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Testing. Advising. Assuring.

Title:

The Fire Resistance Performance Of Two Single-Acting, Single-Leaf Doorsets Incorporating Various Items Of Hardware Tested In Accordance With BS EN 1634-1:2014

Report No:

397894



Prepared for:

Samuel Heath & Sons plc
Leopold Street
Birmingham
B12 0UJ

Date: 30th July 2018

Notified Body No:

0833



0249

Summary

Objective To determine the fire resistance performance of two single-acting, single-leaf doorsets incorporating various items of hardware in accordance with BS EN 1634-1: 2014.

Test Sponsor **Samuel Heath & Sons plc**
Leopold Street, Birmingham, B12 0UJ

Summary of Tested Specimens For the purpose of the test the doorsets were referenced **Doorset A** and **Doorset B**.

Doorset A had overall dimensions of 2080 mm high by 1000 mm wide incorporating a door leaf with overall dimensions 2040 mm high by 933 mm wide by 44 mm thick. The door leaf was of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges. The leaf was hung within a softwood frame on three steel butt hinges, opening towards the heating conditions of the test. The doorset was fitted with a Perko 'Powermatic R100' concealed closer. The closer was fitted on the hinged edge with the closer body morticed into the leaf. The centre line of the closer was positioned nominally 782 mm from the notional floor level. The doorset was unlatched for the duration of the test.

Doorset A had overall nominal dimensions 2090 mm high by 1040 mm wide incorporating a door leaf with overall dimensions 2051 mm high by 974 mm wide by 45 mm thick. The door leaf was formed from 1.5 mm thick galvanised steel facings with a paper honeycomb core. The leaf was hung within a profiled steel door frame such that it opened away from the heating conditions of the test. The doorset was fitted with a Perko 'Powermatic R100' concealed closer. The closer was fitted on the hinged edge with the closer body morticed into the leaf. The centre line of the closer was positioned nominally 782 mm from the notional floor level. The doorset was unlatched for the duration of the test.

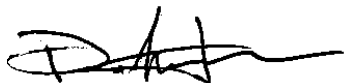
Test Results:		Doorset A	Doorset B			
Integrity performance	Sustained flaming	42 minutes	243 minutes*			
	Gap gauge	44 minutes [#]	243 minutes*			
	Cotton Pad	42 minutes	35 minutes			
Insulation performance		42 minutes	5 minutes			
Radiation Performance (Doorset B)		5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
		37 minutes	94 minutes	201 minutes	243 minutes*	243 minutes*

*The test was discontinued after a period of 243 minutes.

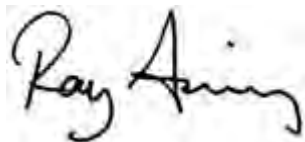
The door was blanked off to allow the test to continue.

Date of Test 2nd May 2018

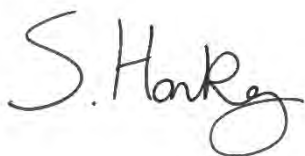
Signatories



Responsible Officer
D. Fitzsimmons*
Senior Technical Officer



Approved
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Head of Department
S. Hankey*
Business Unit Manager

* For and on behalf of **Exova Warringtonfire**.

Report Issued

Date: 30th July 2018

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Test Procedure

Introduction

The doorsets are required to provide a fire separating function and were therefore tested in accordance with BS EN 1634-1: 2014 'Fire resistance tests for doors and shutter assemblies - Part 1: Fire doors and shutters'. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 2012 'Fire resistance tests - Part 1: General requirements' and BS EN 1363-2: 1999, 'Fire resistance tests - Part 2: Alternative and additional procedures'.

The specimens were judged on their ability to comply with the performance criteria for integrity and insulation, as required by BS EN 1634-1: 2014.

The specific purpose of the test was to evaluate the effects of the inclusion of various items of building hardware into a previously tested doorset construction. Because of this, no direct field of application for the doorsets are included in this report.

Fire Test Study Group/EGOLF

Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.

Instruction To test

The test was conducted on the 2nd May 2018 on behalf of **Samuel Heath & Sons plc**, the sponsor of the test.

Test Specimen Construction

A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimens and information supplied by the sponsor of the test.

The doorsets' storage, installation, and test preparation took place in the test laboratory between the 28th April 2018 and the 2nd May 2018.

Installation

The doorsets incorporating the hardware were mounted within apertures provided within a low density rigid supporting construction. Doorset A was mounted opening towards the heating conditions of the test and Doorset B was mounted opening away from the heating conditions of the test.

Representatives of **Exova Warringtonfire** conducted the installation on the 28th April 2018.

Sampling

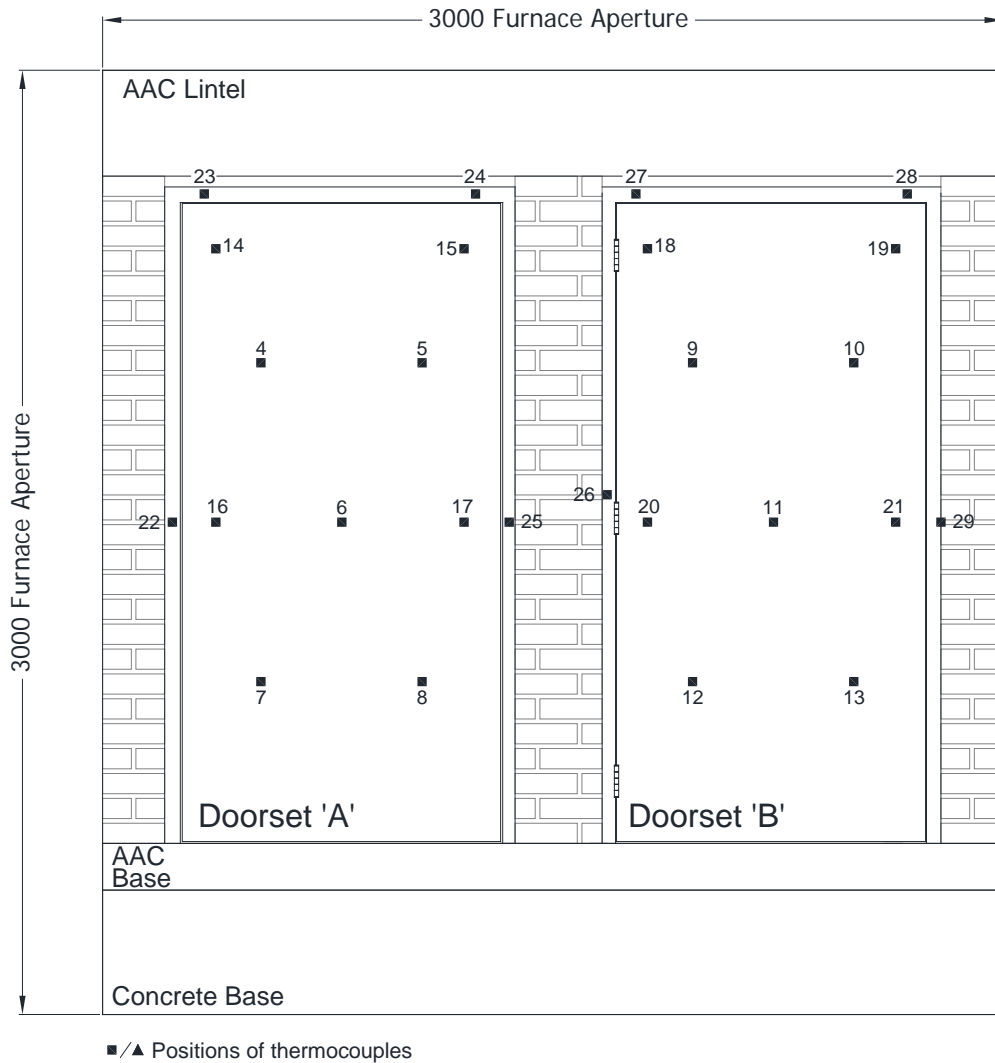
A representative of **Warrington Certification** sample selected the concealed closers on the 13th December 2017. Sample Report reference FM392465 can be found at the rear of this report.

Conditioning

The specimens' storage, construction, and test preparation took place in the test laboratory over a total, combined time of 5 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 11°C to 20°C and 38% to 68.5% respectively.

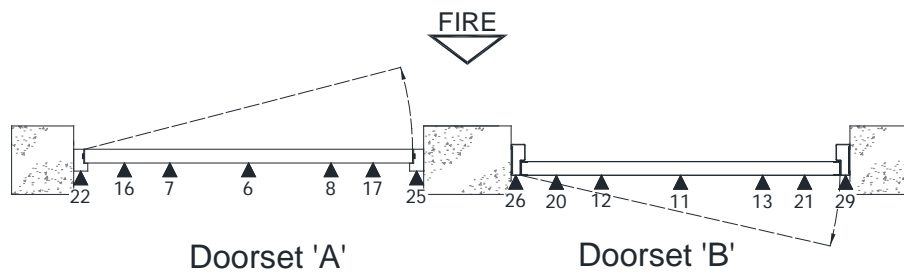
Test Construction

Figure 1- General Elevation of Test Construction



■/▲ Positions of thermocouples

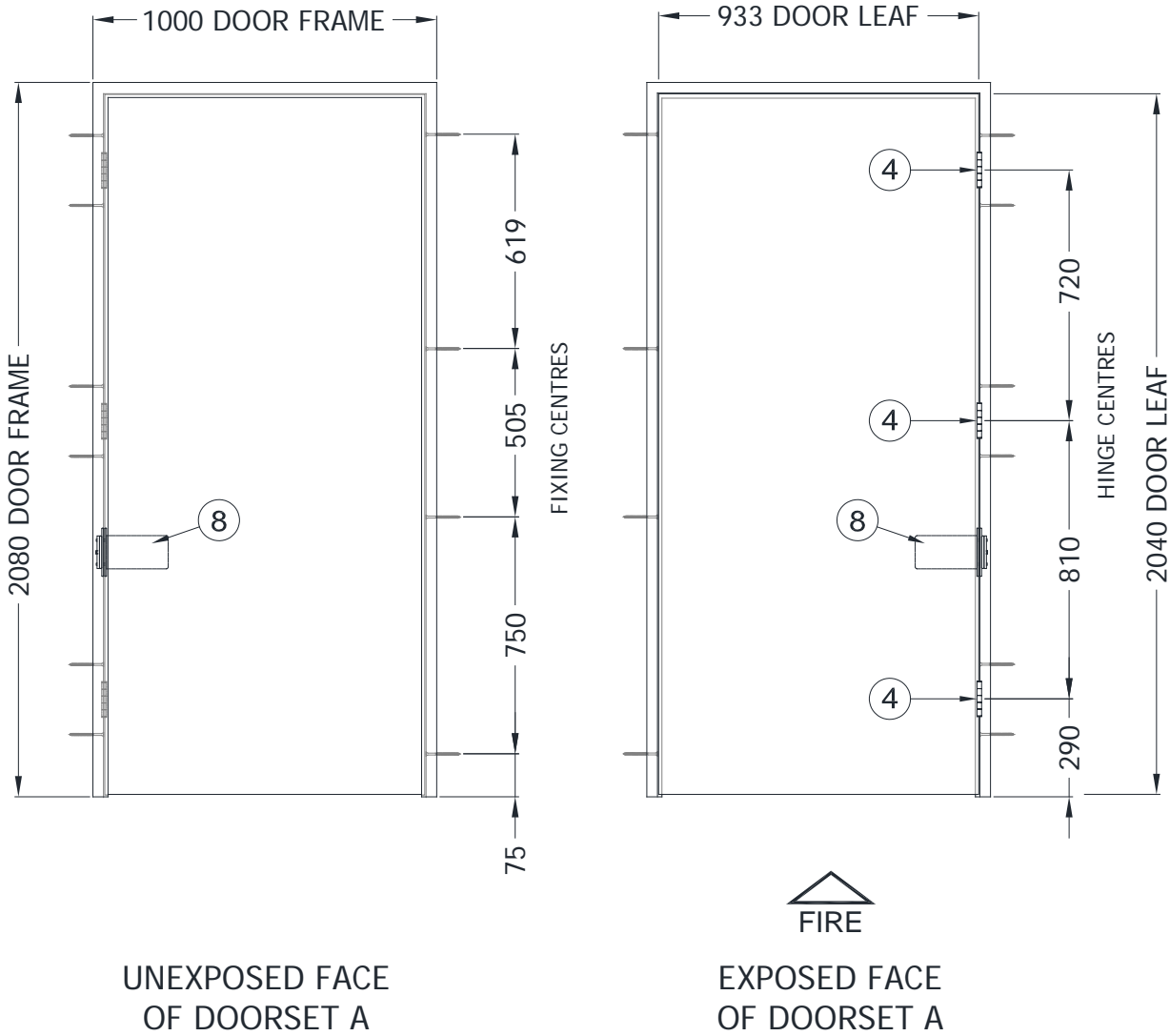
GENERAL ELEVATION OF TEST CONSTRUCTION ON THE UNEXPOSED FACE



HORIZONTAL SECTION OF TEST CONSTRUCTION

Do not scale. All dimensions are in mm

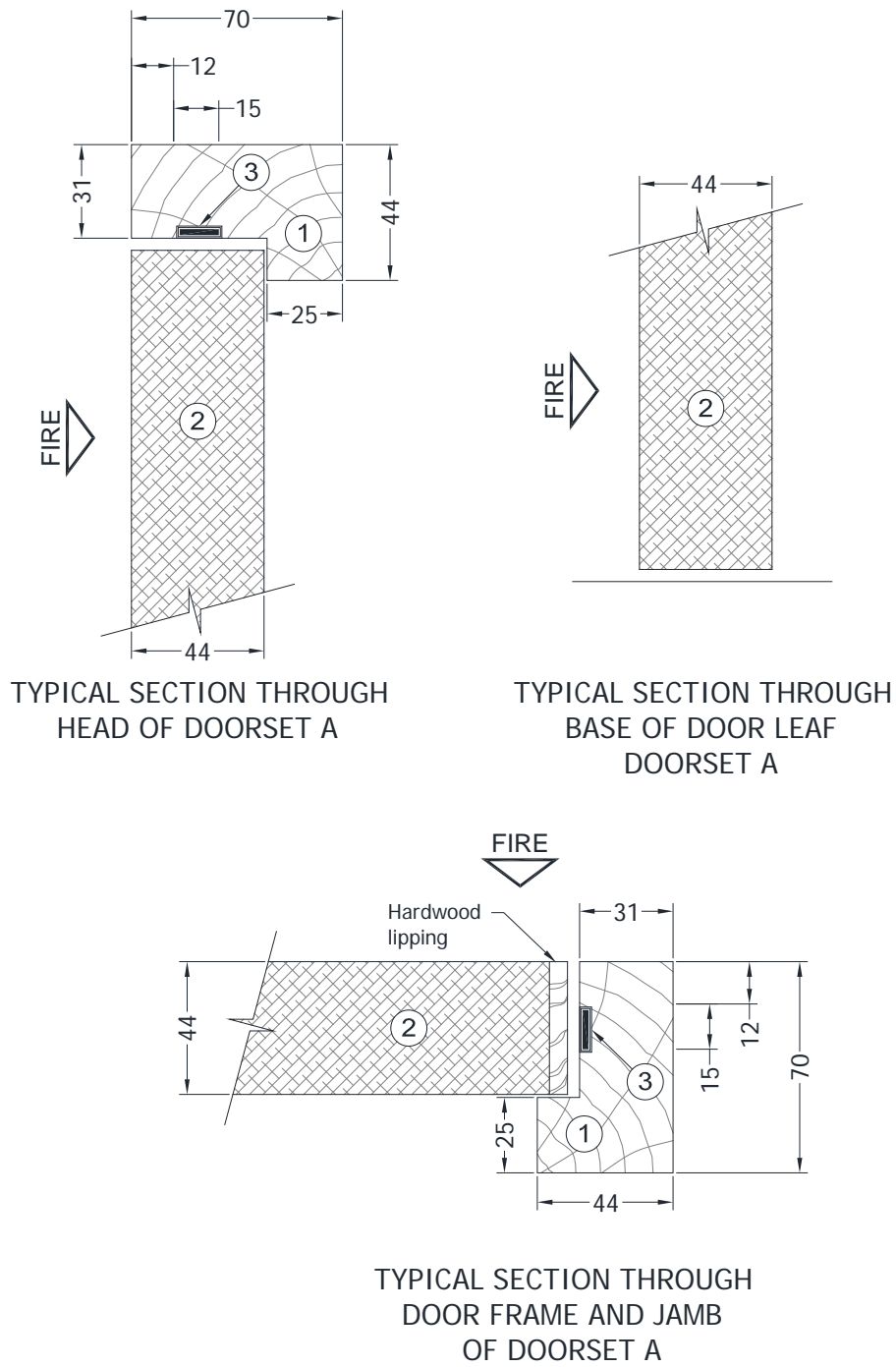
Figure 2 – Doorset A - General Elevations



GENERAL ELEVATIONS OF DOORSET A

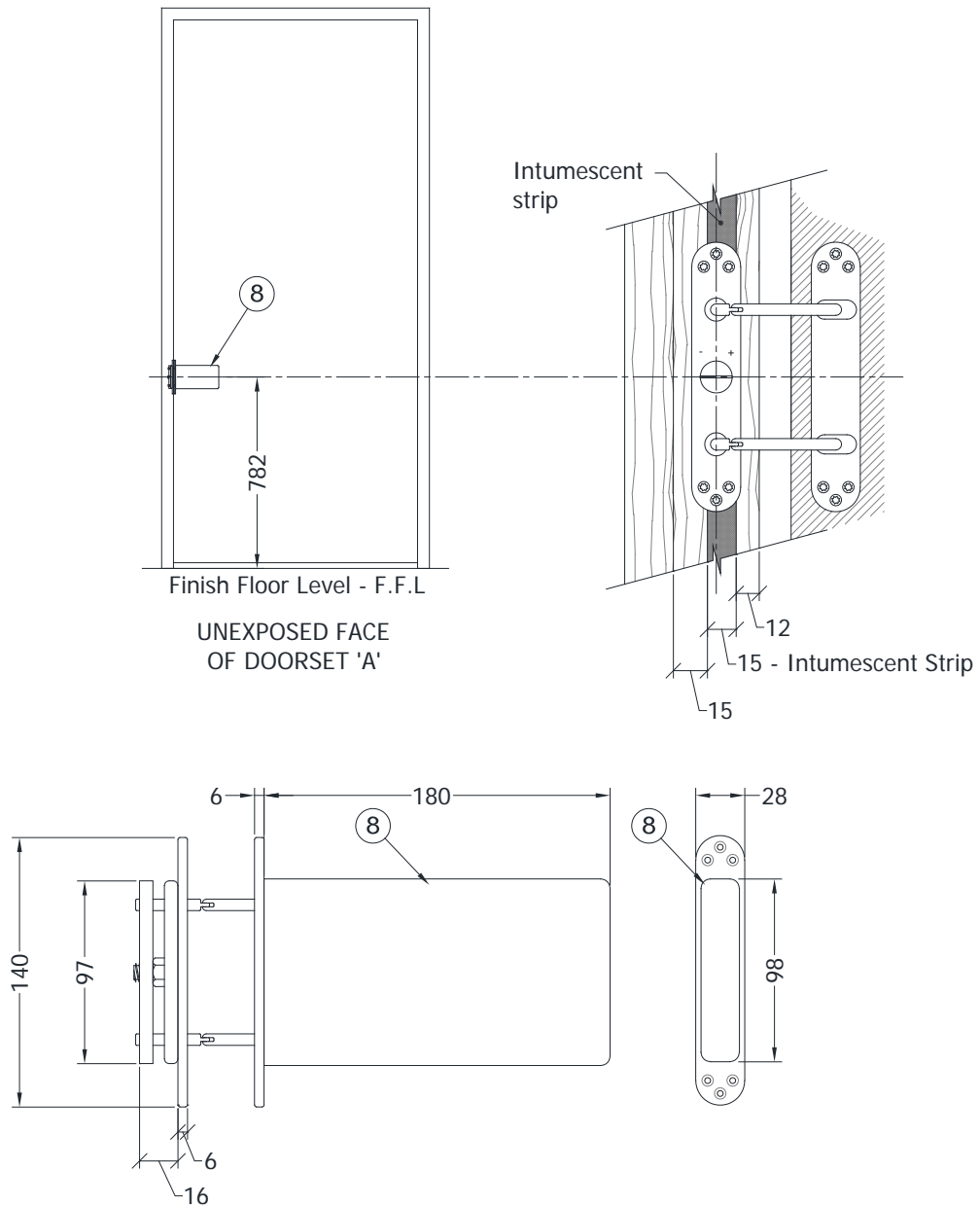
Do not scale. All dimensions are in mm

Figure 3 – Doorset A - Details of Door Frame and Leaves



Do not scale. All dimensions are in mm

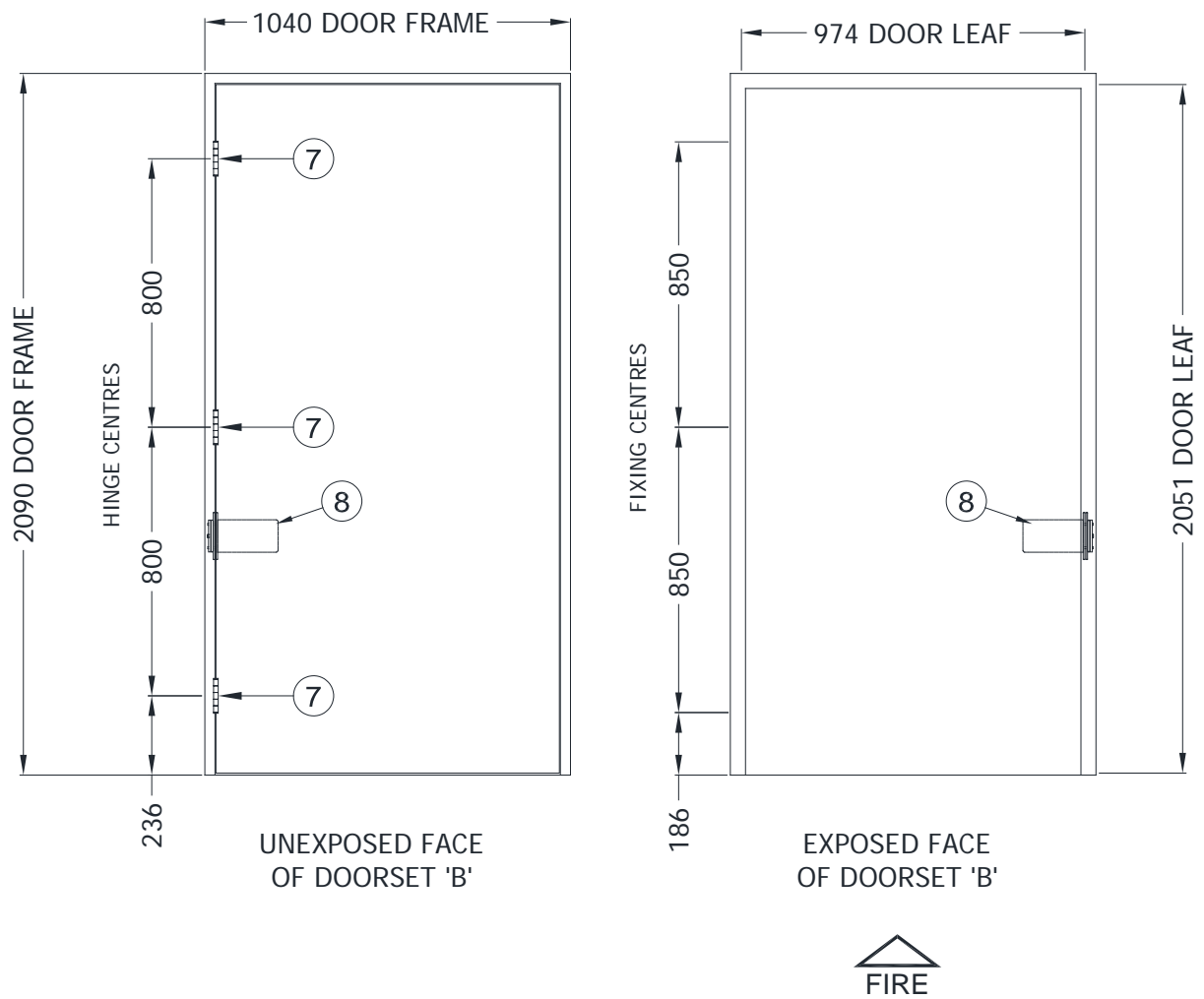
Figure 4 – Doorset A – Details of Item 8



**ITEM 8 - PERKO POWERMATIC
CONCEALED DOOR CLOSER
DOORSET A**

Do not scale. All dimensions are in mm

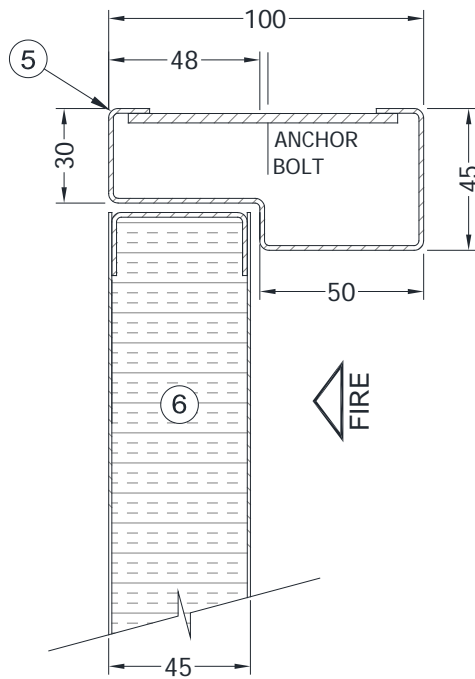
Figure 5 – Doorset B - General Elevations



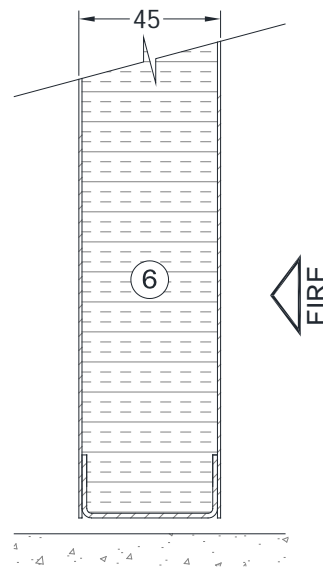
GENERAL ELEVATIONS OF DOORSET 'B'

Do not scale. All dimensions are in mm

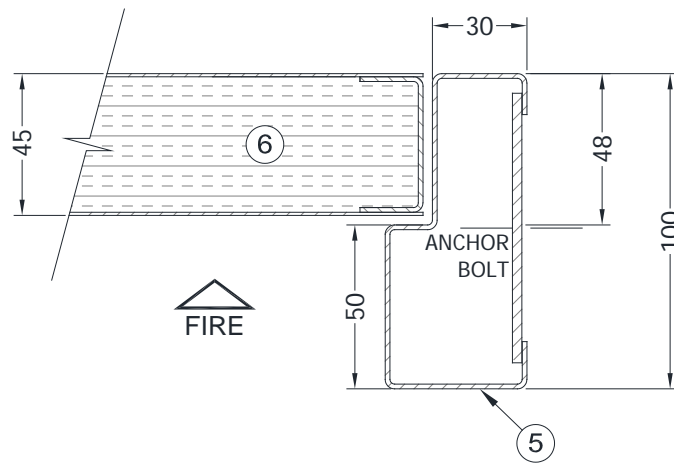
Figure 6 – Doorset B - Details of Door Frame and Leaves



TYPICAL SECTION THROUGH HEAD OF DOORSET 'B'



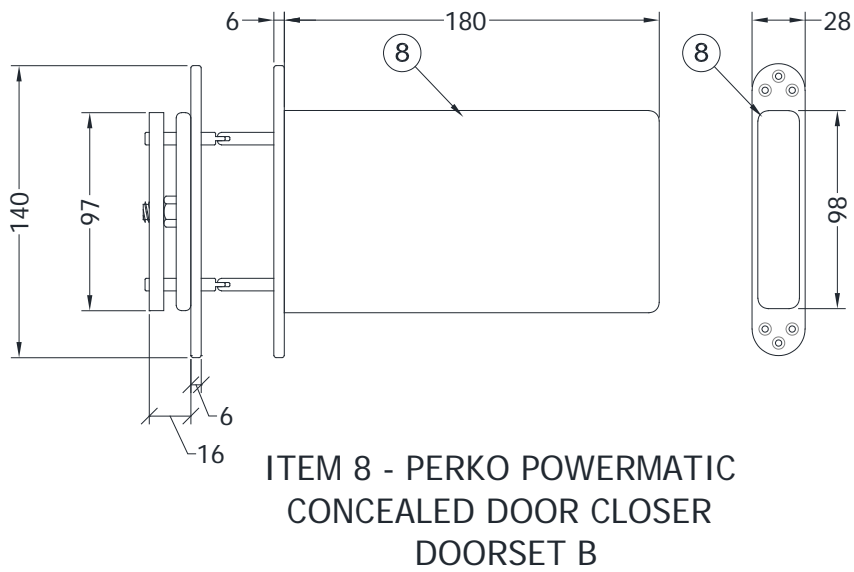
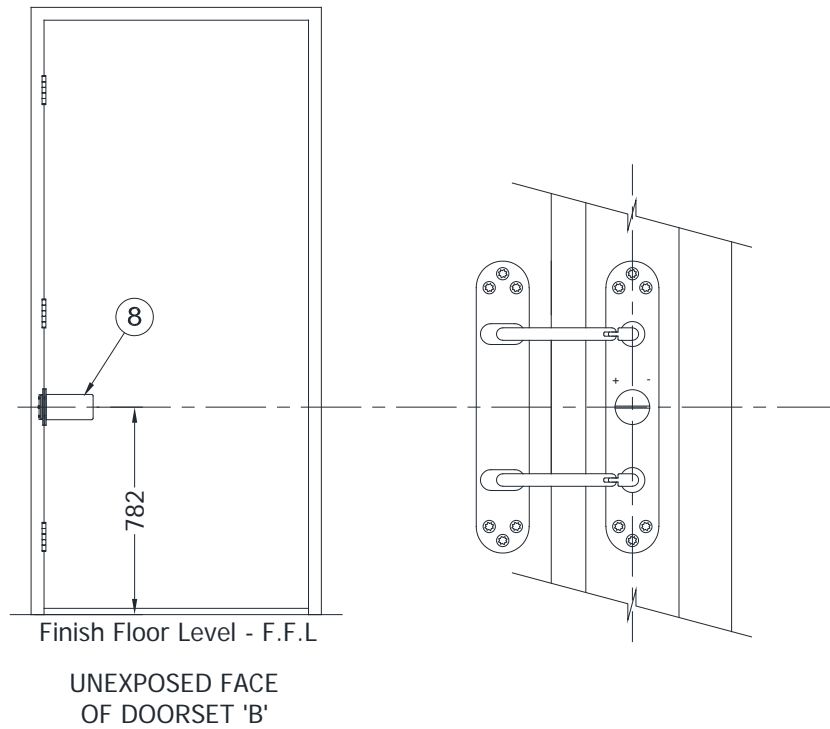
TYPICAL SECTION THROUGH HEAD OF DOORSET 'B'



TYPICAL SECTION THROUGH THE DOOR FRAME AND JAMB OF DOORSET 'B'

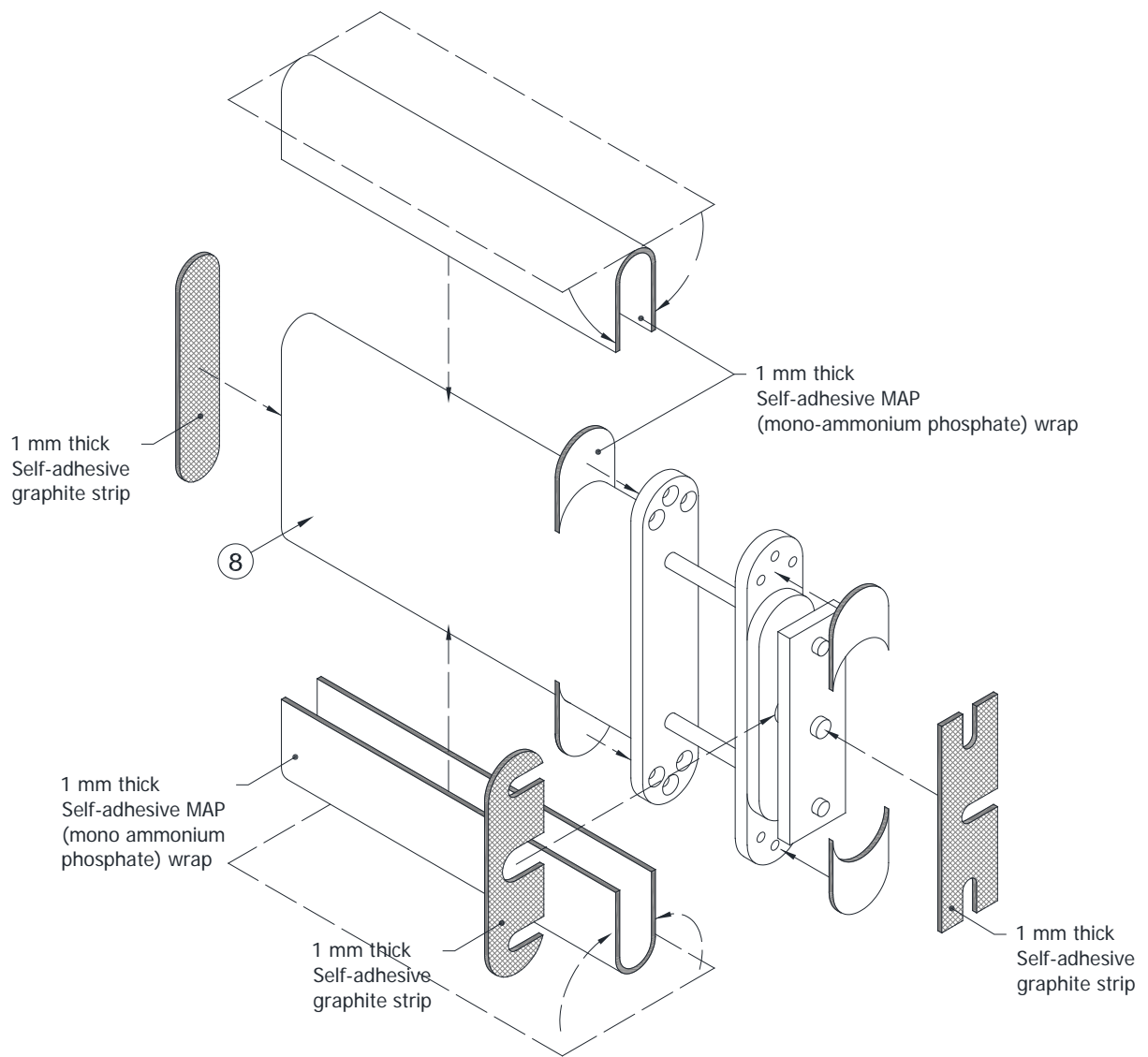
Do not scale. All dimensions are in mm

Figure 7 – Doorset B - Details of Item 8



Do not scale. All dimensions are in mm

Figure 8 – Details of SHR 100 Intumescent kit



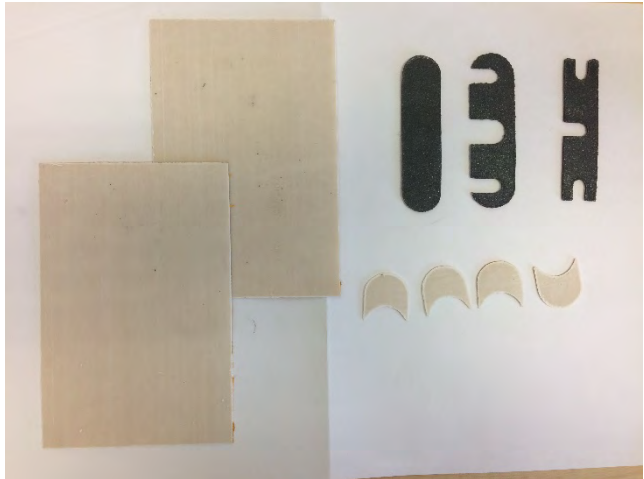
DETAILS OF INTUMESCENT KIT - SHR 100

Do not scale. All dimensions are in mm

Figure 9 – Photos of Cut Outs to Doorsets / Intumescent Kit



Mortise to Door Leaf A



Closer Intumescent Kit – SHR 100



SHR 100 Kit applied to Closer-Doorset A



SHR 100 Kit applied to Closer-Doorset A



Concealed closer installed – Doorset A



Concealed closer installed – Doorset B

Schedule of Components

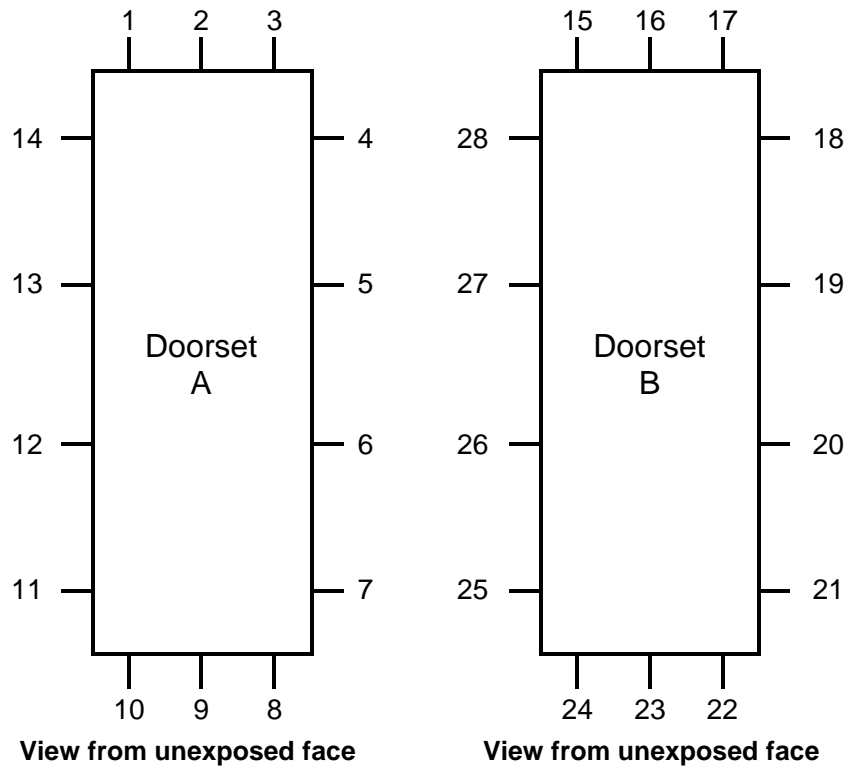
(Refer to Figures 1 to 8)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Doorset A - Door Frame, Jamb & Head	
Material	: Pine Softwood.
Density	: 510 ~ 550 kg/m ³ nominal.
Average moisture content	: Measured with a Protimeter moisture meter by Exova Warringtonfire
i. doorset A	: 8.9 %
Overall size	: 70 mm x 44 mm, with 44 mm x 13 mm deep rebate.
Jambs to head jointing method	: Stub mortice & screwed, using 75 mm long x 4.6 mm diameter countersunk head wood screws.
Fixing method	: Through screwed and plugged.
Fixings	
ii. type	: Countersunk head wood screws.
iii. material	: Steel screws with plastics plugs.
iv. size	: 100 mm long by 4.8 diameter.
Centres	: 6 off, nominally 40 - 50 mm above and below each hinge position.
2. Doorset A - Door Leaf	
Manufacturer	: Halspan.
Reference	: Prima.
Average moisture content	: Measured with a Protimeter moisture meter by Exova Warringtonfire
i. doorset A	: 7 %
Overall thickness	: 44mm.
Construction	
Core	: Chipboard.
Lippings	: Hardwood 8 mm thick, to vertical edges only.
ii. species	: Sapele.
iii. density	: 620 ~ 660 kg/m ³ , nominal.
Adhesive to lipping	
iv. manufacturer	: Polyvine.
v. type	: Formaldehyde.
vi. reference	: Cascamite.
vii. curing Method	: Cold press.
viii. application method	: Brushed.
3. Intumescent Seal	
Manufacturer	: Pyroplex Ltd.
Reference	: CF 355.
Material	: Graphite intumescent strip within a polyvinyl chloride, PVC, carrier.
Overall size	: 15 mm x 4 mm.
Fixing method	: Self-adhered into grooves within rebate of frame, strips were interrupted at furniture positions.

<u>Item</u>	<u>Description</u>
4. Hinges	
Manufacturer	: Royde & Tucker Ltd.
Reference	: Hi-Load 102.
Primary material	: Zinc plated steel.
Overall sizes	
i. knuckle	: 104 mm long by 13.8 mm diameter.
ii. blades	: 100 mm long by 35 mm wide by 3 mm thick.
Fixings	
iii. type	: Countersunk head wood screws.
iv. material	: Steel.
v. size	: 29 mm long by 5.1 mm diameter (usually supplied with hinges)
vi. number off per blade	: 4 No.
vii. maximum distance of fixing screws from exposed face of door leaf A	: 26 mm.
viii. minimum distance of fixing screws from exposed face of door leaf A	: 15 mm.
ix. maximum distance of fixing screws from exposed face of door leaf B	: 26 mm.
x. minimum distance of fixing screws from exposed face of door leaf B	: 15 mm.
Intumescent bedding material	
xi. Doorset A (30 minute)	: Bedded on one layer of 1 mm Interdens sheet.
5. Doorset B - Door Frame, Jamb & Head	
Manufacturer	: Teckentrup Door Solutions Ltd.
Type	: Single action steel door frame, pressed to form a single rebate profile with a bolted fixed header.
Material	: Galvanised mild steel.
Thickness	: 1.5 mm.
Overall section size	: 100 mm x 45 mm.
Fixing method	
i. to masonry surround	: Expanding anchor bolts through fixing plates.
Details of Fixing Plates	
ii. material	: Galvanised mild steel.
iii. thickness	: 3 mm.
iv. size	: 60 mm x 115 mm.
v. fixing method	: Tack welded within back face of door frame, jamb and head.
Details of Anchor bolts	
vi. type	: Rawlok bolts.
vii. material	: Steel.
viii. overall size	: M10 x 80 mm long.
ix. quantity	: 1 no. anchor bolt per fixing plate.
6. Doorset B - Door Leaf	
Manufacturer	: Teckentrup Door Solutions Ltd.
Type	: Steel door leaf facings with a folded interlock seam along vertical edges.
Material	: Galvanised mild steel.
Thickness	: 1.5 mm.
Door Leaf Core	
i. manufacturer	: Honicel.
ii. material	: 25 mm square Honeycomb paper.
iii. fixing method	: Bonded to door leaf facings with adhesive.
Details of Adhesive	
iv. manufacturer	: Henkel Technologies industrial Adhesives.

<u>Item</u>	<u>Description</u>
6. Doorset B - Door Leaf (continued)	
v. type	: 2 pack polyurethane based adhesive.
vi. material	: Polyurethane.
vii. reference	: Macroplast, UK 8103 B15 resin with UK 5400 Hardener.
viii. application method	: Roller.
7. Hinges - Doorset B	
Manufacturer	: Cooke Brothers Ltd.
Type	: Dual Bearing hinge, Grade 13 to BS EN1935.
Reference	: 7800 DB.
Certifire Number	: 351.
Material	: Stainless steel.
Overall size	: 102 mm x 114 mm x 3 mm.
Security Hinge	: 7800 DB hinge at mid-point along the door jamb has a security dog bolt.
Fixings	
i. type	: Countersunk head machine screws.
ii. material	: Steel.
iii. overall size	: 16.2 mm long x 5.8 mm diameter.
iv. number off per blade	: 4 off.
Hinge tapping plate	
v. material	: Galvanised mild steel.
vi. thickness	: 3 mm.
vii. overall size	: 230 mm long x 30 mm wide.
viii. fixing method	: Welded within vertical edge of door leaf and door frame profile at hinge positions.
8. Concealed Door Closer	
Manufacturer	: Perko.
Manufactures product reference	: Powermatic R100.
Fixing Method	: The main body is concealed within a mortice in the door leaf. The frame plate is morticed into the hinge jamb of the door frame. Fixings supplied in kit.
Fixings	: 6 No. 4 mm x 25 mm screws per foreplate (supplied with the closer kit)
Intumescent Kit – Doorset A (see figure 8)	
i. reference	: SHR 100.
ii. Manufacture	: Dixon International Group (Client Supplied)
iii. closer body	: Wrapped in 1 layer of 1 mm thick self-adhesive MAP (mono-ammonium phosphate) intumescent.
iv. closer body rear	: 1 layer of 1 mm thick self-adhesive graphite sheet intumescent.
v. closer foreplates	: 1 layer of 1 mm thick self-adhesive MAP intumescent also applied to the rear of the closer foreplates.
vi. frame plate body	: 2 No. strips of 1 mm thick self-adhesive graphite sheet intumescent.
Closer forces	
vii. doorset A - maximum opening moment	: 36.3 Newton metre (Nm)
viii. doorset A - maximum closer moment	: 14.8 Newton metre (Nm)
ix. doorset B - maximum opening moment	: 36.3 Newton metre (Nm)
x. doorset B - maximum closer moment	: 12.5 Newton metre (Nm)

Doorset Clearance Gaps



Door Ref	Gap Dimension in mm at Positions													
A	1	2	3	4	5	6	7	8*	9*	10*	11	12	13	14
	3.2	2.7	2.6	2.4	2.6	2.3	2	10.2	10.4	10.6	2.9	2.8	2.9	3.7
B	15	16	17	18	19	20	21	22*	23*	24*	25	26	27	28
	5.9	5.3	4.4	2.5	2.6	2.8	3.2	5.1	4.7	6	1.9	2.5	2.1	2.9
A	Mean		2.7		Maximum			3.7		Minimum			2	
B	Mean		3.3		Maximum			5.9		Minimum			2.1	

Door Ref	Gap Between Face of Leaf and Doorstop in mm at Position													
A	1	2	3	4	5	6	7	8*	9*	10*	11	12	13	14
	0.4	0.3	0.9	1.2	1.2	0.8	0.6	#	#	#	1.3	0.1	0.1	1.5
B	15	16	17	18	19	20	21	22*	23*	24*	25	26	27	28
	2.1	2.6	2.4	2.5	2.6	2.8	2.3	#	#	#	3.3	4.4	4.4	4.6

* Dimension not included in calculations

Dimension not measured

ALL DIMENSIONS ARE IN mm

Instrumentation

General	The instrumentation was provided in accordance with the requirements of the Standard.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2012 Clause 5.1 using six plate thermometers, distributed over a plane 100 mm from the surface of the test construction.
General	Thermocouples were provided to monitor the unexposed surface of the specimens and the output of all instrumentation was recorded at no less than one minute intervals as follows.
Thermocouples 4 to 8 (Doorset A) & Thermocouples 9 to 13 (Doorset B)	At five positions on each doorset, one approximately at the centre and one at the approximate centre of each quarter section of the doorset.
Thermocouples 14 to 17 (Doorset A) & Thermocouples 18 to 21 (Doorset B)	At four positions on each door leaf, positioned at 100 mm in from the door leaf vertical edges, two at mid-height, and two at 100 mm below the top edge of the leaf.
Thermocouples 22 to 25 (Doorset A) & 26 to 29 (Doorset B)	At four positions on the unexposed face each door frame, one positioned at mid-height on each jamb and one in each top corner 50 mm in from the leaf edges. The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1.
Roving Thermocouple	A roving thermocouple was available to measure temperatures on the unexposed surface of the specimens at any position which might appear to be hotter than the temperatures indicated by the fixed thermocouples.
Integrity Criteria	Cotton pads and gap gauges were available to evaluate the integrity of the specimens.
Furnace Pressure	The furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1363-1: 2012. Clause 5.2. The calculated pressure differential relative to the laboratory atmosphere at the top of each doorset was 13.5 (± 3) Pa.

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	secs	The ambient air temperature in the vicinity of the test construction was 17°C at the start of the test with a maximum variation of +8°C during the test.
00	00	The test commences.
01	54	Steam/smoke release issues from the head of Doorset A.
03	50	When viewed from the exposed face, Doorset A has ignited.
04	40	Light steam/smoke release issues from the head of Doorset B.
5	00	Both doorsets are unrestrained.
10	00	The face of Doorset B begins to discolour to an off grey colour.
15	00	Light steam/smoke release issues from the top corner of the hanging edge of Doorset A.
22	00	Very light steam/smoke release issues from the top corner of the leading edge of Doorset A.
30	00	No significant visible changes are observed.
32	00	Cotton pad integrity test is performed over the centre of the leaf of Doorset B. Cotton pad does not discolour or ignite.
35	05	Cotton pad integrity test is performed over the centre of the leaf of Doorset B. Cotton pad ignites.
		Cotton pad integrity failure is deemed to have occurred.
35	40	A very small orange coloured glow is observed at the top corner of the leading edge Doorset B.
38	00	Steam/smoke release increases at the head of Doorset B.
40	00	Discolouring of the leaf is observed at approximately where the closer is morticed on Doorset A.
42	00	Small flickers of flame issue at the top corner of the hanging edge of Doorset A.
42	48	Flicker of flame at the top corner of the hanging edge of Doorset A increases in intensity and forms a sustained flame. Sustained flame integrity failure is deemed to have occurred.
44	00	Doorset A is blanked off to allow the test to continue on Doorset B.
90	00	No significant visible changes are observed to Doorset B.
91	00	Doorset B is now discolouring to an off green/brown colour.

Time**mins secs**

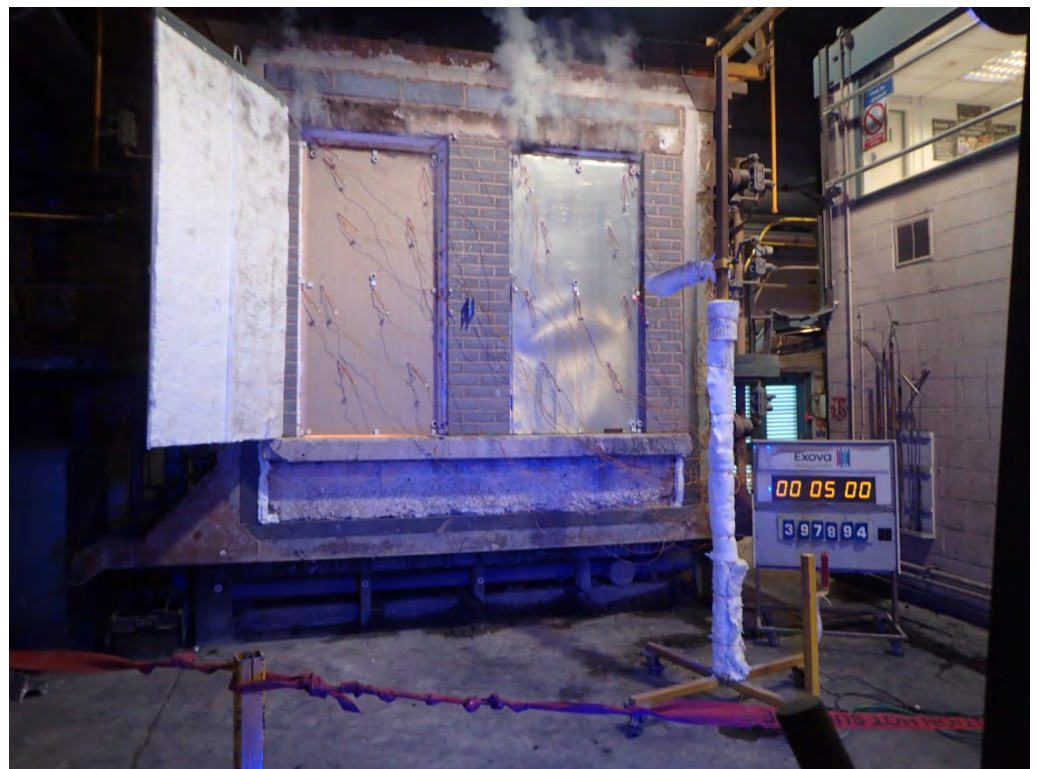
- | | | |
|------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 131 | 00 | Doorset B is now beginning to glow a dull orange colour. |
| 147 | 00 | The head of Doorset B between the head and the frame is glowing bright orange in colour. |
| 160 | 00 | The orange glowing radiating for the face of Doorset B, increases in intensity. |
| 200 | 00 | The orange glowing radiating for the face of Doorset B continues to increase in intensity. No other significant visible changes are observed to Doorset B. |
| 240 | 00 | The glowing radiating for the face of Doorset B continues to increase in intensity. Glowing is now bright red in colour. No other significant visible changes are observed to Doorset B. |
| 243 | 00 | The test is discontinued. |

Test Photographs

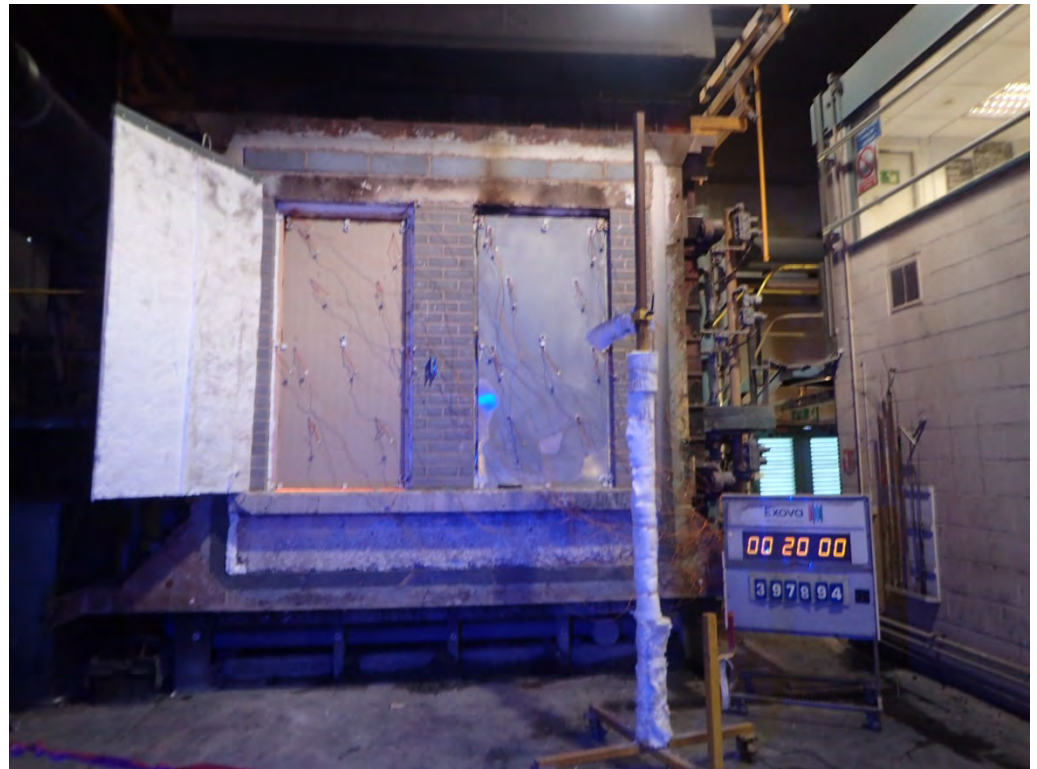
The exposed face of the doorsets prior to the start of the test



The unexposed face of the doorsets after a test duration of 5 minutes



The unexposed face of the Doorsets after a test duration of 20 minutes



The unexposed face of the Doorsets after a test duration of 30 minutes



Flaming seen in the top leading edge corner of Doorset A after a test duration of 42 minutes



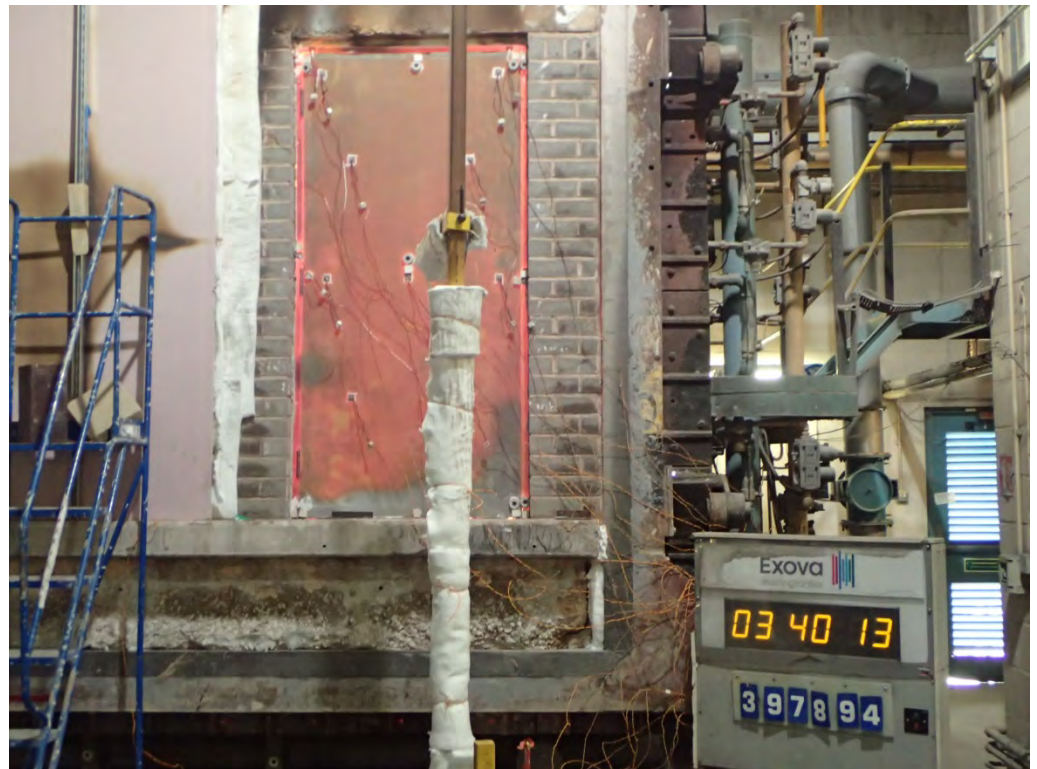
The unexposed face of the Doorset B after a test duration of 60 minutes



The unexposed face of Doorset B after a test duration of 120 minutes



The unexposed face of Doorset B after a test duration of 220 minutes



The unexposed face of Doorset B after a test duration of 240 minutes



The exposed face of the test assembly immediately after the test



Temperature and Deflection Data

Mean furnace temperature, together with the temperature/time relationship specified in the Standard

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	39
7	626	633
14	728	723
21	789	802
28	832	837
35	865	864
42	892	890
49	915	915
56	935	944
63	953	952
70	968	967
77	983	978
84	996	993
91	1008	1003
98	1019	1014
105	1029	1031
112	1039	1033
119	1048	1050
126	1056	1058
133	1064	1065
140	1072	1069
147	1080	1085
154	1086	1089
161	1093	1091
168	1099	1098
175	1106	1106
182	1111	1101
189	1117	1113
196	1122	1120
203	1128	1134
210	1133	1131
217	1138	1137
224	1142	1137
231	1147	1144
238	1152	1149
243	1155	1155

Individual and mean temperatures recorded on the unexposed surface of Doorset A

Time Mins	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	T/C Number 7 Deg. C	T/C Number 8 Deg. C	Mean Temp Deg. C
0	19	19	19	13	18	18
2	19	20	20	*	19	20
4	20	20	20	*	19	20
6	20	20	20	*	19	20
8	20	21	20	*	19	20
10	22	22	21	*	20	21
12	24	24	23	*	21	23
14	27	27	26	*	23	26
16	30	30	29	*	26	29
18	32	33	32	33	29	32
20	36	36	36	34	32	35
22	39	40	40	35	36	38
24	42	44	44	37	39	41
26	45	47	48	39	43	44
28	49	51	51	41	47	48
30	52	54	55	43	51	51
32	56	58	58	45	55	54
34	59	61	61	47	58	57
36	62	64	64	48	62	60
38	64	66	67	49	66	62
40	67	69	70	50	69	65
42	70	71	73	51	72	67
44	#	#	#	#	#	#

*Thermocouple Malfunction

Doorset Blanked Off

Individual and mean temperatures recorded on the unexposed surface of Doorset B

Time Mins	T/C Number 9 Deg. C	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C	Mean Temp Deg. C
0	20	21	10	20	20	18
7	217	194	*	184	226	205
14	466	462	*	381	394	426
21	504	495	514	486	437	487
28	533	521	546	522	521	529
35	559	548	574	557	540	556
42	584	572	598	563	560	575
49	587	588	604	580	566	585
56	610	594	627	609	587	605
63	628	621	646	620	601	623
70	644	637	658	635	615	638
77	654	651	672	644	625	649
84	665	663	684	656	637	661
91	674	671	694	664	647	670
98	682	680	702	671	654	678
105	695	692	715	684	668	691
112	702	699	722	687	673	697
119	713	712	731	699	684	708
126	706	701	726	700	682	703
133	707	707	729	702	686	706
140	708	710	732	705	690	709
147	715	720	742	716	698	718
154	714	724	744	721	701	721
161	710	721	741	722	700	719
168	707	725	749	728	710	724
175	703	719	754	735	717	726
182	704	715	751	733	714	723
189	714	724	763	744	725	734
196	725	733	778	759	738	747
203	747	758	800	779	760	769
210	761	766	807	788	768	778
217	773	777	813	792	772	785
224	777	780	817	794	771	788
231	781	782	819	798	774	791
238	784	785	824	804	781	796
243	788	789	827	806	784	799

*Thermocouple Malfunction

**Individual temperatures recorded on the unexposed surface of Doorset A
100 mm in from door leaf edge**

Time Mins	T/C Number 14 Deg. C	T/C Number 15 Deg. C	T/C Number 16 Deg. C	T/C Number 17 Deg. C
0	20	19	20	19
2	21	21	20	20
4	21	21	20	20
6	21	21	21	20
8	23	22	22	20
10	27	25	23	21
12	31	29	27	23
14	36	33	30	26
16	40	38	34	29
18	44	43	37	32
20	48	46	41	36
22	51	50	45	39
24	54	53	48	43
26	56	56	51	46
28	59	59	54	50
30	61	62	57	54
32	63	64	60	57
34	65	66	63	60
36	67	68	65	63
38	69	70	68	66
40	71	72	70	69
42	73	75	72	72
44	#	#	#	#

Doorset Blanked off

**Individual temperatures recorded on the unexposed surface of Doorset B
100 mm in from door leaf edge**

Time	T/C	T/C	T/C	T/C
Mins	Number	Number	Number	Number
	18	19	20	21
	Deg. C	Deg. C	Deg. C	Deg. C
0	19	19	22	21
7	282	184	118	99
14	415	441	344	315
21	422	457	500	437
28	510	480	529	450
35	534	514	554	477
42	556	532	570	502
49	559	548	589	528
56	585	567	618	533
63	599	590	625	551
70	614	606	639	563
77	625	620	650	578
84	635	633	662	589
91	646	643	675	598
98	654	650	680	604
105	666	661	695	614
112	675	668	701	621
119	686	681	711	698
126	687	678	715	688
133	689	681	713	692
140	694	683	716	694
147	703	690	727	703
154	706	694	730	706
161	706	694	730	704
168	711	696	734	720
175	715	697	739	727
182	713	697	738	725
189	722	704	750	735
196	730	709	762	747
203	750	731	785	767
210	758	743	794	771
217	765	749	799	780
224	768	753	802	782
231	774	759	807	786
238	778	764	811	790
243	780	768	815	793

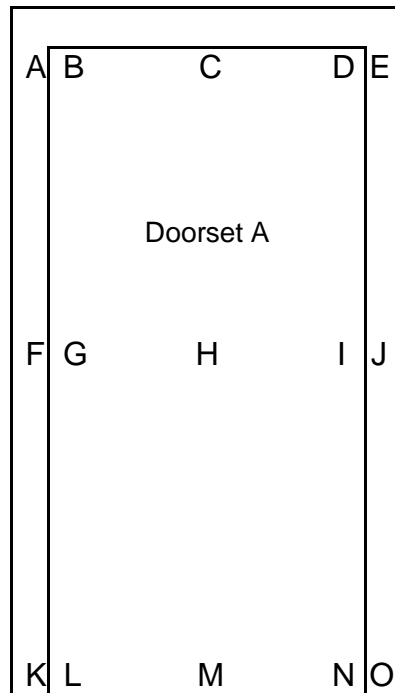
Individual temperatures recorded on the unexposed surface of Door Frame A

Time Mins	T/C Number 22 Deg. C	T/C Number 23 Deg. C	T/C Number 24 Deg. C	T/C Number 25 Deg. C
0	15	16	16	16
2	15	30	37	17
4	16	42	36	17
6	16	48	34	17
8	16	50	31	18
10	16	50	29	18
12	17	44	28	20
14	17	42	28	21
16	19	42	32	24
18	21	43	37	26
20	24	44	41	29
22	28	44	45	32
24	32	46	48	36
26	36	47	50	39
28	42	49	53	43
30	47	51	54	45
32	51	52	56	48
34	53	54	57	50
36	55	56	61	51
38	56	66	62	52
40	58	82	67	53
42	59	102	75	54
44	#	#	#	#

#Doorset Blanked Off

Individual temperatures recorded on the unexposed surface of Door Frame B

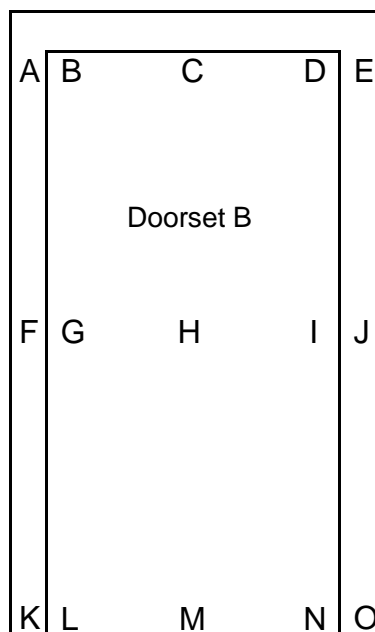
Time Mins	T/C Number 26 Deg. C	T/C Number 27 Deg. C	T/C Number 28 Deg. C	T/C Number 29 Deg. C
0	18	19	19	20
7	149	326	122	324
14	265	416	232	454
21	368	487	332	490
28	418	497	375	505
35	465	534	417	538
42	503	569	465	568
49	533	596	500	593
56	563	621	532	617
63	590	641	562	647
70	608	653	582	663
77	626	669	609	683
84	644	681	630	699
91	659	693	646	714
98	673	703	659	726
105	688	717	673	739
112	702	727	685	751
119	717	737	702	763
126	723	739	700	766
133	730	743	704	772
140	736	747	709	777
147	745	755	717	787
154	756	760	725	796
161	759	760	727	797
168	766	763	735	803
175	773	769	742	810
182	778	771	746	812
189	787	778	752	819
196	799	786	757	826
203	821	802	770	846
210	833	811	778	856
217	842	819	786	864
224	849	827	791	866
231	857	836	798	869
238	866	842	802	878
243	872	848	806	897

Horizontal deflections of the door leaves and door frames during the test

Doorset A															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	2	-5	-4	-1	-6	-4	-3	-5	-2	0	-3	-10	3	1	0
10	6	-3	-1	-3	1	-1	-1	4	1	5	1	0	5	-9	3
15	6	-4	-5	-2	0	-3	-2	-7	0	4	-2	-5	7	11	0
20	3	-1	-1	4	4	1	2	11	11	5	-2	-4	8	14	2
25	3	-6	-9	0	-6	-3	-2	-12	2	3	-2	-3	5	14	1
30	7	3	-10	1	-4	-5	-3	-14	-2	1	-3	-4	4	16	2
35	2	0	-13	3	-8	-4	-6	-25	1	3	-1	-3	4	19	2

A positive value indicate a deflection towards the heating conditions of the test

Horizontal deflections of the door leaves and door frames during the test (continued)

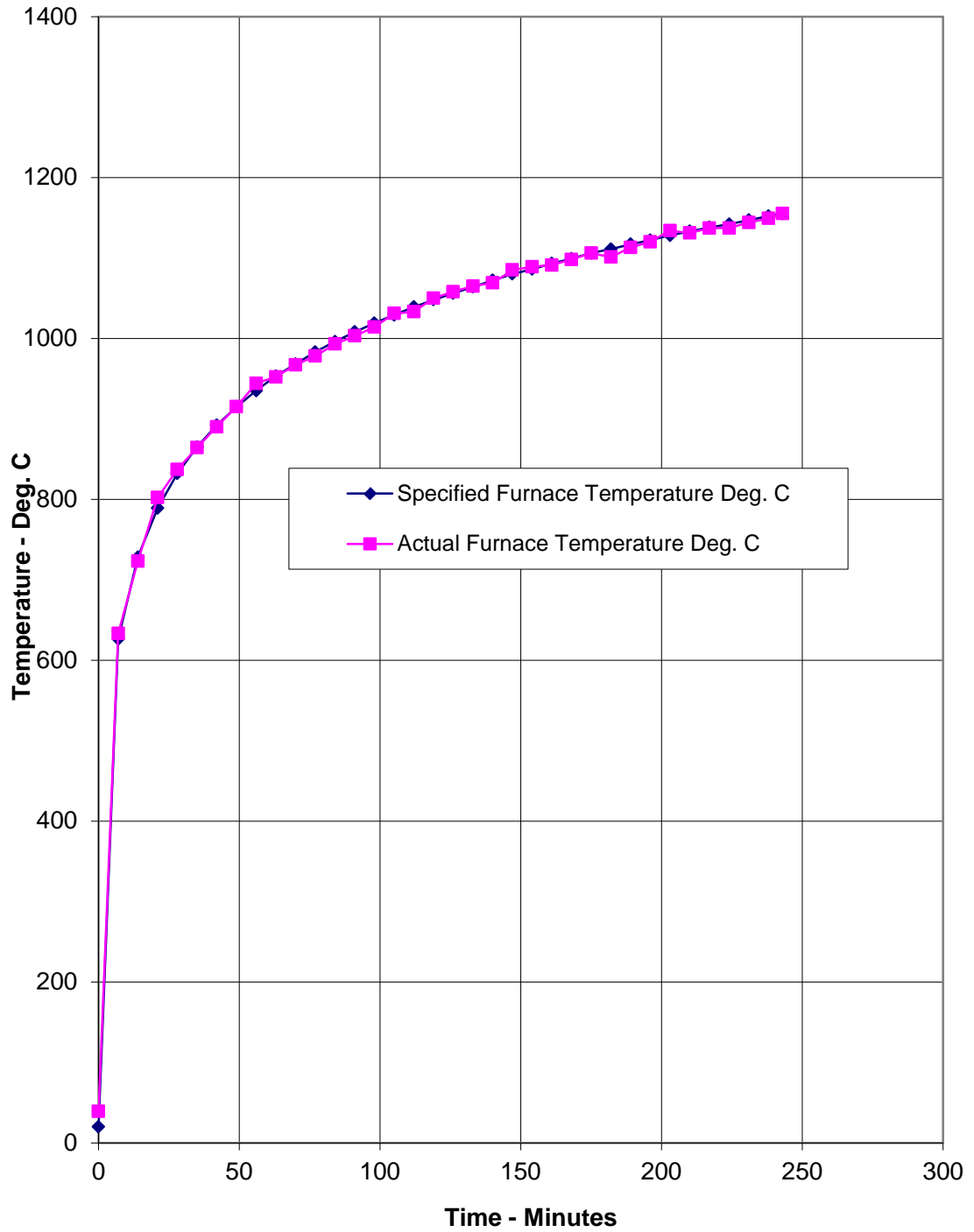


Doorset B															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	-6	-32	-9	-24	-6	5	-16	4	4	-1	-4	-6	-10	-2	1
20	-7	-33	-11	-24	-9	0	-20	19	-9	-6	-5	-38	-72	-8	0
30	-2	-36	-13	-25	-10	0	-20	11	-10	-6	-7	-41	-74	-9	-1
40	-1	-41	-15	-28	-12	-3	-22	5	-11	-4	-7	-40	-74	-11	-2
50	-5	-35	-13	-41	-11	*	-44	8	3	-5	10	-39	-72	-11	-2
60	-4	-36	-14	-23	-7	7	-17	6	-1	-7	-3	-37	-71	-4	0
70	-3	-19	-15	-26	-9	4	-19	-2	-10	-8	-4	-39	-73	-10	-1
80	-5	-36	-15	-24	-9	5	-19	-1	-9	-4	10	-26	-74	-10	8
90	0	-37	-14	-28	-6	3	-20	-7	-7	-5	-4	-39	-75	-10	10
100	-7	-38	-11	-21	-10	0	-19	-4	-8	-8	-4	-36	-75	-11	3
110	1	-35	*	-24	-6	7	-2	5	-6	-6	7	-39	-62	-10	7
120	1	-37	*	-25	-5	*	-49	-5	-5	-5	-2	-24	-75	-13	3
130	-5	-13	-10	-2	-5	*	-51	-1	-70	-4	-13	-39	*	-13	-4
140	-2	-14	-14	1	-5	3	-16	-3	-7	-5	-13	-39	-73	-12	-1
150	0	-32	*	-19	-11	*	-13	-5	-12	-1	2	-21	-73	-13	-2
160	3	-34	*	-19	-2	6	-10	-4	-8	-2	11	-39	-74	-14	-2
170	0	-37	*	-23	-5	*	-12	-5	-8	-5	10	-41	-74	-11	-5
180	3	-32	-2	-19	-3	7	-12	-1	-3	-3	-4	-42	-73	-15	-1
190	-1	-36	-12	-19	-6	8	-11	-4	-3	-4	-3	-41	-72	-12	-2
200	5	-33	-8	-15	-6	*	-18	-5	-4	-7	-3	-44	-75	-13	-8
210	8	-24	-1	-14	-2	*	-9	-2	-4	-7	-4	-44	-71	-10	-5
220	1	-32	-3	-24	-6	*	-4	4	-6	-6	-3	-41	-71	-14	-8
230	16	44	5	-24	-9	8	-9	19	-6	-8	-2	-37	*	-14	-8
240	10	-29	-5	-17	-10	*	-11	11	-1	-9	-1	-40	-56	-12	-5

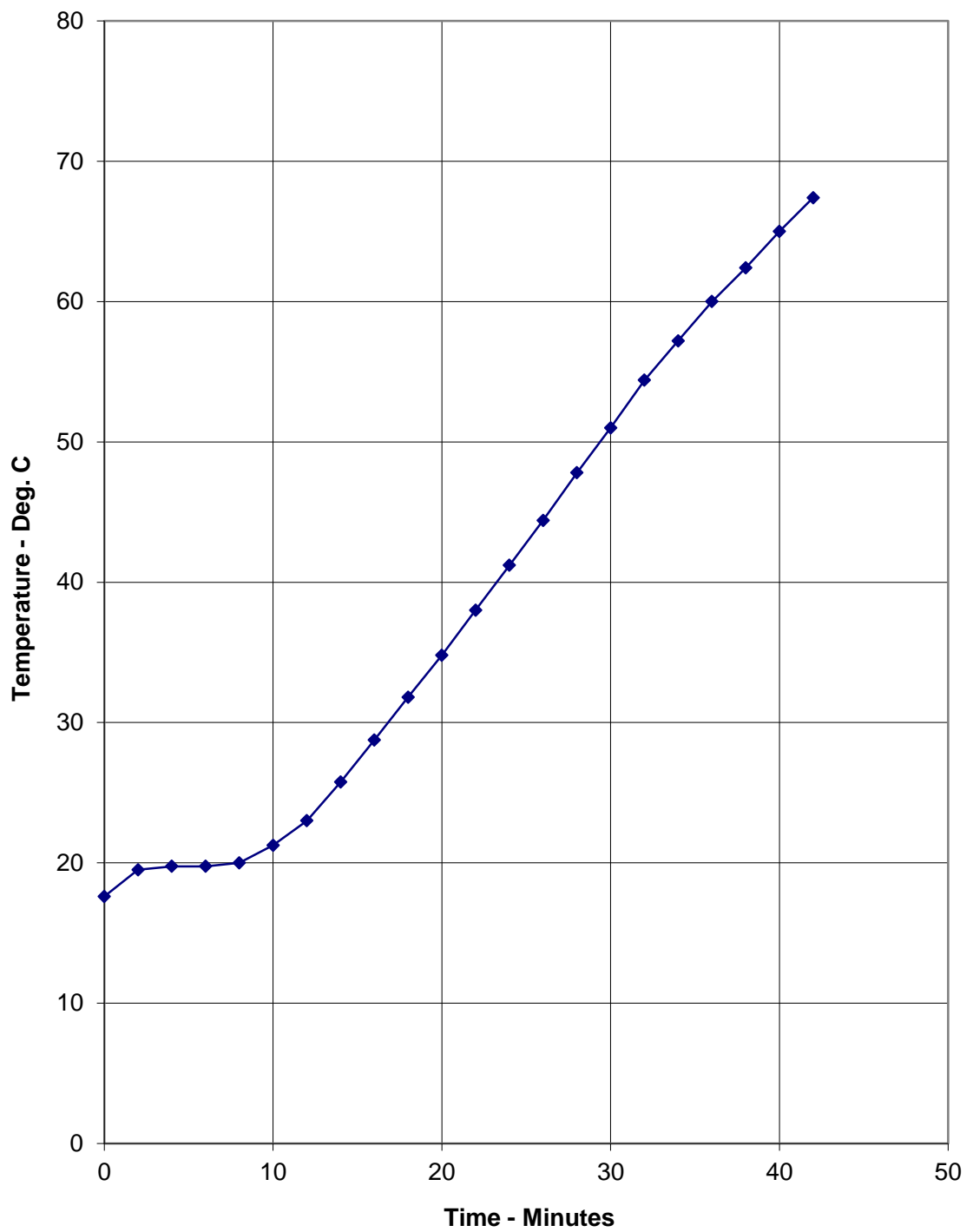
A positive value indicate a deflection towards the heating conditions of the test

*Unable to take accurate readings due to steam/smoke release

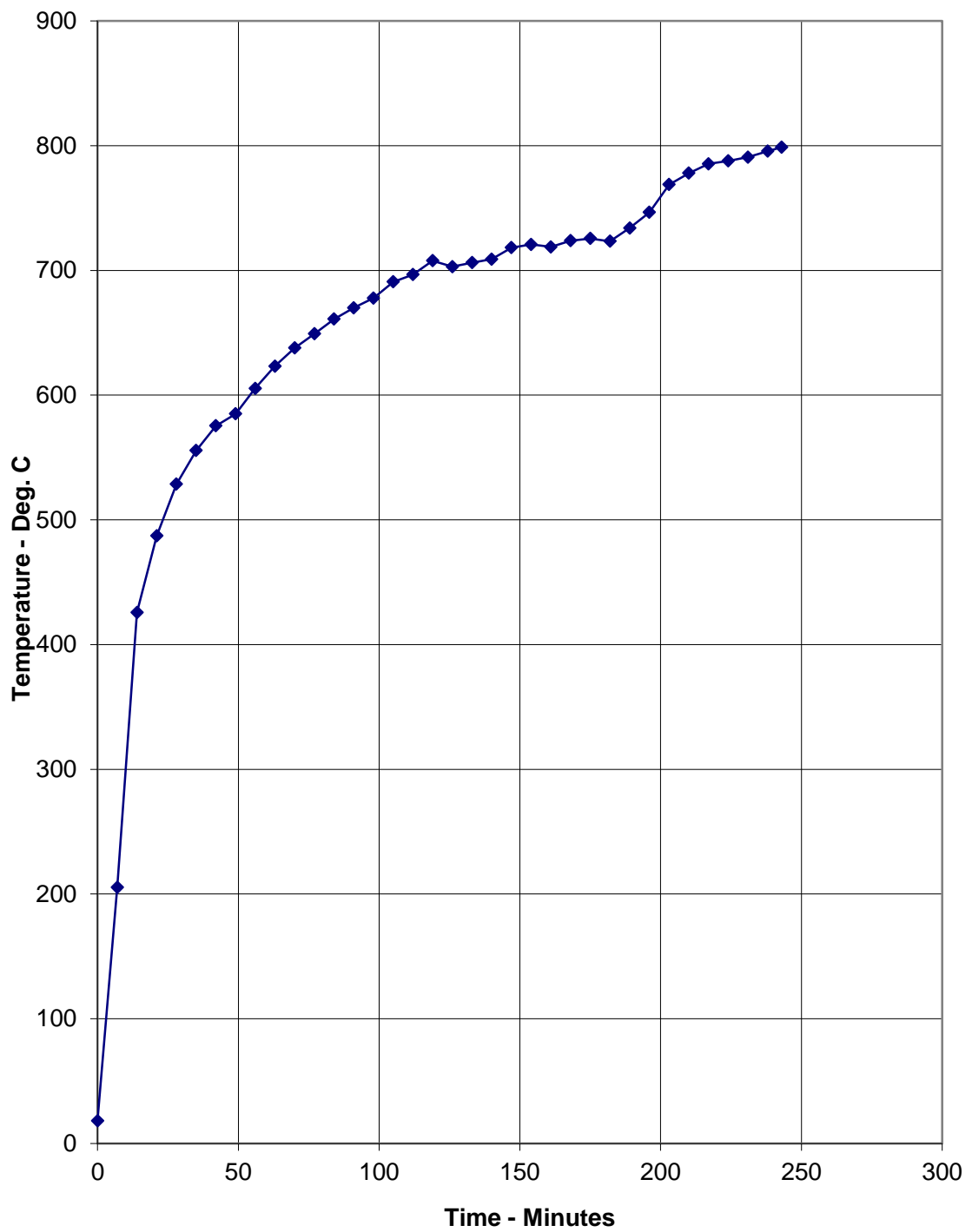
Graph showing mean furnace temperature, together with the temperature/time relationship specified in the Standard



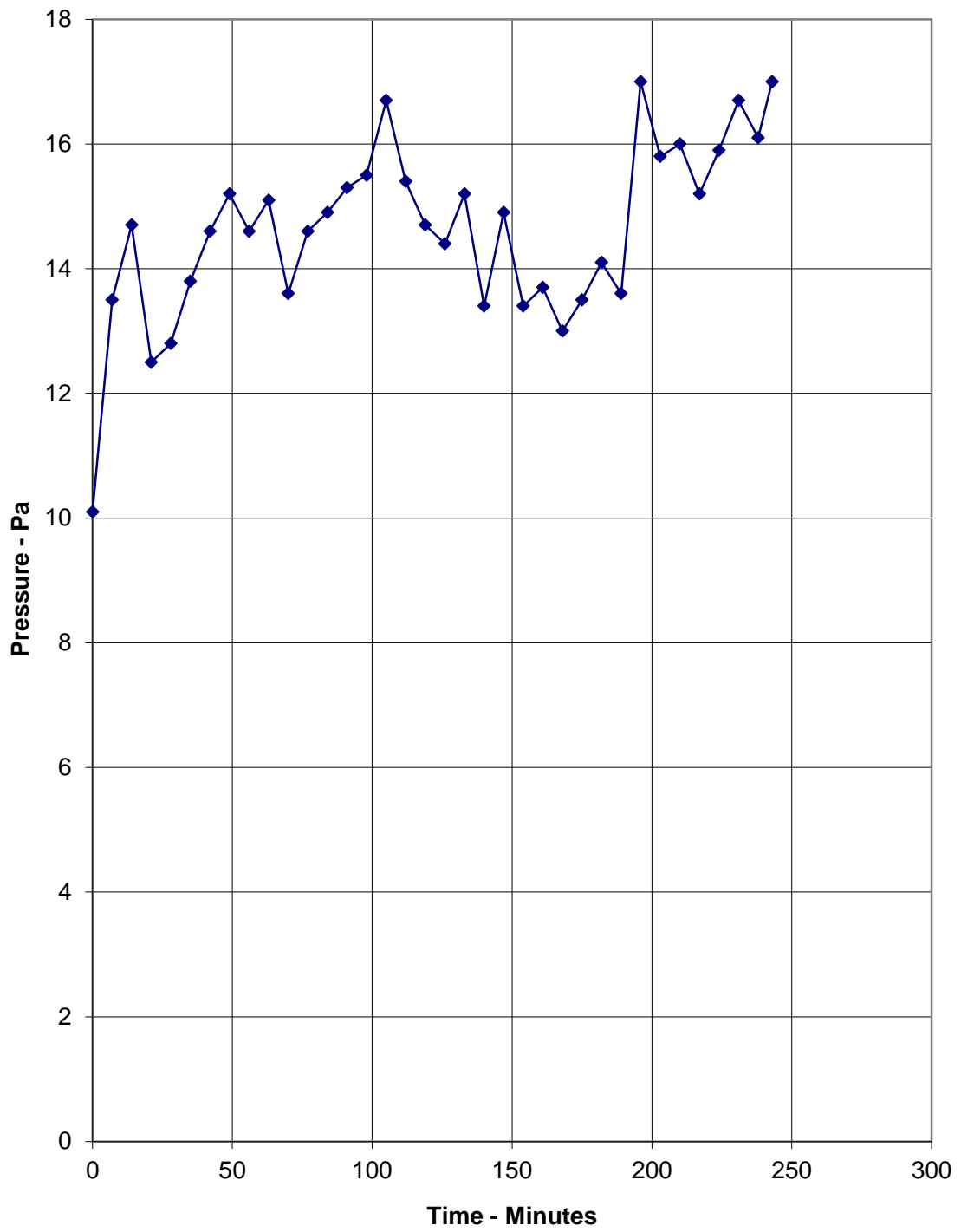
Graph showing mean temperatures recorded on the unexposed surface of Doorset A



Graph showing mean temperatures recorded on the unexposed surface of Doorset B



Graph showing recorded furnace pressure at the head of the Doorsets



Performance Criteria and Test Results

Integrity	It is required that the specimen retain its separating function, without either causing ignition of a cotton pad when applied, or permitting the penetration of a gap gauge as specified in BS EN 1634-1: 2014, or resulting in sustained flaming on the unexposed surface. These requirements were satisfied for the periods shown below:				
	Doorset A	Doorset B			
Sustained flaming	42 minutes	243 minutes*			
Gap gauge	44 minutes [#]	243 minutes*			
Cotton pad	42 minutes	35 minutes			
Insulation	The mean temperature rise of the unexposed surface shall not be greater than 140°C and that the maximum temperature rise shall not be greater than 180°C (except on the door frame, where the maximum temperature rise shall not exceed 360°C). Insulation failure also occurs simultaneously with integrity failure as specified in BS EN 1634-1: 2014. These requirements were satisfied for the periods shown below:				
	42 minutes	5 minutes			
Radiation	BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m ² be reported.				
Radiation Performance (Doorset B)	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
	37 minutes	94 minutes	201 minutes	243 minutes*	243 minutes*

*The test was discontinued after a period of 243 minutes.

[#] The door was blanked off to allow the test to continue.

Ongoing Implications

Limitations

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in BS EN 1363-1: 2012 and where appropriate BS EN 1363-2: 1999. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report. Annex A of BS EN 1363-1: 2012 provides guidance information on the application of fire resistance tests and the interpretation of test data.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

Conclusions

Evaluation against objective

Two single-acting, single-leaf doorsets incorporating various items of hardware have been subjected to a fire resistance test in accordance with BS EN 1634-1: 2014, Fire resistance tests for door and shutter assemblies, BS EN 1363-1: 2012 General requirements and BS EN 1363-2: 1999, Alternative and additional procedures.

The evaluation of the doorsets against the requirements of BS EN 1634-1: 2014 showed that each doorset satisfied the requirements for the following periods.

Test Results:		Doorset A	Doorset B		
Integrity performance	Sustained flaming	42 minutes	243 minutes*		
	Gap gauge	44 minutes [#]	243 minutes*		
	Cotton Pad	42 minutes	35 minutes		
Insulation		42 minutes	5 minutes		
Radiation Performance (Doorset B)		5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²
		37 minutes	94 minutes	201 minutes	243 minutes*

*The test was discontinued after a period of 243 minutes.

[#] The door was blanked off to allow the test to continue.

Sample Report



Sample Report

This report provides a record of the information relating to samples taken by Exova (UK) Limited trading as Warrington Certification, or its agent, for certification of the products detailed below.

Job No.	FM392465
Manufacturer	SAMUAL HEATH & SONS PLC
Manufacturing site	LEOPOLD STREET BIRMINGHAM, B12 0UJ
Place of sampling	As above
Traceability information	Date/time of production: WEEK 50 Production unit/line: PRODUCTION Batch number: 5004 50Y Shift:
Product Number/ Description	R100-SCP, POWERMATIC DOOR CLOSER SATIN CHROME PLATED.
Marking of the product by the manufacturer e.g. label, batch number and date of manufacture	Label = Batch = 5004, CE1121, BWF CERTIFIRE CF370
Marking of the samples by Exova (UK) Limited trading as Warrington Certification	Job No: WF FM392465 Date: 13.12.17 Signature or initials: WMS 1121
Stock/batch quantity from which samples selected and sample quantity	Stock Qty: 100 / 1 off for Steve Wilkes Sample Size 3off / 2off for Ray Anning
Results of tests and/or inspections during manufacture	Unable to produce Documentation Taken from stock
Essential Characteristics to be tested ie. Test reference	1off - Thermal test - Steve Wilkes 2off - Fire Test - Ray Anning
Samples to be dispatched by manufacturer to *** within *** weeks/month(s)	3off Taken to Exova Wednesday. 2off to be forwarded to Warrington.
Date of sampling	13.12.17
Exova (UK) Limited trading as Warrington Certification notified body number	1121

Signed:	Signed:
(for and on behalf of Manufacturer)	(for and on behalf of Exova (UK) Limited trading as Warrington Certification)
Print: ADAM DANIELS	Print: WARREN MARSTERS
Date: 13.12.17	Date: 13.12.17