

**Title:**

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

**WF Report No:**

414162



**Prepared for:**

**Falcon Panel Products Ltd**

Clock House  
Station Approach  
Shepperton  
Middlesex  
TW17 8AN

**Test date:**

14<sup>th</sup> May 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.

<b>Results:</b>  <b>Fire resistance test in accordance with BS 476: Part 20/22: 1987</b>	<b>Times to failure:</b>		
		<b>Integrity</b>	<b>Insulation</b>
	<b>Doorset A</b>	<b>36 (thirty six) minutes</b>	<b>36 (thirty six) minutes *</b>
	<b>Doorset B</b>	<b>38 (thirty eight) minutes</b>	<b>38 (thirty eight) minutes *</b>
* Failure by virtue of integrity failure			

	<b>Summary of specimens:</b>  Two latched, single leaf, single acting doorsets, doorset A hung opening in towards the furnace and doorset B hung opening away from the furnace  Leaf size - both leaves:- 2045mm high x 925mm wide x 44mm thick
---	--



## 1 Introduction

The specimens were manufactured and supplied for test by the client and delivered during May 2019.

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 2045mm high x 925mm 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 from doorsets fitted with a multi-point latch engaged at all points for the duration of 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	27	13
Doorset B	28	14

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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 <sup>3</sup> )	Moisture (% w/w)	Key to figures
Stiles and rails	None fitted	-	-	-	-
Core	Falcon Panel Products Strebord particleboard *	44 thick	630-635*	10.3-10.7	1
Decorative inserts	Ash fitted horizontally 50mm down and at 200mm centres*	10 x 10 including a 3 x 3 groove	-	-	2
Facings	Paper – fitted on the exposed face of doorset A and the unexposed face of doorset B	-	-	-	-
	Ash veneer - fitted on the unexposed face of doorset A and the exposed face of doorset B	-	-	-	-
Adhesive	Lippings	PUR*	-	-	-
	Inserts	PVA*	-	-	-
Lippings – vertical edges only	Ash	10 thick	710**	-	3

\* 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	Ash*	32 wide x 143 thick	710*	10.3-10.5	4
Stop – planted (pinned)	Ash*	15 wide x 48 wide	640*	8.9	5
Head to jamb jointing detail	Mortice and tenon - Butted - screwed	-	-	-	-
Frame to supporting construction fire stopping detail	Rock mineral wool for full depth of frame capped with Mann McGowan Pyromas A mastic on the exposed face.	Nominally 8 -12 wide x 10 deep (mastic size)	-	-	-
Frame to supporting construction fixing detail	3No. screws per jamb fitted at no more than 600mm centres, fixed through the stop	5Ø x 100 long	-	-	-
Architrave	None fitted	-	-	-	-
Threshold	Non combustible	-	-	-	-

\* Stated by client, not verified by laboratory

## Intumescent and sealing materials – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Leaf edge – bottom edge	Norseal Ref. 8105 drop seal	20 high x 12 wide	Centrally fitted along the bottom edge of the leaf	6
Frame reveal – head and jambs	Pyroplex Rigid Box Seal Ref. FO8500	10 x 4	Fitted 8mm from the opening face in the frame reveal	7
	Pyroplex Rigid Box SealTwin Flipper Ref. 30150	10 x 4	Fitted 28mm from the opening face in the frame reveal	8
Weather seal	Lorient Polyproducts Ltd LAS 1206	14 wide	Self-adhesive to the upstand of the stop	9

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## Intumescent interruptions and additional hardware protection – both doorsets

	Make/type	Size (mm)	Location
Around hinge blade	Partially interrupted	-	Hinge blade fully interrupts 1 <sup>st</sup> seal leaving 2 <sup>nd</sup> seal continuous in frame reveal
Under hinge blades	Sealmaster graphite type intumescent	1 thick	Fitted under the hinge blade on frame and leaf
Around closer arm channel	Partially interrupted	-	Closer arm fully interrupts 1 <sup>st</sup> seal and partially interrupts 2 <sup>nd</sup> seal with 3mm remaining continuous in frame reveal
Under closer arm channel and closer body	Arrone intumescent kit	2 thick	Fitted as per the manufacturers instructions
Encasing latch bodies	Interdens	1 thick	Fitted around all latch bodies
Under latch forend	None fitted	-	-
Around centre latch keep	Partially interrupted	-	Centre latch keep fully interrupts 1 <sup>st</sup> seal with 2mm of 2 <sup>nd</sup> seal remaining continuous
Around top and bottom latch keeps	Partially interrupted	-	Top and bottom latch keeps partially interrupt both seals in frame reveal with 3mm of 1 <sup>st</sup> seal and
Under latch keeps	Interdens	1 thick	Fitted under all latch keeps
Eye viewer	Jedo JV942 Kit – graphite type	1 thick	Fitted around the barrel of the eye viewer
Letter plate	Royde and Tucker LP008 kit supplied with letter plate	-	Fitted lining the letterplate tunnel

\* Stated by client, not verified by laboratory

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## Hardware – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No. Royde and Tucker Hi-Load 207 bearing butt type hinge	101 x 76 x 3	Fitted 145mm, 955mm and 1765mm from the head of the leaf	10
Closer	Arrone AR7383 concealed overhead type closer	430 x 32 x 49 (body size)	Grooved into the leaf head as per the manufacturers instructions	11
		464 x 23 x 15 (closer arm channel size)	Grooved into frame head	
Latch – engaged at all points	Winkhaus AV3 Autofire multipoint lock with ERA Fortress 35/35 Eurocylinder with thumbturn	1770 x 20 (forend size) 210 x 45 (centre case size) 112 x 45 (top and bottom case size) 250 x 24 (centre keep size)	Centre latch nib fitted 1000mm from the bottom of the leaf	12
		155 x 24 (top and bottom keep size)	Fitted 220mm and 1835mm from the bottom of the leaf	13
Furniture	Serozzetta Plaza stainless steel lever type handle and Smith and lock escutcheon Ref. 4378H	132 (lever size) Ø50 (rose size)	Fitted appropriate to the centre latch	14
Security eye viewer	Jedo Ref. JV942	Ø14 (barrel size)	Fitted 735mm from the leaf head	15
Letter plate	Royde and Tucker LP008	250 x 40 (cut out size) 270 x 60 (sleeve size) 312 x 80 (footprint) 320 x 96 x 92 (cowl size)	Fitted 1183mm from the leaf head	16



## 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 15°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  $-4.25 \pm 2$  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 door frame, one at mid height on each jamb and one centrally located above the leaf on the frame head. The temperature of the letter plate was monitored by one thermocouple attached to the letter plate and one thermocouple fixed to the door leaf 25mm from the letter plate.

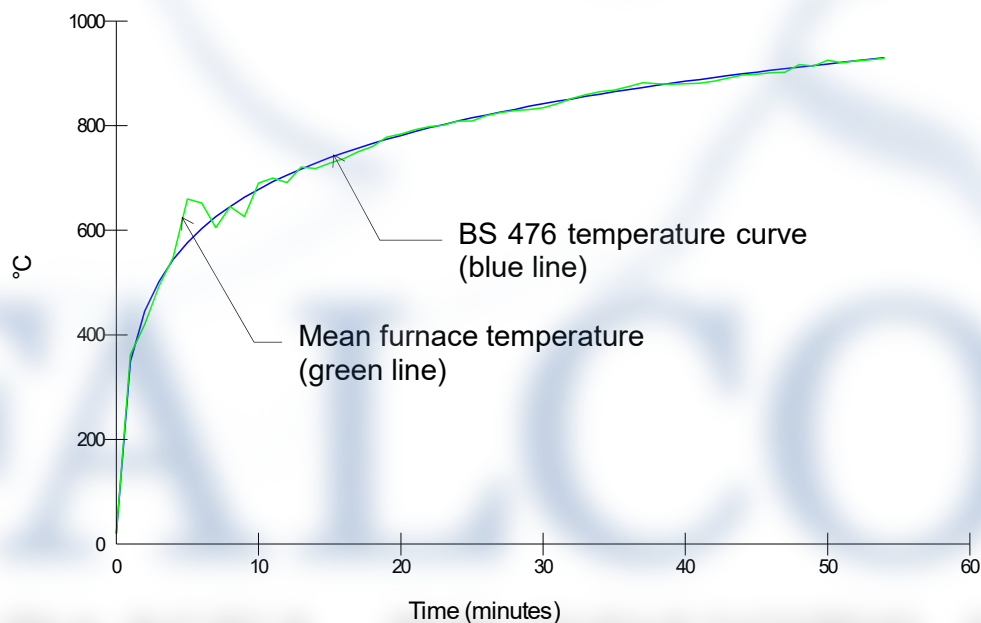
The thermocouple positions are shown in Figure 4 of the appendix. The average temperature of the door leaves and maximum temperature of the doorset are shown graphically in Section 5.2.

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## 5 Test results

The following data and observations were recorded during the test.

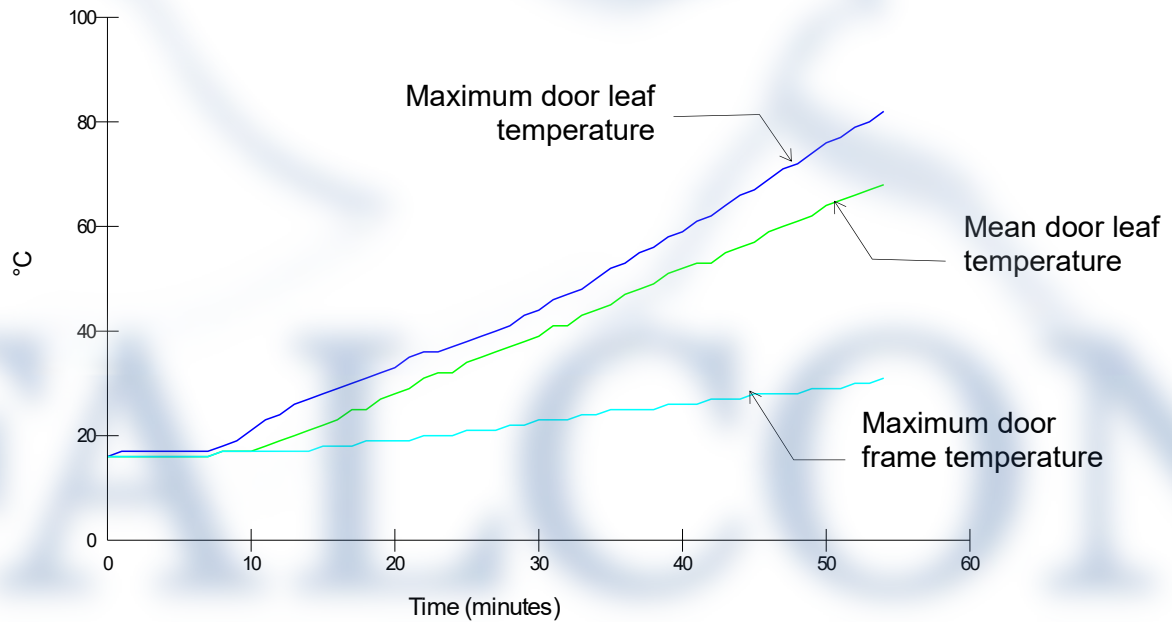
### 5.1 Furnace Temperature Curve



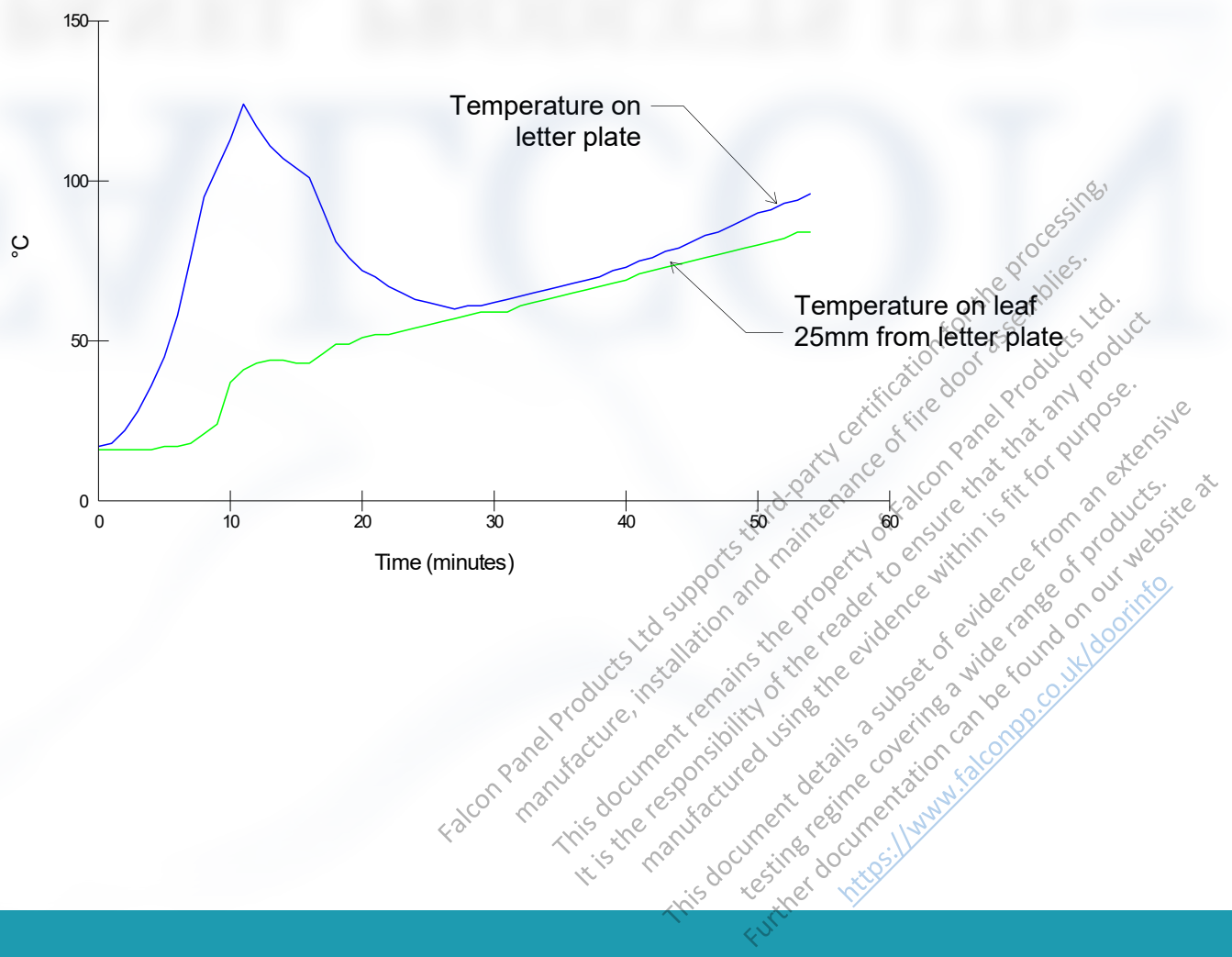
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## 5.2 Unexposed Face Temperature Curves

### Doorset A

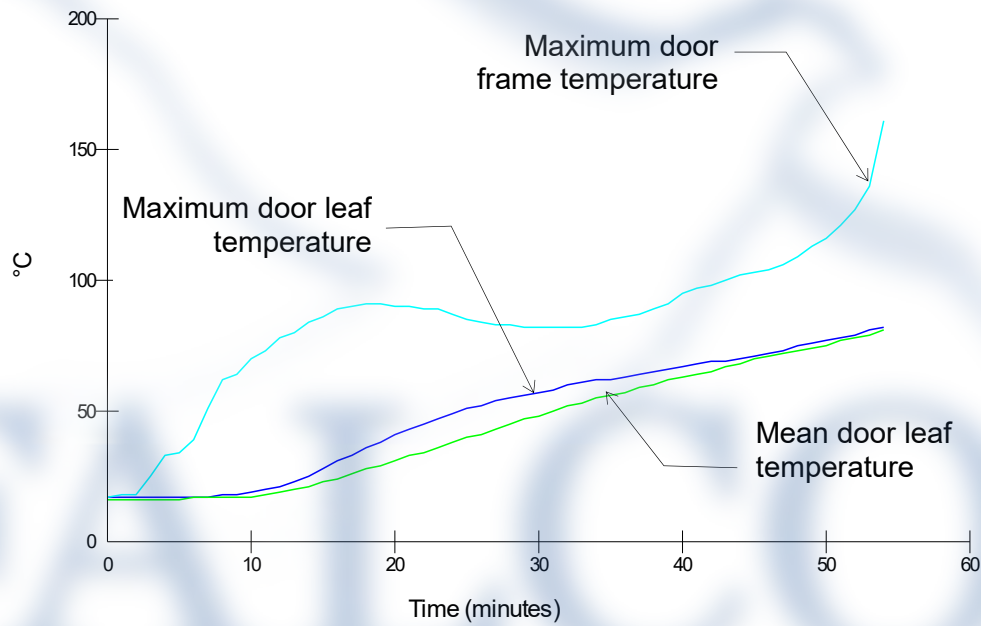


### Letter plate

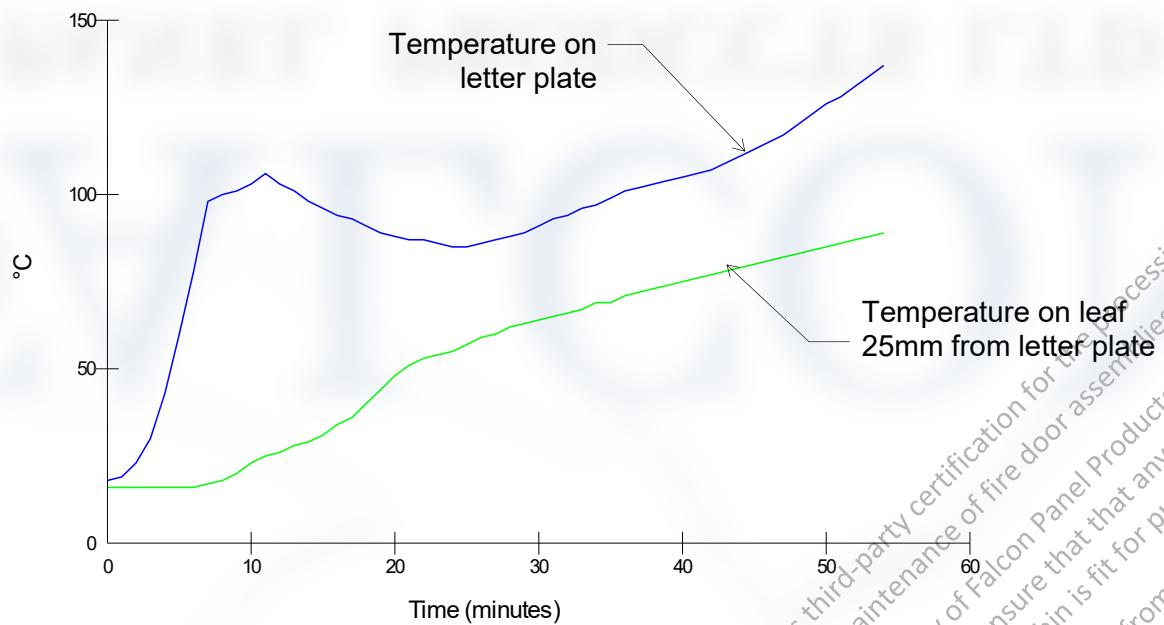




## Doorset B

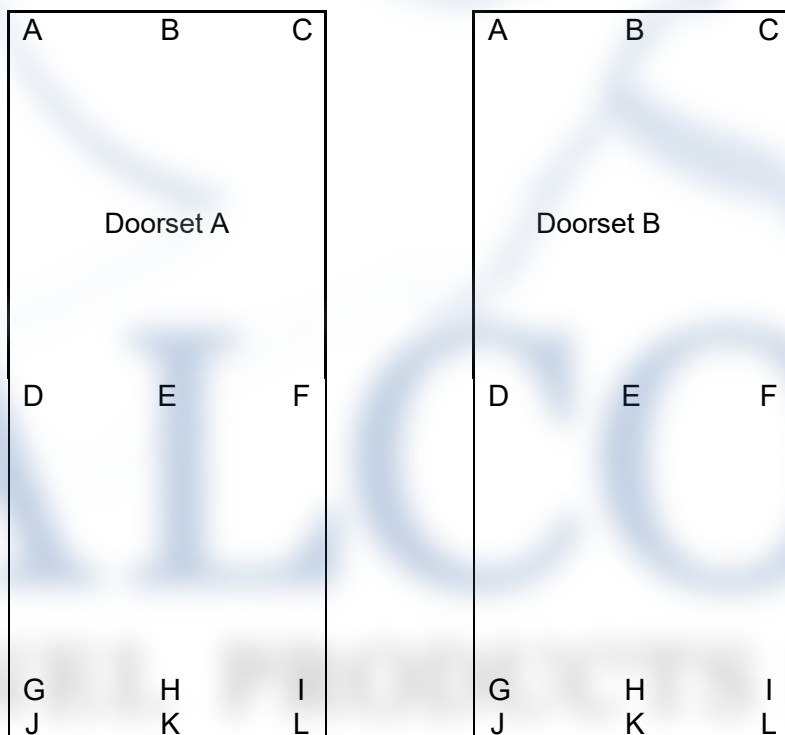


## Letter plate



### 5.3 Leaf Distortion Data

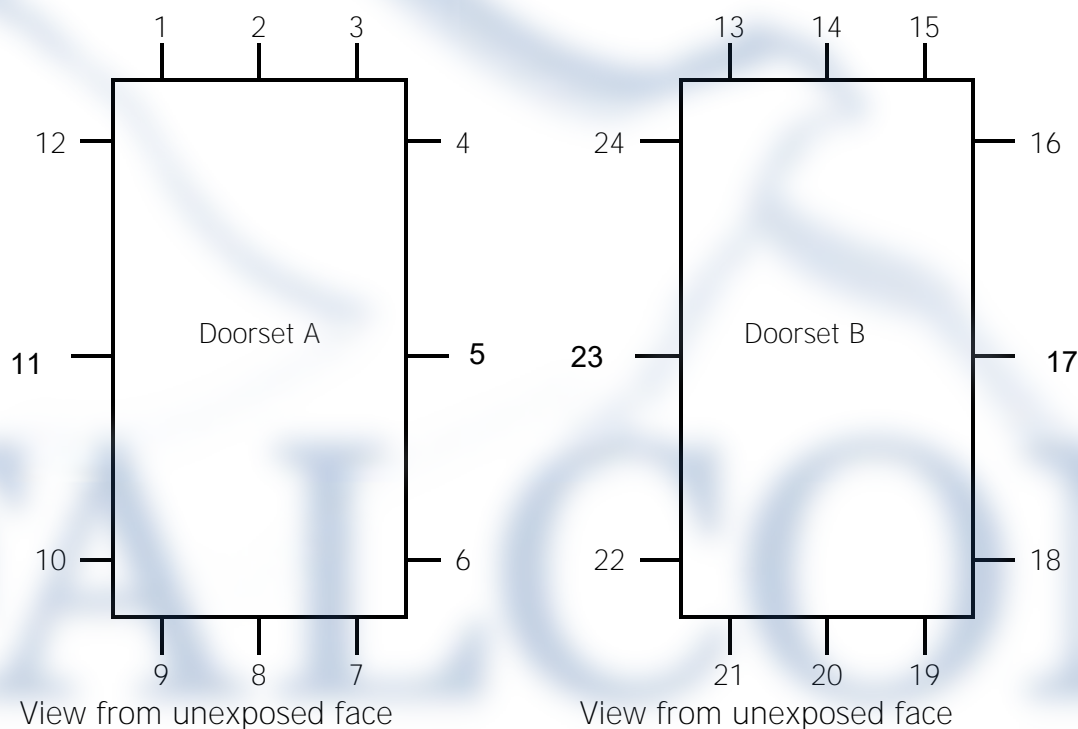
#### Deflections of the Doorsets During the Test



Doorset A												
Deflections – mm												
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L
0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	0	2	2	2	-1	2	-1	0	0	0
20	2	1	0	1	2	4	-1	2	-1	0	0	0
30	3	1	0	1	5	4	1	2	0	-2	51	-2

Doorset B												
Deflections – mm												
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L
0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	-2	1	0	0	-2	-2	-4	-2	0	0	-1
20	1	2	1	0	0	-2	-2	-4	-2	0	0	0
30	1	-8	1	-2	-4	-2	-2	-9	-2	-1	-2	-3

#### 5.4 Door leaf to frame gaps



Door Ref	Gap Dimension in mm at Positions											
A	1	2	3	4	5	6	7*	8*	9*	10	11	12
	3.1	3.1	3.0	3.1	3.2	3.3	2.3	2.2	2.1	3.1	3.0	3.3
B	13	14	15	16	17	18	19*	20*	21*	22	23	24
	2.6	2.7	3.0	3.0	2.8	2.9	2.2	2.1	2.0	3.1	3.0	3.2

Door Ref	Gap Between Face of Leaf and Doorstop in mm at Position											
A	1	2	3	4	5	6	7	8	9	10	11	12
	3.0	2.7	2.9	3.0	2.9	3.0	-	-	-	3.0	3.3	3.4
B	13	14	15	16	17	18	19	20	21	22	23	24
	2.5	2.5	2.5	2.5	2.7	2.9	-	-	-	2.5	2.5	2.5

Door Ref	Gap Between Doorframe and Supporting construction in mm at Position											
A	1	2	3	4	5	6	7	8	9	10	11	12
	10.0	9.0	9.0	9.0	10.0	11.0	-	-	-	10.0	10.0	12.0
B	13	14	15	16	17	18	19	20	21	22	23	24
	9.0	8.0	9.0	9.0	9.0	10.0	-	-	-	10.0	12.0	10.0

\* Dimension not included in calculations at the bottom

# Gap not measured

DO NOT SCALE  
ALL DIMENSIONS ARE IN mm



## 5.5 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00:00	Test Started
04:16	Doorset B, There is smoke issuing at the top closing corner, the head and the top hanging corner.
07:14	Both doorsets, There is smoke issuing at the letter box.
13:50	Doorset B, There is discolouration at the letter box.
14:15	Doorset A, There is smoke issuing at the top hinge position, the middle hinge position and the latch position.
14:36	There is smoke issuing at the latch position and 300mm down the closing edge from the top closing corner.
22:12	Doorset A, There is smoke issuing at the top hanging corner.
32:10	Doorset B, There is discolouration at the threshold.
34:57	Doorset B, There is a glow visible at the closing edge 120mm up from the bottom closing corner.
35:21	Doorset B, There is discolouration at the latch position.
36:03	Doorset A, There is continuous flaming at the threshold thereby constituting <b>integrity failure</b> .
36:19	Doorset B, There is discolouration at the eye viewer.
37:17	Doorset B, a cotton pad integrity test was performed at the closing edge which did not result in the ignition of the cotton pad. No failure.
38:10	Doorset B, There is continuous flaming at the threshold thereby constituting <b>integrity failure</b> .
51:18	Doorset A, There is a glow visible at the top hanging corner.
51:38	Doorset A, a cotton pad integrity test was performed at the top hanging corner which did not result in the ignition of the cotton pad. No failure.
53:15	Doorset A, a cotton pad integrity test was performed at the top hanging corner which did not result in the ignition of the cotton pad. No failure.
53:41	Doorset A, There is a glow visible at the top closing corner.
53:50	Doorset A, a cotton pad integrity test was performed at the top hanging corner which resulted in the ignition of the cotton pad therefore constituting <b>further integrity failure</b> .
54.00	Test terminated.

## 5.6 Times to Failure

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

	Integrity	Insulation
Doorset A	36 (thirty six) minutes	36 (thirty six) minutes *
Doorset B	38 (thirty eight) minutes	38 (thirty eight) 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 assemblies were asymmetrical and were tested such that doorset A opened towards the heating conditions of the test and 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:		
Name:	Anthony Davis	Nikolas Whitelock
Title:	Senior Technical Author	Technical Manager
Date of issue:	19/09/2019	19/09/2019



## Photographs

Intumescent interruption by hardware and additional intumescent protection

Around hinge blade



Around centre latch keep



Around top and bottom latch keeps



Around closer arm channel



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At the start of the test



After 10 minutes



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After 20 minutes



At 30 minutes



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After 45 minutes



Exposed face – post test



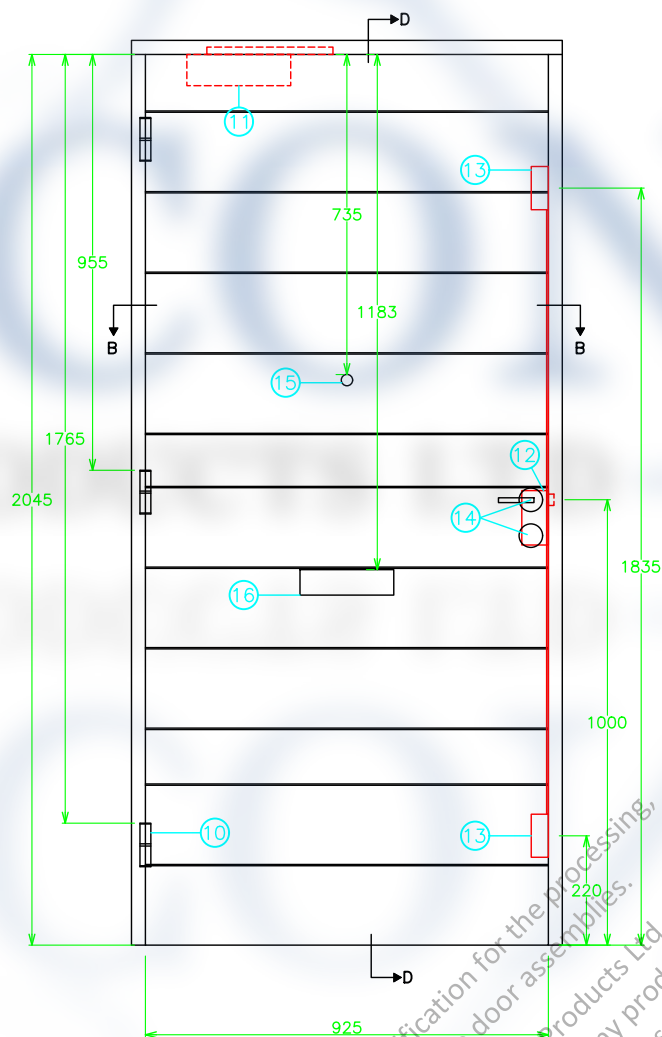
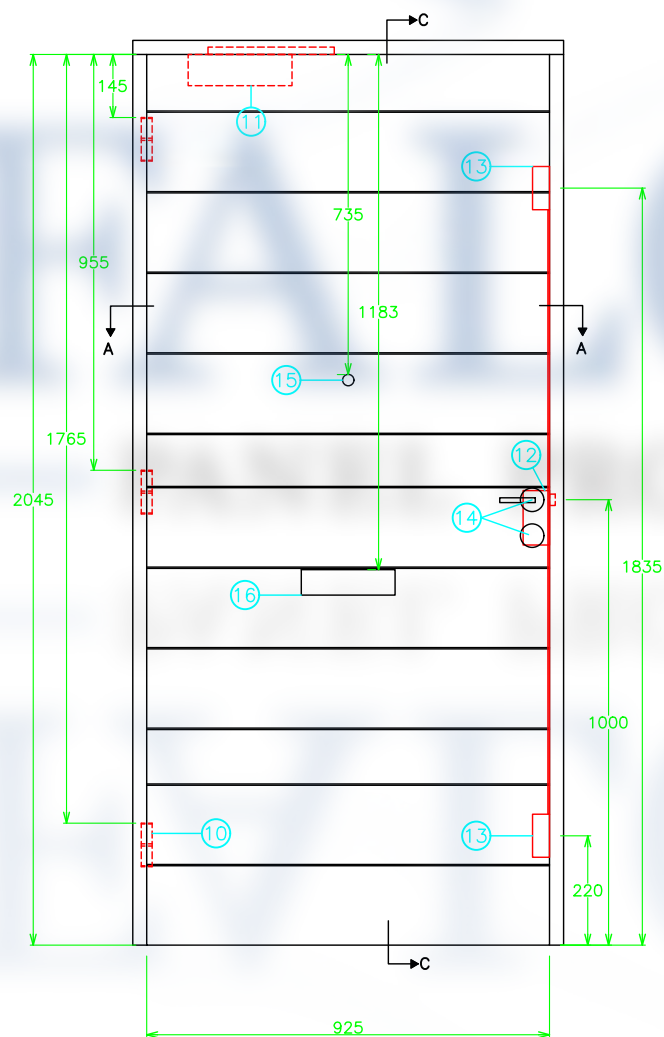
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**Appendix – figures 1 to 4**

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Doorset A

Doorset B



**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 06/06/19

Drawn By ARD

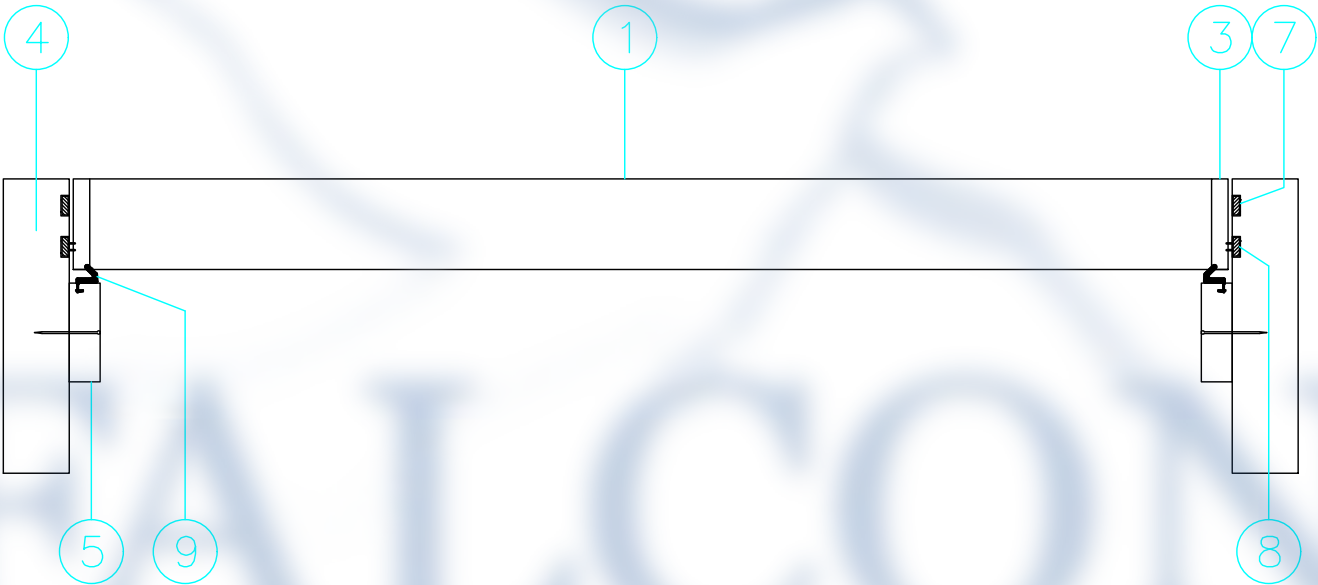
Scale NTS

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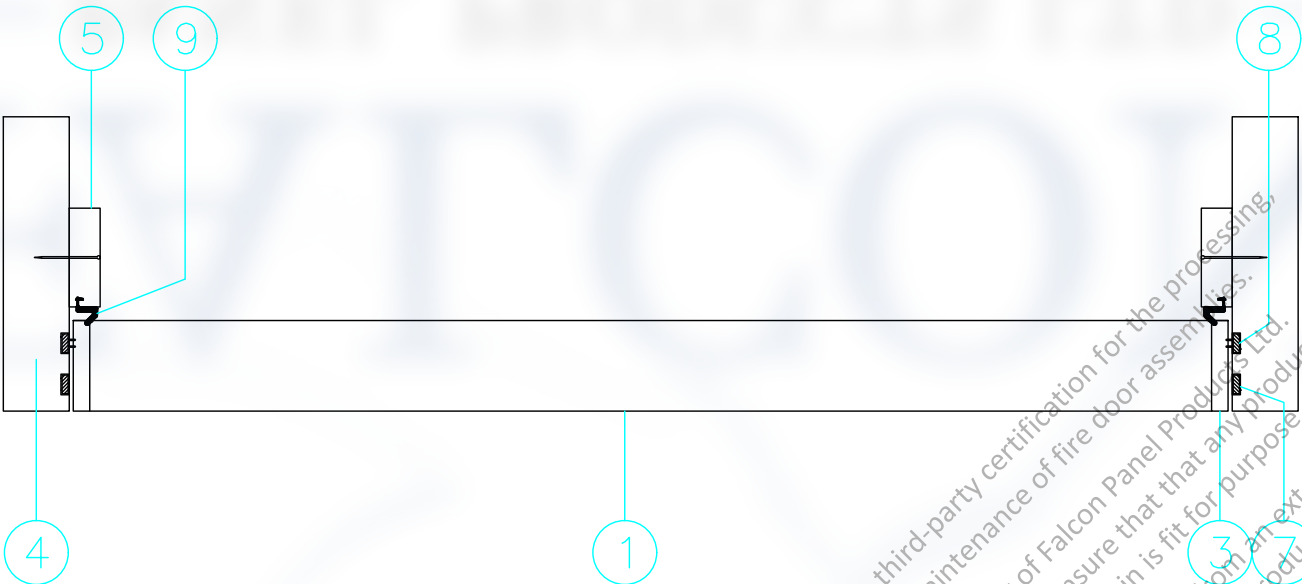
Appendix



Section A-A



Section B-B



**warringtonfire**  
Proud to be part of 

Warringtonfire, Stocking Lane,  
Hughenden Valley, High Wycombe,  
Buckinghamshire, HP14 4ND, UK.  
Tel: +44 (0)1494 569750

Title  
Horizontal cross-sections  
(All dimensions in mm)

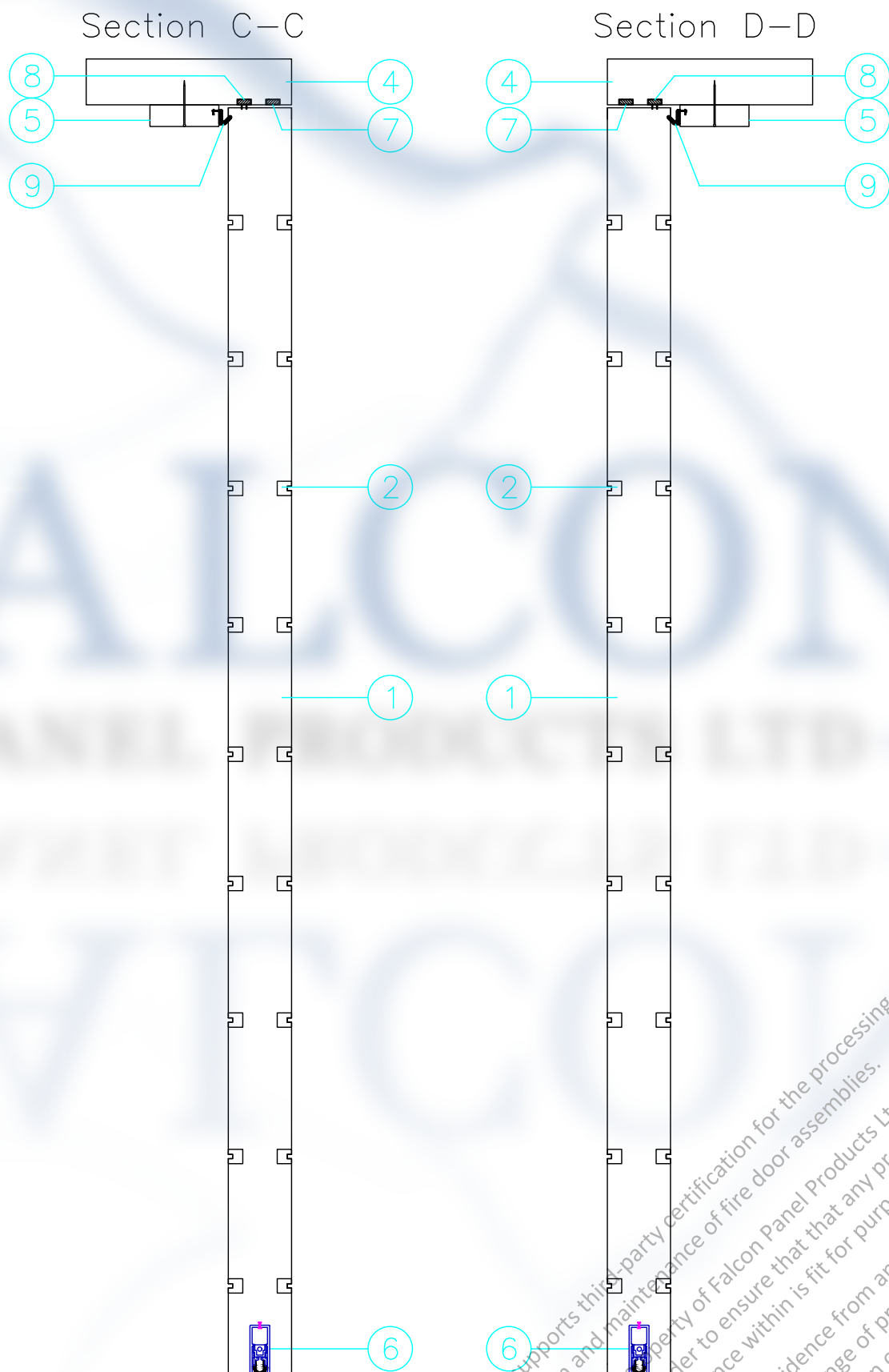
Date Drawn  
06/06/19

Drawn By  
ARD

Scale  
NTS

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Appendix



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Hughenden Valley, High Wycombe,  
Buckinghamshire, HP14 4ND, UK.  
Tel: +44 (0)1494 569750

Title

Vertical cross-section  
(All dimensions in mm)

Date Drawn

06/06/19

Drawn By

ARD

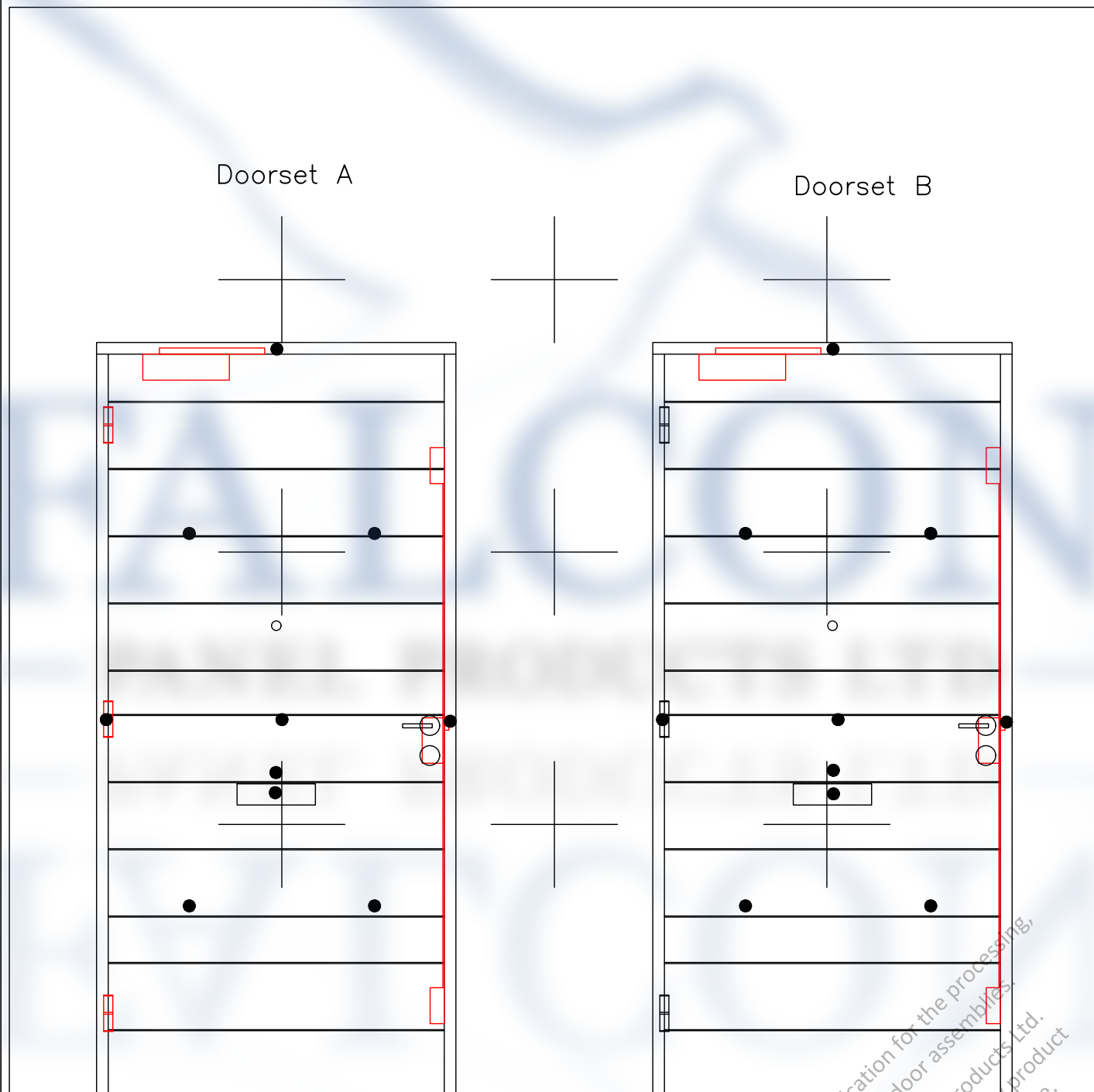
Scale

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Appendix



✚ : Furnace Thermocouples  
● : Unexposed Face Thermocouples

Viewed From Unexposed Face

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Buckinghamshire, HP14 4ND, UK.  
Tel: +44 (0)1494 569750

Title Thermocouple positions  
(All dimensions in mm)

Date Drawn  
06/06/19

Drawn By  
ARD

Scale  
NTS

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Appendix