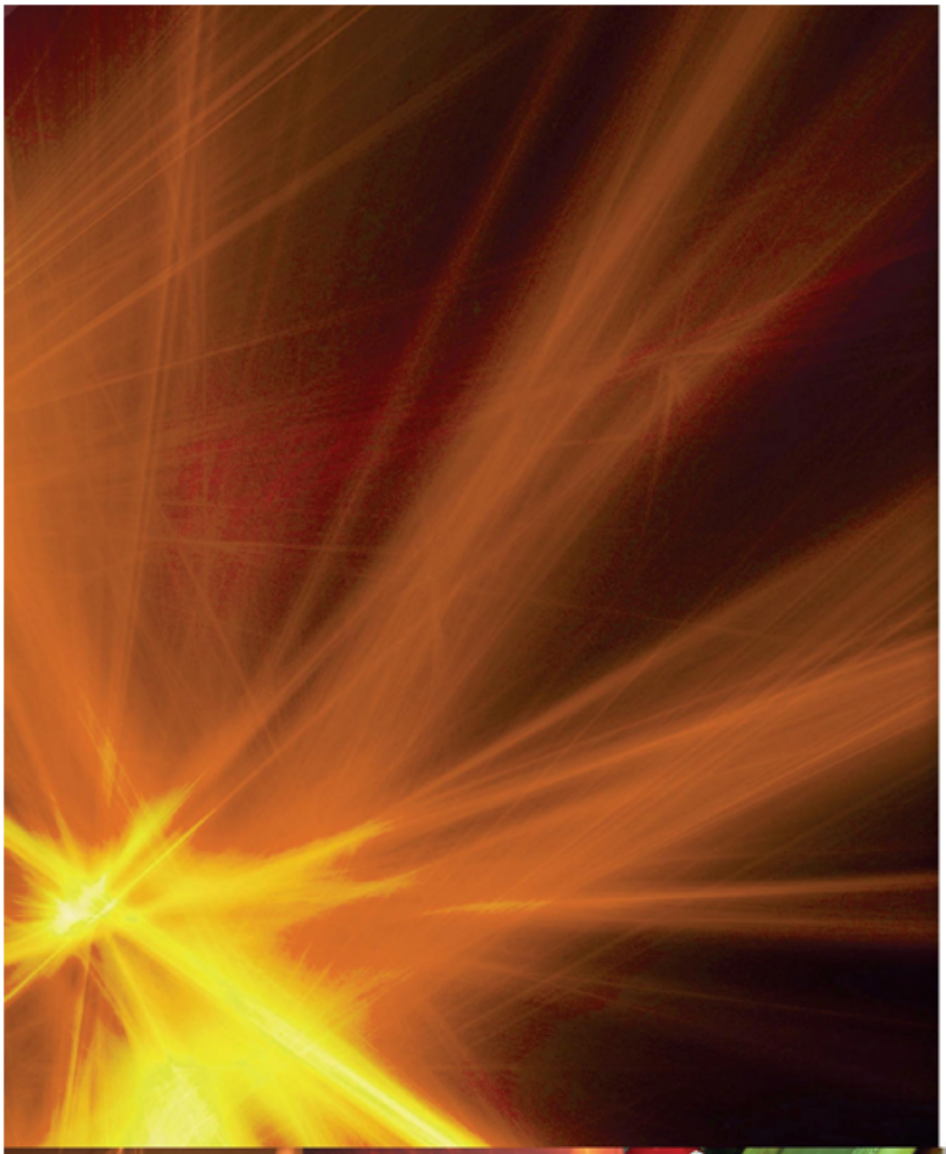


CONFIDENTIAL

Report: Chilt/RF13011 Revision A

A fire resistance test performed on a double leaf single acting doorset with glazing

Test conducted in accordance with BSEN 1634-1: 2008 and BSEN 1363-1: 1999

Test date: 5th March 2013

committed to excellence

www.chilternfire.co.uk

www.chilterndynamics.co.uk

www.qmark.info

Prepared for: Acoustic and Fire Door Solutions Ltd
3 Esplanade
Broughty Ferry
Dundee
DD5 2EL

UKAS TESTING
1762

Contents

1 Summary of performance

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

Results:

Fire resistance test in accordance with BSEN 1634-1: 2008 and BSEN 1363-1: 1999

Integrity	
Cotton pad	65 (sixty five) minutes
Continuous flaming	62 (sixty two) minutes
Gap gauges	66 (sixty six) minutes*
Insulation	
Average set	62 (sixty two) minutes**
Maximum ≥ 100mm in from leaf edge	62 (sixty two) minutes**
Maximum ≥ 25mm in from leaf edge	62 (sixty two) minutes**
Door frame ≥ 180ºc temp rise	62 (sixty two) minutes**
Door frame ≥ 360ºc temp rise	62 (sixty two) minutes**
Glass - Pyrostop	62 (sixty two) minutes**
Glass - Pyrobelite	36 (thirty six) minutes
Radiation	
Time to 15kW/m^2	66 (sixty six) minutes*

* No failure of the test criteria had occurred at termination of the test at 66 minutes
** Failure by virtue of integrity failure at 62 minutes

Summary of specimen:

Latched double leaf single acting doorset with glazing

Leaf size - left leaf:
2100mm high x 970mm wide x 57mm thick

Leaf size - right leaf:
2100mm high x 958mm wide x 57mm thick

2 Introduction

A doorset was tested to determine its fire resistance performance. The doorset was installed into a flexible supporting construction. In accordance with BS EN 14600: 2005 the leaves were pre-cycled before the fire test. The doorset was instrumented with the standard and supplementary sets of thermocouples and was installed opening in towards the furnace.

3 Specimen verification

The doorset was delivered to Chiltern International Fire Ltd (CIFL) during March 2013. CIFL 'reworked' the doorset on behalf of the client and provided an alternative frame / intumescent specification and also fitted alternative drop down seals. The component parts of the doorset were identified based on nominal information provided by the client. The conformity of the specimens 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

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

3.2 Sampling

CIFL were not involved in factory sampling of the components used for the specimen subject to this report.

4 Description of supporting construction

The supporting construction comprised a British Gypsum steel stud partition built in accordance with Clause 7.2.2.4 of BSEN 1363: Part 1, for a flexible supporting construction. The vertical studs surrounding the apertures created for the doorsets incorporated a 67mm x 29mm softwood timber infill to facilitate the fixings for the specimens. The specimen tested is a 60 minute product with an anticipated Category B performance, therefore intended fire resistance is 68 minutes and three layers of 12.5mm Gypsum plasterboard type F are required. The supporting construction was fixed only on the horizontal edges, the vertical edges remained free.

5 Description of specimen

5.1 Door leaves

Both leaves measured 2100mm high x 970mm wide (overall including rebate) x 57mm thick.

6 Description of construction (refers to Figures 1 to 6 of appendix 1)

Door leaves

			Species/type		Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Stiles	Inner		Sapele		38 wide x 45 thick	650*	-	1
	Outer		Sapele		32 wide x 45 thick	650*	6.8	2
Rails	Inner		Sapele		38 wide x 45 thick	650*	-	3
	Outer		Sapele		32 wide x 45 thick	650*	6.9	4
Core			Trisound S3D by Sauerland	3No. layers extruded chipboard	13 thick (per layer)	560*	-	5
				2No. layers cork	3 thick	220*	-	6
Facings			High density MDF		6 thick	850*	6.6	7
Glazing aperture inserts			2no. Sapele hardwood		2.5 thick x 15 wide	650*	-	8
Lipping – vertical edges only	Hanging edges		Oak		6 thick	630*	6.5	9
	Closing edge – left leaf		Oak		18 thick with a 39 wide x 12 deep rebate	630*	6.5	10
	Closing edge – right leaf		Oak		18 thick with an 18 wide x 12 deep rebate	630*	6.5	10a
Adhesive	Lipping		PVA D3*		-	-	-	-
	Facings	Left leaf	PVA D3*		-	-	-	-
		Right leaf	Urea Formaldehyde*					
	Glazing inserts		EPi type adhesive*		-	-	-	-

* Stated by client, accuracy agreed by the laboratory

Door frame

	Species/type	Dimensions (mm)	Density (kg/m³)	Moisture (% w/w)	Key to figures
Head & Jambs	Sapele	32 thick x 95 deep	650*	7.2	11
Stops – planted (pinned)	Sapele	38 wide x 12 thick	650*	6.4	12
Frame jointing detail	Butted - screwed	-	-	-	-
Architrave	MDF - pinned	18 thick x 45 wide	-	-	-
Threshold	Non combustible	-	-	-	-
Frame fixings	4 No steel wood screws per jamb	No 10 x 80 long at nominally 600-800 centres	-	-	-
Frame fire stopping	Mineral fibre capped with intumescent acrylic mastic on both faces	Nominally 10-15mm wide x 20-30 deep to both faces	-	-	-

* Stated by client, accuracy agreed by the laboratory

Intumescent and sealing materials

		Make/type	Size (mm)	Location	Key to figures
Leaf edge	Left leaf closing edge only	2No. Pyroplex Rigid Box Seal FO 8500	10 x 4	Fitted 10mm apart with the 1st seal 4.5mm from the unexposed face in the rebate of the left leaf closing edge	13
	Right leaf closing edge only	Pyroplex Rigid Box Seal FS 8512 (combined smoke and fire seal)	10 x 4	Fitted 4mm from the exposed face in the rebate of the right leaf closing edge	14
Frame reveal - head and jambs		2No. Pyroplex Rigid Box Seal FO 8700	15 x 4	Fitted 10mm apart with the 1st seal 8mm from the exposed face in the frame reveal	15
Smoke/acoustic seal		Norsound NOR710	10.2 x 11	Fitted in the frame reveal to the upstand of the stop	16
Glazing aperture – Pyrobelite glass		Norseal glazing liner	54 x 2	Fitted lining the glazing aperture	17
		2No. Interdens F	10 x 2 (each layer)	Fitted between the glass and bead on both faces	18
Glazing aperture – Pyrostop glass		Norseal glazing liner	54 x 2	Fitted lining the glazing aperture	19
		Kerafix 2000 Ceramic glazing tape by Kuhn	10 x 2	Fitted between the glass and bead on both faces	20

Intumescent interruptions and additional protection

	Make/type	Size (mm)	Location
Around hinges	Partially interrupted	-	Hinge blade fully interrupts 1st seal leaving 2nd seal continuous in frame reveal
Under hinge blade	Interdens	1 thick	Fitted under hinge blade on frame and leaf
Encasing latch body	Interdens	1 thick	Fitted around the body of the latch
Around latch forend	Partially interrupted	-	Latch forend partially interrupts both seals in leaf edge with 5mm of 1st seal and 6mm of 2nd seal remaining continuous
Under latch forend	None fitted	-	-
Around latch keep	Continuous	-	-
Under latch keep	Interdens	1 thick	Fitted under the latch keep plate
	Norseal graphite sheet	1 thick	Lining the keep cut out 'box' sections
Around flush bolt keep	Partially interrupted	-	Flush bolt keep partially interrupts 2nd seal in frame reveal leaving 1st seal continuous
Lining flush bolt cut out	Interdens	0.5 thick	Fitted lining the flush bolt cut outs in the right leaf edge
Lining drop down seal cut out	None fitted	-	-

Hardware

	Make/type	Size (mm)	Location	Key to figures
Hinges	3 No. Hafele bearing butt type hinges product reference SUS 304	101 x 31 x 3 (blade size)	Fitted 200mm, 1000mm and 1800mm from the head of the leaves fixed with 4No. Ø4 x 30 long screws per blade	21
Closer	Dorma (UK) Ltd TS71 overhead type closer	230 x 67 (footprint size)	Fitted on the exposed face as per the manufacturer's instructions	22
Lock/latch – disengaged	Laidlaw steel mortice lock/latch: product reference LA60SS/R with Cisa Euro cylinder: Laidlaw product reference 01 833,2SNP	234 x 20 x 3 (forend size) 165 x 90 x 15 (body size) 170 x 24 x 2 (keep size)	Fitted 1075mm from the threshold of the leaf, latch and keep fixed with 3No. Ø3 x 24 long security screws	23
Furniture	Laidlaw steel lever type handle product reference LA02.SSS	Ø50 (rose size)	Fitted appropriate to the lock/latch, fixed with 4No. Ø4 x 32 long screws	24
	Hafele lock escutcheon plate Product reference Laidlaw LA17.5SS	Ø50 (rose size)	Fitted appropriate to the lock/latch	25
	Flush bolt - engaged at top and bottom product reference Laidlaw 34 002.2	200 x 20 x 21 (body size)	Fitted at the top and bottom edge of the right leaf, fixed with 2No. Ø4 x 30 long screws	26
	Drop down seal – Norsound NOR 810S	25 high x 12 wide (body size)	Fitted in the threshold of both leaves fixed with 2No. 20mm long screws per seal	27

Glazing

	Make/type		Size (mm)	Location	Key to figures
Glass	Left leaf upper aperture and right leaf lower aperture	C3S Securiglass Pyrobelite	12 thick	Fitted 150mm from the left leaf head, 620mm from the hanging edge, and 1200mm from the head of the right leaf, 620mm from the hanging edge	28
	Left leaf lower aperture and right leaf upper aperture	Pilkington Pyrostop	23 thick	Fitted 150mm from the right leaf head, 620mm from the hanging edge, and 1200mm from the head of the left leaf, 620mm from the hanging edge	29
Sight size	Upper apertures		775 high x 130 wide	-	-
	Lower apertures		530 high x 130 wide	-	-
Aperture size	Upper apertures		184 x 834	-	-
	Lower apertures		184 x 587	-	-
Beading	Pyrobelite glass	Oak	30 high x 25 deep including a 5 x 5 bolection return and a 45º chamfer	Fitted on both faces of the glass	30
	Pyrostop glass	Oak	30 high x 19 deep including a 5 x 5 bolection return and a 45º chamfer	Fitted on both faces of the glass	31
Beading fixings	Steel pins		50 long	Fitted at 50mm from corners and at 150mm centres at 45º to the face of the glass	32

7 Pre-test measurements

7.1 Pre-cycling

Operability test of 25 manual cycles was completed on each leaf in accordance with BSEN 14600, section 5.1.1.1.

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

Specimen self closing of doorset, in accordance with BS 14600, section 5.1.1.3 was completed prior to test.

Angle of measurement	10º ± 2º
Closing speed – Left leaf	1.3 seconds
Closing speed – Right leaf	1.4 seconds

7.2 Door perimeter gaps

The manufacturer did not declare a working range so the doors were 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 door leaves and frame / threshold were measured prior to test. A total of 21 readings were taken. The measurements (in mm) are given in Figure 5 of Appendix 1.

7.3 Closer forces

Measured in accordance with BSEN 1634-1: 2008 Section 10.1.3.

	Opening Force (Nm)
Left leaf	64 @ handle position
Right leaf	66 @ handle position

7.4 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.

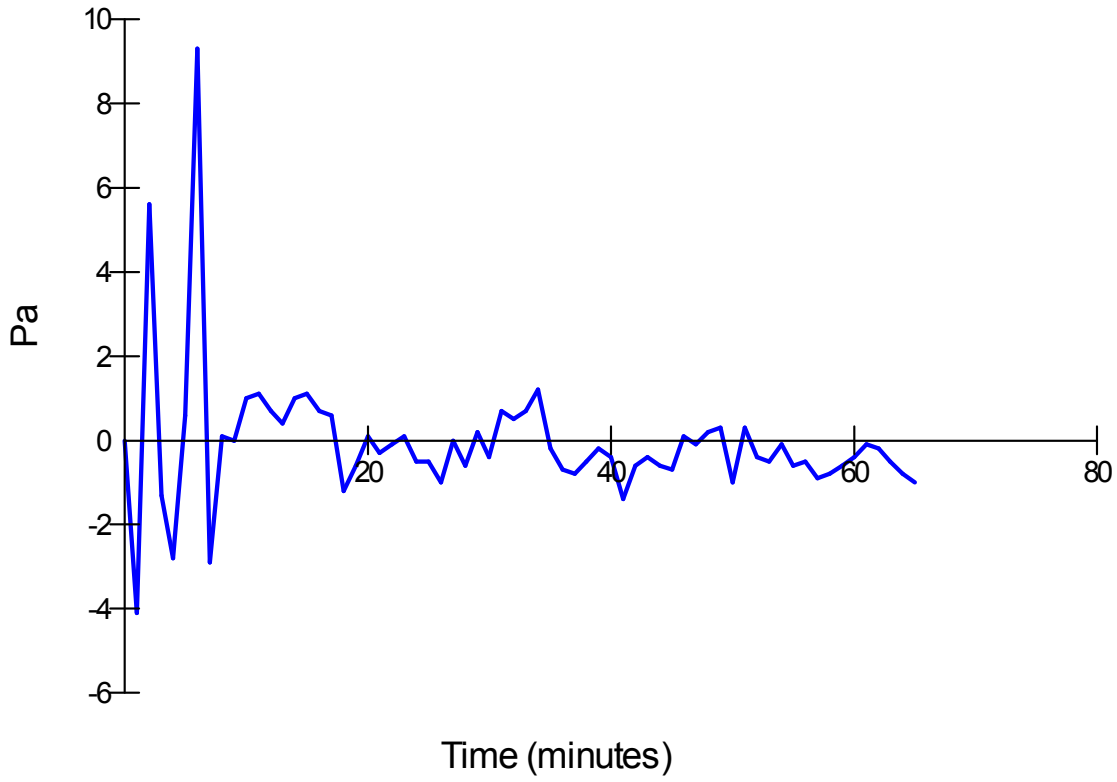
8 Test conditions

8.1 Ambient temperature

The ambient temperature of the test area at commencement of test was 12°C. The ambient temperature for the duration of the test has been recorded in Appendix 2.

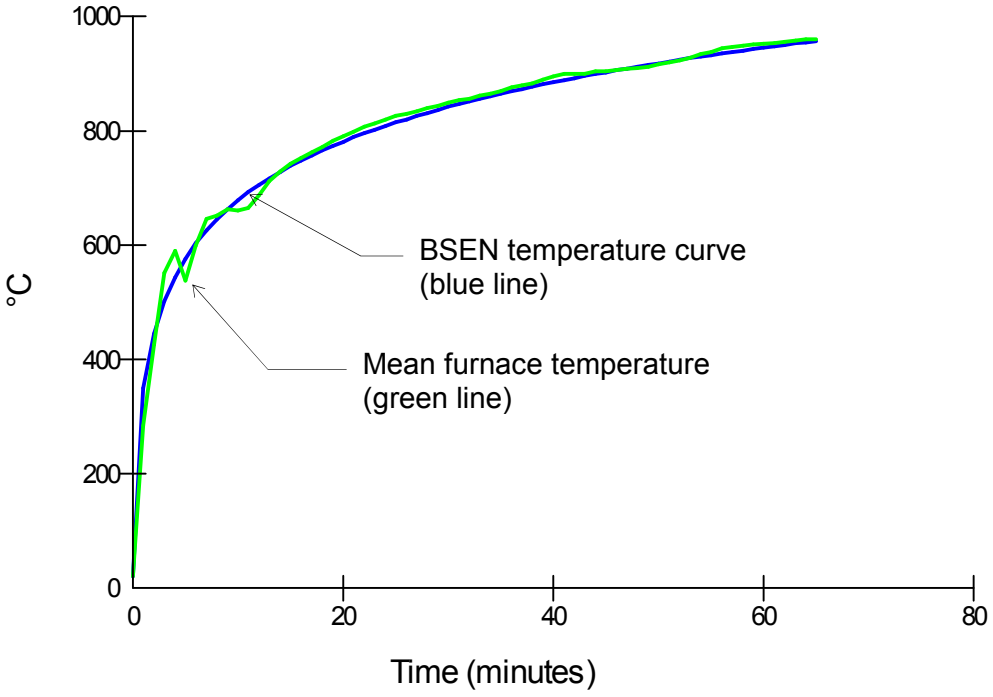
8.2 Pressure readings

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 have been tabulated in Appendix 2 and are shown graphically below:



8.3 Furnace temperature

The furnace was controlled to follow the temperature/time relationship specified in BSEN 1363: Part 1: 1999 Section 5.1.1 as closely as possible, using the average of nine plate thermocouples suitably distributed within the furnace. The temperatures recorded have been tabulated in Appendix 2 and are shown graphically below:



8.4 Unexposed face temperatures

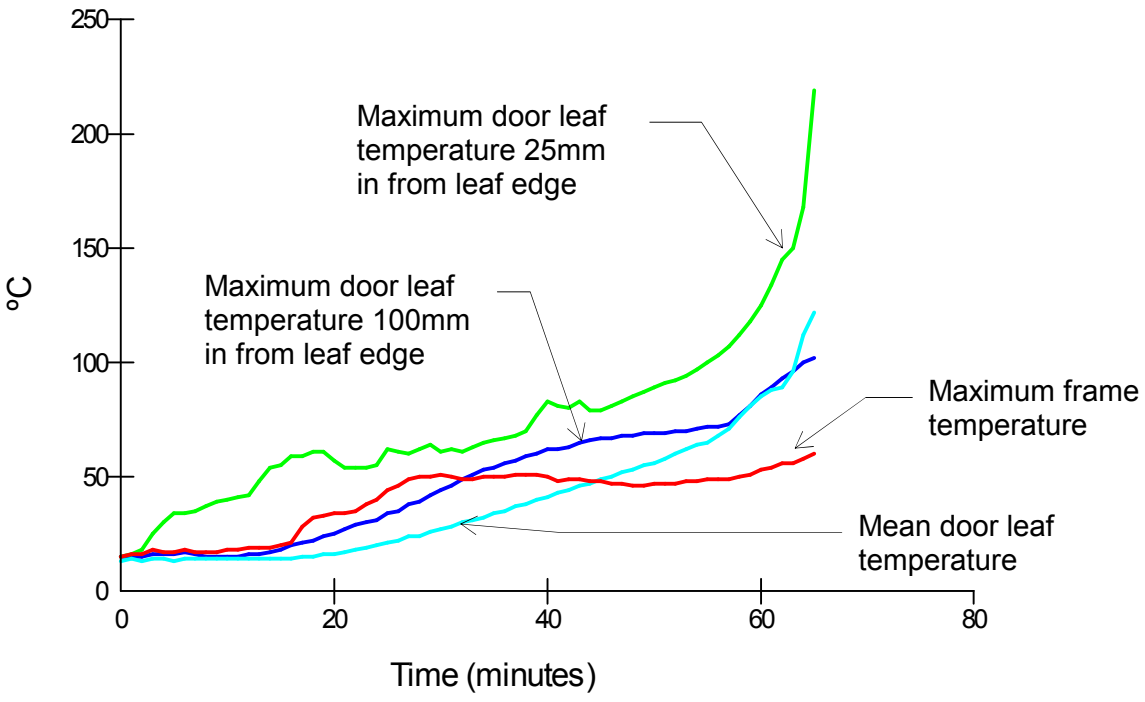
The temperature of the unexposed face of the doorset was monitored by means of the following thermocouples:

Doorset – two discrete areas

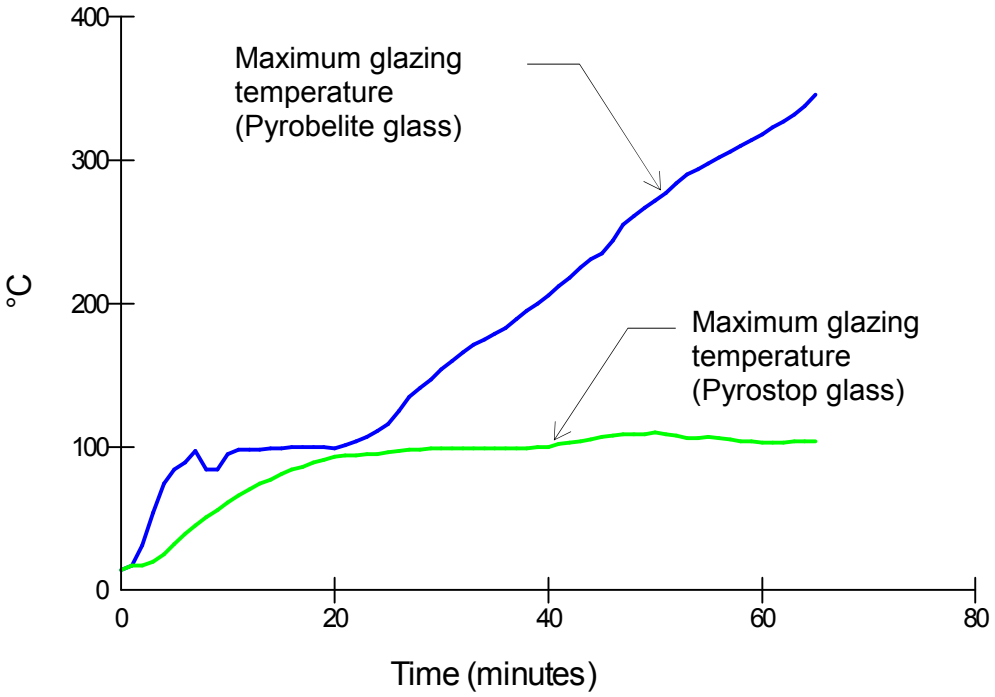
Leaves	Discrete area 1 (timber)	5 measuring mean temperature rise.
		10 measuring maximum temperature rise, standard set 100mm in from the door leaf edges.
		10 measuring maximum temperature rise, supplementary set 25mm in from the door leaf edges.
	Discrete area 2 (glass)	8 measuring maximum temperature (2 fixed to each aperture)
Frame		5 measuring maximum temperature rise.

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

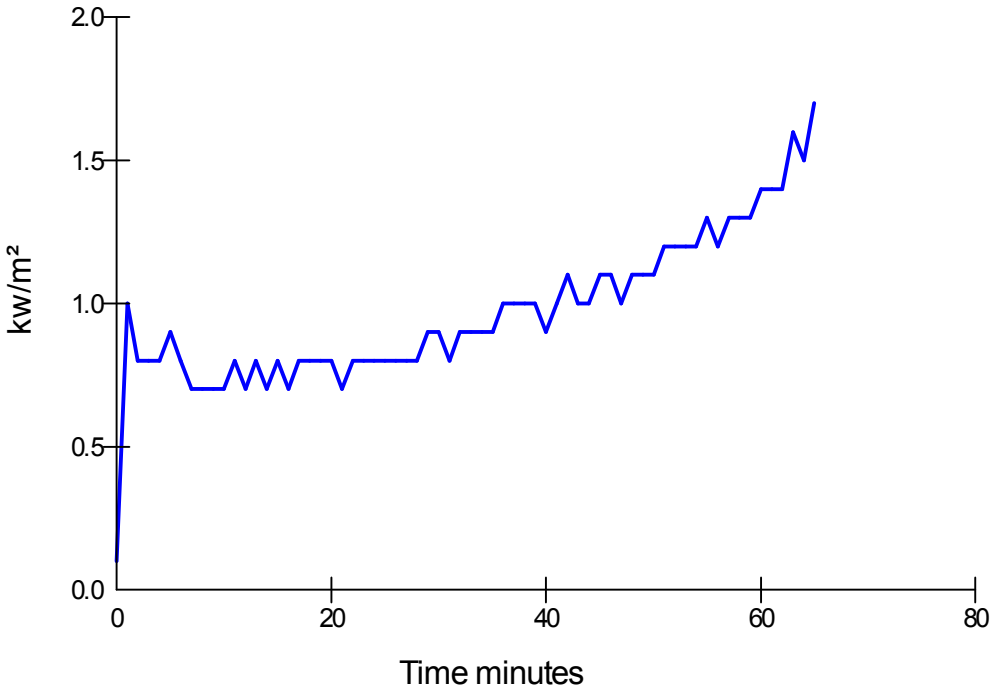
Doorset



Glass

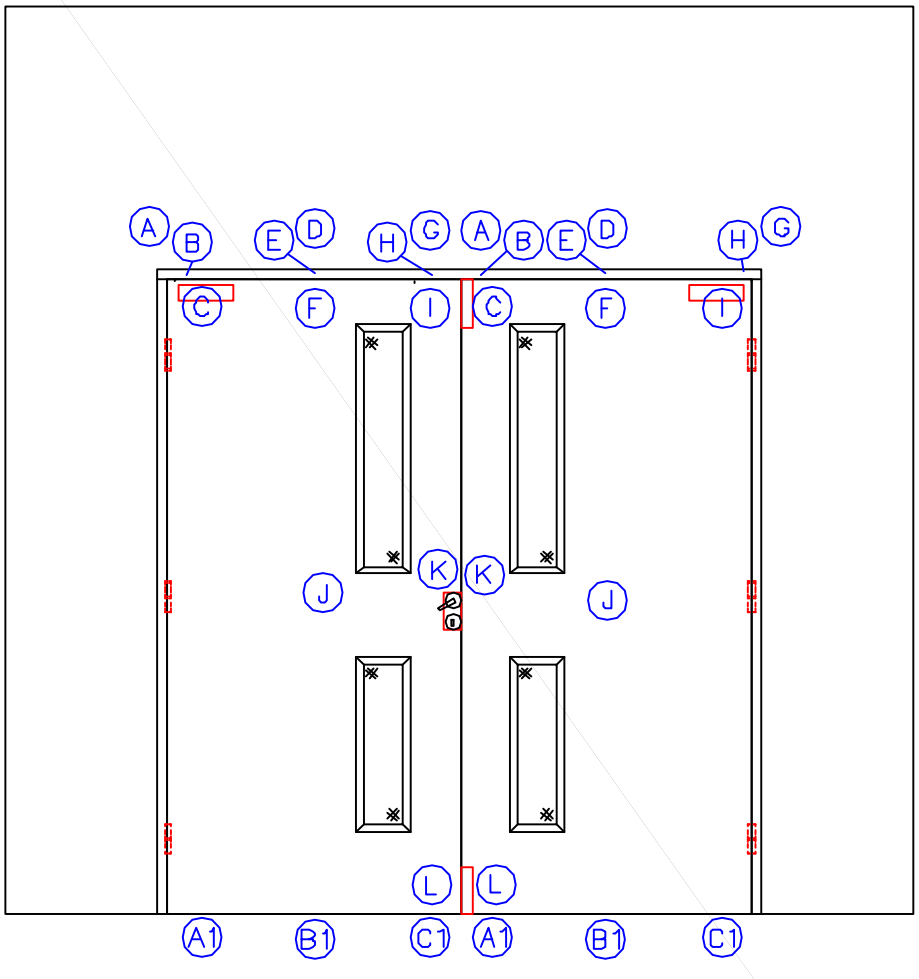


Radiation



8.5 Leaf, frame head and partition distortion data

The following tables show the distortion in mm with an accuracy of ±1mm.
A positive measurement indicates distortion towards the furnace.
A negative measurement indicates distortion away from the furnace.
G, H and I for the door leaves give vertical movement of the door; a negative reading indicates that the door has dropped.



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

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	5	5	5	6	5	7	7	7	8	8	10	8
30	2	3	5	7	3	6	5	4	8	1	1	9
45	0	2	5	2	2	2	3	1	7	-19	-20	4
60	0	2	8	2	2	-3	2	0	9	-60	-86	-10

Time	A1	B1	C1
15	-1	-2	0
30	-1	-2	-2
45	-2	-3	-3
60	-7	-6	-4

Right 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	7	6	7	6	5	6	5	5	6	3	1	1
30	4	3	4	3	3	4	5	3	9	-5	-11	-1
45	1	1	2	1	1	2	2	2	7	-31	-33	-6
60	1	0	0	1	1	-3	1	3	12	-64	-94	-20

Time	A1	B1	C1
15	-1	0	0
30	-1	-1	0
45	-3	-2	-4
60	-5	-3	-6

9 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
0.00	Test started.
02.14	There is smoke issuing from the top half leaf/frame gaps. The glazing panel interlayers are starting to react.
03.50	There is a decrease in the level of smoke issuing from the top leaf/frame gaps.
05.30	The smoke issuing from previous positions has reduced to just the top meeting edge and latch position of the leaves.
13.29	There is discolouration to the top meeting edge of the leaves. There is smoke issuing through the cracks across the surface of all the glazing panels.
17.44	There is a maximum deflection difference between the leaves at the meeting edge of 10mm. There is discolouration and smoke issuing from the top three quarters of the meeting edge of the leaves.
28.35	Both leaves, there is discolouration and smoke issuing from the top hanging corner of the leaves. There is an increase in the level of smoke issuing from the surface of the top left and bottom right glazing panels.
29.50	There is an increase in the level of discolouration and smoke issuing from the top half of the meeting edge and key hole of the leaves.
30.00	The intumescent at the perimeter of the top left and bottom right glazing panels are beginning to react outwards, with smoke issuing.
36.25	Small sections of the red seal at the perimeter of the top left and bottom right glazing panels are beginning to drop out.
40.00	Sections of the red seal at the perimeter of the top left and bottom right glazing panels continues to fall away as further reaction and expansion occurs.
48.29	There is an increase in the level of smoke issuing from the perimeter of the top left and bottom right glazing panels.
57.26	Right leaf, there is discolouration and smoke issuing from the surface of the leaf at mid height, approximately 300mm from the hanging edge.
59.15	Right leaf, there is an increase in the level of discolouration at the surface of

the leaf at mid height, approximately 300mm from the hanging edge.

59.44 Both leaves, there is discolouration above the top left and bottom right glazing panels.

60.38 Both leaves, there is discolouration and smoke issuing from the middle hinge position of the leaves.

61.14 Left leaf, there is discolouration and smoke issuing from across the top half of the surface of the leaf.

61.42 Right leaf, there is a glow visible from the centre of the leaf.
There is burn through and a glow visible from the latch position of the leaves.

62.50 There is continuous flaming from the latch position of the leaves, thereby constituting **integrity failure.**

63.20 Right leaf, there is continuous flaming from the area of burn through, thereby constituting **further integrity failure.**

64.10 A cotton pad integrity test was performed on the top meeting edge of the leaves, no failure.

64.40 Left leaf, there is burn through across the face of the leaf.

65.00 A cotton pad integrity test was performed on the top meeting edge of the leaves, thereby constituting **further integrity failure.**

65.40 There is continuous flaming from across the head and top meeting edge of the leaves, thereby constituting **further integrity failure.**

66.00 Test terminated.

10 Expression of results

Integrity	
Cotton pad	65 (sixty five) minutes
Continuous flaming	62 (sixty two) minutes
Gap gauges	66 (sixty six) minutes*
Insulation	
Average set	62 (sixty two) minutes**
Maximum ≥ 100mm in from leaf edge	62 (sixty two) minutes**
Maximum ≥ 25mm in from leaf edge	62 (sixty two) minutes**
Door frame ≥ 180ºc temp rise	62 (sixty two) minutes**
Door frame ≥ 360ºc temp rise	62 (sixty two) minutes**
Glass - Pyrostop	62 (sixty two) minutes**
Glass - Pyrobelite	36 (thirty six) minutes
Radiation	
Time to 15kW/m^2	66 (sixty six) minutes*

* No failure of the test criteria had occurred at termination of the test at 66 minutes
** Failure by virtue of integrity failure at 62 minutes

11 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 door to frame gaps recorded in Figure 5 of the appendix. 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. CIFL 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.

Signature:		
Name:	Robert Axe	Vincent Kerrigan
Title:	Deputy Section Leader – Fire Resistance	Technical Manager
Date of issue:	24.05.2013	24-05-2013

Revision A – May 2013 – changes to cork layers of figures 2-4.

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 BSEN 1634-1: 2008, 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 CIFL upon request.

13 Photographs

Intumescent interruptions by hardware

Latch forend

Hinge

Shoot bolt keep

Latch keep

At start of test

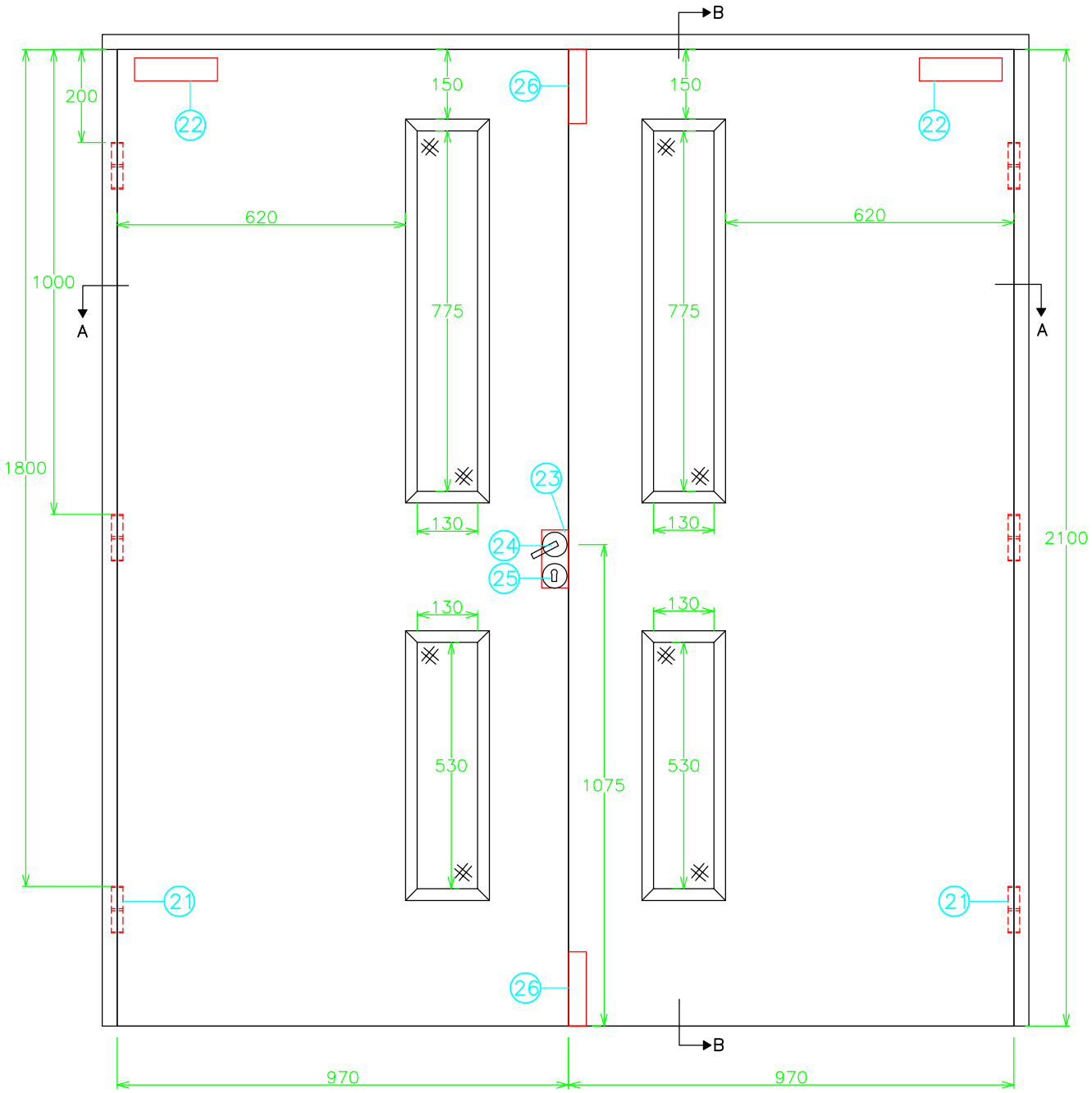
At 15 minutes

After 30 minutes

After 44 minutes

After 60 minutes

Appendix 1 - figures 1 to 6



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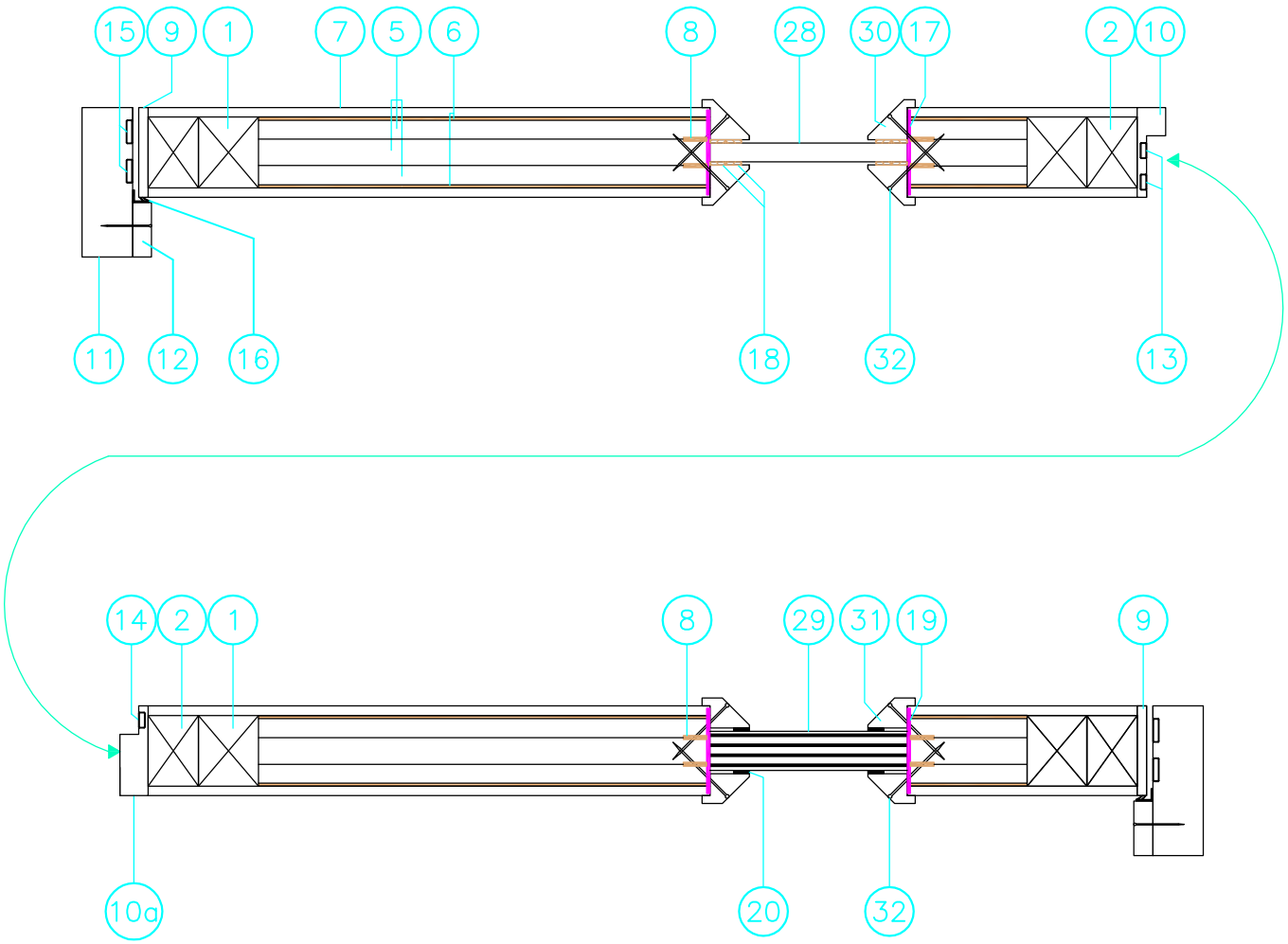
Title: Unexposed face elevation showing hardware positions
(All dimensions in mm)

Date Drawn	Drawn By	Scale
18/03/13	ARD	NTS

Project No.	
Chilt/RF13011 Rev A	Appendix 1

Section A–A



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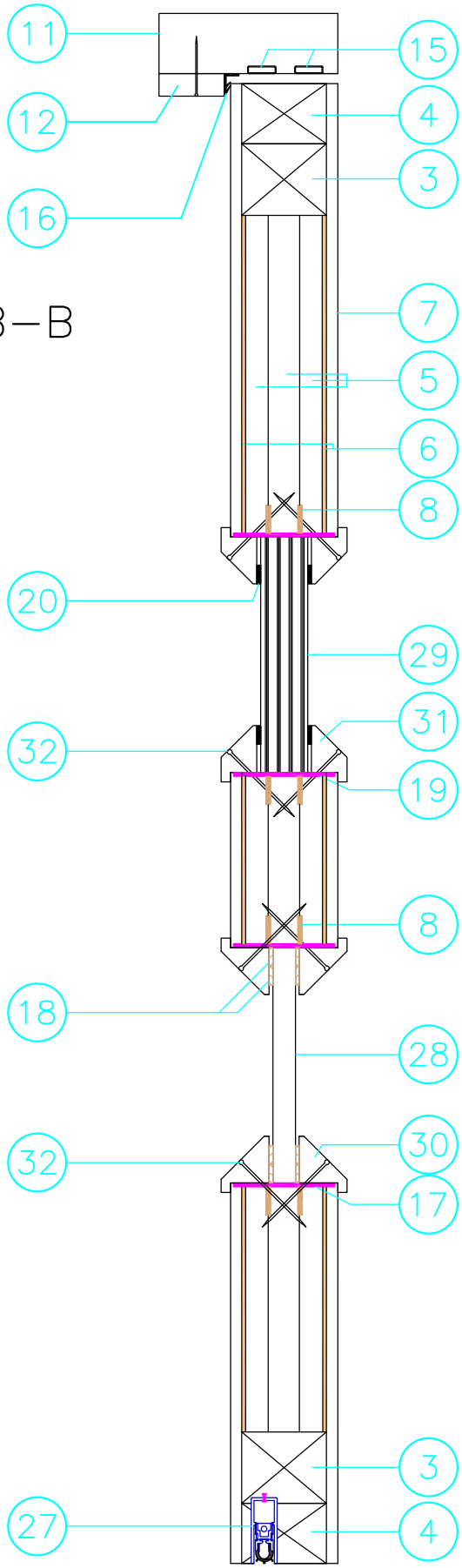
Title
Horizontal cross sections
(All dimensions in mm)

Date Drawn	Drawn By	Scale
18/03/13	ARD	NTS

Project No.	
Chilt/RF13011 Rev A	Appendix 1

Section B–B



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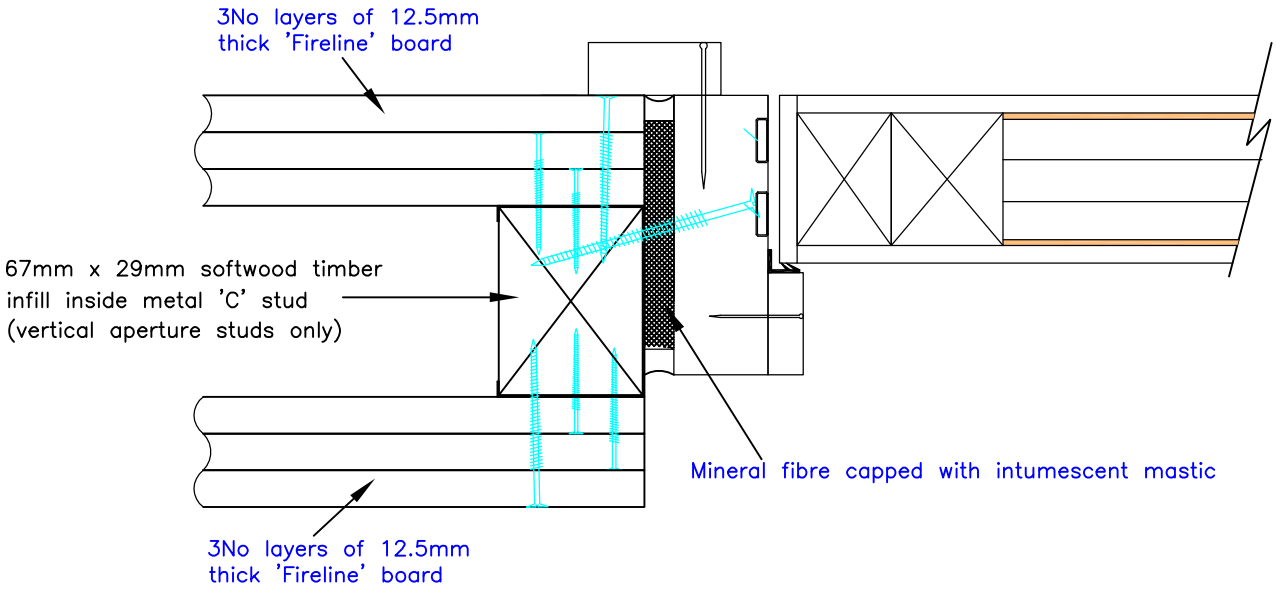
Title
Vertical cross section
(All dimensions in mm)

Date Drawn	Drawn By	Scale
18/03/13	ARD	NTS

Project No.	
Chilt/RF13011 Rev A	Appendix 1



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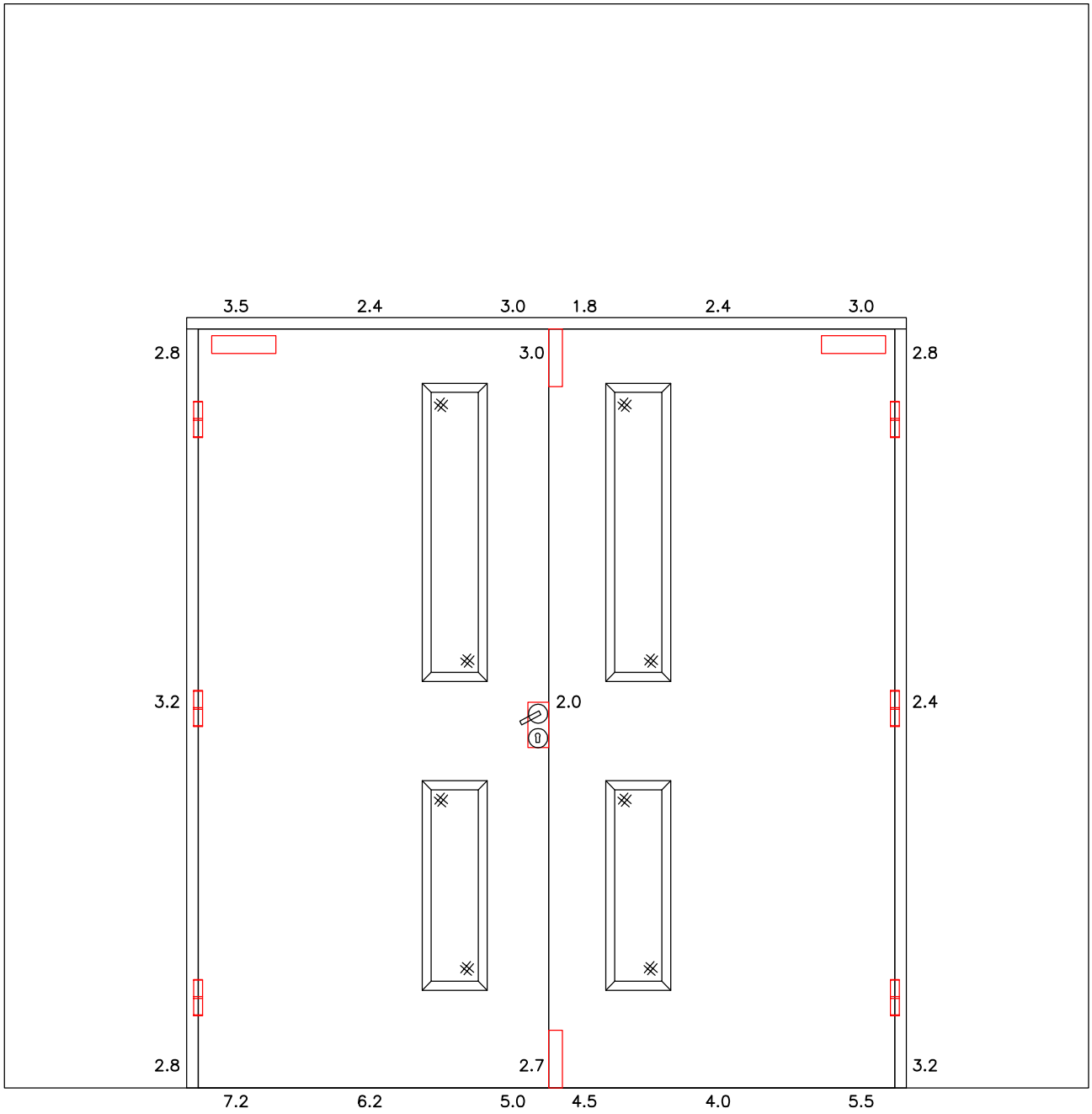
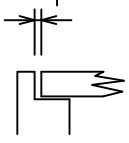
Title
Frame to supporting construction fixing detail
(All dimensions in mm)

Date Drawn	Drawn By	Scale
18/03/13	ARD	NTS

Project No.	
Chilt/RF13011 Rev A	Appendix 1



Gaps shown



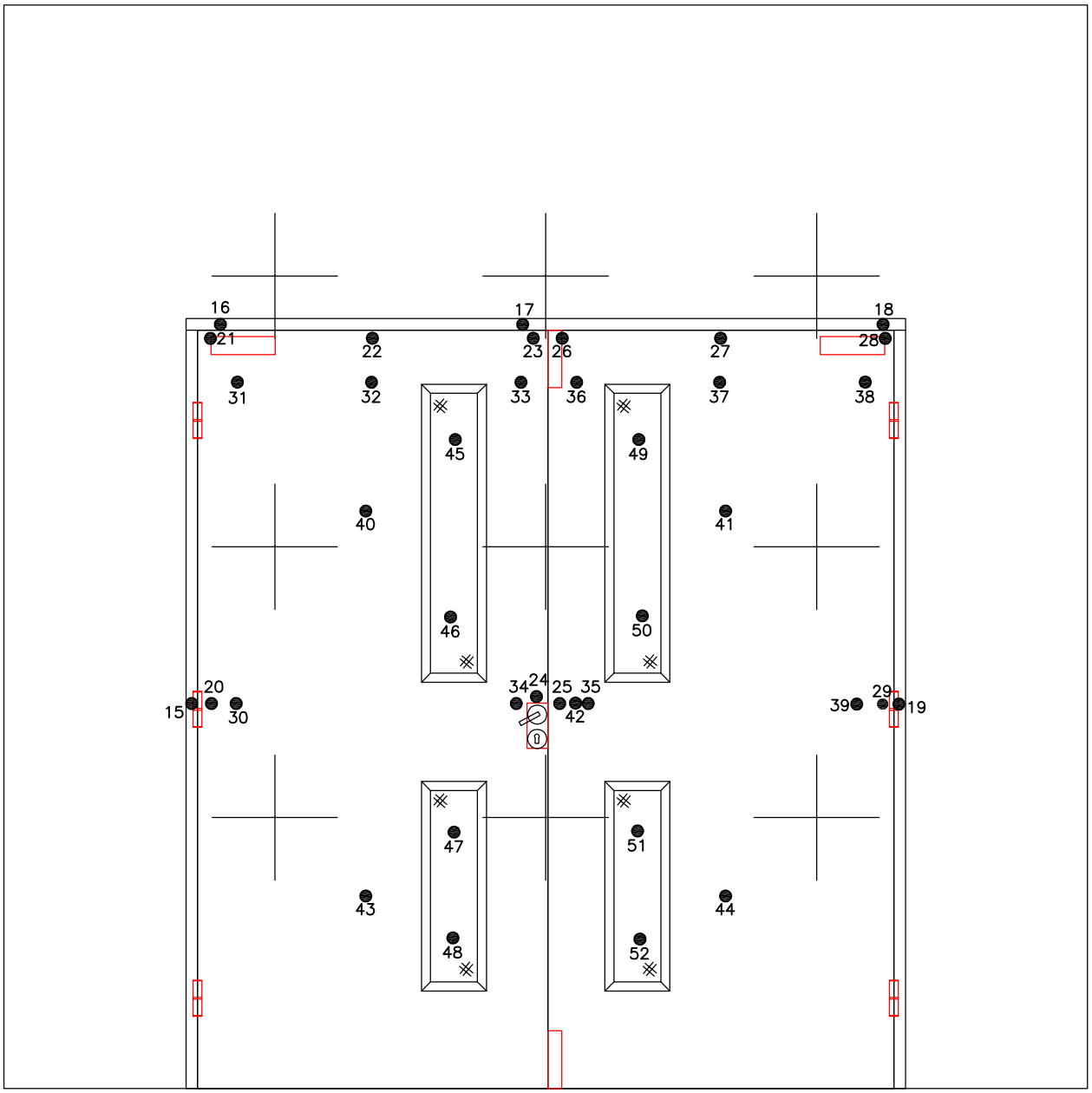
Viewed From Unexposed Face

Chiltern House, Stocking Lane, Hughenden Valley
High Wycombe, Buckinghamshire, HP14 4ND, UK.
Tel: +44 (0)1494 569800 Fax: +44 (0)1494 564895

Title
Door leaves/frame gaps
(All dimensions in mm)

Date Drawn	Drawn By	Scale
18/03/13	ARD	NTS

Project No.	
Chilt/RF13011 Rev A	Appendix 1



: Furnace Thermocouples

: Unexposed Face Thermocouples

Viewed From Unexposed Face

Chiltern International Fire
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Title: Thermocouple positions

(All dimensions in mm)

Date Drawn	Drawn By	Scale
18/03/13	ARD	NTS

Project No.	
Chilt/RF13011 Rev A	Appendix 1

Appendix 2 - raw test data (9 pages)

(See figure 6 of appendix 1 for channel locations)

Furnace thermocouples | Failure times and corresponding thermocouples | Average thermocouples

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Chan 11	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	0	13	13	14	14	14	14	15	15	15	12	14	15	15	15	14	13	14	14
1	-4.1	334	243	162	350	285	316	266	275	284	12	14	15	16	15	15	14	14	14
2	5.6	436	353	358	478	436	450	408	421	424	12	14	15	16	15	14	13	14	14
3	-1.3	513	474	499	574	555	582	548	578	574	12	14	15	18	15	14	13	14	14
4	-2.8	541	493	551	591	589	613	602	608	627	12	14	15	17	15	14	13	14	14
5	0.6	489	446	509	554	544	545	549	554	563	12	14	15	17	15	14	13	14	14
6	9.3	569	532	550	621	606	621	605	622	605	12	14	15	18	15	15	13	14	14
7	-2.9	592	563	604	642	641	681	655	668	688	12	14	15	17	15	15	13	14	15
8	0.1	594	558	624	640	646	678	668	671	690	12	14	15	17	15	14	13	14	15
9	0	613	565	640	652	653	687	683	678	701	12	14	15	17	15	14	13	14	15
10	1	638	363	643	669	664	667	663	671	669	12	14	15	18	16	14	13	14	15
11	1.1	648	740	657	683	677	662	660	674	662	12	14	15	18	16	14	13	14	15
12	0.7	676	1247	679	705	701	680	683	699	677	12	14	15	19	16	15	13	14	16
13	0.4	702	1247	703	727	729	704	713	729	696	12	14	15	19	17	15	13	15	16
14	1	719	721	723	741	747	722	730	748	706	12	14	16	19	18	15	14	15	16
15	1.1	737	734	737	753	760	731	743	755	721	12	14	17	20	19	17	14	15	16
16	0.7	751	745	746	766	769	740	753	764	733	12	15	18	21	20	21	14	16	16
17	0.6	761	758	756	774	782	749	766	775	737	12	19	21	22	22	28	14	16	17

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Chan 11	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
18	-1.2	771	768	765	781	789	759	774	786	746	12	26	24	24	23	32	15	17	17
19	-0.6	784	778	777	790	798	771	784	798	762	12	32	26	25	24	33	16	18	17
20	0.1	787	788	787	795	805	782	796	809	771	12	34	29	26	26	34	16	19	18
21	-0.3	793	797	792	802	812	795	805	822	778	12	33	31	27	27	34	17	21	18
22	-0.1	797	800	800	808	820	802	814	829	789	12	32	34	28	29	35	17	21	19
23	0.1	800	805	806	815	823	809	821	836	794	12	34	38	29	31	36	18	24	19
24	-0.5	806	807	813	819	828	819	830	842	806	12	34	40	31	33	37	19	25	20
25	-0.5	807	811	821	822	831	831	834	850	817	12	35	44	33	35	36	20	26	21
26	-1	810	815	825	828	833	835	838	855	823	12	36	46	37	36	37	21	27	22
27	0	816	817	831	829	836	842	839	857	827	12	37	49	38	37	37	22	29	22
28	-0.6	820	821	837	834	840	849	846	865	836	12	38	50	38	38	37	22	32	23
29	0.2	825	828	838	839	845	847	853	867	837	12	39	50	38	39	37	23	34	24
30	-0.4	831	835	843	844	850	855	858	873	844	12	40	51	37	40	37	24	37	25
31	0.7	836	839	848	848	855	858	861	879	851	12	39	50	36	40	37	26	40	26
32	0.5	841	845	849	851	859	856	865	882	848	12	38	49	38	42	38	27	41	27
33	0.7	848	853	857	857	867	858	869	885	849	12	37	49	39	42	38	28	43	28
34	1.2	853	860	862	864	872	862	874	887	851	12	37	50	39	42	38	29	44	30
35	-0.2	859	867	871	869	877	863	879	888	853	12	37	50	40	43	39	30	45	31
36	-0.7	868	875	877	872	884	870	886	895	861	12	37	50	40	42	39	32	47	32
37	-0.8	872	878	881	876	887	872	888	898	865	12	37	51	40	42	40	33	48	33
38	-0.5	877	882	884	877	889	876	892	900	870	12	37	51	39	41	41	34	49	34
39	-0.2	883	886	890	885	894	884	896	907	875	12	37	51	39	41	41	36	51	36
40	-0.4	884	889	898	890	897	891	903	915	883	12	37	50	39	42	42	37	52	37
41	-1.4	889	892	900	894	899	896	908	917	890	12	37	48	39	42	43	39	53	38

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Chan 11	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
42	-0.6	900	905	896	898	907	886	910	912	884	12	36	49	39	42	44	40	54	40
43	-0.4	909	913	887	908	915	879	912	910	882	12	36	49	39	42	44	42	55	41
44	-0.6	913	916	885	915	919	881	923	914	885	12	36	48	39	42	45	43	56	43
45	-0.7	916	918	882	917	922	883	917	916	884	12	36	48	39	42	44	45	58	44
46	0.1	917	919	885	917	925	883	923	917	887	12	36	47	39	43	44	46	59	46
47	-0.1	922	919	883	920	926	885	921	919	888	12	36	47	39	43	45	48	60	48
48	0.2	926	926	885	923	929	888	921	922	888	12	36	46	39	43	45	49	61	50
49	0.3	928	927	885	925	933	891	920	927	892	12	36	46	40	44	46	51	63	52
50	-1	931	929	891	928	937	895	926	930	895	12	36	47	40	44	47	53	64	54
51	0.3	933	937	900	931	938	898	934	931	898	12	36	47	40	44	47	55	65	56
52	-0.4	939	939	901	934	943	904	931	937	901	12	36	47	40	45	47	57	68	58
53	-0.5	944	944	907	937	947	907	935	943	907	12	37	48	41	45	47	60	69	60
54	-0.1	943	948	919	943	951	914	948	946	913	12	36	48	41	44	47	61	72	62
55	-0.6	951	951	921	945	954	917	955	951	916	12	37	49	42	45	48	64	75	64
56	-0.5	956	954	924	949	959	922	964	955	923	12	37	49	42	46	49	66	77	66
57	-0.9	958	959	928	954	962	926	972	953	928	12	37	49	42	46	49	69	79	68
58	-0.8	962	962	927	955	964	929	966	960	929	12	38	50	41	48	49	71	82	71
59	-0.6	962	962	928	959	966	930	976	959	933	12	38	51	42	49	49	73	84	73
60	-0.4	963	963	930	961	968	932	972	963	934	12	38	53	42	50	50	76	86	75
61	-0.1	969	966	930	963	971	935	968	964	931	12	39	54	42	50	50	80	88	77
62	-0.2	968	969	933	967	973	940	970	966	932	12	40	56	43	51	52	83	91	80
63	-0.5	970	971	940	967	976	939	974	969	935	12	40	56	45	52	52	86	97	85
64	-0.8	970	972	936	971	979	937	981	969	937	12	41	58	49	56	53	88	110	91
65	-1	970	972	930	972	988	937	987	968	935	12	41	60	57	19	16	89	140	98

Time	Chan 23	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	15	15	15	15	15	15	14	14	14	15	15	14	15	15	15	15	15
1	16	15	15	16	15	15	14	14	14	15	15	15	15	15	15	15	15
2	17	14	15	18	15	15	14	13	14	14	15	14	14	15	15	15	14
3	22	16	19	25	15	15	14	13	14	14	15	14	16	16	15	15	14
4	25	16	18	30	15	15	14	13	14	14	15	14	15	16	15	15	14
5	24	16	17	34	15	15	14	13	14	14	15	14	15	16	15	15	14
6	27	17	18	34	15	15	14	13	14	14	15	15	17	16	15	15	15
7	27	17	17	35	15	15	14	13	14	14	15	15	16	16	15	15	15
8	27	17	17	37	15	16	14	13	14	14	15	15	15	15	15	15	14
9	26	18	18	39	15	16	14	13	14	14	15	15	15	15	15	15	14
10	27	19	18	40	15	17	14	13	14	14	15	15	15	15	15	15	14
11	28	21	18	41	15	18	14	13	14	14	15	15	15	15	15	15	14
12	29	23	18	42	15	18	14	13	14	14	15	16	15	16	15	15	14
13	30	25	19	48	15	19	15	13	14	14	16	16	16	16	15	15	15
14	31	27	19	54	16	20	15	14	14	14	16	17	16	17	15	15	15
15	33	29	20	55	16	21	15	14	14	15	17	18	16	18	15	15	15
16	39	33	20	59	16	22	15	14	14	15	18	20	17	19	15	15	15
17	41	36	22	59	16	23	16	15	15	16	19	21	18	20	16	16	16
18	45	39	24	61	17	25	16	16	16	16	20	22	19	22	16	16	17
19	46	42	26	61	17	27	17	16	17	17	21	24	19	23	17	17	17
20	45	44	27	57	18	28	17	17	18	18	22	25	20	24	18	18	18
21	42	45	26	54	18	30	18	18	19	19	23	27	21	25	18	19	19
22	45	47	27	54	19	32	18	19	20	21	24	29	22	26	19	20	20

Time	Chan 23	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
23	50	48	28	54	20	35	19	20	21	22	24	30	23	27	21	22	21
24	54	50	29	55	20	37	20	22	22	24	26	31	24	28	22	23	23
25	62	50	29	55	21	40	21	23	24	25	27	34	25	29	23	25	24
26	61	51	30	56	22	43	22	24	25	27	28	35	27	30	25	26	25
27	60	53	31	57	23	46	23	25	26	28	29	38	28	31	26	28	26
28	62	55	32	58	24	48	24	26	28	30	31	39	29	33	28	29	27
29	64	56	33	58	25	49	25	28	29	31	32	42	31	34	29	31	28
30	61	58	34	60	26	52	26	29	30	33	34	44	32	35	31	32	30
31	60	60	36	62	28	55	27	30	32	34	36	46	33	37	33	34	31
32	59	61	37	61	29	57	29	32	33	35	38	49	35	38	35	35	32
33	61	62	38	63	30	59	30	33	35	37	41	51	37	39	37	36	34
34	61	63	39	65	31	59	31	34	36	39	43	53	38	41	39	38	35
35	62	65	40	66	33	60	32	36	37	40	45	54	39	42	41	39	36
36	62	67	41	67	34	60	34	37	39	42	47	56	41	43	42	40	37
37	62	68	42	68	36	63	35	39	41	43	48	57	42	45	44	41	39
38	62	70	44	69	37	63	37	40	42	45	50	59	43	46	45	42	40
39	63	70	44	77	40	63	38	42	44	46	52	60	45	47	47	43	41
40	63	71	45	83	42	64	40	43	45	47	53	62	46	49	48	44	43
41	63	73	47	81	44	64	41	44	47	49	55	62	47	50	49	46	44
42	63	75	48	80	46	65	43	46	49	50	56	63	48	52	51	47	46
43	65	76	49	83	48	65	45	47	51	51	58	65	50	53	52	48	47
44	65	78	51	79	50	67	47	49	53	53	59	66	51	55	53	49	48
45	67	79	52	78	52	68	49	50	54	54	60	67	53	56	55	51	50
46	68	81	54	78	54	68	52	52	56	55	62	67	55	57	56	52	51

Time	Chan 23	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
47	69	83	56	79	56	68	54	53	57	56	63	68	57	59	57	54	53
48	70	85	57	81	57	69	57	54	59	57	64	68	58	60	58	55	54
49	72	87	59	83	59	70	59	56	60	58	65	69	60	61	59	57	55
50	73	89	61	85	61	71	62	57	61	58	65	69	61	61	60	58	57
51	75	91	64	86	63	72	64	58	62	59	66	69	63	62	61	60	58
52	77	92	66	87	66	74	66	60	63	60	66	70	63	63	62	61	58
53	79	94	69	89	67	75	68	61	64	61	67	70	64	63	63	62	59
54	81	97	72	92	69	76	71	61	64	61	67	71	65	64	65	63	60
55	83	100	75	94	71	78	73	62	65	63	68	72	66	64	67	64	61
56	85	103	78	98	73	80	75	63	65	64	68	72	67	65	70	64	61
57	87	107	80	104	75	80	78	65	66	66	69	73	67	66	73	65	62
58	91	112	82	109	77	84	80	66	66	69	69	73	68	67	77	65	64
59	94	118	84	114	79	89	82	67	67	72	70	74	69	69	81	66	65
60	99	125	86	120	81	92	86	69	68	76	72	76	70	70	86	67	67
61	105	134	87	129	84	96	88	71	69	83	74	77	71	72	89	67	70
62	112	145	88	137	86	99	91	73	70	91	76	80	72	75	93	68	72
63	125	139	88	150	89	101	92	75	71	96	79	85	76	78	95	70	76
64	145	105	83	168	103	102	93	77	72	98	82	84	75	82	100	72	76
65	190	106	83	219	34	19	96	79	74	102	87	85	75	86	55	28	76

Time	Chan 40	Chan 41	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Mean
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	kw/m²	°C
0	14	14	14	13	14	14	14	12	12	14	13	13	13	0.1	13
1	14	15	15	13	14	17	16	13	15	17	16	18	18	1	14
2	14	14	14	13	13	31	29	13	15	17	15	32	32	0.8	13
3	14	14	17	13	13	54	22	15	17	20	18	57	54	0.8	14
4	14	14	16	13	13	74	51	19	22	25	22	78	76	0.8	14
5	14	14	15	13	13	84	61	23	28	32	29	86	84	0.9	13
6	14	15	16	13	15	89	81	24	34	39	35	89	90	0.8	14
7	14	15	16	13	14	97	88	27	40	45	18	94	98	0.7	14
8	14	14	15	13	14	84	92	29	44	51	14	97	99	0.7	14
9	14	14	15	13	14	84	92	32	48	56	13	100	100	0.7	14
10	14	14	15	13	14	95	93	35	52	61	46	97	95	0.7	14
11	14	14	15	13	14	98	94	37	55	66	35	94	93	0.8	14
12	14	14	15	13	14	98	95	40	59	70	55	92	93	0.7	14
13	14	15	15	13	14	98	95	42	62	74	57	91	96	0.8	14
14	14	15	15	13	14	99	96	44	65	77	67	91	99	0.7	14
15	14	15	15	13	14	99	96	48	69	81	72	93	101	0.8	14
16	14	15	16	14	14	100	96	48	73	84	76	92	101	0.7	14
17	15	15	16	14	15	100	97	50	75	86	79	92	101	0.8	15
18	15	15	17	14	15	100	97	51	76	89	82	92	101	0.8	15
19	16	16	18	15	16	100	99	51	77	91	85	93	102	0.8	16
20	17	17	18	15	16	99	101	53	79	93	88	95	104	0.8	16
21	18	17	18	16	17	101	103	54	80	94	89	97	106	0.7	17
22	19	18	18	17	18	104	106	55	81	94	90	99	110	0.8	18
23	20	19	19	18	20	107	109	57	81	95	91	102	114	0.8	19

Time	Chan 40	Chan 41	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Mean
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	kw/m²	°C
24	22	20	19	19	21	111	114	57	82	95	92	105	119	0.8	20
25	23	21	20	20	23	116	120	56	83	96	92	110	124	0.8	21
26	25	22	20	22	25	125	125	57	84	97	93	115	131	0.8	22
27	26	24	21	23	26	135	131	57	85	98	94	121	137	0.8	24
28	27	25	21	24	27	141	136	58	87	98	95	126	143	0.8	24
29	29	26	22	26	29	147	143	59	89	99	96	133	149	0.9	26
30	30	27	23	27	31	154	150	63	91	99	97	139	153	0.9	27
31	31	28	24	28	32	160	156	60	91	99	97	144	157	0.8	28
32	33	30	25	30	33	166	162	62	92	99	98	151	162	0.9	30
33	34	31	26	31	35	171	166	62	92	99	98	156	163	0.9	31
34	36	32	27	32	36	175	172	63	92	99	98	160	168	0.9	32
35	37	34	29	33	37	179	178	63	92	99	98	163	174	0.9	34
36	38	35	30	35	39	183	186	63	93	99	97	167	181	1	35
37	40	37	32	36	40	189	194	64	93	99	97	171	188	1	37
38	41	38	34	37	42	195	204	65	94	99	97	176	196	1	38
39	42	40	36	39	43	200	214	67	94	100	97	184	204	1	40
40	44	41	38	41	45	206	224	67	95	100	97	190	212	0.9	41
41	45	43	41	42	46	212	233	64	95	102	97	196	219	1	43
42	46	44	42	43	47	218	243	65	94	103	98	205	226	1.1	44
43	48	46	44	45	49	225	252	65	95	104	98	212	233	1	46
44	49	47	46	46	50	231	260	66	95	105	98	217	240	1	47
45	51	49	47	48	51	235	268	66	95	107	99	225	246	1.1	49
46	52	50	49	49	52	244	276	65	95	108	99	230	252	1.1	50
47	53	52	52	50	53	255	284	63	95	109	100	235	257	1	52

Time	Chan 40	Chan 41	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Mean
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	kw/m²	°C
48	55	53	54	52	54	261	292	66	95	109	101	240	262	1.1	53
49	56	54	58	53	56	267	298	66	96	109	102	245	267	1.1	55
50	57	55	62	54	56	272	304	66	97	110	103	250	271	1.1	56
51	58	56	67	56	57	277	310	67	98	109	103	257	275	1.2	58
52	59	58	71	57	58	284	315	67	98	108	103	263	280	1.2	60
53	60	59	75	58	59	290	319	66	98	106	103	265	283	1.2	62
54	62	60	79	59	60	294	323	65	98	106	103	268	286	1.2	64
55	65	62	80	62	60	298	327	66	98	107	103	270	290	1.3	65
56	69	65	81	65	62	302	331	66	99	106	103	272	293	1.2	68
57	74	67	80	71	66	306	335	67	99	105	103	274	297	1.3	71
58	80	71	80	80	71	310	338	64	99	104	102	277	299	1.3	76
59	85	74	80	89	78	314	342	66	99	104	102	280	303	1.3	81
60	88	77	82	92	86	318	346	68	100	103	102	283	306	1.4	85
61	92	81	84	94	91	323	349	68	100	103	103	287	309	1.4	88
62	93	85	85	92	94	327	353	67	100	103	103	291	313	1.4	89
63	108	88	88	102	95	332	356	68	100	104	104	294	313	1.6	96
64	157	96	85	131	95	338	359	67	100	104	104	296	316	1.5	112
65	213	49	86	170	93	346	362	65	100	104	105	299	318	1.7	122