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Testing. Advising. Assuring.

Title:

The fire resistance performance of two specimens of single-acting doorsets incorporating various items of building hardware when tested in accordance with BS EN 1634-1: 2008

WF Report No:

316159 Issue 2



Prepared for:

**Eurospec Architectural
Hardware Ltd.**

Stancliffe Street,
Millhill
Blackburn
Lancashire
BB2 2QR

Date:

31st May 2012

Notified Body No:

0833



0249

Summary

Objective To determine the fire resistance performance of two specimens of single-acting doorsets incorporating various items of building hardware when tested in accordance with BS EN 1634-1: 2008

Sponsor **Eurospec Architectural Hardware Ltd.** Stancliffe Street, Millhill, Blackburn, Lancashire

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

Doorset A had overall dimensions of 2090 mm high by 990 mm wide and incorporated a door leaf of overall dimensions 2040 mm high by 903 mm wide by 45 mm thick. The door leaf was hung within a Zintec frame on three Eurospec Stainless Steel hinges referenced 'HIN1433/13SZP'. The door leaf comprised 1.2 mm Zintec Steel facings encasing a 'Dufaylite' Honeycomb core, reinforced with 1.6 mm Zintec Steel channels. The doorset was fitted with a latch referenced 'DLS0060LSSS' along with a lever handle referenced 'LRS9001SAA', a second latch referenced 'ESB5030CT/SSS' and lever handles referenced SW11, a door closer to exposed face was referenced 'DCC2024SM' and an inactive door closer to unexposed face, referenced 'DCC2024SM/36'. The unexposed face also incorporated; a pull handle referenced 'CDS1225SSS', a door viewer reference 'SWE1010SSS', a door knocker referenced 'SWE1020SSS' and a centre knob referenced 'SWE1040SSS'.

Doorset B had overall dimensions of 2090 mm high by 990 mm wide and incorporated a door leaf of overall dimensions 2000 mm high by 903 mm wide by 45 mm thick. The door leaves were hung within a Zintec steel door frame on three Eurospec Stainless Steel hinges referenced 'SCH14325/13SSS'. The door leaf comprised of a 1.2 mm Zintec steel facing, encasing a 'Dufaylite' Honeycomb core reinforced with 1.6 mm Zintec steel channels. The doorset was fitted with a latch referenced 'DLE7255EPSSS' along with a lever handle referenced 'CSL1190SSS', an active door closer to the exposed side referenced 'DCF2003SV' and an inactive closer to the unexposed fire side referenced 'DCS2026BC/SV', and a magnetic lock manufactured by AEM, referenced '10100'.

The leaves were orientated such that they opened away from the heating conditions of the test and were rendered unlatched for the test duration.

Test Results:		Doorset A	Doorset B
Integrity	Sustained Flaming	264 minutes*	36 minutes
	Cotton wool pad	61 minutes	36 minutes
	Gap gauge	264 minutes*	264 minutes*
Insulation		5 minutes	6 minutes

*The test duration, the test was discontinued after a period of 264 minutes.

Radiation Performance	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
Doorset A	32 minutes	85 minutes	177 minutes	264 minutes*	264 minutes*
Doorset B	39 minutes	109 minutes	188 minutes	264 minutes*	264 minutes*

*The test duration, the test was discontinued after a period of 264 minutes

Date of Test 9th March 2012

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Signatories



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Approved
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Head of Department
S. Hankey*
Operations Manager

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

Report Issued

Date : 31st May 2012

Issue 2: Sustained flaming and Cotton Pad integrity results were transposed incorrectly for Doorsets A and B – Results corrected on Pages 2, 51 and 52 (2nd May 2013).

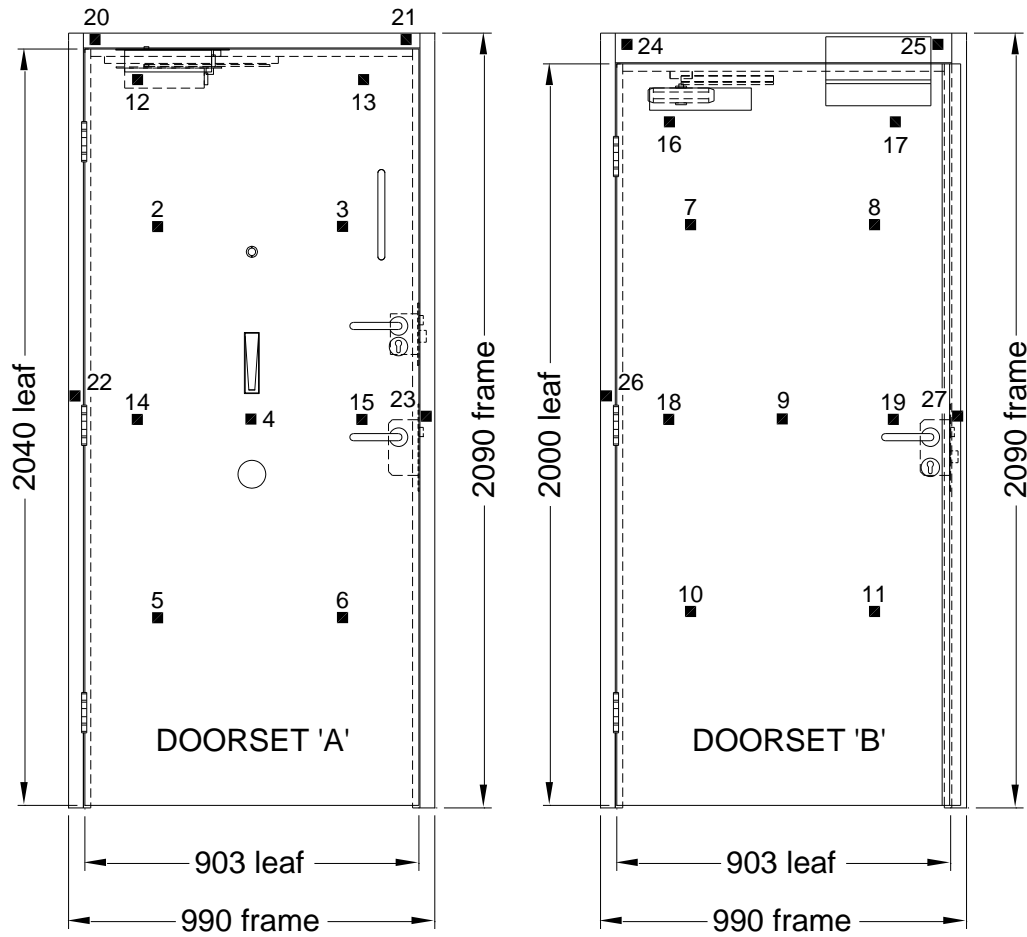
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Test Procedure

Introduction	<p>The doorsets are required to provide a fire separating function and were therefore tested in accordance with BS EN 1634-1: 2008 'Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware - Part 1: Fire resistance tests for doors, shutters and openable windows'. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 1999, 'Fire resistance tests - Part 1: General requirements' and BS EN 1363-2: 1999, 'Fire resistance tests - Part 2: Alternative and additional procedures'.</p> <p>The specimens were judged on their ability to comply with the performance criteria for integrity and insulation, as required by BS EN 1634-1: 2008.</p> <p>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 doorset is included in this report.</p>
Fire Test Study Group/EGOLF	<p>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.</p>
Instruction to test	<p>The test was conducted on the 9th March 2012 at the request of Eurospec Architectural Hardware Ltd, the test sponsor.</p> <p>Mr. P. Campbell, a representative of Eurospec Architectural Hardware Ltd and Mr. W. Duncombe a representative of Ascot Doors witnessed the test.</p>
Test Specimen Construction	<p>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.</p>
Installation	<p>The doorsets were mounted within apertures in a brickwork wall construction such that their door leaves opened towards the heating conditions of the test. Representatives of Exova Warringtonfire conducted the installation work on the 9th March 2012</p>
Sampling	<p>The hardware and doorsets included in the test were sample selected, or the subject of witnessed manufacture, by representatives of Warrington Certification Limited.</p>
Conditioning	<p>The specimens' storage, construction, and test preparation took place in the test laboratory over a total combined time of 5 days. Throughout this period both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 11°C to 15°C and 45% to 78% respectively.</p>

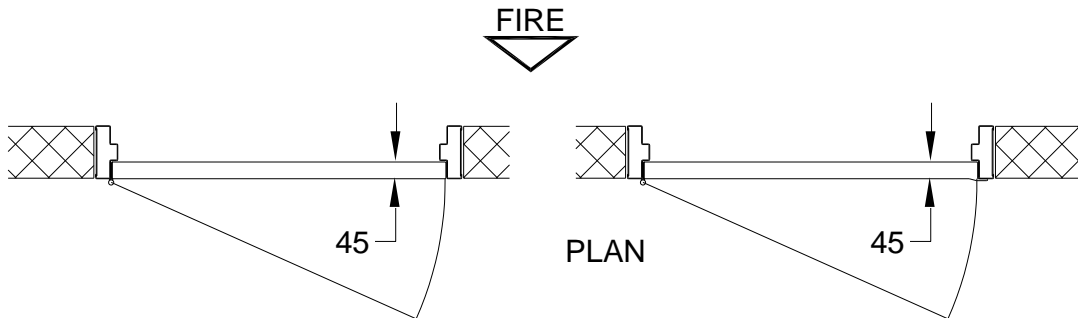
Test Specimens

Figure 1- General Elevation of Test Specimens and Unexposed Face Thermocouples



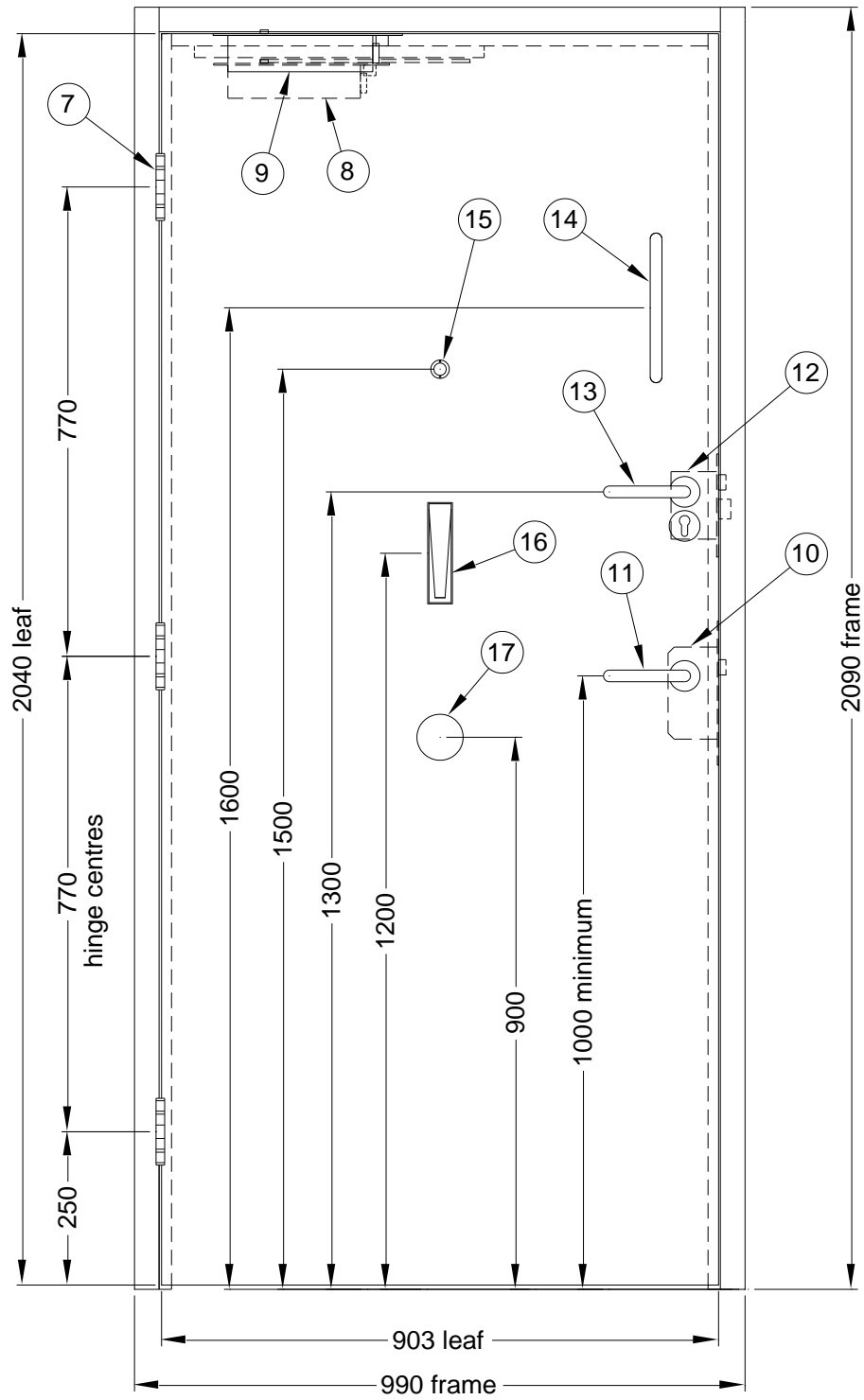
GENERAL ELEVATION
OF UNEXPOSED FACE

■ Positions of thermocouples



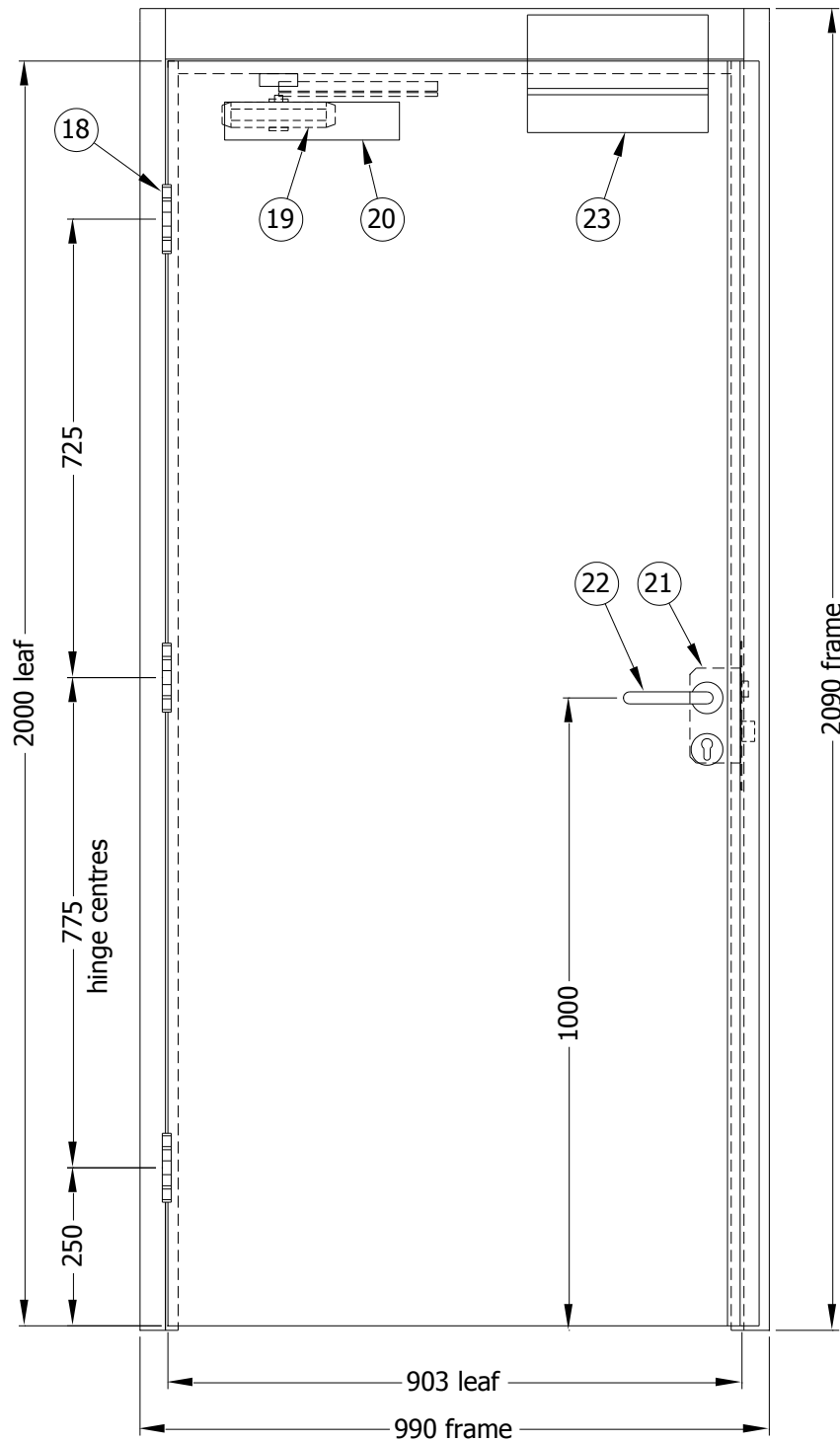
Do not scale. All dimensions are in mm

Figure 2 – Elevation View of Doorset 'A'



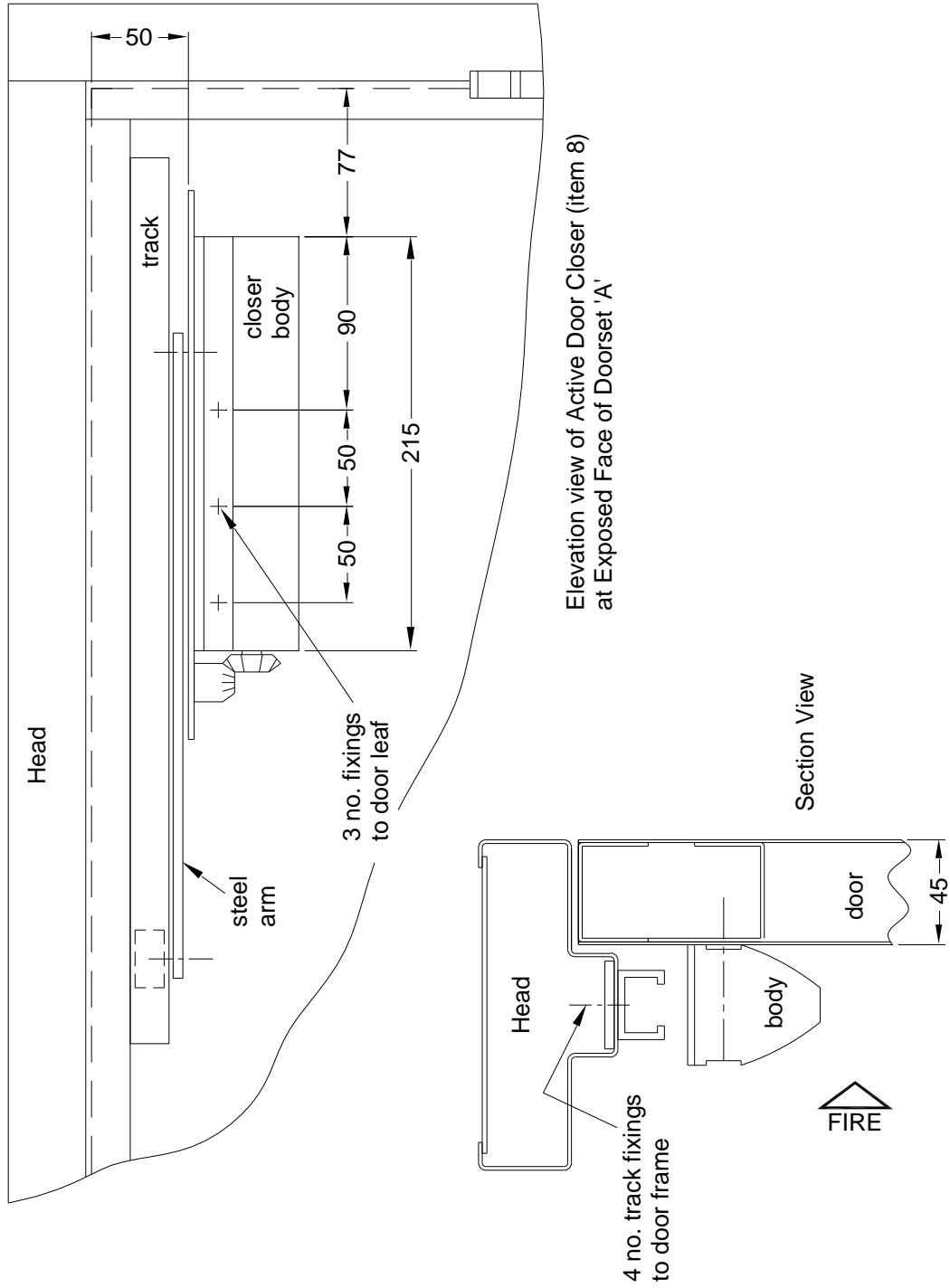
Do not scale. All dimensions are in mm

Figure 3 – Elevation View of Doorset 'B'



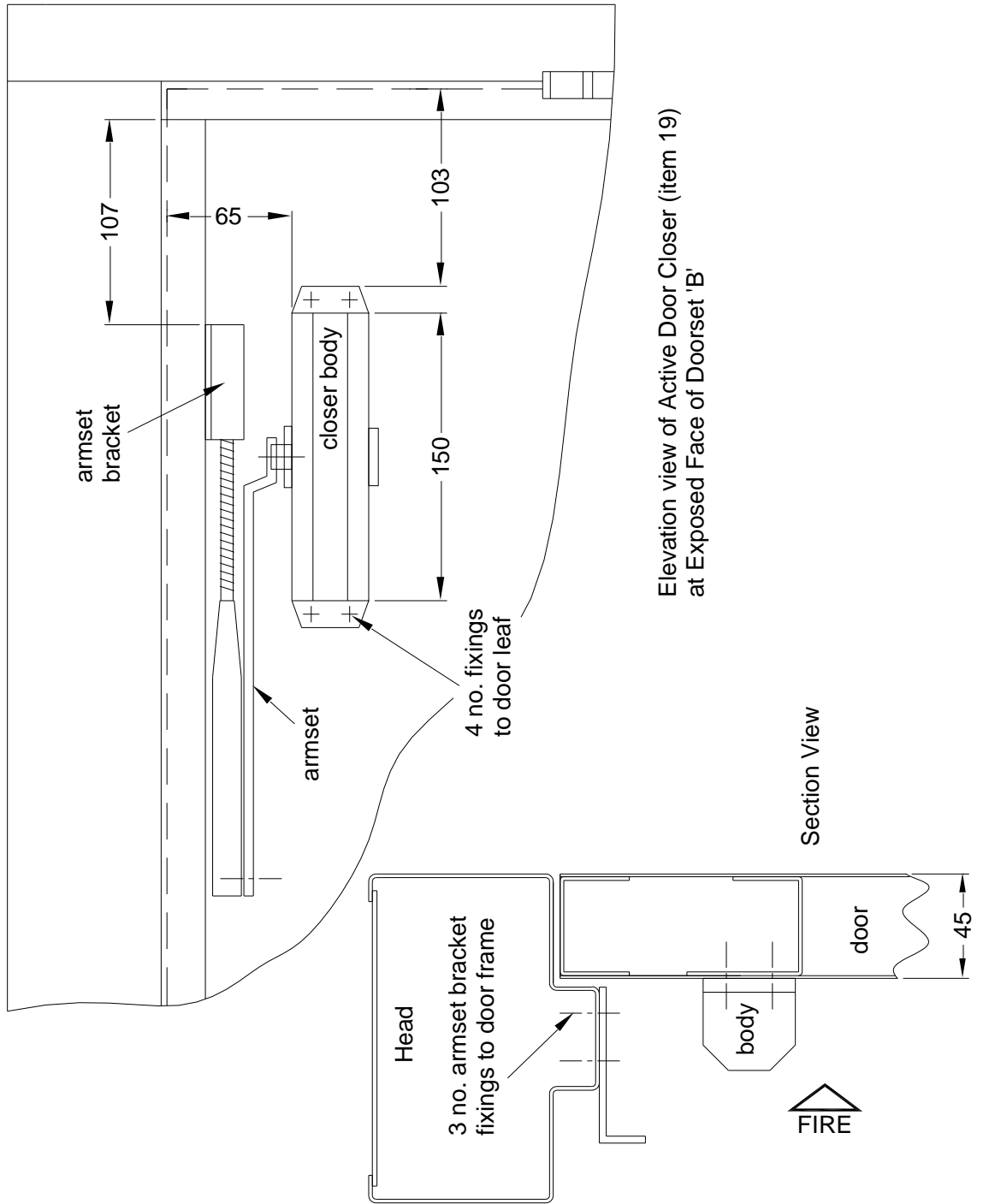
Do not scale. All dimensions are in mm

Figure 4 – Details for Doorset 'A' Active Door Closer



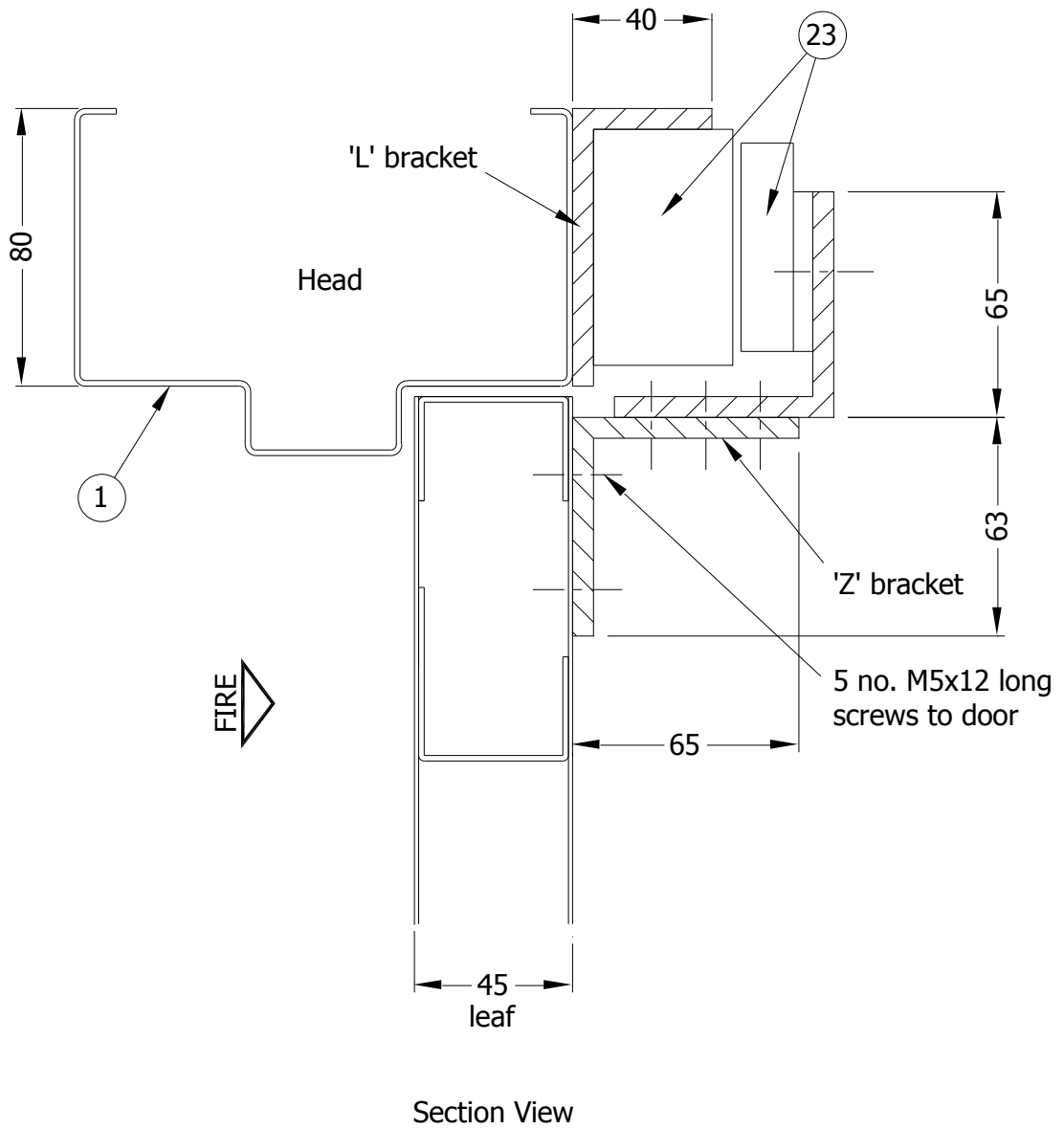
Do not scale. All dimensions are in mm

Figure 5 – Details for Doorset 'B' Active Door Closer



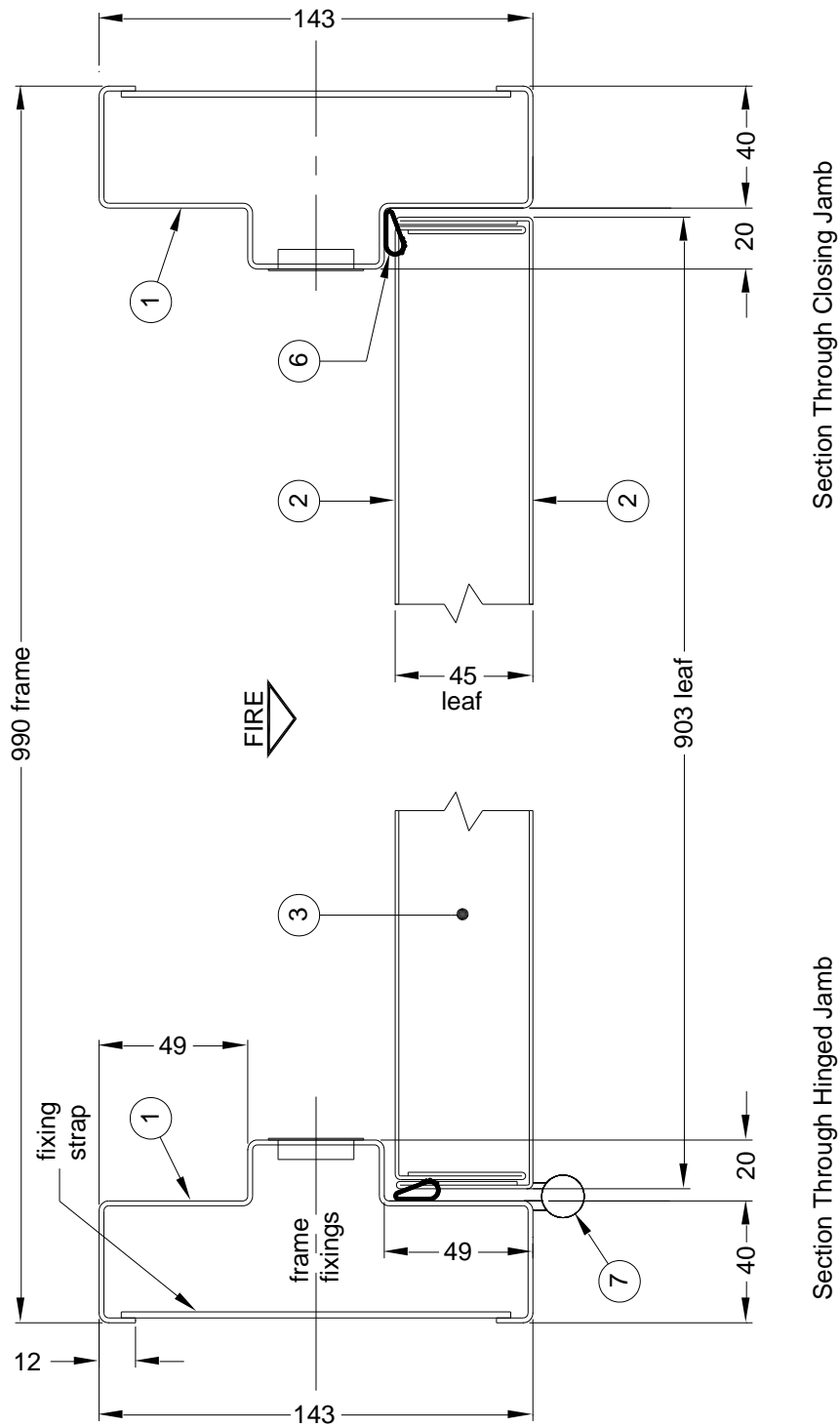
Do not scale. All dimensions are in mm

Figure 6 – Details for Doorset 'B' Magnetic Lock



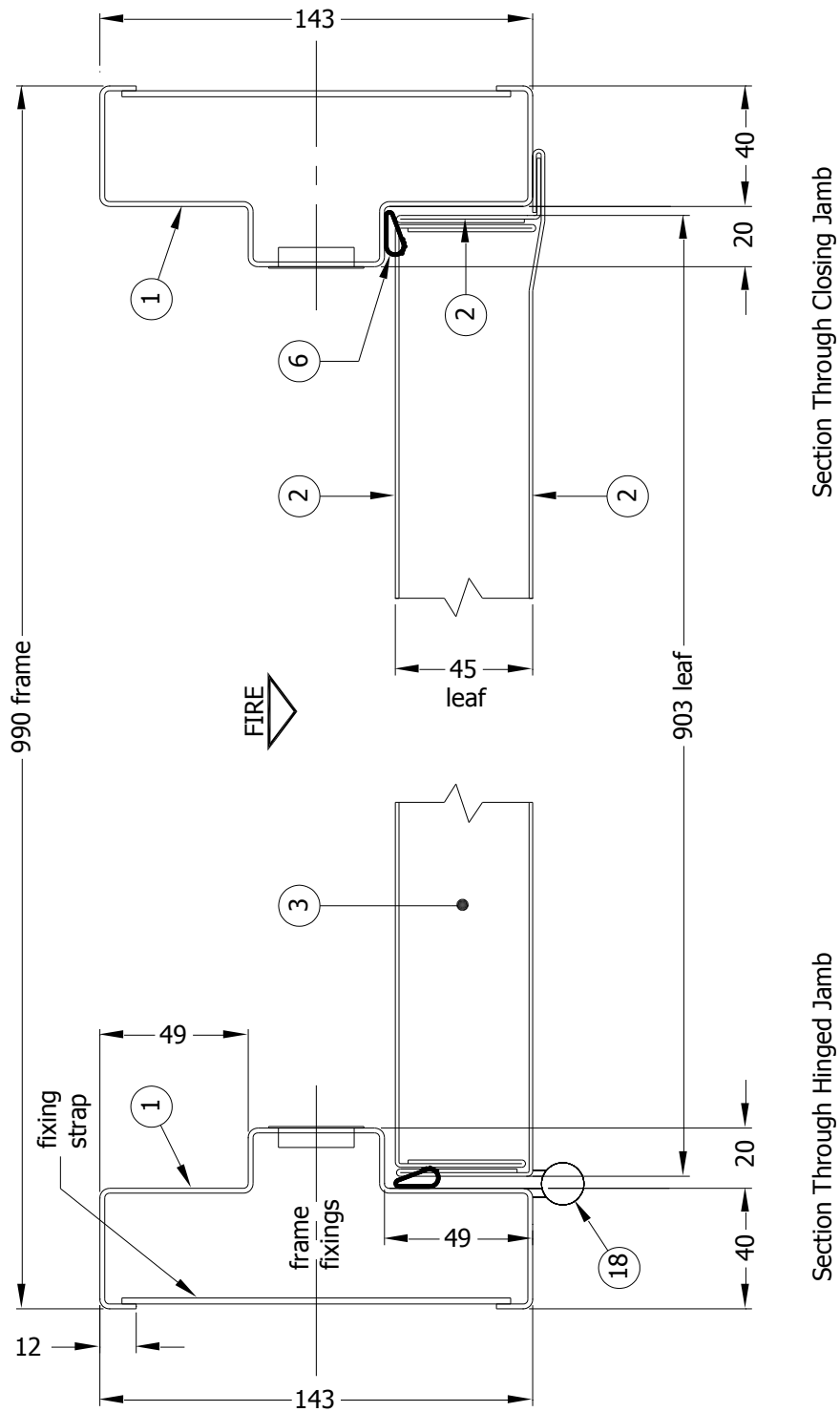
Do not scale. All dimensions are in mm

Figure 7 – Horizontal Section Through Doorset 'A'



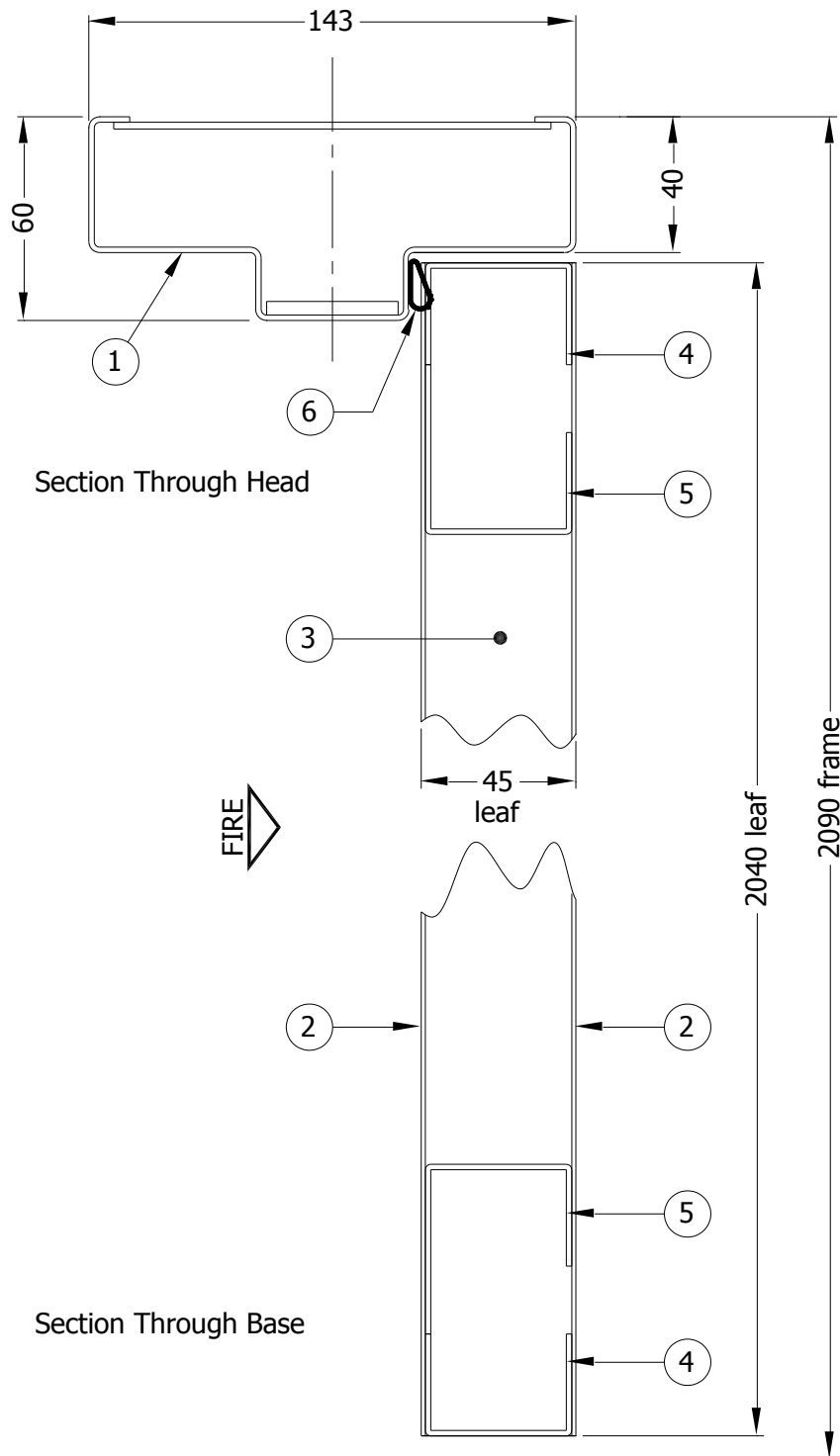
Do not scale. All dimensions are in mm

Figure 8 – Horizontal Section Through Doorset 'B'



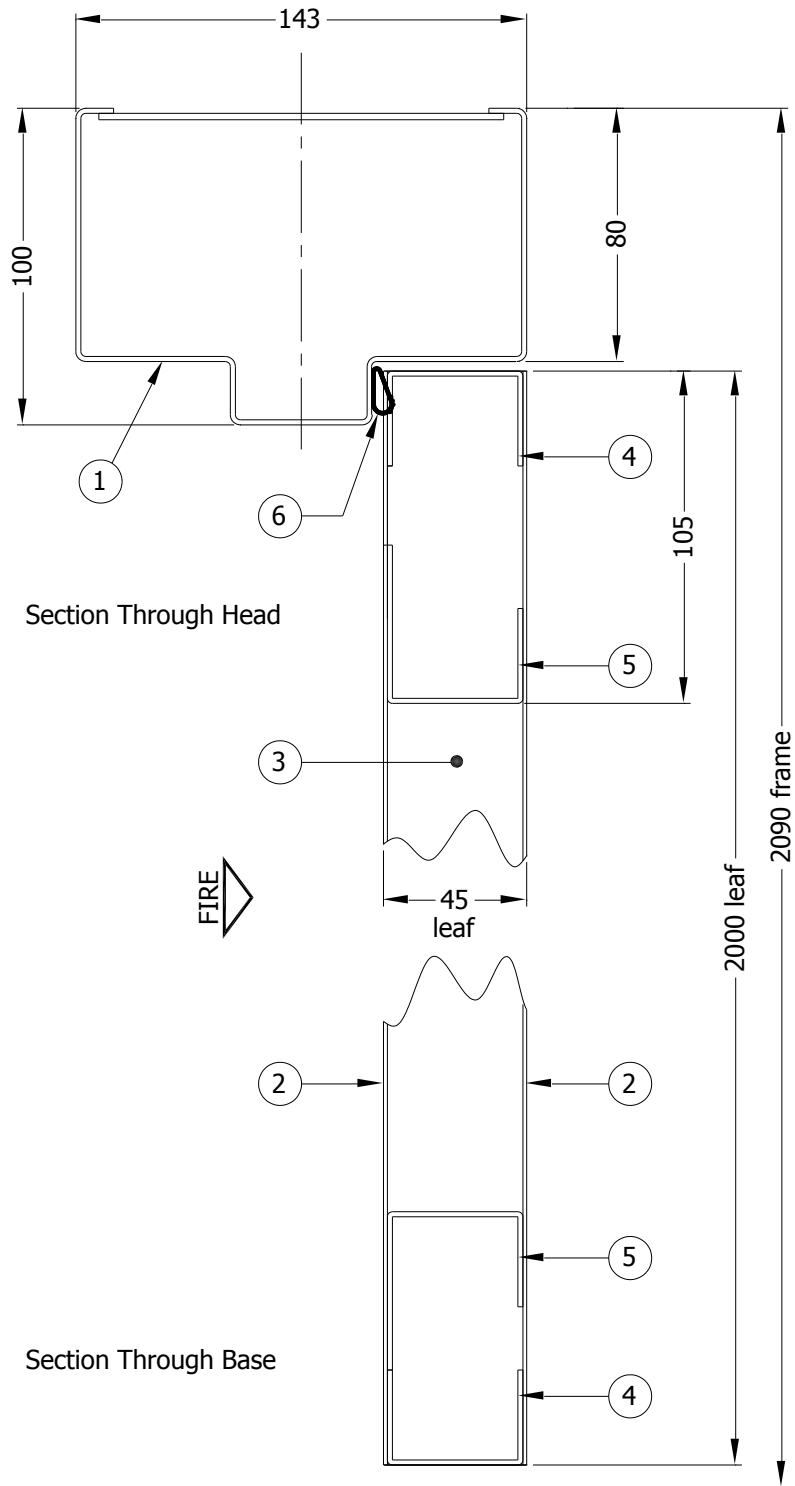
Do not scale. All dimensions are in mm

Figure 9 – Vertical Section Through Doorset 'A'



Do not scale. All dimensions are in mm

Figure 10 – Vertical Section Through Doorset 'B'



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 10)
 (All values are nominal unless stated otherwise)
 (All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Door Frame Jambs and Head	
Material	: Zinc coated mild steel (Zintec steel)
Thickness	: 1.6 mm
Jambs to head jointing method	: Each jamb bolted to frame head using 3 no. M8 steel bolts into nutserts.
Fixing method to masonry	: Anchor bolts through fixing straps
Details of Fixing Straps	
i. material	: Mild steel
ii. thickness	: 3 mm
iii. size	: 50 mm wide
iv. fixing method	: Welded within back face of door frame
v. quantity	: 5 no. straps along full height of each jamb. Single strap along head at mid-span.
Details of Anchor Bolts	
i. type	: M8 expanding anchor bolts
ii. quantity	: 1 no. anchor through each fixing strap
2. Door Leaf Faces	
Material	: Zintec steel
Thickness	: 1.2 mm
Details	
i. door leaf 'A'	: Faces are formed from two steel sheets, one for each face, see Figure 7. The folded vertical edges of the door leaf are fixed together with plug welds.
ii. door leaf 'B'	: Faces are formed from three steel sheets, one for each face and a third to form the astragal, see Figure 8. The folded vertical edges of the door leaf are fixed together with plug welds.
3. Door Leaf Core	
Manufacturer	: Dufaylite
Material	: Cardboard Honeycombe – 28 mm cells
Weight	: 140 kg/m ² (stated)
Thickness	: 43 mm
Fixing method	: Bonded with adhesive to full area of door leaf skin
Details of Adhesive	
i. manufacturer	: Apollo
ii. reference	: A7521
iii. material type	: Thermo-setting polyurethane adhesive
4. Door Leaf Top and Bottom Capping Channel	
Material	: Zintec steel
Thickness	: 1.6 mm
Overall section size	: 43 mm x 30 mm x full width of door leaf
Fixing method	: Plug welds to door leaf faces

<u>Item</u>	<u>Description</u>
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5. Door Leaf Top and Bottom Reinforcement Channel

Material	: Zintec steel
Thickness	: 1.6 mm
Overall section size	: 50 mm x 43 mm x 30 mm x full width of door leaf
Fixing method	: Plug welds to door leaf faces

6. Door Frame Gasket

Manufacturer	: Zero Seal Systems Limited
Reference	: 188S
Material	: Silicone extruded compound (colour: black)
Fixing method	: Self adhesive fixed continuously along rebated stop of door frame jambs and head.

Details of Doorset 'A' Hardware (items 7 to 17)**7. Hinges**

Manufacturer	: Eurospec Architectural Hardware
Reference	: HIN1433/13SZP
Type	: Butt hinge
Material	: Mild steel
Quantity	: 3 no. hinges
Overall Size	: 102 mm (4") long x 76 mm (3") wide x 3 mm thick
Details of Hinge reinforcement (door frame)	
i. material	: Mild steel plate
ii. thickness	: 6 mm (2 no. plates, each 3 mm thick)
iii. overall size	: 215 mm long x 30 mm wide
Details of Hinge reinforcement (door leaf)	
i. material	: Mild steel plate
ii. thickness	: 3 mm
iii. overall size	: 114 mm long x 30 mm wide
Details of Fixings	
i. type	: Setscrews
ii. material	: Steel
iii. size	: M6 x 12 mm (door leaf) M6 x 16 mm (door frame)
iv. number off per blade	: 4 no. screws

8. Overhead Door Closer (Active)

Manufacturer	: Eurospec Architectural Hardware
Reference	: DCC2024SM
Location	: Exposed face of doorset 'A'
Material	
i. closer body	: Extruded Alloy
ii. track	: Aluminium
iii. operating arm	: Steel
iv. slider	: Plastic/steel
Details of Fixings	
i. type	: Setscrews
ii. material	: Steel
iii. quantity/size	: 3 no. M5 x 50 mm long screws, body to door leaf. 4 no. M5 x 12 mm long screws, track to door frame head through 4 mm thick reinforcement plate.
Maximum opening and closing moments (measured by Exova warringtonfire)	
i. opening moment	: 40.2 Nm (Newton metre)
ii. closing moment	: 22.8 Nm

<u>Item</u>	<u>Description</u>
9. Overhead Door Closer (Inactive, body only fitted)	
Manufacturer	: Eurospec Architectural Hardware
Reference	: DCC2024SM/36
Location	: Unexposed face of doorset 'A'
Material	: Extruded Alloy, closer body
Details of Fixings	
i. type	: Setscrews
ii. material	: Steel
iii. size	: M5 x 50 mm long screws, body to door leaf
iv. quantity	: 3 no. screws
10. Lower Latch	
Manufacturer	: Eurospec Architectural Hardware
Type	: DIN latch 60 mm
Reference	: DLS0060LSSS
Material	
i. casing	: Mild steel
ii. forend plate	: Stainless steel
iii. latch bolt	: Stainless steel
iv. strike plate	: Stainless steel
Overall sizes	
i. latch forend plate	: 235 mm long x 24 mm wide
ii. strike plate	: 85 mm long
Fixings	: M5 x 12 mm long steel setscrews
Operation of latch bolt	: Disengaged
11. Lower Lever Handleset	
Manufacturer	: Eurospec Architectural Hardware
Reference	: LRS9001SAA
Type	: Safety lever on rose
Material	: Aluminium
Size	: 19 mm diameter
12. Upper Latch/Lockset	
Manufacturer	: Eurospec Architectural Hardware
Type	: Mortise sashlock with cylinder and escutcheons
Reference	
i. sashlock	: ESB5030CT/SSS BS8621
ii. cylinder and turn	: CYS71370AB
iii. escutcheons	: AEB5000
'Markings on forend plate	: 'Easi-T ' and 'CERTIFIRE' markings
Material	
i. casing	: Mild steel
ii. forend plate and strike plate	: Stainless steel
iii. latch bolt	: Brass
iv. dead bolt	: Mild steel
v. cylinder & turn	: Brass
vi. escutcheons	: Zinc,brass and mild steel
Overall sizes	
i. forend plate	: 165 mm long x 25 mm wide
ii. strike plate	: 180 mm long plate with steel back-box
Fixings	: M4 steel setscrews
Operation of latch bolt	: Disengaged
Operation of lock bolt	: Disengaged

<u>Item</u>	<u>Description</u>
13. Upper Lever Handleset	
Manufacturer	: Eurospec Architectural Hardware
Reference	: SW11/EN1906
Type	: Lever handle return on rose
Material	: Stainless steel
Size	: 19 mm diameter
14. Pull Handle	
Manufacturer	: Eurospec Architectural Hardware
Reference	: CSD1225SSS
Material	: Stainless steel
Size	: 19 mm diameter x 225 mm centres
Fixing method	: Through bolted
15. Viewer	
Manufacturer	: Eurospec Architectural Hardware
Reference	: SWE1010SSS
Type	: Wide angle door viewer
Material	: Stainless steel
16. Door Knocker	
Manufacturer	: Eurospec Architectural Hardware
Reference	: SWE1020SSS
Material	: Stainless steel
Fixing method	: Through bolted
17. Centre Door Knob	
Manufacturer	: Eurospec Architectural Hardware
Reference	: SWE1040SSS
Material	: Stainless steel
Fixing method	: Through bolted
Details of Doorset 'B' Hardware (items 18 to 23)	
18. Hinges	
Manufacturer	: Eurospec Architectural Hardware
Reference	: SCH14325/13SSS
Type	: Butt hinge, narrow knuckle CE13
Specification	: Grade 13 BS EN 1935
Material	: Stainless steel
Quantity	: 3 no. hinges
Overall Size	: 102 mm (4") long x 76 mm (3") wide x 3 mm thick
Details of Hinge reinforcement (door frame)	
i. material	: Mild steel plate
ii. thickness	: 6 mm (2 no. plates, each 3 mm thick)
iii. overall size	: 215 mm long x 30 mm wide
Details of Hinge reinforcement (door leaf)	
i. material	: Mild steel plate
ii. thickness	: 3 mm
iii. overall size	: 114 mm long x 30 mm wide
Details of Fixings	
i. type	: Setscrews
ii. material	: Steel
iii. size	: M6 x 12 mm (to door leaf) and M6 x 16 mm (door frame)
iv. number off per blade	: 4 no. screws

<u>Item</u>	<u>Description</u>
19. Overhead Door Closer (Active)	
Manufacturer	: Eurospec Architectural Hardware
Reference	: DCF2003SV
Location	: Exposed face of doorset 'B'
Material	
i. closer body	: Die Cast Alloy
ii. armset	: Steel
iii. armset bracket	: Steel, 3 mm thick x 58 mm wide
Details of Fixings	
i. type	: Setscrews
ii. material	: Steel
iii. quantity/size	: 4 no. M5 x 50 mm long screws, body to door leaf. 3 no. M5 x 12 mm long screws, armset bracket to door frame head.
Maximum opening and closing moments (measured by Exova warringtonfire)	
i. opening moment	: 56.2 Nm (Newton metre)
ii. closing moment	: 24.5 Nm
20. Overhead Door Closer (Inactive, body only fitted)	
Manufacturer	: Eurospec Architectural Hardware
Reference	: DCS2026BC/SV
Location	: Unexposed face of doorset 'B'
Material	: Die Cast Alloy, closer body
Details of Fixings	
i. type	: Setscrews
ii. material	: Steel
iii. size	: M5 x 50 mm long screws, body to door leaf
iv. quantity	: 6 no. screws
21. Latch/Lockset	
Manufacturer	: Eurospec Architectural Hardware
Type	: DIN Euro Mortise sashlock 55 mm, with cylinder and escutcheons.
Reference	
i. sashlock	: DLE7255EPSSS
ii. cylinder	: CYA71270SC MP5
iii. escutcheons	: CSE1105SSS
'Markings on forend plate	: 'Easi-T ' and 'CERTIFIRE' markings
Material	
i. casing	: Mild steel
ii. forend plate	: Stainless steel
iii. latch bolt	: Zinc alloy
iv. dead bolt	: Zinc alloy
v. cylinder	: Brass
vi. escutcheons	: Stainless steel
Overall sizes	
i. latch forend plate	: 235 mm long x 24 mm wide
ii. escutcheons	: 50 mm diameter
Fixings	: M5 x 12 mm long steel setscrews
Operation of latch bolt	: Disengaged
Operation of lock bolt	: Disengaged

Item

Description

22. Lever Handleset

Manufacturer : Eurospec Architectural Hardware
Reference : CSL1190SSS
Type : Safety lever on rose
Material : Stainless steel
Size : 19 mm diameter

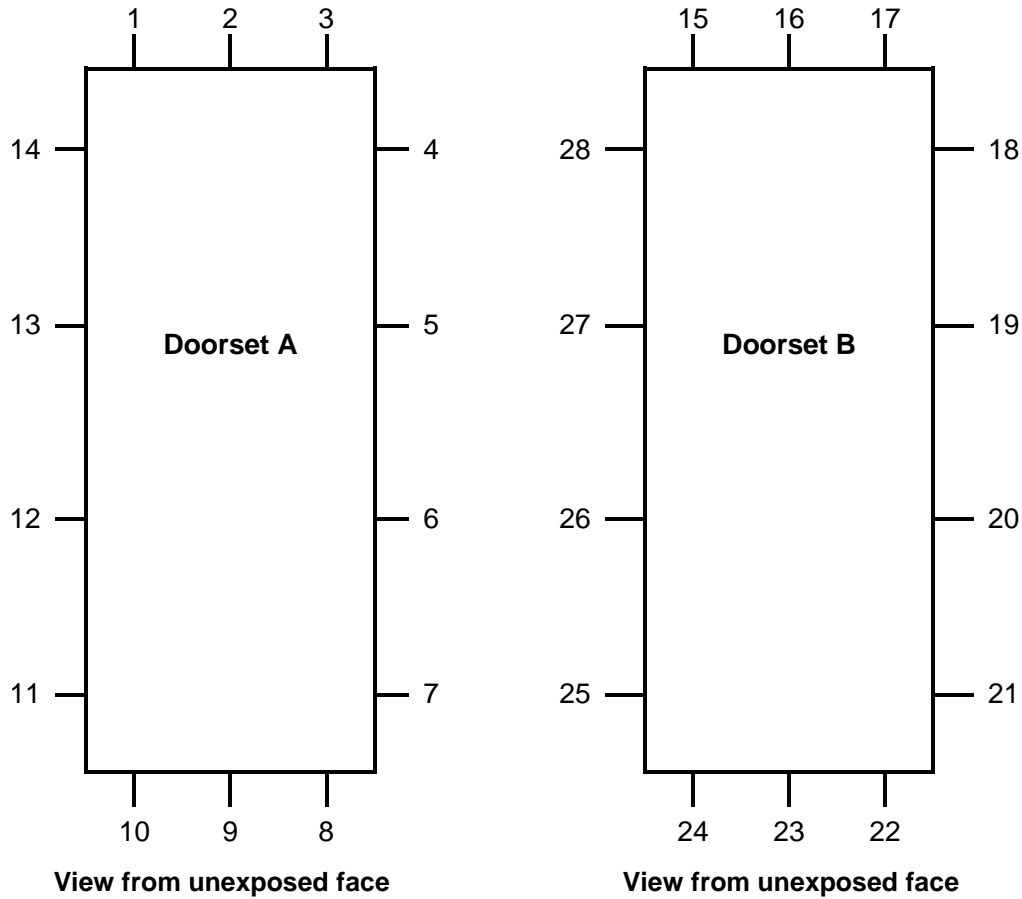
23. Magnetic Lock

Manufacturer : AEM
Reference : 10010
Fixing method : Fixed to door leaf and door frame using 'Z' and 'L' brackets with M5 x 12 mm long steel setscrews.

Details of Brackets

i. material : Aluminium
ii. thickness : 6 mm
iii. length : 185 mm
iv. overall section size : See Figure 6

Doorset Clearance Gaps



Door Ref	Gap Dimension in mm at Positions													
	1	2	3	4	5	6	7	8*	9*	10*	11	12	13	14
A	2.2	3.2	4	2.1	2.4	3.2	2.4	10.7	12.9	11.9	4.8	5.4	5.4	5.6
	15	16	17	18	19	20	21	22*	23*	24*	25	26	27	28
B	2.2	2.5	3.3	*	*	*	*	11.3	11.6	12	2.7	3.1	3	2.7
	Mean		3.7		Maximum			5.6		Minimum			2.1	
B	Mean		2.8		Maximum			3.3		Minimum			2.2	

Door Ref	Gap Between Face of Leaf and Doorstop in mm at Position													
	1	2	3	4	5	6	7	8*	9*	10*	11	12	13	14
A	*	*	*	*	*	*	*	n/a	n/a	n/a	*	*	*	*
	15	16	17	18	19	20	21	22*	23*	24*	25	26	27	28
B	*	*	*	*	*	*	*	n/a	n/a	n/a	*	*	*	*
	Mean		2.8		Maximum			3.3		Minimum			2.2	

* Dimension not included in calculations

Covered by astragal / filled by seal

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: 1999 Clause 5.1 using six plate thermometers, distributed over a plane 100 mm from the surface of the test construction.
Thermocouple Allocation	Thermocouples were provided to monitor the unexposed surface of the specimens. The output of all instrumentation was recorded at no less than one minute intervals as follows:
Thermocouples 2 to 6 (Doorset A) & Thermocouples 7 to 11 (Doorset B)	At five positions on the unexposed surface of each doorset, one approximately at the centre and one at the approximate centre of each quarter section of each doorset.
Thermocouples 12 to 15 (Doorset A) & Thermocouples 16 to 19 (Doorset B)	At four positions on the unexposed surface of 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 20 to 23 (Doorset A) & Thermocouples 24 to 27 (Doorset B)	At four positions on the unexposed surface of each door frame, one positioned approximately 50 mm from each vertical edge and one positioned on each vertical frame member at mid-height.
	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 where relevant.
Furnace Pressure	After the first five minutes of testing and for the remainder of the test, the furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1363-1: 1999. Clause 5.2. The calculated pressure differential relative to the laboratory atmosphere was 13.5 (± 2) at the head of each doorset.

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 14°C at the start of the test with a maximum variation of 12°C during the test.
00	00	The test commences.
02	40	Smoke emission originates from Doorset A at the latch position.
03	30	Smoke emission appears on Doorset A around the central round handle and across the head of the door leaf.
04	00	Smoke emission also occurs on Doorset B at the magnetic lock, closer and latch position. Smoke emission also occurs at the base of Doorset A.
06	00	Smoke emissions increase from all aforementioned positions.
06	20	A black liquid emanates from the central round handle of Doorset A.
06	55	Glowing visible across the threshold of Doorset B.
07	30	A black liquid emanates from the latch of Doorset A.
09	30	Both doorset faces begin to discolour.
12	30	The discolouration continues, to increase.
17	00	The closers are still in position on the exposed face of the test specimens.
17	50	A black liquid expels from the closers on the unexposed faces of both doorsets.
25	00	The discolouration has covered most of both of the door leaves.
27	00	The closer on Doorset A (exposed face) has fallen away but the closer on Doorset B remains in position.
30	00	The dark discolouration begins to turn to a whitish blue. The glowing along the threshold of Doorset B ceases.

Time		
mins	secs	
36	00	Sustained flaming occurs at the base of the leaf of Doorset B owing to the oil that has leaked out of the closer fixed on the unexposed face. Sustained flaming and cotton pad integrity failure is deemed to have occurred.
38	00	Flakes of charred coating fall away from the head of both doorsets.
42	00	Sustained flaming occurs from the closer of Doorset B.
45	00	A cotton pad is applied to the leaf of Doorset A, the pad discolours.
46	00	The door closer on the left hand side of Doorset B, is engulfed in flames.
58	30	Both door leaves have discoloured, almost entirely to a pale lime green colour.
61	00	A cotton pad is applied to the lower half of Doorset A and ignites. Cotton pad integrity failure is deemed to occur.
71	00	The exposed closer bodies have fallen away from both doorsets.
95	45	The door viewer lens still appears to be in place on Doorset A.
99	51	All the exposed handles remain attached, with the exception of the lower handle on Doorset A.
120	00	No significant visible change to either doorset.
141	00	Molten metal drips from the left hand side of the magnetic lock at the head of Doorset B.
144	41	The frame section at the head of Doorset B now glows a dull red colour.
166	10	Molten metal drips from the right hand side of the magnetic lock at the head of Doorset B.
222	34	The lens of the eye viewer fitted to Doorset A is still in place.
250	50	The frame of Doorset B glows red, there is still some surface finish left on the frame of Doorset A.
264	00	No significant visible change to either doorset, the test is discontinued at the sponsor's request.

Test Photographs

The exposed face of the test construction prior to testing



The unexposed face of the doorsets prior to testing



The unexposed face of the doorsets after 10 minutes of testing



The unexposed face of the doorsets after 20 minutes of testing



The unexposed face of the doorsets after 30 minutes of testing



The unexposed face of the doorsets after 36 minutes of testing



The unexposed face of the doorsets after 40 minutes of testing



The unexposed face of the doorsets after 42 minutes of testing



The unexposed face of the doorsets after 60 minutes of testing



The unexposed face of the doorsets after 120 minutes of testing



The unexposed face of the doorsets after 180 minutes of testing



The unexposed face of the doorsets after 225 minutes of testing



The unexposed face of the doorsets after 240 minutes of testing



The unexposed face of the doorsets after 259 minutes of testing



The exposed face
of the doorsets
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	23
10	678	673
20	781	778
30	842	839
40	885	887
50	918	921
60	945	945
70	968	967
80	988	988
90	1006	1007
100	1022	1026
110	1036	1034
120	1049	1049
130	1061	1061
140	1072	1072
150	1082	1083
160	1092	1092
170	1101	1102
180	1110	1107
190	1118	1120
200	1126	1124
210	1133	1131
220	1140	1141
230	1146	1148
240	1153	1155
250	1159	1155
260	1165	1165
264	1167	1167

Individual And Mean Temperatures Recorded On The Unexposed Surface Of Doorset A

Time Mins	T/C Number 2 Deg. C	T/C Number 3 Deg. C	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	Mean Temp Deg. C
0	18	18	18	18	18	18
10	248	245	287	297	304	276
20	363	361	396	411	419	390
30	417	414	453	467	470	444
40	463	453	493	503	503	483
50	484	467	505	524	529	502
60	501	490	524	547	553	523
70	521	510	544	569	578	544
80	541	528	559	586	600	563
90	555	545	573	599	617	578
100	584	572	594	620	636	601
110	562	577	596	618	638	598
120	555	582	603	630	651	604
130	559	585	608	637	660	610
140	562	587	611	649	672	616
150	567	590	611	655	681	621
160	574	598	599	661	689	624
170	578	615	592	667	698	630
180	581	628	595	669	704	635
190	586	642	599	676	716	644
200	587	643	600	673	717	644
210	591	650	603	675	723	648
220	596	658	597	674	729	651
230	600	663	602	676	735	655
240	604	667	605	680	740	659
250	605	668	608	682	742	661
260	608	674	610	688	746	665
264	612	678	615	692	751	670

Individual And Mean Temperatures Recorded On The Unexposed Surface Of Doorset B

Time Mins	T/C Number 7 Deg. C	T/C Number 8 Deg. C	T/C Number 9 Deg. C	T/C Number 10 Deg. C	T/C Number 11 Deg. C	Mean Temp Deg. C
0	19	20	20	19	19	19
10	278	268	321	318	295	296
20	377	383	430	427	414	406
30	433	437	481	484	470	461
40	479	480	514	519	506	500
50	496	497	533	547	527	520
60	519	520	557	572	554	544
70	536	537	575	593	576	563
80	557	560	597	615	599	586
90	574	576	612	632	617	602
100	607	607	626	639	630	622
110	*	619	618	629	629	624
120		*	624	625	637	629
130			622	624	636	627
140			624	630	632	629
150			628	635	628	630
160	611	610	630	640	630	624
170	616	612	632	645	633	628
180	617	612	632	646	634	628
190	625	620	641	654	641	636
200	626	621	641	654	643	637
210	629	624	644	658	648	641
220	634	630	650	663	654	646
230	639	635	654	668	657	651
240	641	636	656	672	661	653
250	643	637	657	672	662	654
260	646	640	660	676	665	657
264	649	644	662	679	667	660

* Denotes thermocouple failure

Individual Temperatures Recorded On The Frame Of Doorset A

Time Mins	T/C Number 20 Deg. C	T/C Number 21 Deg. C	T/C Number 22 Deg. C	T/C Number 23 Deg. C
0	15	15	17	17
10	181	257	151	129
20	296	346	277	175
30	366	387	364	212
40	414	428	420	239
50	459	466	468	255
60	496	495	509	267
70	520	514	537	272
80	542	536	565	272
90	558	552	592	278
100	576	568	616	289
110	602	594	638	310
120	622	607	653	323
130	638	620	668	344
140	654	631	680	354
150	667	643	690	360
160	680	654	701	365
170	690	663	712	375
180	701	673	722	381
190	708	680	729	389
200	715	686	736	397
210	723	693	744	401
220	729	699	753	406
230	735	702	761	408
240	740	708	767	414
250	745	712	772	415
260	751	716	779	419
264	754	718	783	420

Individual Temperatures Recorded On The Frame Of Doorset B

Time Mins	T/C Number 24 Deg. C	T/C Number 25 Deg. C	T/C Number 26 Deg. C	T/C Number 27 Deg. C
0	18	17	18	17
10	203	182	154	202
20	349	303	286	343
30	421	370	383	426
40	464	417	448	493
50	501	459	505	539
60	521	495	541	578
70	543	524	569	603
80	565	541	597	630
90	582	559	619	653
100	605	579	639	673
110	639	612	652	689
120	653	630	669	704
130	666	641	684	717
140	680	652	696	730
150	690	670	706	741
160	701	688	716	752
170	710	701	726	762
180	719	712	735	770
190	726	720	746	779
200	733	726	753	786
210	740	734	763	792
220	747	740	774	799
230	753	753	784	804
240	758	762	791	810
250	763	767	796	815
260	768	773	806	820
264	772	777	810	823

Additional Unexposed Face Thermocouples To Doorset A

Time Mins	T/C Number 12 Deg. C	T/C Number 13 Deg. C	T/C Number 14 Deg. C	T/C Number 15 Deg. C
0	20	19	20	15
10	139	257	255	251
20	289	400	374	401
30	374	455	425	462
40	424	514	470	512
50	473	536	490	544
60	514	554	512	571
70	540	564	533	601
80	563	582	553	625
90	585	598	571	642
100	614	620	583	662
110	642	639	572	669
120	658	648	576	676
130	671	656	575	686
140	686	668	580	698
150	697	673	583	710
160	708	682	583	722
170	714	692	586	734
180	717	699	588	741
190	*	701	594	752
200		706	597	758
210		*	602	765
220			607	773
230			612	782
240			614	787
250			615	789
260			619	794
264			622	798

* Denotes thermocouple failure

Additional Unexposed Face Thermocouples To Doorset B

Time Mins	T/C Number 16 Deg. C	T/C Number 17 Deg. C	T/C Number 18 Deg. C	T/C Number 19 Deg. C
0	16	16	16	16
10	151	205	281	277
20	308	363	392	410
30	397	417	444	477
40	461	469	483	530
50	508	512	507	559
60	536	531	530	591
70	556	547	546	612
80	580	567	567	636
90	599	583	584	654
100	636	613	594	674
110	661	641	592	679
120	678	657	595	685
130	691	669	595	*
140	704	682	601	
150	710	692	603	
160	713	703	602	692
170	*	710	603	697
180		*	605	699
190			613	715
200	685		613	713
210	689		616	719
220	694	682	622	727
230	700	687	627	734
240	703	688	629	735
250	705	691	629	736
260	708	694	633	740
264	711	696	638	745

* Denotes thermocouple failure

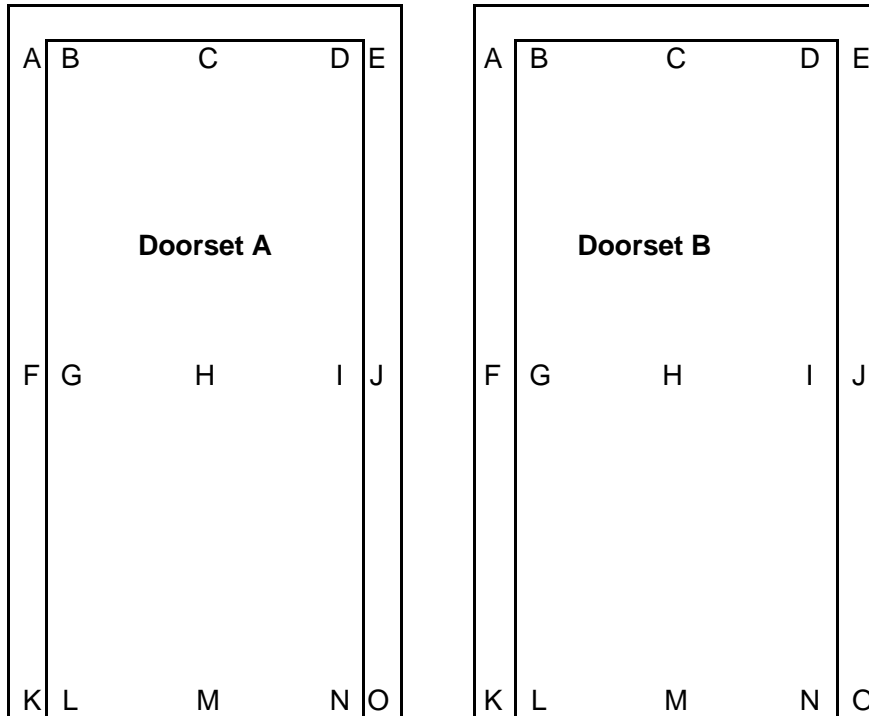
Recorded radiation intensity Of Doorset A

Time Mins	Radiation Intensity Leaf A at 1m kW/m ²
0	0.00
10	1.68
20	3.41
30	4.73
40	6.00
50	6.95
60	7.76
70	8.74
80	9.60
90	10.44
100	11.47
110	11.76
120	12.33
130	12.63
140	13.04
150	13.58
160	14.17
170	14.55
180	15.01
190	15.60
200	15.98
210	16.63
220	17.09
230	17.61
240	18.17
250	18.61
260	19.23
264	19.45

Recorded radiation intensity Of Doorset B

Time Mins	Radiation Intensity Leaf B at 1m kW/m ²
0	0.00
10	1.62
20	3.00
30	4.19
40	5.17
50	5.65
60	6.68
70	7.68
80	7.82
90	8.57
100	9.25
110	9.84
120	10.20
130	10.39
140	12.58
150	12.68
160	14.14
170	13.93
180	14.39
190	14.93
200	15.50
210	16.25
220	16.17
230	16.93
240	17.20
250	17.36
260	17.90
264	18.23

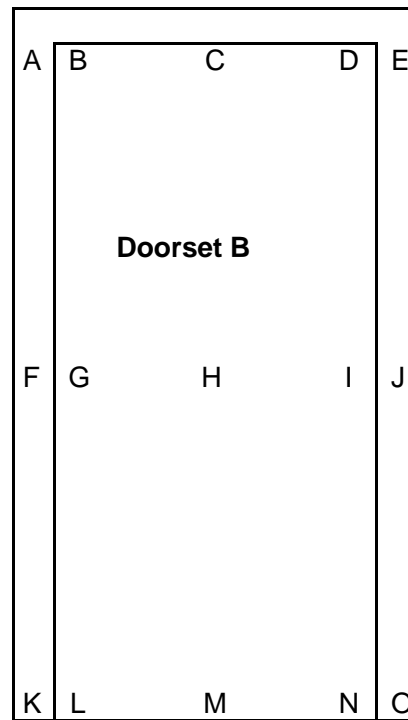
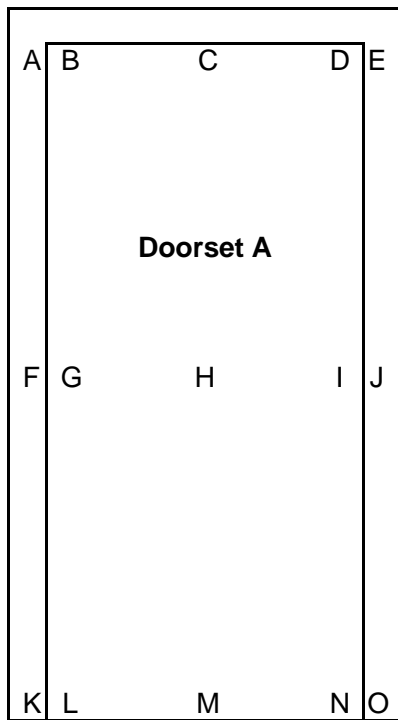
Deflection Of The Door Leaves During The Test



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
10	-2	1	-4	1	-4	-1	-1	25	14	0	-6	-9	-3	-4	-5
20	-2	4	-3	-5	-4	-1	2	22	17	0	-8	-7	1	-3	-3
30	3	4	-1	-4	-5	0	5	24	19	4	-9	-9	0	1	-2
40	-2	6	0	1	-1	-2	-3	25	18	4	-9	-10	0	-7	-1
50	-4	7	0	-3	-1	-3	0	15	20	5	-8	-10	-5	-8	-1
60	-1	6	0	-2	-3	-2	-2	15	20	7	-9	-10	-2	-2	-1
70	-3	5	0	0	1	-1	-1	10	21	8	-9	-10	-5	-1	0

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	-1	-8	-3	-16	-3	0	13	32	5	0	-4	-4	-7	-16	-6
20	0	-4	-3	-17	-1	0	16	30	5	2	-4	-4	-6	-9	-8
30	2	-5	1	-13	1	4	17	24	4	-8	-4	-3	-6	-16	-11
40	-4	-5	-6	-12	-1	4	22	2	4	1	-2	-4	-1	-12	-11
50	-2	-8	5	-12	0	*	22	-2	4	-8	-2	-4	3	-13	-10
60	2	-6	-2	-12	-1	5	21	-5	5	1	-4	-4	-7	-18	-34
70	4	-5	0	-11	0	5	21	-10	2	-2	-1	0	2	-15	-32

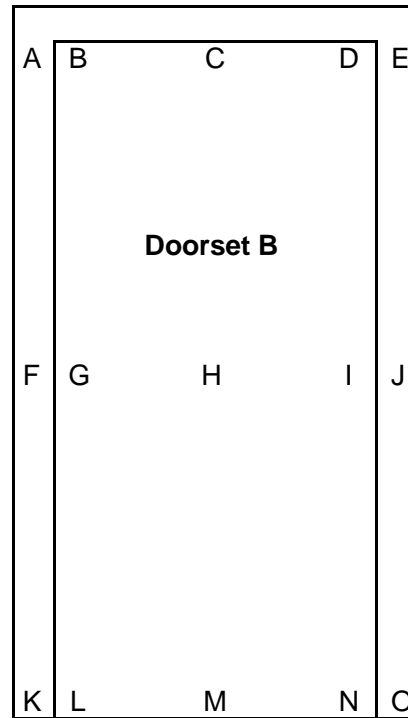
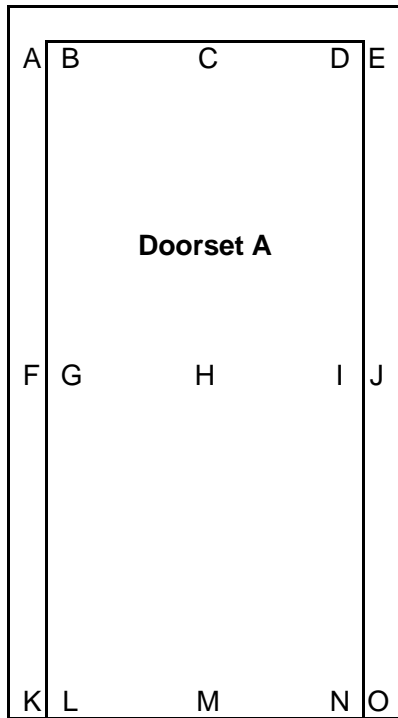
Deflection Of The Door Leaves During The Test, continued.



Doorset A															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
80	0	5	1	1	0	0	-1	6	22	9	-9	-6	0	2	0
90	4	6	0	2	-1	-1	-4	3	21	10	-8	-11	-4	4	1
100	4	6	1	3	0	-1	-4	-7	21	13	-7	-11	-4	1	3
110	3	7	2	4	1	1	-6	-7	23	10	-10	-13	-6	-1	1
120	-2	4	1	1	1	-2	-9	-15	25	11	-7	-11	-4	2	1
135	-1	5	2	3	2	2	-6	-7	26	13	-5	-13	-3	1	4
150	-1	0	1	2	3	2	-3	-9	29	14	-7	-13	-4	-3	4

Doorset B															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
80	6	-4	1	-10	*	5	22	-9	3	-1	1	0	6	-14	-32
90	7	-3	1	-9	*	5	23	-10	4	-3	-1	-2	4	-17	-33
100	2	-8	0	-15	*	2	26	-6	6	-2	-3	-1	2	-19	-34
110	-2	-7	-2	-15	*	0	25	-6	6	-3	2	-2	4	-15	-34
120	-2	-8	-1	-14	*	6	21	-5	7	-11	3	-1	7	-9	-30
135	-5	-10	0	-13	-2	9	29	-6	3	-11	3	0	6	-10	-28
150	0	-7	-2	-10	-6	8	30	-4	6	-9	3	0	6	-8	-12

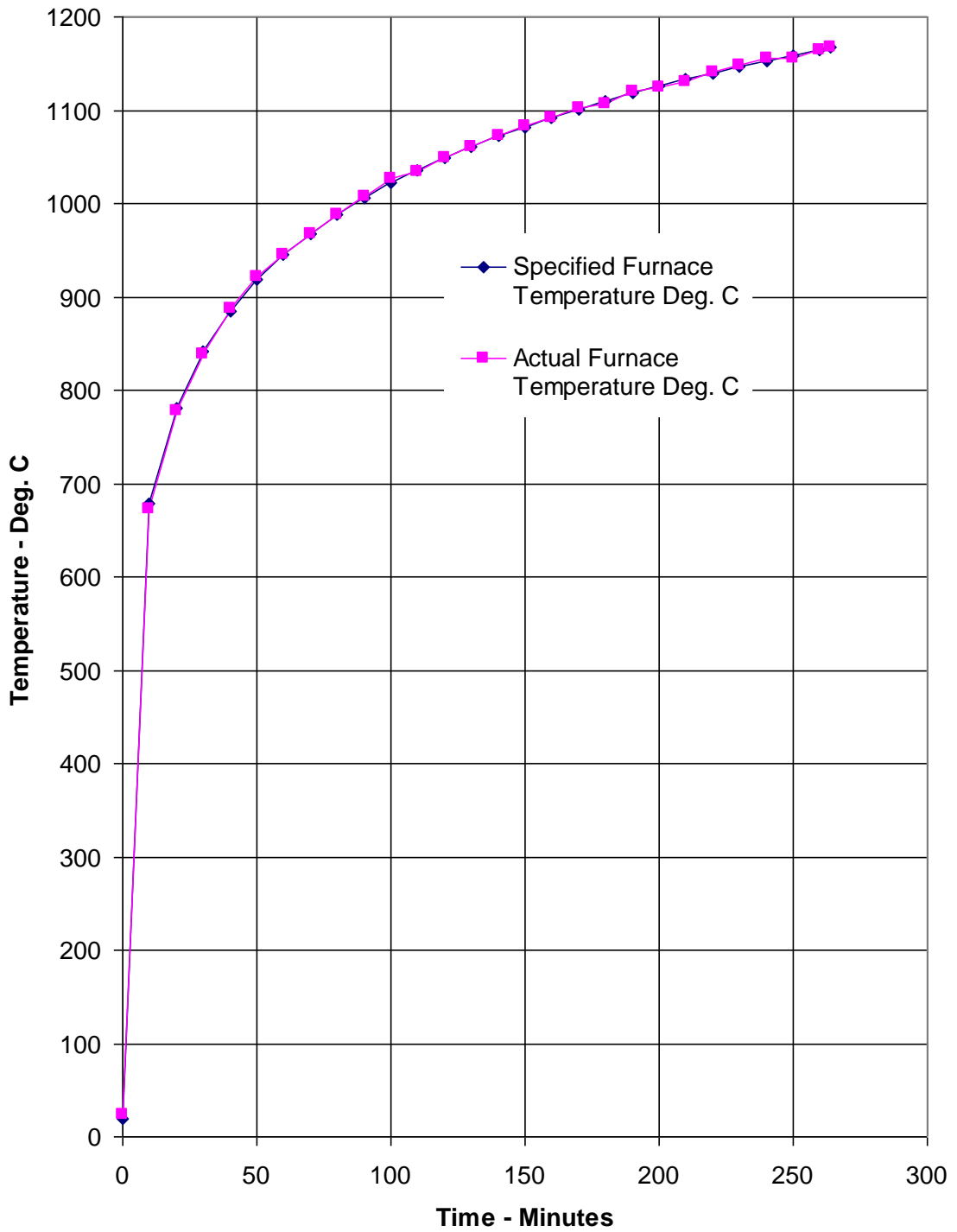
Deflection Of The Door Leaves During The Test, continued



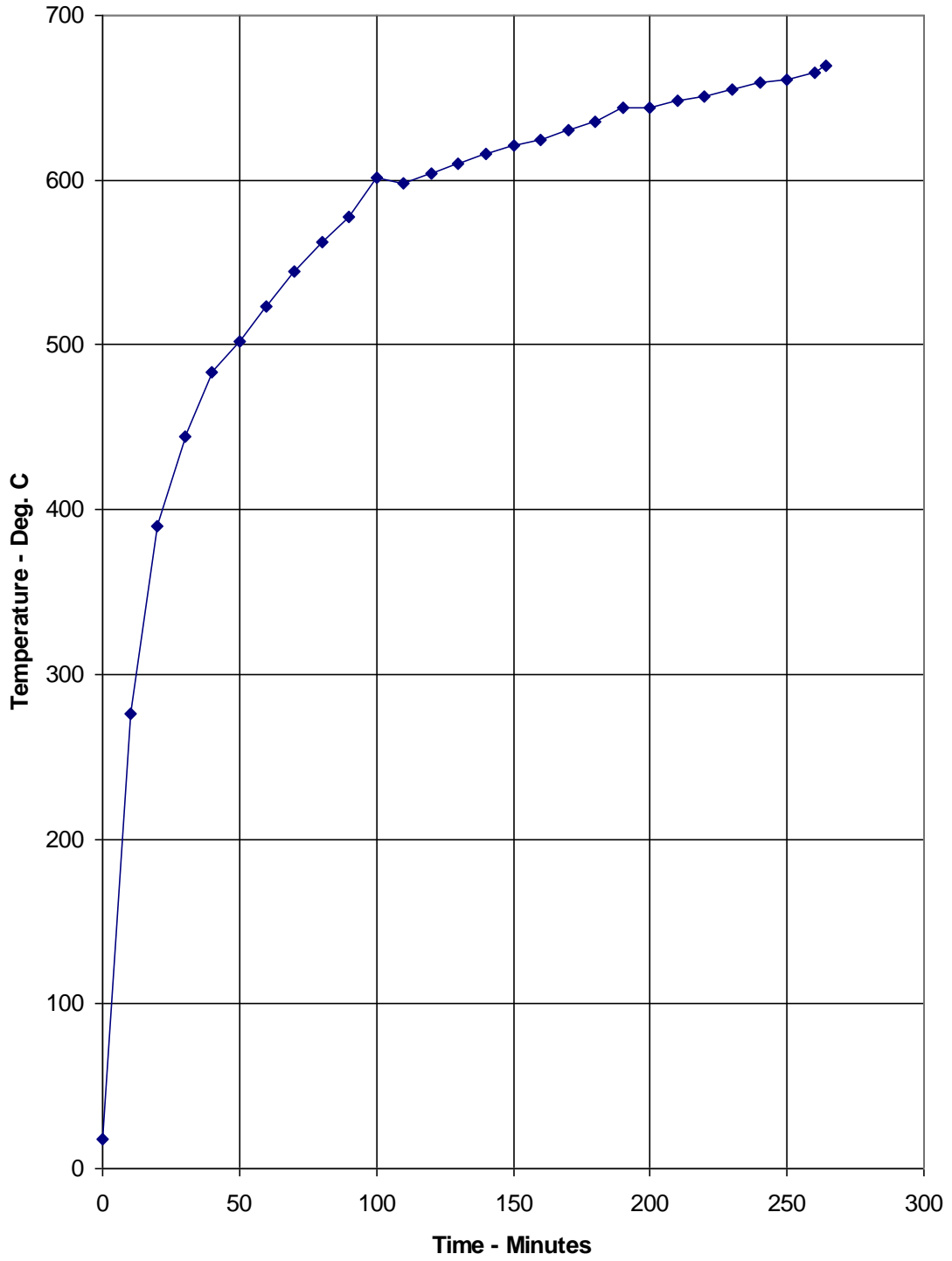
Doorset A															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
165	-5	-4	-3	0	5	1	-7	-16	26	14	-8	-12	-3	-7	5
180	-4	0	0	2	4	1	-5	-14	28	14	-7	-12	-4	-2	3
195	-1	-2	-4	5	5	4	-2	-14	30	16	-7	-14	-6	-4	4
210	-1	3	2	5	8	3	-4	-13	31	14	-8	-16	-5	-1	4
225	-7	-4	-4	5	7	1	-5	-12	30	14	-7	-17	-7	-2	5
240	0	-1	-2	7	6	2	-6	-14	30	17	-8	-15	-8	-2	6
260	-1	3	-1	11	9	3	0	-12	34	16	-7	-14	-6	0	7

Doorset B															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
165	0	-6	-2	-14	-6	12	33	-3	7	-9	4	1	7	-7	-12
180	0	-6	1	-11	-6	10	34	-4	7	-6	3	0	7	-5	-10
195	2	-8	4	-11	-2	13	32	-2	8	-7	4	-1	6	-5	-9
210	4	-4	3	-9	-3	16	33	-5	9	-2	5	0	6	-9	-10
225	5	-3	4	-9	-2	15	32	-4	10	-1	6	1	7	-7	-9
240	6	-2	4	-8	-1	17	31	-5	10	-2	5	1	6	-6	-10
260	7	-1	5	-9	0	18	32	-5	12	-1	6	2	7	-5	-9

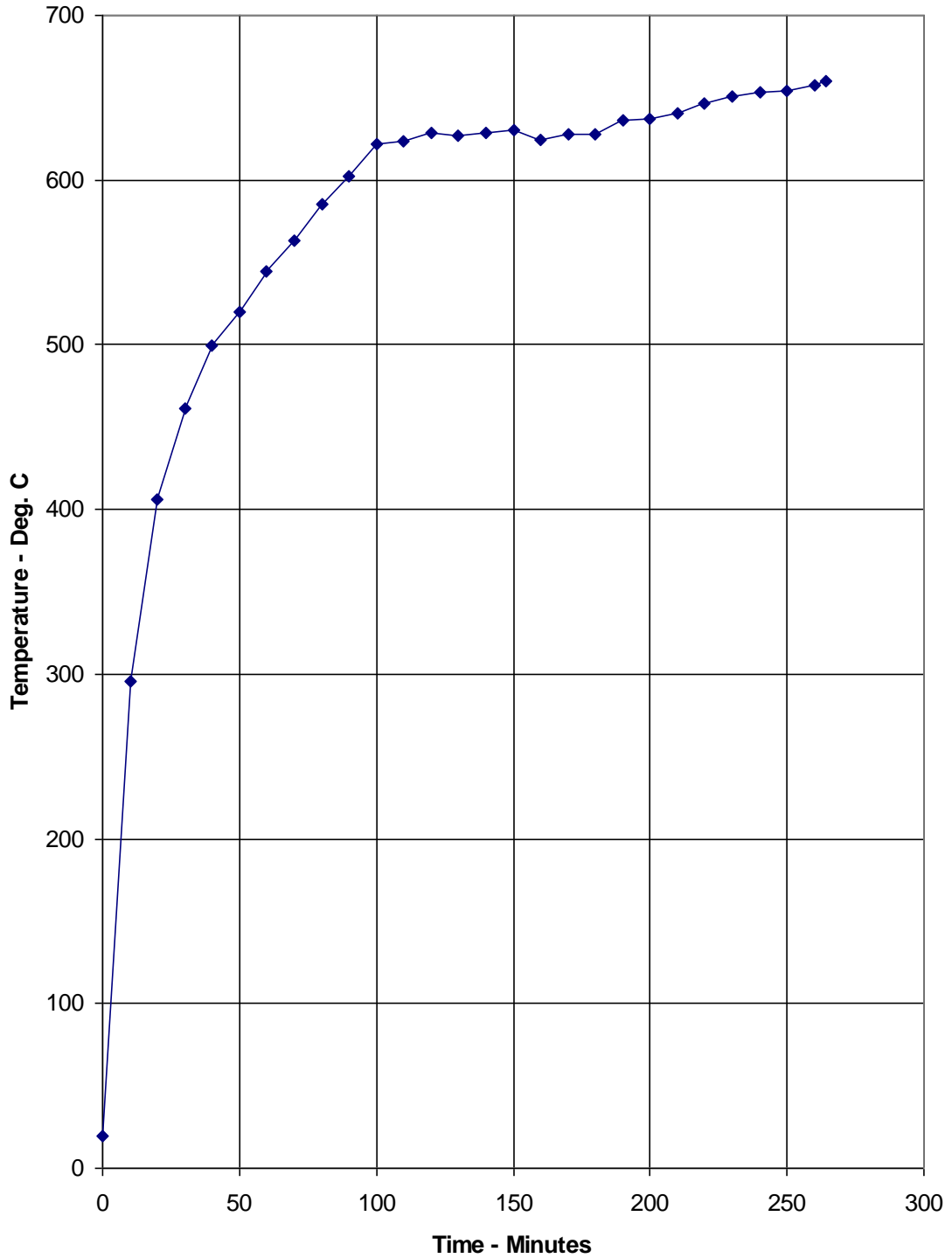
Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard



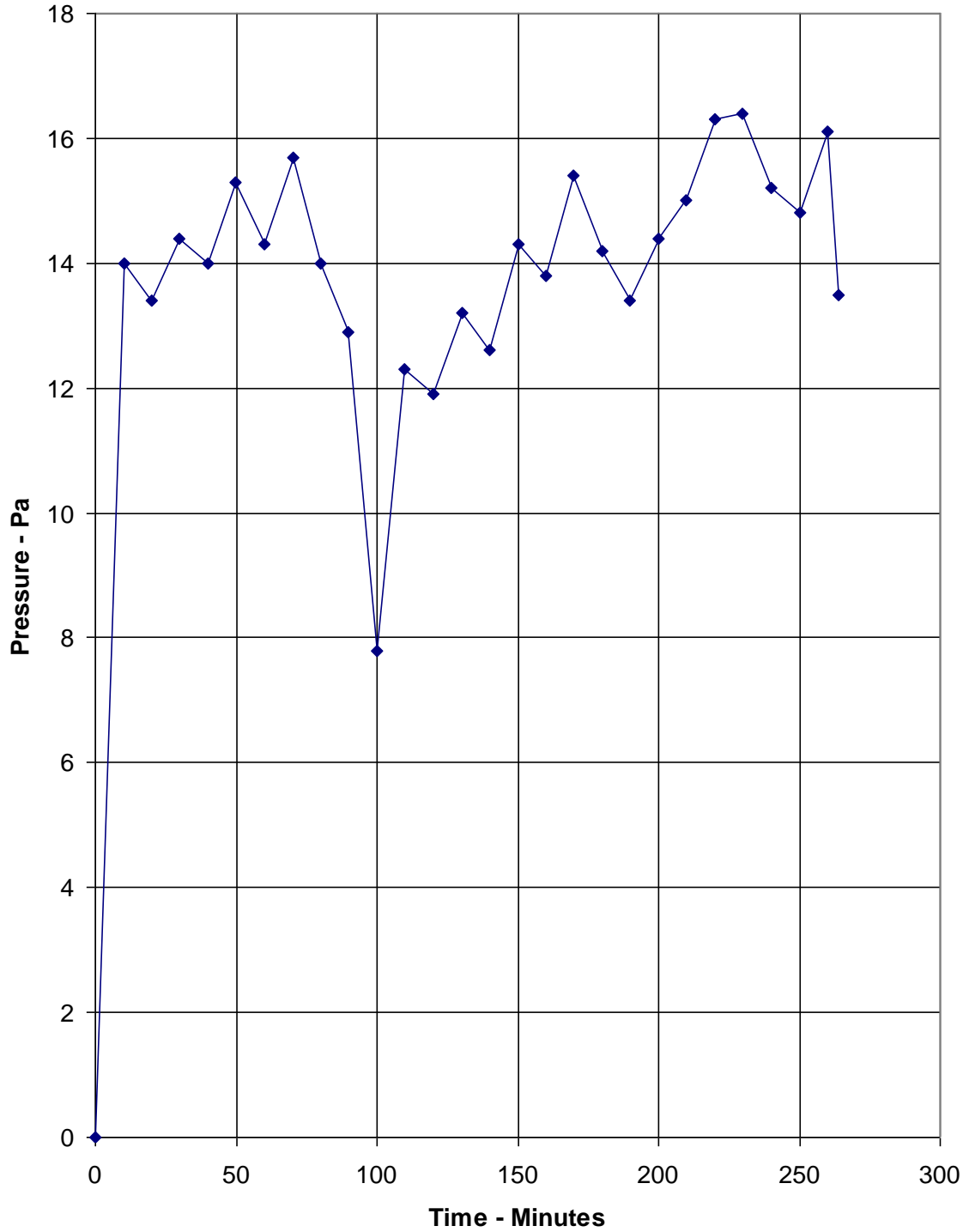
Graph Showing Mean Temperature Recorded On The Unexposed Surface Of Doorset A



Graph Showing Mean Temperature Recorded On The Unexposed Surface Of Doorset B



Graph Showing the furnace pressure recorded during the test



Performance Criteria and Test Results

Integrity

It is required that the specimens retain their 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: 2008, or resulting in sustained flaming on the unexposed surface. **These requirements were satisfied for the periods shown below:**

	Doorset A	Doorset B
Sustained Flaming	264 minutes*	36 minutes
Cotton pad	61 minutes	36 minutes
Gap gauge	264 minutes*	264 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: 2008. **These requirements were satisfied for the periods shown below:**

Insulation performance

	Doorset A	Doorset B
	5 minutes	6 minutes

Radiation

BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m² be reported.

Radiation Performance	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
Doorset A	32 mins	85 mins	177 mins	264 mins*	264 mins*
Doorset B	39 mins	109 mins	188 mins	264 mins*	264 mins*

*The test duration, the test was discontinued after 264 minutes.

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: 1999, and where appropriate BS EN 1363-2: 1999. Any significant deviation with respect to size, constructional details, loads, stresses, and 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: 1999, 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 specimens of single-acting, single-leaf timber based doorsets, incorporating various items of building hardware have been subjected to a fire resistance test in accordance with BS EN 1634-1: 2008, Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware, BS EN 1363-1: 1999, 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: 2008 showed that the doorsets satisfied the requirements for the following periods.

Test Results:		Doorset A	Doorset B		
Integrity	Sustained Flaming	264 minutes*	36 minutes		
	Cotton wool pad	61 minutes	36 minutes		
	Gap gauge	264 minutes*	264 minutes*		
Insulation		5 minutes	6 minutes		
Radiation Performance	5 kW/m ²	10 kW/m ²	15 kW/m ²	20 kW/m ²	25 kW/m ²
Doorset A	32 minutes	85 minutes	177 minutes	264 minutes*	264 minutes*
Doorset B	39 minutes	109 minutes	188 minutes	264 minutes*	264 minutes*

*The test duration, the test was discontinued after 264 minutes.