

Title:

The Fire Resistance
Performance Of A Single-
Leaf, Timber Sliding
Doorset, When Tested In
Accordance With BS EN
1634-1:2014 + A1:2018

Date Of Test:

20th September 2019

Issue 1:

5th November 2019

WF Report No:

413105



Prepared for:

PC Henderson Limited

Durham Road
Bowburn
Durham
DH6 5NG
United Kingdom



0249

Test Specimen

Summary of Tested Specimen

The doorset had overall nominal dimensions of 1887 mm wide by 2385 mm high, incorporating a single door leaf with overall dimensions of 930 mm wide by 2315 mm high by 44 mm thick. The door leaf was formed from a tri-laminated three layer hardwood timber core with 6 mm thick hardwood lippings to all vertical edges and 4 mm thick plywood facings.

The leaf was housed in an aluminium pocket frame with a softwood liner kit. The pocket frame incorporated two pairs of aluminium uprights with noggins and tie backs. The aluminium framing was formed from 55 x 20 mm extruded aluminium sections. The leaf was hung off an aluminium header track on a steel hanger with silicone rubber wheels.

The threshold of the leaf ran on a plastic floor guide with the blade running centrally along a channel routed in the base of the leaf. The softwood liner encased the head and formed the uprights / jambs. The door assembly was housed in a timber frame partition, clad on both faces with two layers of 12.5 mm Fireline plasterboard. The doorset was held closed by an internal self-closing mechanism for the test duration.

Detailed drawings of the test specimen(s) and a comprehensive description of the test construction based on a detailed survey of the specimen(s) and information supplied by the sponsor of the test are included in the Test Specimen and Schedule of Components sections of this report.

Performance Criteria and Test Results

Integrity	It is required that the specimen retains 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 + A1:2018, or resulting in sustained flaming on the unexposed surface. These requirements were satisfied for the periods shown below:	
Sustained flaming	36 minutes	
Gap gauge	38 minutes	No failure*
Cotton pad	36 minutes	
Insulation (I ₂)	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 with the exception that the limit for temperature rise for any frame member or transom member adjacent to the leaf/leaves of the doorset or openable window shall be 360°C. Insulation failure also occurs simultaneously with integrity failure as specified in BS EN 1634-1: 2014 + A1:2018. These requirements were satisfied for the period shown below:	
Specimen	36 minutes	Due to integrity failure
Insulation (I ₁)	The test specimen shall be evaluated against the maximum temperature rise criterion specified in EN 1363-1 (180°C).	
	36 minutes	
*Test was discontinued after a period of 38 minutes.		

Date of Test 20 September 2019

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Signatories



Responsible Officer

N. Howard*

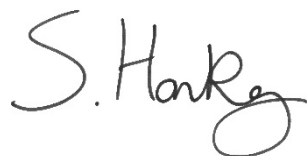
Technical Officer



Approved

S. Gilfedder*

Test Report Co-Ordinator



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S. Hankey*

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

Report Issued

Date: 5th November 2019

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Revision History

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Reason for Revision:	

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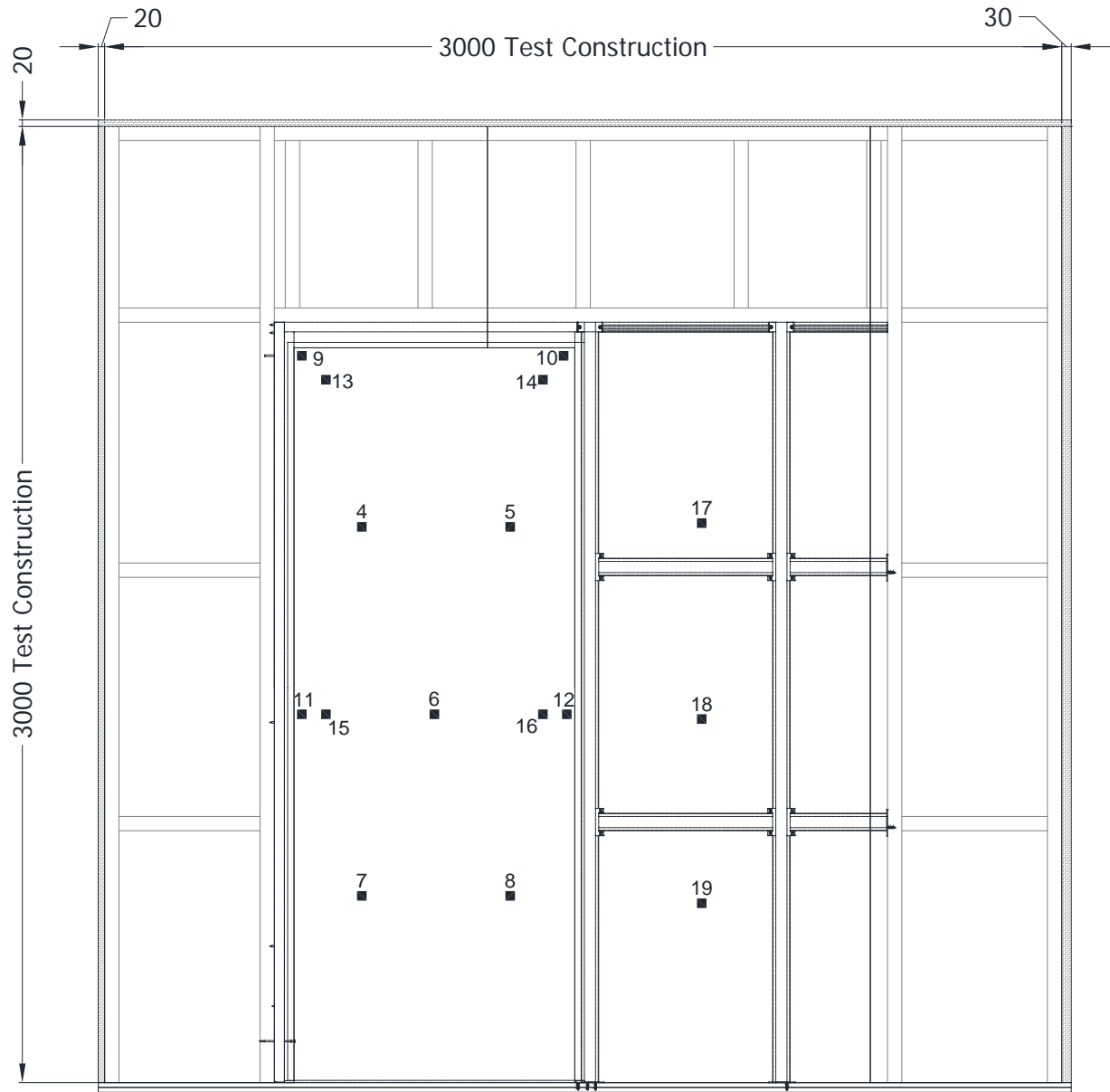
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Test Conditions

Standard	BS EN 1634-1:2014+A1:2018 Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware - Part 1: Fire resistance test for door and shutter assemblies and openable windows
Sampling	Warringtonfire was not involved in the sampling or selection of the tested specimen or any of the components.
Installation	The doorset was received on the 16 th September 2019 and mounted within a partition wall construction. Representatives of Warringtonfire conducted the installation on the 19 th September 2019.
Conditioning	The specimen's 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 15.5°C to 24°C and 48% to 68.5% respectively.
Instruction to Test	The test was conducted on the 20 September 2019 at the request of PC Henderson Limited, the test sponsor.
Pre-Test Conditioning	Prior to testing, the doorset was subjected to appropriate mechanical pre-test conditioning in accordance with the requirement of EN 16034:2014, Annex A.
Ambient Temperature	The ambient air temperature in the vicinity of the test construction was 21°C at the start of the test with a maximum variation of +1°C during the test.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2012 Clause 5.1 using nine plate thermometers, distributed over a plane 100 mm from the surface of the test construction.
Thermocouples	Thermocouples were provided to monitor the unexposed surface of the specimen. The output of all instrumentation was recorded at no less than one minute intervals. The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1.
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: 2012, clause 5.2.1 (including allowance for transient occurrences in-line with permitted deviation as per BS EN 1363-1:2012 Clause 5.7) The calculated pressure differential relative to the laboratory atmosphere at the top of the specimen was 16.0 (± 5) Pa between 5 and 10 minutes and 16.0 (± 3) Pa thereafter. During the test, a pressure exceeding the requirements detailed within Clause 5.2 of BS EN 1363-1: 2012 occurred due to temperature adjustments in the furnace. As this represents more onerous test conditions the test results remain valid in line with clause 5.7 of BS EN 1363-1: 2012.

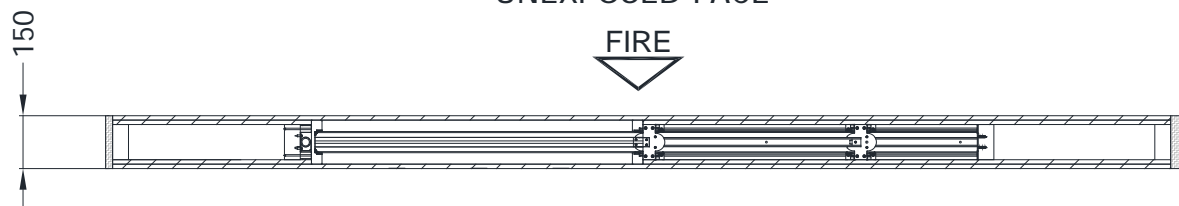
Test Construction

Figure 1- General Elevation of Thermocouple Positions



■ Positions of thermocouples

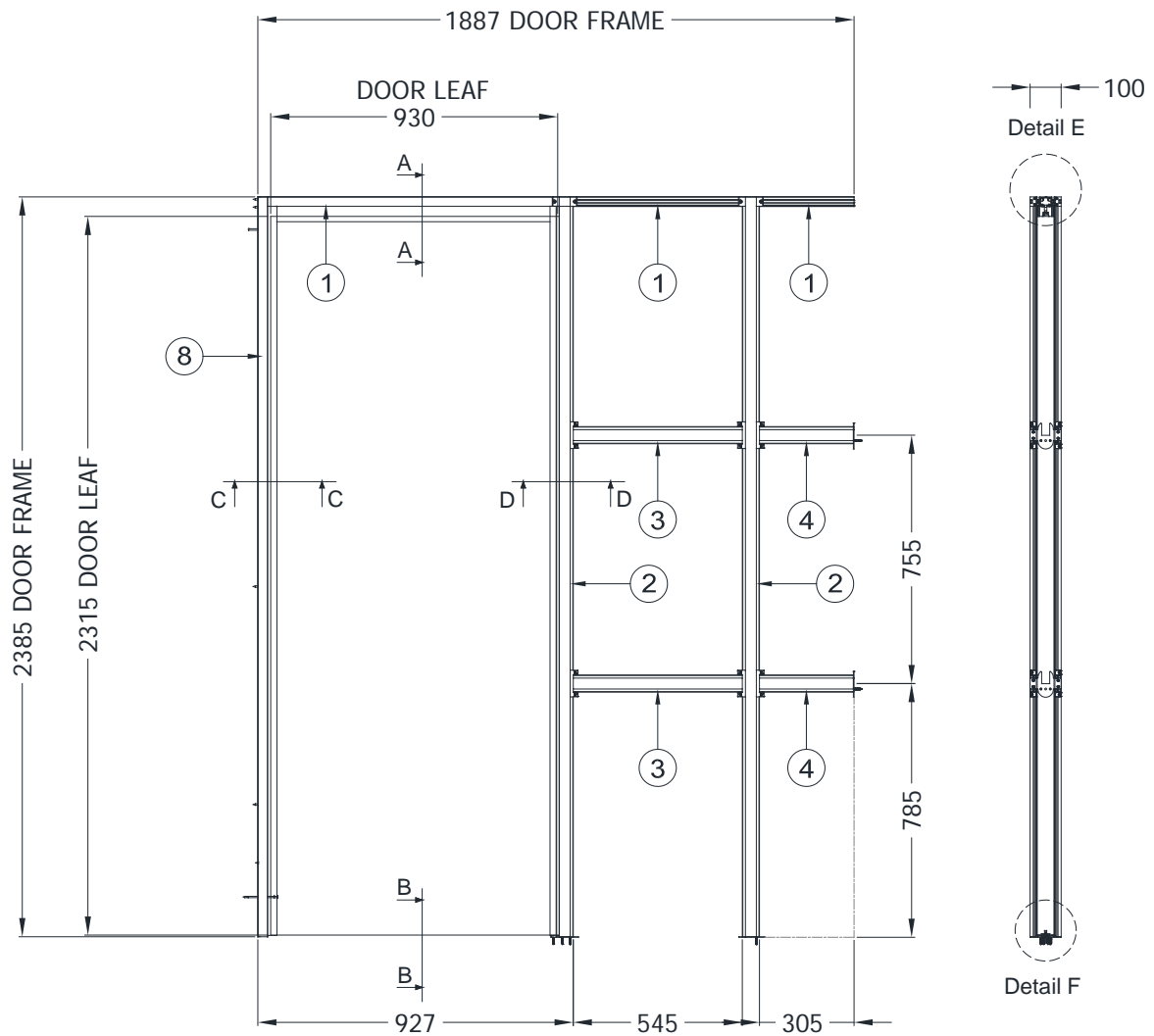
GENERAL ELEVATION OF THERMOCOUPLE POSITIONS
UNEXPOSED FACE



HORIZONTAL SECTION OF TEST CONSTRUCTION

Do not scale. All dimensions are in mm

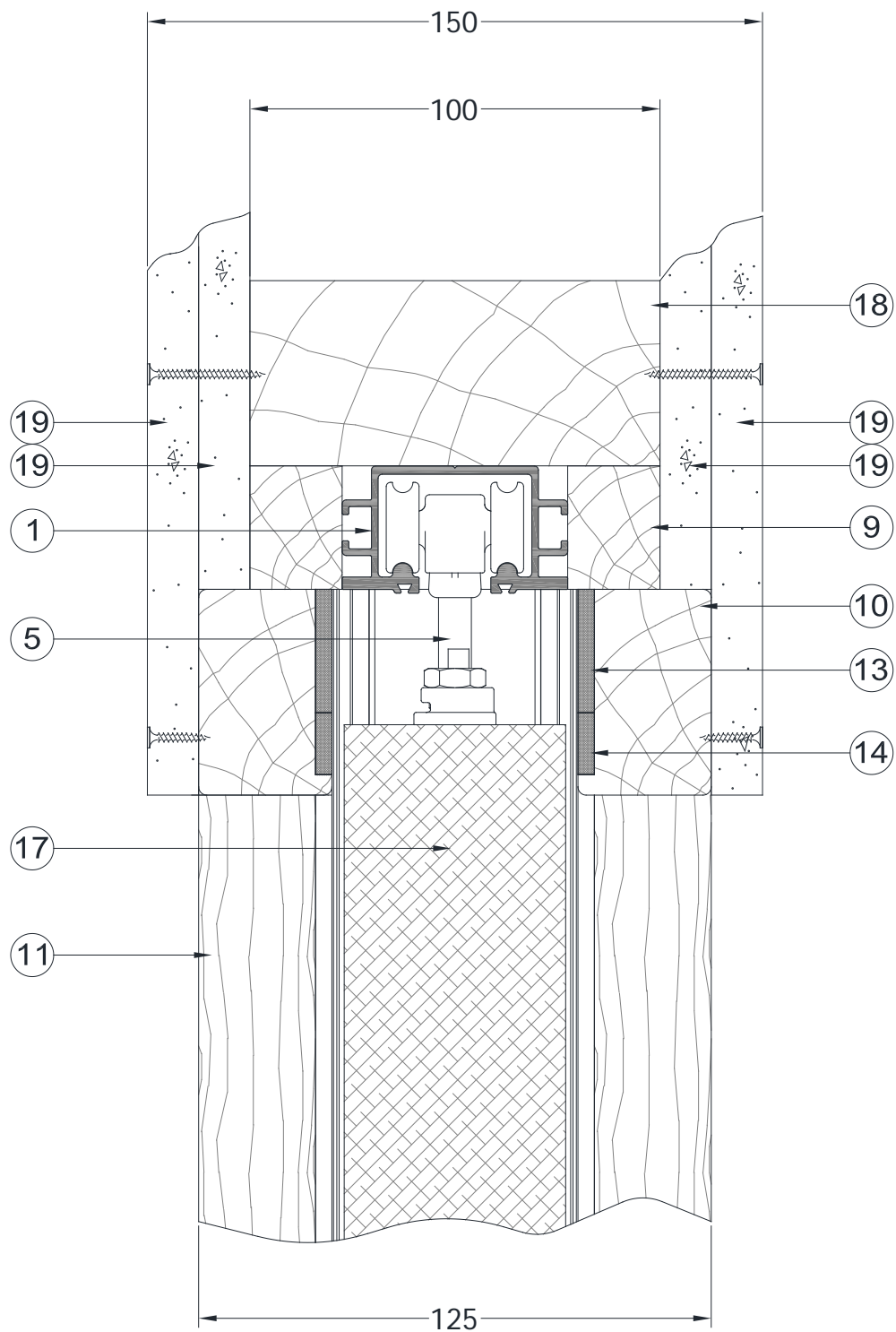
Figure 2 – Doorset - General Elevations



**GENERAL ELEVATIONS OF DOORSET
UNEXPOSED FACE**

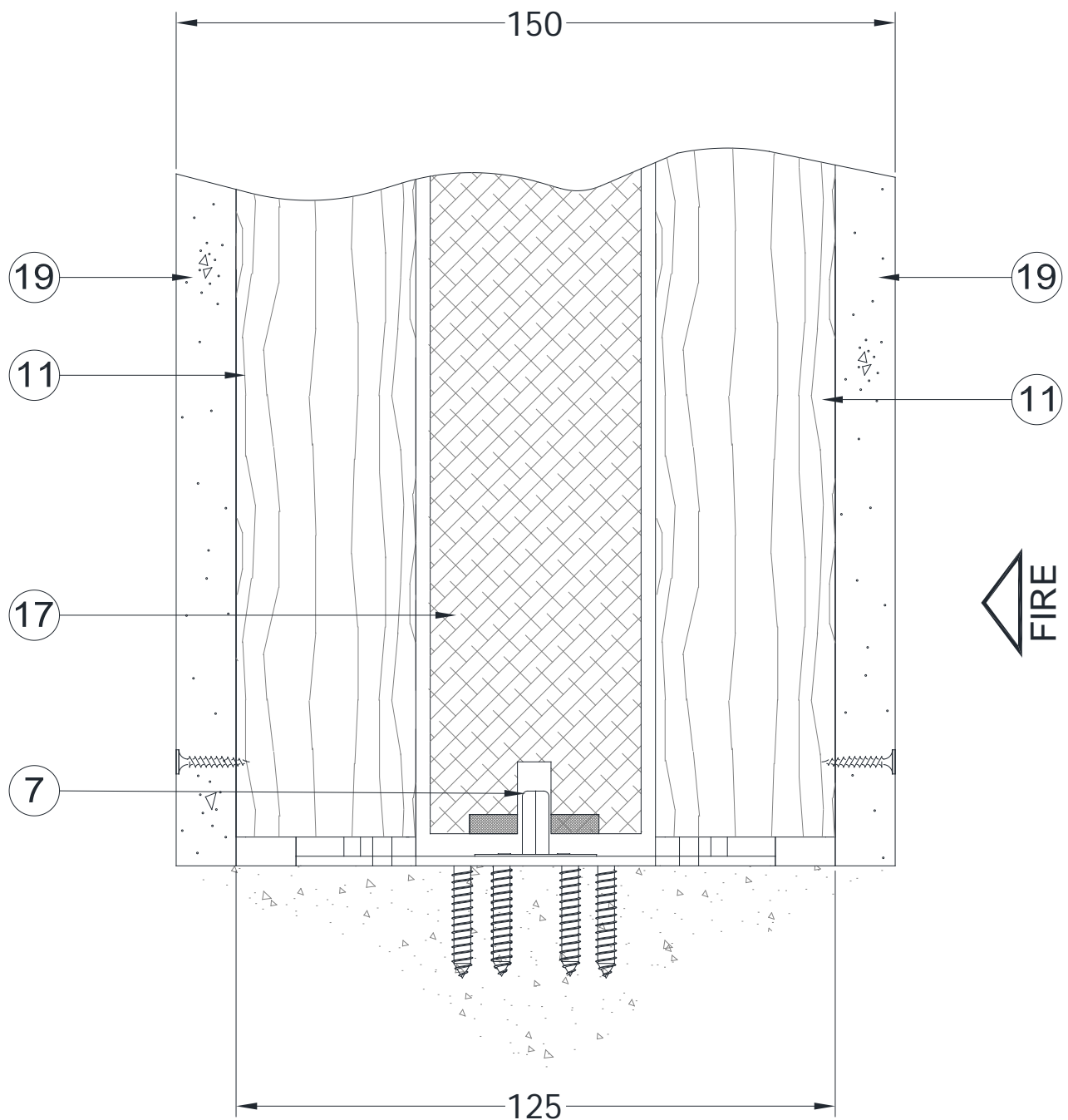
Do not scale. All dimensions are in mm

Figure 3 – View A-A



VIEW A-A - TYPICAL SECTION THROUGH
HEAD OF DOORSET

Do not scale. All dimensions are in mm

Figure 4 – View B-B**VIEW B-B - TYPICAL SECTION THROUGH
BASE OF DOORSET**

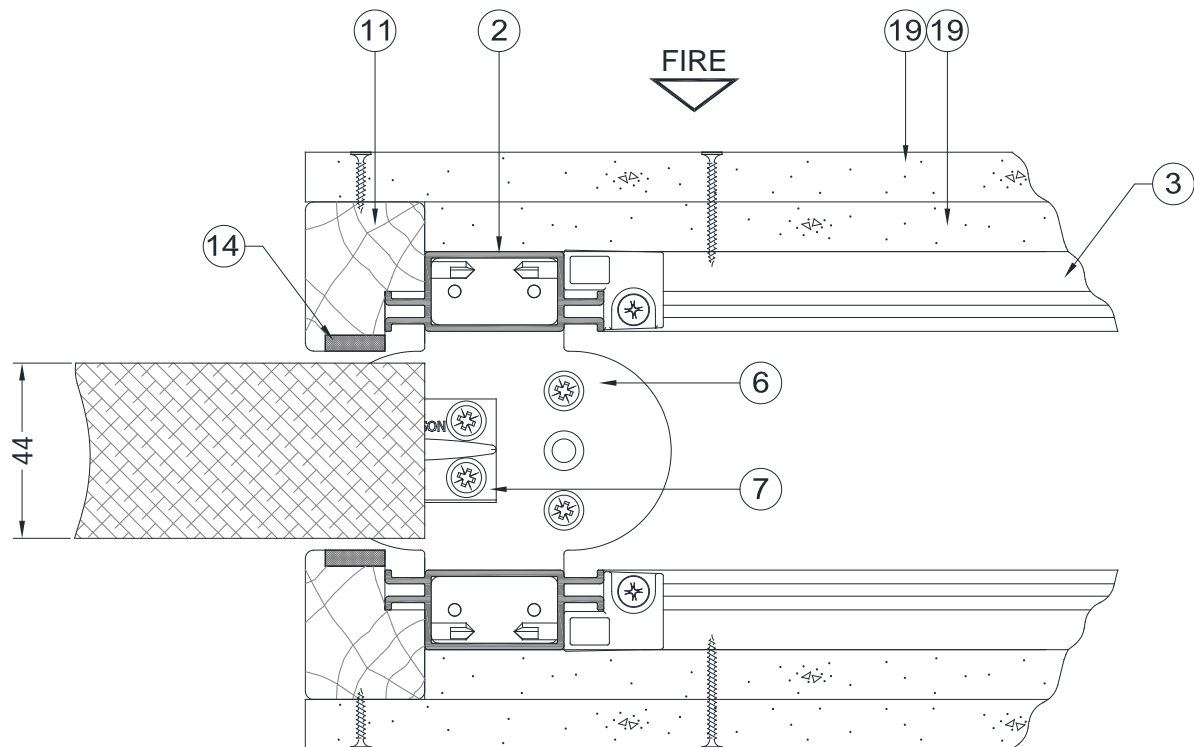
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Figure 5 – Details of Door Frames and Leaves



Do not scale. All dimensions are in mm

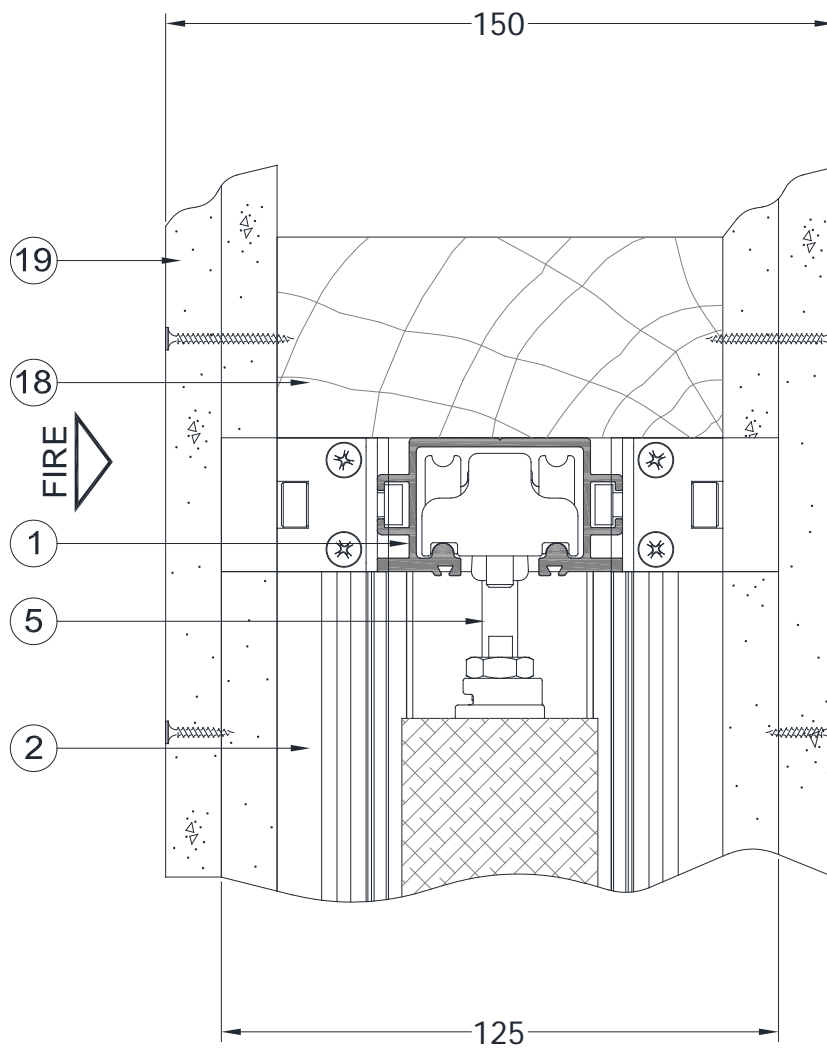
Figure 6 – View D-D



TYPICAL SECTION THROUGH VIEW D-D

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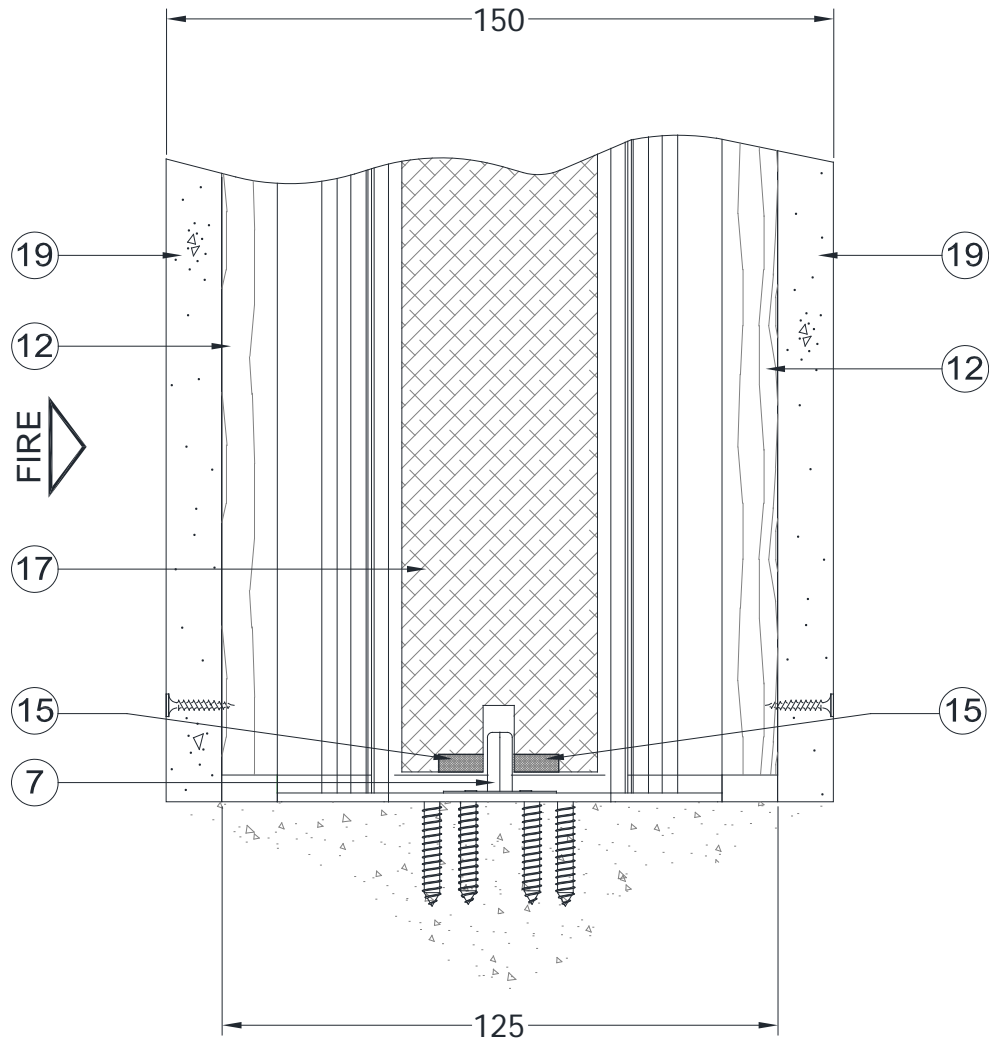
Figure 7 – Detail E-E



DETAIL E-E

Do not scale. All dimensions are in mm

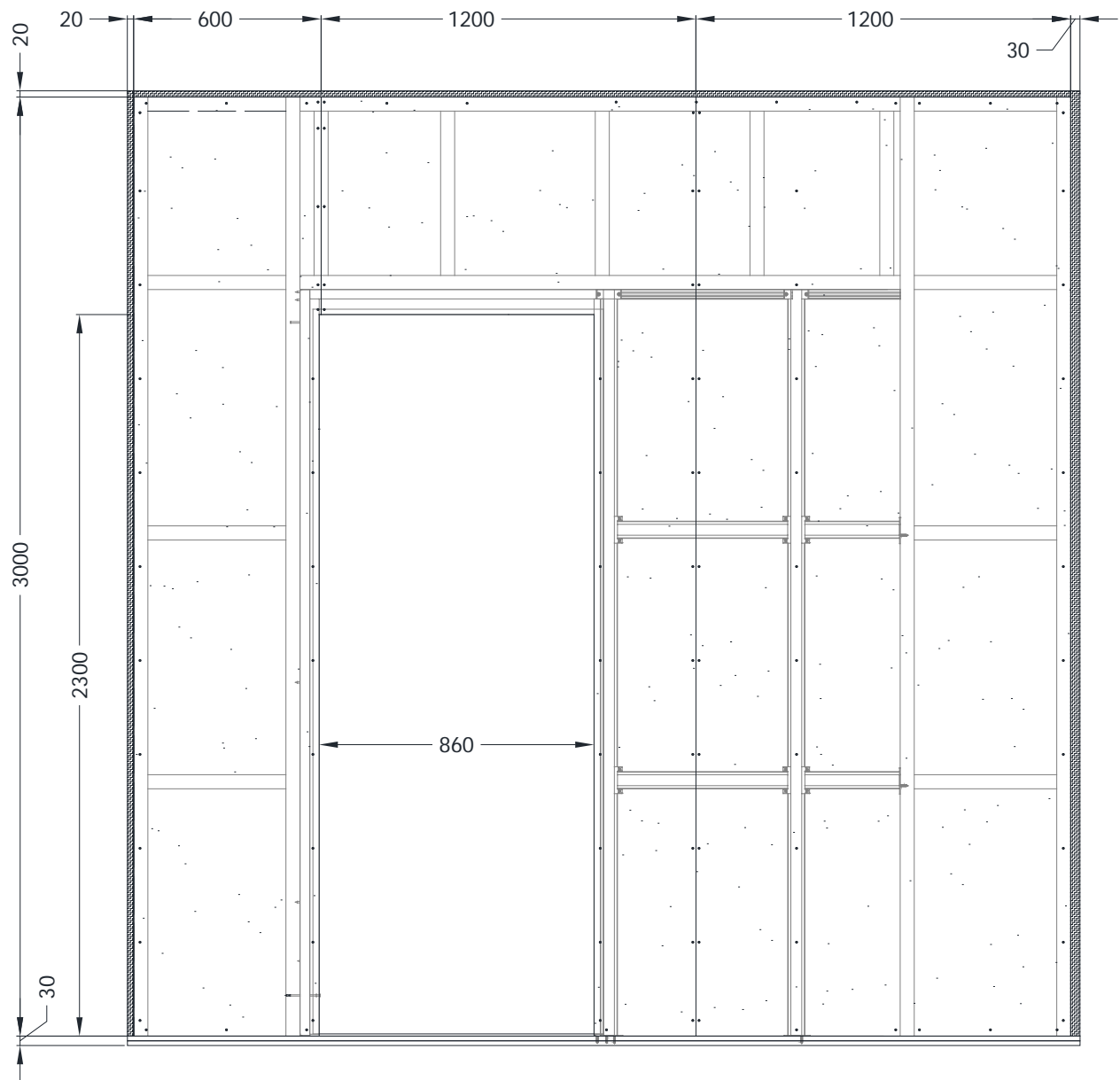
Figure 8 – Detail F-F



DETAIL F-F

Do not scale. All dimensions are in mm

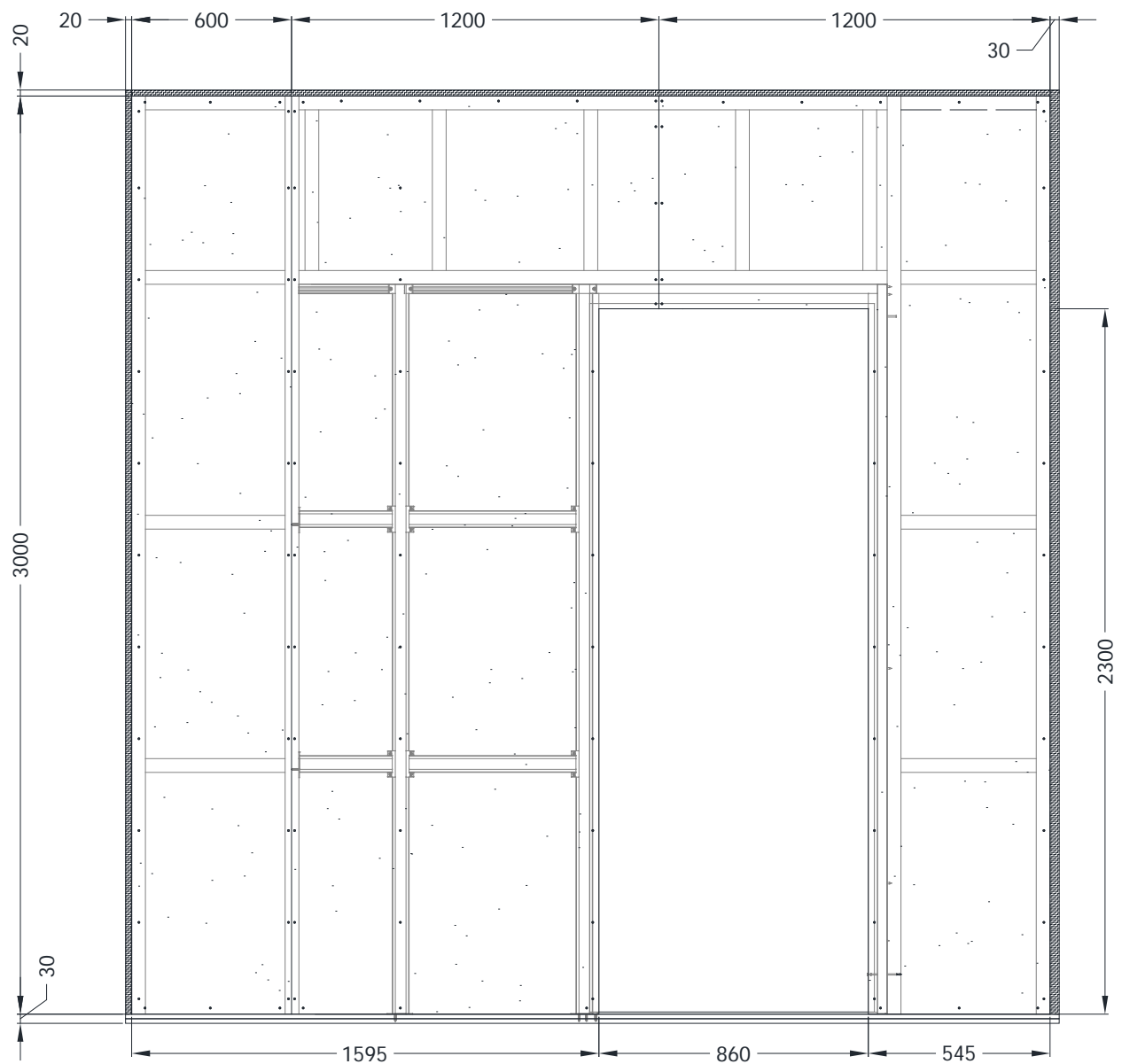
Figure 9 – Details of Board Positions – Unexposed Face



**ELEVATION OF BOARD POSITIONS
UNEXPOSED FACE**

Do not scale. All dimensions are in mm

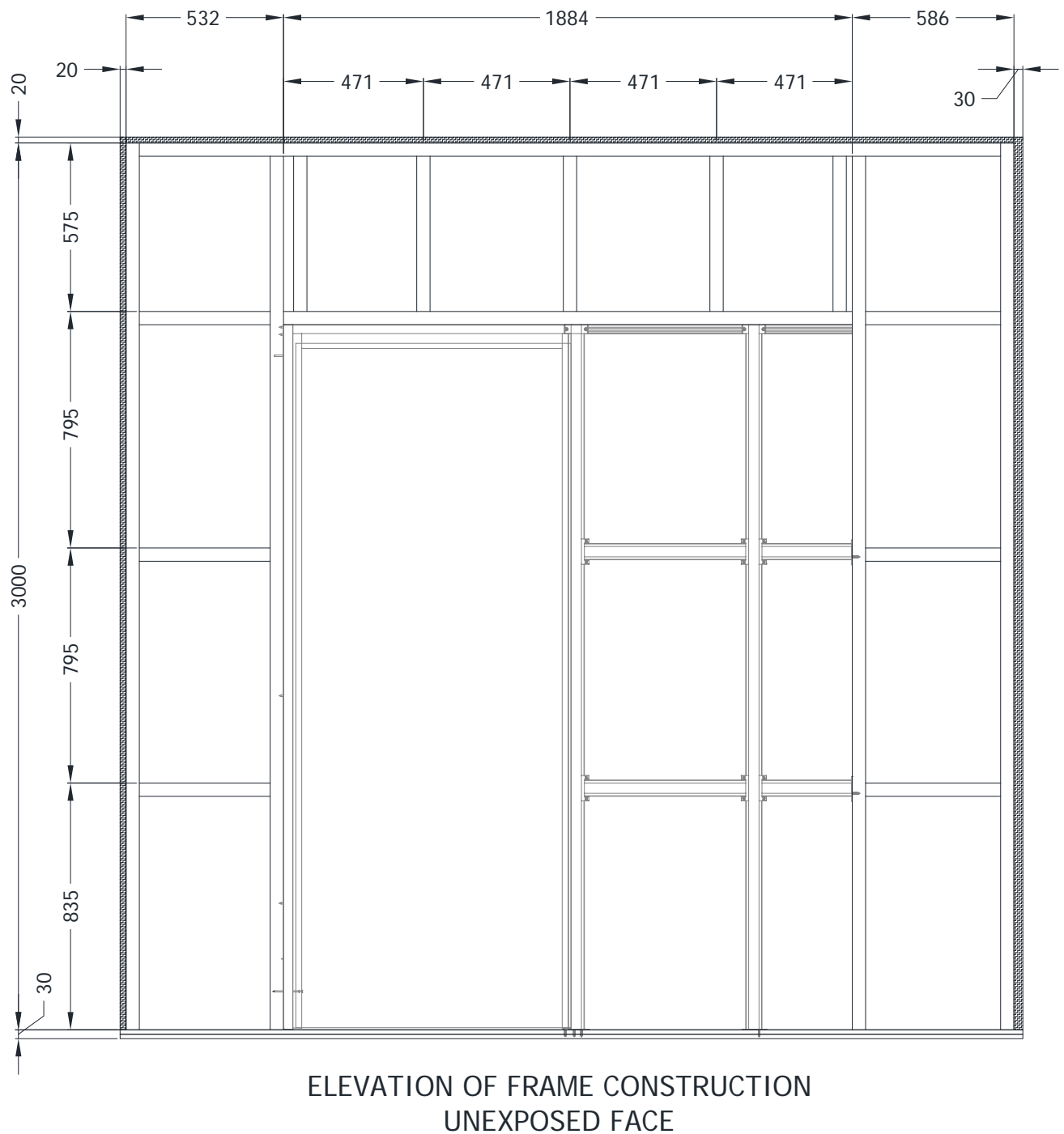
Figure 10 – Details of Board Positions – Exposed Face



**ELEVATION OF BOARD POSITIONS
EXPOSED FACE**

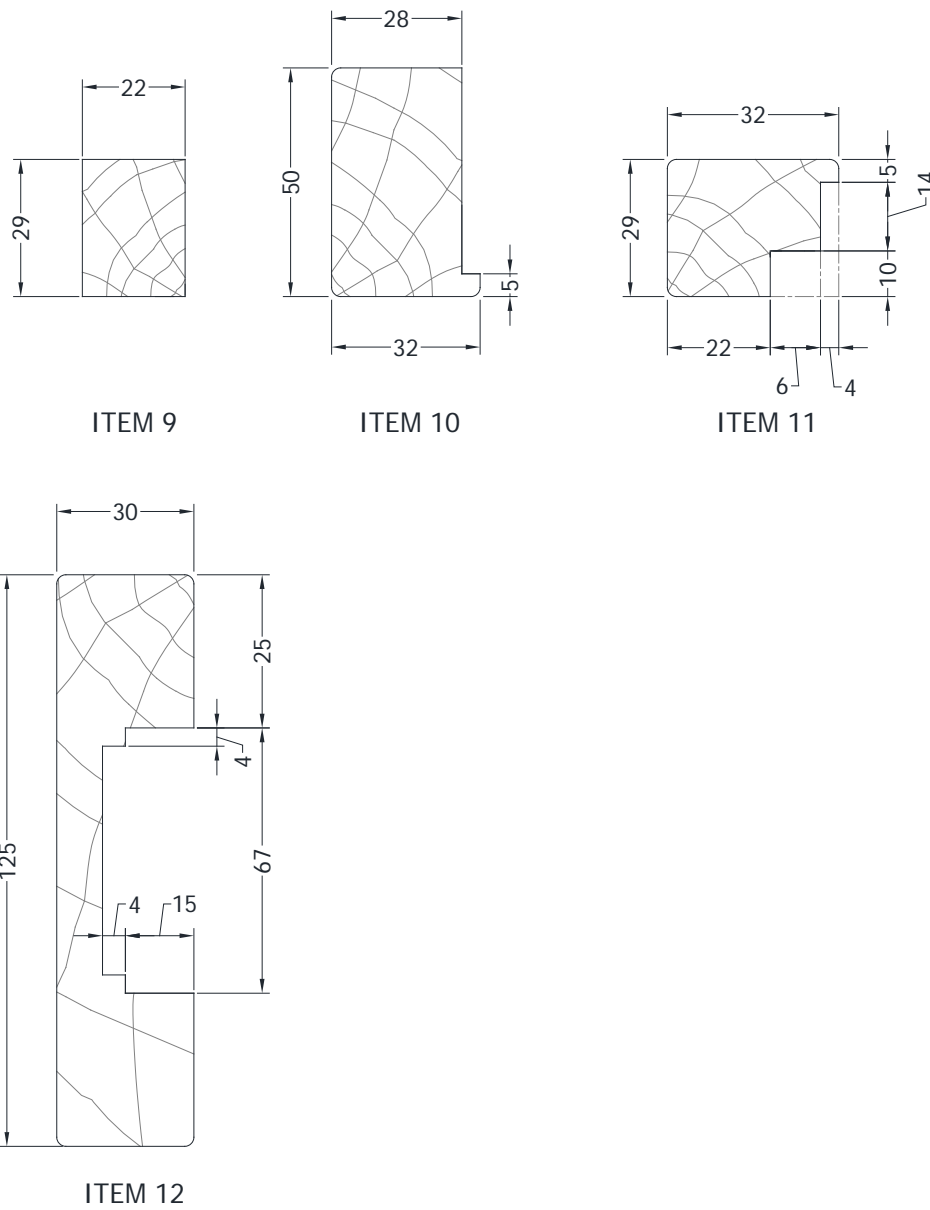
Do not scale. All dimensions are in mm

Figure 11 – Details of Timber Stud Partition



Do not scale. All dimensions are in mm

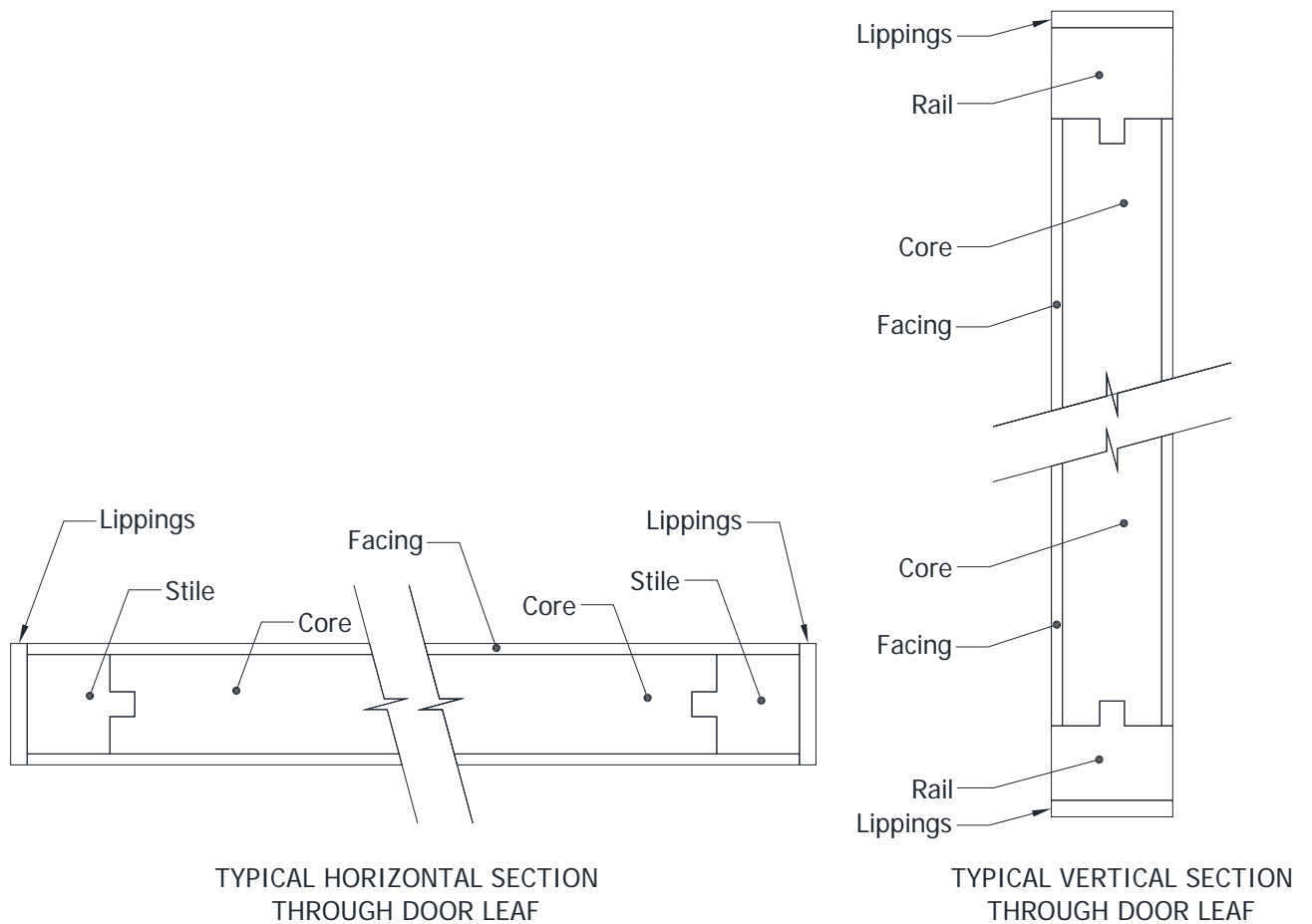
Figure 12 – Details of Timber Liner Kit



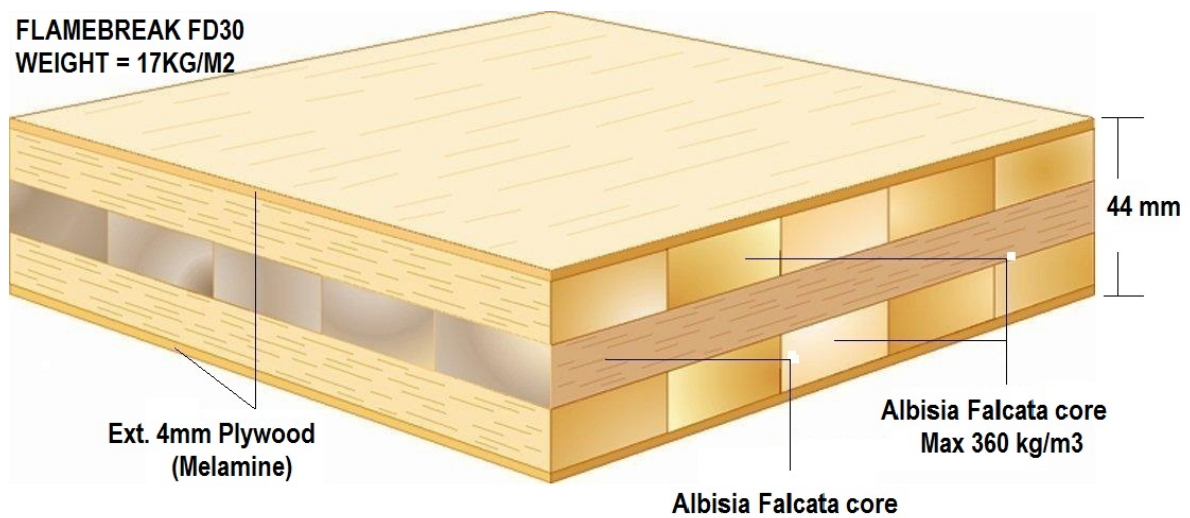
DETAILS OF LINER KIT

Do not scale. All dimensions are in mm

Figure 13 – Details of Door Leaf



FLAMEBREAK FD30
WEIGHT = 17KG/M2



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 13)

(All values are nominal unless stated otherwise)

(All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
Aluminium Pocket Door Frame (items 1 – 8)	
1. Header Track	
Material	: Extruded Aluminium
Overall size	: 55 mm x 30 mm x 1887 mm
Fixing method	: Screwed
Fixings	
i. type	: No. 8 x 1" wood screws.
ii. material	: Steel
iii. size	: 25 mm long by 4.8 mm diameter.
Centres	: 6 off, spaced nominally at 300 mm centres
2. Long Upright	
Material	: Extruded Aluminium
Overall size	: 55 mm x 20 mm x 2300 mm
Fixing method	: Fixed with plastic brackets
Fixings	
i. type	: M6 x 20 cap head screws.
ii. material	: Steel
iii. size	: 20 mm long by 6 mm diameter.
Centres	: 8 off, 2 screws per bracket, located at the junction of the Long upright and Header track
3. Noggin	
Material	: Extruded Aluminium
Overall size	: 55 mm x 20 mm x 545 mm
Fixing method	: Fixed with plastic brackets
Fixings	
i. type	: Self-tapping screws
ii. material	: Steel
iii. size	: 25 mm long by 4.2 mm diameter.
Centres	: 4 off per Noggin, 2 screws per bracket, located at the junction of the Noggin and Long upright
4. Tie back	
Material	: Extruded Aluminium
Overall size	: 55 mm x 20 mm x 305 mm
Fixing method	: Fixed with plastic brackets
Fixings	
i. type	: Self-tapping screws
ii. material	: Steel
iii. size	: 25 mm long by 4.2 mm diameter.
Centres	: 4 off per Noggin, 2 screws per bracket, located at the junction of the Noggin and Long upright

Item**Description****5. Hangers**

Material	:	Galvanised steel body and silicone rubber wheels
Overall size	:	58 mm x 17 mm body with 2 No. 22 mm diameter x 8 mm wheels
Fixing method	:	2 No. brackets screwed to the head of the door leaf
Fixings		
i. type	:	No. 8 x 1" wood screws.
ii. material	:	Steel
iii. size	:	25 mm long by 4.8 mm diameter.
Centres	:	2 off per bracket, spaced equally across the head of the door leaf

6. Floor Bracket

Material	:	Extruded Aluminium
Overall size	:	100 mm x 83 mm x 4 mm
Fixing method	:	Screwed
Fixings		
i. type	:	No. 8 x 1" wood screws.
ii. material	:	Steel
iii. size	:	25 mm long by 4.8 mm diameter.
Centres	:	3 off per bracket, brackets spaced nominally at 600 mm centres

7. Floor Guide Assembly

Material	:	Plastic
Overall size	:	13 mm x 5 mm Blade
Fixing method	:	Screwed
Fixings		
i. type	:	No. 8 x 1" wood screws.
ii. material	:	Steel
iii. size	:	25 mm long by 4.8 mm diameter.
Centres	:	4 off per unit, 1 No. unit fixed to the floor bracket

8. Trucking Channel

Material	:	Galvanised steel
Overall size	:	95 mm x 31 mm x 2355 mm
Fixing method	:	Screwed
Fixings		
i. type	:	No. 8 x 1" wood screws.
ii. material	:	Steel
iii. size	:	25 mm long by 4.8 mm diameter.
Centres	:	4 off per unit, equally spaced

Softwood liner kit (items 9 – 12)**9. Track Packer**

Material	:	Softwood
Overall size	:	29 mm x 22 mm x 1845 mm
Fixing method	:	Screwed
Fixings		
i. type	:	SS 1 & ¾" x 8G wood screws
ii. material	:	Steel
iii. size	:	44 mm long by 4.8 mm diameter.
Centres	:	4 off per unit, equally spaced along the head of the door leaf

<u>Item</u>	<u>Description</u>
10. Header	
Material	: Softwood
Overall size	: 32 mm x 50 mm x 1765 mm
Fixing method	: Screwed
Fixings	
i. type	: 10G x 4" wood screws
ii. material	: Steel
iii. size	: 100 mm long by 6 mm diameter.
Centres	: 3 off per unit, equally spaced along the head of the door leaf, butted underneath the Track packer
11. Non brush upright	
Material	: Softwood
Overall size	: 32 mm x 29 mm x 2347 mm
Fixing method	: Screwed
Fixings	
i. type	: 4.8 x 45 mm Self-tapping drilling screws
ii. material	: Steel
iii. size	: 45 mm long by 4.8 mm diameter.
Centres	: 3 off per unit, equally spaced fixed to the aluminium long upright (item 2)
12. Non brush jamb upright	
Material	: Softwood
Overall size	: 123 mm x 30 mm x 2347 mm
Fixing method	: Screwed
Fixings	
iv. type	: SS 1 & ¾ " x 8G wood screws
v. material	: Steel
vi. size	: 44 mm long by 4.8 mm diameter.
Centres	: 3 off per unit, equally spaced fixed to the Trucking channel (item 8)
13. Intumescent Seal	
Manufacturer	: Pyroplex Ltd
Reference	: Rigid Box Seal (CF 355)
Material	: Graphite intumescent strip within a polyvinyl chloride, PVC, carrier
Overall size	: 30 mm x 4 mm
Fixing method	: Self-adhered into grooves within rebate of frame
14. Intumescent Seal	
Manufacturer	: Pyroplex Ltd
Reference	: Rigid Box Seal (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
15. Intumescent Seal	
Manufacturer	: Pyroplex Ltd
Reference	: Rigid Box Seal (CF 355)
Material	: Graphite intumescent strip within a polyvinyl chloride, PVC, carrier
Overall size	: 2 no. 10 mm x 4 mm
Fixing method	: Self-adhered into grooves within a rebate to the base of the Door Leaf

Item**Description****16. Acoustic Smoke Seal**

Manufacturer	:	Lorient Polyproducts Ltd
Reference	:	LAS1010 Batwing
Material	:	TPE (thermos plastic elastomer)
Overall size	:	10 mm x 10 mm
Fixing method	:	Self-adhered into grooves within rebate of frame

17. Door Leaf

Manufacturer	:	Pacific Rim Wood Ltd.
Reference	:	FLAMEBREAK FD30
Overall size	:	2315 mm height x 930 mm width x 44 mm thickness
Material		
i. Core	:	Albisia Falcata
ii. Facings	:	4 mm Plywood (Melamine)
iii. Lipping	:	6 mm Hardwood
iv. Rails and Styles	:	36 mm nominal Mixed Tropical Hardwood
Fixing Method	:	Individual core blocks are assembled with a PVA adhesive and the three layer core lamels are bonded using a Melamine Urea adhesive system. Facings are applied to the core assembly with a melamine adhesive.

18. Timber Frame

Supplier	:	Warringtonfire Ltd
Material	:	Softwood, Grade C24
Section Size	:	100 x 45 mm
Surface Finish	:	Planed all round
Fixing Method	:	Head and bottom rails butt jointed and screwed to vertical studs. The left hand stud and right hand stud, was not fixed to the perimeter of the test frame leaving free edge. The gap between was filled using ceramic wool fibre gasket, please see Figure 11.

Fixings

i. type	:	Countersunk head wood screws
ii. material	:	Steel screws with plastics plugs
iii. size	:	100 mm long by 4.8 diameter

Details of Ceramic Fibre Gasket

i. Manufacturer	:	Morgan Advanced Materials
ii. Reference	:	Superwool Plus
iii. Material	:	High temperature insulation wool
iv. Thickness	:	25 mm, uncompressed
v. Density	:	96 kg/m ³ (stated)
vi. Fixing method	:	Compressed within the gap between the specimen and the restraint frame

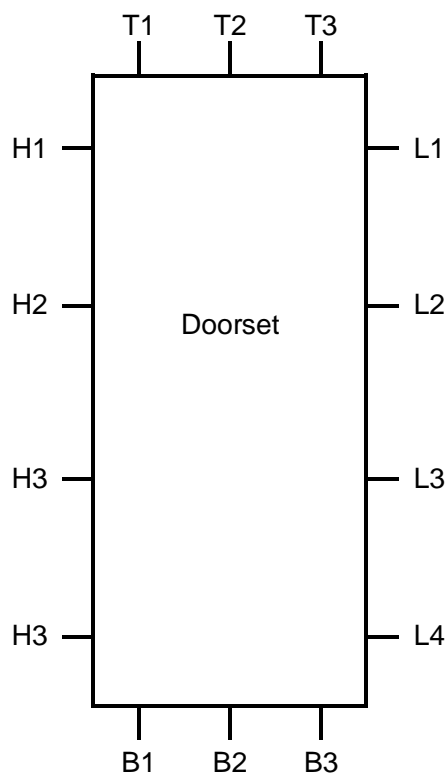
Item**Description****19. Type F Plaster Board**

Manufacturer	:	British Gypsum.
Type	:	Gyprock Fireline Type F Wallboard to EN 520.
Board size	:	1200 x 3000 mm.
Thickness	:	12.5 mm.
Density	:	800 kg/m ³ (stated).
Fixing method	:	2 layers fixed to the head track, vertical stud and base track of the partition and butt jointed. Board joints staggered in relation to the previous layer.
Fixings		
i. manufacturer	:	British Gypsum.
ii. type	:	Coarse thread, drywall screw.
iii. material	:	Galvanised steel.
iv. size (layer 1)	:	2.5 x 25 mm.
v. size (layer 2)	:	2.5 x 50 mm.
Centres		
vi. perimeter of stud partition	:	300 mm - screws adjacent on board joints.
vii. vertical timber studs	:	300 mm - screws adjacent on board joints.
Joint Tape		
viii. manufacturer	:	British Gypsum.
ix. reference	:	Gyproc Plasterboard scrim tape.
Joint Filler		
x. manufacturer	:	British Gypsum.
xi. reference	:	Gyproc Joint Filler.
xii. description	:	Gypsum based material for filling and finishing joints in plasterboard systems.

20. Self-Closing Mechanism

Manufacturer	:	Henderson
Reference	:	Self-Closing Kit
Weight Block Material	:	Mild Steel
Overall size	:	155 mm x 45 mm x 19 mm
Cable Length	:	2250 mm
Fixing method	:	Self-close weight fixed in the trucking channel (item 8) with cable. Cable securing bracket screwed to the top of door.
Fixings		
i. type	:	25.4 mm x 8G screw
ii. material	:	Steel
iii. size	:	25.4 mm long by 4.8 mm diameter.

Doorset Clearance Gaps



Doorset (mm)					
Hinge Side	Unexposed face	Exposed face	Leading Edge	Unexposed face	Exposed face
H1	0.4	0.2	L1	2.5	1.4
H2	0.4	0.2	L2	2.5	1.7
H3	0.4	0.2	L3	2.4	2.8
H4	0.4	0.2	L4	2.4	2.8
Mean	0.4		Mean	2.4	
Max	0.4		Max	2.5	
Min	0.4		Min	2.4	
Top edge	Unexposed face	Exposed face	Threshold	Unexposed face	
T1	2.4	1.4	B1	8.9	
T2	2.6	1.5	B2	9.8	
T3	2.3	1.5	B3	7.6	
Mean	2.4		Mean	8.7	
Max	2.6		Max	9.8	
Min	2.3		Min	7.6	

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	secs	
00	00	The test commences.
01	30	Smoke release is visible from the doorset at its head.
03	00	The smoke release previously mentioned increases in volume.
06	00	Viewed from the exposed face: the exposed surface of the door leaf ignites causing large amounts of flaming.
06	55	Moisture droplets form at the head of the door leaf.
10	00	The moisture droplets descend over the door leaf.
17	00	Large amounts of smoke are evident from the top left of the trailing edge of the door leaf.
20	00	Viewed from the exposed face: the door leaf is charred and cracked in effect and glows a bright orange in parts.
23	00	Discolouration is evident at the top right of the door leaf.
26	00	The smoke release increases in volume, particularly from the top left of the door leaf.
30	00	The specimen continues to satisfy the integrity and insulation criteria.
36	45	Sustained flames issue from the bottom 300 mm up of the door leaf leading edge. Sustained flames and cotton pad integrity failure is deemed to occur.
38	10	Test discontinued.

Test Photographs

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



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



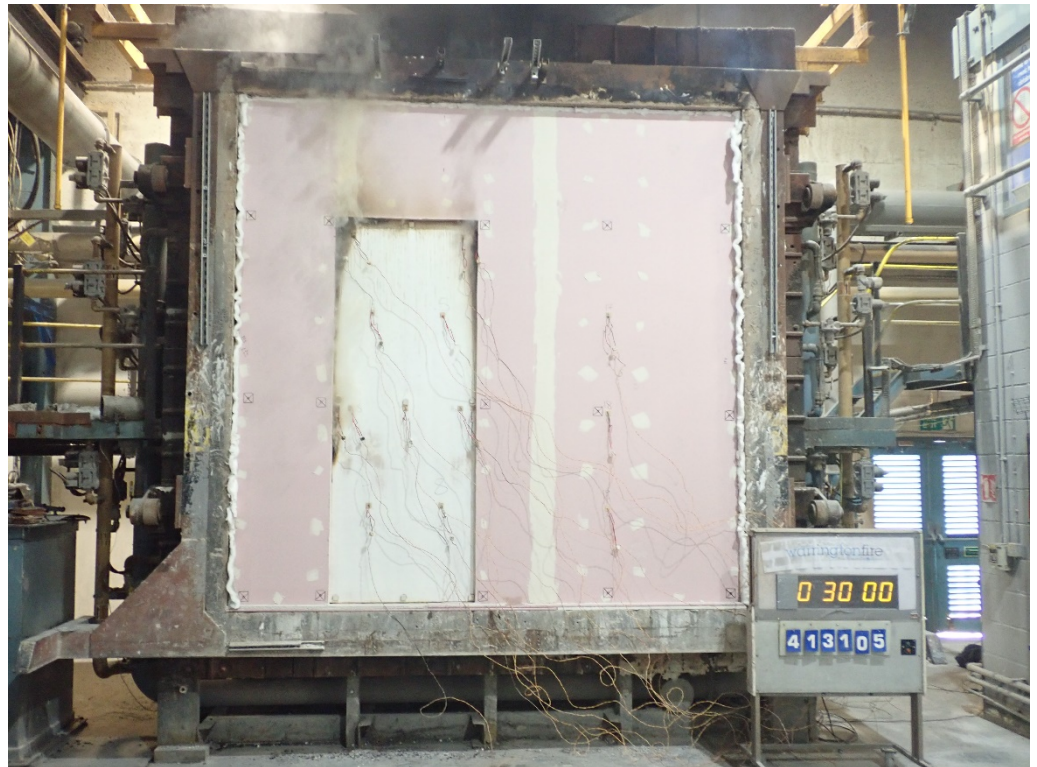
The unexposed
face of the doorset
after a test
duration of 10
minutes



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



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



The unexposed face of the doorset after a test duration of 36 minutes, sustained flaming at the leading edge in the first 300mm from the threshold



The exposed face
of the doorset
shortly after the
test



Temperature and Deflection Data

Mean furnace temperature, together with the temperature/time relationship specified in BS EN 1363-1: 2012

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	28
1	349	295
2	445	493
3	502	484
4	544	555
5	576	534
6	603	587
7	626	621
8	646	633
9	663	664
10	678	680
11	693	685
12	706	700
13	717	714
14	728	723
15	739	738
16	748	754
17	757	757
18	766	766
19	774	774
20	781	783
21	789	790
22	796	796
23	802	802
24	809	807
25	815	814
26	820	819
27	826	824
28	832	830
29	837	834
30	842	839
31	847	843
32	852	847
33	856	851
34	860	855
35	865	858
36	869	865
37	873	867
38	877	874

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

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	24	24	23	23	22	23
1	26	25	26	28	26	26
2	27	25	27	30	27	27
3	26	25	26	28	26	26
4	26	25	25	27	25	26
5	25	25	25	27	25	25
6	25	25	25	26	25	25
7	25	25	25	26	25	25
8	25	25	25	25	25	25
9	25	25	25	25	25	25
10	25	25	25	25	25	25
11	25	25	25	25	25	25
12	25	25	25	25	26	25
13	26	26	26	25	26	26
14	27	27	27	25	27	27
15	29	28	28	26	28	28
16	31	30	30	26	29	29
17	33	32	32	27	30	31
18	35	34	34	28	31	32
19	37	38	36	29	32	34
20	39	40	38	30	34	36
21	41	41	40	32	36	38
22	43	42	42	33	37	39
23	45	43	44	35	39	41
24	47	44	48	37	40	43
25	50	45	50	39	42	45
26	53	47	53	42	44	48
27	57	50	56	46	46	51
28	61	53	60	50	48	54
29	65	56	63	54	51	58
30	69	59	67	59	54	62
31	73	61	70	63	57	65
32	79	64	73	66	60	68
33	84	66	75	68	63	71
34	91	69	77	70	66	75
35	96	72	80	72	69	78
36	97	75	84	74	72	80
37	97	77	86	75	76	82
38	100	85	91	77	79	86

Individual Temperatures Recorded On The Door Leaf 100 mm Away From The Edges

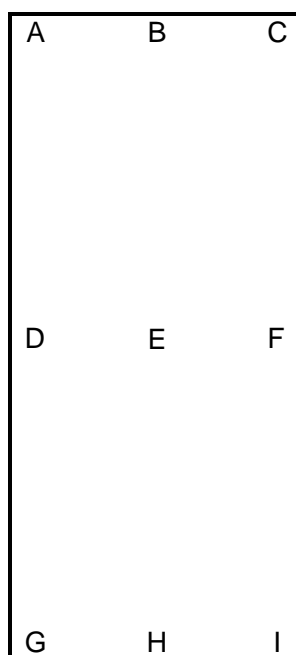
Time Mins	T/C Number 13 Deg. C	T/C Number 14 Deg. C	T/C Number 15 Deg. C	T/C Number 16 Deg. C
0	25	19	24	23
1	28	19	28	26
2	27	19	29	26
3	27	19	27	25
4	26	19	27	25
5	26	19	26	24
6	26	19	26	24
7	26	19	26	24
8	26	19	26	24
9	26	19	26	24
10	26	19	26	25
11	26	19	26	25
12	27	19	26	25
13	27	19	27	25
14	28	19	27	26
15	30	19	28	27
16	31	20	30	27
17	33	20	31	28
18	35	20	33	29
19	40	20	35	30
20	44	20	36	32
21	50	20	38	33
22	56	20	40	34
23	62	20	41	36
24	63	20	43	38
25	64	20	45	39
26	63	20	48	41
27	64	20	51	45
28	71	20	54	47
29	75	20	58	51
30	77	20	62	55
31	78	20	64	58
32	80	20	67	62
33	83	20	70	65
34	87	20	73	67
35	92	20	76	70
36	98	20	80	71
37	100	20	84	74
38	100	20	88	76

**Individual Temperatures Recorded On The Door Leaf 25 mm Away From The Edges
(Supplementary Procedure)**

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
0	22	23	22	23
1	26	24	26	25
2	26	25	28	25
3	26	25	27	25
4	26	25	26	24
5	28	26	25	24
6	33	28	25	24
7	37	31	25	24
8	42	37	25	25
9	47	42	25	25
10	49	45	25	26
11	51	44	25	25
12	52	44	26	25
13	54	48	27	26
14	58	54	27	26
15	63	60	28	27
16	65	62	29	31
17	66	62	31	35
18	71	60	32	40
19	75	60	34	43
20	80	60	36	44
21	84	60	38	45
22	85	63	40	46
23	87	65	41	47
24	90	66	43	47
25	94	69	45	48
26	99	72	47	48
27	100	76	59	48
28	102	78	67	50
29	104	81	69	47
30	106	84	71	46
31	109	89	72	45
32	114	93	74	45
33	119	96	75	46
34	123	97	77	48
35	127	99	79	51
36	129	101	82	54
37	133	102	85	56
38	141	103	89	59

Individual Temperatures Recorded Around On The Unexposed Face Of The Partition Over The Pocket Void

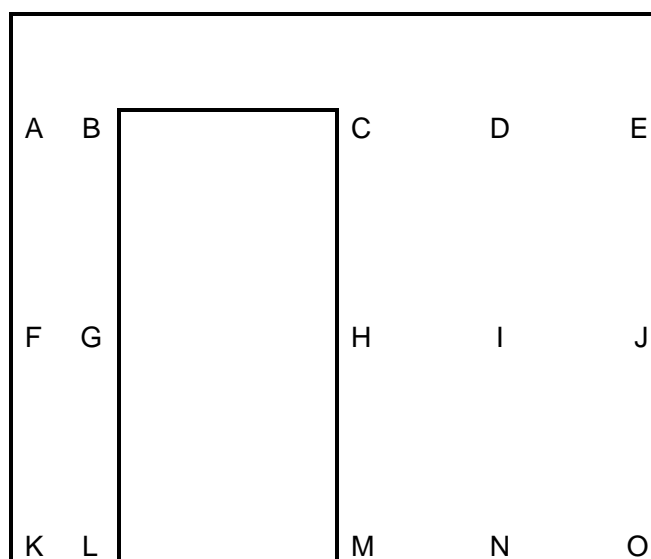
Time Mins	T/C Number 17 Deg. C	T/C Number 18 Deg. C	T/C Number 19 Deg. C
0	23	23	23
1	25	25	27
2	25	25	26
3	24	24	25
4	24	24	24
5	24	24	24
6	24	24	24
7	24	24	24
8	24	24	24
9	24	24	24
10	25	24	24
11	25	25	25
12	26	25	25
13	26	26	25
14	27	27	26
15	28	28	27
16	29	29	28
17	30	30	28
18	32	31	29
19	33	32	30
20	35	33	31
21	36	34	32
22	37	35	32
23	39	35	33
24	40	36	33
25	41	36	33
26	42	36	33
27	43	37	33
28	44	37	33
29	45	38	34
30	46	39	34
31	48	40	35
32	49	42	36
33	51	44	37
34	52	46	39
35	53	48	41
36	54	50	43
37	55	51	45
38	56	53	47

Horizontal Deflections Of The Door Leaf

Deflections - mm									
TIME mins	A	B	C	D	E	F	G	H	I
0	0	0	0	0	0	0	0	0	0
5	-3	3	9	19	13	15	5	11	17
10	-1	2	22	23	26	8	20	4	18
15	13	10	-34	8	14	18	16	19	9
20	-11	19	-14	8	14	18	18	5	20
25	-18	-7	-17	29	4	42	11	23	13
30	-35	8	1	27	9	28	18	40	12
35	-46	3	13	22	16	8	*	*	*

Positive values indicate movement towards the furnace

*Measurement not taken

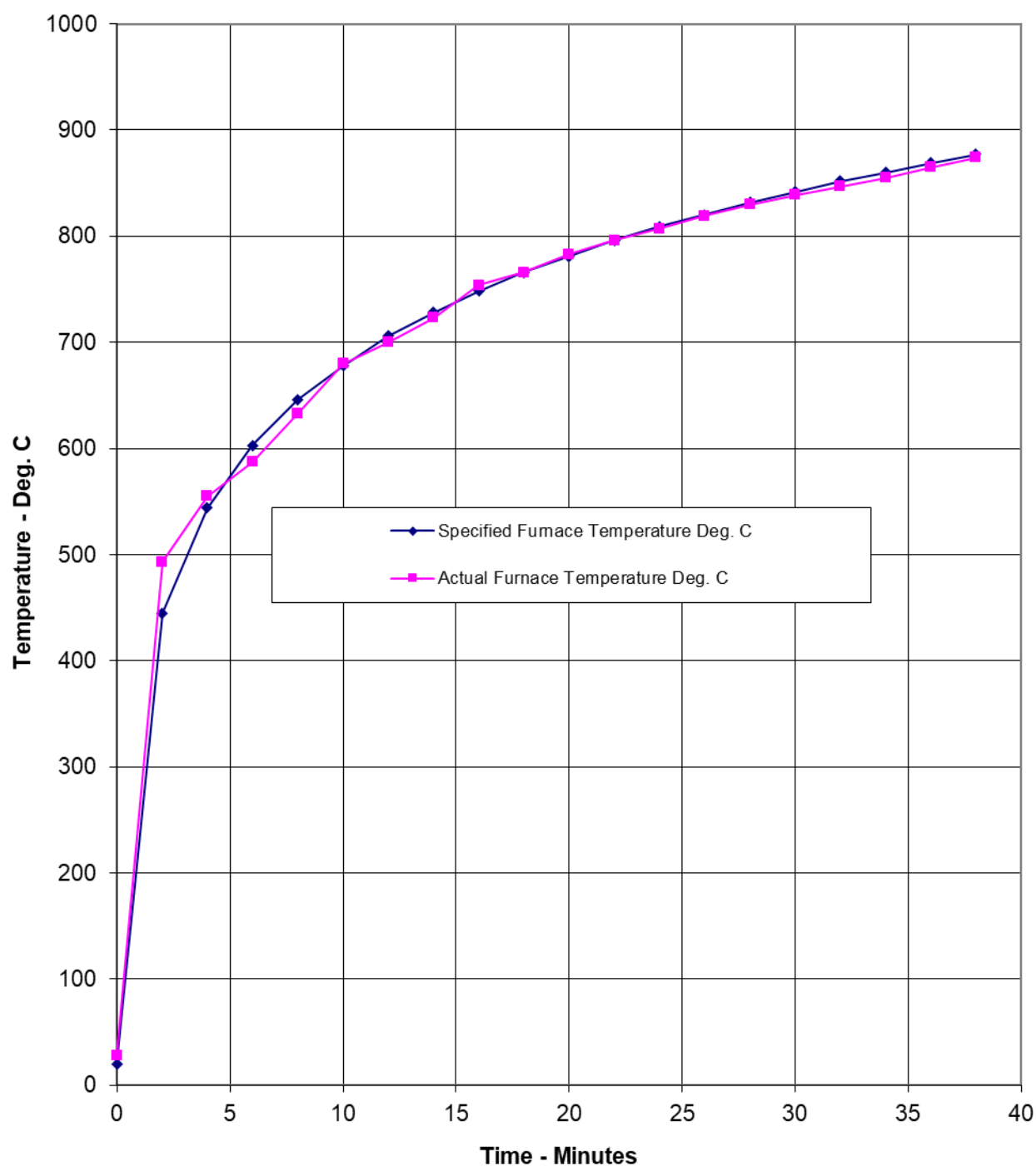
Horizontal Deflections Of The Partition

Time Mins	Deflections – mm									
	A	B	C	D	E	F	G	H	I	J
0	0	0	0	0	0	0	0	0	0	0
5	-7	-10	3	2	6	2	11	11	22	19
10	-9	-2	4	5	-3	5	2	5	6	-1
15	-8	10	-4	77	-1	9	57	14	16	-3
20	-1	4	12	25	3	7	14	31	18	7
25	-17	57	-4	14	9	11	15	18	26	23
30	2	4	13	47	23	17	22	23	34	21

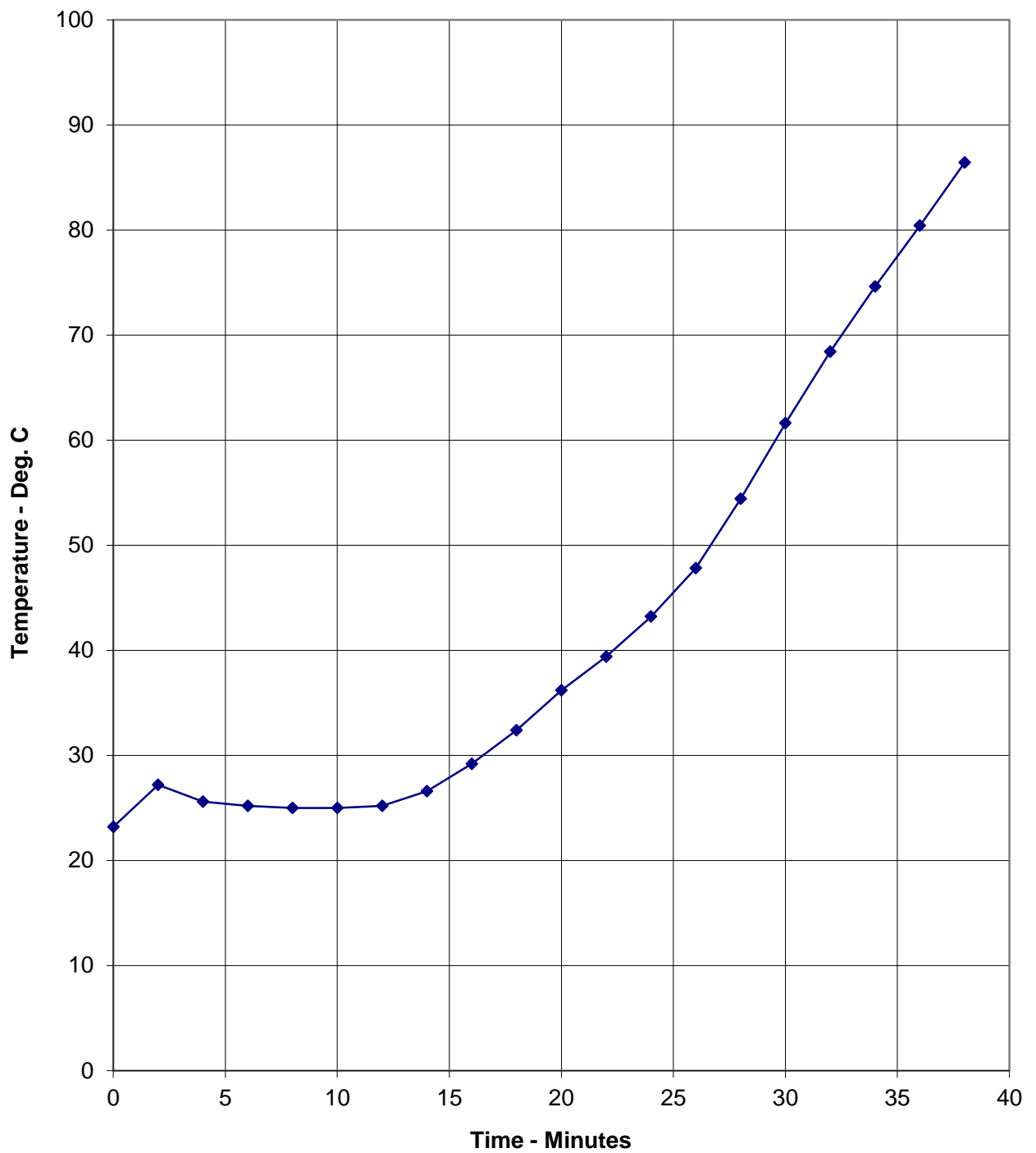
Time Mins	Deflections – mm				
	K	L	M	N	O
0	0	0	0	0	0
5	2	95	39	6	4
10	3	64	41	6	-9
15	4	30	31	10	14
20	7	25	11	7	19
25	9	13	15	17	14
30	10	13	18	20	25

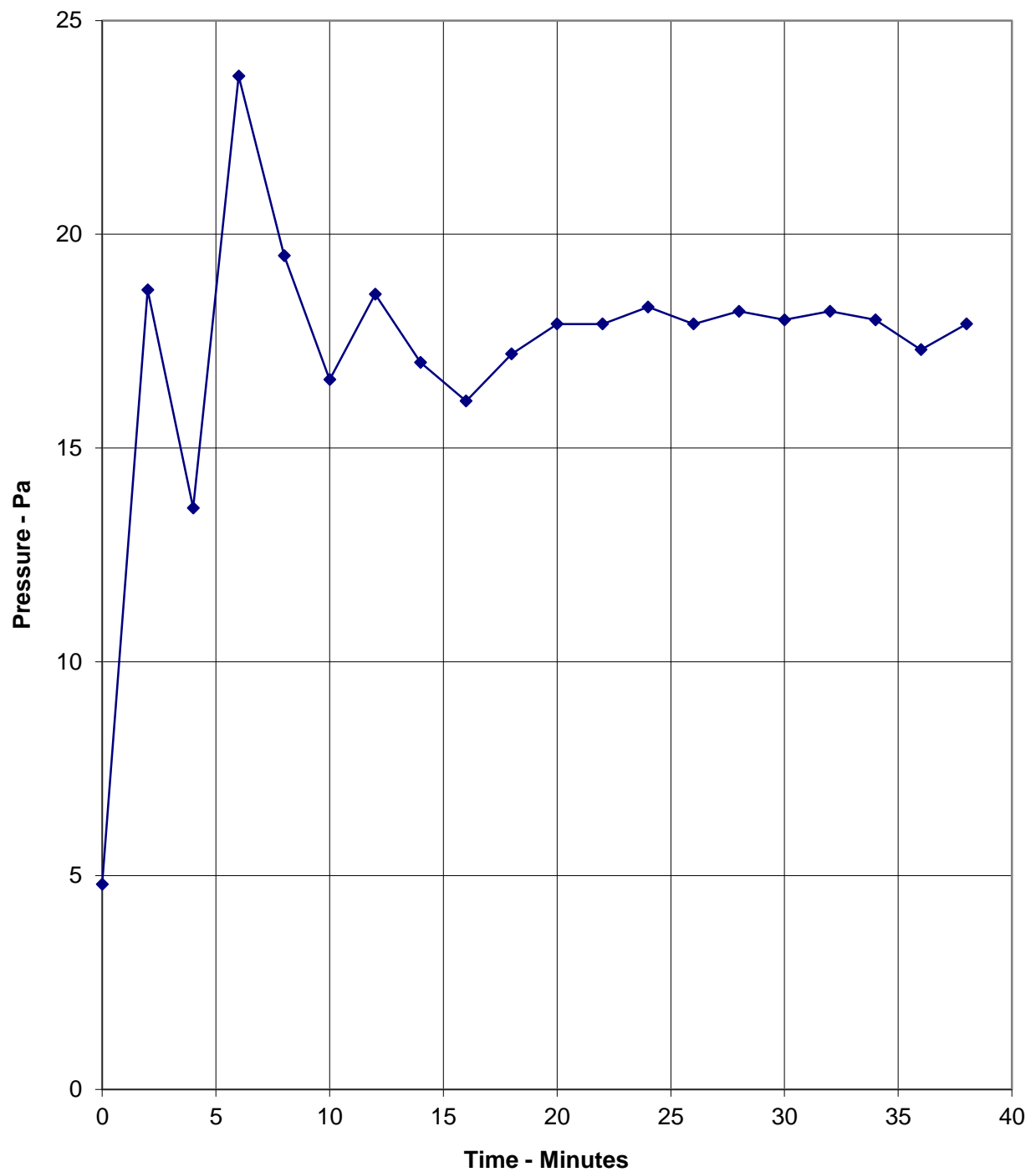
Positive values indicate movement towards the furnace

Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In BS EN 1363-1: 2012



Graph Showing Mean Temperatures Recorded On The Unexposed Surface Of The Doorset



Graph Showing Recorded Furnace Pressure At The Head Of The Doorset

On-going Implications

Limitations

This report details the method of construction, the test conditions and the results obtained when the specific elements of construction described herein were 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.

EGOLF

Certain aspects of some fire test specifications are open to different interpretations. 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

Field of Direct Application

General	The field of direct application defines the allowable changes to the test specimen following a successful fire resistance test. These variations can be applied automatically without the need for the sponsor to seek additional evaluation, calculation or approval.
Materials And Constructions, General	Unless otherwise stated in the following text, the materials and construction of the doorset or openable window shall be the same as that tested. The number of leaves and the mode of operation (e.g. sliding, single action or double action) shall not be changed.
Specific Restrictions On Materials And Construction (Timber Constructions)	<p>The thickness of the door panel(s) shall not be reduced but may be increased.</p> <p>The door panel thickness and/or density may be increased provided the total increase in weight is not greater than 25 %.</p> <p>For timber based board products (e.g. particle board, blockboard, etc), the composition (e.g. type of resin) shall not change from that tested. The density shall not be reduced but may be increased.</p> <p>The cross-sectional dimensions and/or the density of the timber frames (including rebates) shall not be reduced but may be increased.</p>
Decorative Finishes (Paint)	Where the paint finish is not expected to contribute to the fire resistance of the door, alternative paints are acceptable and may be added to door leaves or frames for which unfinished test specimens were tested. Where the paint finish contributes to the fire resistance of the door (e.g. intumescent paints) then no change shall be permitted.
Decorative Finishes (Laminates)	<p>Decorative laminates and timber veneers up to 1,5 mm thickness may be added to the faces (but not the edges) of doors that satisfy the insulation criteria (normal or supplementary procedure).</p> <p>Decorative laminates and timber veneers applied to door leaves that do not satisfy the insulation criteria (normal or supplementary procedure) and/or those in excess of 1,5 mm thickness shall be tested as part of the test specimen. For all doorsets tested with decorative laminate faces, the only variations possible shall be within similar types and thicknesses of material (e.g. for colour, pattern, supplier).</p>
Fixings	The number of fixings per unit length used to attach doorsets to supporting constructions may be increased, but shall not be decreased and the distance between fixings may be reduced but shall not be increased.
Building Hardware	<p>The number of hinges and dog bolts may be increased but shall not be decreased.</p> <p>NOTE 1 The number of movement restrictors such as locks and latches is not covered by direct application.</p> <p>Where a doorset has been tested with a door closing device fitted, but with the retention force released in accordance with 10.1.4, the doorset may be provided either with or without that closing device, i.e. where self closing characteristics are not required.</p> <p>NOTE 2 Interchange of building hardware is not covered by the field of direct application.</p>

Permissible Size Variations

Doorsets of sizes different from those of tested specimens are permitted within certain limitations, but the variations are dependent on product type and the length of time that the performance criteria are fulfilled.

The increase and decrease of dimensions permitted by the field of direct application are applicable to the overall size and to each door leaf, each side panel and each over panel independently.

In accordance with 13.2.2.3, the dimensions (width and height) of any glass pane cannot be increased.

Test periods

The amount of variation of size permitted is dependent on whether the classification time was just reached (Category 'A') or whether an extended time (Category 'B') in accordance with the values shown in Table 1 were fulfilled before the test was concluded.

For category 'B':

Table 1 — Category B overrun requirements

Classification time (min)	All performance criteria fulfilled for at least minutes
15	18
20	24
30	36
45	52
60	68
90	100
120	132
180	196
240	260

**Size variation
related to product
type**

The rules to cover increase or decrease of size without additional considerations are applicable only to six main product groups:

General

- a) hinged and pivoted doorsets and openable windows;
- b) horizontally sliding and vertically sliding doorsets including sectional doorsets;
- c) steel single skin folding shutters doorsets (uninsulated);
- d) other sliding and folding doorsets (insulated);
- e) rolling shutter doorsets;
- f) openable fabric curtains.

No increases in size are permitted for doorsets which are required to satisfy radiation control levels unless the insulation criteria are also satisfied. This is because any increase in size will increase the radiation received at a fixed distance away from the door. There are calculation methods which can be used to determine acceptable size increases for such doors; however, these are beyond the scope of direct application. Doors that satisfy both the radiation control levels and insulation criteria may have their sizes increased as outlined in Annex B. This is accepted because the increase in radiation resulting from a size increase allowed under this section, for an insulated door, will be such that it will still satisfy the required radiation control levels. Size decreases are permitted for both doors which satisfy radiation control levels and those which satisfy insulation criteria and radiation control levels.

Permissible variations for each product group are detailed in Annex B which also contains some examples relating to hinged/pivoted doorsets.

Size increases for doorsets which do not fall into one of the six groups given above are the subject of extended application.

**Hinged and
pivoted doorsets
and openable
windows**

For Category 'A' tests with no overrun of classification period, no increase is allowed. Unlimited reductions from the tested specimen are permitted with the exception of insulated metal doors where the size reduction is limited.

For Category 'B' tests (with specified overrun of classification period) all smaller sizes are permitted and increases in height and width are permitted as stated in Annex B.

Other changes

For smaller doorset sizes the relative positioning of movement restrictors (e.g. hinges and latches) shall remain the same as tested or any change to the distances between them will be limited to the same percentage reduction as the decrease of test specimen size.

For larger doorset sizes the following shall also apply:

- a) the height of the latch above floor level shall be equal to or greater than the tested height, and such increase in height shall be at least proportional to the increase in door height;
- b) the distance of the top hinge from the top of door leaf shall be equal to or less than that tested;
- c) the distance of the bottom hinge from bottom of door leaf shall be equal to or less than that tested;
- d) where three hinges or distortion preventers are used, the distance between the bottom of the door leaf and centre restraint shall be equal to or greater than that tested.

Side and transom panels

The rules for variation to tested specimens of side and transom panel arrangements are the same as those applied generally to hinged doorsets.

If only one side panel can be tested due to the constraints of the furnace size then providing a type 'B' overrun time has been proven, a second panel up to the same size may be added to the opposite side. Where an additional side panel is to be added to a tested single-leaf doorset then the tested panel shall be positioned on the latch side.

The addition of a second side panel is not allowed for doorsets satisfying the radiation control levels, unless they also satisfy the insulation criteria for the reasons given in 13.3.3.1

Timber constructions

The number, size, location and orientation of any joints in the timber framing shall not be changed. Where decorative veneers of 1,5 mm or greater thickness, or other claddings which themselves provide constructive benefits, are part of the test specimen, they shall not be substituted with alternatives of lesser thickness or strength.

Gaps

The maximum size of the primary gaps identified in 7.3 is restricted to the following sizes in practice:

$$x = (a + b)/2 + 2 \text{ mm}$$

where

x is the maximum permitted gap size;

a is the maximum measured gap size;

b is the mean measured gap size.

The minimum size of the primary gaps may be reduced.

The permitted gap size may be different for different parts of the door or window.

Asymmetrical assemblies

EN 1363-1 states that for separating elements required to be fire resisting from both sides, two test specimens shall be tested (one from each direction) unless the element is fully symmetrical, i.e. the construction of the doorset is identical on both sides of the centre line when viewed in plan (from above). However, in some cases it is possible to develop rules whereby the fire resistance of an asymmetrical door assembly tested in one direction can apply when the fire exposure is from the other direction. The possibility to develop such rules increases if the consideration is limited to certain types of door assembly and on the criteria being applicable (e.g. integrity only doors). The following rules represent the minimum level of common agreement which shall be followed. The rationale behind the rules is given in Annex C.

Specific Rules

The rules governing the applicability of tests carried out in one direction to other directions are given in Table 2 and are based on the following premises:

— that each of the door leaves are themselves of symmetrical construction with the exception of the edges (e.g. lock/leading edge and hinge edge or double rebated doors);

— that any restraining/supporting elements of building hardware has been included in a test to EN 1634-1 when exposed in both directions so that they will retain their function when exposed to the heat of the test;

— that there is no change in the number of leaves or the mode of operation (e.g. sliding, swinging, single action or double action);

— that side, over and transom panels are excluded from Table 2 unless they are fully symmetrical.

Table 2 lists the type of door assembly for which rules can be generated and gives the direction in which it should be tested to cover the opposite direction. The separate columns for the integrity and insulation criteria reflect the different ability to make rules for integrity only doors as opposed to those which satisfy both criteria. A 'Yes' means that it is possible to identify the direction of test which covers the opposite direction. A 'No' indicates that it is not possible to identify the direction which will cover the opposite direction. Table 2 — Type of doorset and direction to be tested to cover the opposite direction

Type of doorset	Direction to be tested to cover opposite direction	Integrity	Insulation	Radiation
Hinged or pivoted, timber leaf, timber frame	Opening into the furnace	yes	yes	yes
Hinged or pivoted, timber leaf, metal frame (no transom)	Opening into the furnace	yes	no	yes
Hinged, metal leaf, metal frame (not pivoted)	Opening away from Furnace	yes	no	yes
Rolling shutter	Barrel and supporting components fixed on the face of the supporting wall on the fire side	yes	no	no
Sliding/folding	Sliding/folding supporting components fixed on the face of the supporting wall on the fire side	yes	no	no
Operable fabric curtains	Not possible to define a scenario			
^a This only applies to doors without insulation in the core and with a movement restrictor at approximately mid-height on the hinge side.				

Supporting Constructions

The fire resistance of a door assembly tested in one form of standard supporting construction may or may not apply when it is mounted in other types of construction. Generally, the rigid and flexible types are not interchangeable and rules governing the direct application within each group are given in 13.5.2 to 13.5.4. However, in some cases it is possible for the result of a test on a particular type of door assembly tested in one form of standard supporting construction to be applicable to that door assembly when mounted in a different type of standard supporting construction. Specific rules governing the situation for hinged and pivoted door assemblies are given in 13.5.4. The rationale behind the rules is given in Annex C.

Specific rules for hinged or pivoted doorsets

- a) For timber door leaves hung in timber frames, the result of a test in a rigid standard supporting construction is applicable to that door assembly mounted in a flexible construction.
- b) For timber door leaves hung in timber frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction.
- c) For timber door leaves hung in metal frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction but not vice versa.
- d) For insulated metal door leaves hung in metal frames, there is no applicability of results in rigid standard supporting construction to flexible constructions or vice versa; to cover rigid and flexible types, tests shall be undertaken in each type of standard supporting construction.
- e) For uninsulated metal doors, the result of a test in a rigid standard supporting construction is applicable to that door assembly mounted in a flexible construction, but not vice versa.

The rules above assume that the fixing methods used in each type of supporting construction are appropriate to that construction. Thus for example in a), the test on the timber door leaf in a timber frame will have been carried out with appropriate fixings for timber frames in rigid constructions. The result is applicable to a timber door leaf in a timber frame mounted into a flexible construction with appropriate fixings for timber frames in flexible constructions.

**Associated
supporting
construction**

The fire resistance of a door tested in an associated supporting construction has no field of direct application. The applicability of the result to other supporting constructions shall be the subject of extended application.