Warringtonfire
Chiltern House
Stocking Lane
High Wycombe
HP14 4ND
United Kingdom
T: +44 (0)1494 569750
W: www.warringtonfire.com

Title:

The fire resistance performance of two single leaf single acting doorsets with glazing when tested in accordance with BS 476: Parts 20 and 22: 1987

WF Report No:

405305

Prepared for:

Falcon Panel Products Limited

Clock House
Station Approach
Middlesex
TW17 8AN
United Kingdom

Test date:

25th October 2018

1762

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Summary of Performance

The following performance was achieved from the specimen tested. Full details of the testing and specimen construction are described in the report.

Results:

Fire resistance test in accordance with BS 476: Part 20/22: 1987

Times to failure:

	Integrity	Insulation
Doorset A	**40 (forty) minutes ***	**40 (forty) minutes ****
Doorset B	**40 (forty) minutes ***	**40 (forty) minutes ****

* No failure at the termination of the test at 40 minutes
** No failure at the termination of the test at 40 minutes. In accordance with the note to clause 7.6.1.1 of BS 476: Part 22: 1987, the glazing has not been evaluated for insulation

Summary of specimens:

Two unlatched single leaf, single-acting doorsets with glazing, doorset A hung opening in towards the furnace and doorset B hung opening out away from the furnace.

Leaf size – both doorsets - 2040mm high x 930mm wide x 44mm thick

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1 Introduction

The specimens were stated to have been manufactured by By Dezign Carpentry and supplied for test by the client and delivered on 8th October 2018.

Warringtonfire constructed a plasterboard clad timber stud supporting construction and installed the specimens into the wall.

2 Specification

Details of the specimens are shown in the Appendix.

2.1 Door leaf

The left doorset was designated doorset A and the right doorset was designated doorset B. The leaf of both doorsets measured 2040mm high x 930mm wide x 44mm thick. Doorset A was hung to open in towards the furnace and doorset B was hung to open out away from the furnace. The results of this test were obtained where both doorsets were tested fitted with a latch, which was disengaged for the test.

2.2 Door perimeter gaps

The gaps between the edge of the door and frame were measured prior to test. A total of 24 readings were taken. The measurements (in mm) are given in Section 5.4 of the report.

2.3 Closer forces

Measured in accordance with FTSG Resolution No 63.

	Opening force (Nm)	Closing force (Nm)
Doorset A	22	14
Doorset B	25	16

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3 Description of Construction (Refers to Figures 1 to 4 of the Appendix)

Leaf – both doorsets

		Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Stiles and rails		None fitted	-	-	-	-
Core		Falcon Panel Products Ltd Strebord particleboard*	44 thick	630-635*	10.9-11.2	1
Facings		None fitted	-	-	-	-
Decorative inlay		Sapele*	10 wide x 10 deep with a 6 wide x 6 deep triangular groove Fitted within a 10mm deep x 10mm wide groove within the face of the leaf*	640**	-	14
Adhesive	Lippings	Caberfix D4 Polyurethane*	-	-	-	-
	Decorative Inlay	Gorilla Wood Glue PVA*	-	-	-	-
Lippings – all edges		Sapele*	9 thick	640**	9.7-9.9	2

* Stated by client, not verified by laboratory ** Nominal density, TRADA timber database

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Frame – both doorsets

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Head and jambs	European Redwood	32 wide x 91 deep	510**	7.3	3
Stop – planted (pinned)	European Redwood	39 deep x 14 wide	510**	7.4-7.5	4
Head to jamb jointing detail	Half lapped (screwed)	-	-	-	-
Frame to supporting construction fire stopping detail	Rock mineral wool for full depth of frame capped with acrylic intumescent mastic on the fire side.	Nominally 7.3 -20 wide x 10 deep (mastic size)	-	-	-
Frame to supporting construction fixing detail	4No. screws per jamb fitted at no more than 600mm centres	5Ø x 100 long	-	-	-
Architrave	European Redwood fitted on the exposed face only	45 wide x 18 thick	510**	7.1-7.2	-
Threshold	Non combustible	-	-	-	-

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Intumescent and sealing materials – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Leaf edge	None fitted	-	-	-
Frame reveal – head and jambs	Lorient Polyproducts Ltd LP1504*	15 x 4	Fitted 14mm from the opening face in the frame reveal	5
Glazing perimeter	Lorient Polyproducts Ltd System-36/7 PLUS LG1513 Plus*	15 high x 13 wide x 2.6 thick U channel*	Fitted encasing the whole perimeter of the glass	6

* Stated by client, not verified by laboratory ** Nominal density, TRADA timber database

Intumescent interruptions and additional hardware protection – both doorsets

	Make/type	Size (mm)	Location
Around hinge blade	Fully interrupted	-	Hinge blade fully interrupts seal in frame reveal
Under hinge blades	Lorient Polyproducts Ltd MAP*	1 thick	Fitted under the hinge blade on frame
Encasing latch body	Lorient Polyproducts Ltd MAP*	1 thick	Fitted around the body of the latch
Under latch forend	Lorient Polyproducts Ltd MAP*	1 thick	Fitted under the latch forend
Around latch keep	Fully interrupted	-	Latch keep fully interrupts seal in frame reveal
Under latch keep	Lorient Polyproducts Ltd MAP*	1 thick	Fitted under the latch keep

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Hardware – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No. Eurospec Enduromax stainless steel bearing butt hinges*	100 x 30 x 3 (blade size)	Fitted 150mm, 944mm and 1732mm from the head of the leaf	7
Closer	Rutland TS.9205 overhead type closer	236 x 55 (footprint)	Surface fitted as per the manufacturer's instructions on the exposed face of doorset A and the unexposed face of doorset B	8
Latch	ERA tubular steel latch reference: 1880-95 CE tubular latch*	55 x 25 (forend size) 55 x 20 x 60 (case size)	Latch nib fitted 1007mm from the bottom of the leaf	9
Furniture	Stanza Stainless steel lever type handle reference: ZPZ090SC*	Ø 52 (rose size)	Fitted appropriate to the latch	10

* Stated by client, not verified by laboratory

Glazing – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Glass type	Pyroguard EW30*	7.2 thick*	Fitted 118mm from the leaf head, 117mm from the leaf closing edge	11
Aperture size	-	732 high x 156 wide*	-	-
Sight size	-	702 high x 126 wide	-	-
Glass size	-	726 high x 150 wide*	-	-
Expansion allowance	-	3 all-round	-	-
Beading	Sapele (640kg/m^3 nominal density, 10.9-12.1% mc)	21 high x 25 deep including an 6 x 6 bolection return and a 15° chamfer*	Fitted around the glazing perimeter on both faces	12
Beading fixings	Pneumatically fired steel pins	50 long*	Fitted 50mm from corners at 130mm centres at 30° to the face of the glass*	13

* Stated by client, not verified by laboratory

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4 Test Conditions

Where areas of the test specification are ambiguous or open to interpretation the Fire Test Study Group Resolutions No's 51, 63, 70, 71, 72 and 78 have been followed (further specific details are available on request). These Resolutions provide basis of common agreements between the fire test laboratories which are members of this Group.

The ambient temperature of the test area at commencement of test was 12°C.

After the first 5 minutes of the test, the furnace pressure was maintained such that it complied with the requirements of BS 476-20:1987 clause 3.2.2 (including allowance for transient occurrences in line with clause 12 (L)) at -4.25 ± 2 Pa with respect to atmosphere, at a point 0.5m from the notional floor level, equating to 0Pa at a point 1m above the notional floor level.

The furnace was controlled to follow the temperature/time relationship specified in BS 476: Part 20: 1987 as closely as possible, using the average of nine thermocouples suitably distributed within the furnace. The temperatures recorded are shown graphically in Section 5.1.

The temperature of the unexposed face of doorset A was monitored by means of five thermocouples fixed to the surface of the door leaf and three thermocouples attached to the doorframe, one at mid height on each jamb and one centrally located on the frame head. Two additional thermocouples fixed to the glass.

The temperature of the unexposed face of doorset B was monitored by means of five thermocouples fixed to the surface of the door leaf and three thermocouples attached to the doorframe, one at mid height on each jamb and one centrally located on the frame head. Two additional thermocouples fixed to the glass and one additional thermocouple was fixed to the door closer.

The thermocouple positions are shown in Figure 4 of the appendix. The average temperature of the door leaves and maximum temperature of the doorsets are shown graphically in Section 5.2.

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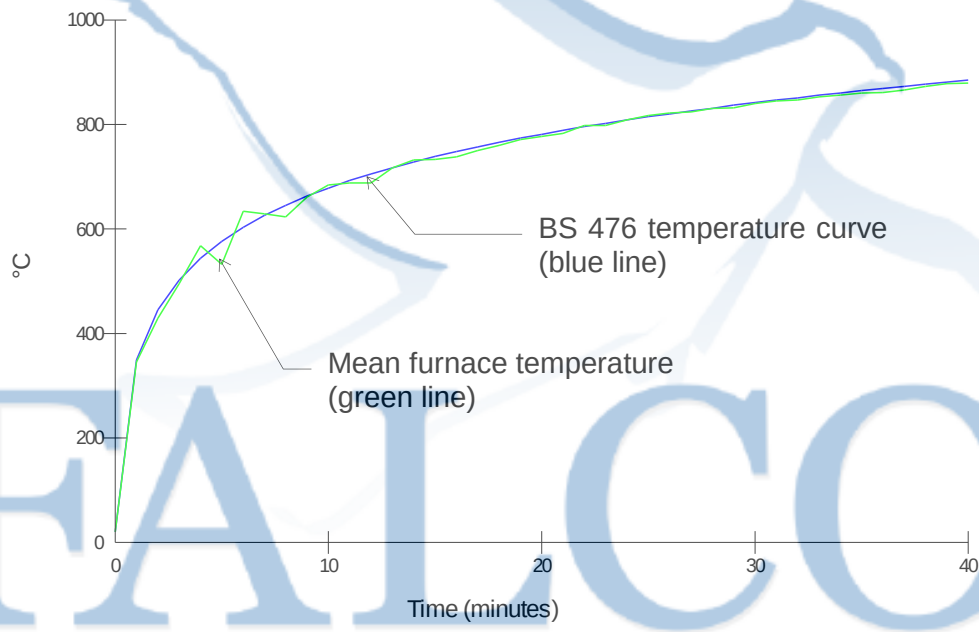
5 Test results

The following data and observations were recorded during the test.

5.1 Furnace Temperature Curve



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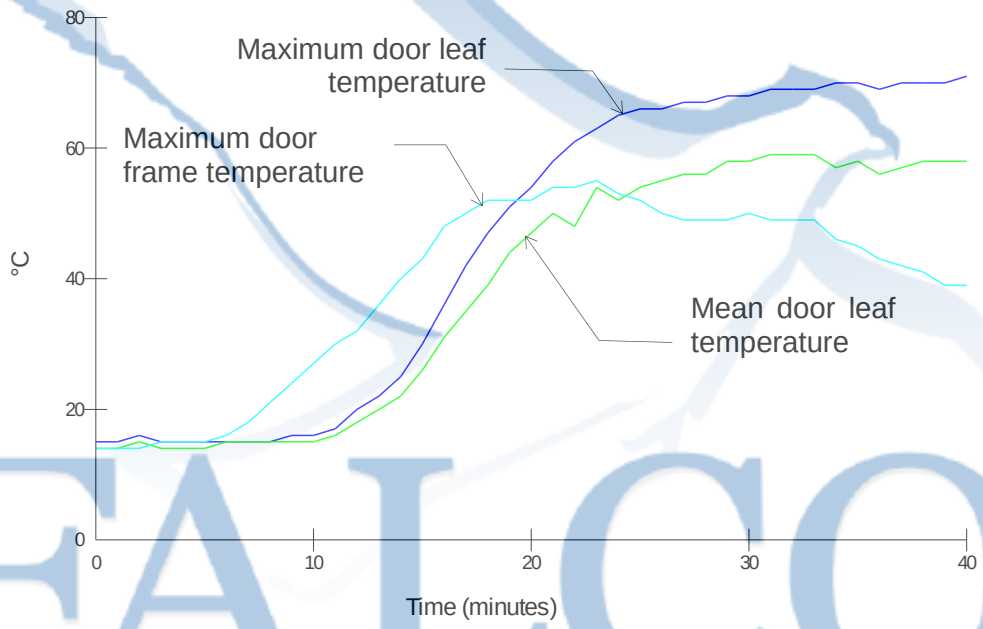
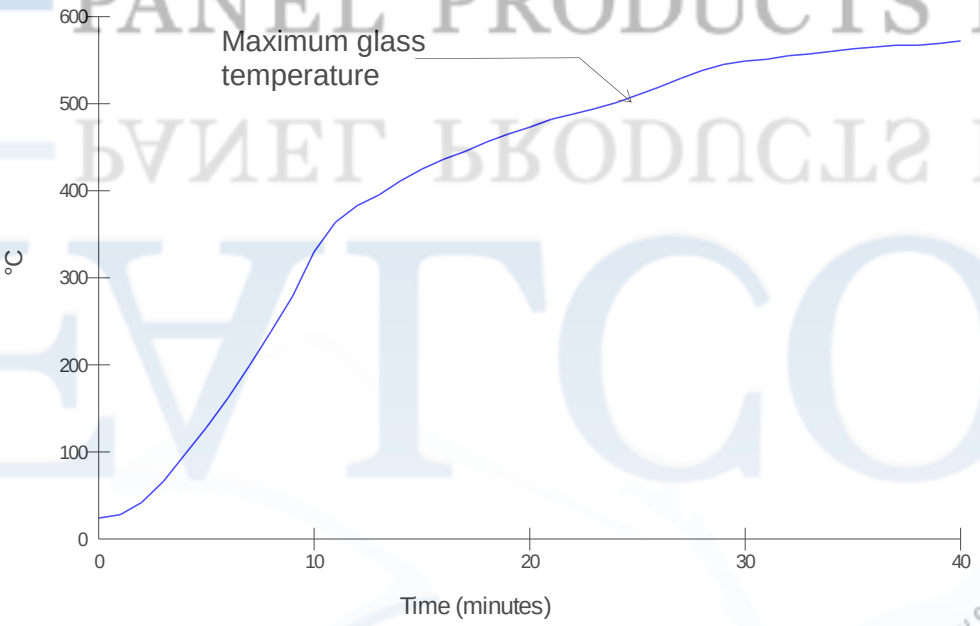
5.2 Unexposed Face Temperature Curves

Doorset A



Glazing



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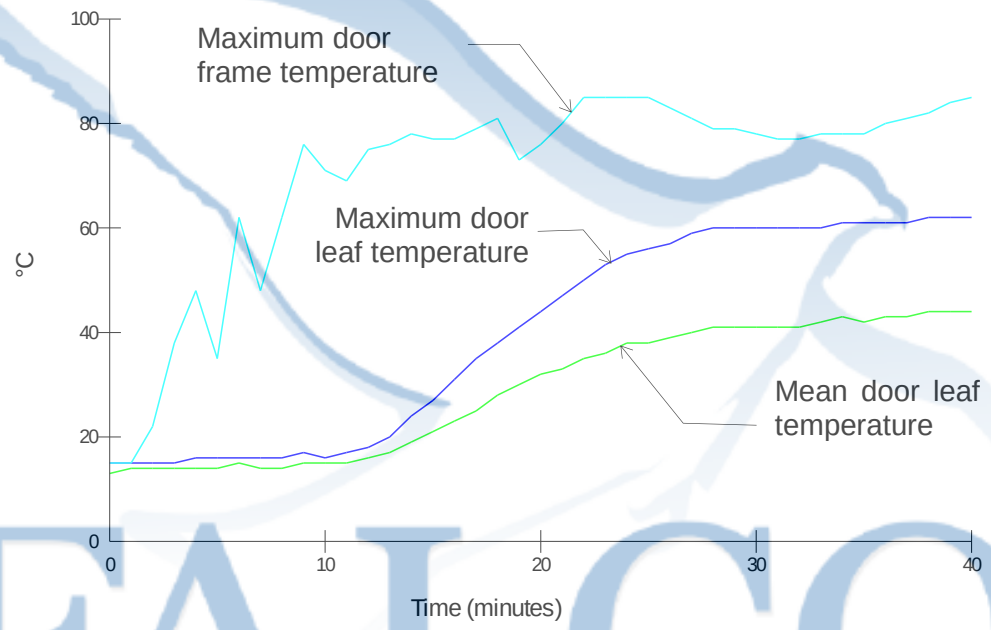
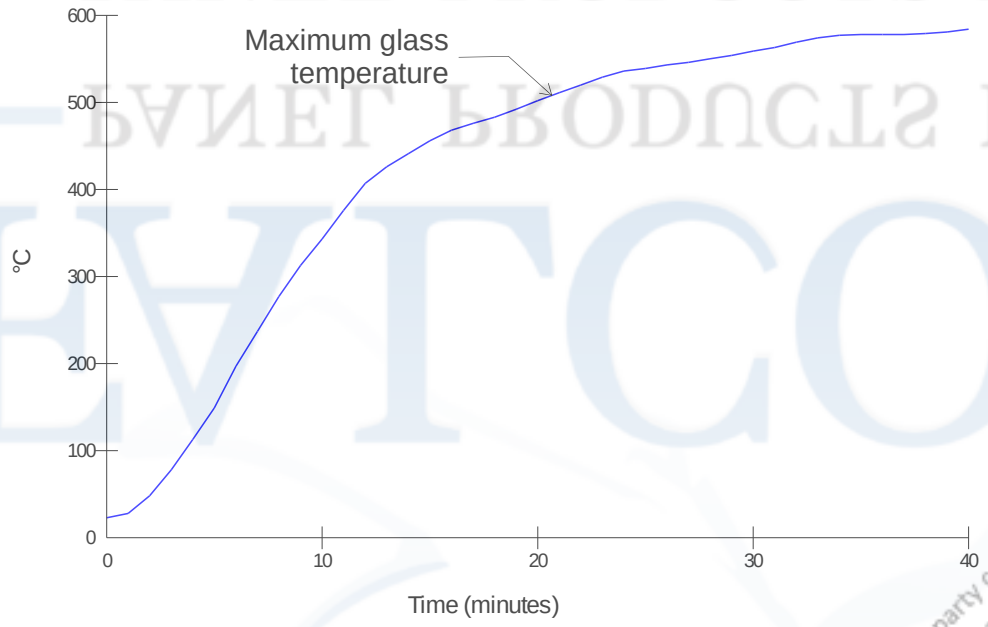
Doorset B



Glazing



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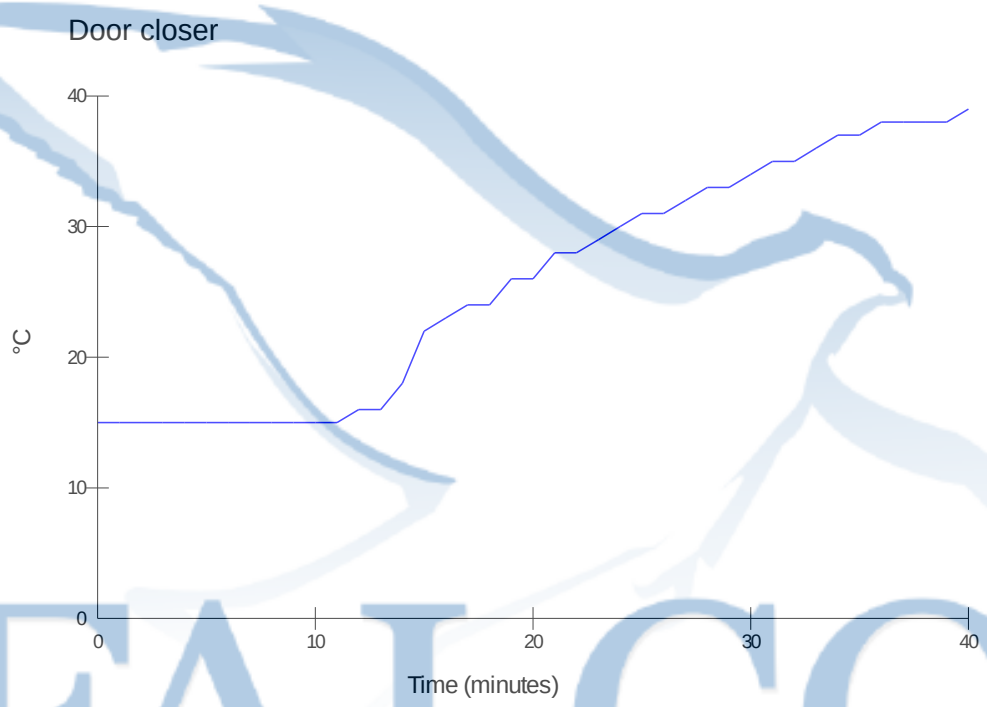

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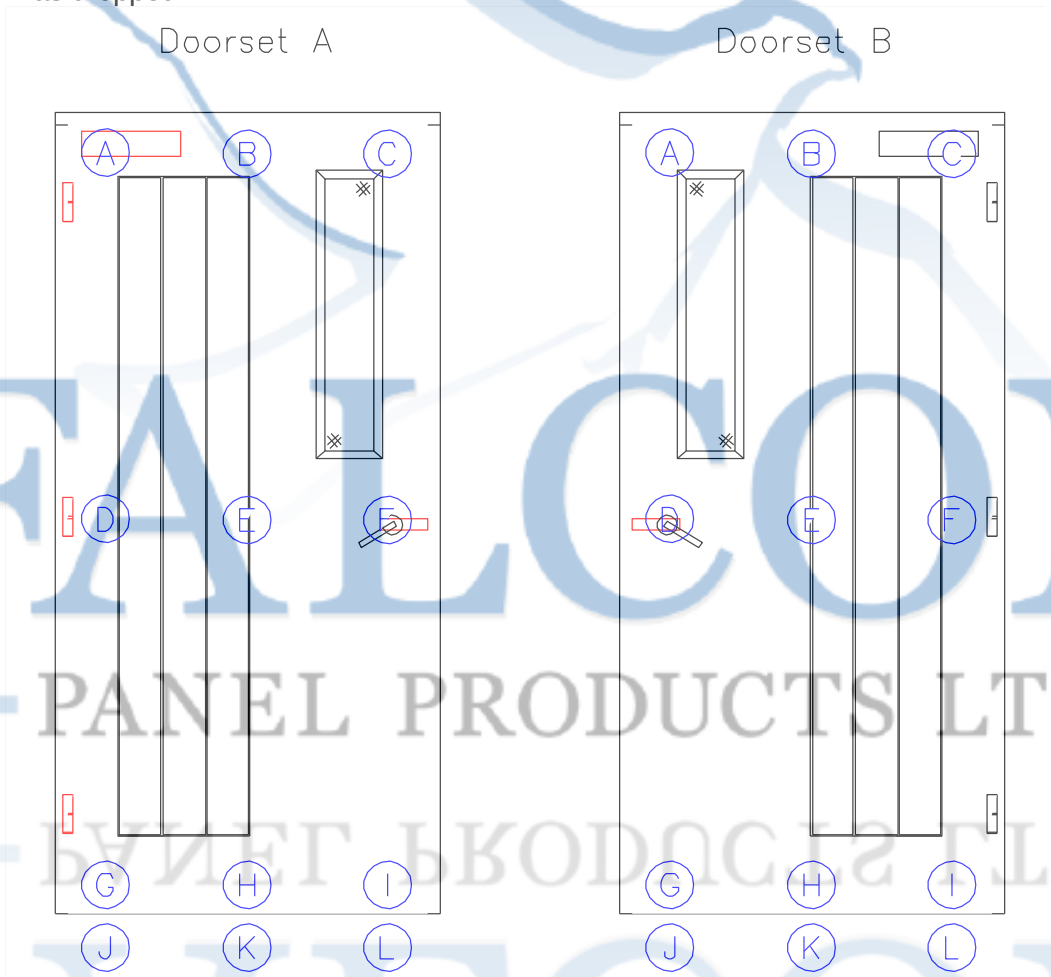
5.3 Leaf Distortion Data

The following tables show the distortion of the door in mm with an accuracy of ±1mm.
A positive measurement indicates distortion towards the furnace.
A negative measurement indicates distortion away from the furnace.
J, K and L give vertical movement of the door, a negative reading indicates that the door has dropped.



Doorset A - leaf (hung on the left and opening in towards the furnace)

Time	A	B	C	D	E	F	G	H	I	J	K	L
10	-1	0	1	-9	-6	-3	-14	11	2	-1	0	-1
20	-1	-4	10	-7	-23	-7	-13	-9	6	0	-1	-1
30	0	-4	14	-10	-35	-7	-3	-5	7	-1	-1	-1

Doorset B - leaf (hung on the right and opening out away from the furnace)

Time	A	B	C	D	E	F	G	H	I	J	K	L
10	-2	-5	-1	-11	-12	-5	-4	-9	-3	-1	-2	0
20	2	-6	-1	1	-30	-8	3	-6	2	-1	-2	0
30	2	-6	0	5	-43	-5	8	-4	2	0	-2	-1

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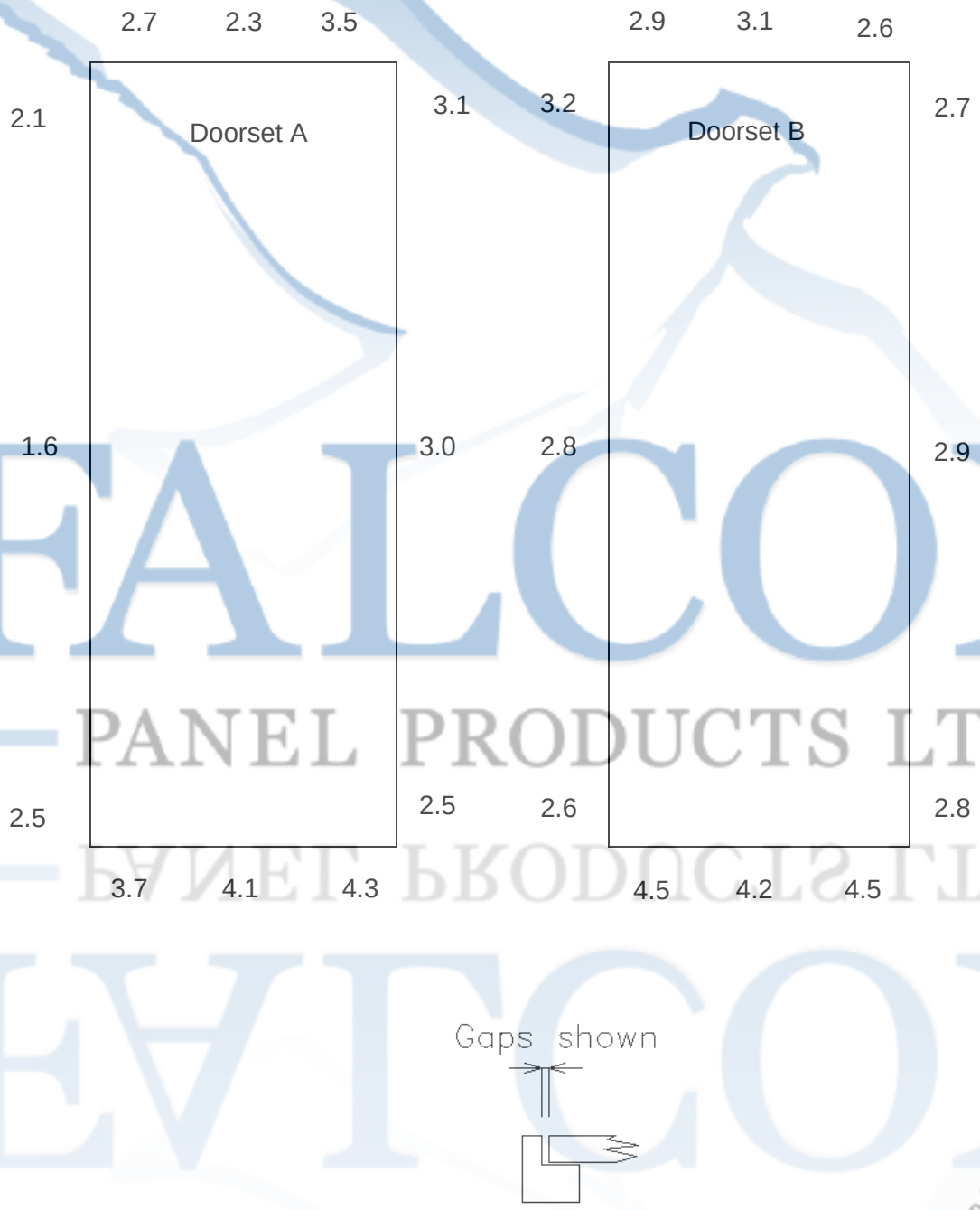
5.4 Door leaf to frame gaps



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5.5 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00:00	Test started
01:55	Doorset A, there is smoke issuing along the closing edge from the latch position up to the top closing corner.
02:15	Doorset B, there is smoke issuing from the top closing corner.
04:07	Doorset B, there is smoke issuing from the head.
04:11	Doorset A, there is smoke issuing from the top hanging corner and the top hinge position.
05:00	Doorsets A and B, the glazing has cracked.
05:37	Doorset A, there is smoke issuing from the head.
06:00	Doorsets A and B, the glazing beginning to react.
10:11	Doorset B, there is smoke issuing from the top hinge position.
10:25	Doorset A, there is discolouration at the top hanging corner.
10:35	Doorset B, there is discolouration at the latch position and the top closing corner.
14:45	Doorset B, there is smoke issuing and discolouration at the middle hinge position and the top hinge position.
16:05	Doorset A, there is discolouration on the surface of the leaf above the glazing.
21:05	Doorsets A and B, the graphite is reacting around the perimeter of the glazing.
24:34	Doorset B, there is discolouration on the surface of the leaf above the glazing.
24:48	Doorset A, there is discolouration at the latch position.
34:52	Doorset A, there is a glow visible at the top closing corner.
36:25	Doorset A, a cotton pad integrity test was performed at the top closing corner which did not result in the ignition of the cotton pad.
39:44	Doorset A, a cotton pad integrity test was performed at the top closing corner which did not result in the ignition of the cotton pad.
40.00	Test terminated.

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5.6 Times to Failure

When tested in accordance with BS 476, Part 22, 1987, Method 7, determination of fire resistance of partially insulated doorsets and shutter assemblies, the requirements of the standard were satisfied for the following periods:

	Integrity	Insulation
Doorset A	**40 (forty) minutes ***	**40 (forty) minutes ****
Doorset B	**40 (forty) minutes ***	**40 (forty) minutes ****

* No failure at the termination of the test at 40 minutes
** No failure at the termination of the test at 40 minutes. In accordance with the note to clause 7.6.1.1 of BS 476: Part 22: 1987, the glazing has not been evaluated for insulation.

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6 Limitations

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

The results of this test were obtained using the specimens provided for testing, and the door to frame gaps recorded in Section 5.4 of this report. Further, where information in relation to the specimen has been provided to us but not verified by us, we have assumed that it is correct; and where comments above identify particular materials or substances comprised in the specimen those comments are based on information supplied to us and/or on general visual inspection undertaken during the process of testing of the sample, and in either case have not been verified by reference to materials testing or documentary evidence except as described above. The fire resistance performance of doors of this design may be different if any aspect of the design or construction differs from that tested. This includes, by way of example only, any difference as a result of (i) any deviation from the information supplied to us, or (ii) the employment of different door to frame gaps. The tested assembly was asymmetrical and was tested such that the door leaf of doorset A opened towards the heating conditions and the door leaf of doorset B opened away from the heating conditions of the test. The test result may not be appropriate to situations where by the samples tested have been installed in a different configuration to that which they are tested.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. No assurance can be given that this test or its results will reflect current practice, and/or be consistent with prevailing legislative / regulatory requirements, at any time after the date of this report. Warringtonfire will be able to offer the addressee of this report, at any time on request, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report. It is strongly recommended that, at the latest, such a review be sought at intervals of no more than five years.

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	Written and checked by:	Authorised by:
Signature:	J.R.Jones	
Name:	John Jones	Nikolas Whitelock
Title:	Technical Officer	Lead Technical Officer
Date of issue:	12/12/2018	12/12/2018

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Photographs

Intumescent interruption by hardware and additional intumescent protection

Around hinge blade and intumescent under hinge blades – both doorsets

Intumescent fitted to latch body – both doorsets

Around latch keep and intumescent under latch keep – both doorsets

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At the start of the test

At 10 minutes

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At 20 minutes

After 30 minutes

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Appendix – figures 1 to 4

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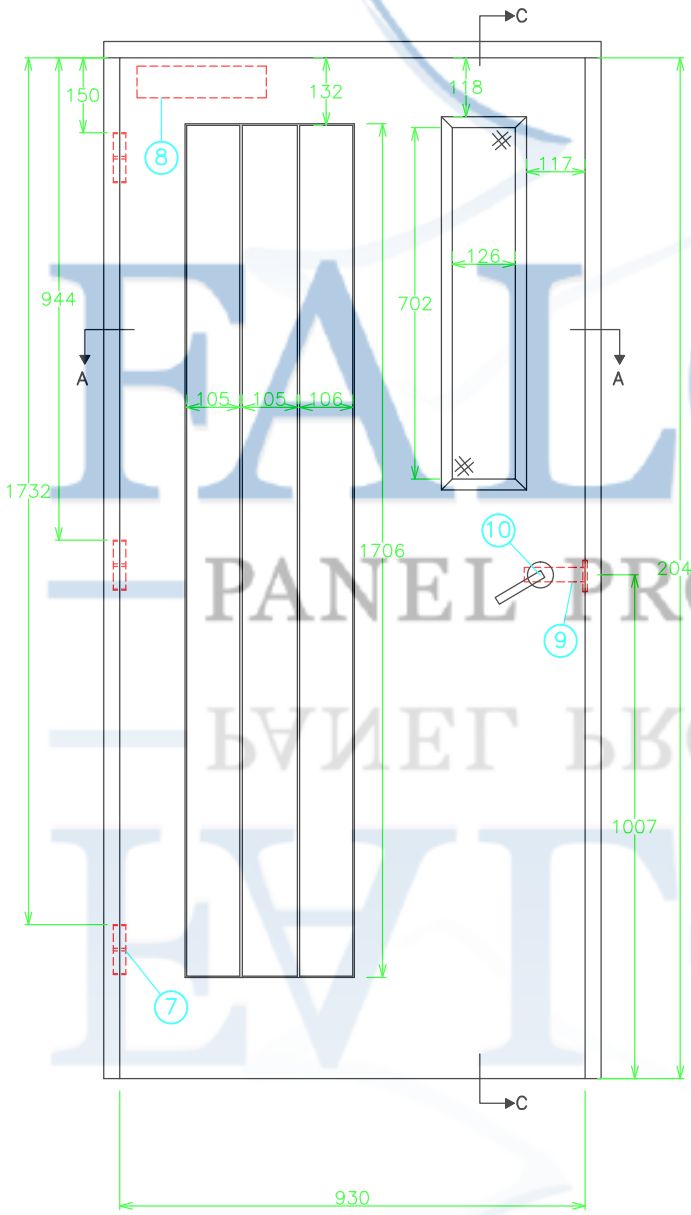
Doorset A



Doorset B

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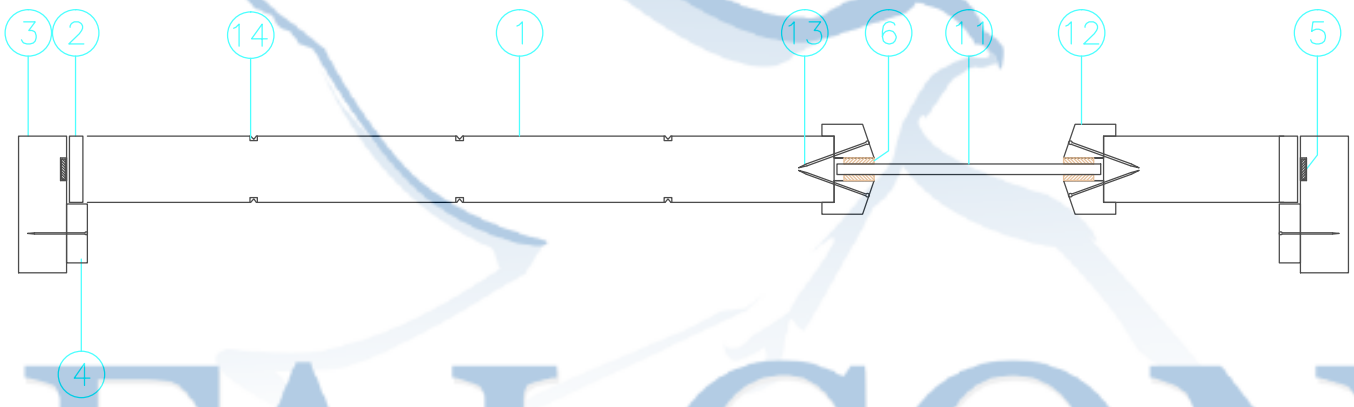
warringtonfire
Proud to be part of element
Warringtonfire, Stocking Lane,
Hughenden Valley, High Wycombe,
Buckinghamshire, HP14 4ND, UK.
Tel: +44 (0)1494 569750

Title: Unexposed face elevation showing hardware positions
(All dimensions in mm)

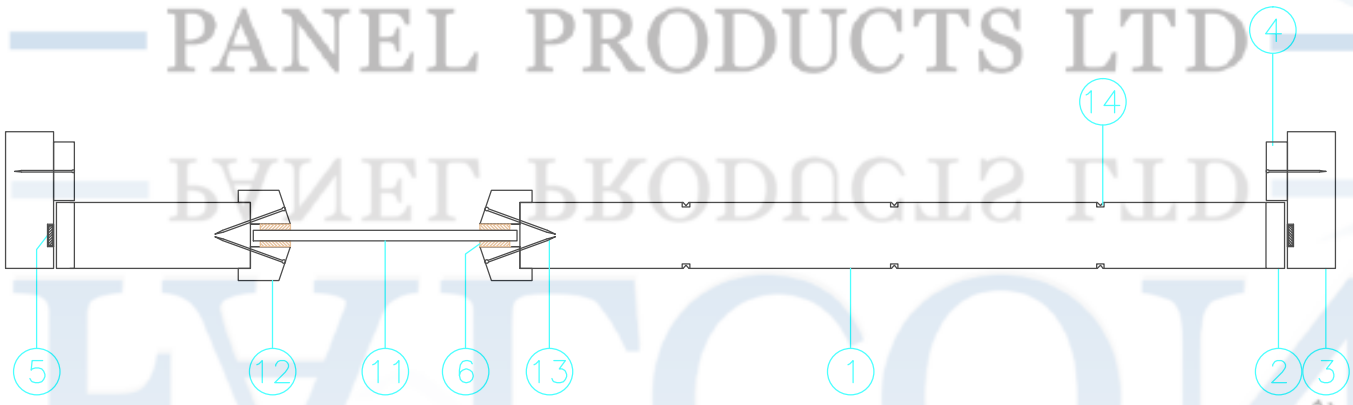
Date Drawn	Drawn By	Scale
26/10/18	ARD	NTS

Project No.	
WF 405305	Appendix

Section A–A



Section B–B



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warringtonfire
Proud to be part of element
Warringtonfire, Stocking Lane,
Hughenden Valley, High Wycombe,
Buckinghamshire, HP14 4ND, UK.
Tel: +44 (0)1494 569750

Title
Horizontal cross-sections
(All dimensions in mm)

Date Drawn	Drawn By	Scale
26/10/18	ARD	NTS

Project No.	
WF 405305	Appendix

warringtonfire
Proud to be part of element
Warringtonfire, Stocking Lane,
Hughenden Valley, High Wycombe,
Buckinghamshire, HP14 4ND, UK.
Tel: +44 (0)1494 569750

Title
Vertical cross-sections
(All dimensions in mm)

Date Drawn	Drawn By	Scale
26/10/18	ARD	NTS

Project No.	
WF 405305	Appendix

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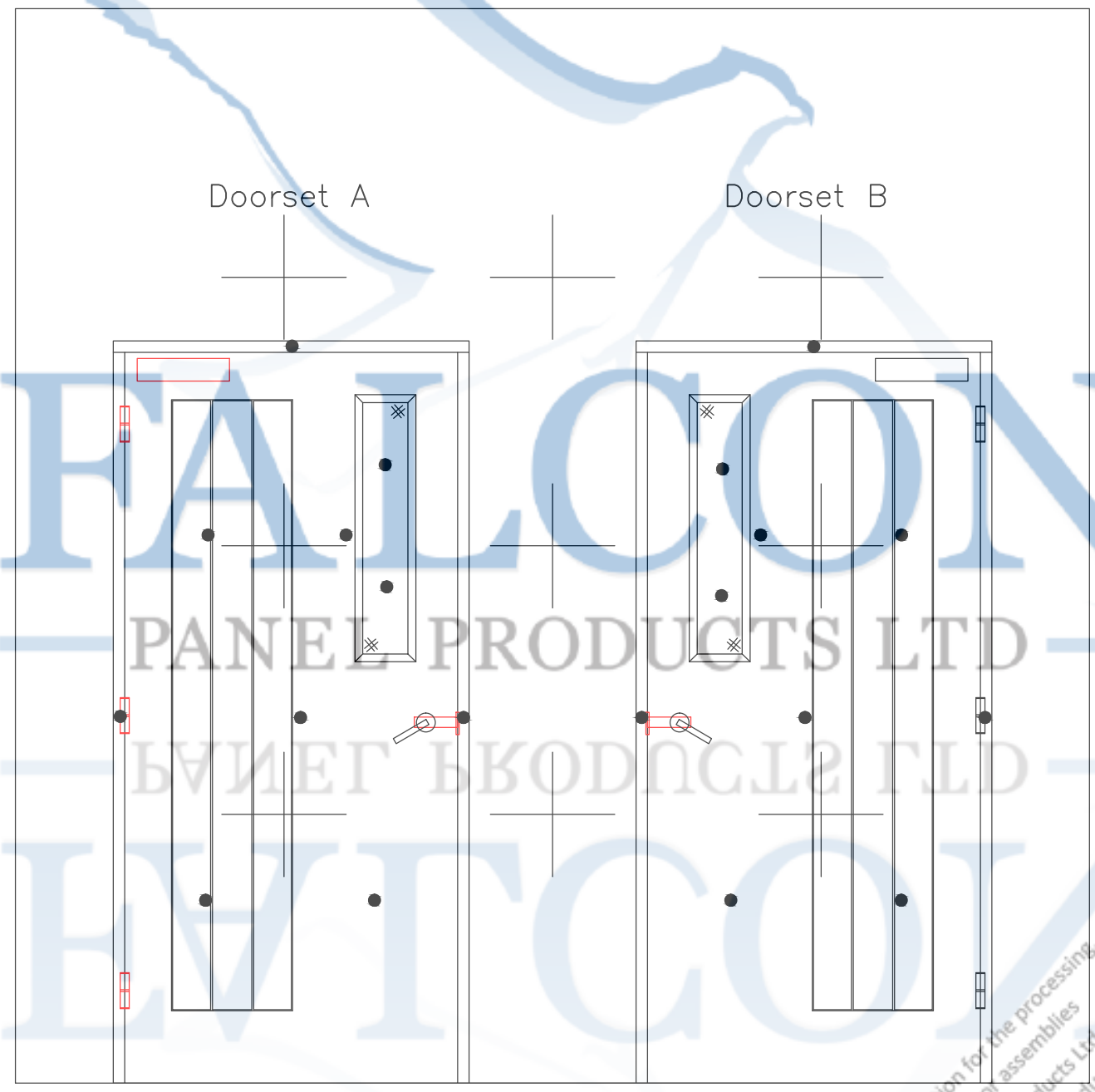

: Furnace Thermocouples

: Unexposed Face Thermocouples

Viewed From Unexposed Face

warringtonfire
Proud to be part of element
Warringtonfire, Stocking Lane,
Hughenden Valley, High Wycombe,
Buckinghamshire, HP14 4ND, UK.
Tel: +44 (0)1494 569750

Title: Thermocouple positions and leaf/frame gaps
(All dimensions in mm)

Date Drawn	Drawn By	Scale
26/10/18	ARD	NTS

Project No.	
WF 405305	Appendix

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