



CONFIDENTIAL

Report: Chilt/RF11054 Revision A

**A fire resistance test performed on 2No.
single leaf single acting doorsets**

**Test conducted in accordance with
BS 476: Part 20/22: 1987**

Test date: 13th December 2011

Page 1 of 21



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www.chilterndynamics.co.uk

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**Prepared for: Firestop Manufacturing
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1 Summary of performance

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

Results: Fire resistance test in accordance with BS476: Part 20/22: 1987	Times to failure:		
		Doorset A	Doorset B
	Integrity	66 (sixty six) minutes	50 (fifty) minutes
	Insulation	66 (sixty six) minutes	50 (fifty) minutes

	<p>Summary of specimen:</p> <p>2No single leaf single acting doorsets.</p> <p>Doorset A – Leaf size: 2135mm high x 926mm wide x 54mm thick</p> <p>Doorset B – Leaf size: 2135mm high x 926mm wide x 54mm thick</p>
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2 Introduction

The door blanks were identified as Falcon Panel Products Ltd Strebord 54 doorblanks and were sourced and purchased 'off the shelf' for test by Chiltern International Fire Ltd (CIFL) on the clients behalf, during November 2011. (CIFL) conducted further work to produce the doorsets as follows:

Doorset A	Hardwood door frame Hardwood lipping Intumescent materials Hardware Overhead closer	Doorset B	Hardwood door frame Hardwood lippings Intumescent materials Hardware Overhead closer
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CIFL constructed a timber stud/plasterboard clad partition and installed the doorsets into the partition.

3 Specification

Details of the specimen are shown in the Appendix.

3.1 Door leaf

The leaf of both doorsets measured 2135mm high x 926mm wide x 54mm thick. Both leaves were hung opening towards the furnace, which is considered to be the most onerous direction based on experience of testing doors of similar construction. It is therefore the opinion of the laboratory that the test results can be applied to doors opening in either direction. The results of this test were obtained where doorset A was fitted with a disengaged latch and doorset B was fitted with disengaged deadlock.

3.2 Door perimeter gaps

The gaps between the edge of the leaves and frames were measured prior to test. A total of 24 readings were taken. The measurements (in mm) are given in Figure 4 of the Appendix.

3.3 Closer forces

Measured in accordance with FTSG Resolution No 63.

	Opening force (Nm)	Closing force (Nm)
Doorset A	49	9
Doorset B	55	28

4 Description of construction (refers to Figures 1 to 4 of the appendix)

Door leaf – both doorsets – were identified as Falcon Panel Products Ltd Strebord 54 doorblanks

		Material	Dimensions (mm)	Density (kg/m ³)	Moisture (% w/w)	Key to figures
Stiles and rails		None fitted	-	-	-	-
Core		Falcon Panel Products Strebord 54 particleboard	54 thick	630-635*	6.8-7.9	1
Adhesive	Lippings	Polyurethane	-	-	-	-
Lippings – vertical edges only		Sapele	8 thick	640**	7.7-8.3	2

* Door manufacturers stated density

** Nominal density

Door frame – both doorsets

		Species/type	Dimensions (mm)	Density (kg/m ³)	Moisture (% w/w)	Key to figures
Head & jambs		Sapele	70 wide x 32 thick	640**	7.7-8.5	3
Head to jamb jointing detail		Mortice and tenon – screwed	-	-	-	-
Stops – planted (pinned)		Sapele	12 thick x 12 wide	640**	6.1-7.7	4
Frame to supporting construction fire stopping detail		Tightly packed mineral fibre capped with Firestop acrylic intumescent sealant on both faces	Nominally 5-10mm wide x 30 - 40 deep	-	-	-
Frame to supporting construction fixing detail		4 No. steel wood screws per jamb	100 long	-	-	-
Architrave		Sapele	18 thick	640**	8.1-9.5	-
Threshold		Non combustible	-	-	-	-

** Nominal density

Intumescent materials – doorset A

	Make/type	Size (mm)	Location	Key to figures
Frame reveal – head and jambs*	Firestop Manufacturing Ltd Plain Fire Seal Product reference FS131	20 x 4	Fitted 17mm from the exposed face in the frame reveal	5
Leaf edges	None fitted	-	-	-
Smoke seal	Firestop Manufacturing Ltd Acoustic Twin Blade 35 seal Product reference FS1400	11 x 5	Fitted in the frame reveal and upstand of the stop	6

* All frame reveal seals were sampled and signed by Simon Beer of BM Trada Certification on 18/04/11. Sampling Sheets held on file by CIFL.

Intumescent interruptions and hardware protection – doorset A

	Make/type	Size (mm)	Location
Around hinges	Fully interrupted	-	Hinge blade fully interrupts seal in frame reveal
Under hinge blade	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted under the hinge blade on frame and leaf
Around latch body	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted around the body of the latch
Under latch forend	Interdens	1 thick	Fitted under the latch forend
Around latch keep	Fully interrupted	-	Latch keep fully interrupts seal in frame reveal
Under latch keep	Interdens	1 thick	Fitted under the latch keep
Under drop down seal	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted lining the drop down seal rebate
Around eye viewer	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted lining the eye viewer cut out aperture
Letter plate aperture	Manufacturers supplied intumescent kit	1225 long x 40 wide x 2 thick	Fitted as per the manufacturer's instructions

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Intumescent materials – doorset B

	Make/type	Size (mm)	Location	Key to figures
Frame reveal – head and jambs*	2No. Firestop Manufacturing Ltd Plain Fire Seals Product reference FS116	15 x 4	Fitted 10mm apart, with the 1 st seal 7.5mm from the exposed face in the frame reveal	7
Leaf edges	None fitted	-	-	-
Smoke seal	Firestop Manufacturing Ltd Acoustic Corner Seal 39 Product reference FS1404	11 x 11	Fitted in the frame reveal and upstand of the stop	8

* All frame reveal seals were sampled and signed by Simon Beer of BM Trada Certification on 18/04/11. Sampling Sheets held on file by CIFL.

Intumescent interruptions and hardware protection – doorset B

	Make/type	Size (mm)	Location
Around hinges	Partially interrupted	-	Hinge blade fully interrupts 1 st seal and partially interrupts 2 nd seal leaving 11mm continuous in the frame reveal
Under hinge blade	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted under the hinge blade on frame and leaf
Around latch body	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted around the body of the latch
Under latch forend	Interdens	1 thick	Fitted under the latch forend
Around dead bolt keep	Partially interrupted	-	Latch keep partially interrupts both seals in the frame reveal with 7mm of the 1 st seal and 8mm of the 2 nd seal remaining continuous
Under latch keep	Interdens	1 thick	Fitted under the latch keep
Under drop down seal	Firestop Manufacturing Ltd intumescent sheet material Product reference FS318	0.8 thick	Fitted lining the drop down seal rebate
Around eye viewer	None fitted	-	-
Letter plate aperture	Manufacturers supplied intumescent kit	1225 long x 40 wide x 2 thick	Fitted as per the manufactures instructions

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Hardware – doorset A

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No EuroSpec Parliament type hinges Product reference H2N1446/BSS	102 x 102 (blade size)	Fitted 150mm, 1090mm and 1855mm from the head of the leaf	9
Closer	Rutland TS3204 Overhead type closer	220 x 59 (footprint size)	Fitted on the exposed face of the leaf as per the manufacturer's instructions	10
Latch - disengaged	EuroSpec tubular steel mortice latch Product reference TLS 503 0SSS	57 x 26 (forend size)	Fitted 1000mm from the threshold of the leaf	11
		57 x 26 (keep size)		
Furniture	Aluminium lever type handle	100 x 38 (footprint size)	Fitted appropriate to the latch	12
	Firestop Manufacturing Ltd Elite letter plate Product reference FS310	305 x 70 (overall size)	Fitted 1000mm from the threshold of the leaf	13
	Firestop Manufacturing Ltd eye viewer 200° Product reference FS316/SWE1010SSS	Ø22	Fitted 600mm from the head of the leaf	14
	Firestop Manufacturing Ltd 930 Acoustic Plus 51 automatic drop down seal	28 high x 15 wide	Fitted centrally in the threshold of the leaf	15
	Firestop Manufacturing Ltd Applique 37 drop down seal	40 high x 13 wide	Fitted on the unexposed face at the leaf threshold	16

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Hardware – doorset B

	Make/type	Size (mm)	Location	Key to figures
Hinges	3No EuroSpec lift off type hinges Product reference H3N1107/13SZP	100 x 35 (blade size)	Fitted 150mm, 1090mm and 1855mm from the head of the leaf	17
Closer	Rutland TS3204 Overhead type closer	220 x 59 (footprint size)	Fitted on the exposed face of the leaf as per the manufacturer's instructions	18
Dead Lock - disengaged	Euro Spec BSEN Deadlock Product reference LDS 5530 SSS	139 x 23 (forend size)	Fitted 1000mm from the threshold of the leaf	19
		150 x 30 (keep size)		
Furniture	Firestop Manufacturing Ltd Standard letter plate Product reference FS307	305 x 70 (overall size)	Fitted 1000mm from the threshold of the leaf	20
	Firestop Manufacturing Ltd eye viewer Product reference FS316/SWE1010SSS	Ø22	Fitted 600mm from the head of the leaf	21
	Firestop Manufacturing Ltd 930 TOP 37 automatic drop down seal	28 high x 13 wide	Fitted centrally in the threshold of the leaf	22

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5 Test conditions

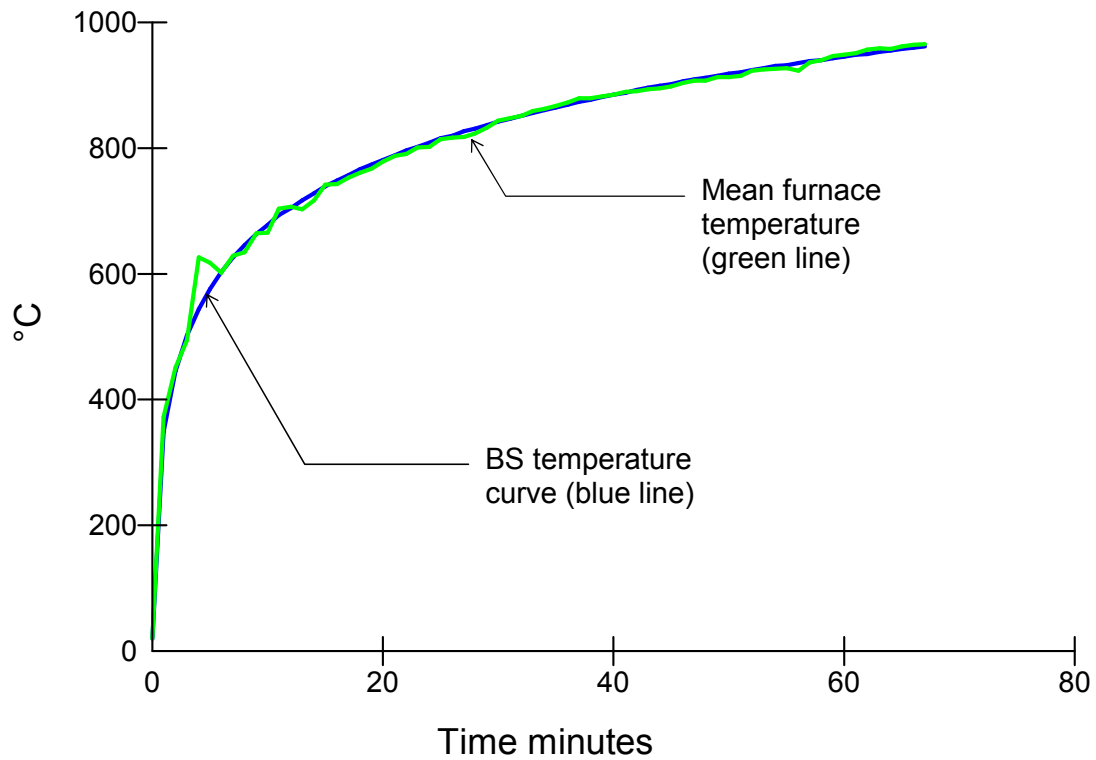
- 5.1 Where areas of the test specification are ambiguous or open to interpretation the Fire Test Study Group Resolutions No's 51, 63, 70, 71, 72 and 78 have been followed (further specific details are available on request). These Resolutions provide basis of common agreements between the fire test laboratories which are members of this Group.
- 5.2 The ambient temperature of the test area at commencement of test was 11°C.
- 5.3 After the first 5 minutes of the test, the furnace pressure was maintained at -4.25 ± 3 Pa with respect to atmosphere, at a point 0.5m from the notional floor level, equating to 0 Pa at a point 1m above the notional floor level.
- 5.4 The furnace was controlled to follow the temperature/time relationship specified in BS 476: Part 20: 1987 as closely as possible, using the average of nine thermocouples suitably distributed within the furnace. The temperatures recorded are shown graphically in Section 6.1.
- 5.5 The temperature of the unexposed face was monitored by means of 5 thermocouples fixed to the surface of each door leaf and 3 thermocouples attached to each door frame, one at midheight on each jamb and one centrally located above the leaf on the door frame head. An additional thermocouple was fixed to the letter plate of both leaves.

The thermocouple positions are shown in Figure 4 of the appendix. The average temperature of the door leaf and maximum temperature of the doorset are shown graphically in Section 6.2.

6 Test results

The following data and observations were recorded during the test.

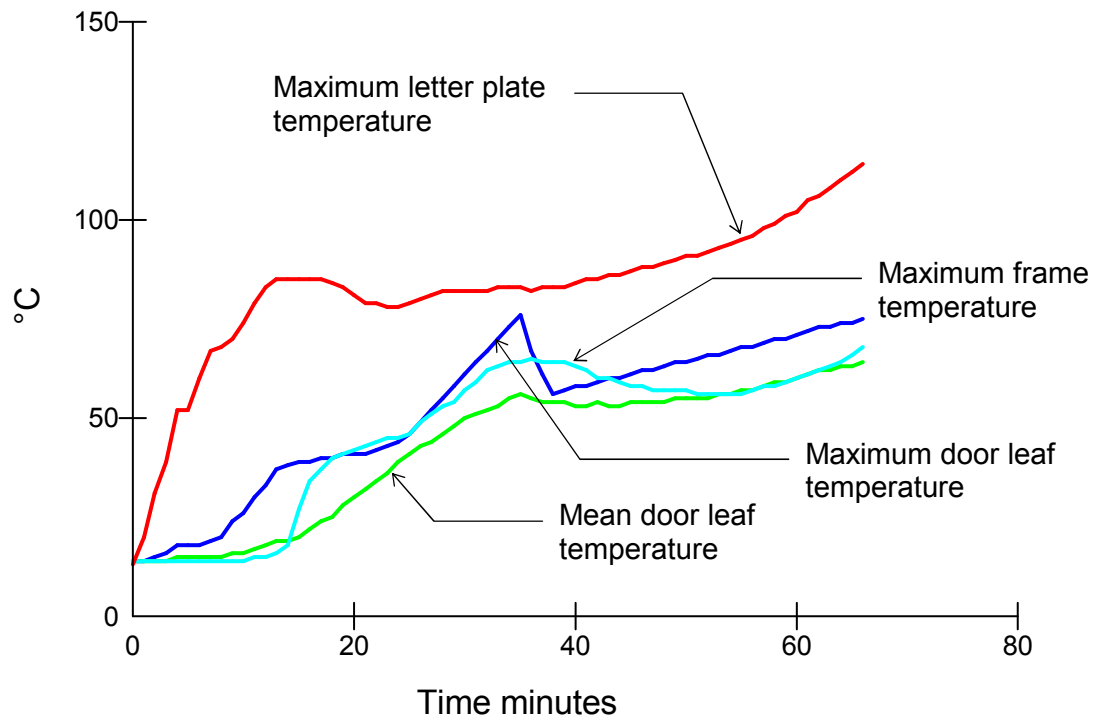
6.1 Furnace temperature curve



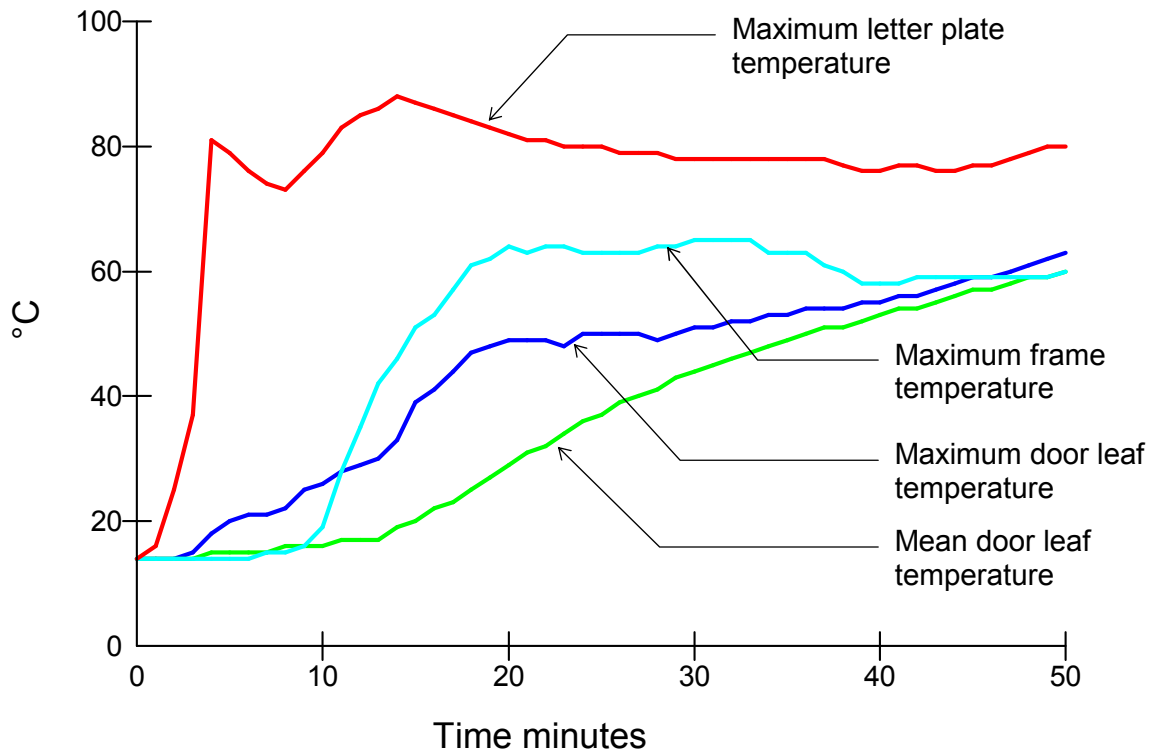
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6.2 Unexposed face temperature curves

Doorset A



Doorset B



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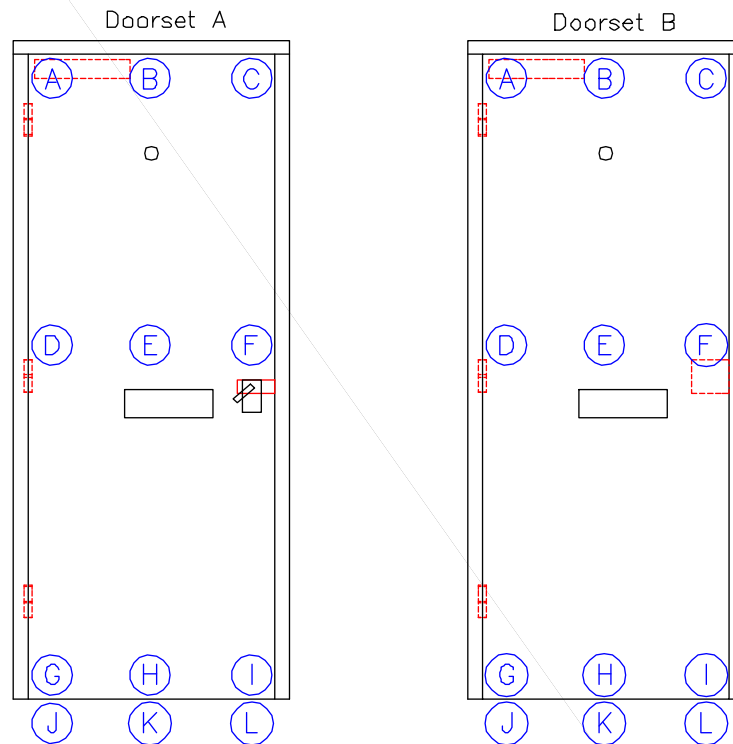
6.3 Door distortion data

The following tables show the distortion of the doors in mm with an accuracy of ± 1 mm.

A positive measurement indicates distortion towards the furnace.

A negative measurement indicates distortion away from the furnace.

J, K and L give vertical movement of the door, a negative reading indicates that the door has dropped.



Doorset A (hung on the left and opening towards the furnace)

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	2	2	4	-1	-4	0	0	0	2	0	-2	-1
30	5	0	8	-4	-9	-6	0	-2	2	-2	-4	-2
45	5	-1	9	-3	-12	-2	-2	-7	0	-3	-4	-3
60	6	-6	12	-8	-28	-4	-3	-8	1	-3	-7	-4

Doorset B (hung on the left and opening towards the furnace)

Time	A	B	C	D	E	F	G	H	I	J	K	L
15	3	2	5	-2	-5	-1	1	3	7	-1	-6	3
30	4	2	8	-4	-10	-1	2	2	11	-3	-9	1
45	7	0	11	-4	-14	-1	0	0	10	-4	-10	1
60	7	-5	15	-8	-29	-2	0	-7	10	-6	-12	-1

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6.4 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00.00	Test started.
04.43	Doorset A, there is smoke issuing from the letter plate.
05.00	Doorset B, there is smoke issuing from the letter plate.
08.20	Both doorsets, there is smoke issuing from the perimeter of the eye viewer.
11.31	Both doorsets, there is smoke issuing from the top closing corners of the leaves.
12.21	Doorset A, there is discolouration of the leaf above the letter plate. Doorset B, there is discolouration of the leaf above the letter plate and of the leaf above the eye viewer.
15.30	Both doorsets, there is a decrease in the level of smoke issuing from the letter plates.
18.48	Doorset A, there is discolouration and smoke issuing from the top closing corner and the top hanging corner of the leaf. Doorset B, there is discolouration at the top closing corner of the leaf.
21.47	Doorset B, there is smoke issuing from the top hanging corner of the leaf.
30.31	Doorset B, there is discolouration of the seal on the stop at the top closing corner off the leaf. It is starting to fall out due to distortion at the top closing corner.
37.00	Both doorsets, there is smoke issuing from the top hinge position.
39.40	Both doorsets, there is discolouration at the top hinge position and the top hanging corners of the leaves.
40.43	Doorset B, there is smoke issuing from approximately 150mm up from the bottom closing corner of the leaf.
42.34	Both doorsets, the letter plates have opened slightly due to intumescent expanding. Doorset B, there is an increase in the level of discolouration and smoke issuing from the eye viewer.
44.14	Doorset B, there is smoke issuing from the bottom hanging corner of the leaf.

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- 48.28 Doorset A, the outer cover on the unexposed face drop down seal has fallen off.
- 49.17 Doorset B, the letter plate has moved away from the leaf by approximately 15mm.
- 50.09 Doorset B, the letter plate has fallen off causing continuous flaming thereby constituting **integrity failure**.
- 53.58 Doorset A, there is a glow visible at the top hanging corner approximately 100mm down.
- 56.34 Doorset A, there is discolouration and smoke issuing from the middle hinge position.
- 57.16 Doorset A, a cotton pad integrity test was performed at the top hanging corner of the leaf, no failure.
- 57.47 Doorset B, there is a glow visible at the top of the eye viewer.
- 58.25 Doorset A, a cotton pad integrity test was performed at the top hanging corner of the leaf, no failure.
The glow has spread down to the top hinge position.
- 59.20 Doorset B, there is a glow visible at the top closing corner of the leaf.
- 59.45 Doorset A, a cotton pad integrity test was performed at the top hinge position, no failure.
- 61.45 Doorset B, a cotton pad integrity test was performed at the top closing corner of the leaf, no failure.
There is a glow visible at the top hinge position.
- 63.30 Doorset B, there is continuous flaming at the eye viewer thereby constituting **further integrity failure**.
- 65.20 Doorset A, a cotton pad integrity test was performed at the top hinge position, no failure.
There is a glow visible at the top closing corner of the leaf.
- 66.00 Doorset B, there is continuous flaming at the top hinge position thereby constituting **further integrity failure**.
- 66.20 Doorset A, there is continuous flaming at the top hinge position thereby constituting **integrity failure**.
- 67.30 Test terminated.

6.5 Times to failure

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


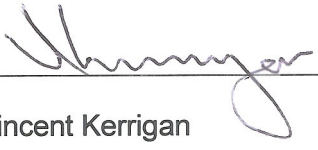
	Doorset A	Doorset B
Integrity	66 (sixty six) minutes	50 (fifty) minutes
Insulation	66 (sixty six) minutes	50 (fifty) minutes

7 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 leaf to frame gaps recorded in Figure 4 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 Head Of Section – Fire Resistance	Technical Manager
Date of issue:		13.04.2012

Revision A – changes and additional product references.

Photographs

Pre test photographs including Intumescent interruptions due to hardware

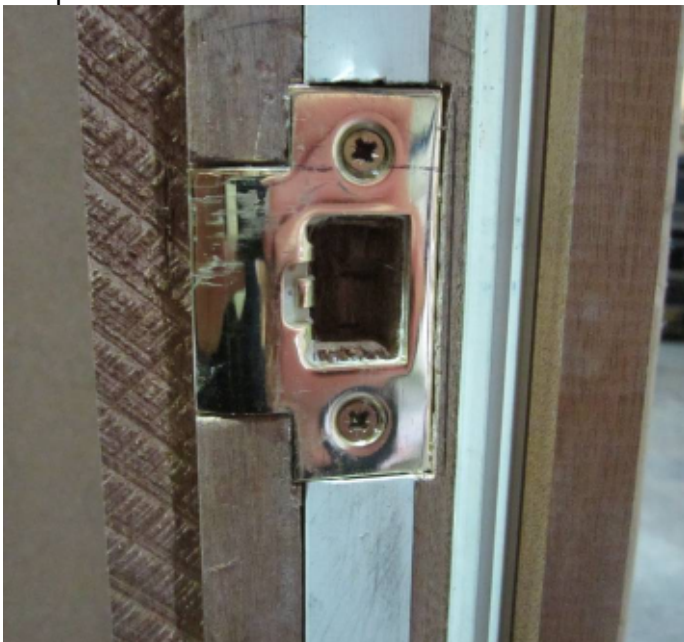
Hinge – doorset A



Hinge – doorset B



Keep – doorset A



Keep – doorset B



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At start of test



After 15 minutes



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After 30 minutes



After 45 minutes



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After 61 minutes

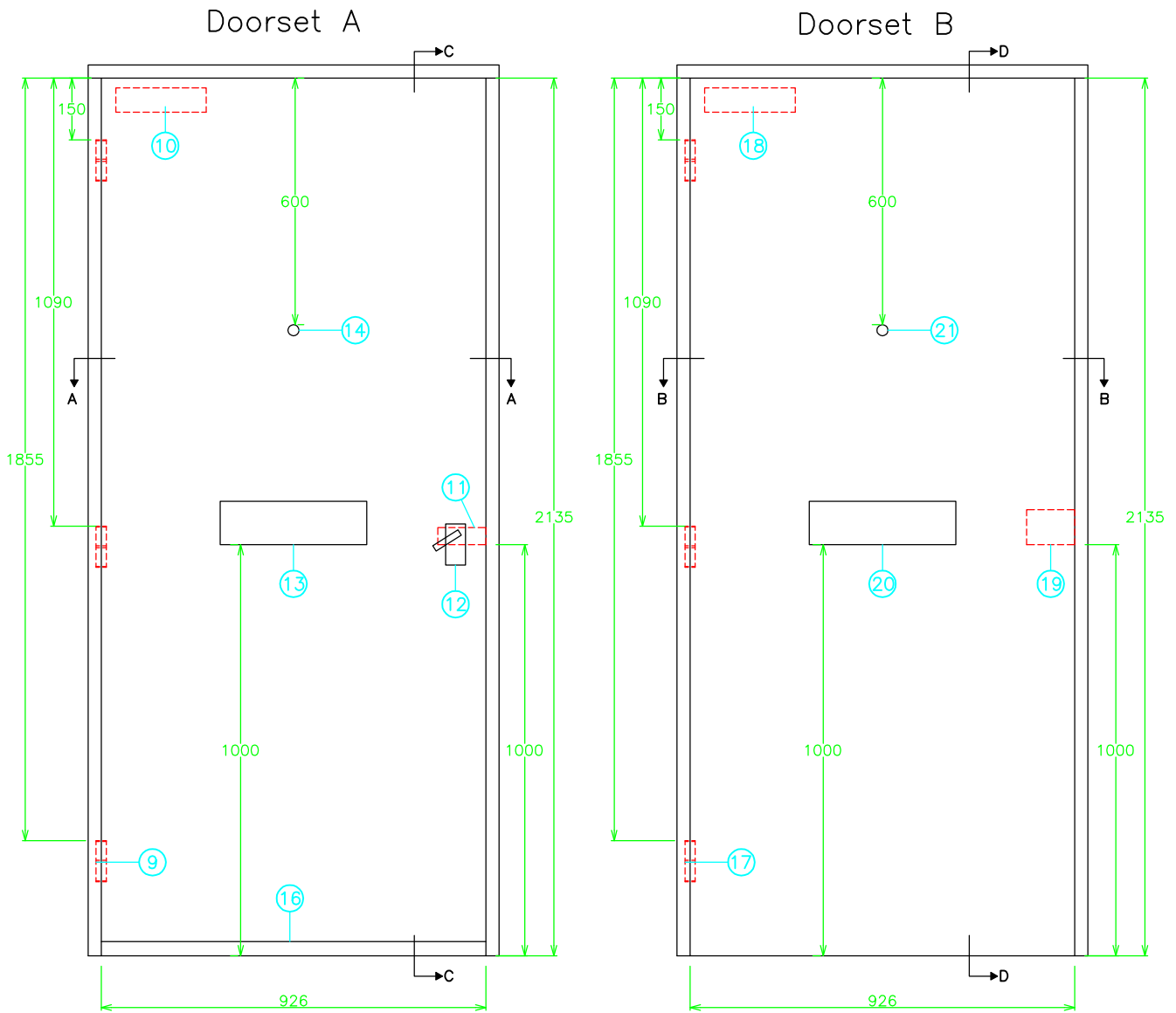


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Appendix – Figures 1 to 4

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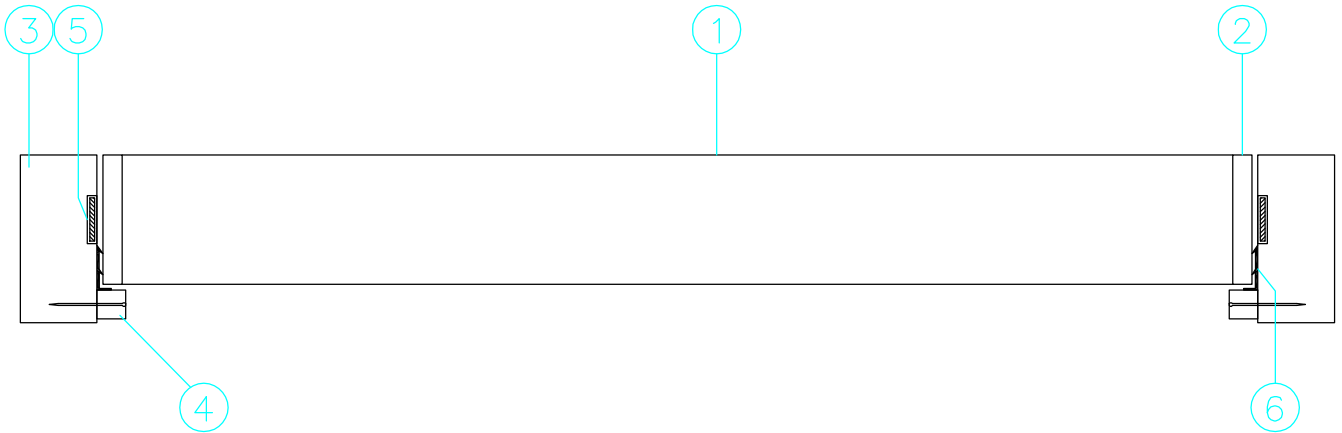


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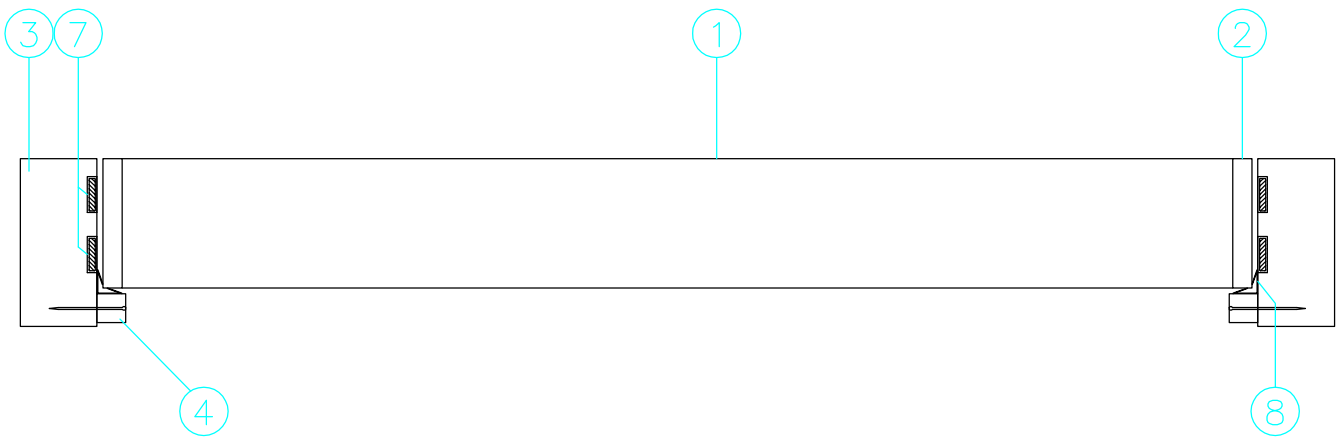
Title Unexposed face elevation showing hardware positions (All dimensions in mm)

Date Drawn 05/01/12	Drawn By ARD	Scale NTS
Project No. Chilt/RF11054 Rev A		Appendix

Section A-A



Section B-B



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Title

Horizontal cross-sections
(All dimensions in mm)

Date Drawn

05/01/12

Drawn By

ARD

Scale

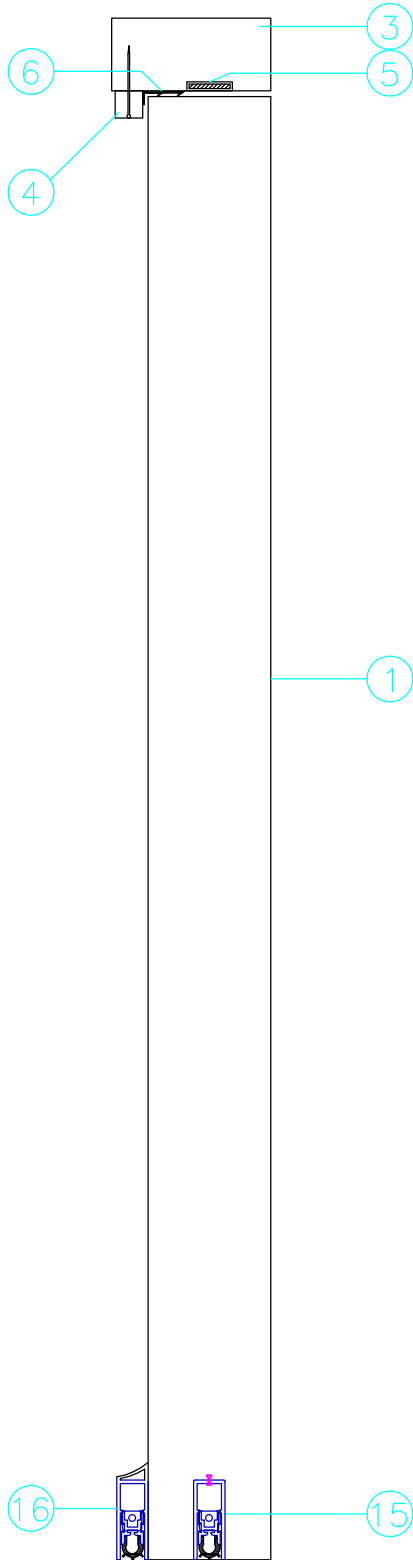
NTS

Project No.

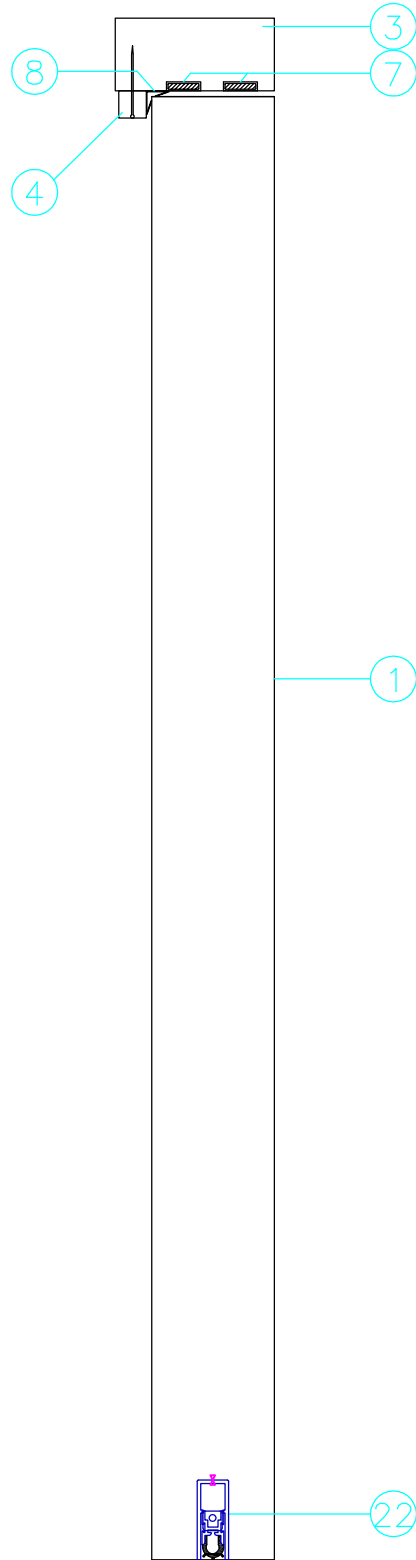
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Appendix

Section C-C



Section D-D

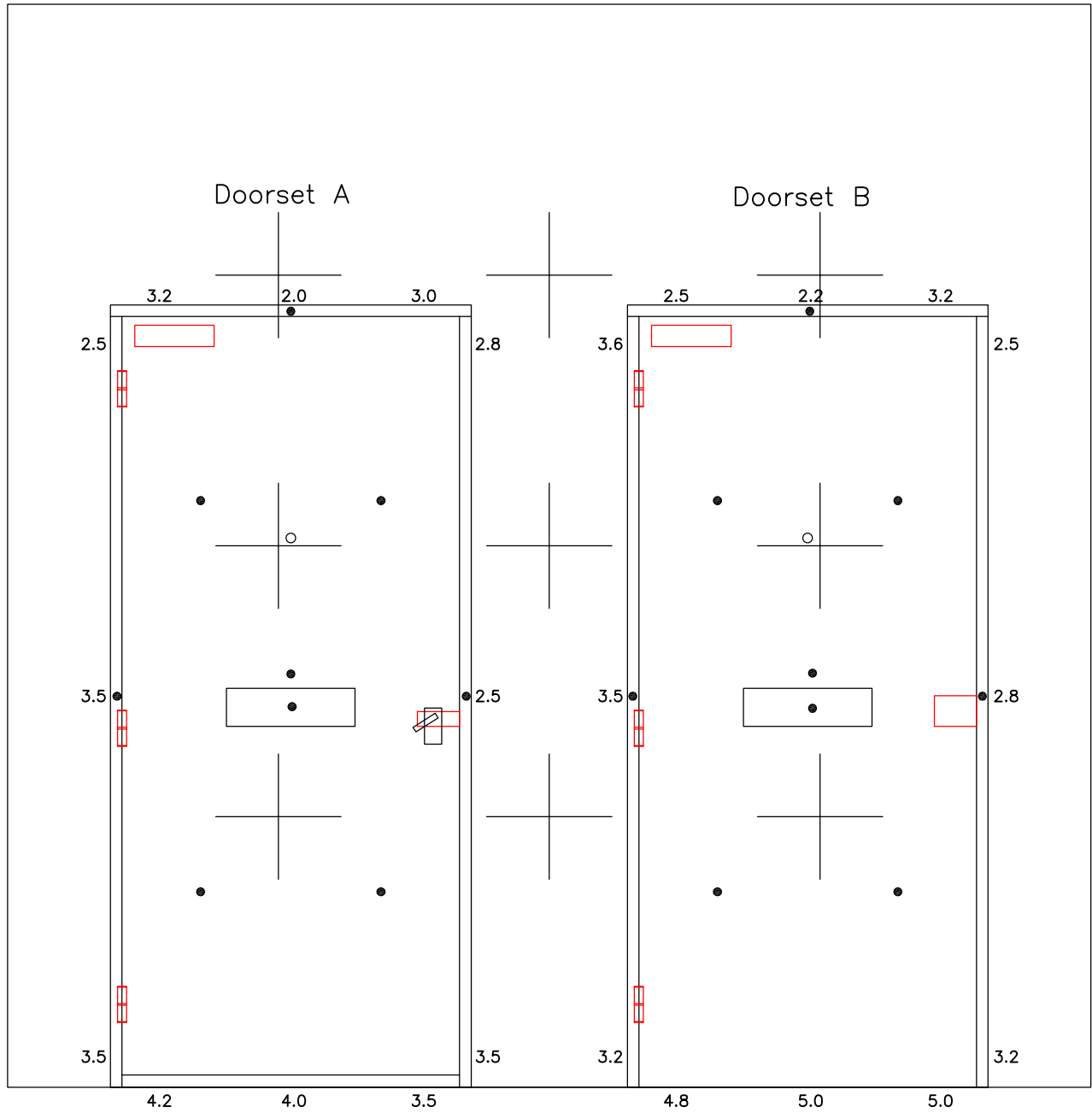


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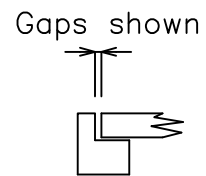
Title
 Vertical cross-sections
 (All dimensions in mm)

Date Drawn 05/01/12	Drawn By ARD	Scale NTS
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+ : Furnace Thermocouples
 ● : Unexposed Face Thermocouples



Viewed From Unexposed Face



Chiltern House, Stocking Lane, Hughenden Valley
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Title Thermocouple positions and door/frame gaps
(All dimensions in mm)

Date Drawn 05/01/12

Drawn By ARD

Scale NTS

Project No. Chilt/RF11054 Rev A

Appendix