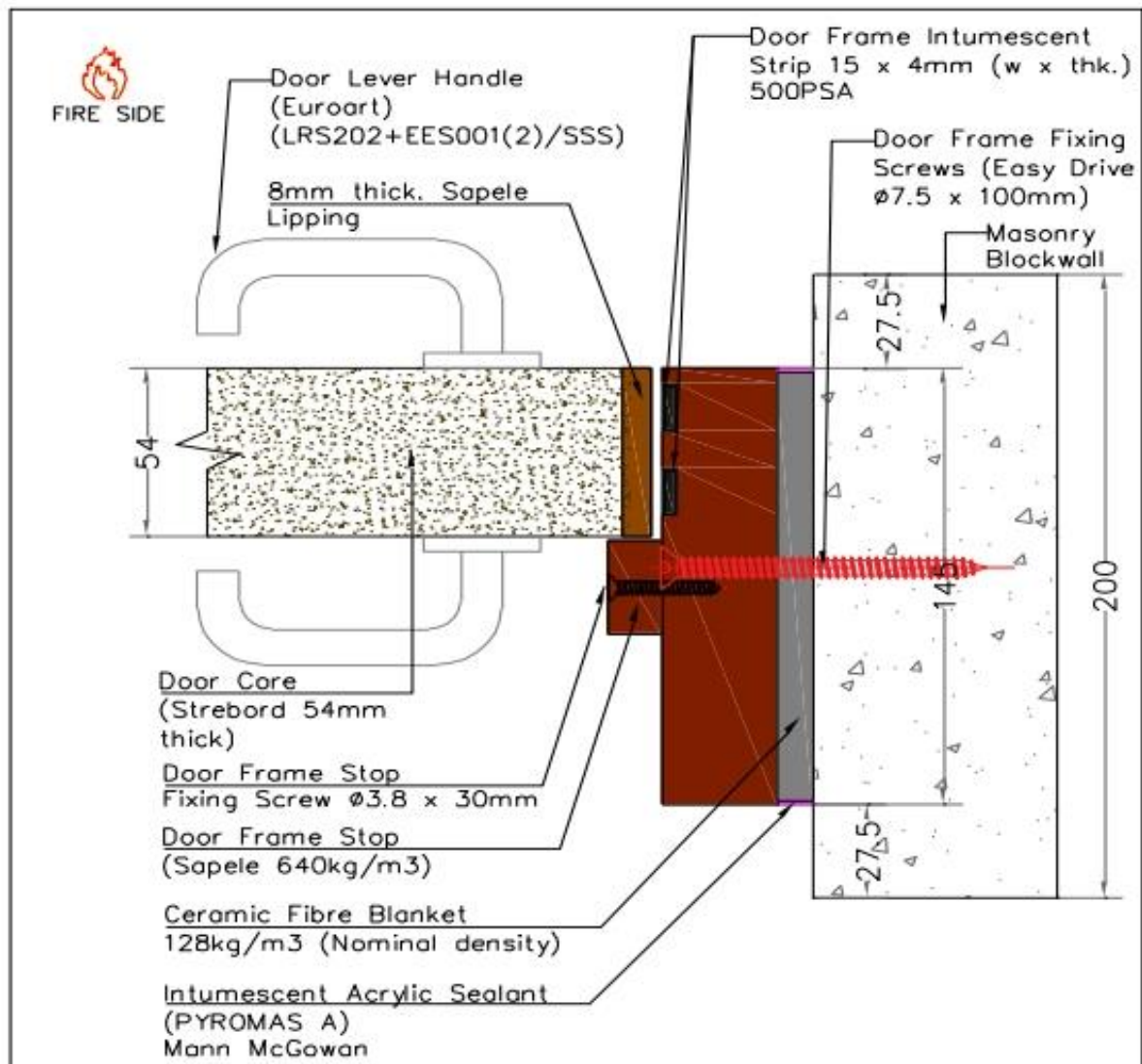
Drawing 20: Sectional detail of the bottom edge of door B leaf (Section 4 from Drawing 14).
(Drawing provided by test sponsor)



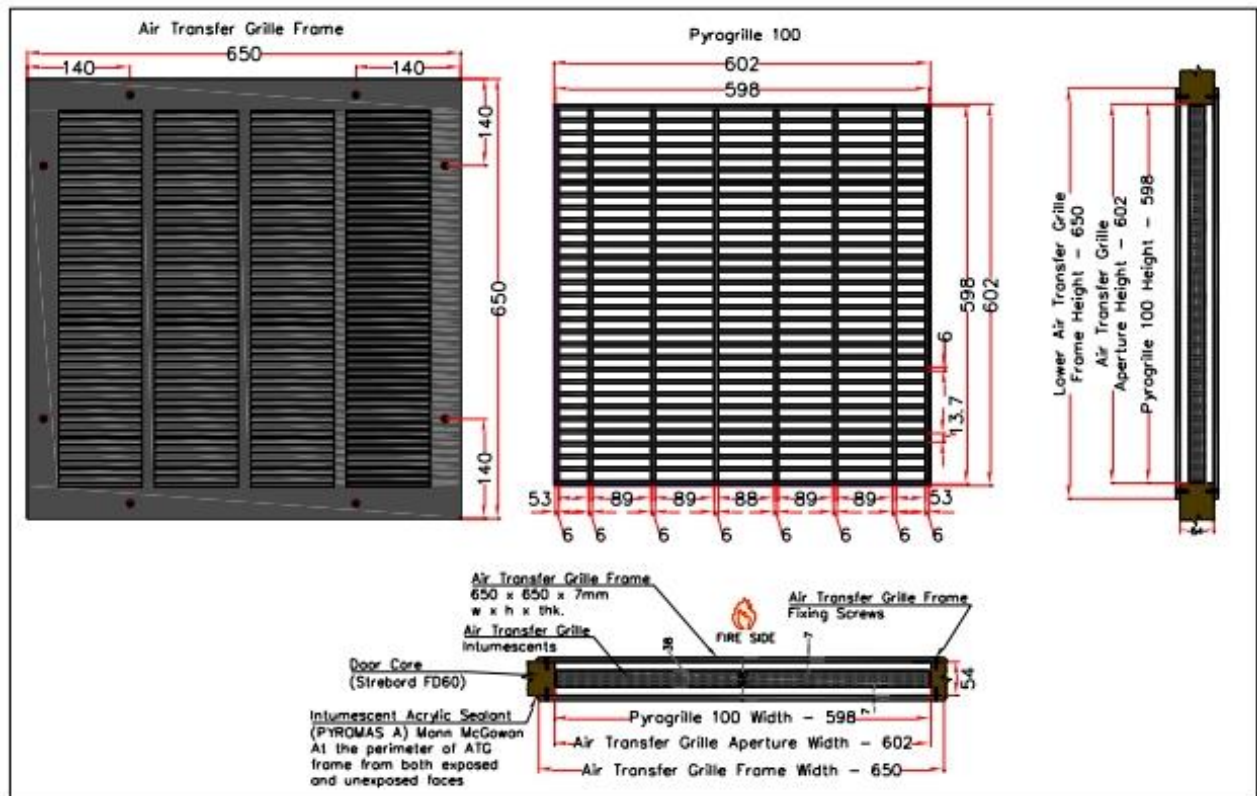
Drawing 21: Sectional detail of the hinge stile edge of doorset B (Section 5 from Drawing 15).
(Drawing provided by test sponsor)



Drawing 22: Horizontal section of doorset B upper Air Transfer Grille (Section 6 from Drawing 5).
(Drawing provided by test sponsor)



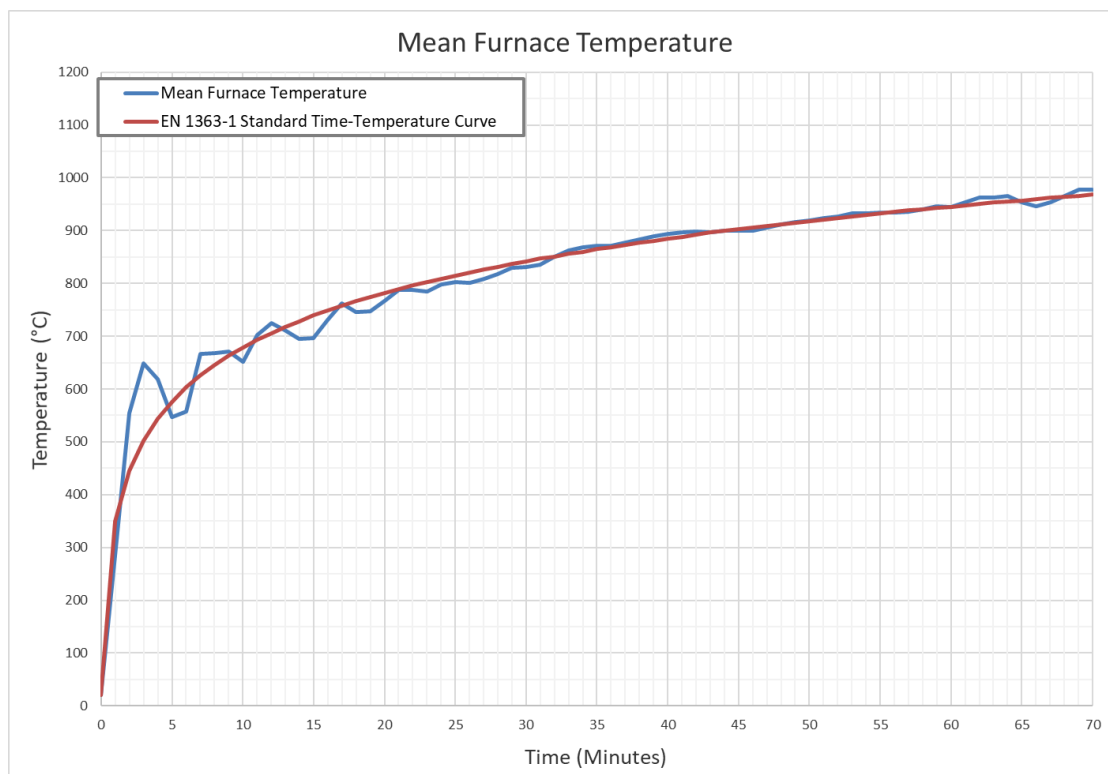
Drawing 23: Sectional detail of the latch stile edge of doorset B (Section 7 from Drawing 15).
(Drawing provided by test sponsor)



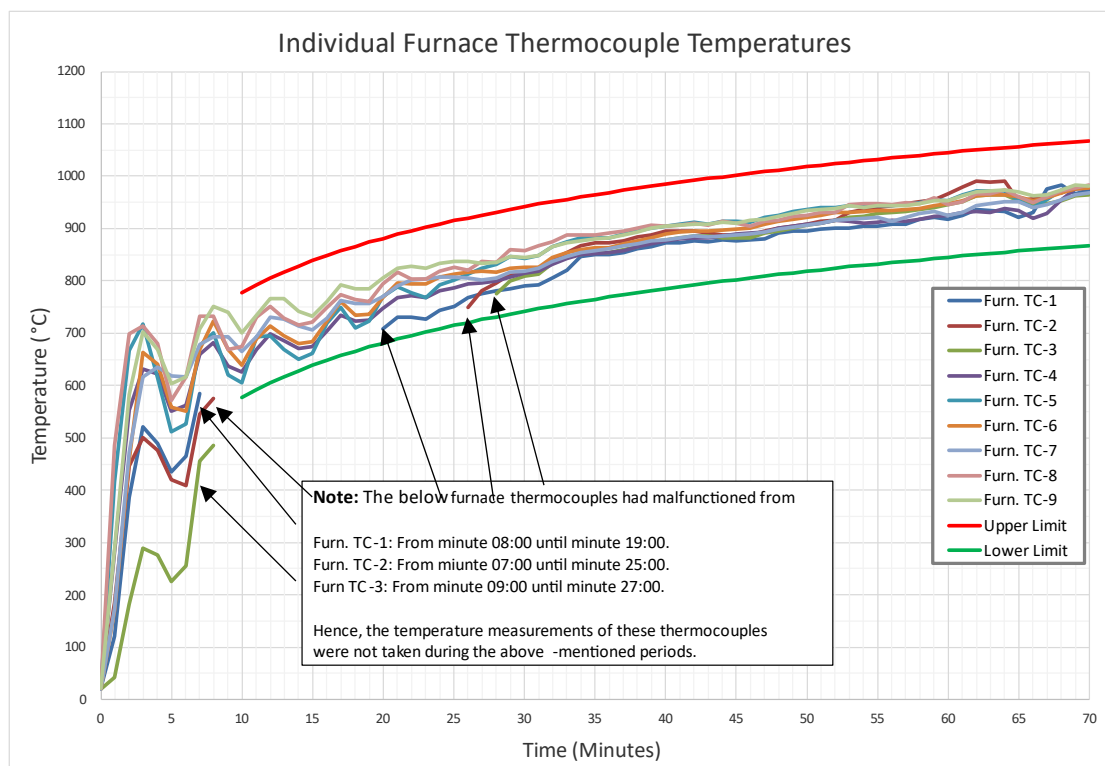
Drawing 24: Horizontal section of doorset B lower Air Transfer Grille (Section 8 from Drawing 16).
(Drawing provided by test sponsor)



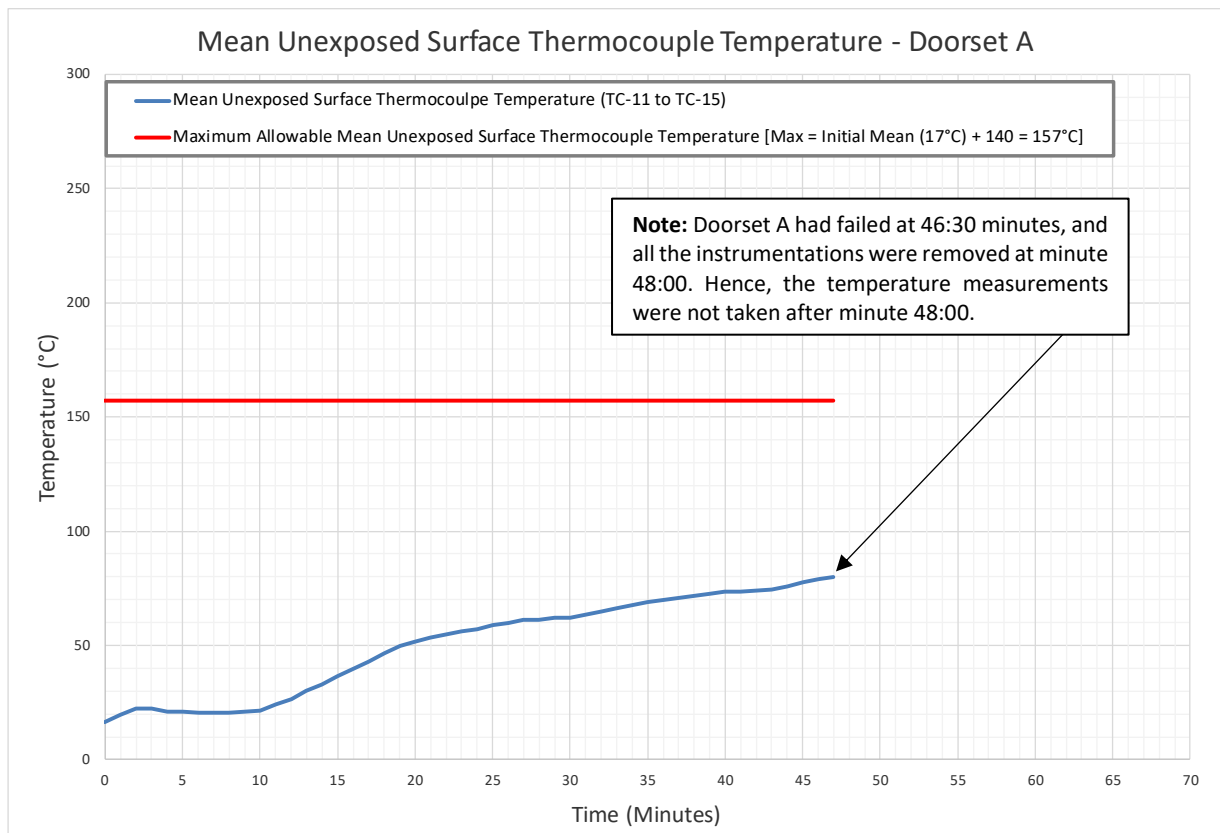
14. APPENDIX 3 – GRAPHS



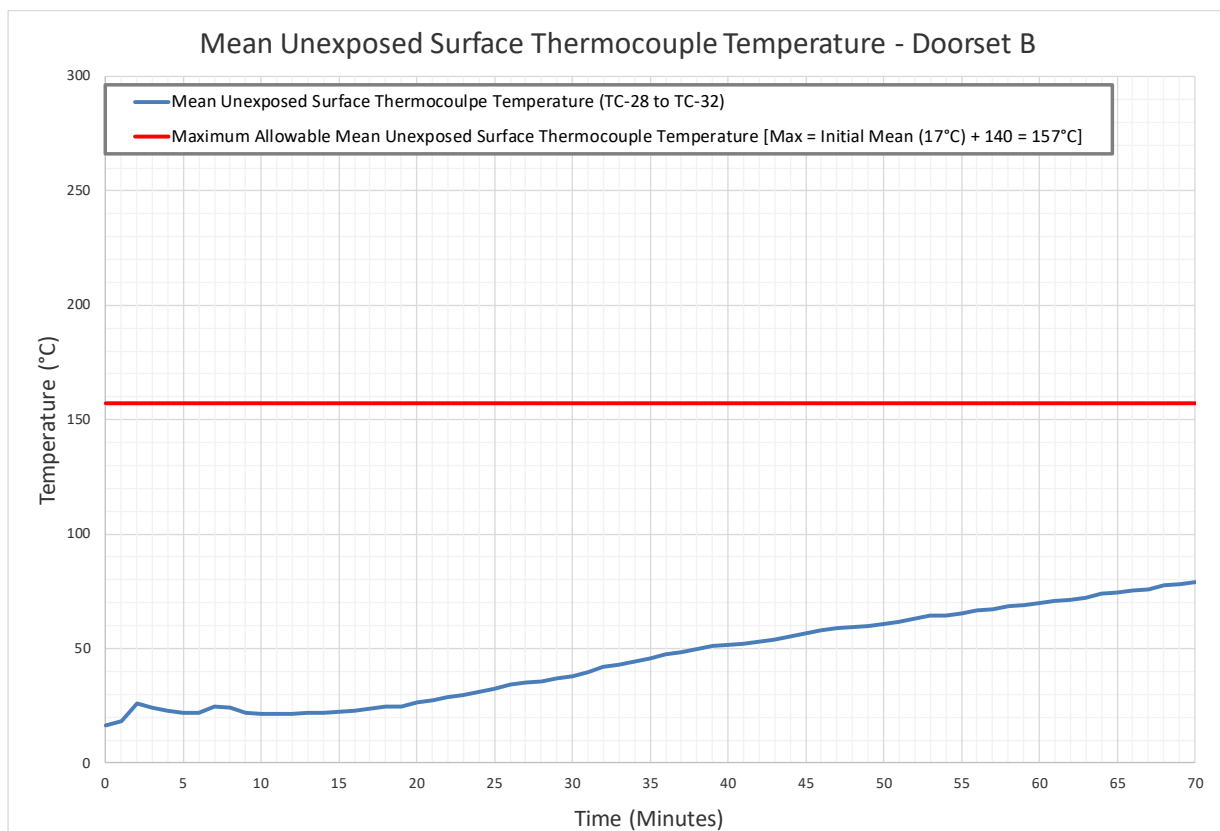
Graph 1: Mean Furnace Temperature



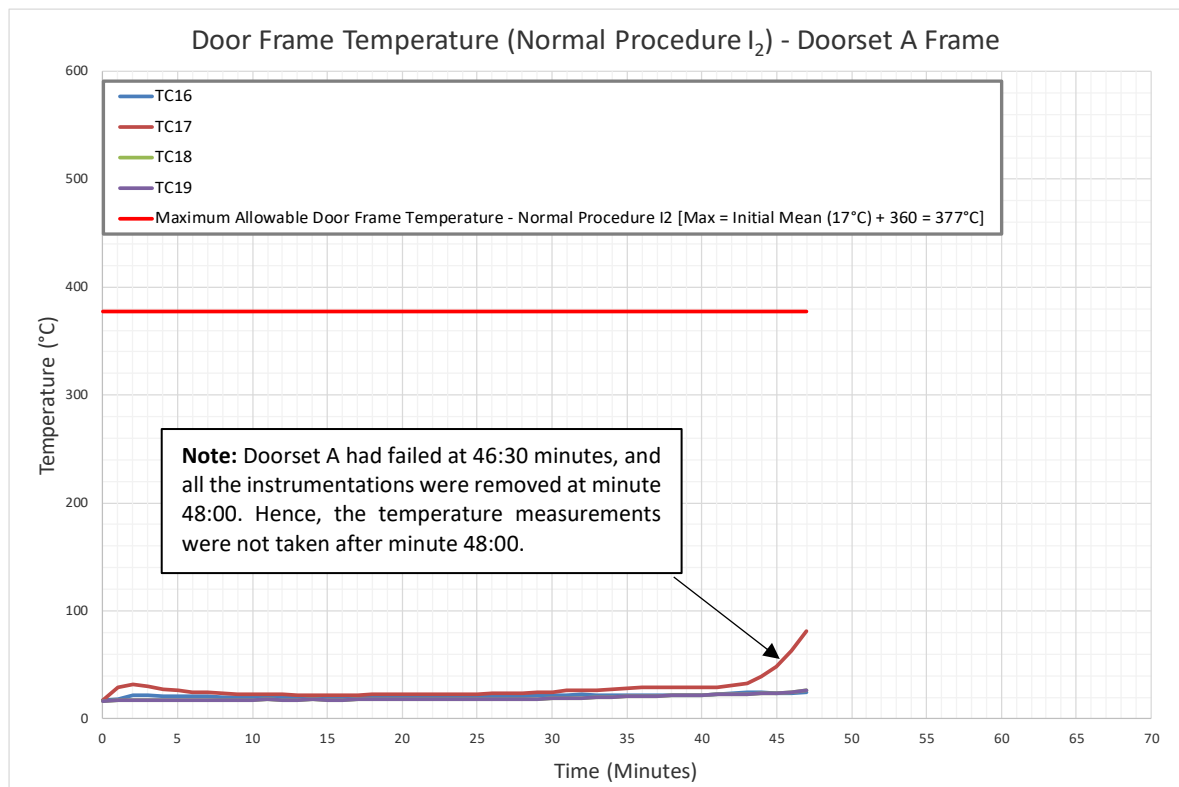
Graph 2: Individual Furnace Thermocouple Temperature



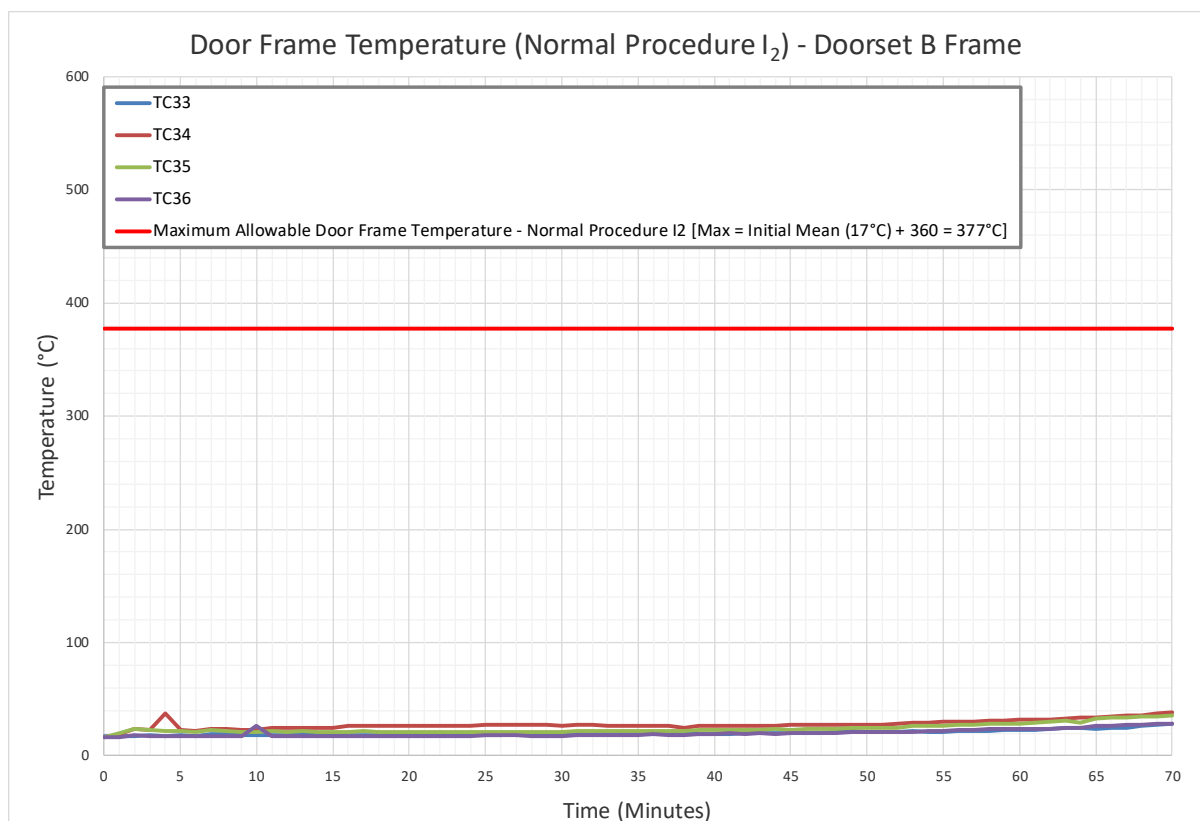
Graph 3: Mean Unexposed Surface Thermocouple Temperature – Doorset A.



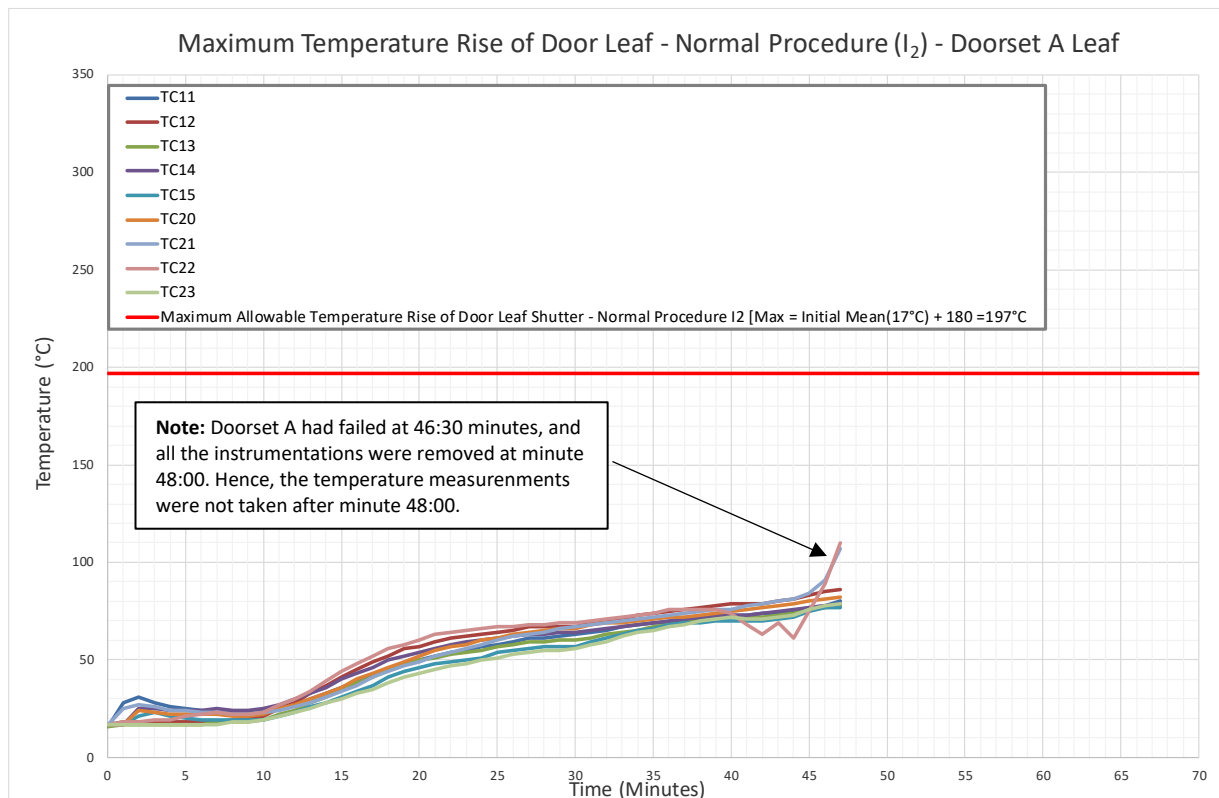
Graph 4: Mean Unexposed Surface Thermocouple Temperature – Doorset B.



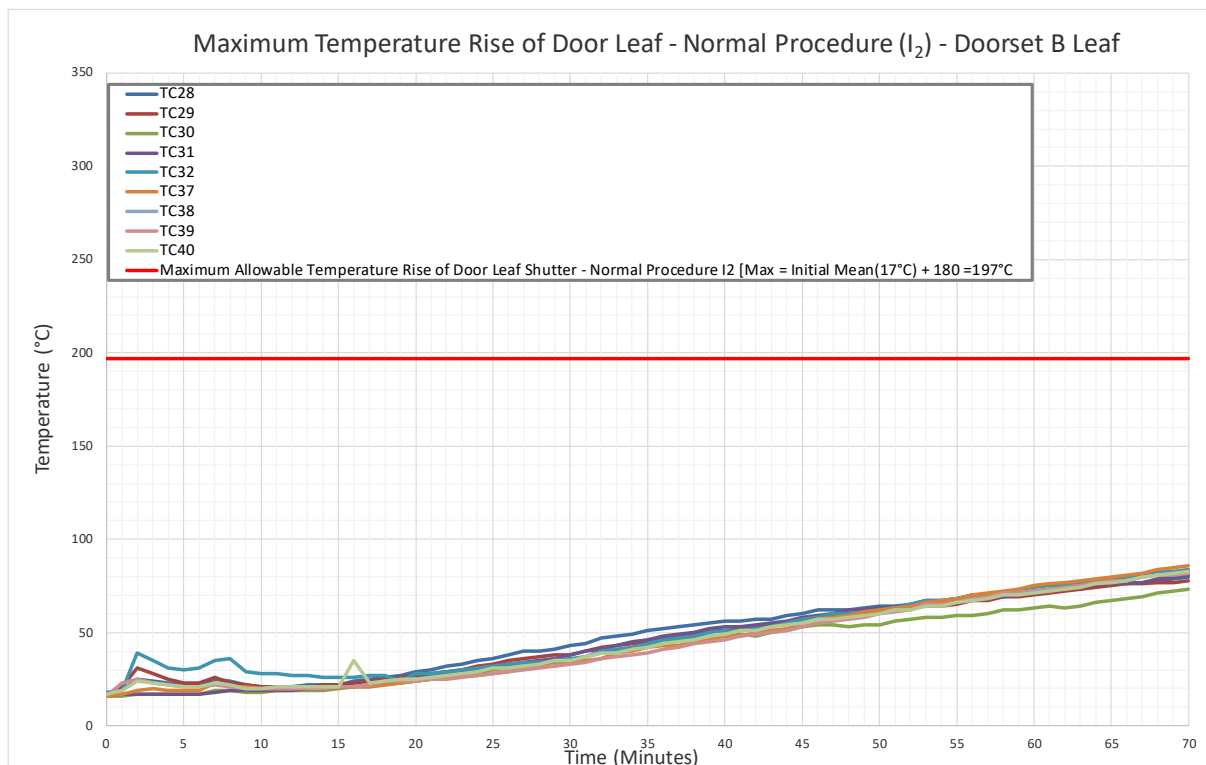
Graph 5: Individual Unexposed Door Frame Surface Thermocouple Temperatures – Normal Procedure (I₂) – Doorset A Frame.



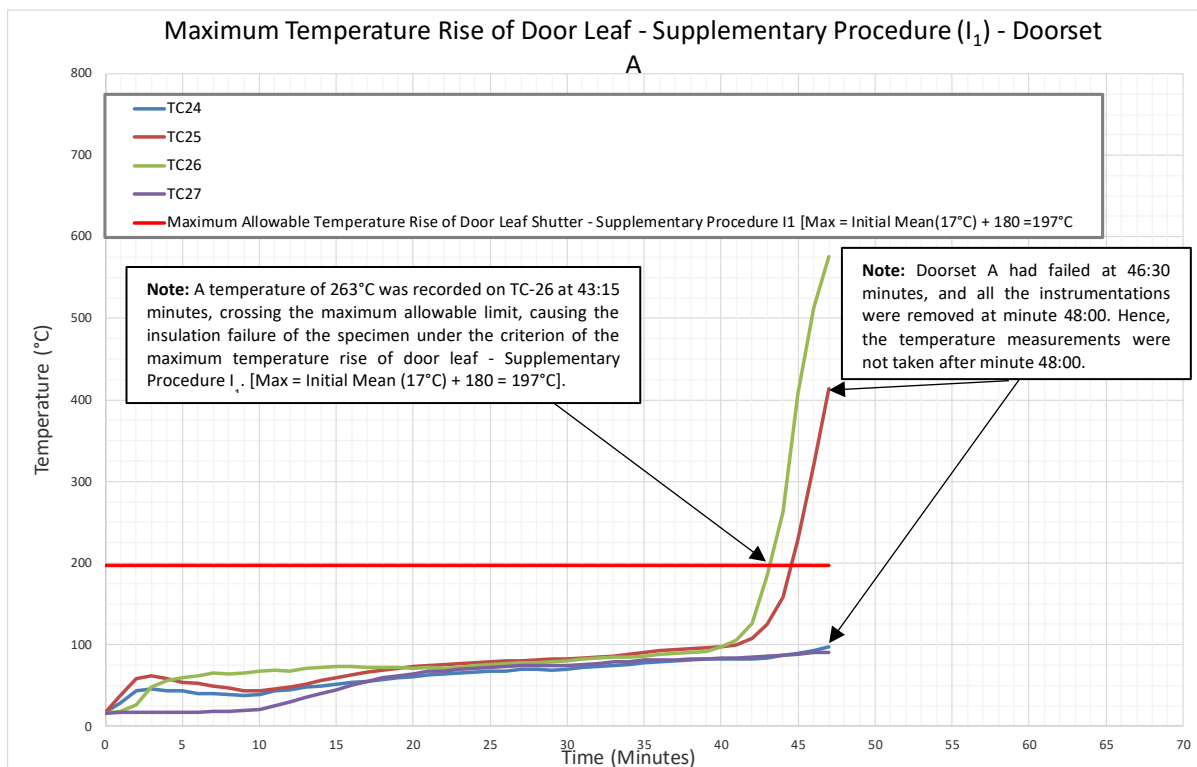
Graph 6: Individual Unexposed Door Frame Surface Thermocouple Temperatures – Normal Procedure (I₂) – Doorset B Frame.



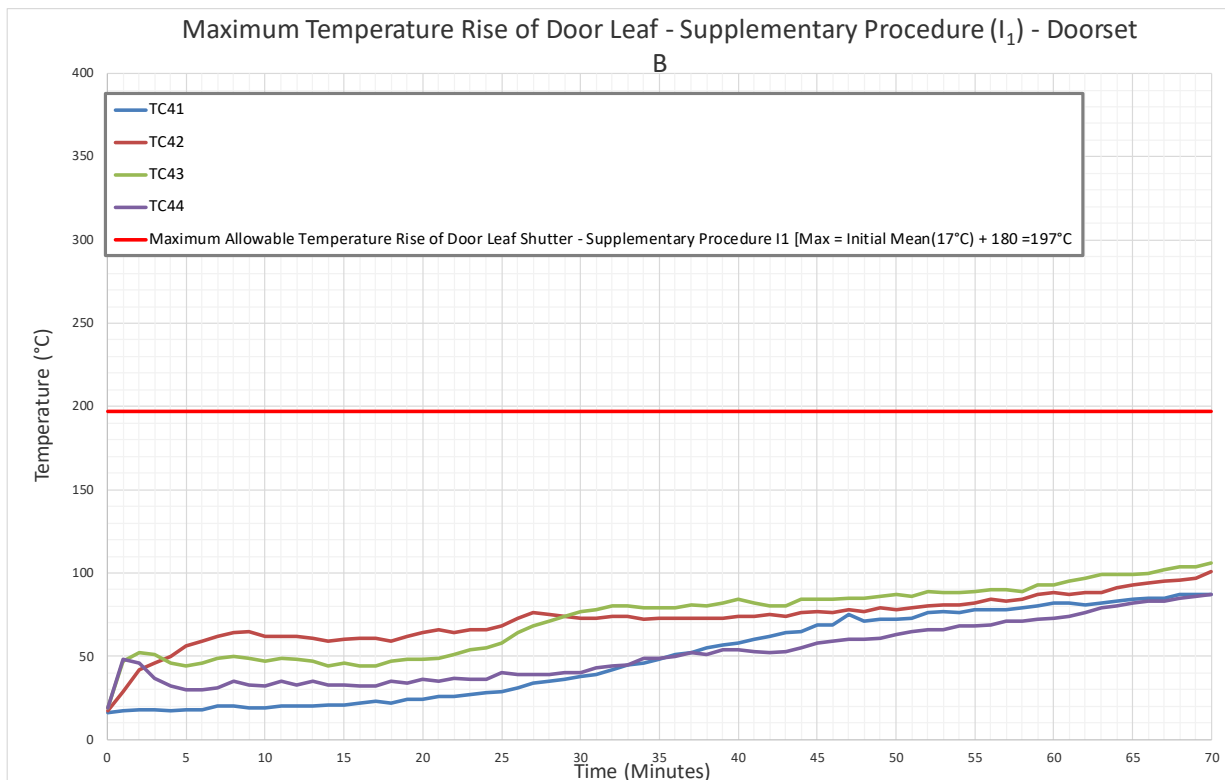
Graph 7: Maximum Individual Unexposed Leaf Surface Thermocouple Temperatures for Doorset A – Normal Procedure (I₂).



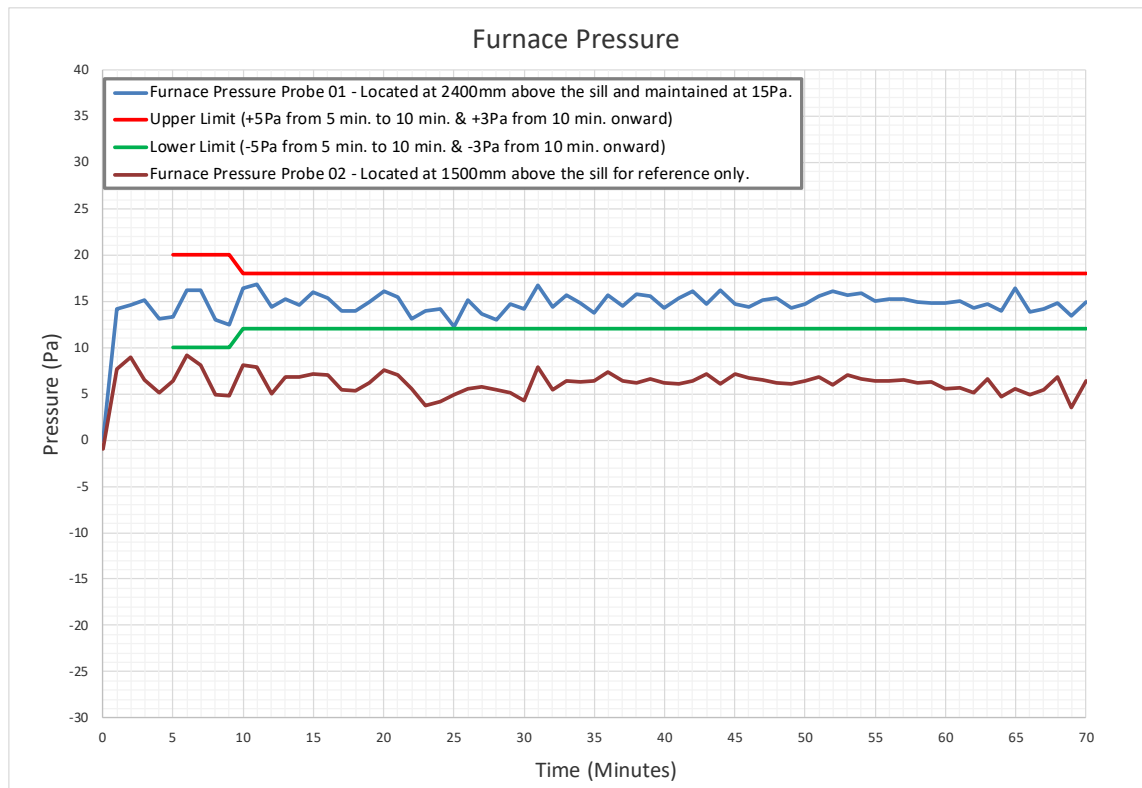
Graph 8: Maximum Individual Unexposed Leaf Surface Thermocouple Temperatures for Doorset B – Normal Procedure (I₂).



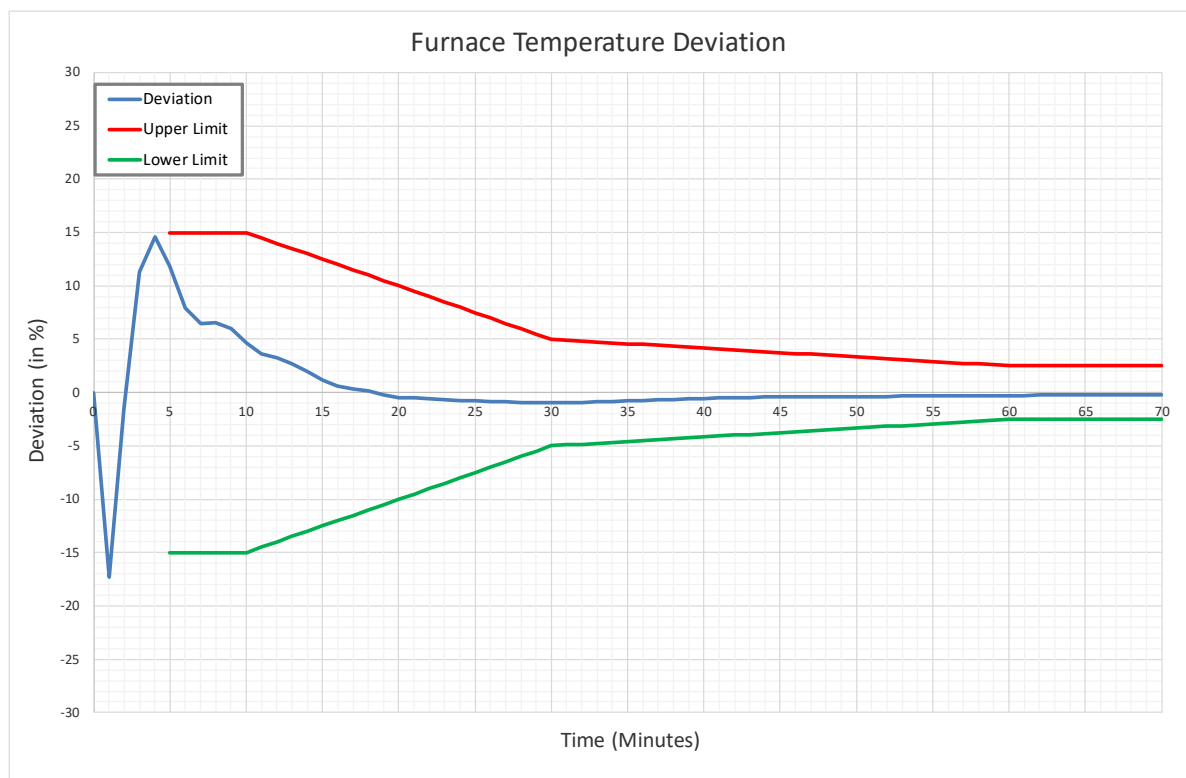
Graph 9: Individual Unexposed Leaf Surface Thermocouple Temperatures for doorset A – Supplementary Procedure (I₂)



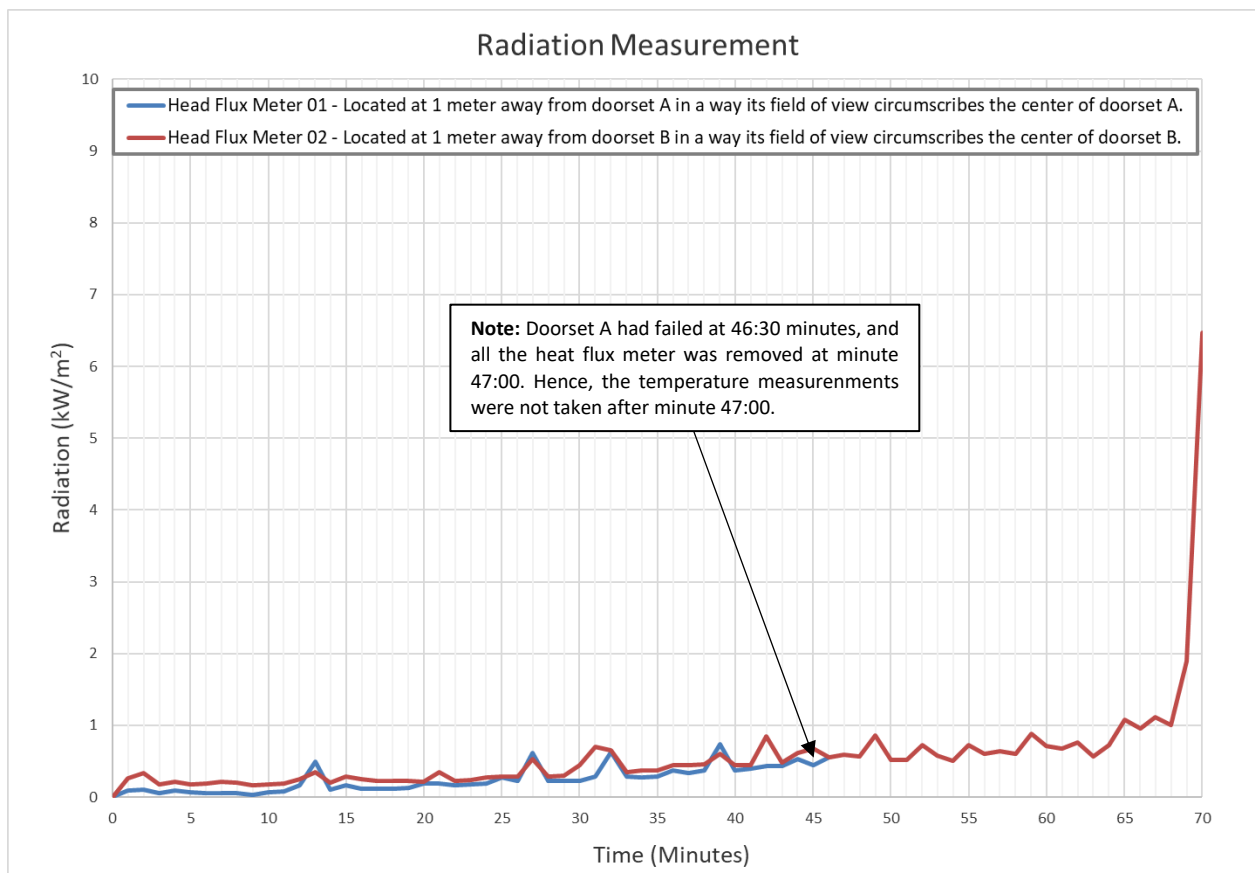
Graph 10: Individual Unexposed Leaf Surface Thermocouple Temperatures for Doorset B – Supplementary Procedure (I₁).



Graph 11: Furnace pressure.



Graph 12: Furnace Temperature Deviation.



Graph 11: Radiation Measurements.



15. APPENDIX 4 – DEFLECTION & DOOR GAPS

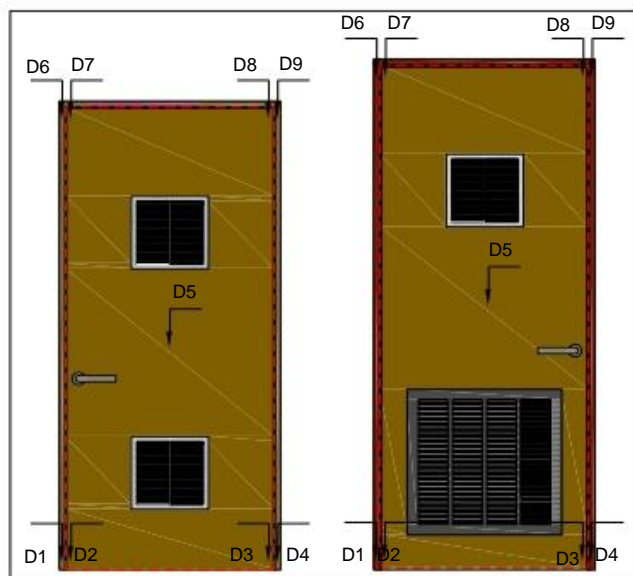
15.1. Deflection

The following table shows the deflection measurements in mm. recorded during the test.

(+) are for measurements going into the furnace.

(-) are for measurements coming out of the furnace.

Door deflection measurement:



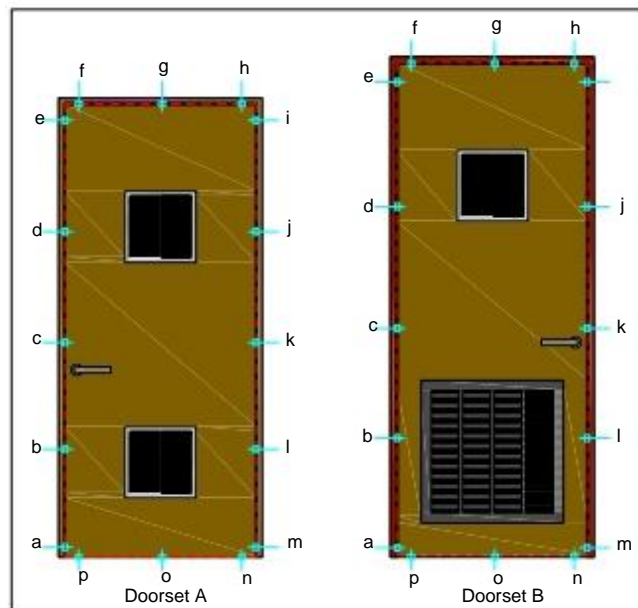
Time (mins)	Doorset A								
	Deflection Points								
	D1	D2	D3	D4	D5	D6	D7	D8	D9
0:00	0	0	0	0	0	0	0	0	0
10:00	-2	0	-1	2	0	-2	0	3	1
20:00	6	10	4	6	-7	6	2	10	6
30:00	5	11	4	6	-12	6	4	11	8
45:00	4	10	4	6	-15	5	5	12	10

Time (mins)	Doorset B								
	Deflection Points								
	D1	D2	D3	D4	D5	D6	D7	D8	D9
0:00	0	0	0	0	0	0	0	0	0
10:00	1	2	-1	2	6	6	6	2	3
20:00	2	2	0	0	6	8	7	3	3
30:00	2	3	0	1	4	7	7	2	2
45:00	4	4	1	2	-9	3	10	5	2
60:00	3	4	-1	1	-13	7	10	3	3

15.2.Door Gaps

Gaps between the fixed and moveable parts of the specimen were measure prior to the test, on both the exposed and unexposed faces. Measurements are given in the table below, with reference to the figure.

All measurements are in mm, as viewed from the unexposed face of the specimen.



Door Gaps (in mm) – Doorset A								
Unexposed Face	a	b	c	d	e	f	g	h
	2.65	2.36	2.08	1.89	2.65	TR	TR	TR
	i	j	k	l	m	n	o	p
	TR	TR	TR	TR	TR	3.18	2.87	3.41
Exposed Face	a	b	c	d	e	f	g	h
	2.67	2.31	2.58	2.66	3.07	2.91	1.78	1.81
	i	j	k	l	m	n	o	p
	2.22	1.96	3.11	3.38	3.78	2.79	3.11	3.60

Door Gaps (in mm) – Doorset B								
Unexposed Face	a	b	c	d	e	f	g	h
	TR	TR	TR	TR	TR	TR	TR	TR
	i	j	k	l	m	n	o	p
	TR	TR	TR	TR	TR	3.61	3.70	3.81
Exposed Face	a	b	c	d	e	f	g	h
	3.32	2.01	1.97	3.69	3.68	2.72	2.63	2.23
	i	j	k	l	m	n	o	p
	2.44	2.54	3.39	2.66	3.18	2.62	3.07	3.03

Note: "TR" indicates that the gap at the corresponding location was too small to be measured.



16. APPENDIX 5 – PHOTOGRAPHS



Picture 1: Exposed face of the specimens prior to the commencement of the fire test.



Picture 2: Unexposed face of the specimens prior to the commencement of the fire test.



Picture 3: Unexposed face of the specimens at the commencement of the fire test.



Picture 4: Specimens at 10:00 minutes.



Picture 5: Specimens at 20:00 minutes.



Picture 6: Specimens at 30:00 minutes.



Picture 7: A negative cotton pad test was conducted on the upper right corner of door A leaf at 44:25 minute



Picture 8: Specimens at 45:00 minutes.



Picture 9: Sustained flaming for more than 10 seconds was observed on the top horizontal edge of door A leaf at 46:30 minutes, causing the integrity failure of doorset A. The doorset was then covered with a gypsum board, and the test was continued further for doorset B only.



Picture 10: Doorset B at 60:00 minutes.



Picture 11: Unexposed face of doorset B prior to the termination of the fire test at 70:00 minutes.



Picture 12: Unexposed face of doorset B after the termination of the fire test at 70:00 minutes.



Picture 13: Exposed face of the specimens after the termination of the fire test at 70:00 minutes.



17. APPENDIX 6 – FIELD OF DIRECT APPLICATION OF TEST RESULTS

The following text has been taken directly from section 13 and Annex B, as applicable, of EN 1634-1:2014. The text is quoted directly, and only sections relevant to the tested specimen have been included in this appendix.

17.1. General

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

Note: When extended product size requirements are envisaged, the dimensions of certain components within the test specimen can be less than those intended to be used at full size in order to maximize the extrapolation of the test results by modelling the interaction between components at the same scale.

17.2. Materials and construction

17.2.1. 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.

17.2.2. SPECIFIC RESTRICTIONS ON MATERIALS AND CONSTRUCTIONS.

17.2.2.1. TIMBER CONSTRUCTION

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 weights is not greater than 25%.

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

17.2.3. DECORATIVE FINISHES

17.2.3.1. 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 and 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.

17.2.3.2. DECORATIVE LAMINATES

Decorative laminated and timber veneers up to 1.5mm 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 1.5mm thickness shall be testes 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. colour, patter, supplier).

17.2.4. FIXINGS

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

17.2.5. 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 section 10.1.4 of EN 1634-1:2014, the doorset may be provided either with or without that closing device, i.e. where self-closing characteristics are not required.

Note: Interchange of building hardware is not covered by the field of direct application.

17.3. Permissible size variations

17.3.1. 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 or EN 1634-1:2014, the dimensions (width and height) of any glass pane cannot be increased.)

17.3.2. 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 1 were fulfilled before the test was concluded.

For Category 'B':

Table 1 – Category B overrun requirements

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

17.3.3. SIZE VARIATION RELATED TO PRODUCT TYPE

17.3.3.1. GENERAL

The rules to cover increase or decrease of size without additional considerations are applicable to

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 size increased as outlined in Annex B of EN 1634-1:2014. 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 hinges/pivoted doorsets.



Size increases for doorsets which do not fall into one of the six groups given in section 13.3.3.1 of EN 1634-1:2014+A1:2018 standard are the subject of extended application.

17.3.3.2. HINGED AND PIVOTED DOORSETS AND OPENABLE WINDOWS

17.3.3.2.1. FOR SIZE VARIATIONS (SEE ANNEX B OF EN 1634-1:2014)

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 of EN 1634-1:2014 of this report.

17.3.3.2.2. 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 to 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 center restraint shall be equal to or greater than that tested.

17.3.3.2.3. TIMBER CONSTRUCTIONS

The number, size, location, and orientation of any joints in the timber framing shall not be changed.

Where decorative veneers of 1.5mm 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.

17.3.3.2.4. GAPS

The maximum size of the primary gaps identified in section 7.3 of EN 1634-1:2014 is restricted to the following sized in practice:

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

where:

- x is the maximum permitted size gap;
- 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.

17.4. Asymmetrical Assemblies

17.4.1. GENERAL

EN 1363-1:2012 states that for separating elements required to be fire resisting from both sides, two 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 center 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 Annex C of EN 1634-1:2014.

17.4.2. SPECIFIC RULES

The rules governing the applicability of tests carried out in one direction to the other directions are given in Table 2 and are based on the following premises:

- That each of the door leaves are themselves of symmetrical construction with the exception of the edges (e.g. locking/leading and hinge edge or double rebated doors).
- That any restraining/supporting elements of building hardware has been included in a test to EN 1634-1:2014 when exposed in both directions so that they will retain their function when exposed to the heat of the test.
- That there is no change in the number of leaves or the mode of operations (e.g. sliding, swinging, single action, or double action.)
- That side, over, and transom panels are excluded from Table 2 unless they are fully symmetrical.

Table 2 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' Indicated that it is not possible to identify the direction which will cover the opposite direction.

Table 2 — 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

17.5. Supporting Constructions

17.5.1. 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 of EN 1634-1:2014. 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 section 13.5.4 of EN 1634-1:2014. The rationale behind the rules is given in Annex C of EN 1634-1:2014.

17.5.2. RIGID STANDARD SUPPORTING CONSTRUCTIONS (HIGH OR LOW DENSITY)

The fire resistance of a doorset tested in a high or low density rigid standard supporting construction as specified in EN 1363-1 can be applied to a doorset mounted in the same manner in a wall provided the density and the thickness of the wall are equal to or greater than that in which the doorset was tested.



17.5.3. SPECIFIC RULES FOR HINGED OR PIVOTED DOORSETS

- 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.
- 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.
- 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.
- 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.
- 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.

17.6. Associated Supporting Constructions

The fire resistance of a door tested in an associated supporting construction has no field of direct application. The applicability of the result to other supporting constructions shall be the subject of extended application.

17.7. Field of Direct Application Limits of Permitted Size Variations

The following table has been taken directly from Annex B of EN 1634-1:2014.

Type of Doorset	Category 'A' Allowance	Category 'B' Allowance
Hinged and pivoted doorsets and openable windows.	Unlimited size reduction is permitted for all types except insulated metal doors where a reduction to 50% width and 75% height of the tested specimen is the limit of variation. Size increase is not permitted.	Unlimited size reduction is permitted for all types except insulated metal doors where a reduction to 50 % width and 75 % height of the tested specimen is the limit of variation. Size increase is permitted only for those which are required to satisfy integrity or integrity and insulation and then only up to: 15% height 15% width 20% area

Example: For a double leaf doorset with category B overrun time, the tested overall door leaf width 1600mm can be increased for the door leaves by 15% overall 1840mm. each leaf could be increased equally by 15% up to 920mm. For an insulated hinged/pivoted doorset, one leaf could be increased by 15% up to 920mm whilst the other leaf could be decreased by 50% to 400mm.

Note: In this latter case, the full extended width of 1840mm could not be achieved.

If these relationships, particularly the latter one for unequal leaves, are still not sufficient to cover a manufacturer's needs, then an asymmetrical test specimen could be tested following which, with a Category B overrun, the increase and decrease rules could be applied individually to each leaf in turn.

For all asymmetrical size variations, the 50% reduction will apply to both insulated and non-insulated products.

----- End of Test Report -----