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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:

403596

Prepared for:

Sealed Tight Solutions

Units 1B, 1C & 1D
Princess Court
Low Prudhoe Industrial Estate
Prudhoe
Northumberland
NE42 6PL

Test date:

20th August 2018

1762

Contents

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 BS476: Part 20/22: 1987

Times to failure:

	Doorset A	Doorset B
Integrity	[redacted]	39 (thirty nine) minutes
Insulation		39 (thirty nine) minutes **

* No failure at the termination of the test
** Failure by virtue of integrity failure

Summary of specimen:

Two unlatched, single-leaf, single-acting doorsets, both hung opening out away from the furnace.

Leaf size – doorset A:
[redacted]

Leaf size – doorset B:
2400mm high x 1000mm wide x 44mm thick

1 Introduction

The doorsets were manufactured and supplied for test by the client and delivered during August 2018.

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 leaf measured [redacted]. The right doorset was designated doorset B and the leaf measured 2400mm high x 1000mm wide x 44mm thick. Both doorsets were hung to open out away from the furnace. The results of this test were obtained from doorsets 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 this report.

2.3 Closer forces

Measured in accordance with FTSG Resolution No 63.

	Opening force (Nm)	Closing force (Nm)
Doorset A	[redacted]	
Doorset B	43	27

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

Leaf – Doorset A

[redacted]

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

Door frame – Doorset A

[redacted]

* Stated by client, not verified by laboratory ** Nominal density

Leaf – Doorset B

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Stiles and rails	None fitted	-	-	-	-
Core	Strebord 44 particleboard *	44 thick	550*	6.3	5
Facings	None fitted	-	-	-	-
Adhesive / Lippings	Technomelt polyurethane resin*	-	-	-	-
Lippings – all edges	Sapele*	6 thick	640**	7.9	6

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

Door frame – Doorset B

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Head and jambs	European Redwood*	95 wide x 32 deep	510*	10.9	7
Stop – planted (pinned)	European Redwood*	12 high x 32 wide	510*	10.2	8
Head to jamb jointing detail	Half lap jointed – screwed	-	-	-	-
Frame to supporting construction fire stopping detail	Stone based mineral fibre capped with 10mm deep ST88 intumescent mastic on the both sides	Nominally 10-18 wide x mineral fibre with 10mm ST88 intumescent capping to each face	-	-	-
Frame to supporting construction fixing detail	4No. steel screws per jamb with Broadfix Polyproprelene plastic packers fitted to the full depth of the frame at each fixing location*	5Ø x 100 long fitted at 600 to 800mm centres.*	-	-	-
Architrave	MDF fitted on the exposed face only	45 wide x 18 thick	750**	9.8	-
Threshold	Promat Supalux	9 thick	-	-	-

* Stated by client, not verified by laboratory ** Nominal density

Intumescent and sealing materials – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Leaf edge	None fitted	-	-	-
Frame reveal – head and jambs	Sealed Tight Solutions STS154FO (Fire only)	15 x 4	Fitted centrally in the frame reveal	9
	Sealed Tight Solutions STS1009 acoustic/smoke seal	11 x 5*	Fitted to the upstand of the stop	10

* 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 by the thickness of the hinge	-	Hinge blade partially interrupts the seal in the frame reveal – leaving nominally 1mm remaining continuous. See picture on page 17
Under hinge blades	None fitted	-	-
Encasing latch body	None fitted	-	-
Under latch forend	None fitted	-	-
Around latch keep	Fully interrupted	-	Latch keep fully interrupts the seal in the frame reveal
Under keep	None fitted	-	-

Hardware – both doorsets

	Make/type	Size (mm)	Location	Key to figures
Hinges	4No. Jedo 102 bearing butt type hinge – stainless steel construction	102 x 31 x 3 (blade size)*	Fitted 150mm, 800mm, 1445mm and 2095mm from the head of the leaf	11
Closer	Synergy Hardware overhead type closer Ref: s 800 EN 2-5*	260 x 75 (footprint)	Surface fitted on the unexposed face of the leaf as per the manufacturer's instructions	12
Latch – disengaged	Harbrine steel mortice lock/latch with Eurocylinder with thumbturn Ref: Hoppe Arrone AR8100*	235 x 20 (forend size) 235 x 85 x 20 (case size) 170 x 25 (keep size)	Centre of the latch nib fitted 975mm from the bottom edge of the leaf	13
Furniture	Harbrine lever type handle and lock escutcheon Ref: Instinct Hardware IH - 1912	Ø50 (rose size)	Fitted appropriate to the lock/latch	14

* Stated by client, not verified by laboratory

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 23°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 - 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.

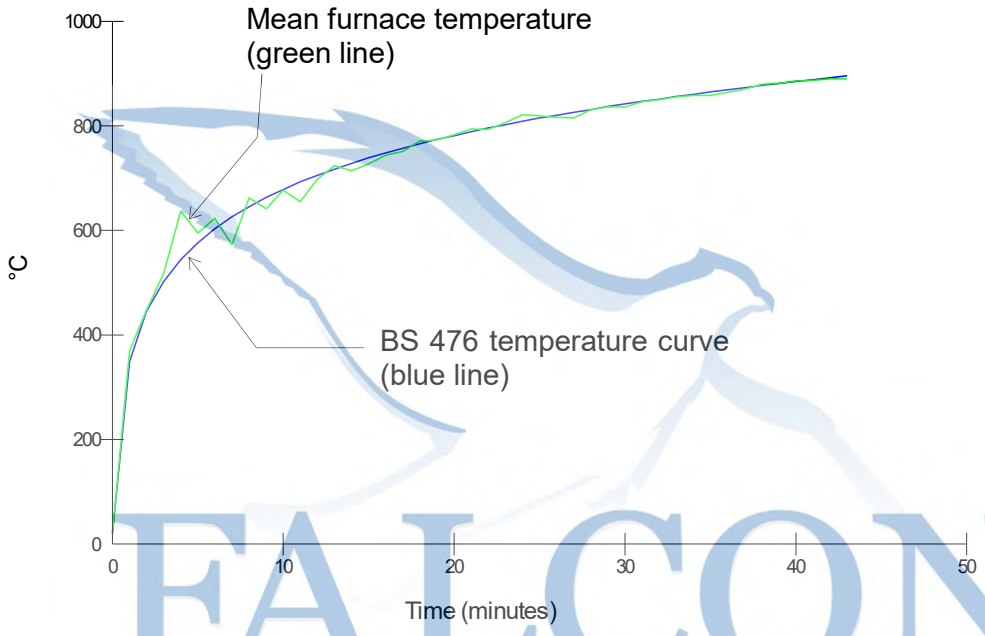
The temperature of the unexposed face of both doorsets was monitored by means of five thermocouples fixed to the surface of the door leaf and three thermocouples attached to the frame, one at midheight on each jamb and one centrally located above the leaf on the frame head, an additional thermocouple was fixed to the closer body.

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.

5 Test results

The following data and observations were recorded during the test.

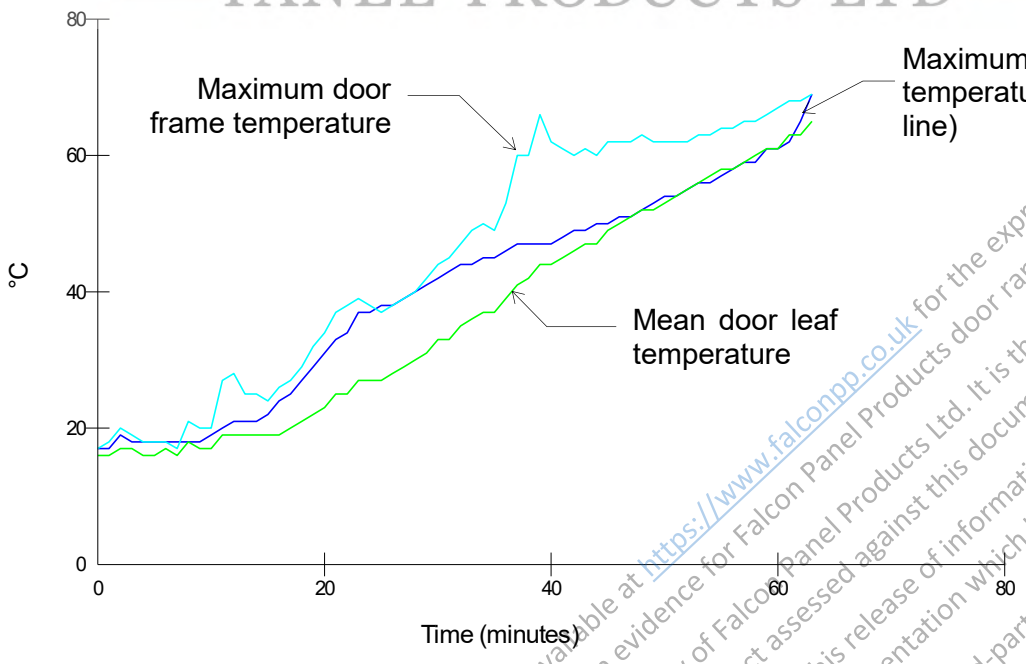
5.1 Furnace Temperature Curve



5.2 Unexposed Face Temperature Curves

Doorset A

Doorset B



5.3 Door 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.

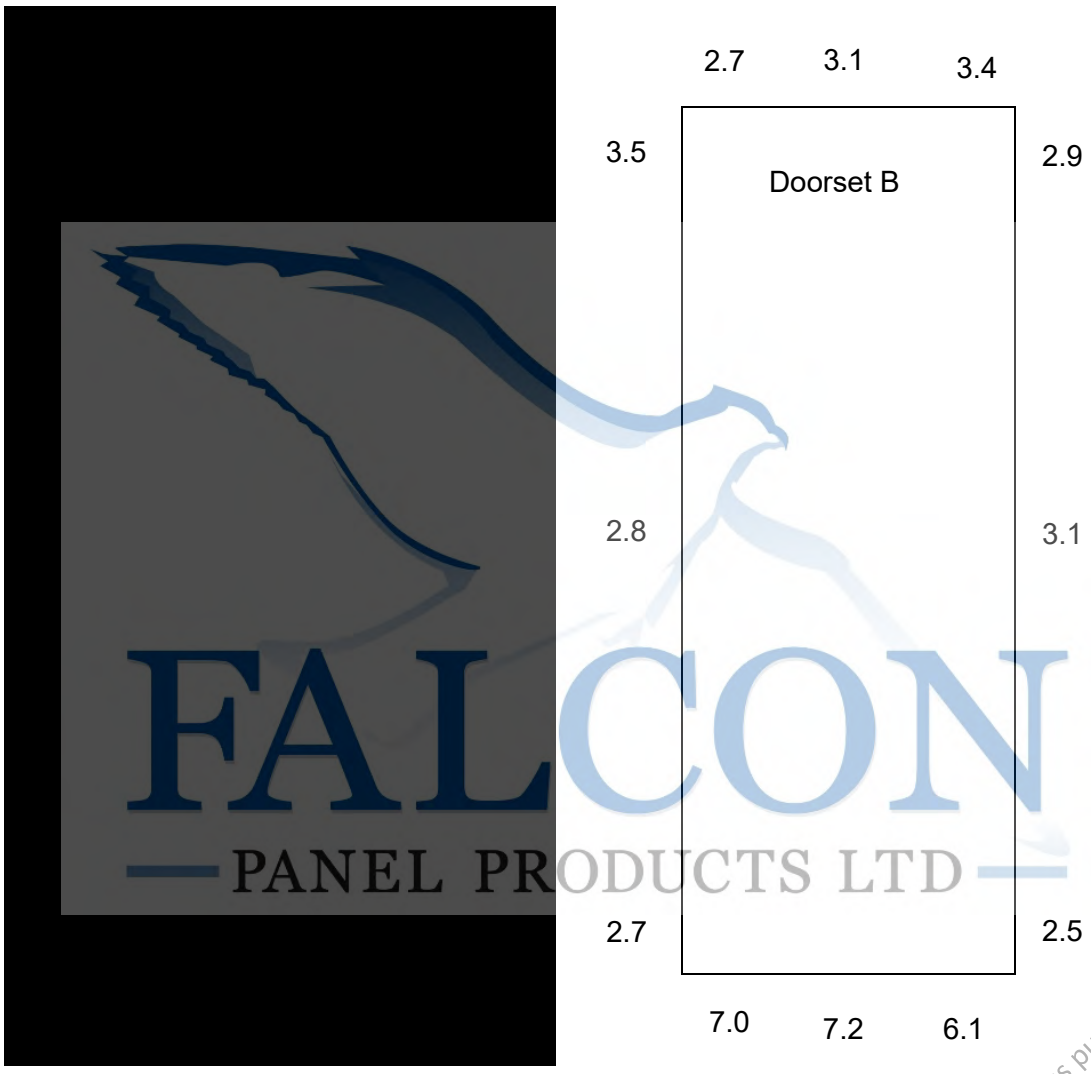
Doorset A - leaf (hung on the left and opening out away from the furnace)

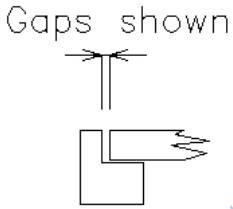
[redacted]

Doorset B – left 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
10	16	1	-5	-2	-14	-19	-2	-2	0	0	-	-
20	8	3	5	-4	-24	-18	3	-6	-5	0	-1	-2
30	8	5	11	-4	-29	-18	5	-	10	0	-	-2

5.4 Door leaf to frame gaps





5.5 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00:00	Test started
[redacted]	[redacted]
02:41	Doorset B, There is smoke issuing from the head.
03:56	Doorset B, There is smoke issuing from the closing edge.
[redacted]	[redacted]
07:09	Doorset B, There is smoke issuing from the hanging edge.
[redacted]	[redacted]
14:28	Doorset B, The door has distorted out at the centre point 16mm.
[redacted]	[redacted]
16:38	Doorset B, There is a visual bow outwards in the door leaf.
[redacted]	[redacted]
24:58	Doorset B, There is a glow visible at the hanging edge.
26:08	Doorset B, There is a glow visible at the latch position.
26:40	Exposed face, The architrave has fallen away.
27:18	Doorset B, There is a glow at the hanging edge allowing visibility into the furnace.
28:53	Doorset B, A cotton pad integrity test was performed at the latch position meeting edge which did not result in the ignition of the cotton pad. No failure
[redacted]	[redacted]
30:50	Both doorsets, There is discolouration around the top two hinge positions on both doorsets and the third hinge on doorset B.
34:40	Doorset B, There is a glow visible at the head.
35:17	Doorset B, A cotton pad integrity test was performed at the head which did not result in the ignition of the cotton pad. No failure
36:24	Doorset B, A cotton pad integrity test was performed at the head which did not result in the ignition of the cotton pad. No failure
37:22	Doorset B, A cotton pad integrity test was performed at the head which did not result in the ignition of the cotton pad. No failure

38:12 Doorset B, A cotton pad integrity test was performed at the head which did not result in the ignition of the cotton pad. No failure

39:04 Doorset B, A cotton pad integrity test was performed at the head which resulted in the ignition of the cotton pad, thereby constituting **integrity failure.**

39:41 Doorset B, There is intermittent flaming at the head.

40:11 Doorset B, There is a glow visible down the entire hanging edge.

40:56 Doorset B, There is continuous flaming at the head, thereby constituting **further integrity failure.**

42:12 Doorset B, There is continuous flaming down the entire hanging edge, 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 insulated doorsets and shutter assemblies, the requirements of the standard were satisfied for the following periods:

	Doorset A	Doorset B
Integrity	[redacted]	39 (thirty nine) minutes
Insulation	[redacted]	39 (thirty nine) minutes **

** Failure by virtue of integrity failure
* No failure at the termination of the test

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.

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 both door leaves from both doorset A and B, where tested opening 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.

	Written by:	Checked by:	Authorised by:
Signature:			
Name:	Liam Dunk	Courtney Clifford	Nik Whitelock
Title:	Technical Officer	Technical Officer	Technical Manager
Date of issue:	24/01/2019	24/01/2019	24/01/2019

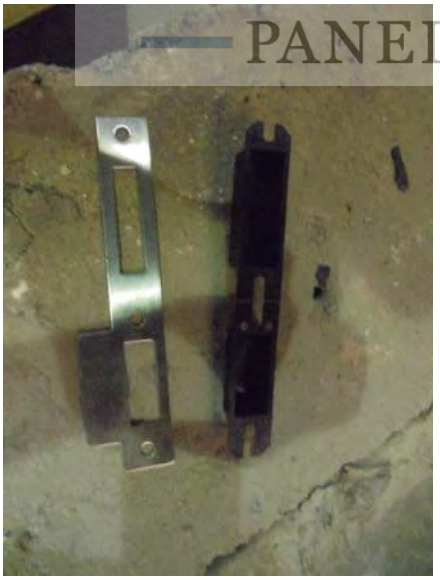
Photographs

Intumescent interruptions by hardware

Around hinge blade – both doorsets

Hinges – both doorsets

Keep – both doorsets



At start of test

After 10 minutes

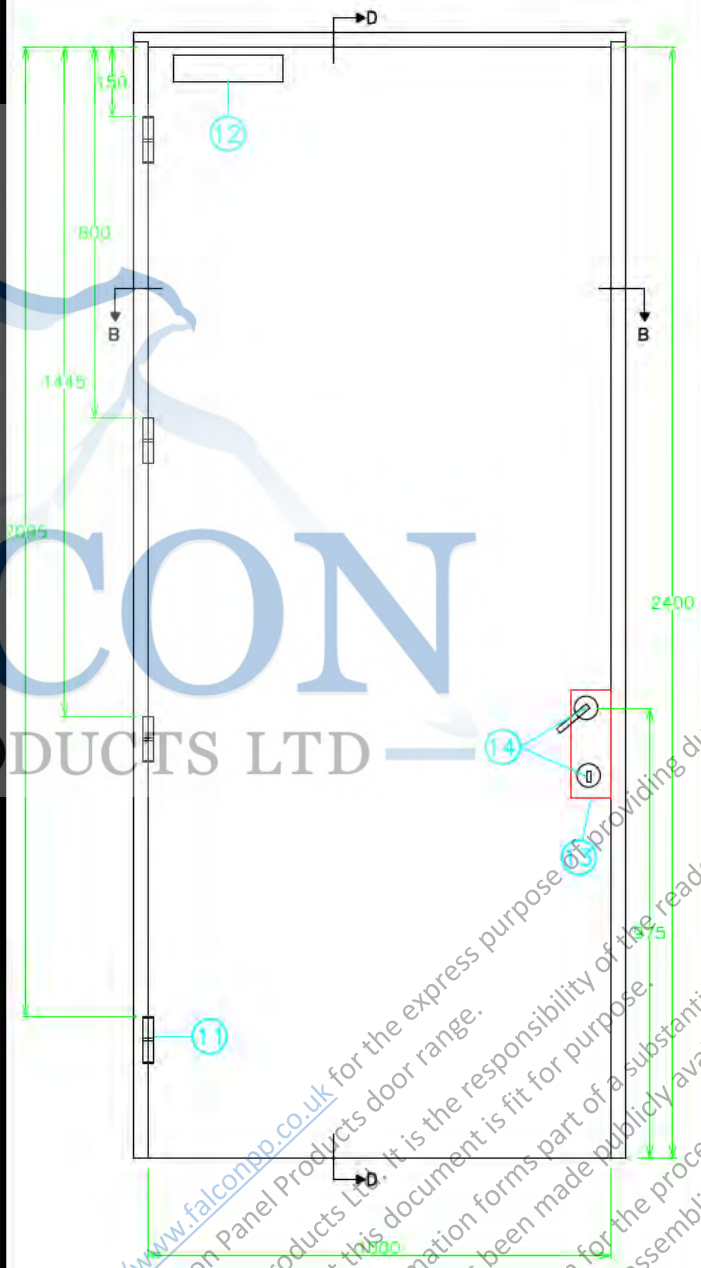
At 20 minutes

At 30 minutes

Exposed face, post test

Appendix – figures 1 to 4

Doorset B



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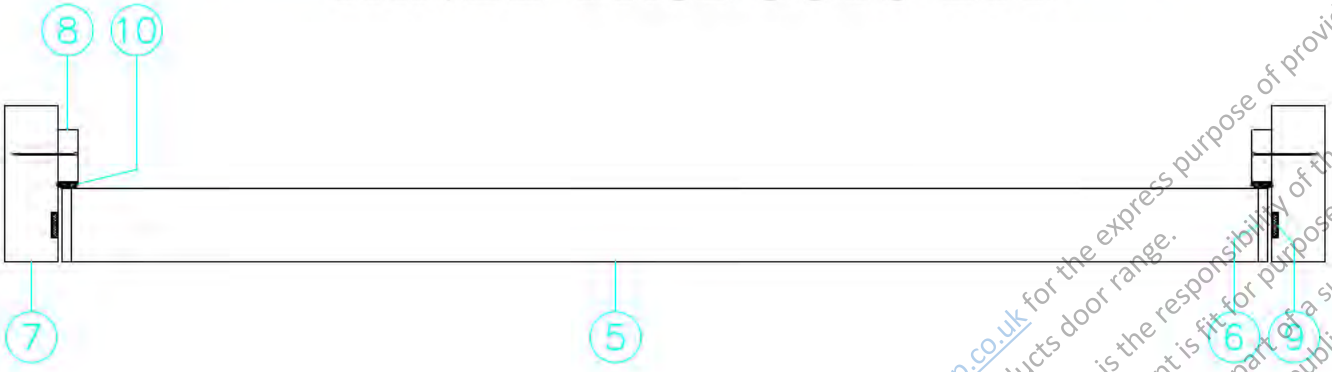
Title: Unexposed face elevation showing hardware positions (All dimensions in mm)		
Date Drawn: 24/08/18	Drawn By: ARD	Scale: NTS
Project No.: WF 403596		Appendix

Section B–B



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Title	Horizontal cross sections (All dimensions in mm)
Date Drawn: 24/08/18	Drawn By: ARD
Scale: NTS	
Project No: WF 403596	Appendix

[redacted]

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Title		
Vertical cross section (All dimensions in mm)		
Date Drawn 24/08/18	Drawn By ARD	Scale NTS
Project No. WF 403596		Appendix

: Furnace Thermocouples

: Unexposed Face Thermocouples

Viewed From Unexposed Face

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Title
Thermocouple positions
(All dimensions in mm)

Date Drawn	Drawn By	Scale
24/08/18	ARD	NTS

Project No.
WF 403596

Appendix