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Testing, calibrating, advising.

Title:

The fire resistance performance of a single leaf single acting doorset, when tested in accordance with BS EN 1634-1: 2014 and BS EN 1363-1: 2012

WF Report No:

WF 391562



Prepared for:

Astra Door Controls Ltd

Astra Business Centre
Preston
Lancashire
PR2 5AP

Test date:

6th November 2017

Notified Body No:

1314



1762

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1 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 EN 1634-1: 2014 and BS EN 1363-1: 2012

Integrity	
Cotton pad	40 (forty) minutes*
Continuous flaming	35 (thirty five) minutes
Gap gauges	40 (forty) minutes*
Insulation I₂ - 1 discrete area	
Discrete area 1 – timber	
Average set	35 (thirty five) minutes **
Maximum ≥ 100mm in from leaf edge	35 (thirty five) minutes **
Door frame ≥ 180°C temp rise	35 (thirty five) minutes **
Door frame ≥ 360°C temp rise	35 (thirty five) minutes **
Radiation – time to 15kW/m²	40 (forty) minutes*

* No failure of this test criteria had occurred at termination of the test at 40 minutes

** Failure by virtue of integrity failure at 35 minutes



Summary of specimens:

An unlatched single leaf single acting doorset

Leaf size:

1983mm high x 839mm wide
x 44mm thick

2 Introduction

The doorset was installed into a flexible supporting construction. In accordance with BS EN 16034: 2014 Annex A the leaf was pre-cycled before the fire test. The doorset was instrumented with the standard set of thermocouples. The doorset was installed opening in towards the furnace.

3 Specimen verification

The doorset was supplied for testing to Exova Warringtonfire by the client during November 2017. The component parts of the doorset were identified based on nominal information provided by the client. The conformity of the specimen against these nominal values has been verified and agreed by the laboratory insofar as the structure of the specimen allowed verification to take place. If possible, additional moisture content readings, species verification and density checks were performed on either the original specimen, or, samples provided by the sponsor. These details are outlined in the construction section of this report (section 6).

3.1 Conditioning

Exova Warringtonfire stored the specimen in climatic conditions approximate to those in normal service.

3.2 Sampling

Exova Warringtonfire was not involved in factory sampling of the components used for the specimen subject to this report.

The closer used within this test was stated by the client to be AST 4000 series and to have been sampled by Ian Laithwaite of IFC Certification on 11/09/17. The sampling report can be found within the Appendix 1.

4 Description of supporting construction

The supporting construction comprised a British Gypsum steel stud partition with 50mm thick 30kg/m³ density insulation fitted between the studs, built in accordance with Clause 7.2.2.4 of BS EN 1363: Part 1, for a flexible supporting construction (table 1 group A). The vertical studs surrounding the apertures created for the doorsets incorporated a 47mm x 29mm softwood timber infill to facilitate the fixings for the specimen. The specimen tested is a 30 minute product with an anticipated Category B performance, therefore intended fire resistance is 36 minutes and one layer of 12.5mm thick Gypsum plasterboard type F is required on each face. The supporting construction was only fixed on the horizontal edges, the vertical edges remained free.

5 Description of specimens

Details of the specimen are shown in Figures 1 to 6 of Appendix 1.

5.1 Door leaf

The leaf measured 1983mm high x 839mm wide x 44mm thick.

6 Description of construction (Figures 1 to 6 of Appendix 1)

Leaf – Stated by the client to be constructed from Falcon Panel Products Strebord 44

	Species/type	Dimensions (mm)	Density (kg/m ³)	Moisture (% w/w)	Key to figures
Stiles and rails	None fitted	-	-	-	-
Core	Falcon Panel Products Strebord particleboard core	44 thick	520-630*	7.5	1
Veneer	Beech*	0.5 nominal thickness	-	-	-
Adhesive	Lippings	PVA*	-	-	-
	Veneer	Unknown Adhesive*			
Lippings – all edges	Sapele	8 thick	640**	8.6-8.9	2

*Stated by client, not verified by laboratory

** Nominal density, TRADA timber database

Door frame

	Species/type	Dimensions (mm)	Density (kg/m ³)	Moisture (% w/w)	Key to figures
Head and jambs	Sapele	91 wide x 35 thick	640**	10.2	3
Stop – planted (pinned)	Sapele	32 wide x 13 high	640**	10.0	4
Frame jointing detail	Half lapped - screwed	-	-	-	-
Fire stopping	Tightly packed rock mineral fibre capped with intumescent acrylic mastic on the exposed face	10 - 15 wide x full depth of frame	-	-	-
Architrave	European Redwood	45 thick x 18 wide	510**	-	-
Threshold	Non combustible	-	-	-	-
Frame fixings	4No. steel woodscrews per jamb	Ø5 x 100 long	-	-	-

* Stated by client, not verified by laboratory

** Nominal density, TRADA timber database

Intumescent and sealing materials

	Make/type	Size (mm)	Location	Key to figures
Leaf edge	None fitted	-	-	-
Frame reveal – head and jambs	1No. Sealed Tight Solutions STS 154FO	15 x 4	Fitted 15mm from the exposed face in the frame reveal	5

Intumescent interruptions and additional protection

	Make/type	Size (mm)	Location
Around hinge blade	Fully interrupted	-	Hinge blade fully interrupts seal in the frame reveal
Under hinge blades	None fitted	-	-
Around closer reaction plate	Fully interrupted	-	Closer reaction plate fully interrupts seal in frame reveal
Under closer reaction plate	None fitted	-	-

Hardware

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No. Royde and Tucker Hi-Load 101 stainless steel bearing butt type hinge fixed with 5No. 31mm long screws per blade	100 x 34 x 3 (blade size)	Fitted 150mm, 925mm and 1700mm from the head of the leaf	6
Closer	Astra Door Controls Ltd jamb acting concealed closer Ref: AST 4000 series*	110 x 32 (forend size)	Fitted 1035mm from the head of the leaf	7
Latch	None fitted	-	-	-
Furniture	None fitted	-	-	-

*Stated by client, not verified by laboratory

7 Pre-test measurements and mechanical conditioning

Pre-test measurements and mechanical conditioning were conducted on the sample in the order detailed below.

7.1 Method of installation

The doorset was fixed into a pre-prepared opening. The details of the fixings and fire stopping between frame and supporting construction are outlined in the construction section and Figure 4 of Appendix 1. The exposed face of the doorset was flush with the exposed face of the supporting construction.

7.2 Pre-cycling operability

Operability test of 25 manual cycles was completed on the leaf in accordance with BS EN 16034: 2014 Annex A, section A2.2.

Minimum angle of opening	90°
Number of operation cycles completed	25

7.3 Specimen self-closing

Specimen self-closing was completed on the leaf in accordance with BS EN 14600, section 5.1.1.2 / 5.1.1.3.

Angle of measurement	10° ± 2°
Closing speed	0.51 seconds

7.4 Door perimeter gaps

The manufacturer did not declare a working range so the door was installed to open and close freely, maintaining gaps, where possible, to a range of 2-4mm along all edges except the threshold, and 3-8mm along the threshold. The gaps between the edge of the leaf and frame were measured prior to test in accordance with BS EN 1634-1 2014, section 10.1.2. A total of 12 readings were recorded. The measurements (in mm) are detailed in Figure 5 of Appendix 1.

7.5 Closer forces

Measured in accordance with BS EN 1634-1: 2014 Section 10.1.3.

Opening Force (Nm)	Closing force (Nm)
36 @ handle position	24 @ handle position

7.6 Final setting

Final setting of the specimen was conducted in accordance with BS EN 1634-1 2014, section 10.1.4.

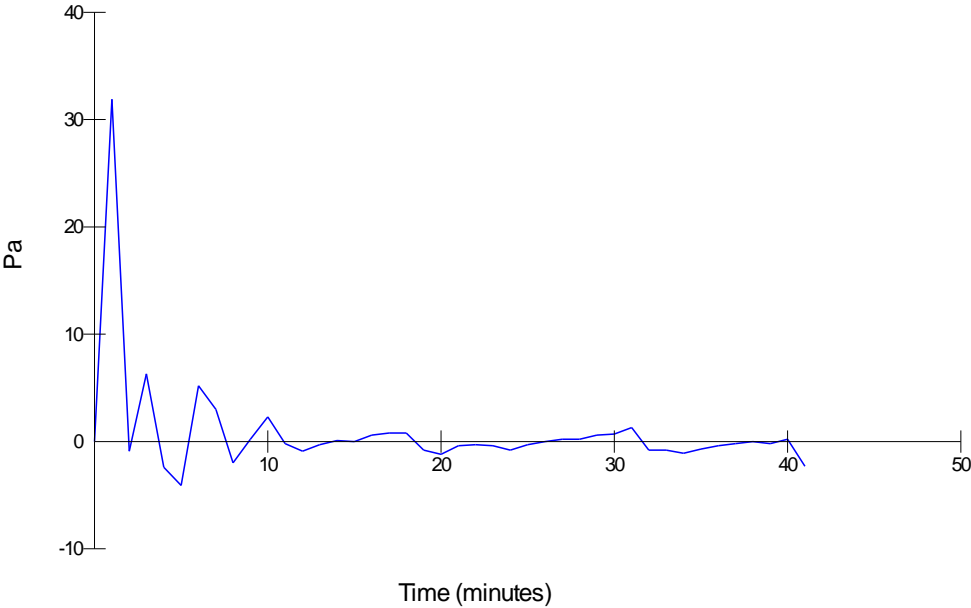
8 Test conditions

8.1 Ambient temperature

The ambient temperature of the test area at commencement of test was 11°C.

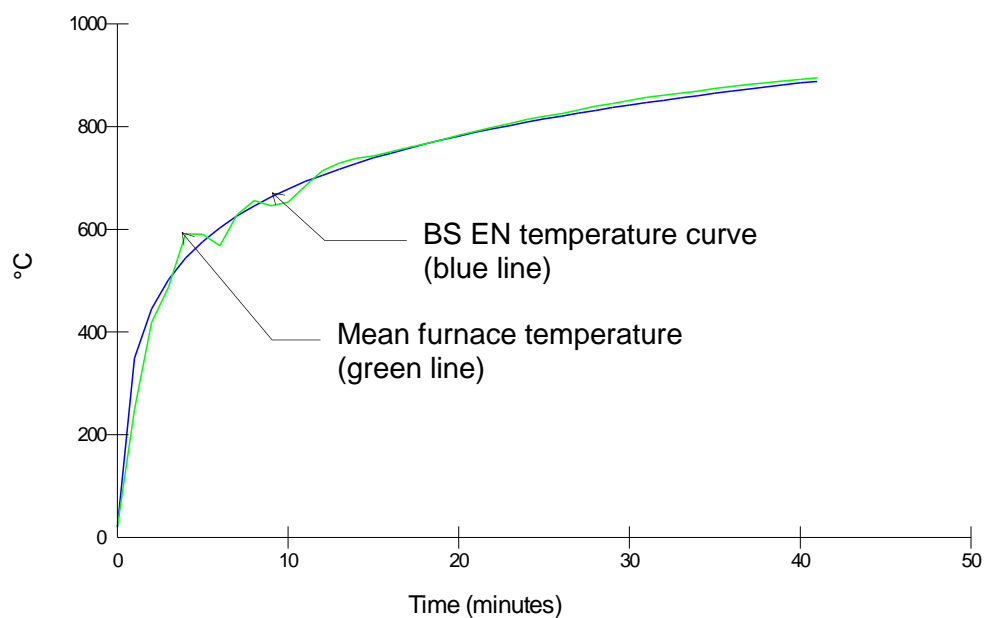
8.2 Pressure readings

After the first 5 minutes of the test, the furnace pressure was maintained at 0 ± 5 Pa and after 10 minutes was maintained at 0 ± 3 Pa with respect to atmosphere, at a point 0.5m from the notional floor level. The pressure readings were recorded and are shown graphically below:



8.3 Furnace temperature

The furnace was controlled to follow the temperature/time relationship specified in BS EN 1363: Part 1: 2012 Section 5.1.1 as closely as possible, using the average of nine plate thermometers suitably distributed within the furnace. The temperatures were recorded and are shown graphically below:



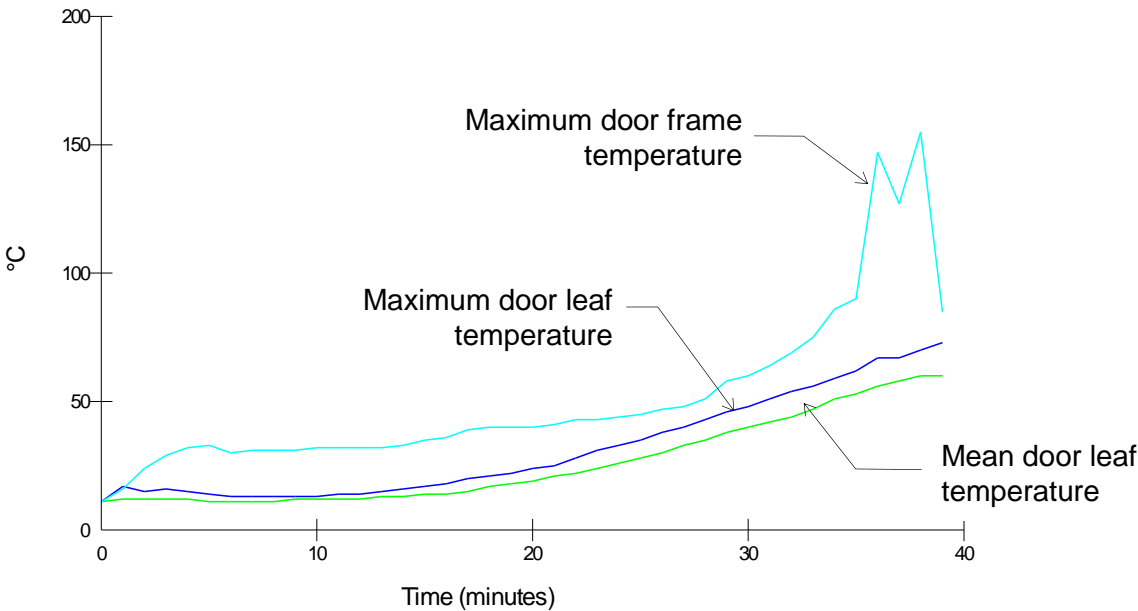
8.4 Unexposed face temperatures

The temperature of the unexposed face was monitored by means of the following thermocouples:

	1 discrete area	
Leaf	Discrete area (timber)	5 measuring mean temperature rise. 4 measuring maximum temperature rise, standard set 100mm in from the door leaf edges.
Frame		5 measuring maximum temperature

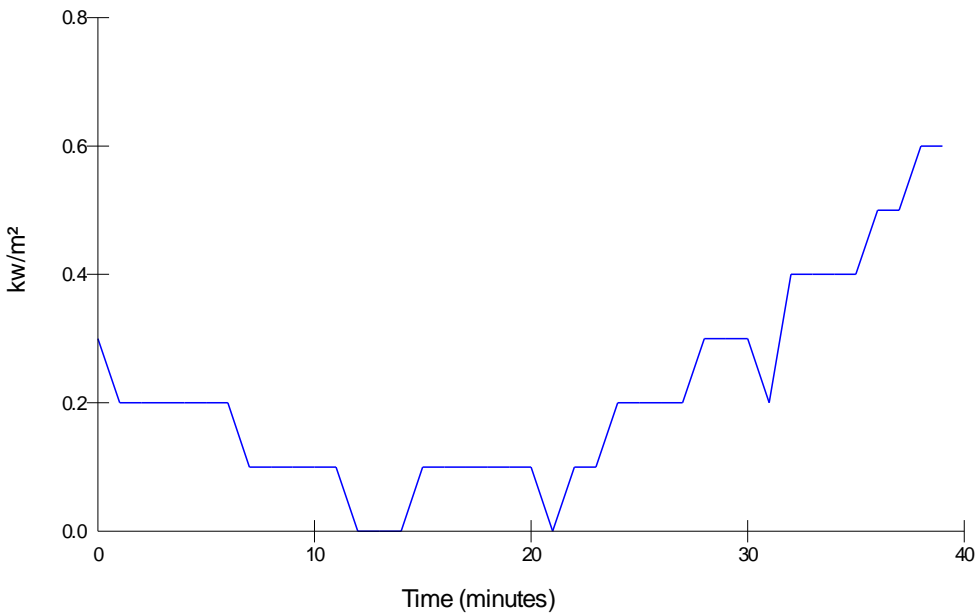
The locations of the thermocouples are shown in Figure 6 of Appendix 1. The temperatures were recorded and tabulated in Appendix 2 and are shown graphically below:

Unexposed face temperature curves



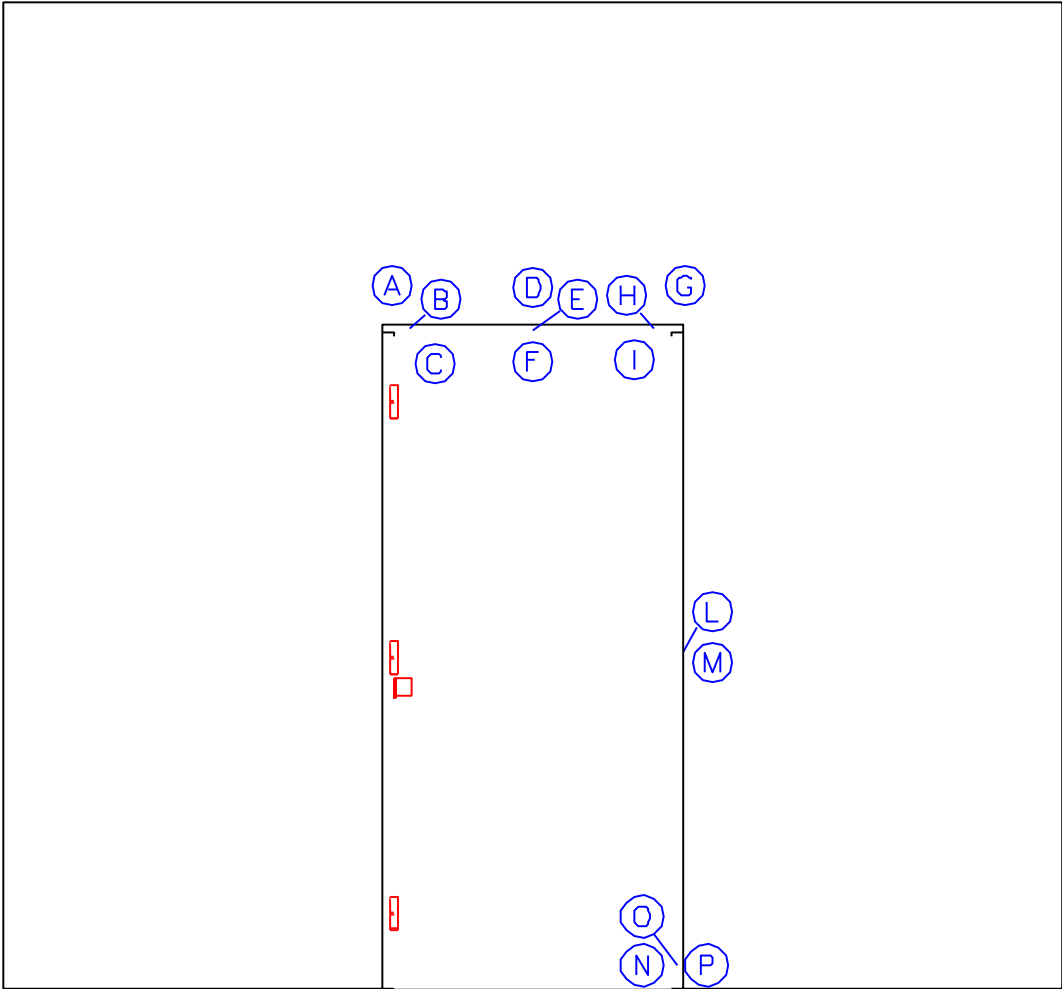
8.5 Radiation

A radiometer was used to measure the radiation 1m away from the specimen. The results of the radiometer were recorded and are shown graphically below:



8.6 Leaf and frame distortion data

The following tables show the distortion 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.



Leaf - hung on the left and opening in towards the furnace

Time	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
10	12	11	9	10	12	11	11	10	11	9	9	11	10	8	7	8
20	24	25	24	28	29	31	32	34	35	19	24	24	26	14	10	8
30	32	35	35	44	43	42	47	50	54	17	32	36	35	16	11	9

9 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00:00	Test started.
01:00	There is smoke issuing at the top half of perimeter door gaps.
02:30	There is smoke issuing across the head and top hinge position, top hanging corner and top closing corner.
04:12	There is smoke issuing at the top half of the closing edge.
05:52	There is discolouration at the top hinge position.
11:15	Exposed face, the veneer has fallen away, fissures approximately 3-4mm on the leaf.
27:03	There is a glow visible at the top hinge position.
29:10	A cotton pad integrity test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure.
33:46	A cotton pad integrity test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure.
35:29	A cotton pad integrity test was performed at the top hinge position which did not result in the ignition of the cotton pad. No failure.
35:51	There is continuous flaming at the top hinge position thereby constituting integrity failure .
37:11	There is smoke issuing and discolouration at the top closing corner across the leaf head for approximately 300mm.
38:01	There is continuous flaming at the head, 250mm from the top hanging corner, thereby constituting further integrity failure .
39:00	There is a glow visible at the top closing corner.
40.00	Test Terminated.

10 Expression of results

Integrity	
Cotton pad	40 (forty) minutes*
Continuous flaming	35 (thirty five) minutes
Gap gauges	40 (forty) minutes*
Insulation I₂ - 1 discrete area	
Discrete area – timber	
Average set	35 (thirty five) minutes **
Maximum ≥ 100mm in from leaf edge	35 (thirty five) minutes **
Door frame ≥ 180°C temp rise	35 (thirty five) minutes **
Door frame ≥ 360°C temp rise	35 (thirty five) minutes **
Radiation – time to 15kW/m²	40 (forty) minutes*

* No failure of the test criteria had occurred at termination of the test at 40 minutes

** Failure by virtue of integrity failure at 35 minutes



11 Limitations

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 outline in BS EN 1634-1, BS EN 1363-1, and where appropriate BS EN 1363-2. Any significant deviation with respect to size, construction details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

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 leaf to frame gaps recorded in Figure 5 of Appendix 1. The fire resistance performance of doors of this design may change if substantially different gaps are employed.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. Exova Warringtonfire will be able to offer, on behalf of the legal owner, 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.

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.

	Written and Checked by:	Authorised by:
Signature:		
Name:	Alan McKie	Nikolas Whitelock
Title:	Technical Officer	Lead Technical Officer
Date of issue:	07/02/2018	07/02/2018

12 Field of direct application of test results

The results of the test are directly applicable to similar constructions where one or more of the changes listed in BS EN 1634-1: 2014, Clause 13, are made and the construction continues to comply with that appropriate design code for its stiffness and stability. Other changes are not permitted by the document. A copy of the field of direct application is available from Exova Warringtonfire upon request.

Photographs

Intumescent interruptions by hardware and additional intumescent protection

Around hinge blade



Around closer reaction plate



At start of test



At 10 minutes



At 20 minutes



At 30 minutes



Exposed face – post test




Appendix 1 – Sampling report and figures 1 to 6

IFC certification Sample Report

This report provides a record of the information relating to samples taken by IFC Certification Limited, or its agent, for certification of the products detailed below.

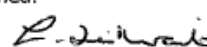
IFCC Job No.	17078	IFCC Notified Body No.	1720
Manufacturer	Aska Door Controls.		
Certificate holder if different from above	_____		
Manufacturing site	UNIT 10, ASTRA BUSINESS CENTRE, CONWAY, PLETON PR2 5AP		
Place of sampling (if different from above)	_____		
Stock/batch quantity from which samples selected	MANUFACTURED ON THE DAY FOR TEST WITNESSED BY THE ANALYST.		
Number/quantity of samples	3 of each type.		
Identification of the product in accordance with the technical specification	4001 4002 COMMENTS DOOR CLOSERS. 4003		
Manufacturer's marks including batch no. and date of manufacture	4001 x 3 4002 x 3 11/9/17 4003 x 3		
Sampler's identifying marks	E. J. K. 11/9/17		
Samples to be dispatched by manufacturer to	A - TO BE DETERMINED. B - TESTED ON SITE C - TO BE DETERMINED.		
Properties to be tested	A - TUGGAGE B - WEAR/TEAR C - SALT CORROSION		
Date of sampling	11/9/17		
Comments	MANUFACTURED TO DOCUMENTED PROCEDES AS WITNESSED BY THE ANALYST.		

Signed:


for and on behalf of manufacturer

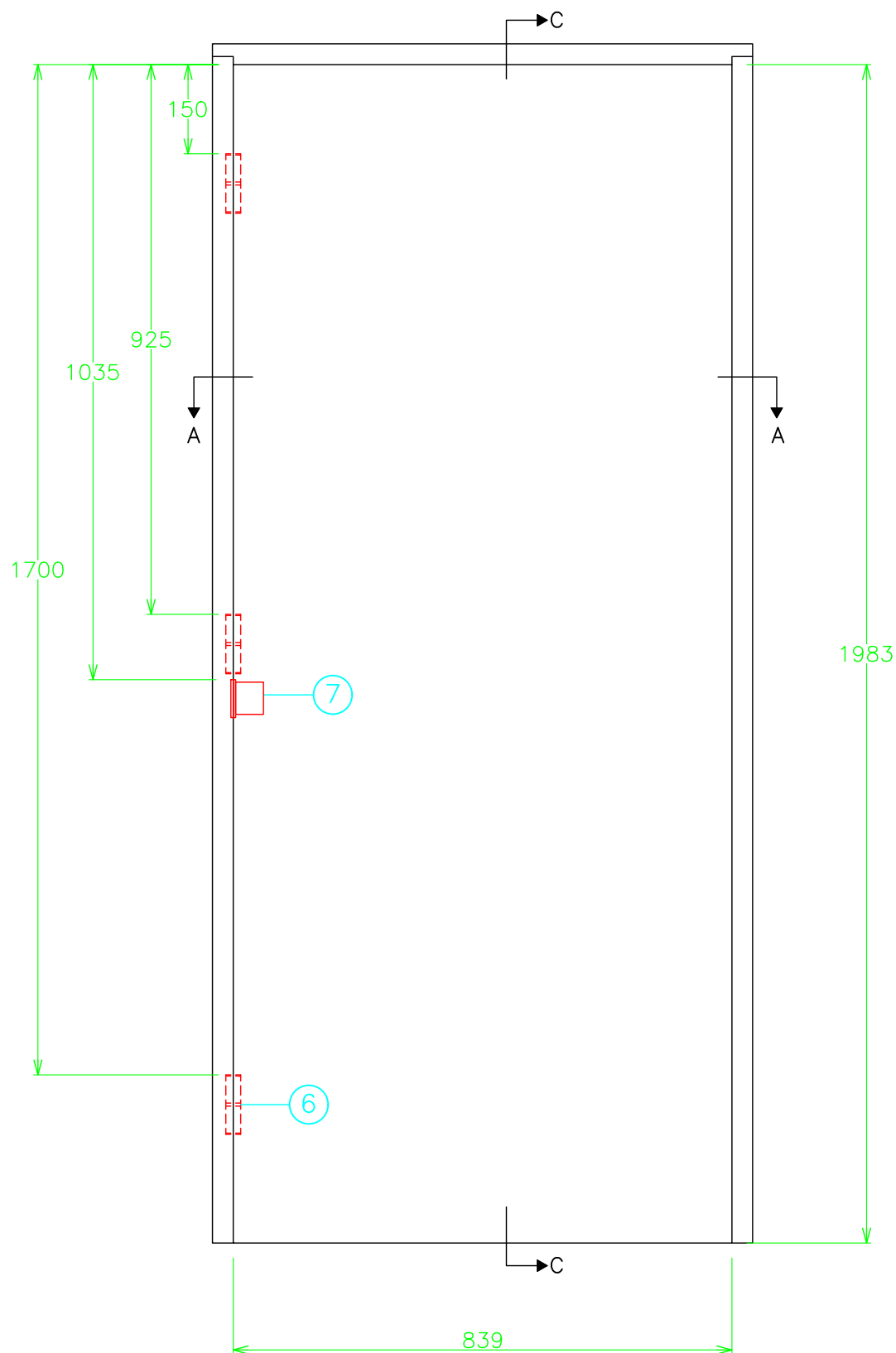
Name (please print): HELEN HULL

Signed:


for and on behalf of IFC Certification

Date: 11/9/17

Form No.: F82 Sample Report	Status: Current	Date: 26/01/11
Written by: AJ	Authorised by: BW	Page 1 of 1



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Tel: +44 (0)1494 569800
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Title Unexposed face elevation
showing hardware positions
(All dimensions in mm)

Date Drawn

16/11/17

Drawn By

ARD

Scale

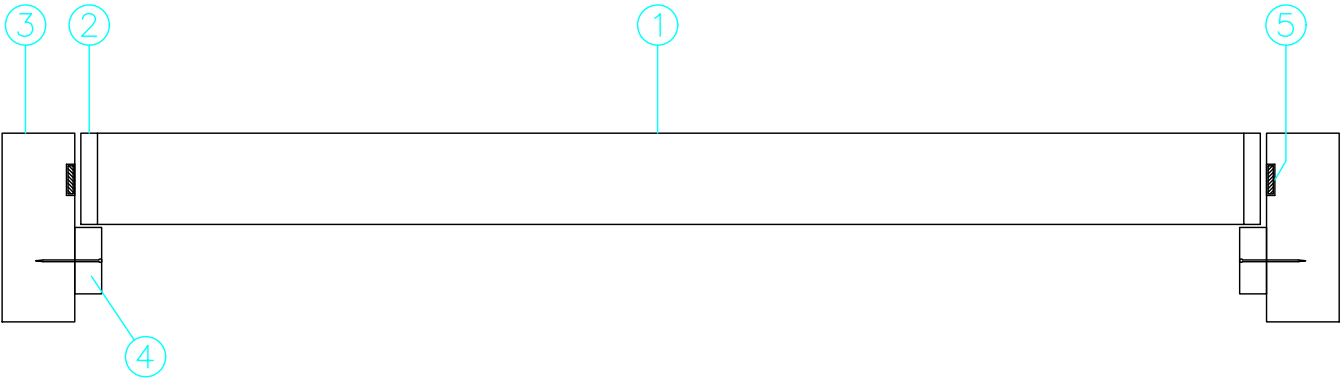
NTS

Project No.

WF 391562

Appendix 1

Section A-A



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Tel: +44 (0)1494 569800
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Title

Horizontal cross sections
(All dimensions in mm)

Date Drawn
16/11/17

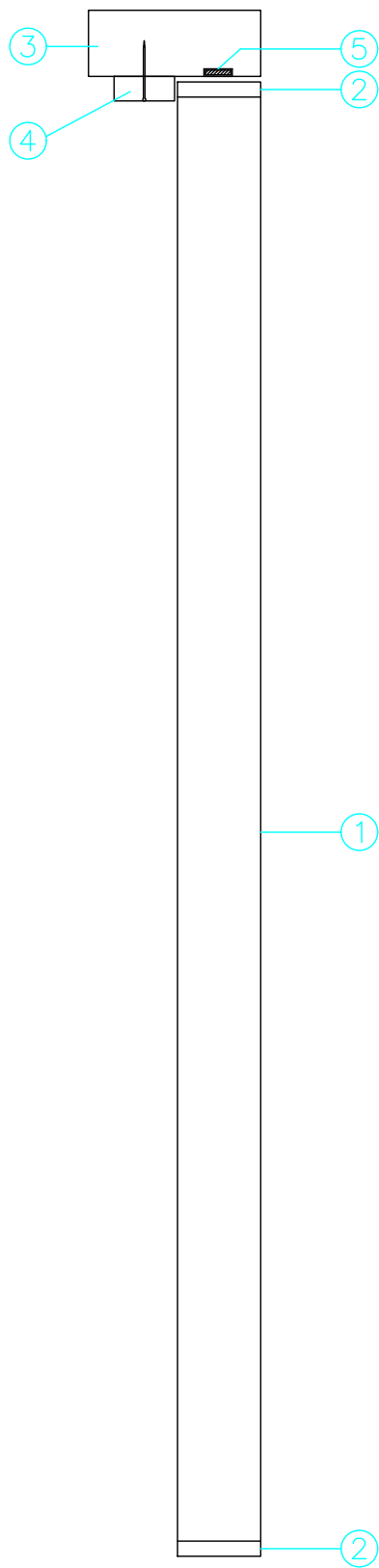
Drawn By
ARD

Scale
NTS

Project No.
WF 391562

Appendix 1

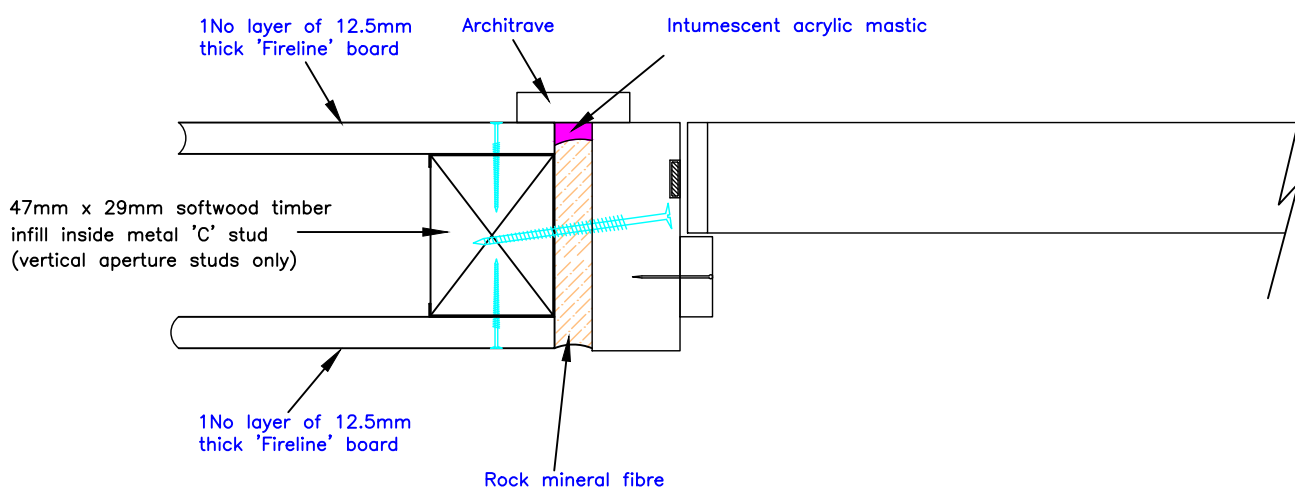
Section B-B



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Hughenden Valley, High Wycombe,
Buckinghamshire, HP14 4ND, UK.

Tel: +44 (0)1494 569800
Fax: +44 (0)1494 564895

Title		
Vertical cross section		
(All dimensions in mm)		
Date Drawn	Drawn By	Scale
16/11/17	ARD	NTS
Project No.		Appendix 1
WF 391562		



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Tel: +44 (0)1494 569800
Fax: +44 (0)1494 564895

Title
Frame to supporting construction
fixing detail
(All dimensions in mm)

Date Drawn

16/11/17

Drawn By

ARD

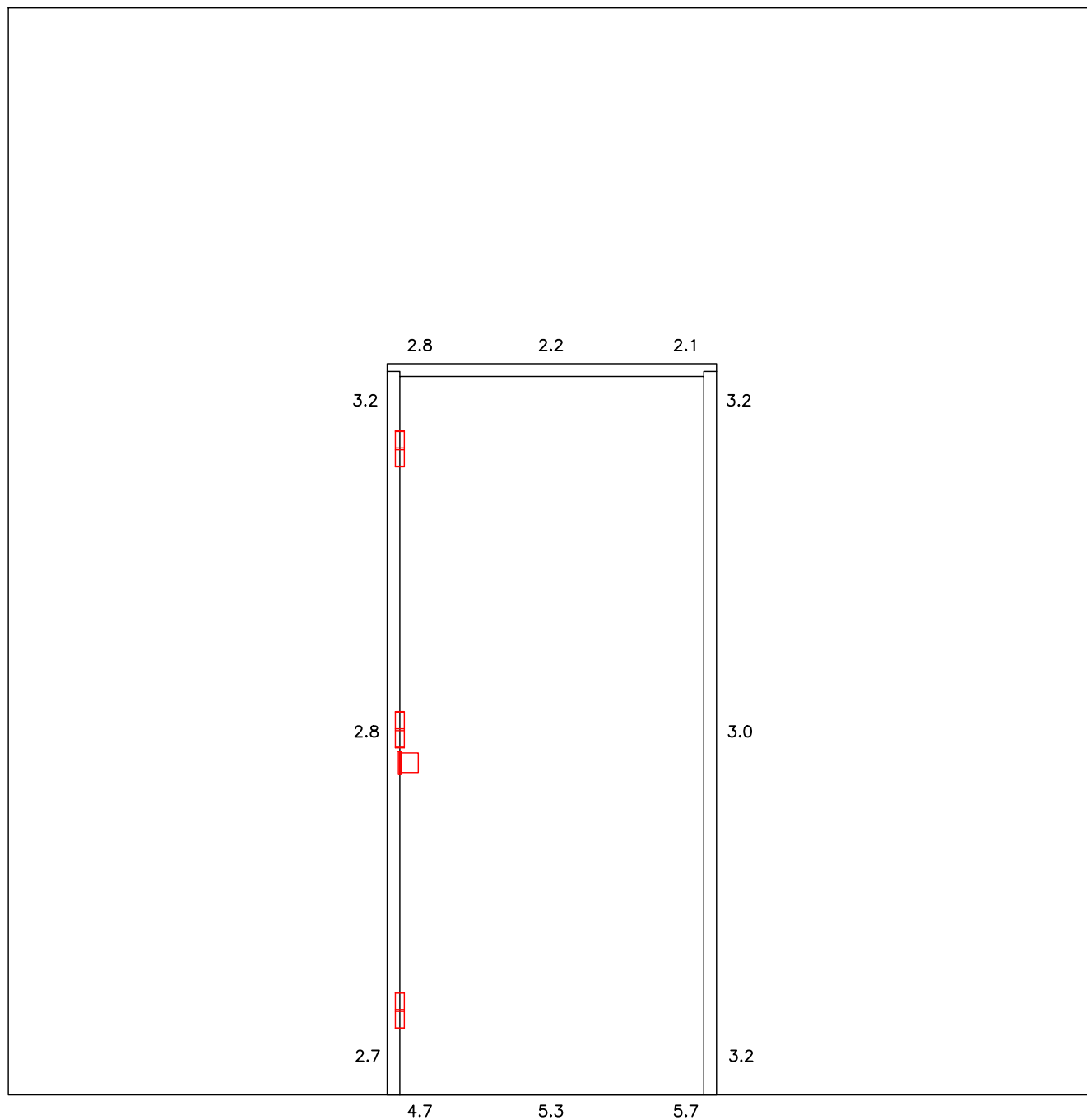
Scale

NTS

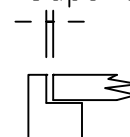
Project No.

WF 391562

Appendix 1



Gaps shown



Viewed From Unexposed Face



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Tel: +44 (0)1494 569800
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Title

Door leaves/frame gaps
(All dimensions in mm)

Date Drawn

16/11/17

Drawn By

ARD

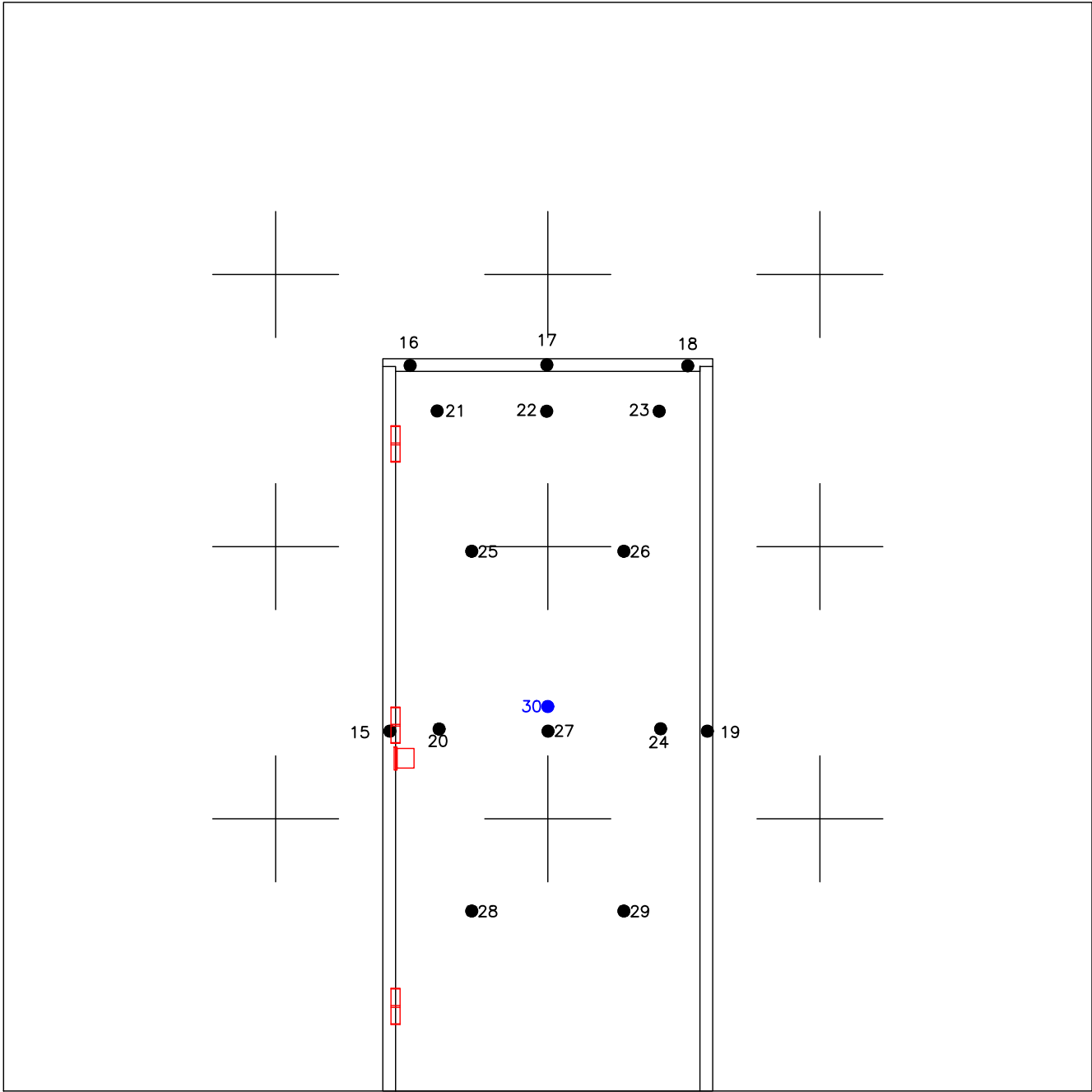
Scale

NTS

Project No.

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Appendix 1



- ⊕ : Furnace Thermocouples
● : Unexposed Face Thermocouples
● : Radiometer

Viewed From Unexposed Face



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Title		
Thermocouple positions		
(All dimensions in mm)		
Date Drawn	Drawn By	Scale
16/11/17	ARD	NTS
Project No.		Appendix 1
WF 391562		

Appendix 2 - raw test data

(see Figure 6 of Appendix 1 for channel locations)

Time	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	10	11	11	11	11	11	11	11	11	11	11	11	11	11	11
1	10	12	16	13	13	11	17	14	13	14	12	12	12	11	13
2	10	19	24	17	13	11	15	13	13	13	11	12	12	11	13
3	10	27	29	17	13	11	16	13	13	13	11	12	12	12	13
4	10	30	32	18	12	11	15	12	12	12	11	12	11	11	13
5	10	30	33	20	12	11	14	12	12	12	11	12	11	11	12
6	10	29	30	22	12	11	13	12	12	12	11	12	11	11	12
7	11	31	27	23	12	11	13	12	12	12	11	12	11	11	12
8	11	31	24	24	12	11	13	12	12	11	11	12	11	11	12
9	11	31	22	24	12	11	13	12	12	11	12	12	11	11	12
10	12	32	21	23	13	11	13	12	12	12	12	12	12	12	12
11	12	32	19	23	14	12	14	12	12	12	12	12	12	12	12
12	13	32	19	22	15	12	14	13	13	12	12	12	12	12	12
13	14	32	19	22	18	13	15	13	13	13	13	13	13	12	13
14	16	33	19	22	20	14	16	14	14	13	13	13	13	13	13
15	18	35	20	23	22	15	17	14	15	14	14	14	14	13	14
16	19	36	20	24	23	16	18	15	16	15	14	15	15	14	14
17	21	39	20	26	23	17	20	16	17	17	15	16	16	15	15
18	23	40	20	27	23	19	21	17	19	18	15	18	17	16	17
19	23	40	20	29	23	20	22	19	21	20	16	19	18	17	18
20	24	40	21	29	22	22	24	20	23	21	17	21	19	18	19
21	24	41	21	30	22	23	25	22	25	23	19	23	21	19	21
22	24	43	21	31	21	25	27	24	28	25	20	26	22	21	23
23	24	43	22	32	21	27	29	26	31	27	21	28	24	22	25

Time	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
24	24	44	23	34	21	29	33	28	33	29	23	30	26	24	27
25	26	45	24	34	21	31	35	30	35	32	24	33	28	26	29
26	27	47	25	36	22	33	36	32	38	34	26	36	30	28	32
27	28	48	26	36	22	35	38	35	40	36	28	39	32	30	34
28	29	51	27	37	22	37	39	37	43	39	29	41	34	33	37
29	30	58	28	37	22	40	42	40	46	41	33	44	36	35	40
30	30	60	29	39	23	42	44	43	48	43	33	47	38	37	43
31	31	64	30	39	23	44	47	46	51	46	34	50	41	40	46
32	30	69	31	40	23	46	50	49	54	48	36	52	43	42	49
33	31	75	31	40	23	49	52	51	56	51	39	55	45	45	52
34	30	86	32	42	24	51	57	54	59	53	45	57	48	48	55
35	30	90	33	43	25	53	59	57	62	56	48	60	50	50	58
36	30	147	33	44	25	55	67	60	65	58	50	62	53	53	61
37	28	127	34	45	27	56	64	62	67	61	51	64	55	55	63
38	28	155	34	47	27	57	63	65	70	63	51	67	57	58	66
39	28	85	35	50	28	51	59	68	73	65	52	69	60	51	68
40	28	75	36	53	28	47	59	70	76	67	49	71	62	48	70