

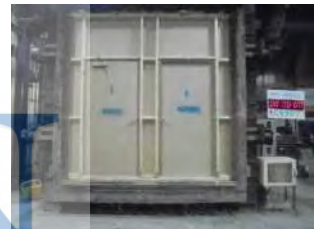


Title:

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

WF Report No:

408989



Prepared for:

Falcon Panel Products Limited

Clock House
Station Approach
Middlesex
TW17 8AN
United Kingdom

Test date:

21st January 2019



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	78 (seventy eight) minutes	78 (seventy eight) minutes*
	Doorset B	71 (seventy one) minutes	71 (seventy one) minutes*

* Failure by virtue of integrity failure

	Summary of specimens: Two unlatched single leaf, single-acting doorsets, doorset A hung opening out away from the furnace and doorset B hung opening in towards the furnace. Leaf size – both doorsets - 2033mm high x 925mm wide x 54mm thick
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1 Introduction

The specimens were manufactured and supplied for test by the client and delivered to Warringtonfire during January 2019.

Warringtonfire constructed a plasterboard clad timber stud supporting construction and at the request of the client 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 leafs of both doorsets measured 2033mm high x 925mm wide x 54mm thick. Doorset A was hung to open out away from the furnace and doorset B was hung to open in towards 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

Closer forces not taken.

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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/m ³)	Moisture (% w/w)	Key to figures
Stiles and rails	None fitted	-	-	-	-
Core	Falcon Panel Products Ltd Strebord graduated density particleboard	54 thick	570-630*	-	1
Facings	None fitted	-	-	-	-
Adhesive	Lippings	Norbord CaberFix D4 Polyurethane*	-	-	-
Lippings – vertical edges only	Sapele*	8 thick	640*	7.2-7.5	2

* Stated by client, not verified by laboratory

Frame – both doorsets

	Species/type	Dimensions (mm)	Density (kg/m ³)	Moisture (% w/w)	Key to figures
Head and jambs	Sapele*	32 wide x 100 deep	640*	8.0-8.1	3
Stop – planted (pinned)	Sapele*	34 wide x 14 high	640*	7.3-7.9	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 Fire and Acoustic Seals Ltd intumescent acrylic mastic sealant	Nominally 6 -18 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	MDF	18 thick x 45 wide	750 **	8.4-8.5	-
Threshold	Non combustible	-	-	-	-

* Stated by client, not verified by laboratory

** BMTRADA timber database

Intumescent and sealing materials – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Leaf bottom edge	Lorient Polyproducts Ltd drop down seal Ref. LAS8000 1SI*	14 x 35 (rebate size)	Fitted centrally along the bottom edge of the leaf	5
Frame reveal – head and jambs	2No. Lorient Polyproducts Ltd LP1504 Type 617	15 x 4	Fitted 10mm apart, 7mm from the opening face in the frame reveal	6
Smoke seal	Lorient Polyproducts Ltd batwing type seal Ref. LAS 1212*	12 x 12	Fitted in the frame reveal up to the upstand of the stop	7

* Stated by client, not verified by laboratory

Intumescent interruptions and additional hardware protection – both doorsets

	Make/type	Size (mm)	Location
Around hinge blade	Partially interrupted	-	Hinge blade fully interrupts 1 st seal in frame reveal and partially interrupts 2 nd seal with 12mm remaining continuous
Under hinge blades	Lorient Polyproducts Ltd MAP*	1 thick	Fitted under the hinge blade on frame and leaf
Encasing latch body	Lorient Polyproducts Ltd MAP*	1 thick	Fitted around the body of the latch
Under latch forend	None fitted	-	-
Around latch keep	Partially interrupted	-	Latch keep fully interrupts 1 st seal in frame reveal and partially interrupts 2 nd seal with 7mm remaining continuous
Under latch keep	Lorient Polyproducts Ltd MAP*	1 thick	Fitted fully lining the latch keep rebate
Under drop seal	Lorient Polyproducts Ltd MAP*	1 thick	Fitted fully lining the drop seal rebate

* Stated by client, not verified by laboratory

Hardware

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No. Royde and Tucker Hi-Load H102	100 x 35 x 3 (blade size)	Fitted 154mm, 938mm and 1720mm from the head of the leaf	8
Closer	Rutland TS9205*	236 x 55 (footprint)*	Surface fitted as per the manufacturer's instructions on the unexposed face of doorset A and the exposed face of doorset B	9
Lock/latch - engaged	Assa Abloy Union steel mortice latch reference: 2249 Euro profile sashlock*	152 x 25 (forend size) 108 x 76 x 25 (case size) 140 x 25 (keep size)	Latch nib fitted 1016mm from the bottom of the leaf	10
Furniture	Altro 19mm straight tee bar lever door handle*	Ø 52 (rose size)	Fitted appropriate to the lock/ latch	11
	A-Spec Escutcheon euro – 316 satin stainless steel*	Ø 50 (rose size)		
	Union J2X28 cylinder – euro double and thumbturn*	32 x 21		

* 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 10°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 both doorsets 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.

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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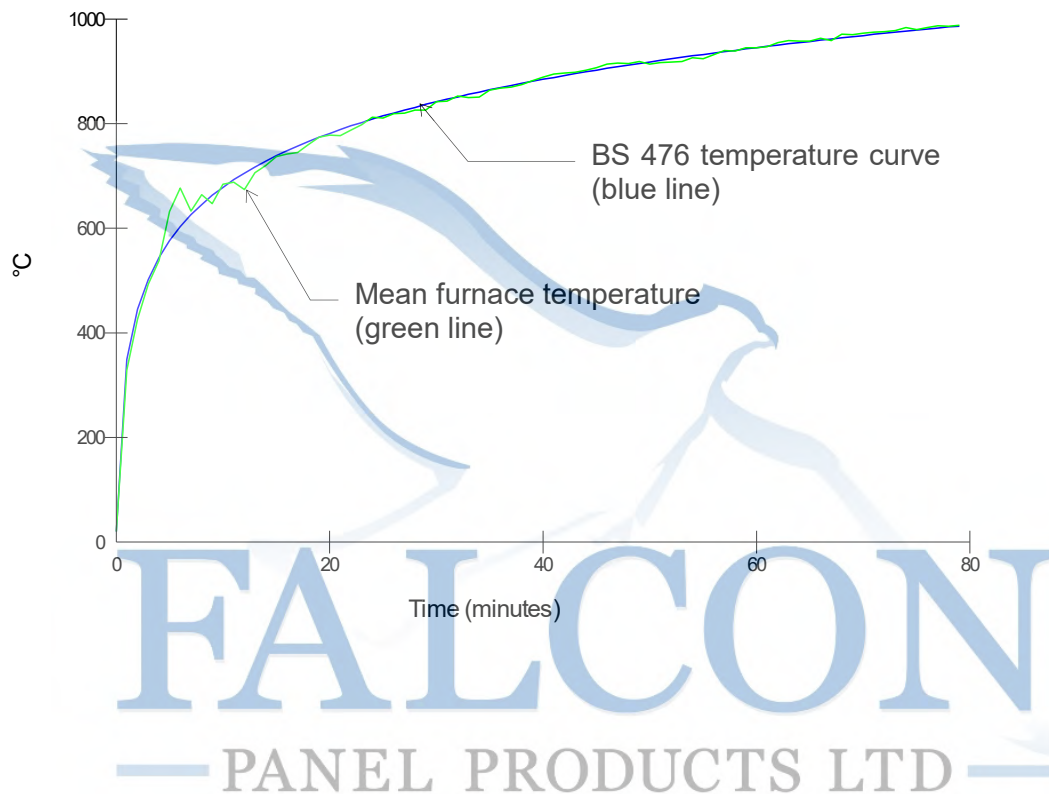
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5 Test results

The following data and observations were recorded during the test.

5.1 Furnace Temperature Curve



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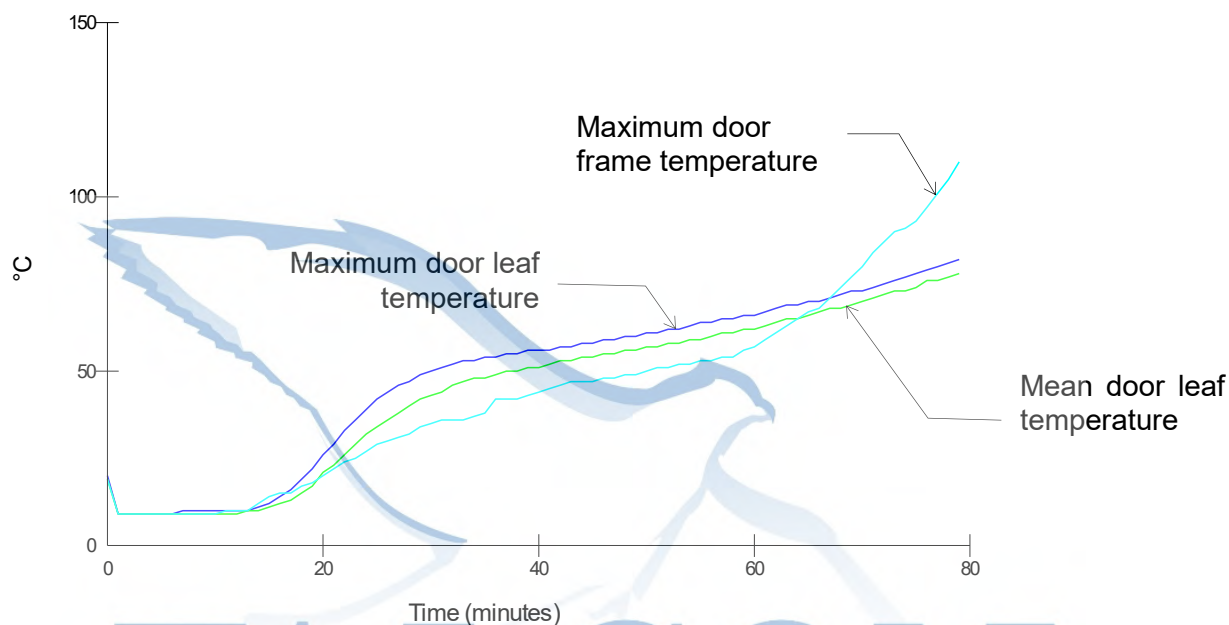
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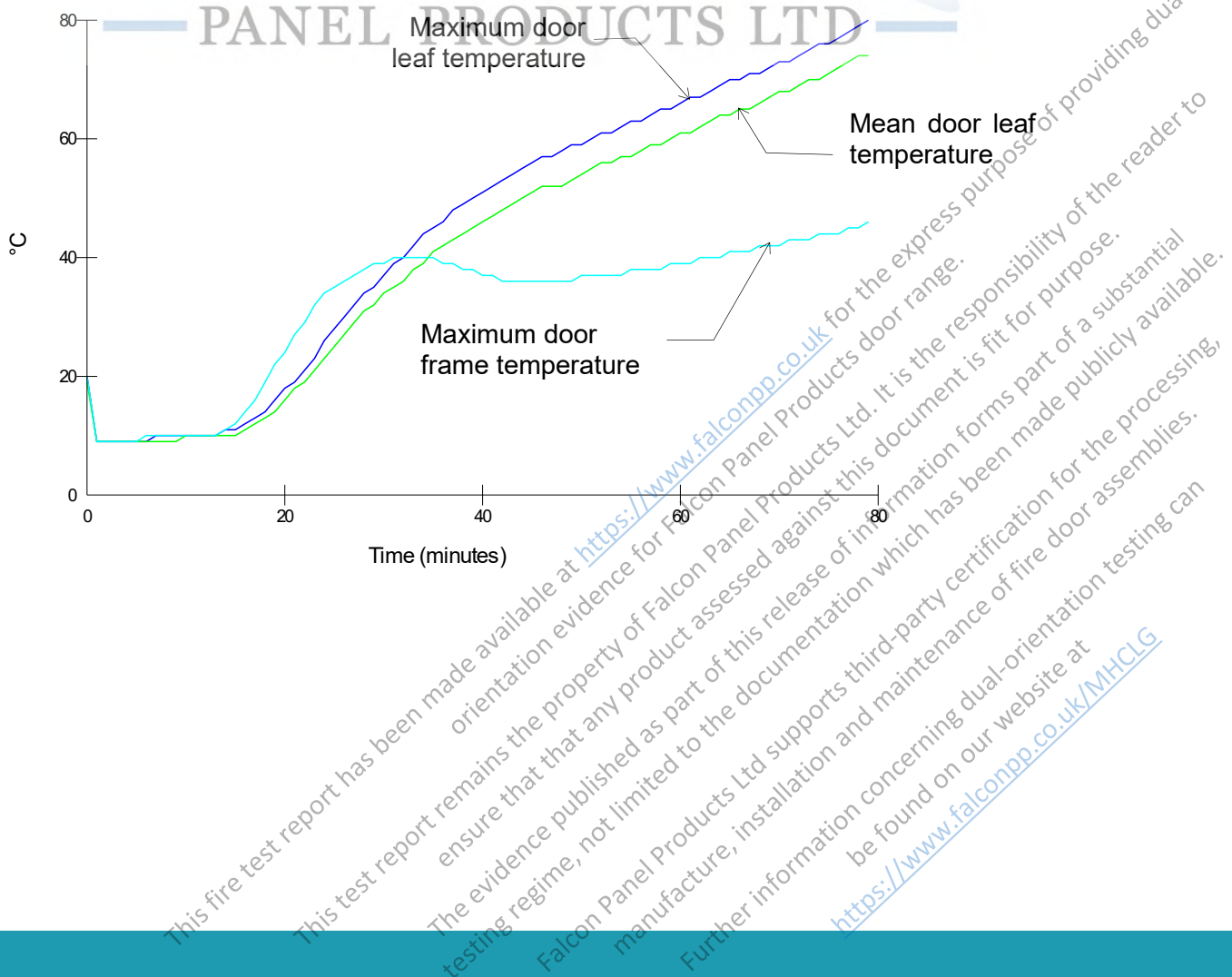
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5.2 Unexposed Face Temperature Curves

Doorset A



Doorset B



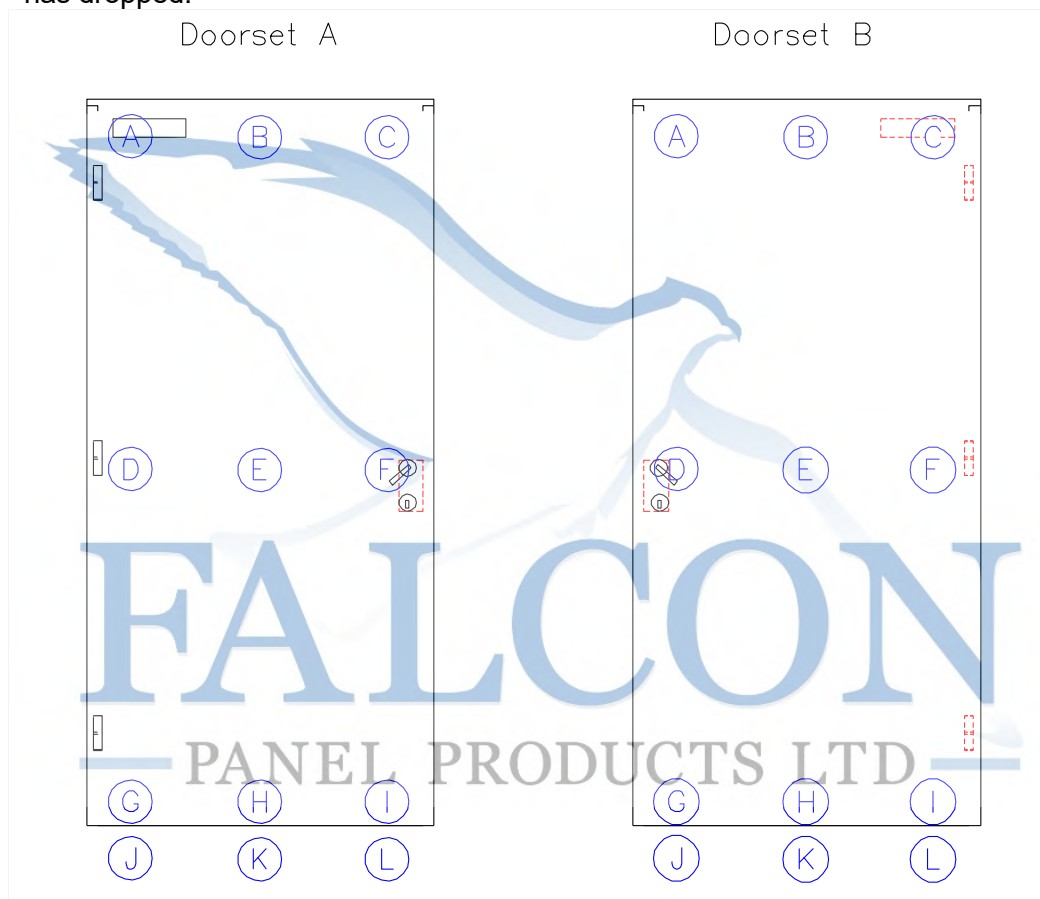
5.3 Leaf Distortion Data

The following tables show the distortion of the door in mm with an accuracy of ± 1 mm.

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 out away from the furnace)

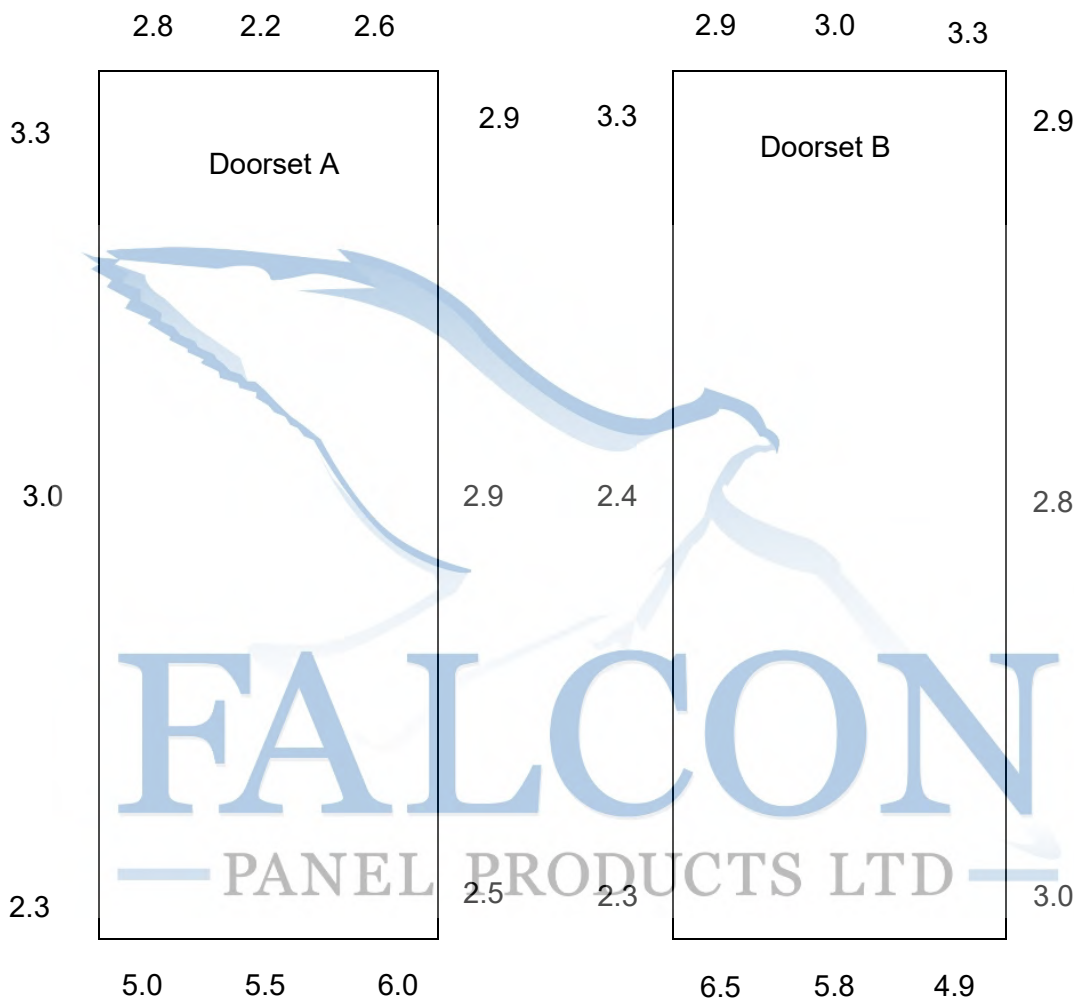
Time	A	B	C	D	E	F	G	H	I	J	K	L
15	-5	-5	-3	-3	-8	-4	0	-2	-2	1	-1	0
30	-5	-10	-5	-10	-24	-5	0	-2	-2	0	0	-1
45	-8	-15	-2	-12	-31	-1	0	-5	-3	0	0	-1
60	-10	-20	-5	-17	-45	-5	-3	-15	-6	1	-1	-1

- A distortion measurement was not recorded

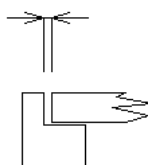
Doorset B - leaf (hung on the right and opening in towards the furnace)

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	-3	-1	-4	-4	-4	7	2	0	2	0	0	0
30	-2	-10	-3	-6	-12	-6	4	10	6	-2	0	-2
45	-2	-15	1	-16	-19	-8	4	10	7	-2	1	-3
60	-7	-24	-14	-20	-32	-12	0	8	2	-3	-3	-3

5.4 Door leaf to frame gaps



Gaps shown



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5.5 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
04:20	Both doorsets, there is smoke issuing from the top hanging corner and top closing corner.
10:00	Doorset B, there is smoke issuing from the latch position.
11:33	Doorset A, there is smoke issuing from the latch position.
22:45	Both doorsets, there is discolouration at the handle.
30:10	Doorset A, the leaf has deflected away from the frame by approximately 5mm at the latch position.
30:30	Both doorsets, fissures in the leaf approximately 5mm on the exposed face
42:10	Both doorsets, fissures in the leaf approximately 10mm on the exposed face
57:06	Doorset B, there is smoke issuing from the threshold.
58:10	Doorset A, there is discolouration at the middle hinge position and between the middle hinge position and the bottom hinge position.
59:09	Doorset A, there is discolouration at the bottom closing corner.
66:46	Doorset B, there is glow at the top closing corner.
67:02	Doorset B, a cotton pad test was performed at the top closing corner which did not result in the ignition of the cotton pad. No fail.
67:12	Doorset A, there is a glow visible at the latch position.
67:48	Doorset A, there is glow visible at the bottom closing corner.
68:08	Doorset A, a cotton pad test was performed at the bottom closing corner which did not result in the ignition of the cotton pad. No fail.
69:07	Doorset B, a cotton pad test was performed at the top closing corner which did not result in the ignition of the cotton pad. No fail.
70:43	Doorset A, a cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No fail.
71:10	Doorset B, a cotton pad test was performed at the top closing corner which did result in the ignition of the cotton pad thereby constituting integrity failure .
71:30	Doorset B, there is continuous flaming at the top closing corner thereby constituting further integrity failure .
72:20	Doorset B, there is glow at the latch position.

- 72:40 Doorset A, a cotton pad test was performed at the bottom closing corner which did not result in the ignition of the cotton pad. No fail.
- 73:25 Doorset A, a cotton pad test was performed at the bottom closing corner which did not result in the ignition of the cotton pad. No fail.
- 74:15 Doorset A, a cotton pad test was performed at the bottom closing corner which did not result in the ignition of the cotton pad. No fail.
- 74:36 Doorset B, there is discolouration at the middle hinge position and top hinge position.
- 75:36 Doorset B, a cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No fail.
- 75:53 B, there is continuous flaming at the latch position thereby constituting **further integrity failure**.
- 76:53 Doorset A, a cotton pad test was performed at the bottom closing corner which did not result in the ignition of the cotton pad. No fail.
- 78:00 Doorset A, there is intermittent flaming at the latch position.
- 78:22 Doorset A, a cotton pad test was performed at the latch position which did not result in the ignition of the cotton pad. No fail.
- 78:53 Doorset A, a cotton pad test was performed at the latch position which did result in the ignition of the cotton pad thereby constituting **integrity failure**.
- 79:05 Doorset A, there is continuous flaming at the latch position thereby constituting **further integrity failure**.

Test terminated.

5.6 Times to Failure

When tested in accordance with BS 476, Part 22, 1987, Method 6, determination of fire resistance of fully insulated doorsets and shutter assemblies, the requirements of the standard were satisfied for the following periods:

	Integrity	Insulation
Doorset A	78 (seventy eight) minutes	78 (seventy eight) minutes*
Doorset B	71 (seventy one) minutes	71 (seventy one) minutes*

* Failure by virtue of integrity failure

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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 away from the heating conditions and the door leaf of doorset B opened in towards 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:		
Name:	Courtney Clifford	Adam Scot
Title:	Technical Officer	Laboratory Manager
Date of issue:	17/05/2019	17/05/2019

Photographs

Intumescent interruption by hardware and additional intumescent protection

Around hinge blades – both doorsets



Around latch keep – both doorsets



At the start of the test



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At 15 minutes



At 30 minutes



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At 45 minutes



At 60 minutes



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Appendix – Figures 1 to 4



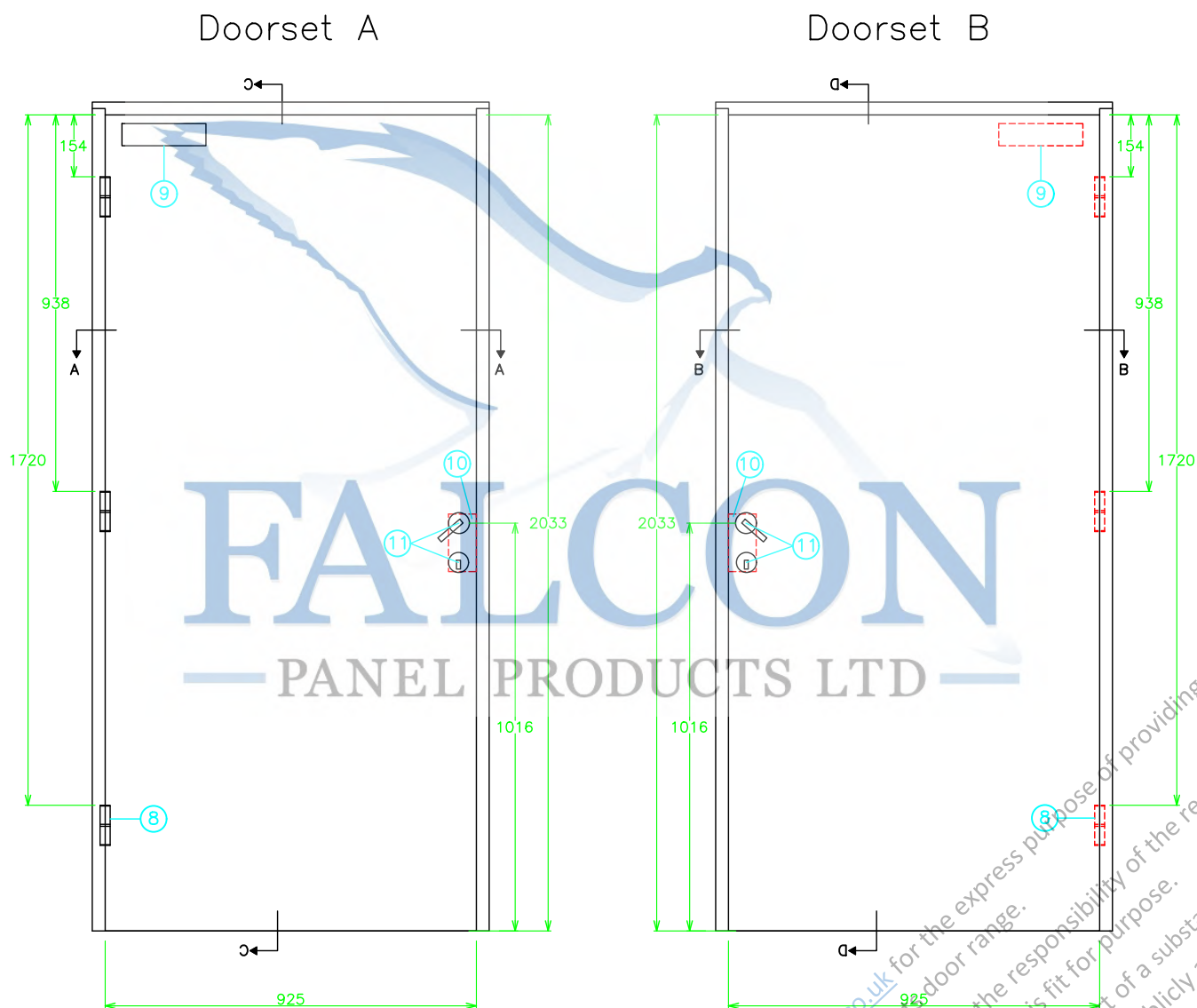
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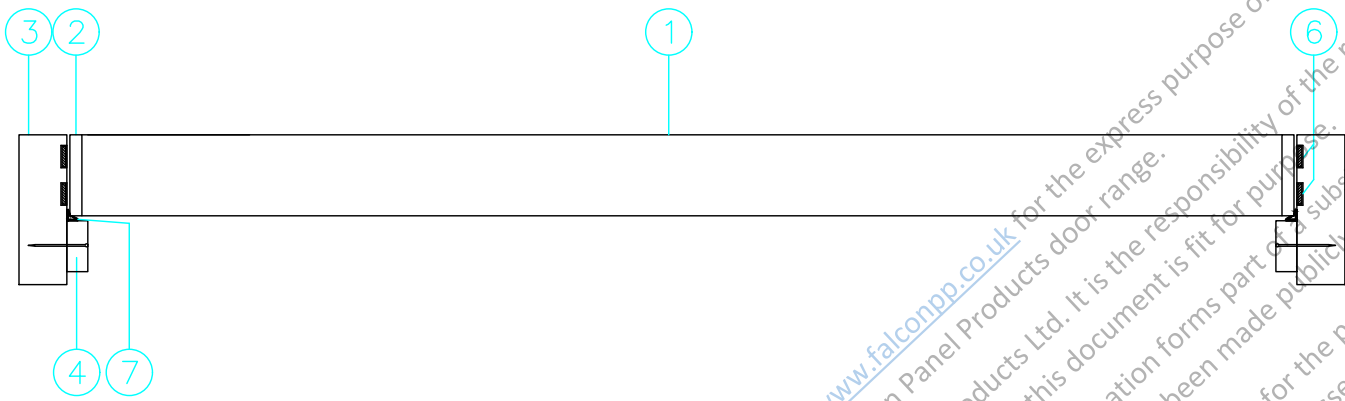
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Section A-A



Section B-B





warringtonfire

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Title

Vertical cross-sections
(All dimensions in mm)

Date Drawn

22/01/19

Drawn By

ARD

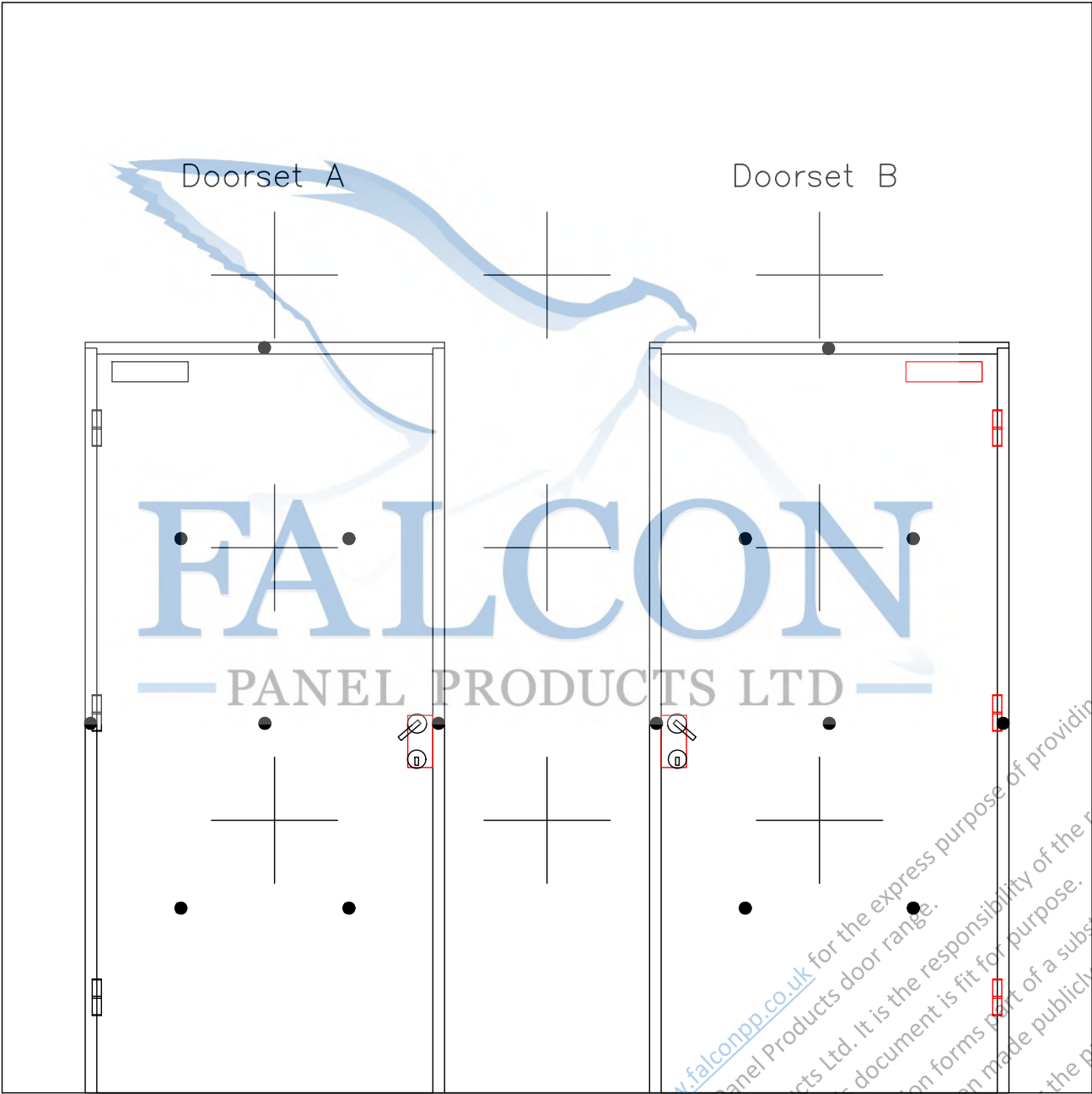
Scale

NTS

Project No.

WF 408989

Appendix



⊕ : Furnace Thermocouples
● : Unexposed Face Thermocouples

Viewed From Unexposed Face

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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 22/01/19

Drawn By ARD

Scale NTS

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Appendix