

# Fire Resistance Test

Prepared for:

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## CONFIDENTIAL

### Report: Chilt/RF12198 Revision A

A fire resistance test performed on a two single leaf single acting doorsets

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

Test date: 14th February 2013



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**BM TRADA – the new name for Chiltern International Fire Ltd**

From July 1st 2013, Chiltern International Fire Ltd commenced trading under the name of its parent company BM TRADA and at the same time adopted a brand new visual identity.

Historically, the group has delivered its services through a number of individual companies: BM TRADA Certification Ltd, TRADA Technology Ltd, Chiltern International Fire Ltd (including Chiltern Dynamics) and a network of international offices. Both BM TRADA Group and these individual companies will now trade under the same name - BM TRADA - and adopt the new visual identity.

To coincide with this change, our Technical Reports, Test Reports, Products Assessments, company stationery and marketing collateral have been re-designed to carry the new branding and visual identity.

The validity of all documents previously issued by the individual companies including certificates, test reports and product assessments is unaffected by this change and a letter to this effect will be available to download from our website [www.bmtradagroup.com](http://www.bmtradagroup.com).

About BM TRADA.

With origins dating back to 1934, we have a deep history and services which are highly valued by our customers. We offer independent certification, testing, inspection, training and technical services around the world. In all these areas we continue to use industry-leading experts in their chosen fields to develop and deliver services – an ethos that has been at the heart of our approach since we began.

A recent review of our businesses and customers revealed that the individual identities sometimes make communications confusing, and that in an already complex business area, clarity and simplicity in communications is rare, but valued. It also revealed that a single identity and combined offer would help us strengthen our appeal.

With this in mind, we brought the companies together under the name BM TRADA and took the opportunity to create a fresh new visual identity.

We have modernised our image and combined our strengths. However, our values, our people and the integrity of our services remain the same. I hope you will welcome these changes and the improvements they will bring.



Jon Osborn  
Chief Operating Officer

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**1 Summary of performance** (see page 27 for individual hardware 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**

**Doorset A**

<b>Integrity</b>	
Cotton pad	68 (sixty eight) minutes*
Continuous flaming	56 (fifty six) minutes
Gap gauges	68 (sixty eight) minutes*
<b>Insulation</b>	
Average set	56 (fifty six) minutes**
Maximum $\geq$ 100mm in from leaf edge	56 (fifty six) minutes**
Maximum $\geq$ 25mm in from leaf edge	49 (forty nine) minutes
Door frame $\geq$ 180°C temp rise	56 (fifty six) minutes**
Door frame $\geq$ 360°C temp rise	56 (fifty six) minutes**

\* No failure at test termination at 68 minutes

\*\* Failure by virtue of integrity failure at 56 minutes

\*\*\* Failure was located at the top closing corner of the leaf and not associated with any of the hardware recorded within this document

**Doorset B**

<b>Integrity</b>	
Cotton pad	68 (sixty eight) minutes*
Continuous flaming	68 (sixty eight) minutes*
Gap gauges	68 (sixty eight) minutes*
<b>Insulation</b>	
Average set	68 (sixty eight) minutes*
Maximum $\geq$ 100mm in from leaf edge	68 (sixty eight) minutes*
Maximum $\geq$ 25mm in from leaf edge	59 (fifty nine) minutes
Door frame $\geq$ 180°C temp rise	65 (sixty five) minutes
Door frame $\geq$ 360°C temp rise	68 (sixty eight) minutes*

\* No failure of test criteria at test termination at 68 minutes



**Summary of specimens:**

**Two latched single leaf single acting doorsets**

Leaf size – doorset A:  
2135mm high x 930mm wide  
x 54mm thick

Leaf size – doorset B:  
2135mm high x 930mm wide  
x 54mm thick

## 2 Introduction

The doorsets were installed into a flexible supporting construction. In accordance with BS EN 14600: 2005 the leaves were pre-cycled before the fire test. The doorsets were instrumented with the standard and supplementary sets of thermocouples and were installed opening in towards the furnace.

## 3 Specimen verification

The doorsets were manufactured by BM TRADA during February 2013. The component parts of the doorsets were identified based on nominal information provided by the manufacturers of the elements. 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). The hardware elements of both specimens were delivered by the client during February 2013.

### 3.1 Conditioning

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

### 3.2 Sampling

BM TRADA 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 specimens tested are 60 minute products with an anticipated Category B performance, therefore intended fire resistance is 68 minutes and three layers of Gypsum plasterboard type F are required. The supporting construction was only fixed on the horizontal edges, the vertical edges remained free.

## 5 Description of specimen

### 5.1 Door leaves

The left doorset was designated doorset A and the leaf measured 2135mm high x 930mm wide x 54mm thick. The right doorset was designated doorset B and the leaf measured 2135mm high x 930mm wide x 54mm thick.

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

### 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		Halspan Prima three layered particleboard	54 thick	630*± 10%	6.2-6.5	1
Adhesive	Lippings	Polyurethane	-	-	-	-
Lippings – vertical edges only		Sapele	6 thick	640**	7.3	2

\* Manufacturers stated density

\*\* Nominal density



**Frame – both doorsets**

	Material	Dimensions (mm)	Density (kg/m <sup>3</sup> )	Moisture (% w/w)	Key to figures
Head and jambs	Sapele	70 wide x 32 thick	640**	7.3-7.4	3
Head to jamb jointing detail	Mortice and tenon - screwed	-	-	-	-
Stops - planted (pinned)	Sapele	12 thick x 15 wide	640**	7.0	4
Frame to supporting construction fire stopping detail	Tightly packed mineral fibre capped with intumescent acrylic mastic on both faces	Nominally 5-10mm wide x 10-15 deep	-	-	-
Frame to supporting construction fixing detail	Steel wood screws 4 No. fitted per jamb	100 long	-	-	-
Architrave	MDF	18 thick x 45 wide	700**	13.5-13.6	-
Threshold	Non combustible	-	-	-	-

**Intumescent and door sealing – both doorsets**

	Make/type	Size (mm)	Location	Key to figures
Door edges	None fitted	-	-	-
Frame reveal – head and jambs	2No. Lorient Polyproducts Ltd LP1504 Type 617	15 x 4	Centrally fitted 10mm apart, with the 1 <sup>st</sup> seal 7mm from the exposed face in the frame reveal	5
Weather seal	None fitted	-	-	-

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**Intumescent interruptions and additional hardware protection – doorset A**

Around hinges	Partially interrupted	-	Hinge blade fully interrupts 1st seal and partially interrupts 2 <sup>nd</sup> seal leaving 10mm continuous in frame reveal
Under hinge blade	UAP Sheet (graphite)	1 thick	Fitted under hinge blade on frame and leaf
Encasing eye viewer A3	None fitted	-	-
Encasing eye viewer A4	None fitted	-	-
Encasing eye viewer A5	None fitted	-	-
Encasing eye viewer A8	None fitted	-	-
Encasing eye viewer A9	None fitted	-	-
Encasing eye viewer A10	UAP sheet (graphite)	1.8 thick	Fitted lining the eye viewer cut out
Encasing eye viewer/knocker A11	UAP sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Encasing eye viewer A13	UAP sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Encasing eye viewer A14	UAP sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Encasing eye viewer A15	UAP sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Letter plate aperture A16	UAP sheet (graphite)	1.8 thick	Fitted lining the letter plate cut out in the leaf
Letter plate aperture A17	UAP sheet (graphite)	1.8 thick	Fitted lining the letter plate cut out in the leaf
Encasing dead lock body	None fitted	-	-
Under dead lock forend	UAP Sheet (graphite)	1 thick	Fitted under the dead lock forend
Around dead lock keep	Partially interrupted	-	Dead lock keep partially interrupts both seals in frame reveal with 6mm of 1 <sup>st</sup> seal and 2mm of 2 <sup>nd</sup> seal remaining continuous
Under dead lock keep	UAP Sheet (graphite)	1 thick	Fitted under the dead lock keep
Encasing lock/latch body	None fitted	-	-
Under lock/latch forend	UAP Sheet (graphite)	1 thick	Fitted under the lock/latch forend
Around lock/latch keep	Partially interrupted	-	Lock/latch keep fully interrupts 1 <sup>st</sup> seal and partially interrupts 2 <sup>nd</sup> seal with 7mm remaining continuous
Under lock/latch keep	UAP Sheet (graphite)	1 thick	Fitted under the lock/latch keep

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**ntumescent interruptions and additional hardware protection – doorset B**

Around hinges	Partially interrupted	-	Hinge blade fully interrupts 1st seal and partially interrupts 2 <sup>nd</sup> seal leaving 10mm continuous in frame reveal
Under hinge blade	UAP Sheet (graphite)	1 thick	Fitted under hinge blade on frame and leaf
Encasing eye viewer B8	None fitted	-	-
Encasing eye viewer B9	None fitted	-	-
Encasing eye viewer B11	None fitted	-	-
Encasing eye viewer B12	UAP Sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Encasing eye viewer B13	UAP Sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Encasing eye viewer B14	UAP Sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Encasing eye viewer B15	UAP Sheet (graphite)	1 thick	Fitted lining the eye viewer cut out
Letter plate aperture B17	UAP Sheet (graphite)	1.8 thick	Fitted lining the letter plate cut out in the leaf
Encasing dead lock body	None fitted	-	-
Under dead lock forend	UAP Sheet (graphite)	1 thick	Fitted under the dead lock forend
Around dead lock keep	Fully interrupted	-	Dead lock keep fully interrupts seal in frame reveal
Under dead lock keep	UAP Sheet (graphite)	1 thick	Fitted under the dead lock keep

**Hardware – doorset A**

	Make/type	Size (mm)	Location	Key to figures
Hinges	3 No. UAP CDHPVDGPDS butt type hinges fixed with 4No. 30mm long screws in leaf and frame	101 x 37 x 3 thick (blade size)	Fitted 150mm, 1000mm and 1855mm from the head of the leaf	6
Closer	Rutland TS3204 overhead type closer	220 x 58 (footprint size)	Fitted on the exposed face of the leaf as per the manufacturer's instructions	7
Dead lock	UAP 6LMDBR 25	135 x 26 (forend size) 90 x 67 x 18 (body size) 42 backset	Fitted 800mm from the leaf head	8
		180 x 30 x 3 (keep size)		
Lock/latch - engaged	Simplex lock/latch with UAP Eurocylinder Product reference ZL30/30NAS	235 x 20 x 3 (forend size) 165 x 84 x 15 (body size)	Fitted 1000mm from the leaf threshold	9
		175 x 25 (keep size)		
Furniture	UAP Exterior High Sec handle	214 x 34 (footprint size)	Fitted appropriate to the latch	10
	Security Chain product reference DCBN, body fixed with 4No. Ø3.5 x 24mm long screws, keep fixed with 2No. Ø3.5 x 24mm long screws	64 x 15 (body size) 42 x 38 (keep size)	Fitted 290mm from the head of the leaf, 190 from the closing edge	A3
	Security Chain product reference DCCH, body fixed with 4No. Ø3.5 x 24mm long screws, keep fixed with 2No. Ø3.5 x 24mm long screws	84 x 40 (body size) 58 x 18 (keep size)	Fitted 395mm from the head of the leaf, 100mm from the head of the leaf	A4
	Security chain product reference DRPB, body fixed with 4No. Ø4 x 26mm long screws, keep fixed with 3No. Ø4 x 45mm long screws	62 x 21 (body size) 62 x 21 (keep size)	Fitted 575mm from the head of the leaf, 20mm from the closing edge	A5
	Eye viewer product reference SWALFBR. Through fixed – screwed together from each face	Ø18 (cut out size) Ø27 (footprint size)	Fitted 525mm from the head of the leaf, 190mm from the closing edge	A8
	Eye viewer product reference CILCH. Through fixed – screwed together from each face	Ø16 (cut out size) Ø18 (footprint size)	Fitted 525mm from the head of the leaf, 395mm from the closing edge	A9

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	Make/type	Size (mm)	Location	Key to figures
Furniture	Eye viewer product reference STVG. Through fixed – screwed together from each face	Ø43 (cut out size) 62 x 43 (footprint size)	Fitted 525mm from the head of the leaf, 595mm from the closing edge	A10
	Eye viewer product reference CILCH fitted through knocker product reference V6CHH Knocker through fixed with 6mm threaded rod	Ø16 (cut out size) 163 x 72 (footprint size)	Fitted 560mm from the head of the leaf, 210mm from the hanging edge	A11
	Eye viewer product reference SWALFBR. Through fixed – screwed together from each face	Ø18 (cut out size) Ø27 (footprint size)	Fitted 640mm from the head of the leaf, 100mm from the closing edge	A13
	Eye viewer product reference CILCH. Through fixed – screwed together from each face	Ø16 (cut out size) Ø18 (footprint size)	Fitted 640mm from the head of the leaf, 300mm from the closing edge	A14
	Eye viewer product reference CILCH. Through fixed – screwed together from each face	Ø16 (cut out size) Ø18 (footprint size)	Fitted 640mm from the head of the leaf, 400mm from the closing edge	A15
	Letter plate product reference FMS1248S. Through fixed using 2No 60mm screws and surface fixed from both sides with 4No 30mm long screws (one per corner of body)	306 x 77 (footprint size) 260 x 45 (cut out size)	Fitted 1210mm from the leaf head, 140 from the closing edge	A16
	Letter plate product reference FMB1248G. Through fixed using 2No 60mm screws and surface fixed from both sides with 4No 30mm long screws (one per corner of body)	306 x 67 (footprint size) 260 x 40 (cut out size)	Fitted 1210mm from the leaf head, 140 from the hanging edge	A17
	Numerals – product reference 6TRMPSSA, 7TRCH, 1TRGAC, '7' surface fixed with 2No. 20mm screws, others self adhesive fixing	75 x 37.5 (nominal)	Fitted on the unexposed face; 400mm from the leaf head, 350 from the hanging edge.	A18

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**Hardware – doorset B**

	Make/type	Size (mm)	Location	Key to figures
Hinges	3 No. UAP CDHPVDGPDS butt type hinges fixed with 4No. 30mm long screws in leaf and frame	101 x 37 x 3 thick (blade size)	Fitted 150mm, 1000mm and 1855mm from the head of the leaf	11
Closer	Rutland TS3204 overhead type closer	220 x 58 (footprint size)	Fitted on the exposed face of the leaf as per the manufacturer's instructions	12
Dead lock	UAP 6LMDBR 25	135 x 26 (forend size) 90 x 67 x 18 (body size) 42 backset	Fitted 800mm from the leaf head	13
		180 x 30 x 3 (keep size)		
		175 x 25 (keep size)		
Furniture	Security chain product reference DCBN, body fixed with 4No. Ø3.5 x 24mm long screws, keep fixed with 2No. Ø3.5 x 24mm long screws	64 x 15 (body size) 42 x 38 (keep size)	Fitted 290mm from the head of the leaf, 190 from the closing edge	B3
	Security chain product reference DCCH, body fixed with 4No. Ø3.5 x 24mm long screws, keep fixed with 2No. Ø3.5 x 24mm long screws	84 x 40 (body size) 58 x 18 (keep size)	Fitted 395mm from the head of the leaf, 100mm from the head of the leaf	B4
	Security chain product reference DRPB, body fixed with 4No. Ø4 x 26mm long screws, keep fixed with 3No. Ø4 x 45mm long screws	62 x 21 (body size) 62 x 21 (keep size)	Fitted 575mm from the head of the leaf, 20mm from the closing edge	B5
	Eye viewer product reference CILGA Through fixed – screwed together from each face	Ø12 (cut out size) Ø15 (footprint size)	Fitted 530mm from the head of the leaf, 200mm from the closing edge	B8
	Eye viewer product reference CILBR Through fixed – screwed together from each face	Ø12 (cut out size) Ø15 (footprint size)	Fitted 530mm from the head of the leaf, 400mm from the closing edge	B9
	Knocker product reference V6PVDGHF Knocker through fixed with 6mm threaded rod	163 x 72 (footprint size)	Fitted 550mm from the head of the leaf, 100mm from the hanging edge	B11

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	Make/type	Size (mm)	Location	Key to figures
Furniture	Eye viewer product reference CILGA Through fixed – screwed together from each face	Ø12 (cut out size) Ø15 (footprint size)	Fitted 640mm from the head of the leaf, 100mm from the closing edge	B12
	Eye viewer product reference CILBR (glass lens) Through fixed – screwed together from each face	Ø12 (cut out size) Ø15 (footprint size)	Fitted 640mm from the head of the leaf, 300mm from the closing edge	B13
	Eye viewer product reference CILBR (plastic lens) Through fixed – screwed together from each face	Ø12 (cut out size) Ø15 (footprint size)	Fitted 640mm from the head of the leaf, 300mm from the hanging edge	B14
	Eye viewer product reference CILSS Through fixed – screwed together from each face	Ø12 (cut out size) Ø15 (footprint size)	Fitted 640mm from the head of the leaf, 300mm from the closing edge	B15
	Letter plate product reference FMS1248S with SBF shroud on fireside Through fixed using 2No 60mm screws and surface fixed from both sides with 4No 30mm long screws (one per corner of body)	306 x 67 (footprint size) 260 x 40 (cut out size)	Fitted 1210mm from the leaf head, 140 from the closing edge	B17
	Numerals – product reference 6TRMPSSA, 7TRCH, 1TRGAC, '7' surface fixed with 2No. 20mm screws, others self adhesive fixing	75 x 37.5 (nominal)	Fitted on the exposed face	B18

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## 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	90°
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	10° ± 2°
Closing speed – doorset A	1.5 seconds
Closing speed – doorset B	1.3 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 24 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)
Doorset A	65 @ handle position
Doorset B	70 @ handle position

### 7.4 Method of installation

The doorsets were fixed into pre-prepared openings. 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 doorsets were flush with the exposed face of the supporting construction.



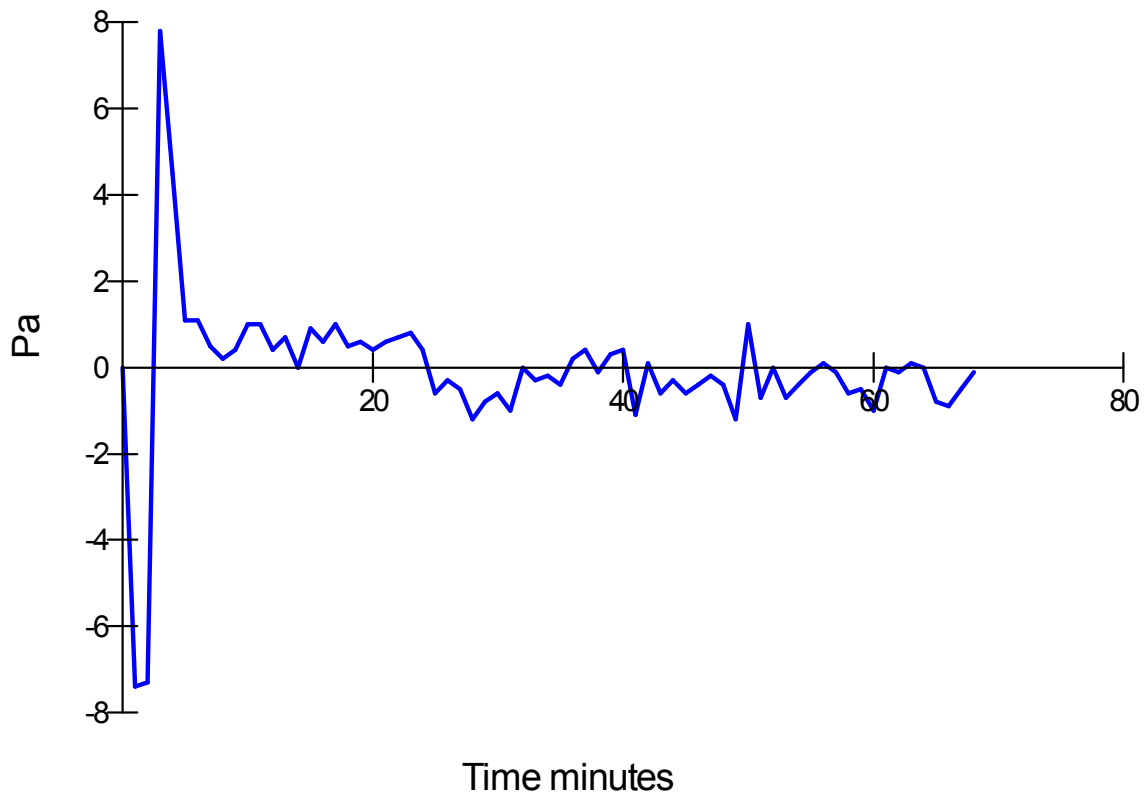
## 8 Test conditions

### 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.

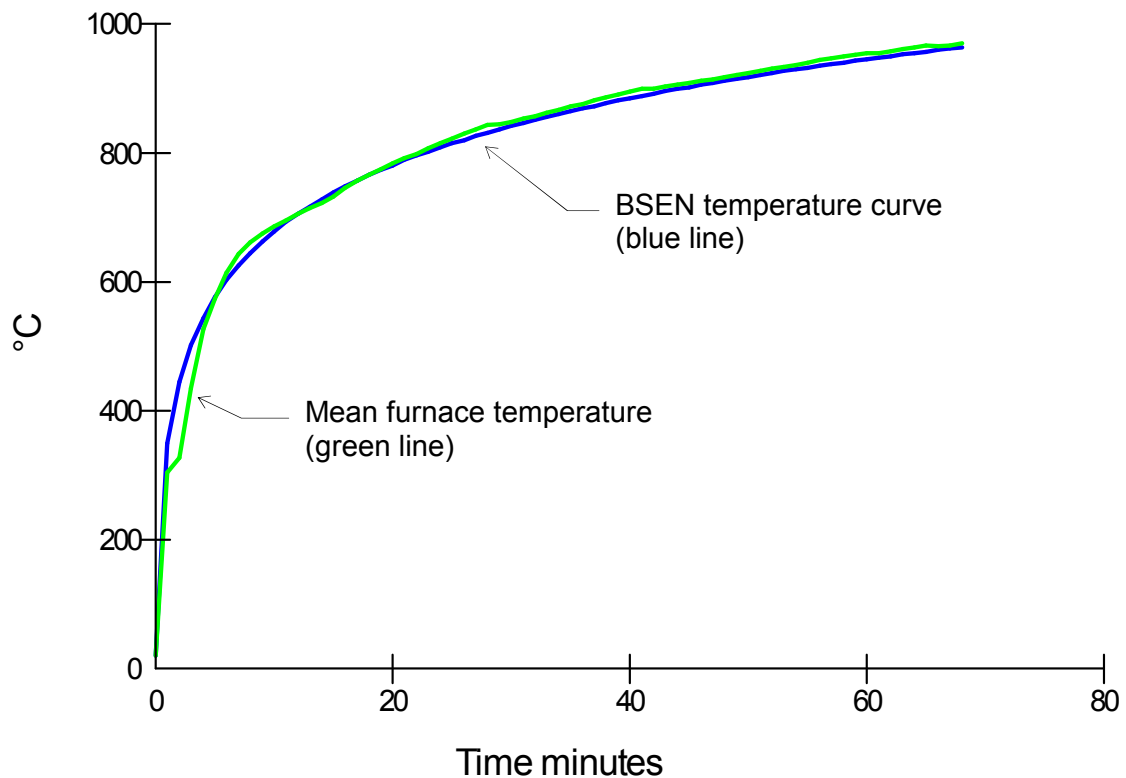
### 8.2 Pressure readings

After the first 5 minutes of the test, the furnace pressure was maintained at  $0 \pm 5$  Pa and after 10 minutes was maintained at  $0 \pm 3$  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 A

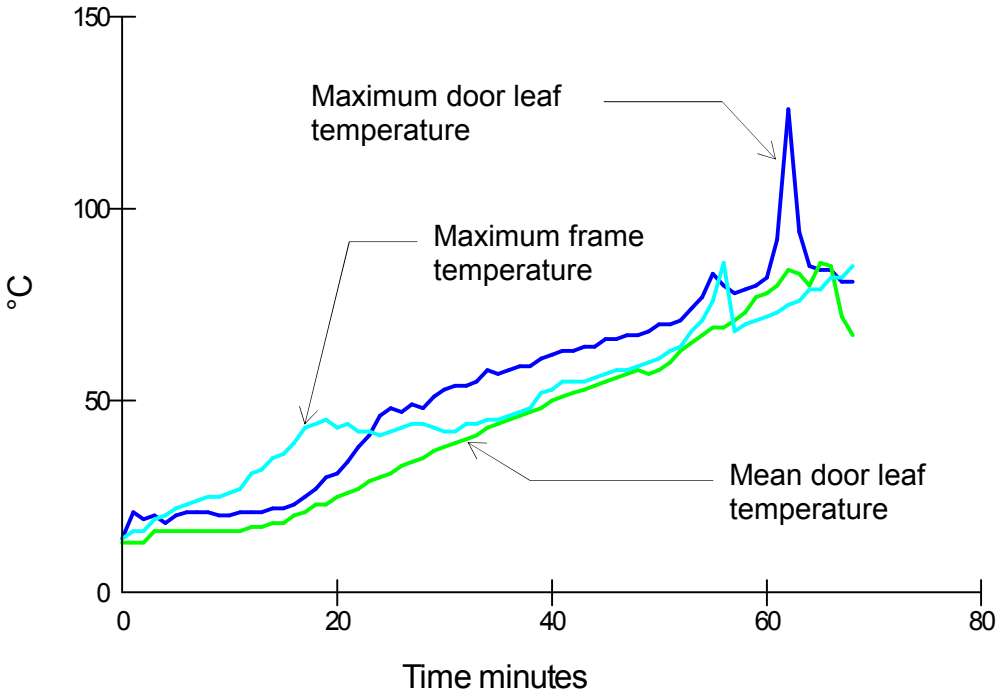
	2 discrete areas	
Leaf	Discrete area 1 (Timber)	5 measuring mean temperature rise. 5 measuring maximum temperature rise, standard set 100mm in from the door leaf edges. 5 measuring maximum temperature rise, supplementary set 25mm in from the door leaf edges.
	Discrete area 2 (Aluminium letterplates)	2 measuring maximum temperature, 1 on each letterplate
Frame		5 measuring maximum temperature rise.

### Doorset B

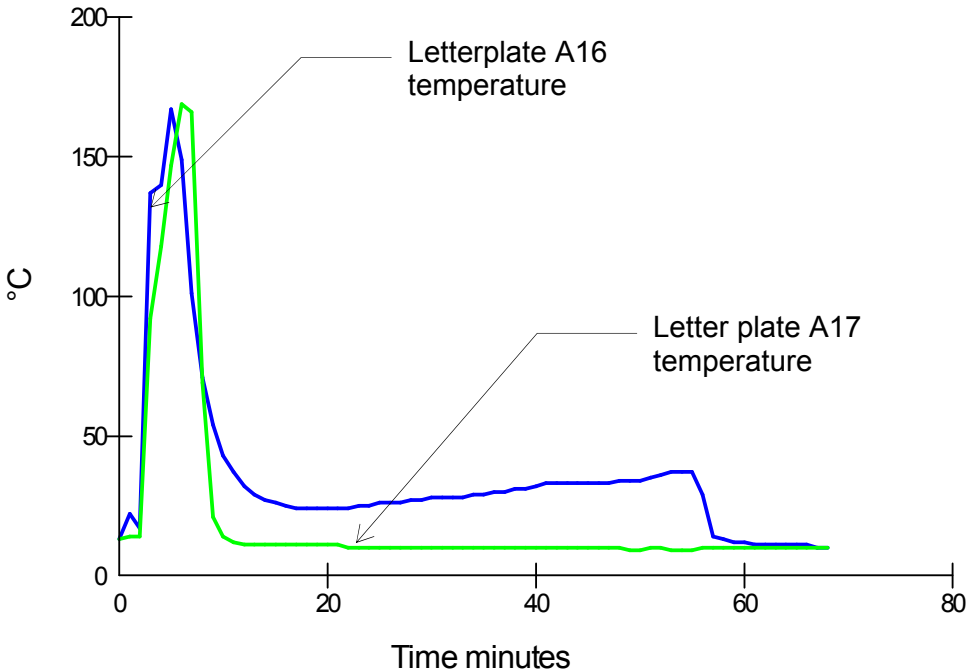
	2 discrete areas	
Leaf	Discrete area 1 (Timber)	5 measuring mean temperature rise. 5 measuring maximum temperature rise, standard set 100mm in from the door leaf edges. 5 measuring maximum temperature rise, supplementary set 25mm in from the door leaf edges.
	Discrete area 2 (Aluminium letterplate)	1 measuring maximum temperature
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 overleaf.

Doorset A

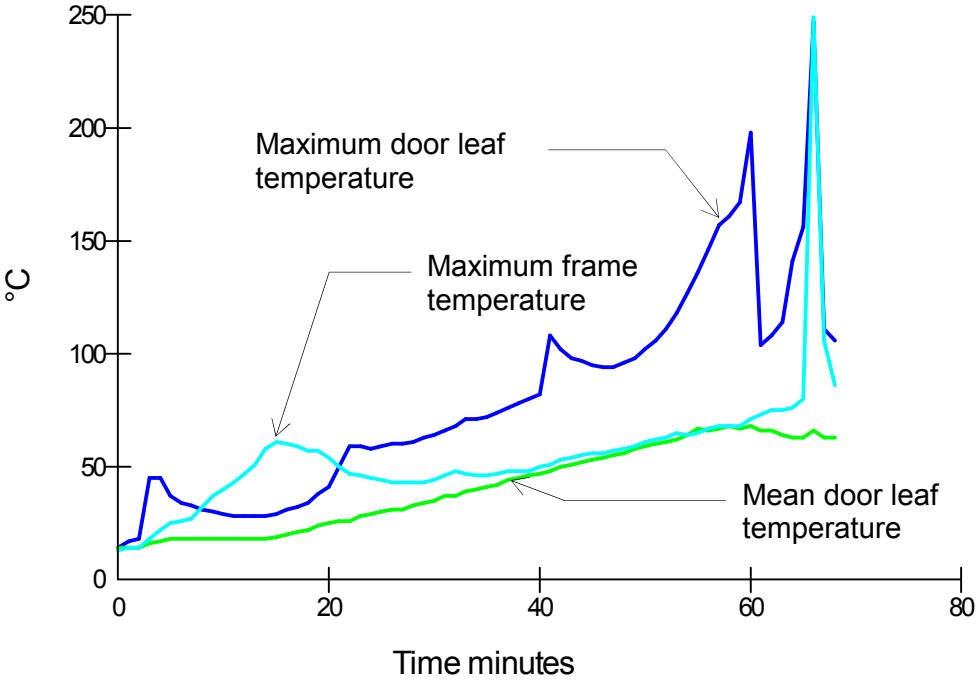


Doorset A - Letter plates

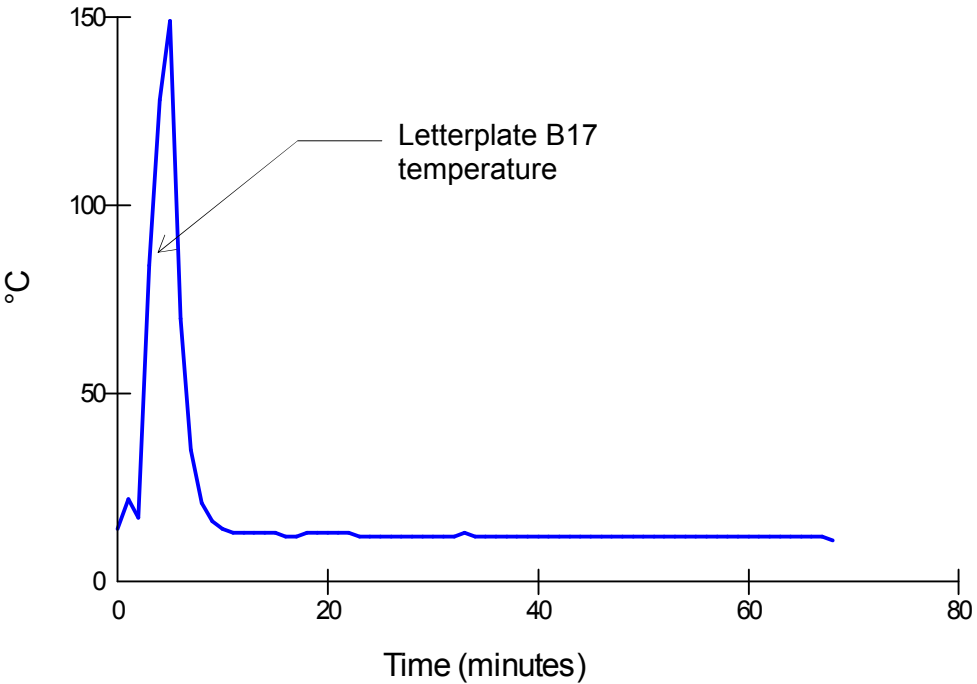


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Doorset B



Doorset B - Letter plates



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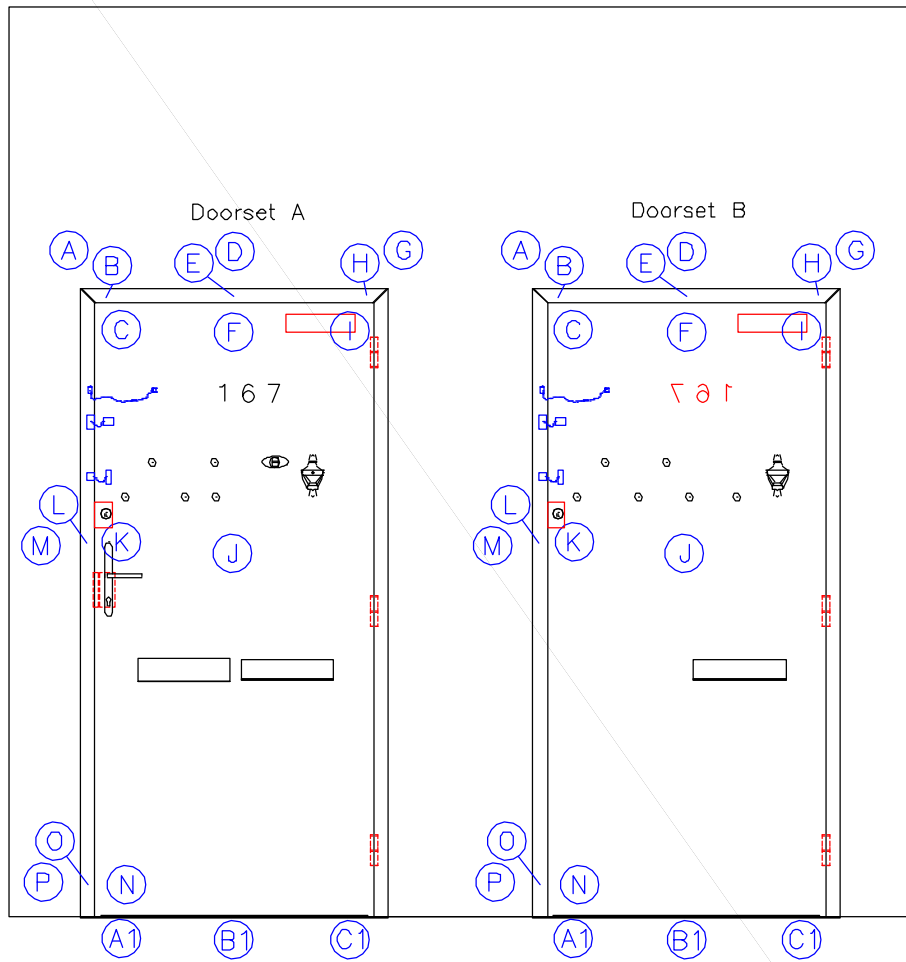
### 8.5 Leaf, frame and partition distortion data

The following tables show the distortion in mm with an accuracy of  $\pm 1$ mm.

A positive measurement indicates distortion towards the furnace.

A negative measurement indicates distortion away from the furnace.

C2, D2 and E2 give vertical movement of the door; a negative reading indicates that the door has dropped.



**Doorset A (hung on the right and opening in towards the furnace)**

Time	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
15	6	5	9	10	7	8	9	9	9	6	5	3	4	1	1	1
30	6	7	19	9	7	14	9	8	13	2	4	5	4	3	2	1
45	5	7	22	9	7	12	9	9	14	-5	2	3	2	2	3	1
60	5	7	18	9	7	11	10	10	15	-17	-2	3	5	2	3	1

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

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

Time	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
15	8	5	5	9	7	9	4	7	6	4	8	7	6	6	4	1
30	7	2	12	7	7	11	4	8	9	0	5	6	5	10	4	0
45	7	3	13	7	7	10	4	9	11	-8	1	5	4	11	2	0
60	8	7	19	8	7	10	4	13	14	-23	-2	5	5	9	4	1

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



## 9 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00.00	Test started.
02.33	Doorset B, there is smoke issuing from the top half leaf/frame gaps and letter plates.
02.40	Doorset A, there is smoke issuing from A11 eye viewer.
03.05	Doorset A, there is smoke issuing from the top closing corner of the leaf and A16 letter plate flap is falling down.
04.29	Doorset A, there is smoke issuing from the dead lock and the latch keyhole.
04.43	Doorset B, B17 letter plate flap has fallen off.
05.05	Doorset A, A17 letter plate is moving and A16 letter front has fallen away.
06.00	Doorset B, a cotton pad integrity test was performed at B17 where a glow is showing through intumescent, no failure.
06.16	Doorset A, there is a glow visible at A17 letter plate.
06.54	Doorset A, there is discolouration around the dead lock.
07.05	Doorset A, A17 letter plate has fallen away.
07.28	Doorset B, the intumescent has reacted covering the glow visible at B17.
09.04	Doorset A, A16 and A17 glows have sealed up and there is smoke issuing.
09.57	Doorset B, there is smoke issuing from eye viewers B8 and B12.
11.29	Doorset A, there is an increase in smoke issuing from the closing edge from the dead lock up.
14.58	Doorset A, there is smoke issuing from A8 from behind the eye viewer and there is discolouration around the hardware.
15.33	Doorset B, there is smoke issuing from the perimeter of all eye viewers
17.01	Doorset B, the lenses of all eye viewers are melting and there is discolouration of the leaf above the eye viewers B8 and B9.
19.25	Doorset A, there is an increase in discolouration around the dead lock, A8.
20.00	Doorset A, A10 the eye viewer is deflecting out of the aperture.

*The legal validity of this report can only be claimed on presentation of the complete report.*

- 23.02 Doorset B, there is a decrease in the level of smoke issuing from the top half leaf/frame gaps and an increase in the level of smoke issuing from the perimeter of the handle.
- 24.39 Doorset A, there is an increase in discolouration around A8.
- 28.26 Doorset A, A17 the top of the letter plate insert continues to distort and bow creating a gap at the top.
- 30.00 Doorset B, there is discolouration at the perimeter of all eye viewers and perimeter of the handle.
- 39.10 Doorset A, A10 eye viewer has fallen out. There is a glow visible but the intumescent continues to react reducing the glow.
- 41.35 Doorset A, a cotton pad integrity test was performed at A10, no failure.
- 43.28 Doorset B, there is an increase in the discolouration and level of smoke issuing from the perimeter of the handle. There is discoloration at the top hanging and top closing corners.
- 46.41 Doorset A, there is an increase in the discolouration and level of smoke issuing from A7.
- 49.52 Doorset A, A8 eye viewer is moving out from the aperture.
- 51.03 Doorset A, there is a glow visible from behind A8.
- 51.36 Doorset A, there is a glow visible at A12.
- 55.58 Doorset B, there is a glow visible at B17 letter plate where the left fixing is located. There is also a glow visible at the centre through intumescent.
- 56.25 Doorset A, there is continuous flaming at the top closing corner of the leaf thereby constituting **integrity failure**.
- 57.35 Doorset B, sections of intumescent has fallen away from B17 letter plate exposing more of a glow.
- 58.20 Doorset A, a cotton pad integrity test was performed at A8, no failure.
- 59.30 Doorset B, there is a glow visible at the latch position B7.
- 61.07 Doorset A, there is continuous flaming at A6 igniting the lock and latch position thereby constituting **further integrity failure**.
- 62.28 Doorset A, there is continuous flaming at A16 igniting the latch closing edge and A8 thereby constituting **further integrity failure**.
- 64.12 Doorset A, there is continuous flaming at A17 thereby constituting **further integrity failure**.
- 64.43 Doorset A, there is continuous flaming at the handle thereby constituting **further integrity failure**.

---

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- 65.25 Doorset B, there is continuous flaming at the right letter plate B17 and a glow visible at the top closing corner of the leaf thereby constituting **integrity failure**.
- 68.36 Test terminated.

## 10 Expression of results

### Doorset A

<b>Integrity</b>	
Cotton pad	68 (sixty eight) minutes*
Continuous flaming	56 (fifty six) minutes***
Gap gauges	68 (sixty eight) minutes*
<b>Insulation</b>	
Average set	56 (fifty six) minutes**
Maximum $\geq$ 100mm in from leaf edge	56 (fifty six) minutes**
Maximum $\geq$ 25mm in from leaf edge	49 (forty nine) minutes
Door frame $\geq$ 180°C temp rise	56 (fifty six) minutes**
Door frame $\geq$ 360°C temp rise	56 (fifty six) minutes**

\* No failure at test termination at 68 minutes

\*\* Failure by virtue of integrity failure at 56 minutes

\*\*\* Failure was located at the top closing corner of the leaf and not associated with any of the hardware recorded within this document

### Doorset B

<b>Integrity</b>	
Cotton pad	68 (sixty eight) minutes*
Continuous flaming	68 (sixty eight) minutes*
Gap gauges	68 (sixty eight) minutes*
<b>Insulation</b>	
Average set	68 (sixty eight) minutes*
Maximum $\geq$ 100mm in from leaf edge	68 (sixty eight) minutes*
Maximum $\geq$ 25mm in from leaf edge	59 (fifty nine) minutes
Door frame $\geq$ 180°C temp rise	65 (sixty five) minutes
Door frame $\geq$ 360°C temp rise	68 (sixty eight) minutes*

\* No failure of test criteria at test termination at 68 minutes

**Individual hardware performance** – See figure 1 of Appendix 1 for specimen locations

Specimen reference	Integrity		
	Cotton pad	Continuous flaming	Gap gauge
UAP CDHPVDGPDS butt type hinges (Key to figures 6 and 11)	*	*	*
A3	*	*	*
A4	*	*	*
A5	*	*	*
Deadlock A	*	61 (sixty one) minutes	*
Latch A (including Eurocylinder ZL30/30NAS)	*	*	*
A8	*	62 (sixty two) minutes	*
A9	*	*	*
A10	*	*	*
A11	*	*	*
A13	*	*	*
A14	*	*	*
A15	*	*	*
A16	*	*	*
A17	*	*	*
A18	*	62 (sixty two) minutes	*
B3	*	*	*
B4	*	*	*
B5	*	*	*
Deadlock B	*	*	*
B8	*	*	*
B9	*	*	*
B11	*	*	*
B12	*	*	*
B13	*	*	*
B14	*	*	*
B15	*	*	*
B17	*	65 (sixty five) minutes	*
B18	*	*	*


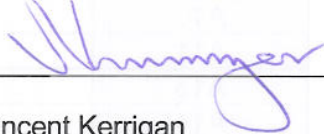
\* No failure of the test criteria had occurred at termination of the test at 68 minutes

## 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. BM TRADA 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.

<b>Signature:</b>		
<b>Name:</b>	Robert Axe	Vincent Kerrigan
<b>Title:</b>	Lead Technical Officer - Fire	Technical Manager
<b>Date of issue:</b>	11.10.13	11-10-2013

Revision A – 10<sup>th</sup> October 2013 – description of construction page 12 – Hardware items not achieving 60 minutes integrity removed from the report.

## 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 BM TRADA upon request.

*The legal validity of this report can only be claimed on presentation of the complete report.*



### 13 Photographs

#### Intumescent interruptions by hardware

Hinge – both doorsets



Dead lock keep – both doorsets



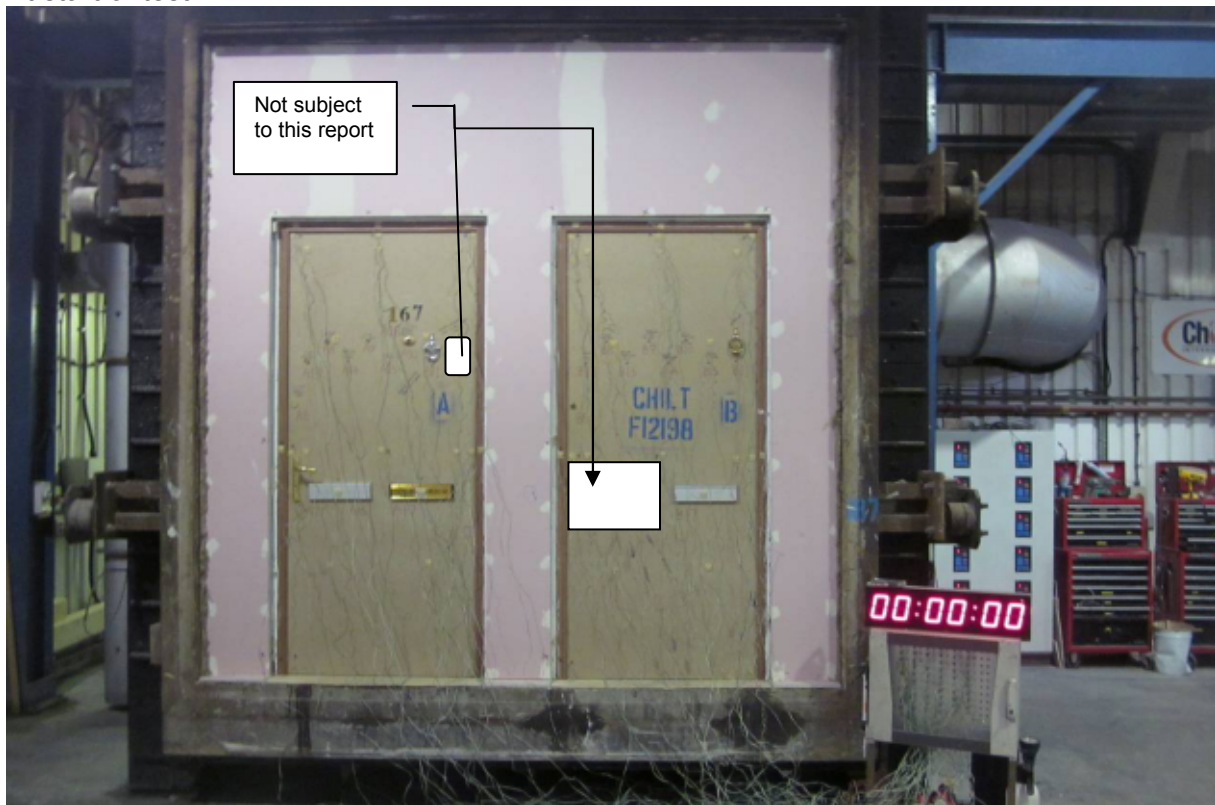
Lock/ latch keep – doorset A



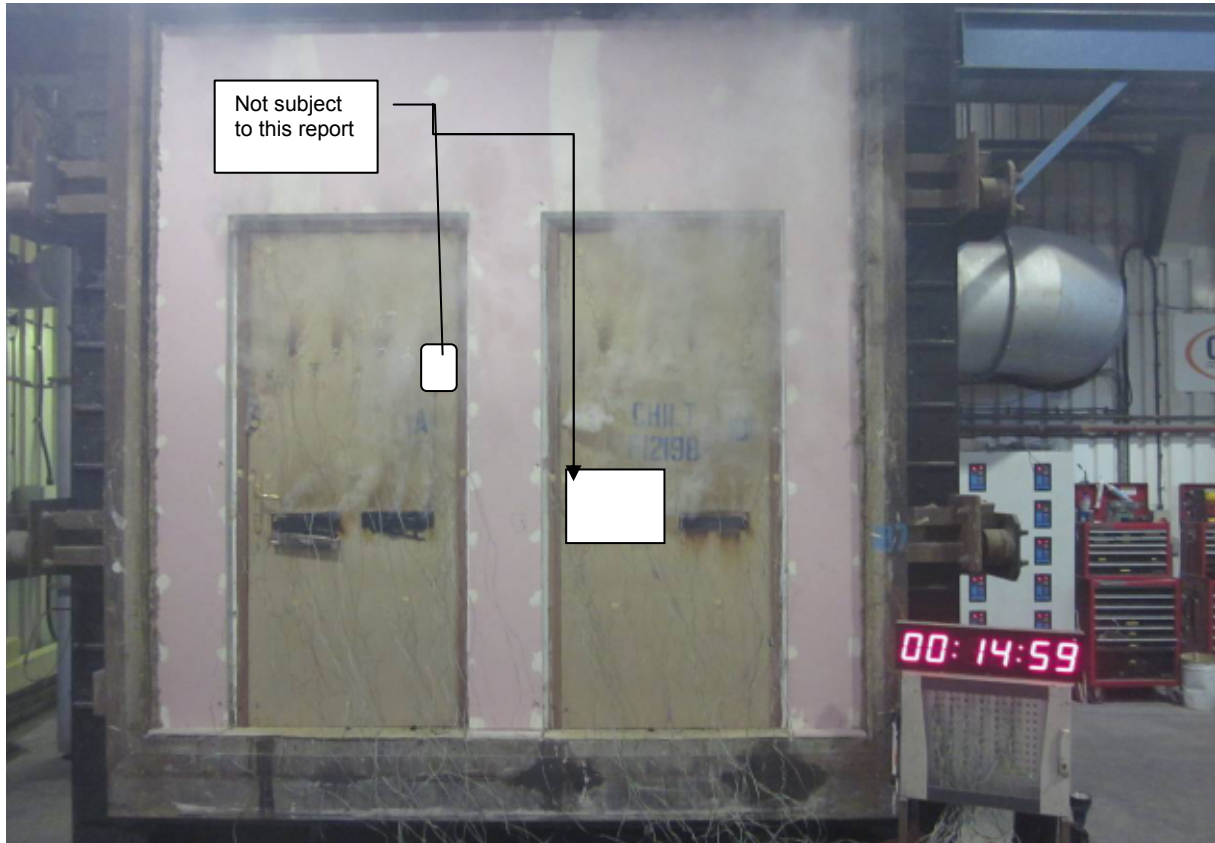
*The legal validity of this report can only be claimed on presentation of the complete report.*



At start of test



After 14 minutes



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After 30 minutes

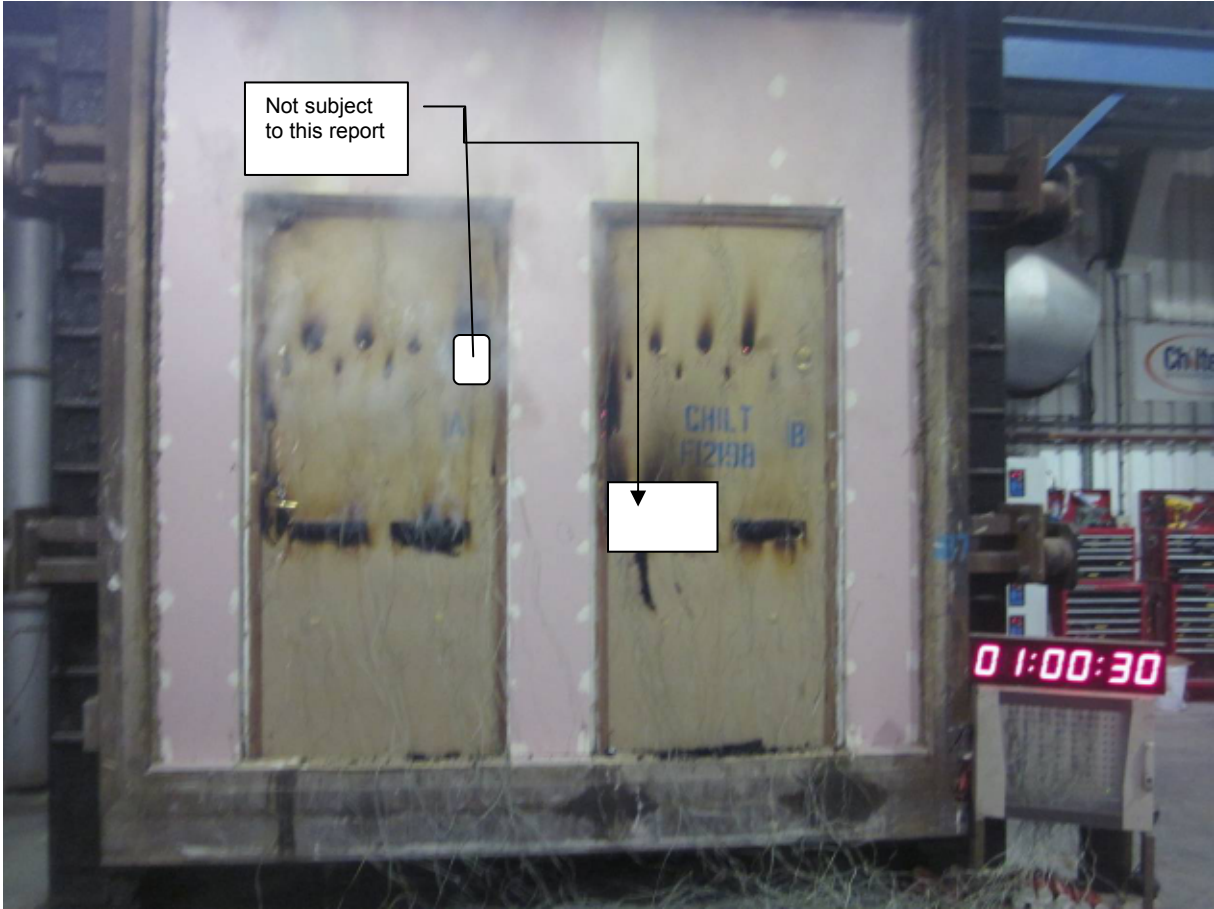


At 45 minutes



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After 60 minutes



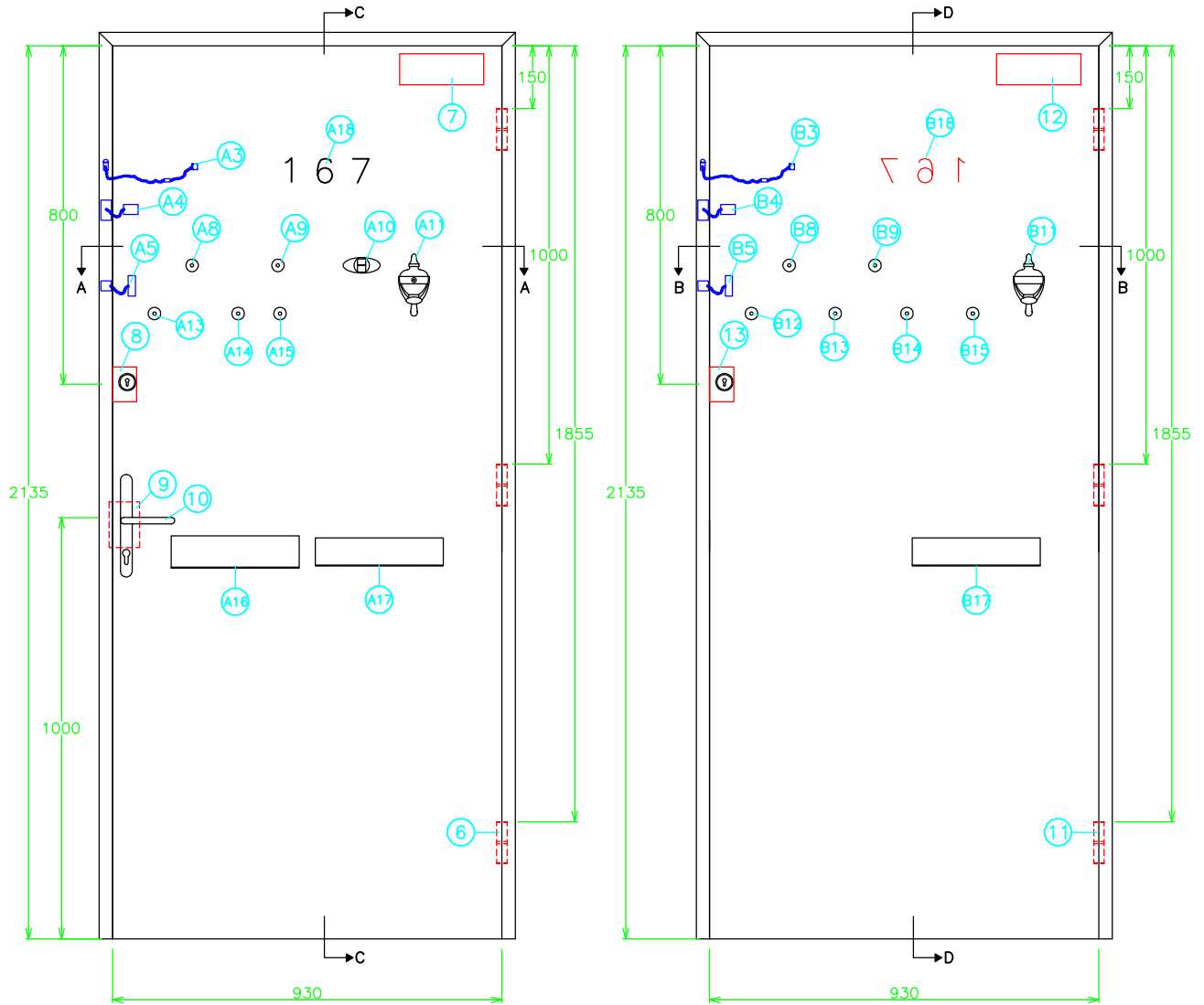
*The legal validity of this report can only be claimed on presentation of the complete report.*

**Appendix 1 - figures 1 to 6**



Doorset A

Doorset B



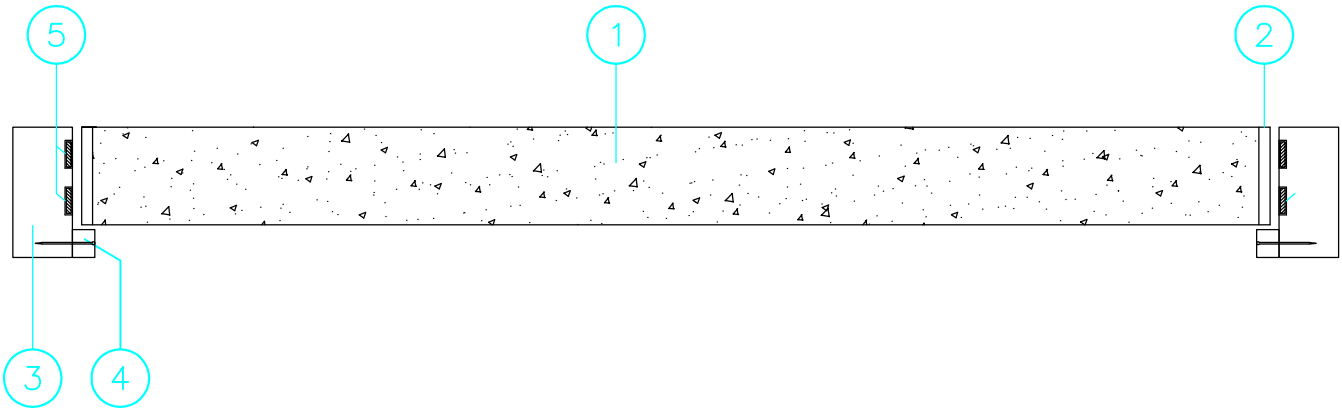
**BMTRADA**

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

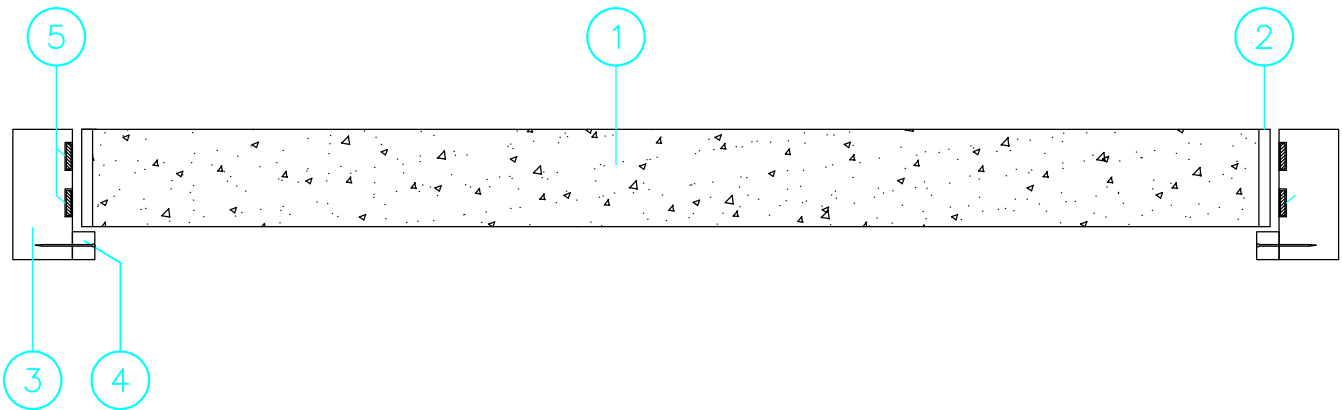
Title Unexposed face elevation showing hardware positions  
 (All dimensions in mm)

Date Drawn 13/03/13	Drawn By ANM	Scale NTS
Project No. Chilt/RF12198 Rev A		Appendix 1

### Section A-A



### Section B-B



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Title

Horizontal cross sections  
(All dimensions in mm)

Date Drawn

14/03/13

Drawn By

ARD

Scale

NTS

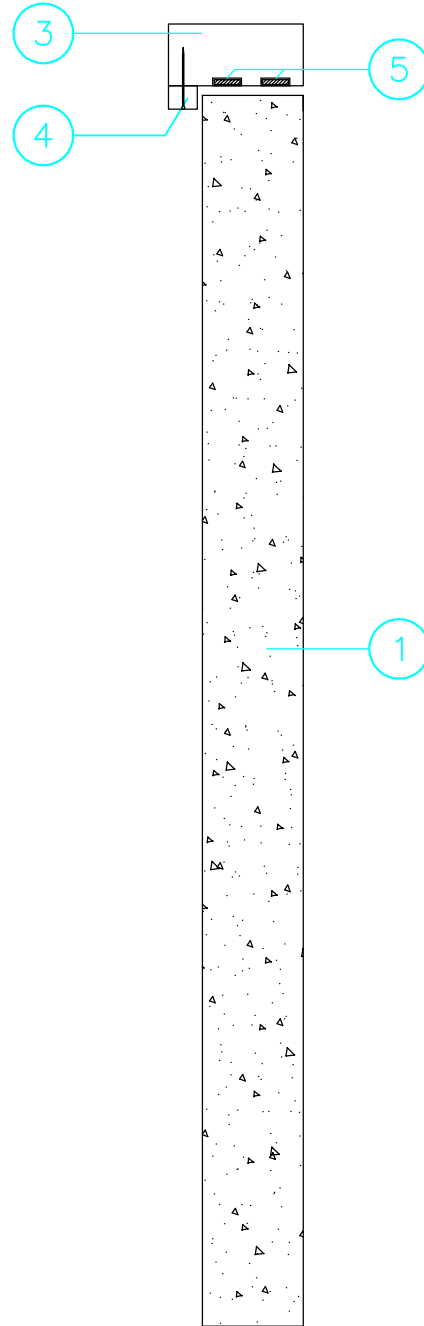
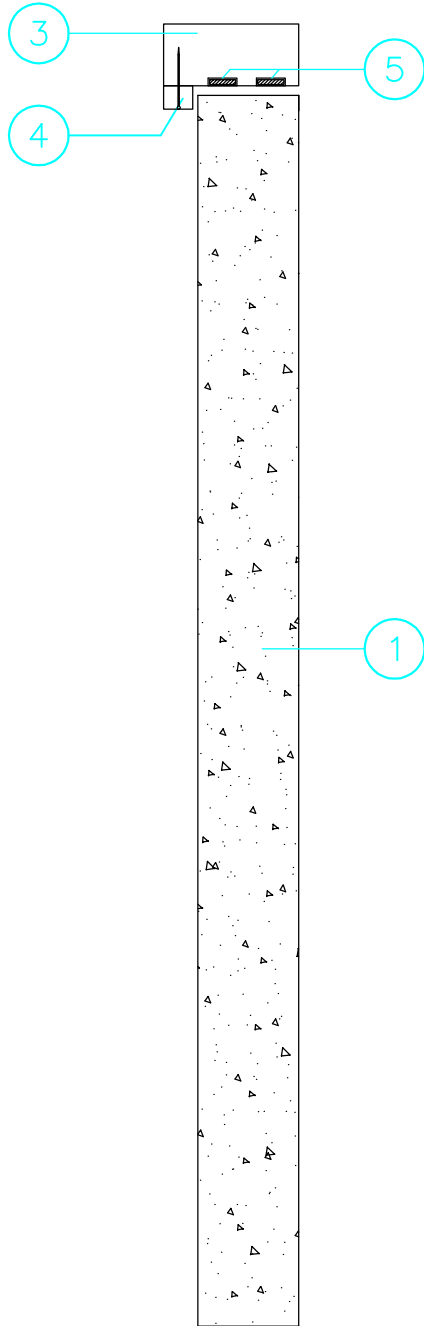
Project No.

Chilt/RF12198 Rev A

Appendix 1

Section C-C

Section D-D



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Title

Vertical cross sections  
(All dimensions in mm)

Date Drawn

14/03/13

Drawn By

ARD

Scale

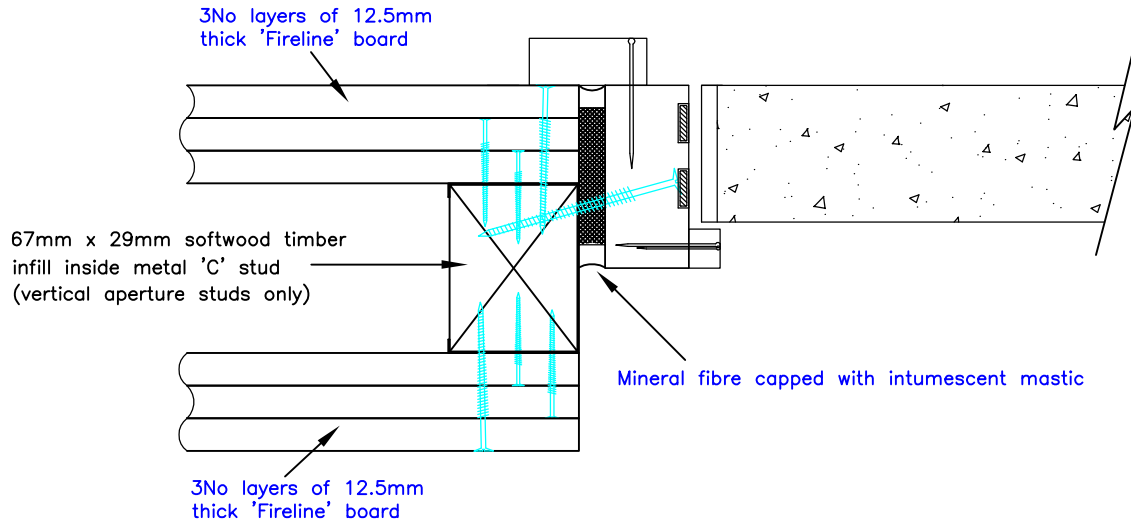
NTS

Project No.

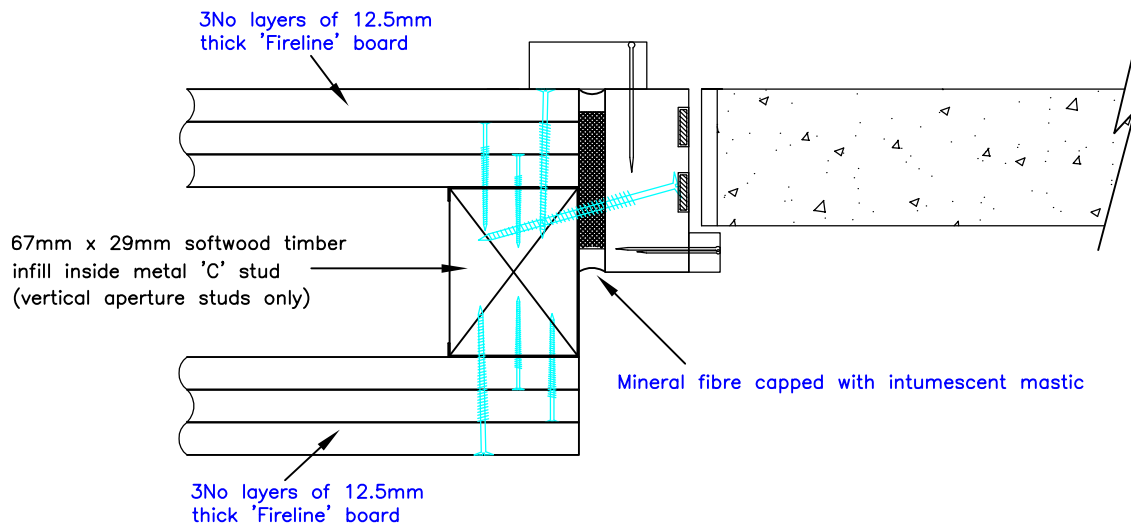
Chilt/RF12198 Rev A

Appendix 1

Doorset A



Doorset B



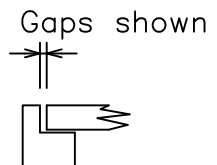
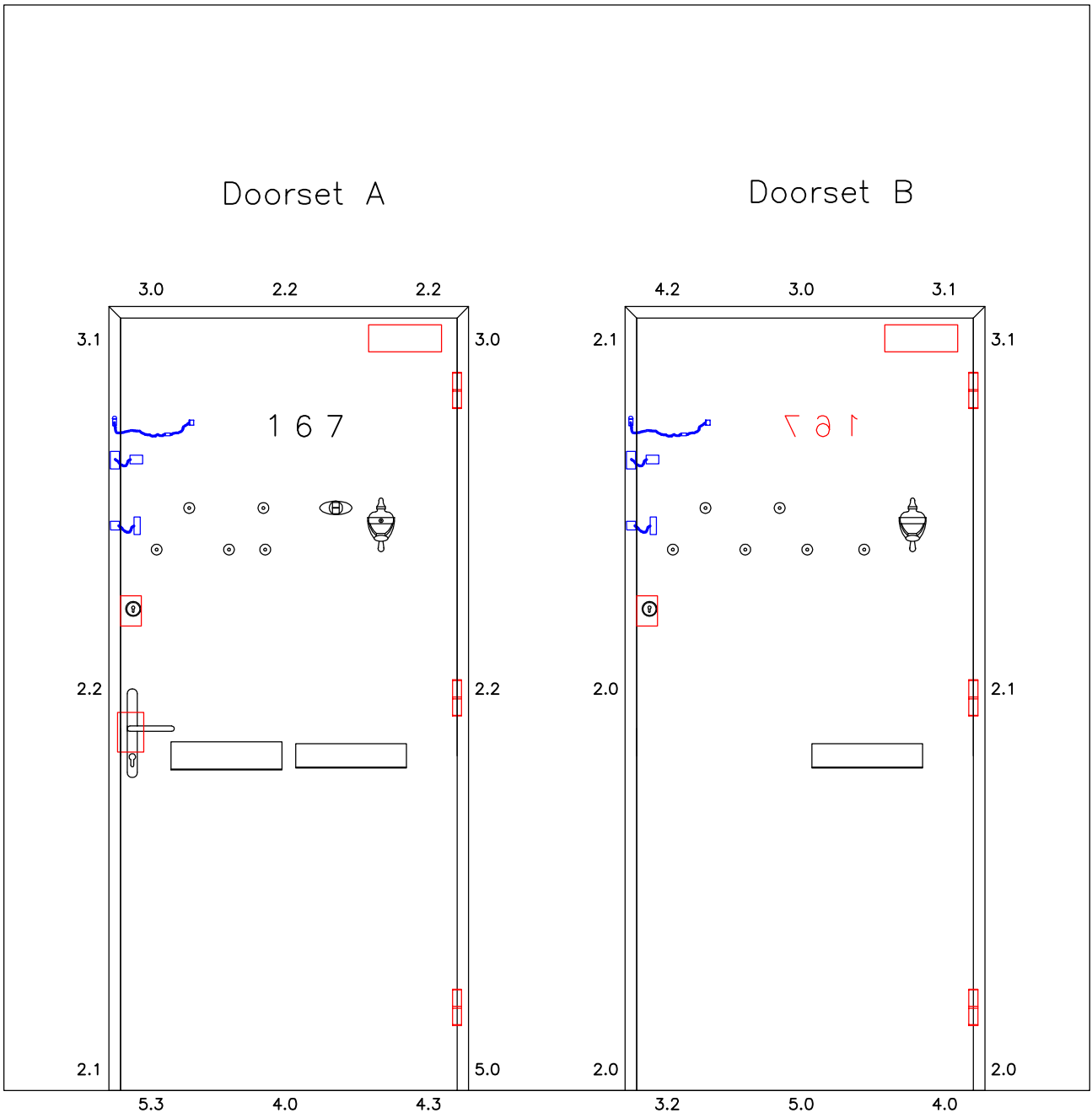
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Title  
Frame to supporting construction  
fixing detail  
(All dimensions in mm)

Date Drawn 14/03/13	Drawn By ARD	Scale NTS
Project No. Chilt/RF12198 Rev A		Appendix 1





Viewed From Unexposed Face



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

Title

Door leaf/frame gaps  
 (All dimensions in mm)

Date Drawn

14/03/13

Drawn By

ARD

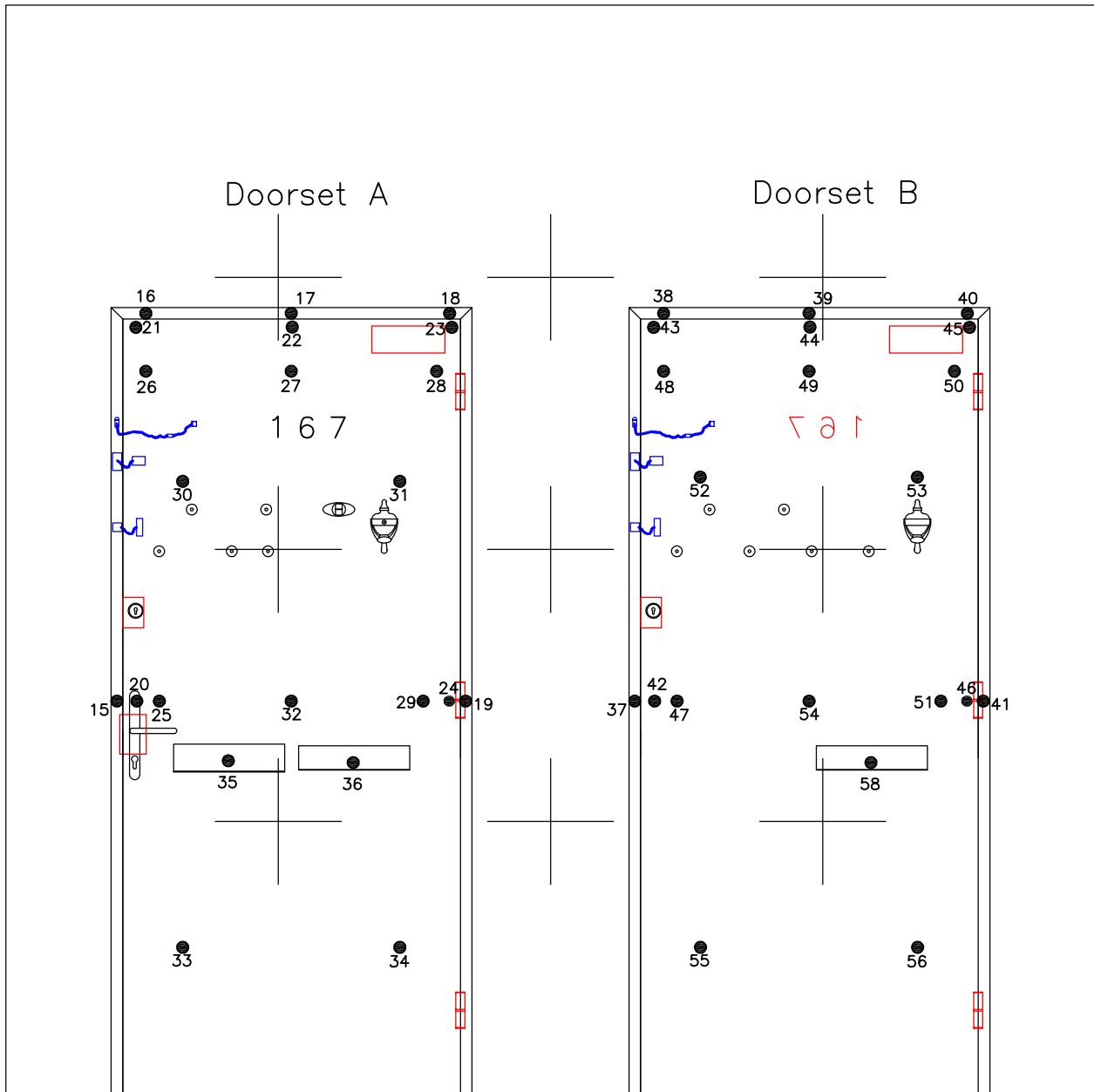
Scale

NTS

Project No.

Chilt/RF12198 Rev A

Appendix 1



- ⊕ : Furnace Thermocouples
- : Unexposed Face Thermocouples

Viewed From Unexposed Face



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Title

Thermocouple positions  
 (All dimensions in mm)

Date Drawn

14/03/13

Drawn By

ARD

Scale

NTS

Project No.

Chilt/RF12198 Rev A

Appendix 1

**Appendix 2 - raw test data** (10 pages)

(see figure 6 of appendix 1 for channel locations)

Furnace 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	Chan 23
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	0	16	17	18	18	18	17	17	18	18	12	13	13	13	14	13	13	13	13	14
1	-7.4	202	225	265	415	348	366	380	243	379	12	13	16	16	14	13	14	41	15	14
2	-7.3	267	292	273	399	340	375	366	315	359	12	13	16	15	14	13	14	31	16	14
3	7.8	350	365	396	525	465	488	482	422	469	12	14	19	17	14	14	16	38	19	15
4	4.5	448	462	503	595	568	561	571	536	545	12	14	20	18	15	14	16	36	20	16
5	1.1	501	496	552	617	595	630	612	582	626	12	14	22	18	16	15	16	35	20	19
6	1.1	537	545	587	643	625	672	626	620	687	12	14	23	19	17	15	16	35	21	22
7	0.5	569	586	605	670	651	691	649	653	720	12	14	24	19	18	15	16	34	24	25
8	0.2	587	608	629	685	669	708	658	673	730	12	14	25	19	18	15	17	33	26	27
9	0.4	603	628	654	699	684	719	674	688	728	12	15	25	20	18	15	17	33	26	28
10	1	617	647	671	707	696	725	682	698	727	12	15	26	21	18	15	18	33	26	30
11	1	631	658	684	716	706	732	695	710	729	12	16	27	24	18	15	19	33	27	31
12	0.4	643	672	696	725	716	737	704	722	734	11	16	31	27	19	15	21	33	27	33
13	0.7	656	685	708	736	726	740	717	730	734	11	17	32	29	20	15	23	35	28	35
14	0	668	699	721	743	737	740	728	737	734	11	18	35	32	20	16	25	36	29	37
15	0.9	682	711	732	754	747	747	735	748	741	11	19	36	35	21	16	29	39	31	40
16	0.6	697	726	748	763	761	762	753	762	750	11	20	39	38	22	16	32	41	33	42
17	1	709	739	755	774	772	773	762	774	761	11	21	39	43	23	17	36	44	35	45

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	Chan 23
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
18	0.5	721	750	766	782	783	778	777	784	767	11	22	37	44	24	18	39	46	37	49
19	0.6	731	761	773	790	791	787	775	792	776	11	23	36	45	25	18	42	47	40	53
20	0.4	744	770	784	800	801	793	791	801	781	11	24	37	43	27	19	44	50	42	59
21	0.6	755	784	794	806	807	799	796	809	788	11	24	39	44	30	20	45	52	44	65
22	0.7	764	792	800	813	815	805	805	816	794	11	25	40	42	32	21	47	54	46	69
23	0.8	771	800	811	821	823	815	810	823	799	11	26	41	42	34	23	49	56	47	69
24	0.4	780	809	818	827	831	820	825	830	805	11	26	41	41	34	24	51	59	49	68
25	-0.6	792	819	825	834	840	825	833	837	810	11	27	42	40	37	25	53	59	50	69
26	-0.3	801	827	834	844	846	834	834	845	816	11	28	43	40	37	27	55	61	51	69
27	-0.5	809	835	839	851	853	840	844	852	823	11	29	44	39	38	28	60	60	52	70
28	-1.2	815	841	847	854	856	848	842	854	829	11	29	44	39	39	30	62	61	53	72
29	-0.8	818	842	849	856	856	847	850	854	830	11	30	43	38	40	31	62	62	54	73
30	-0.6	825	849	854	860	861	848	852	859	832	11	31	42	38	41	33	61	63	55	73
31	-1	830	854	859	866	865	851	857	864	836	11	31	42	38	41	35	61	64	56	74
32	0	835	857	863	870	870	856	863	867	842	11	32	44	38	42	36	64	66	57	75
33	-0.3	840	863	869	875	874	862	868	871	845	10	33	44	37	43	38	66	69	58	74
34	-0.2	844	869	874	881	879	868	870	877	849	10	33	45	37	44	40	67	68	59	73
35	-0.4	853	875	881	885	885	865	883	880	852	11	34	45	37	45	42	68	70	59	72
36	0.2	857	879	883	890	891	871	883	886	856	10	35	45	37	46	43	69	71	60	72
37	0.4	862	884	890	896	896	878	890	888	859	10	36	45	36	47	45	70	72	61	72
38	-0.1	866	888	895	902	900	881	894	894	865	10	37	48	36	48	47	71	75	61	73
39	0.3	871	894	899	905	903	887	902	898	868	10	38	52	36	49	48	73	79	62	73
40	0.4	877	898	904	908	907	896	899	903	872	10	38	53	36	50	50	75	88	62	73
41	-1.1	885	902	909	912	912	891	910	906	876	10	39	55	36	52	51	76	92	63	73

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	Chan 23
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
42	0.1	888	905	911	915	914	892	910	905	876	10	40	55	36	52	53	76	95	63	74
43	-0.6	892	907	912	920	919	896	916	906	876	10	41	55	36	53	54	77	103	64	74
44	-0.3	895	912	915	921	920	897	916	909	880	10	41	56	36	54	55	78	106	64	75
45	-0.6	897	916	917	925	924	901	923	911	881	10	43	57	36	55	56	80	114	65	75
46	-0.4	900	917	918	929	928	911	922	913	881	10	43	58	36	56	57	81	117	65	76
47	-0.2	903	921	924	930	930	911	925	915	884	10	44	58	36	57	58	83	123	66	75
48	-0.4	907	923	926	935	933	917	927	919	886	10	45	58	36	58	59	84	163	66	76
49	-1.2	911	927	931	939	938	915	933	922	890	10	46	60	36	58	60	86	189	67	77
50	1	916	930	932	940	940	921	937	925	893	10	47	61	37	59	61	87	262	68	79
51	-0.7	919	933	934	943	944	922	942	928	899	10	48	63	37	60	63	88	343	69	80
52	0	922	937	936	948	947	929	944	931	899	10	49	63	37	60	64	90	417	70	80
53	-0.7	925	940	942	950	950	926	942	933	900	10	50	68	38	62	65	91	482	70	81
54	-0.4	929	944	946	952	952	932	951	934	903	10	52	71	38	64	66	91	532	71	82
55	-0.1	932	946	946	958	957	942	949	938	906	10	52	76	39	70	67	93	571	72	85
56	0.1	937	950	952	959	959	945	957	944	913	10	53	86	40	68	67	95	594	73	84
57	-0.1	940	954	956	963	962	940	958	946	915	10	54	34	41	67	68	97	466	73	85
58	-0.6	942	958	956	967	967	951	959	948	917	10	54	10	41	67	70	99	340	74	86
59	-0.5	943	956	955	970	969	956	956	951	919	10	56	10	41	68	71	102	259	74	87
60	-1	945	958	958	972	971	958	962	951	920	10	56	10	41	70	72	107	240	75	88
61	0	949	961	962	973	972	952	965	952	922	10	57	10	42	71	73	114	249	76	90
62	-0.1	952	964	962	974	977	965	961	954	923	10	57	10	45	72	75	108	269	78	91
63	0.1	953	964	963	976	979	970	961	957	926	10	52	10	45	74	76	102	295	78	94
64	0	955	967	967	979	980	970	965	959	927	10	48	11	45	79	76	97	324	78	98
65	-0.8	961	974	971	982	984	975	969	964	930	10	49	10	47	79	74	105	357	79	102

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	Chan 23	
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
66	-0.9	962	972	969	982	984	972	971	963	930	10	48	12	48	82	62	91	415	80	107	
67	-0.5	962	972	968	984	985	975	971	964	932	10	49	11	49	82	54	92	543	80	115	
68	-0.1	964	973	973	985	986	978	972	966	936	10	34	10	49	85	52	78	650	80	130	

Time	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	Chan 40	Chan 41	
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	13	14	14	14	14	14	13	13	13	13	13	13	13	13	13	13	13	12	
1	13	14	21	14	14	14	13	13	13	13	13	22	14	13	14	13	13	12	
2	13	14	19	14	14	14	13	13	13	13	13	17	14	13	14	13	13	12	
3	15	17	20	15	15	15	17	14	18	17	14	137	92	14	16	18	13	12	
4	15	18	18	16	15	17	16	15	19	16	14	140	118	14	21	22	15	12	
5	16	17	17	16	16	20	16	16	21	15	13	167	147	14	25	22	17	12	
6	16	17	17	17	17	21	17	18	20	14	13	149	169	15	26	22	19	12	
7	16	16	17	16	17	21	16	19	20	14	13	101	166	15	27	22	19	12	
8	16	16	17	16	18	21	16	19	20	14	13	71	69	16	32	21	19	11	
9	15	16	16	16	17	20	16	19	20	14	13	54	21	16	37	18	19	11	
10	15	16	16	16	17	20	17	19	20	14	13	43	14	17	40	18	19	10	
11	16	17	16	16	17	21	19	18	20	13	13	37	12	18	43	19	20	9	
12	17	17	16	16	17	21	21	19	20	13	13	32	11	19	47	17	20	9	
13	17	18	16	16	17	21	22	20	20	13	13	29	11	20	51	17	21	9	
14	18	19	17	17	18	22	24	20	20	14	13	27	11	21	58	17	22	8	
15	19	20	18	18	18	22	25	21	20	14	14	26	11	22	61	17	22	7	
16	20	22	19	19	19	23	29	23	22	14	14	25	11	22	60	17	24	6	
17	21	25	20	20	21	24	31	25	23	15	15	24	11	23	59	16	25	5	

Time	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	Chan 40	Chan 41
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
18	23	27	22	21	22	25	33	27	24	16	15	24	11	24	57	17	27	3
19	25	30	23	23	23	25	33	29	24	16	16	24	11	25	57	17	29	2
20	27	31	25	25	25	27	34	32	25	17	17	24	11	26	54	16	30	0
21	29	34	27	27	27	28	35	34	26	18	18	24	11	27	50	17	32	12
22	32	38	29	29	28	29	36	37	28	19	19	24	10	28	47	17	34	30
23	34	41	31	31	30	30	38	39	29	20	20	25	10	29	46	17	35	31
24	37	46	33	32	32	30	39	42	30	21	21	25	10	31	45	17	37	32
25	40	48	34	34	34	31	40	44	31	22	22	26	10	31	44	17	39	33
26	43	47	36	36	35	33	41	46	32	23	23	26	10	32	43	17	39	34
27	46	49	38	37	37	33	43	48	34	24	23	26	10	34	43	17	40	35
28	51	48	39	39	39	34	44	50	35	25	24	27	10	35	43	18	41	35
29	55	51	41	41	41	35	46	52	36	26	26	27	10	36	43	18	42	37
30	57	53	42	42	42	36	47	53	37	27	26	28	10	37	44	18	43	38
31	60	54	44	44	45	37	48	55	38	28	27	28	10	38	46	18	43	40
32	61	54	45	45	46	38	50	57	39	29	28	28	10	39	48	19	43	41
33	63	55	46	47	48	38	51	58	40	30	29	28	10	39	47	19	43	42
34	65	58	48	48	49	39	53	59	41	32	30	29	10	41	46	19	44	44
35	65	57	49	49	51	40	54	61	42	32	31	29	10	41	44	19	45	46
36	66	58	50	50	52	41	56	61	43	34	32	30	10	42	44	20	45	47
37	68	59	51	51	53	42	57	62	44	35	33	30	10	43	43	20	45	48
38	69	59	52	52	54	43	59	63	45	36	35	31	10	45	43	20	45	48
39	70	61	53	54	56	44	60	64	46	37	36	31	10	46	43	20	45	48
40	71	62	54	54	57	46	62	65	47	39	37	32	10	47	43	21	46	50
41	71	63	55	55	58	47	63	65	49	40	38	33	10	48	43	21	46	51

Time	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	Chan 40	Chan 41
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
42	72	63	56	56	59	48	65	66	50	41	39	33	10	49	44	21	46	53
43	72	64	57	57	61	49	67	67	51	42	41	33	10	49	44	22	47	54
44	73	64	57	58	62	50	68	67	52	43	42	33	10	50	44	22	47	55
45	73	66	59	59	63	51	69	68	53	44	42	33	10	51	44	21	47	56
46	73	66	59	60	65	52	72	69	54	45	44	33	10	52	45	22	47	56
47	74	67	60	61	66	53	72	69	55	46	45	33	10	53	45	22	48	57
48	75	67	61	61	67	54	73	70	56	45	46	34	10	54	45	22	48	58
49	75	68	62	62	68	55	74	70	56	41	47	34	9	54	46	23	48	59
50	76	69	63	63	70	56	76	71	58	41	48	34	9	55	47	23	49	61
51	77	70	64	64	70	57	80	72	59	43	49	35	10	56	48	24	49	62
52	79	71	65	65	71	58	88	73	60	44	50	36	10	57	49	25	49	63
53	83	72	66	66	74	59	96	73	61	45	52	37	9	58	50	29	49	65
54	89	74	68	67	77	60	104	74	63	45	53	37	9	59	50	51	49	64
55	92	75	70	67	83	62	110	75	64	46	54	37	9	60	51	47	50	65
56	95	77	74	68	80	63	109	74	65	46	55	29	10	61	53	25	50	67
57	99	78	77	69	78	64	114	74	66	48	56	14	10	62	55	24	50	68
58	111	79	71	70	78	65	121	75	68	48	57	13	10	63	57	24	50	68
59	131	80	69	71	79	65	135	77	70	48	58	12	10	63	59	16	50	68
60	157	82	69	72	79	66	134	77	71	49	59	12	10	68	64	19	51	71
61	184	92	69	73	80	68	139	79	72	52	60	11	10	59	69	20	51	73
62	211	126	73	76	81	69	152	81	77	52	61	11	10	56	71	27	51	75
63	241	94	74	76	82	72	141	83	78	52	62	11	10	50	75	18	52	74
64	170	81	72	76	85	65	131	81	76	52	63	11	10	47	76	16	53	76
65	218	67	76	77	84	63	155	89	75	53	62	11	10	46	80	17	53	79



Time	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	Chan 40	Chan 41
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
66	100	65	78	77	84	59	100	136	74	54	62	11	10	52	249	21	54	81
67	112	67	79	78	81	54	79	94	72	55	63	10	10	52	106	18	55	81
68	154	62	81	78	80	53	73	72	71	56	63	10	10	52	86	16	57	83

Time	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 58
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	13	13	14	14	13	13	15	15	14	14	15	15	15	14	15	14
1	13	17	14	14	13	13	15	15	14	15	15	15	15	14	15	22
2	13	18	14	14	13	13	15	15	14	15	15	15	15	14	15	17
3	14	45	14	15	15	14	18	16	15	16	16	16	17	15	16	84
4	14	45	16	16	16	14	17	17	16	20	17	17	20	15	16	128
5	14	37	17	18	17	15	17	18	18	23	17	21	22	15	16	149
6	14	34	17	20	16	15	17	18	19	21	17	23	22	15	16	70
7	14	33	17	21	15	15	17	18	19	20	17	22	21	15	16	35
8	15	31	17	22	15	15	17	18	18	20	17	23	22	15	15	21
9	15	30	17	22	15	15	17	17	18	20	17	22	22	15	15	16
10	17	29	17	22	15	16	17	17	18	21	17	22	22	15	15	14
11	19	28	17	22	15	17	17	17	18	21	18	21	22	15	15	13
12	21	28	17	23	15	19	17	18	18	21	18	22	21	15	15	13
13	24	28	18	23	16	21	17	18	18	21	19	22	22	15	15	13
14	26	28	18	24	17	22	18	19	18	21	20	22	22	15	15	13
15	27	29	19	25	19	24	18	19	19	22	22	22	23	15	15	13
16	30	31	20	26	21	24	19	20	20	23	23	23	23	16	16	12
17	32	32	22	28	23	25	21	21	21	24	26	24	25	16	17	12

Time	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 58
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
18	34	34	24	30	26	26	22	23	22	25	28	24	26	17	17	13
19	38	35	25	32	29	27	23	24	24	26	31	26	27	18	18	13
20	41	37	28	34	31	28	25	26	26	27	32	27	28	19	19	13
21	50	39	30	37	34	29	27	27	27	28	33	28	29	20	20	13
22	59	42	32	39	37	30	29	29	29	28	34	29	29	21	21	13
23	59	44	34	41	39	31	31	30	31	29	35	30	31	22	22	12
24	58	46	37	43	42	33	32	32	32	31	36	32	32	23	23	12
25	59	49	39	45	44	35	34	33	34	32	36	33	33	24	24	12
26	60	51	41	48	46	37	36	35	36	33	37	35	34	25	25	12
27	60	52	43	50	48	39	38	36	37	34	38	36	35	25	25	12
28	61	53	46	52	50	41	39	37	39	35	39	38	36	26	26	12
29	63	55	48	54	52	43	41	39	40	36	40	40	37	28	27	12
30	64	57	49	55	54	45	43	40	42	38	41	41	38	29	28	12
31	66	60	51	57	56	47	44	42	43	39	43	43	40	30	30	12
32	68	68	53	59	57	48	46	43	44	40	44	44	41	30	30	12
33	69	71	54	60	58	49	47	45	46	41	46	46	42	32	32	13
34	71	66	56	61	60	51	48	46	47	42	47	47	43	33	32	12
35	72	64	57	62	61	52	49	47	48	43	48	48	44	34	34	12
36	74	64	58	64	62	53	51	48	49	44	49	49	45	35	35	12
37	76	64	59	65	63	55	52	49	51	45	51	51	46	36	36	12
38	78	65	60	65	64	57	53	50	52	46	52	52	47	37	37	12
39	80	65	61	66	65	59	55	51	53	48	53	54	47	39	38	12
40	82	66	62	67	65	60	56	52	54	49	54	55	49	40	39	12
41	108	67	63	67	66	62	57	54	55	50	56	56	50	41	41	12

Time	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 58
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
42	102	69	63	68	67	64	58	55	56	51	57	58	51	42	42	12
43	98	69	64	68	68	65	59	55	57	52	59	59	52	44	43	12
44	97	70	65	69	68	66	60	56	58	53	60	60	52	45	44	12
45	95	71	65	70	69	67	61	57	58	54	61	61	54	46	45	12
46	94	71	66	70	69	68	62	58	59	55	62	63	55	47	46	12
47	94	71	67	71	70	69	63	59	60	56	63	64	56	48	47	12
48	96	72	67	71	71	70	63	59	61	56	64	65	57	49	48	12
49	98	75	67	72	71	71	65	61	62	58	66	66	58	51	50	12
50	102	76	68	72	72	73	65	61	63	59	66	67	59	52	51	12
51	106	75	69	73	73	74	66	62	63	60	67	68	60	54	53	12
52	111	76	69	73	74	75	67	63	64	61	69	69	61	55	54	12
53	118	78	70	73	74	77	68	65	65	62	70	70	62	56	55	12
54	127	79	71	74	75	81	69	67	64	63	74	71	65	58	56	12
55	136	81	73	74	75	86	70	70	65	64	79	71	68	59	58	12
56	146	86	73	75	76	87	71	69	66	65	77	72	67	58	59	12
57	157	90	73	75	76	85	72	69	67	66	77	73	67	58	60	12
58	161	97	73	75	77	86	73	69	68	67	78	75	67	59	61	12
59	167	102	74	76	77	85	74	70	68	66	79	72	67	60	61	12
60	198	103	74	77	78	93	77	70	69	67	81	72	68	60	63	12
61	103	104	75	77	79	91	78	71	70	68	68	70	68	61	64	12
62	102	108	76	78	80	80	78	72	70	69	65	73	69	62	65	12
63	97	114	76	79	81	78	79	73	71	69	56	68	68	63	66	12
64	100	141	76	80	82	77	80	73	71	70	55	65	68	64	67	12
65	102	156	77	81	83	80	82	73	72	71	49	65	70	65	68	12

Time	Chan 42	Chan 43	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 58
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
66	126	247	78	82	85	115	99	74	74	75	53	73	69	66	69	12
67	107	111	79	84	87	101	93	75	74	74	54	62	64	68	70	12
68	106	78	79	88	89	89	90	75	74	75	54	61	63	69	71	11