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Testing. Advising. Assuring.

Title:

The fire resistance performance of two single-leaf, single-acting doorsets, incorporating various items of hardware when tested in accordance with BS EN 1634-1:2014

Report No:

399805

Prepared for:

ICS Security Solutions Ltd.
Unit 1,
JBJ Business Park,
Northampton Road,
Blisworth,
Northampton,
NN7 3DW.

Date: 13th November 2018

Notified Body No:

0833

UKAS TESTING
0249

Summary

Objective

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

Test Sponsor

ICS Security Solutions Ltd.
Unit 1,
JBJ Business Park,
Northampton Road,
Blisworth,
Northampton,
NN7 3DW.

Summary of Tested Specimens

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

Doorset A had overall nominal dimensions 2080 mm high by 1002 mm wide incorporating a leaf with overall dimensions of 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 and was hung within a softwood frame on three steel hinges, opening towards the heating conditions of the test. The Doorset was latched for the test duration

The doorset incorporated the following hardware:

Item Number	Description	Reference
7	Magnetic Lock Body	FR-SL500
8	Magnetic Lock Armature	FR-SL500
9	Magnetic Lock Body	FR-EB 300
10	Magnetic Lock Armature	FR-EB 300
11	Armature Plate	U Series/A Series Armature Plate
12	Magnetic Lock Armature	GD650S
13	Door Cable Loop	DL Series

Summary of Tested Specimens (Continued)

Doorset B had overall nominal dimensions 2080 mm high by 1002 mm wide incorporating a leaf with overall dimensions of 2040 mm high by 933 mm wide by 54 mm thick. The door leaf was of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges and was hung within a hardwood frame on three steel hinges, opening towards the heating conditions of the test. The Doorset was latched for the test duration

The doorset incorporated the following hardware:

Item Number	Description	Reference
7	Magnetic Lock Body	FR-SL500
8	Magnetic Lock Armature	FR-SL500
9	Magnetic Lock Body	FR-EB 300
10	Magnetic Lock Armature	FR-EB 300
11	Armature Plate	U Series/A Series Armature Plate
12	Magnetic Lock Armature	GD650S
13	Door Cable Loop	DL Series

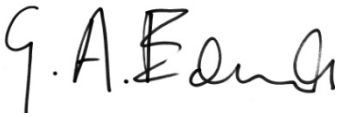
Test Results:		**Doorset A**	**Doorset B**
Integrity performance	Sustained flaming	38 minutes	62 minutes
	Gap gauge	40 minutes[#]	66 minutes*
	Cotton Pad	36 minutes	62 minutes
Insulation performance		36 minutes	62 minutes

*The test was discontinued after a period of 66 minutes.
[#] Sections of the doorset sealed, allowing the test to continue.

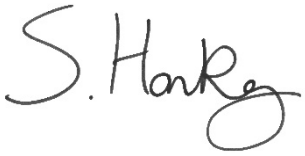
Date of Test: 19th May 2018

Signatories

Responsible Officer
N. Howard*
Technical Officer



Approved
G Edmonds*
Senior Technical Officer



Head of Department
S. Hankey*
Business Unit Manager

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

Report Issued

Date: 13th November 2018

CONTENTS **PAGE NO.**

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 19th May 2018 on behalf of **ICS Security Solutions Ltd**, 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 17th and 19th May 2018

Installation

The doorsets incorporating the hardware were mounted within apertures provided within a low density rigid supporting construction. The doorsets were mounted such that they opened towards the heating conditions of the test.

Representatives of **Exova Warringtonfire** conducted the installation on the 17th May 2018

Sampling

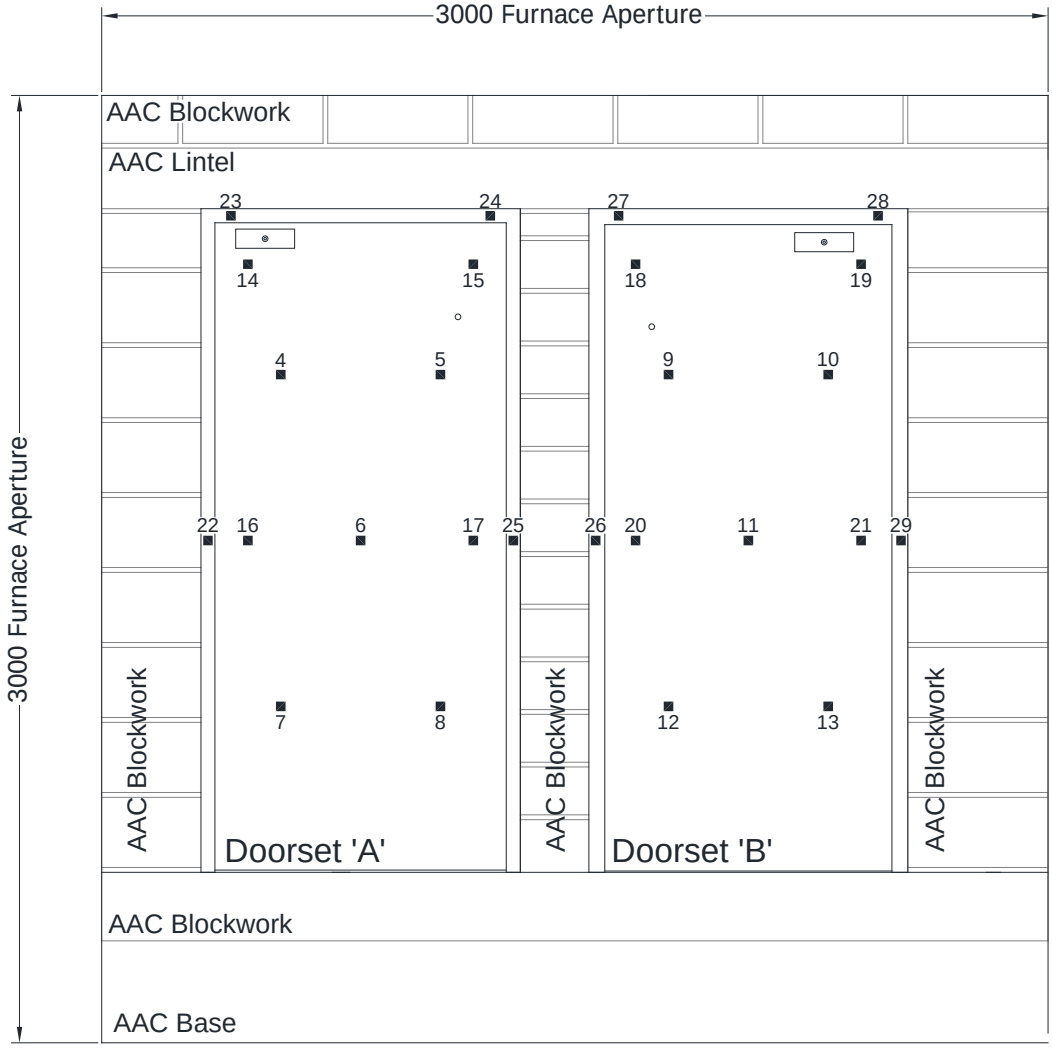
Exova Warringtonfire was not involved in any selection or sampling procedures of the specimen or any of the components.

Conditioning

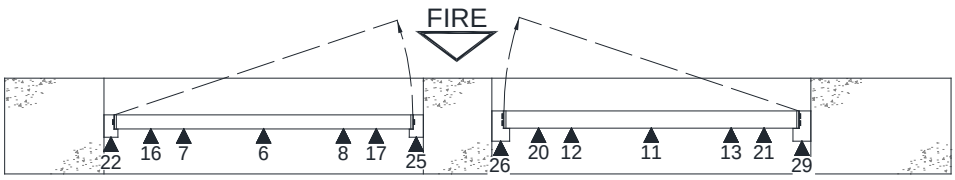
The specimens' storage, construction, and test preparation took place in the test laboratory over a total, combined time of 3 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 12.5°C to 22.5°C and 38.5% to 60.5% respectively.

Test Construction

Figure 1- General Elevation of Test Construction



GENERAL ELEVATION OF TEST CONSTRUCTION
ON THE UNEXPOSED FACE



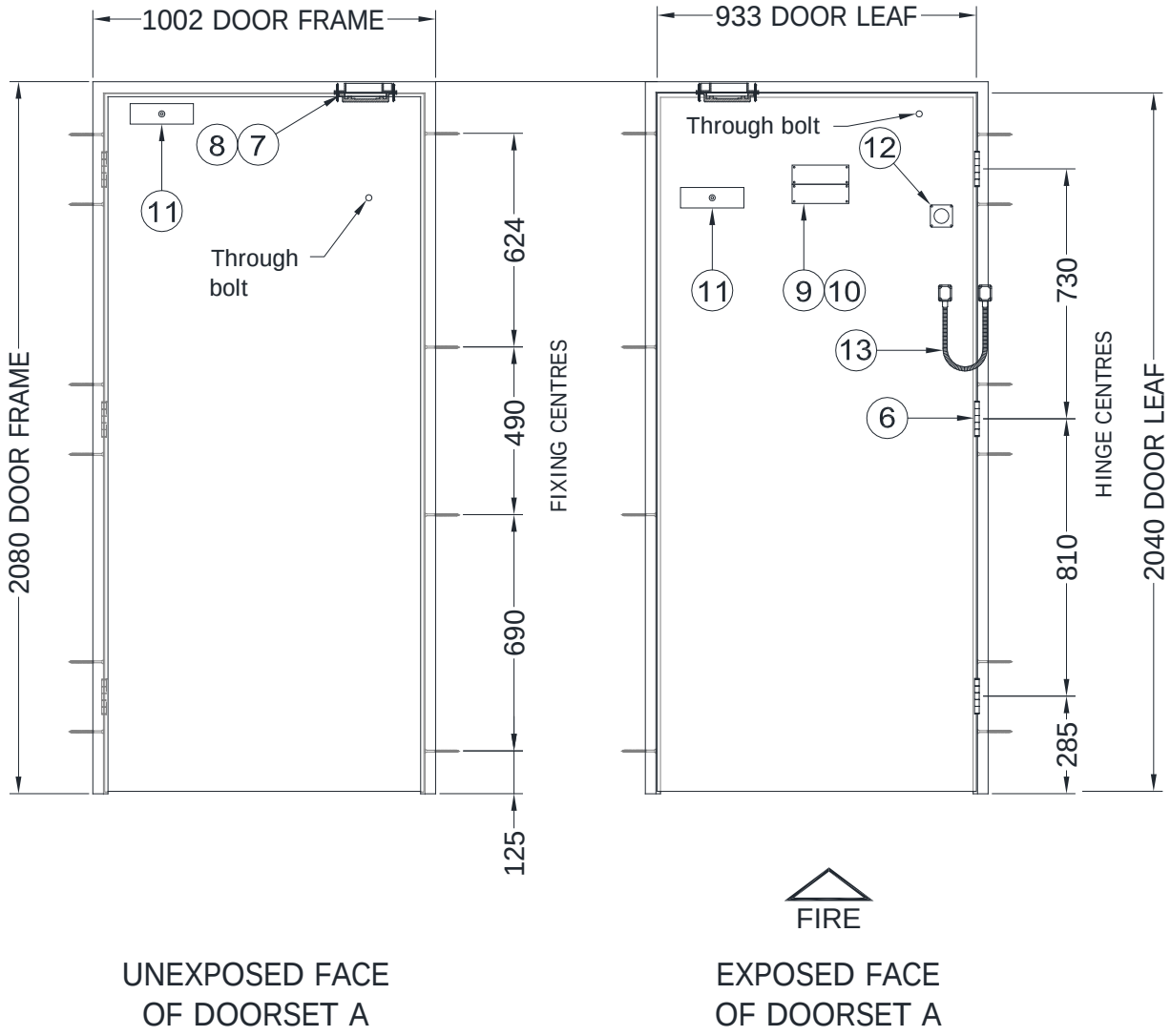
HORIZONTAL SECTION OF TEST CONSTRUCTION

THERMOCOUPLE KEY

■/▲ Positions of thermocouples

Do not scale. All dimensions are in mm

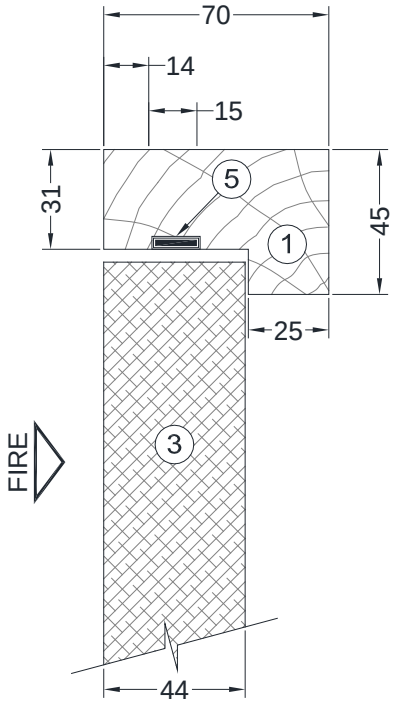
Figure 2 – Doorset A - General Elevations



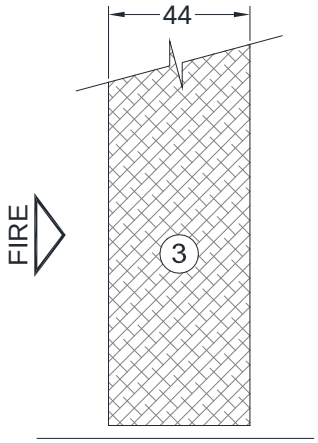
GENERAL ELEVATIONS OF DOORSET A

Do not scale. All dimensions are in mm

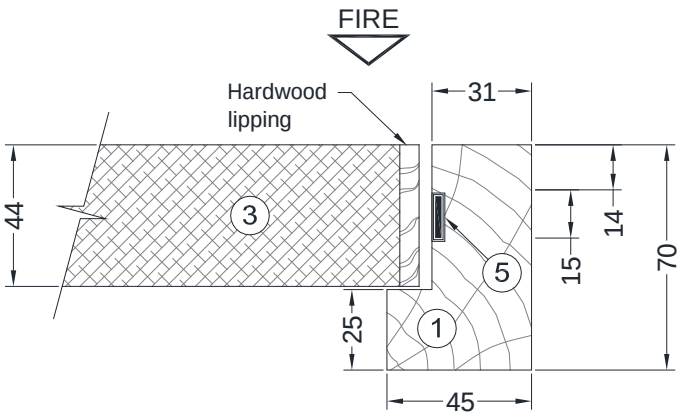
Figure 3 – Doorset A - Details of Door Leaves



TYPICAL SECTION THROUGH
HEAD OF DOORSET A



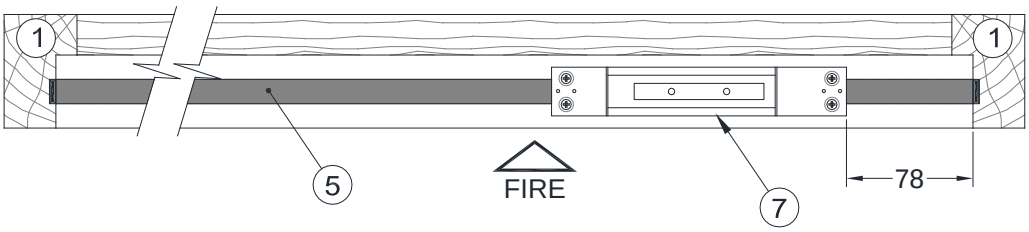
TYPICAL SECTION THROUGH
BASE OF DOOR LEAF
DOORSET A



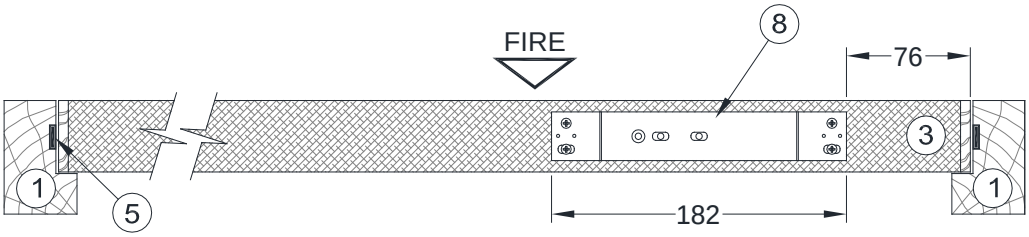
TYPICAL SECTION THROUGH
DOOR FRAME AND JAMB
OF DOORSET A

Do not scale. All dimensions are in mm

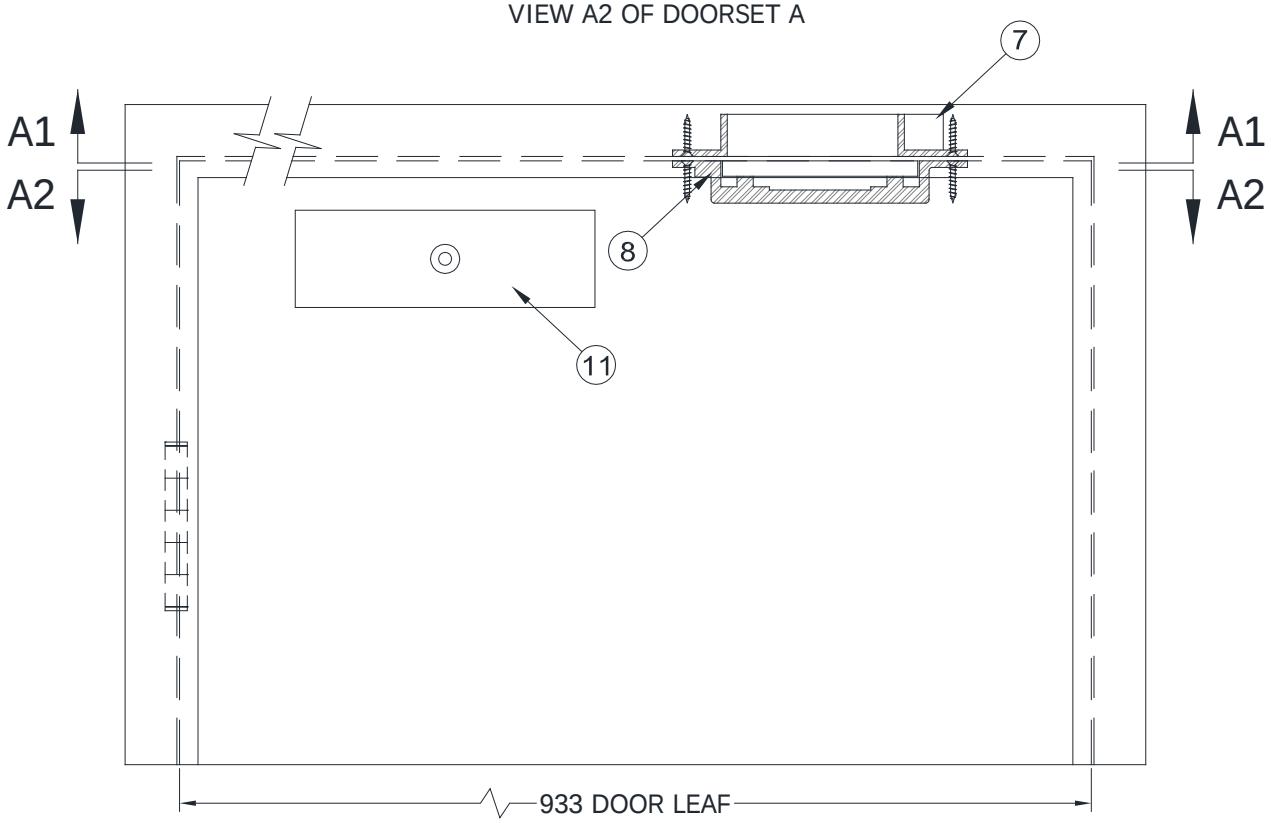
Figure 4 – Doorset A – View A1 and A2



VIEW A1 OF DOORSET A



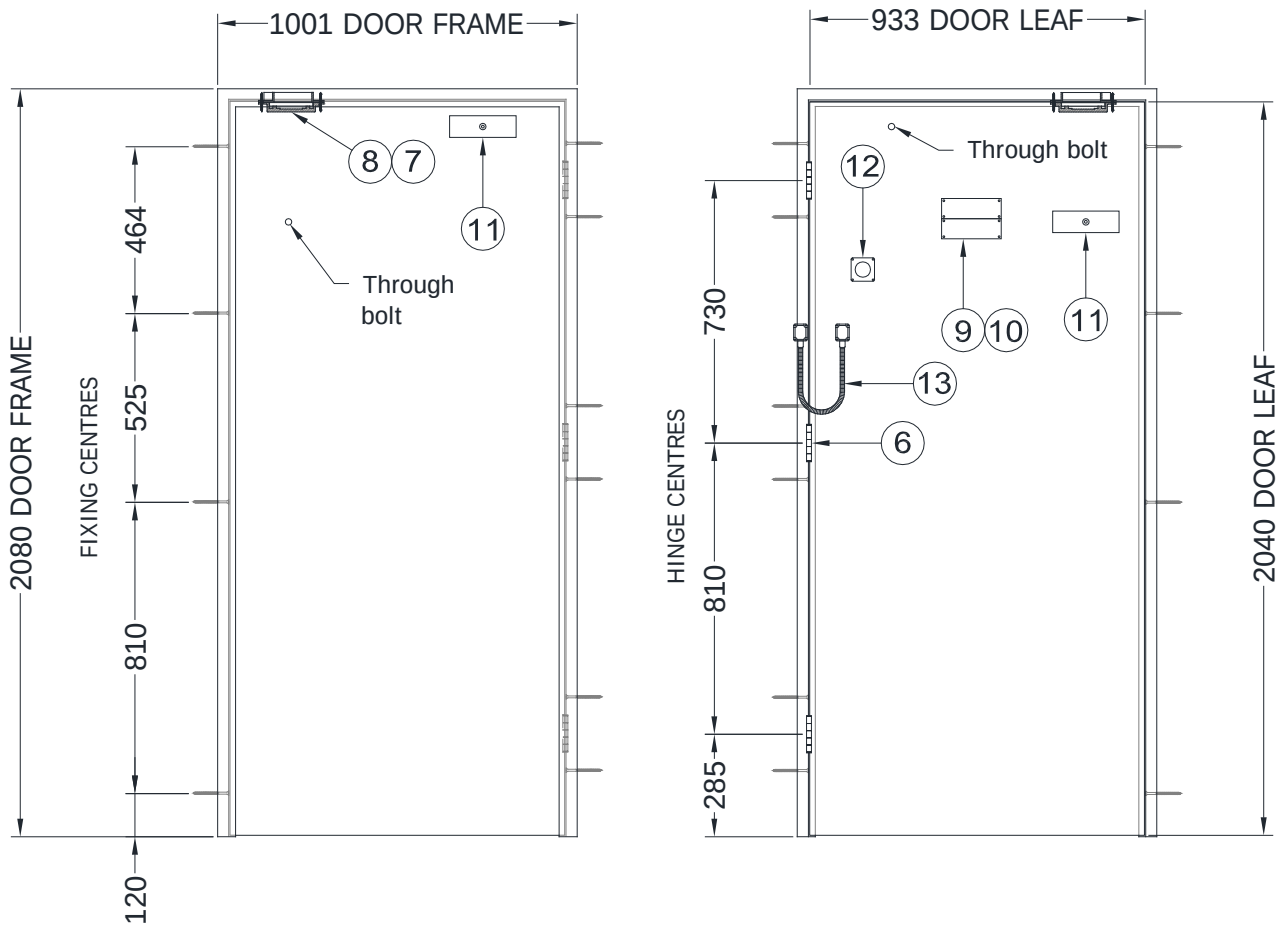
VIEW A2 OF DOORSET A



DETAILS OF ITEMS 7 AND 8
DOORSET A - UNEXPOSED FACE

Do not scale. All dimensions are in mm

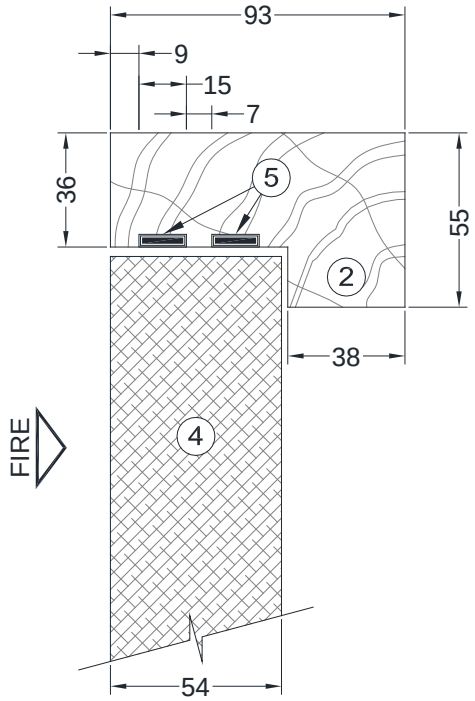
Figure 5 – Doorset B - General Elevations



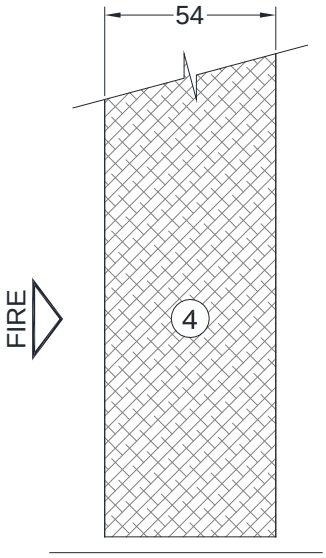
GENERAL ELEVATIONS OF DOORSET B

Do not scale. All dimensions are in mm

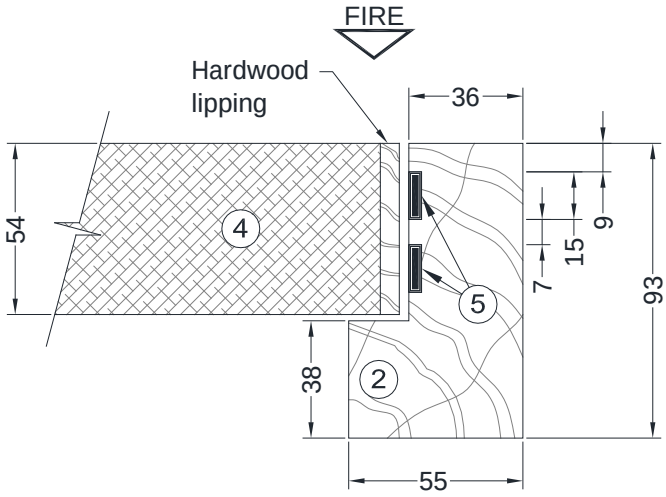
Figure 6 – Doorset B – Details of Door Leaves



TYPICAL SECTION THROUGH HEAD
OF DOORSET B



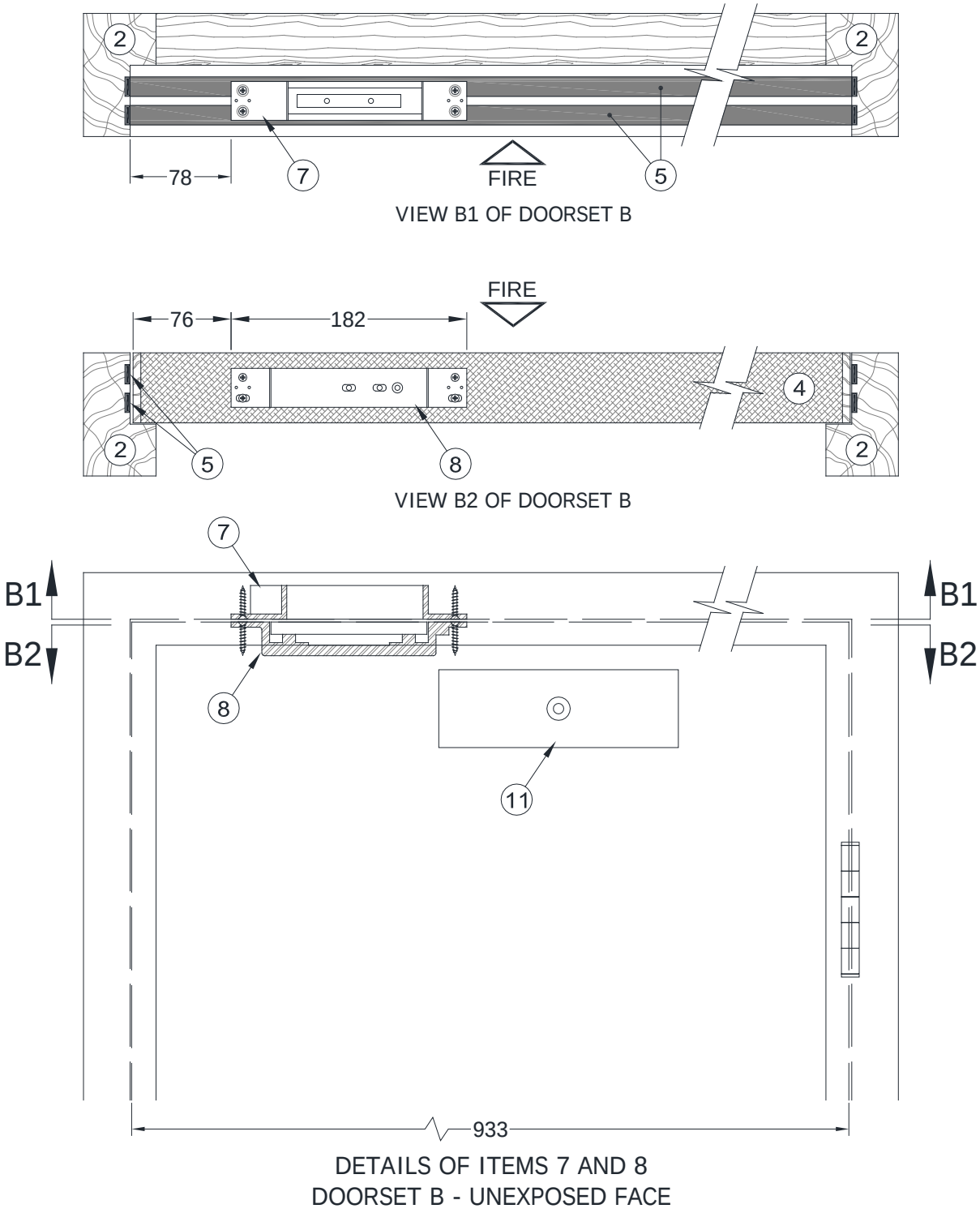
TYPICAL SECTION THROUGH
BASE OF DOORSET B



TYPICAL SECTION THROUGH
DOOR FRAME AND JAMB
OF DOORSET B

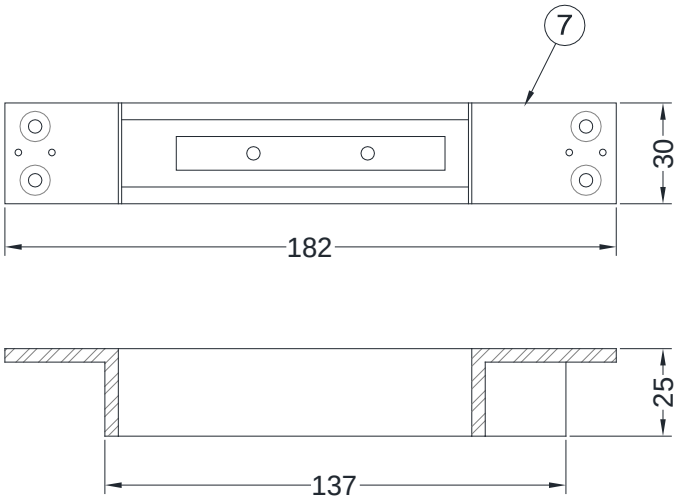
Do not scale. All dimensions are in mm

Figure 7 – Doorset B – View B1 and B2

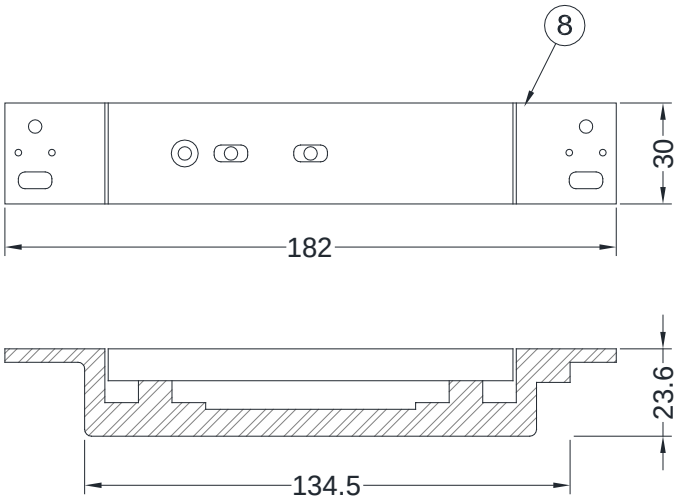


Do not scale. All dimensions are in mm

Figure 8 – Details of Items 7 and 8



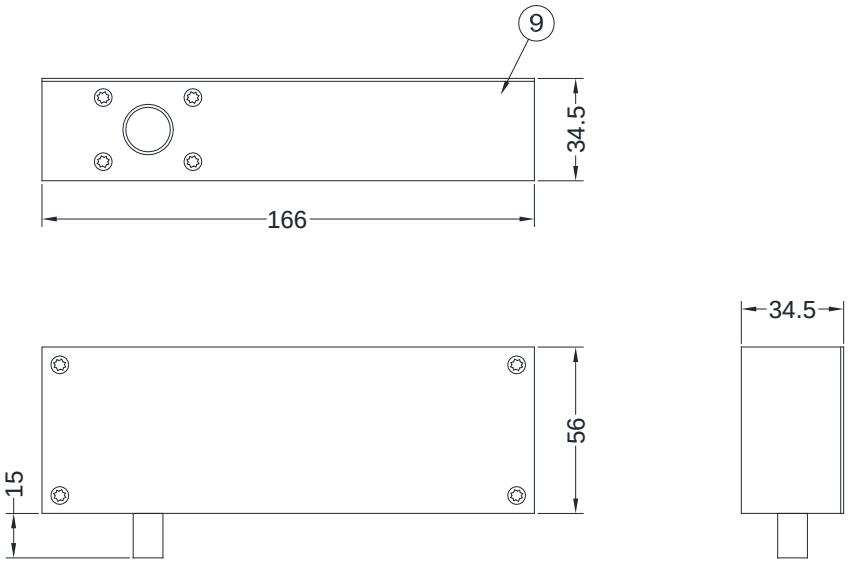
DETAILS OF FR SL500 LOCK BODY
ITEM - 7



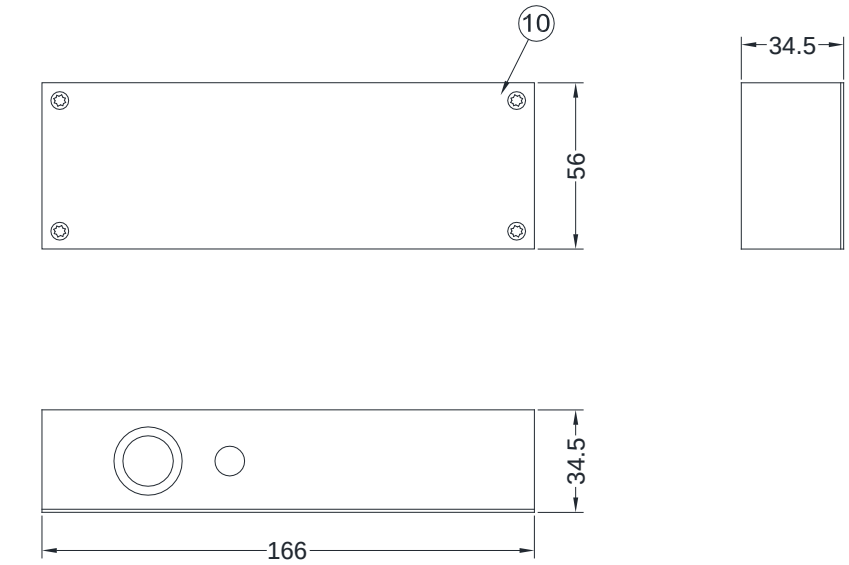
DETAILS OF FR SL500 LOCK ARMATURE
ITEM - 8

Do not scale. All dimensions are in mm

Figure 9 – Details of Items 9 and 10



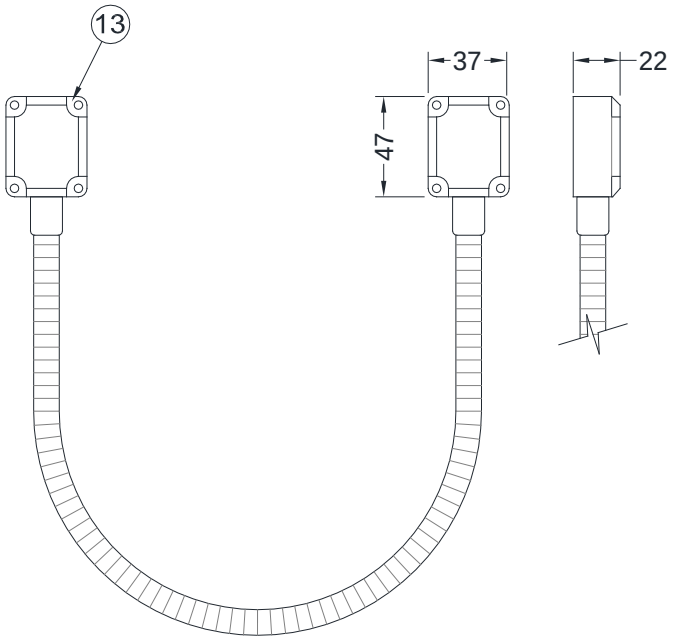
DETAILS OF FR EB 300 LOCK BODY
ITEM - 9



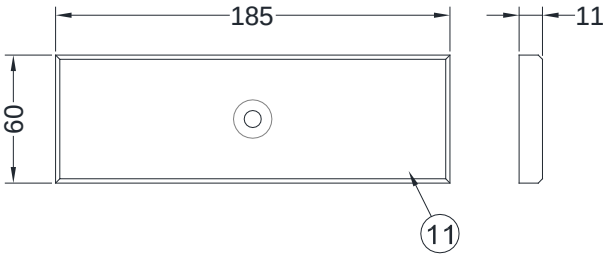
DETAILS OF FR EB 300 LOCK ARMATURE
ITEM - 10

Do not scale. All dimensions are in mm

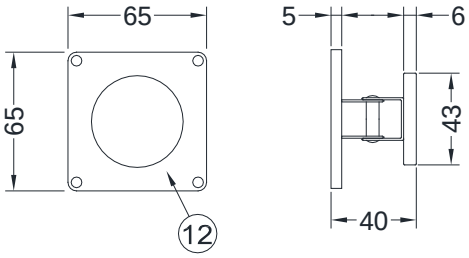
Figure 10 – Details of Items 11 - 13



DETAILS OF DL-SERIES DOOR LOOP
ITEM - 13



DETAILS OF ARMATURE PLATE
ITEM - 11



DETAILS OF GD650S
ARMATURE PLATE
ITEM - 12

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)

Item		Description
1. Doorset A - Door Frame, Jamb & Head		
Material	:	Pine Softwood.
Density	:	510 ~ 550 kg/m³ nominal.
Average moisture content	:	Measured with a Protimeter moisture meter by Exova Warringtonfire.
i. doorset A	:	9.1 %
Overall size	:	70 mm x 45 mm, with 45 mm x 14 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 B - Door Frame, Jamb & Head		
Material	:	Sapele Hardwood.
Density	:	620 ~ 660 kg/m³ nominal.
Average moisture content	:	Measured with a Protimeter moisture meter by Exova Warringtonfire.
i. doorset B	:	8.8 %
Overall size	:	93 mm x 55 mm, with 56 mm x 19mm 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.
3. Doorset A - Door Leaf		
Manufacturer	:	Halspan.
Reference	:	Prima.
Average moisture content		Measured with a Protimeter moisture meter by Exova Warringtonfire.
i. doorset A	:	7.9 %
Overall thickness	:	44mm.
Construction		
Core	:	Chipboard.
Lippings	:	Hardwood 8 mm thick, to vertical edges only.
ii. species	:	Sapele.
iii. density	:	660 kg/m3, nominal.
Adhesive to lipping		
iv. manufacturer	:	Polyvine.
v. type	:	Formaldehyde.

Item		Description
3. Doorset A - Door Leaf (continued)		
vi. reference	:	Cascamite.
vii. curing Method	:	Cold press.
viii. application method	:	Brushed.
4. Doorset B - Door Leaf		
Manufacturer	:	Halspan.
Reference	:	Prima.
Average moisture content	:	Measured with a Protimeter moisture meter by Exova Warringtonfire
i. doorset B	:	7.6 %
Overall thickness	:	54mm.
Construction		
Core	:	Chipboard.
Lippings	:	Hardwood 8 mm thick, to vertical edges only.
ii. species	:	Sapele.
iii. density	:	660 kg/m3, nominal.
Adhesive to lipping		
iv. manufacturer	:	Polyvine.
v. type	:	Formaldehyde.
vi. reference	:	Cascamite.
vii. curing Method	:	Cold press.
viii. application method	:	Brushed.
5. 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.
6. 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	:	5 off.
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.
xii. Doorset B (60 minute)	:	Bedded on two layers of 1 mm Interdens sheet.

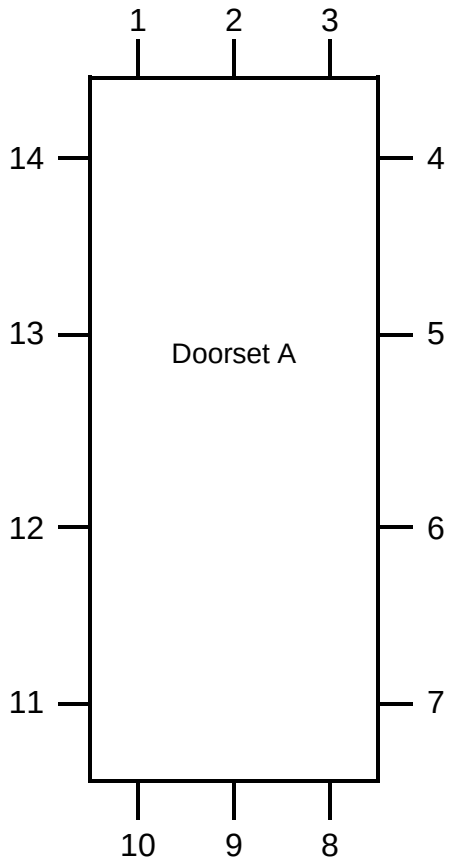
Item		Description
7. Magnetic Lock Body		
Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	FR – SL500.
Type	:	Electromagnetic Door Lock.
Material	:	Steel.
Overall size	:	182 mm long x 30 mm wide x 25 mm deep.
Fixing method	:	Fixed within a mortice in the door frame.
Fixings		
i. type	:	Countersunk head self-tapping steel screws.
ii. material	:	Steel.
iii. size	:	25 mm long by 4 mm diameter (supplied with unit)
Intumescent bedding material		
iv. doorset A	:	Bedded on one layer of 1 mm Interdens sheet.
v. doorset B	:	Bedded on two layers of 1 mm Interdens sheet.
Operation of lock	:	Disengaged.
8. Magnetic Lock Armature		
Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	FR – SL500.
Type	:	Electromagnetic Door Armature.
Material	:	Steel.
Overall size	:	182 mm long x 30 mm wide x 23.6 mm deep.
Fixing method	:	Fixed within a mortice in the door leaf.
Fixings		
i. type	:	Countersunk head self-tapping steel screws.
ii. material	:	Steel.
iii. size	:	25 mm long by 4 mm diameter (supplied with unit)
Intumescent bedding material		
iv. doorset A	:	Bedded on one layer of 1 mm Interdens sheet.
v. doorset B	:	Bedded on two layers of 1 mm Interdens sheet.
9. Magnetic Lock Body		
Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	FR – EB 300.
Type	:	Electromagnetic Door Lock.
Lock Case		
i. material	:	Aluminium.
ii. thickness	:	3 mm.
Overall size	:	166 mm long x 56 mm wide x 34.5 mm deep.
Fixing method	:	Fixed to the exposed face of the door leaf.
Fixings		
iii. type	:	M6 hex head bolt fixed into a blind nut.
iv. material	:	Steel.
v. size	:	M6 46 mm x 4 mm diameter hex head bolt with a 15 mm x 9 mm diameter blind nut. (supplied with unit)
Intumescent bedding material	:	None fitted.
10. Magnetic Lock Armature		
Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	FR – EB 300.
Type	:	Electromagnetic Door Lock.
Lock Case		
i. material	:	Aluminium.
ii. thickness	:	3 mm.
Overall size	:	166 mm long x 56 mm wide x 34.5 mm deep.
Fixing method	:	Fixed to the exposed face of the door leaf.

Item		Description
10. Magnetic Lock Armature (continued)		
Fixings		
iii. type	:	M6 hex head bolt fixed into a blind nut.
iv. material	:	Steel.
v. size	:	M6 46 mm x 4 mm diameter hex head bolt with a 15 mm x 9 mm diameter blind nut. (supplied with unit)
Intumescent bedding material	:	None fitted.
11. Armature Plate		
Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	U series / A Series Armature Plate.
Type	:	Steel Armature Plate.
Material		
i. material	:	Steel.
ii. thickness	:	11 mm.
Overall size	:	185 mm long x 60 mm wide x 11 mm deep.
Fixing method	:	Through fixed to the face of the door leaf.
Fixings		
iii. type	:	Bolt into a blind nut.
iv. material	:	Steel.
v. size	:	37 mm x 7 mm diameter bolt screwed through the plate into a 39 mm x 12 mm diameter dome head blind nut. (supplied with unit)
Intumescent bedding material	:	None fitted.
12. Magnetic Lock Armature		
Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	GD650S.
Type	:	Electromagnetic Door Lock Armature.
Materials	:	Steel/Plastic.
i. armature plate	:	Steel.
ii. back plate	:	Plastic.
Sizes		
i. overall	:	65 mm long x 65 mm wide x 40 mm deep.
ii. armature plate	:	6 mm x 43 mm diameter
iii. back plate	:	5 mm x 65 mm
Fixing method	:	Fixed to the exposed face of the door leaf.
Fixings		
i. type	:	Countersunk head wood screws.
ii. material	:	Steel.
iii. size	:	31 mm x 5 mm diameter countersunk head wood screws. (supplied with unit)
Intumescent bedding material	:	None fitted.

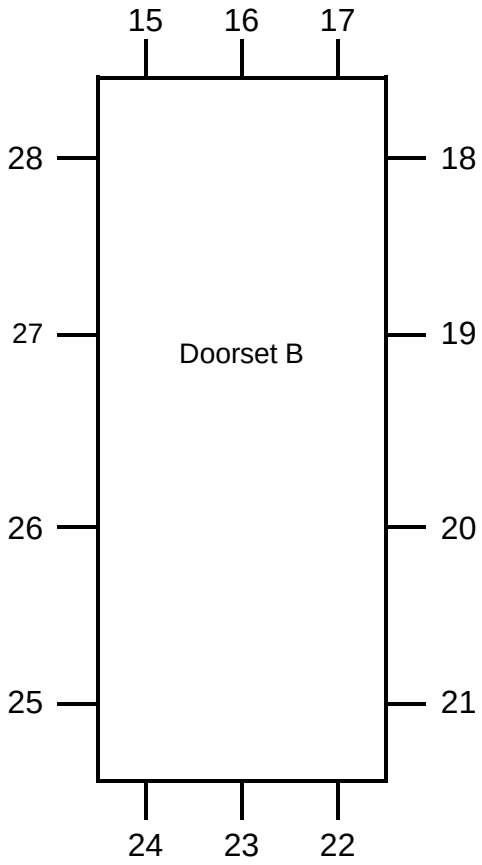
13. Door Cable Loop

Manufacturer	:	GEM® Gianni Industries Inc.
Reference	:	DL Series.
Type	:	Door Lock Cable Loop.
Material	:	Steel
Sizes		
iv. cable box	:	37 mm x 47 mm x 22 mm.
v. cable gland	:	18 mm x 15 mm diameter.
vi. hose	:	500 mm x 12 mm diameter.
Fixing method	:	Fixed to the exposed face of the door leaf and frame.
Fixings		
iv. type	:	Countersunk head wood screws.
v. material	:	Steel.
vi. size	:	37 mm x 4 mm diameter countersunk head wood screws. (supplied with unit)
Intumescent bedding material	:	None fitted.

Doorset Clearance Gaps



View from unexposed face



View from unexposed face

Door Ref	Gap Dimension in mm at Positions													
A	1	2	3	4	5	6	7	8*	9*	10*	11	12	13	14
	1.3	1.5	1.5	1.2	1.1	1	1.1	7	7.3	7.3	0.7	0.7	0.4	0.5
B	15	16	17	18	19	20	21	22*	23*	24*	25	26	27	28
	1.7	1.7	1.7	0.3	0.3	0.2	0.2	7.6	5.9	5.8	0.2	0.2	0.3	0.4
A	Mean		1		Maximum			1.5		Minimum			0.4	
B	Mean		0.7		Maximum			1.7		Minimum			0.2	

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
	1.7	1.8	1.9	2.3	2.3	2.3	2.8	N/A	N/A	N/A	2.4	2.1	2.1	2.2
B	15	16	17	18	19	20	21	22*	23*	24*	25	26	27	28
	3.2	3.6	3.5	2.2	2.2	2.2	2.1	N/A	N/A	N/A	3.2	4	4.1	4.2

* Dimension not included in calculations

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 100 mm in from the door leaf vertical edges, two at mid-height, and two in the top corners.
Thermocouples 22 to 25 (Doorset A) & Thermocouples 26 to 29 (Doorset B)	At four positions on the unexposed door frame, at two positions on the top horizontal frame member, approximately 50 mm from each vertical edge and one on each vertical member, positioned 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.
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 Doorsets was 13.4 (±3)

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 16ºC at the start of the test with a maximum variation of +2ºC during the test.
00	**00**	**The test commences.**
00	**20**	Smoke release from the head of each door leaf A and B.
01	**00**	The smoke release discontinues.
02	**05**	The smoke release increases from the head of each doorset.
03	**00**	The exposed face of each specimen ignites causing flaming within the furnace chamber.
05	**20**	The smoke release begins to lessen from each doorset.
09	**00**	The smoke release lessens further.
15	**00**	Viewed from the exposed face; both doorsets are charred and cracked and glow a dull orange in colour.
30	**00**	Both doorsets continues to satisfy the integrity and insulation criteria.
33	**00**	An area of glowing is visible at the head of the leading edge of Doorset A.
36	**55**	A cotton wool pad is used on the top of the leading edge of Doorset A. The pad ignites**. Cotton pad integrity failure of Doorset A is deemed to occur.**
38	**00**	Sustained flaming issues from the head of the leading edge of Doorset A. **Sustained flame integrity failure of Doorset A is deemed to occur**
44	**00**	Smoke issues from the top left corner of the lead of Doorset B, where hardware is installed.
60	**00**	Doorset B continues to satisfy the integrity and insulation criteria of the test.
62	**00**	Sustained flaming issues from the lower hinge position of Doorset B. **Sustained flame integrity failure of Doorset B is deemed to occur.**
66	**00**	**Test discontinued**.

Test Photographs

The exposed face of the doorsets prior to testing

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

The unexposed face of the doorsets after a test duration of 10 minutes

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

The unexposed face of the Doorsets after a test duration of 60 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	27
2	445	462
4	544	583
6	603	573
8	646	629
10	678	682
12	706	704
14	728	726
16	748	743
18	766	766
20	781	784
22	796	798
24	809	809
26	820	821
28	832	833
30	842	843
32	852	851
34	860	862
36	869	871
38	877	877
40	885	884
42	892	890
44	899	900
46	906	909
48	912	913
50	918	918
52	924	926
54	930	930
56	935	936
58	940	939
60	945	945
62	950	949
64	955	957
66	960	959

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	20	19	19	19	19
2	20	20	19	19	19	19
4	20	20	19	19	19	19
6	20	20	19	21	19	20
8	20	20	20	19	19	20
10	20	21	20	19	20	20
12	21	22	22	21	22	22
14	23	25	25	23	24	24
16	26	28	28	26	28	27
18	29	31	32	29	31	30
20	32	34	35	32	35	34
22	35	37	39	35	39	37
24	39	41	42	38	42	40
26	43	45	46	42	46	44
28	47	49	49	45	49	48
30	51	53	53	49	53	52
32	55	57	57	53	56	56
34	59	61	60	57	60	59
36	63	65	64	61	64	63
38	67	68	67	65	67	67
40	71	71	71	68	70	70
42	72	71	73	70	72	72
44	75	72	70	74	74	73
46	79	76	74	78	78	77
48	82	80	78	81	82	81
50	84	70	82	83	83	80
52	87	64	85	85	86	81
54	89	69	88	87	86	84
56	92	75	90	89	90	87
58	92	81	92	90	94	90
60	96	89	95	94	101	95
62	99	93	99	98	111	100
64	*	*	*	*	*	*
66	*	*	*	*	*	*

*Thermocouple Malfunction

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	19	19	19	19	19	19
2	19	19	19	19	19	19
4	19	19	19	19	19	19
6	19	20	19	19	19	19
8	19	20	19	19	19	19
10	19	20	19	19	19	19
12	20	20	19	19	19	19
14	20	20	20	20	20	20
16	22	21	20	21	21	21
18	23	23	21	22	22	22
20	25	24	22	24	23	24
22	26	25	24	25	25	25
24	28	27	25	27	27	27
26	30	29	27	29	28	29
28	32	31	29	31	30	31
30	34	33	31	33	33	33
32	37	36	33	36	35	35
34	39	38	36	38	38	38
36	42	41	39	41	40	41
38	44	44	42	43	43	43
40	47	46	44	46	46	46
42	50	49	48	49	49	49
44	52	51	51	52	52	52
46	55	54	54	55	55	55
48	58	56	58	58	59	58
50	60	59	61	61	62	61
52	63	61	64	64	65	63
54	66	64	68	67	68	67
56	68	67	71	70	71	69
58	71	69	74	73	74	72
60	73	72	76	76	77	75
62	75	74	79	78	80	77
64	77	76	81	81	82	79
66	79	79	83	83	84	82

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

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	20	20	20
2	21	22	20	20
4	22	22	20	20
6	21	21	20	20
8	21	22	20	20
10	23	25	21	21
12	28	29	22	23
14	32	34	24	26
16	36	37	27	29
18	40	41	29	33
20	44	44	31	36
22	47	47	34	40
24	50	49	38	44
26	54	53	41	47
28	57	56	45	51
30	60	59	49	54
32	63	62	53	58
34	66	65	57	61
36	69	68	61	64
38	72	72	65	67
40	74	*	69	70
42	72	*	71	72
44	70	*	75	75
46	76	*	79	78
48	80	*	82	80
50	84	*	84	79
52	86	*	87	84
54	85	*	86	78
56	86	*	89	78
58	88	*	90	86
60	104	*	93	92
62	190	*	95	96
64	409	*	*	*
66	545	*	*	*

*Thermocouple Malfunction

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

Time Mins	T/C Number 18 Deg. C	T/C Number 19 Deg. C	T/C Number 20 Deg. C	T/C Number 21 Deg. C
0	20	20	20	20
2	22	20	20	20
4	22	21	20	20
6	21	21	20	20
8	21	21	20	20
10	22	21	20	20
12	23	22	20	20
14	27	24	21	21
16	30	26	22	21
18	33	29	23	22
20	37	32	24	23
22	40	35	26	24
24	43	37	27	25
26	45	40	29	27
28	48	43	31	29
30	50	45	33	31
32	52	47	36	33
34	53	50	38	36
36	55	52	40	38
38	56	54	43	41
40	58	56	46	44
42	59	58	48	48
44	60	59	51	51
46	62	61	54	54
48	63	63	57	58
50	65	65	60	61
52	67	66	63	64
54	69	68	66	68
56	71	70	69	71
58	73	72	72	74
60	74	73	74	77
62	77	75	77	80
64	79	77	79	82
66	81	79	81	84

Individual temperatures recorded on the unexposed surface of Door Frame A

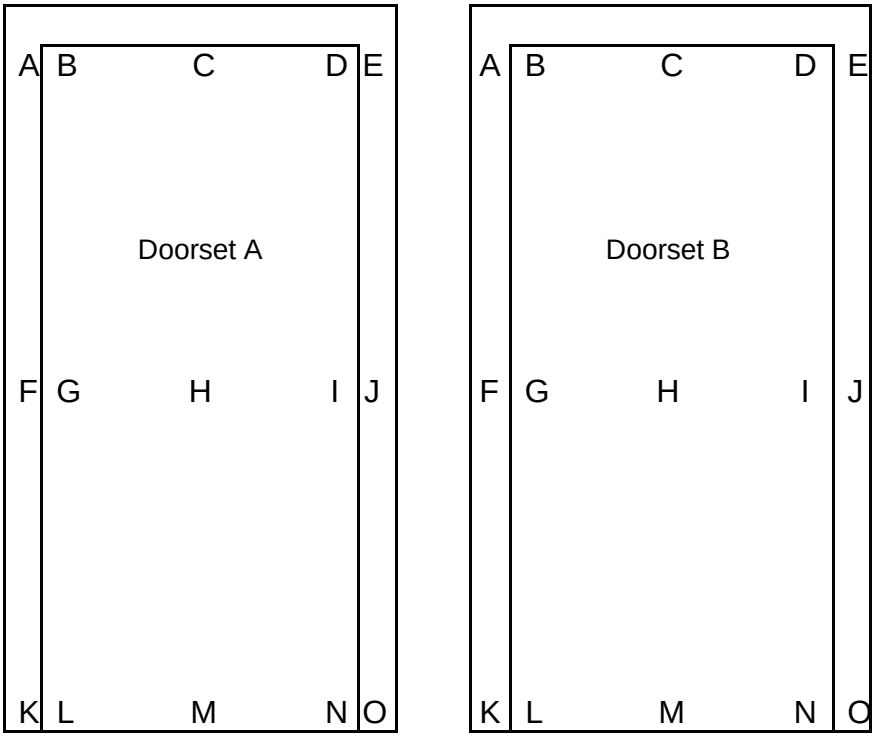
Time Mins	T/C Number 22 Deg. C	T/C Number 23 Deg. C	T/C Number 24 Deg. C	T/C Number 25 Deg. C
0	19	19	19	18
2	19	25	25	18
4	19	36	42	19
6	19	40	47	19
8	19	43	48	19
10	20	49	45	19
12	20	47	39	20
14	21	43	38	20
16	22	41	38	21
18	23	40	40	21
20	25	41	41	22
22	27	42	43	23
24	29	45	45	24
26	31	46	47	26
28	33	48	49	28
30	35	51	51	29
32	37	55	54	32
34	39	59	63	34
36	41	67	67	36
38	43	75	75	37
40	45	84	69	36
42	47	81	66	34
44	49	75	69	34
46	51	74	86	34
48	54	75	112	35
50	56	77	*	38
52	58	79	*	39
54	58	82	*	38
56	56	88	*	40
58	60	91	*	42
60	62	136	*	43
62	67	305	*	44
64	*	462	*	45
66	*	597	*	49

*Thermocouple Malfunction

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	19
2	18	20	19	19
4	18	33	19	19
6	18	45	19	19
8	18	52	20	19
10	18	48	20	19
12	18	44	20	19
14	18	41	21	19
16	18	39	22	19
18	18	39	24	20
20	19	39	28	20
22	19	39	31	21
24	19	39	34	22
26	20	41	36	23
28	21	41	38	24
30	22	40	41	25
32	23	39	41	26
34	24	39	42	28
36	25	39	42	29
38	27	39	42	30
40	28	39	43	31
42	29	40	43	32
44	31	41	43	33
46	32	42	44	35
48	33	43	44	36
50	34	45	46	37
52	35	45	47	38
54	36	47	49	39
56	37	49	50	40
58	39	49	51	42
60	40	51	53	43
62	41	54	55	45
64	44	59	58	46
66	46	66	62	48

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

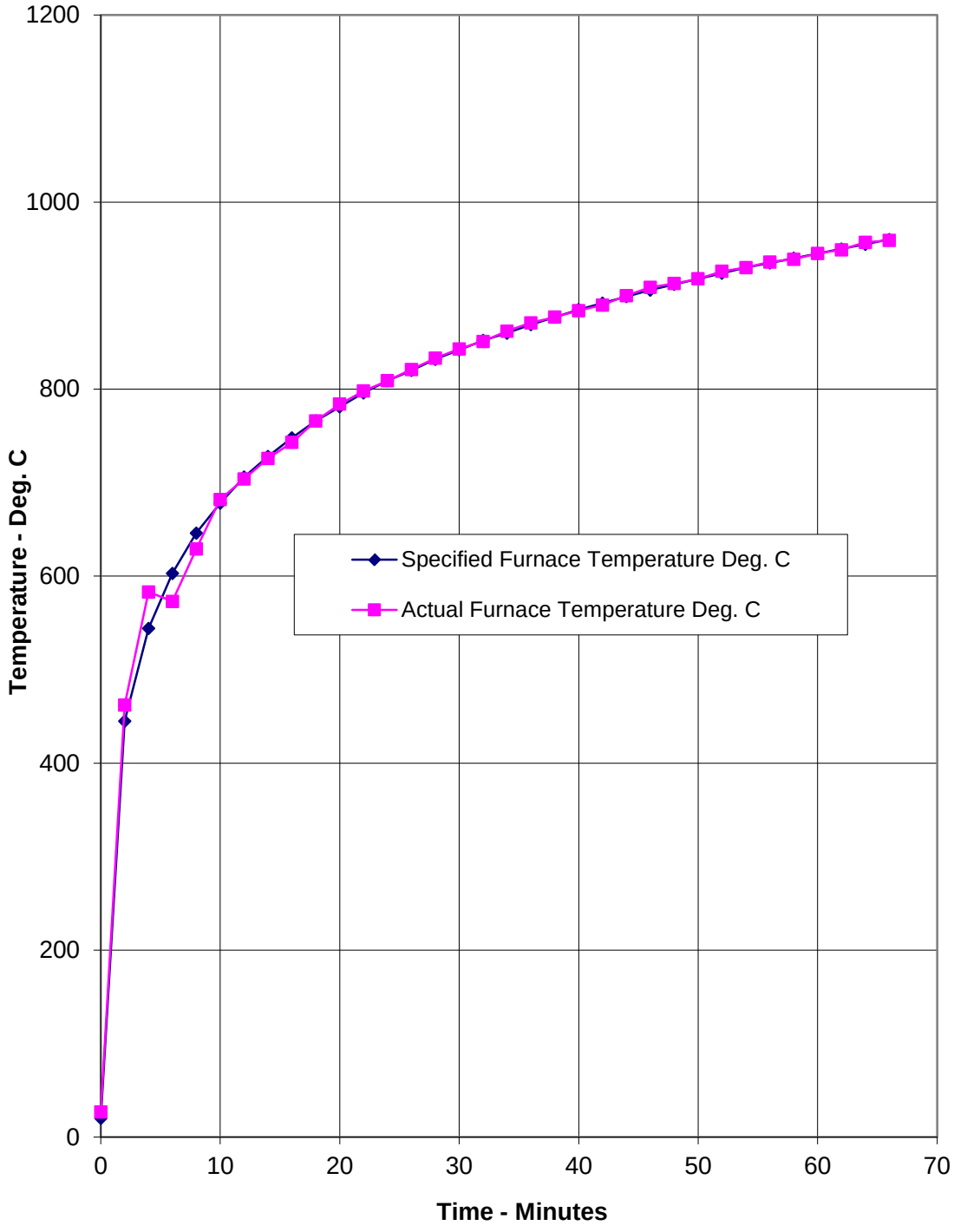


Doorset A															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5	-7	-3	-3	5	-2	-3	-1	-8	-4	-1	-1	-5	0	-3
10	3	-5	-5	-2	2	-1	-1	-3	-7	-1	-2	3	1	0	-4
15	3	-3	0	0	8	0	-1	0	-2	0	1	5	4	6	0
20	4	-3	-2	0	3	-1	-2	-2	-4	-1	1	4	1	5	-2
25	2	-3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

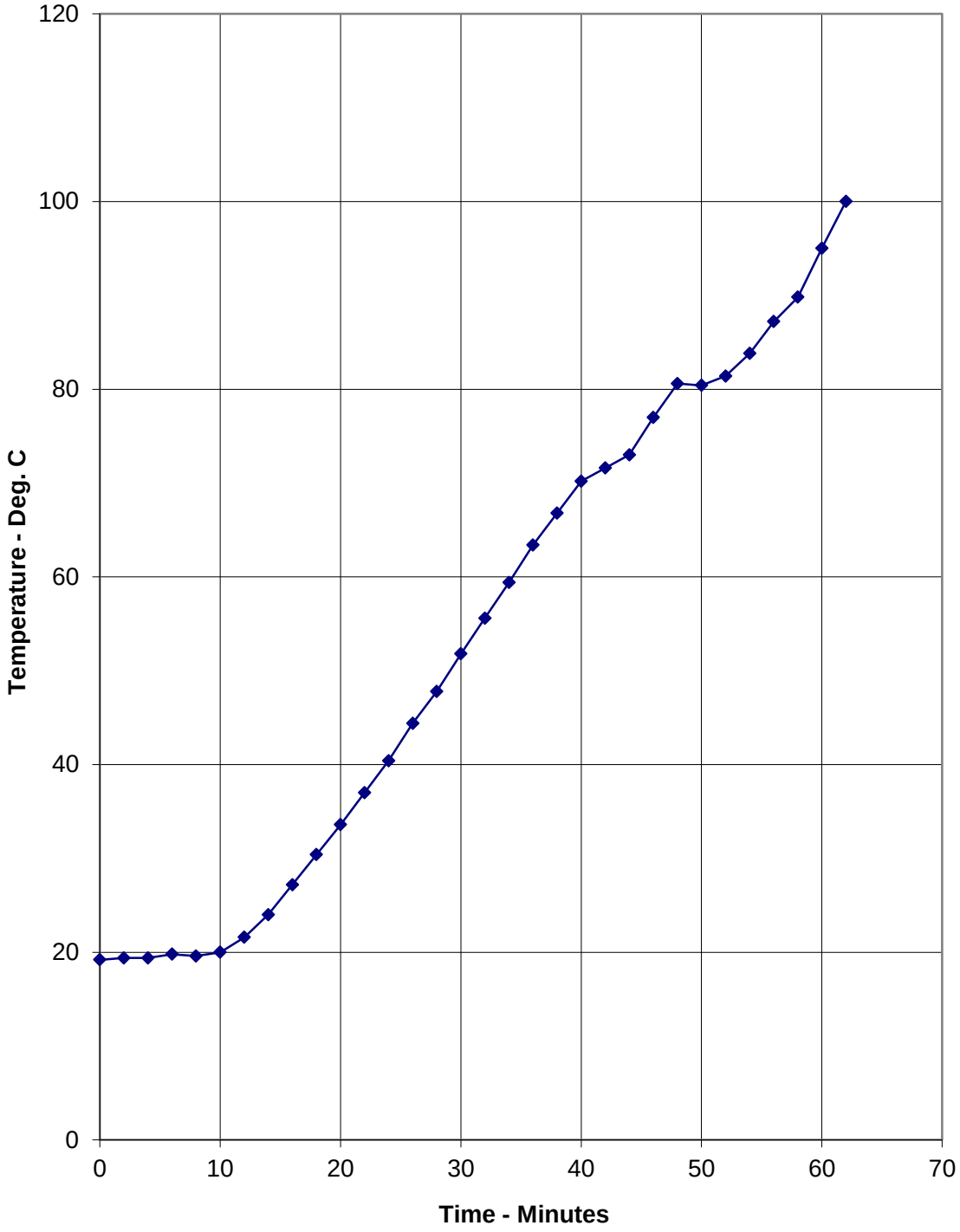
Doorset B															
Deflections – mm															
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	-2	-5	-13	-6	-2	3	0	-2	-3	-6	0	-2	-1	-3	-3
20	-3	-2	-6	-4	-3	3	2	3	-3	-1	2	-1	-1	-2	0
30	-5	-5	-6	-5	-4	3	3	3	-4	-5	1	1	1	-1	2
40	0	-1	-8	-6	-4	1	4	4	0	-2	1	5	1	-1	1
50	-3	1	-4	-1	-2	-1	-2	-9	-4	-6	0	4	-4	2	-1
60	3	0	-7	-4	-1	-1	-3	-18	-12	-6	5	13	-8	0	0

Positive values indicate a deflection towards the heating condition of the test

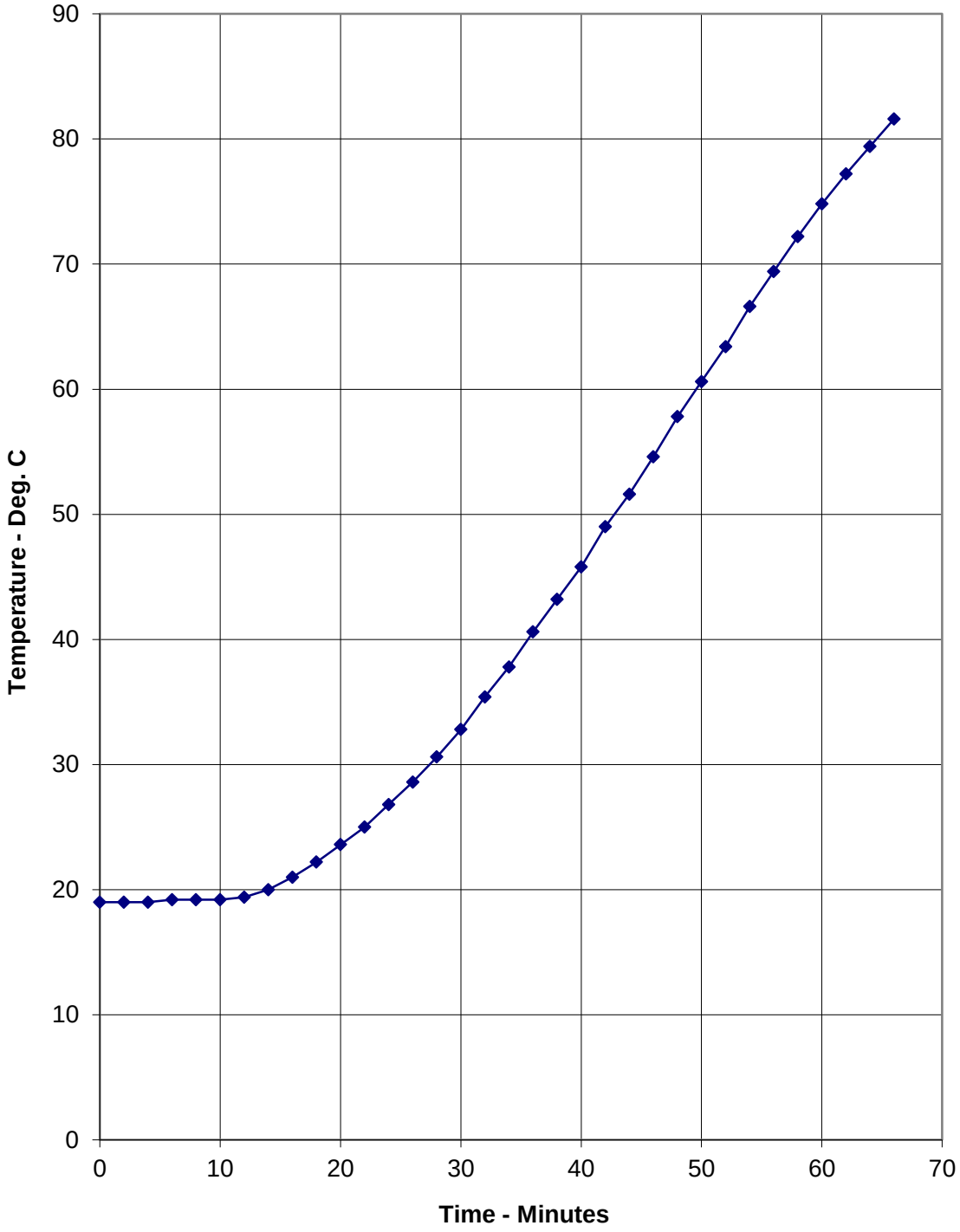
Graph showing mean furnace temperature, together with the temperature/time relationship specified in the Standard



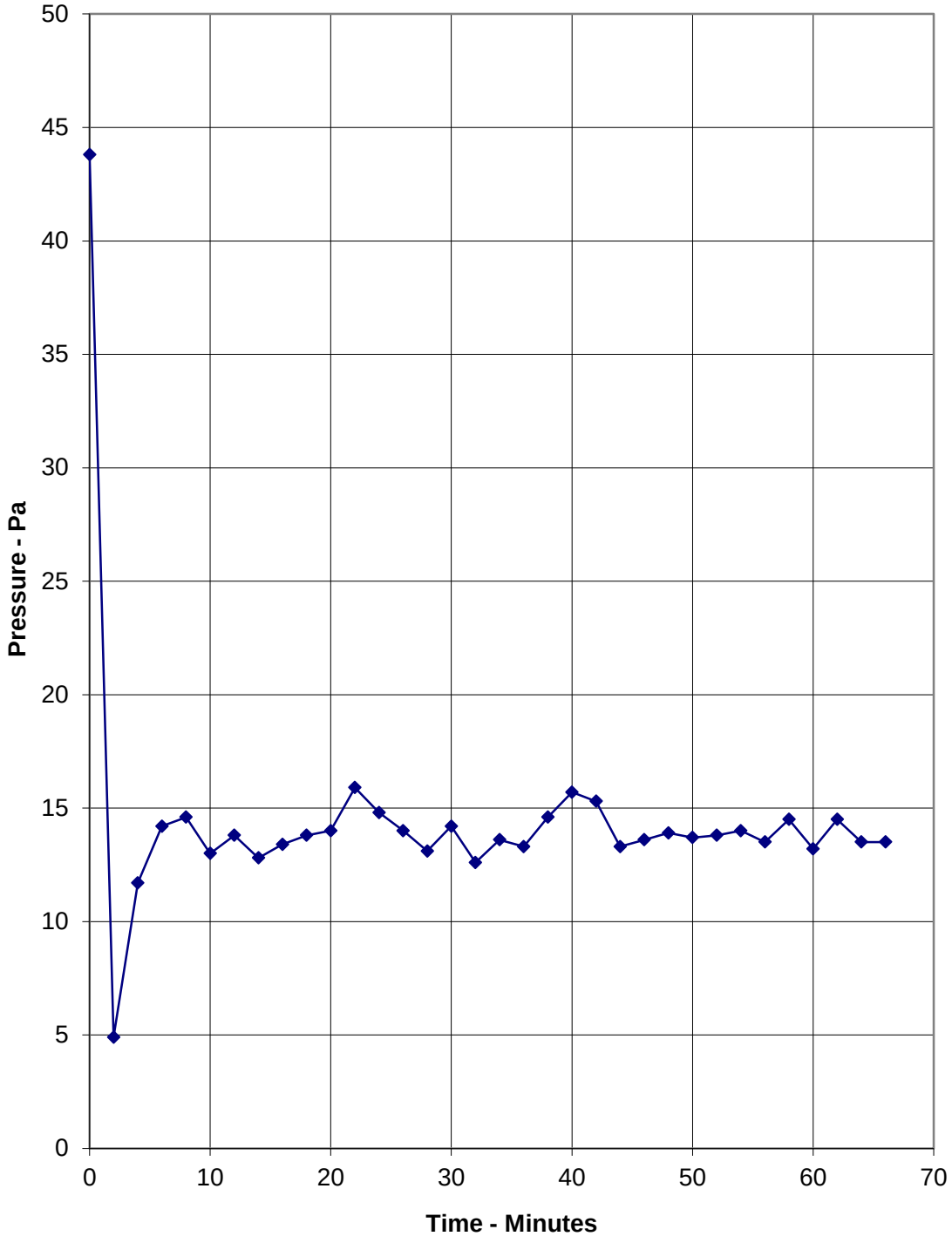
Graph showing mean temperatures recorded on the unexposed surface of Doorset A



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	38 minutes	62 minutes
Gap gauge	40 minutes[#]	66 minutes*
Cotton pad	36 minutes	62 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:**

36 minutes	62 minutes

*The test was discontinued after a period of 66 minutes.
[#] Sections of the doorset sealed allowing 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 both 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	38 minutes	62 minutes
	Gap gauge	40 minutes[#]	66 minutes*
	Cotton Pad	36 minutes	62 minutes
Insulation		36 minutes	62 minutes

*The test was discontinued after a period of 66 minutes.
[#] Sections of the doorset sealed allowing the test to continue.