

ORBITA TECHNOLOGY CO., LTD TEST REPORT

SCOPE OF WORK

EN 1634-1:2014+A1:2018 TESTING ON HOTEL LOCK, MODEL E4031, E4131, E4431, E4041, E4441, E3041 AND E3141 IN SINGLE LEAF SINGLE ACTION TIMBER COMPOSITE FIRE DOOR

REPORT NUMBER

221115007SHF-003

TEST DATE(S)

2023-02-02

ISSUE DATE

2023-03-17

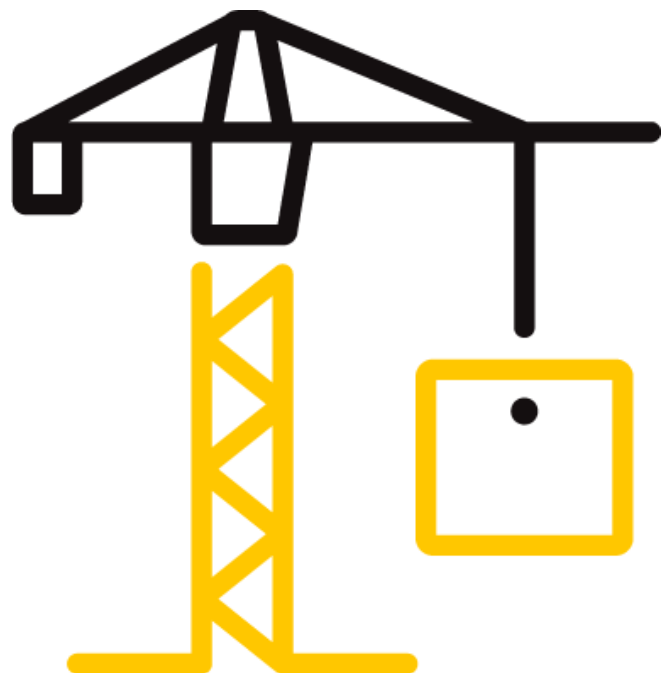
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TEST REPORT

Issue Date: 2023-03-17

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REPORT ISSUED TO

ORBITA TECHNOLOGY CO., LTD

Zhoukangwei Villager Group, Changbu Village, Xinxu Town, Huiyang District
Huizhou City, Guangdong Province

SECTION 1

SCOPE

Intertek has conducted an evaluation for ORBITA TECHNOLOGY CO., LTD to determine the fire resistance characteristics of the Hotel Lock, Model E4041 in Single Leaf Single Action Timber Composite Fire Door. This test was designed to demonstrate evaluation on the Hotel Lock of six types including Model E4031, E4131, E4431, E4441, E3041 and E3141. This evaluation began on November 15, 2022 and was completed on March 9, 2023. The test was conducted on February 2, 2023.

The test was conducted in accordance with 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.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

Intertek B&C will service this report for the entire test record retention period. The test record retention period ends ten years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens (where required by Certification or Accreditation bodies), or other pertinent project documentation, will be retained for the entire test record retention period.

For INTERTEK B&C:

COMPLETED BY:	Susan Liu
TITLE:	Project Engineer – Building Construction
SIGNATURE:	<i>Susan Liu</i>
DATE:	2023-03-17

REVIEWED BY:	Jason Xu
TITLE:	Operation Supervisor Building Construction
SIGNATURE:	<i>Jason Xu</i>
DATE:	2023-03-17



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SECTION 2

SUMMARY OF TEST RESULTS

Product Name: Hotel Lock

Series/Model: E4031, E4131, E4431, E4041, E4441, E3041 and E3141

The test assembly satisfied the performance requirements for the following periods:

Fire resistance		Test results	
		Doorset A open into the furnace	Doorset B open away from the furnace
Integrity	Sustained flaming	68 minutes, no failure	68 minutes, no failure
	Gap gauge	68 minutes, no failure	68 minutes, no failure
	Cotton pad	68 minutes, no failure	68 minutes, no failure
Insulation		68 minutes, no failure	68 minutes, no failure

The test was discontinued after a period of 68 minutes at the request of the sponsor.

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 EN 1363-1, and where appropriate EN 1363-2. 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.

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.

SECTION 3

TEST METHODS

The specimens were evaluated in accordance with the following:

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*

EN 1363-1:2020, *Fire resistance tests - Part 1: General requirements*

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SECTION 4

MATERIAL SOURCE/INSTALLATION

The specimens were randomly selected by Intertek B&C personnel Jason Yuan at the ORBITA TECHNOLOGY CO., LTD's factory, located at Zhoukangwei Villager Group, Changbu Village, Xinxu Town, Huiyang District, Huizhou City, Guangdong Province. The subject test specimen is a traceable sample selected from the manufacturer's facility warehouse and signed prior to shipment on December 24, 2021. Intertek selected the specimen and has verified the composition, manufacturing techniques and quality assurance procedures.

A description of the test assembly is given in the table below. All values quoted below are nominal, unless tolerances are given. All dimensions are in mm in this report, unless otherwise specified.

TESTED ASSEMBLY DESCRIPTION		
Door	Type	Single Leaf Single Action Swing Timber Composite Fire Door
	Nominal Size	836 mm wide by 2040 mm high by 55 mm thick
	Main Material	Facing: 2.5 mm MDF, density of 816 kg/m ³
		Sub-facing: 5 mm Magnesium oxide board, density of 1339 kg/m ³
		Core: 40 mm Mineral board, density of 452 kg/m ³
		Rail: 60 mm x 30 mm solid wood, density of 731 kg/m ³
Frame	Stile: 60 mm x 30 mm solid wood, density of 731 kg/m ³	
	Nominal Size	906 mm wide by 2080 mm high by 140 mm deep
Hardware	Material	Solid wood, density of 731 kg/m ³ , clad with 5 mm Magnesium oxide board, density of 1339 kg/m ³ on both sides
	Hotel Lock, Model E4041	Mortise lock, model M10D Lock case size: 227 mm x 89.9 mm x 20.6 mm Backset: 62 mm; Latch throw: 15.9 mm Latch bolt: engaged; Deadbolt: disengaged.
		Front escutcheon: Panel material: 1.2 mm Stainless Steel Size: L285 mm x W75 mm x D16.7 mm Induction panel: 2.0mm PMMA
		Back escutcheon: Panel material: 1.2 mm Stainless Steel Size: L285 mm x W75 mm x D16.7 mm Induction panel: 2.0mm PMMA

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		Battery: need 6V of DC, use 1.5V AA dry battery Quantity: 4 pieces, in the back escutcheon.
		Bedding material: Lock case is protected by 2 mm thick fireproof board.
		Manufacturer: ORBITA TECHNOLOGY CO., LTD Zhoukangwei Villager Group, Changbu Village, Xinxu Town, Huiyang District, Huizhou City, Guangdong Province
		Brand name: ORBITA
	Hinge	Stainless Steel Hinge; Size: 4''× 4'' × 3mm, Quantity: 3 pcs; Bedding material: Hinge is protected by 2 mm thick fireproof board.
	Door closer	Model: 603 Installation: Surface mounted standard installation on the opening face of door leaf.
Intumescent Seal		Model: RP2004W2100, 20mm*4mm Location: 2 strips around door frame; 1 strip at right, left and top of door leaf edge; 2 strips at bottom of door leaf edge.

The sample ID number assigned by the test lab is S221115007SHF.005~006.

Documents and samples of seven types of Hotel Lock including Model E4031, E4131, E4431, E4041, E4441, E3041 and E3141 were checked, and found that these Hotel locks have the similar design and similar material.

Model E4031, E4131 and E4431 have the same front and back escutcheon, Model E3041 and E3141 have the same front and back escutcheon, Model E4041 and E4441 have the same front and back escutcheon. The 2nd digit of model number represents the different surface finish.

Model E4031, E4131, E4431, E3041 and E3141 have same mechanical lock case, Model M10, Model E4041, E4441 have same mechanical lock case, Model M10D. Mechanical lock M10 is same with M10D except for installation method, M10 is formal installation, M10D is inverted installation.

Model E4041 have the largest cut-out hole sizes on fire door, so model E4041 is selected to test to cover model E4031, E4131, E4431, E4441, E3041, E3141. The differences of these eleven models are listed in the following table.

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Model No.	Finish	Mechanical locks' No.	Electrical structure	Test classification
E4031	Stainless Steel silver	M10	Same circuit board and its installation position	3S5D0H312
E4131	Stainless Steel golden	M10		3S5D0H312
E4431	Stainless Steel black	M10		3S5D0H312
E4041	Stainless Steel silver	M10D		3S5D0H312
E4441	Stainless Steel black	M10D		3S5D0H312
E3041	Stainless Steel silver	M10	Same circuit board and its installation position	3S5D0H312
E3141	Stainless Steel golden	M10		3S5D0H312

The drawings of the Hotel Lock, the drawings of the fire door assembly and test wall construction can be found in Section 6, 7 and 8 respectively.

A comprehensive drawing and Installation Instruction of the Hotel Lock, Model E4031, E4131, E4431, E4041, E4441, E3041 and E3141 are maintained on Intertek file.

The test assembly was installed in a steel restraint frame. The test doorsets were built into a concrete masonry unit partition, with fully mortared joints. The test assembly placed in front of the furnace for the fire exposure. Prior to the commencement of the EN 1634-1 fire test, the test doorsets to be tested were checked for operability in the fire test frame by operating from fully closed to fully open, for 25 cycles. The test measurement data was shown in Section 9.

Two identical doorsets were mounted in one test frame. Doorset A was mounted so that the leaf swung towards the fire and doorset B was mounted so that the leaf swung away the fire. Both doorsets were tested at the same time.

The nominal dimensions of the test wall were 3 m high by 3 m wide.

After positioning the assembly frame over the furnace opening, the burners were ignited and the timer was started. Temperatures within the furnace were monitored using thermocouples and the data was recorded. The burners were controlled to keep the furnace temperatures within the allowable limits specified in the test standards. After 5 minutes, the furnace pressure was adjusted so that the neutral plane was established approximately 500 mm above notional floor level. Periodic observations were made of the surfaces of the test assembly during the fire resistance test.

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Door deflection relative to the frame, where applicable, was monitored throughout the test. Position for measurement of deflection and unexposed temperature is presented in the drawing of Section 9.

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SECTION 5 TEST RESULTS

Integrity

The doorset A withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 68 minutes. No through openings or penetrations were evident at this 68 minutes fire exposure portion of the test. During this 68 minutes fire exposure period no significant flaming was observed on the unexposed face of the assembly.

The doorset A therefore met the criteria of the test standards for integrity performance of 68 minutes.

The doorset B withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 68 minutes. No through openings or penetrations were evident at this 68 minutes fire exposure portion of the test. During this 68 minutes fire exposure period no significant flaming was observed on the unexposed face of the assembly.

The doorset B therefore met the criteria of the test standards for integrity performance of 68 minutes.

Insulation

Transmission of heat through the doorset A during the fire resistance test of 68 minutes did not raise the average temperature on the unexposed surface by more than 140°C above its initial value, and did not raise the maximum temperature on the unexposed surface by more than 180°C above the initial mean unexposed face temperature. In addition, the transmission of heat through the assembly did not raise the maximum temperature of the unexposed surface of the frame by more than 360°C for 68 minutes.

This doorset A therefore met the criteria of the test standards for insulation performance of 68 minutes.

Transmission of heat through the doorset B during the fire resistance test of 68 minutes did not raise the average temperature on the unexposed surface by more than 140°C above its initial value, and did not raise the maximum temperature on the unexposed surface by more than 180°C above the initial mean unexposed face temperature. In addition, the transmission of heat through the assembly did not raise the maximum temperature of the unexposed surface of the frame by more than 360°C for 68 minutes.

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This doorset B therefore met the criteria of the test standards for insulation performance of 68 minutes.

A full set of test data is included in Section 10, and photographs have been presented in Section 11.

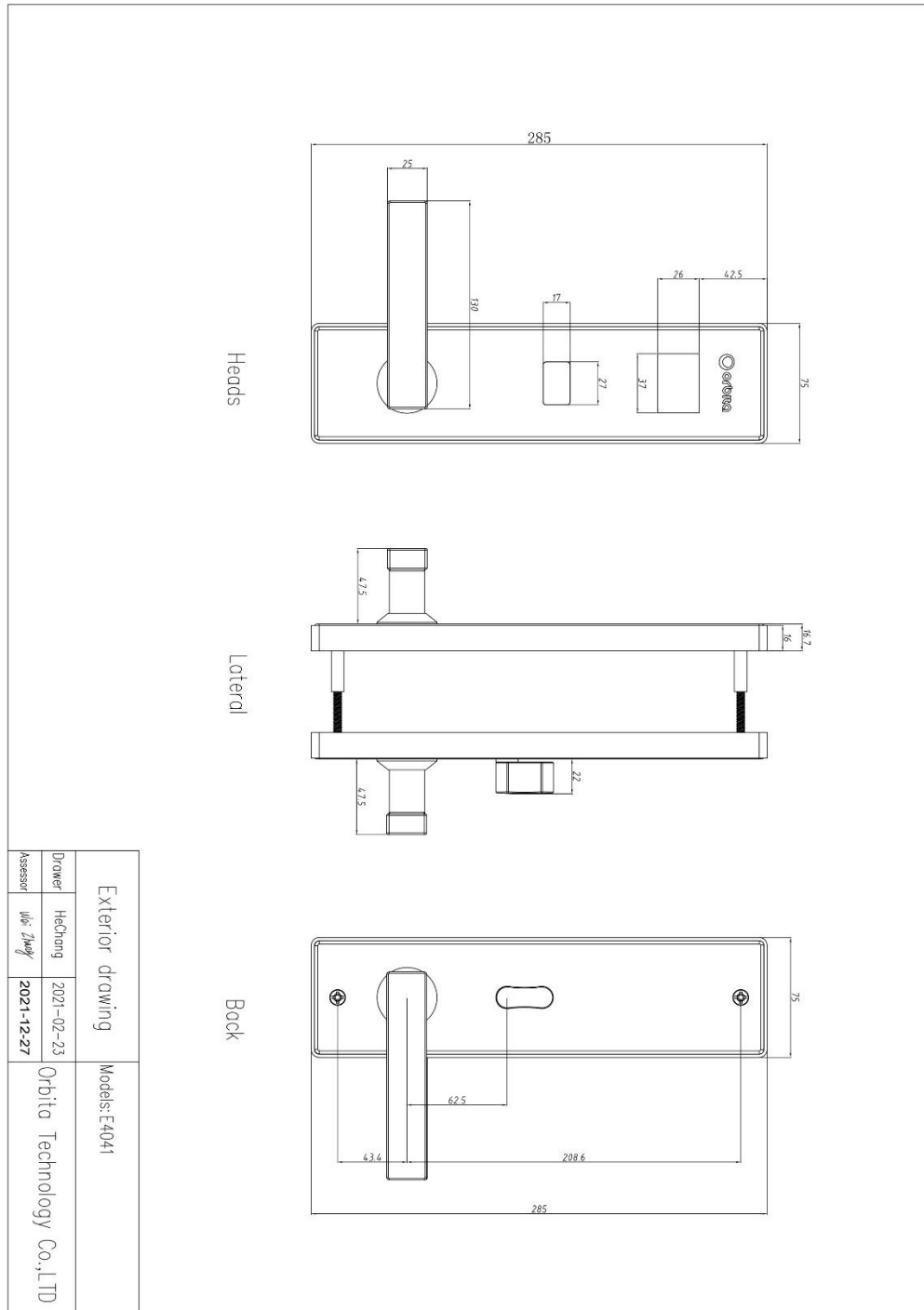
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SECTION 6

SAMPLE DRAWINGS

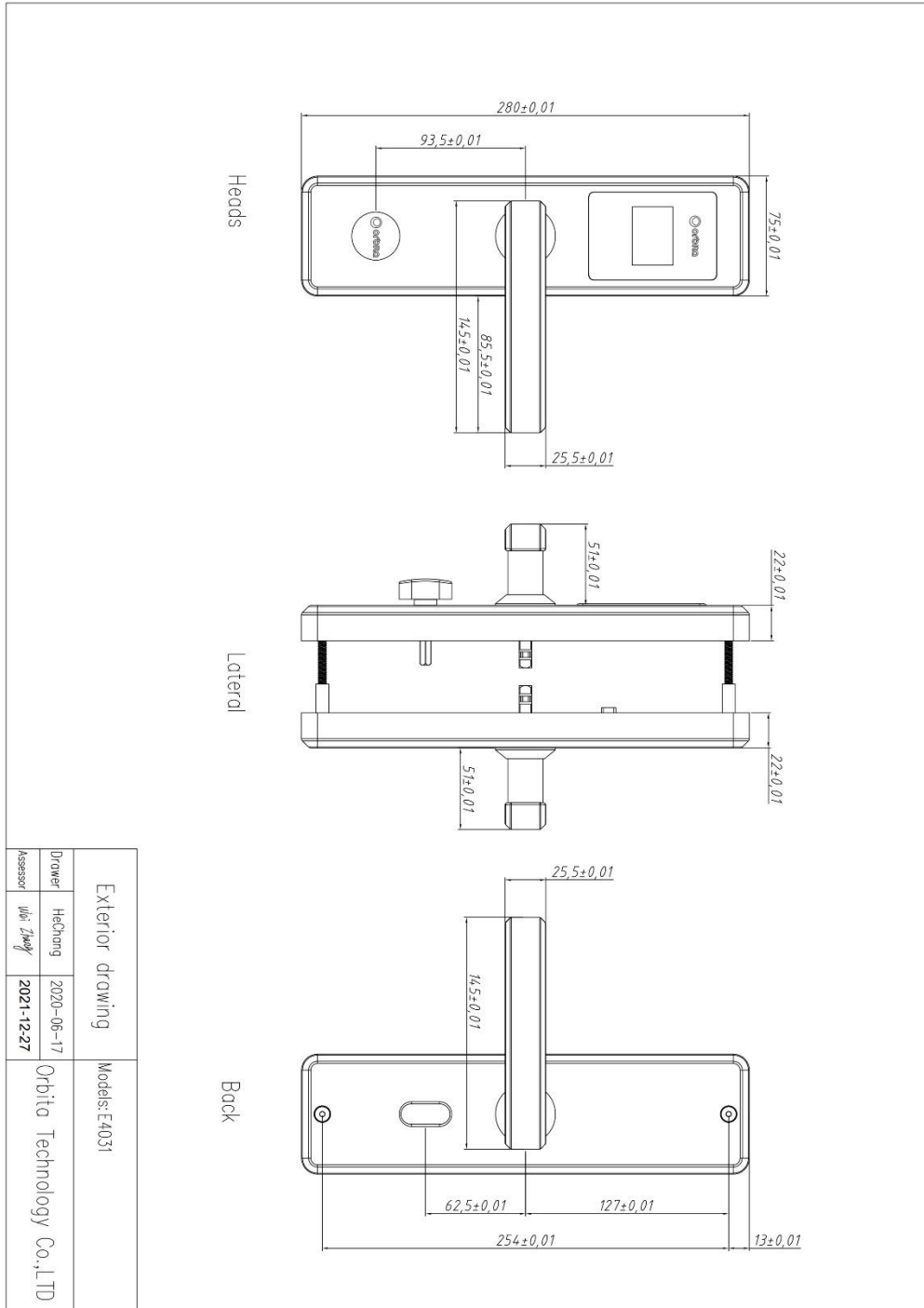


Dimension drawing of Hotel Lock, model E4041 and model E4441

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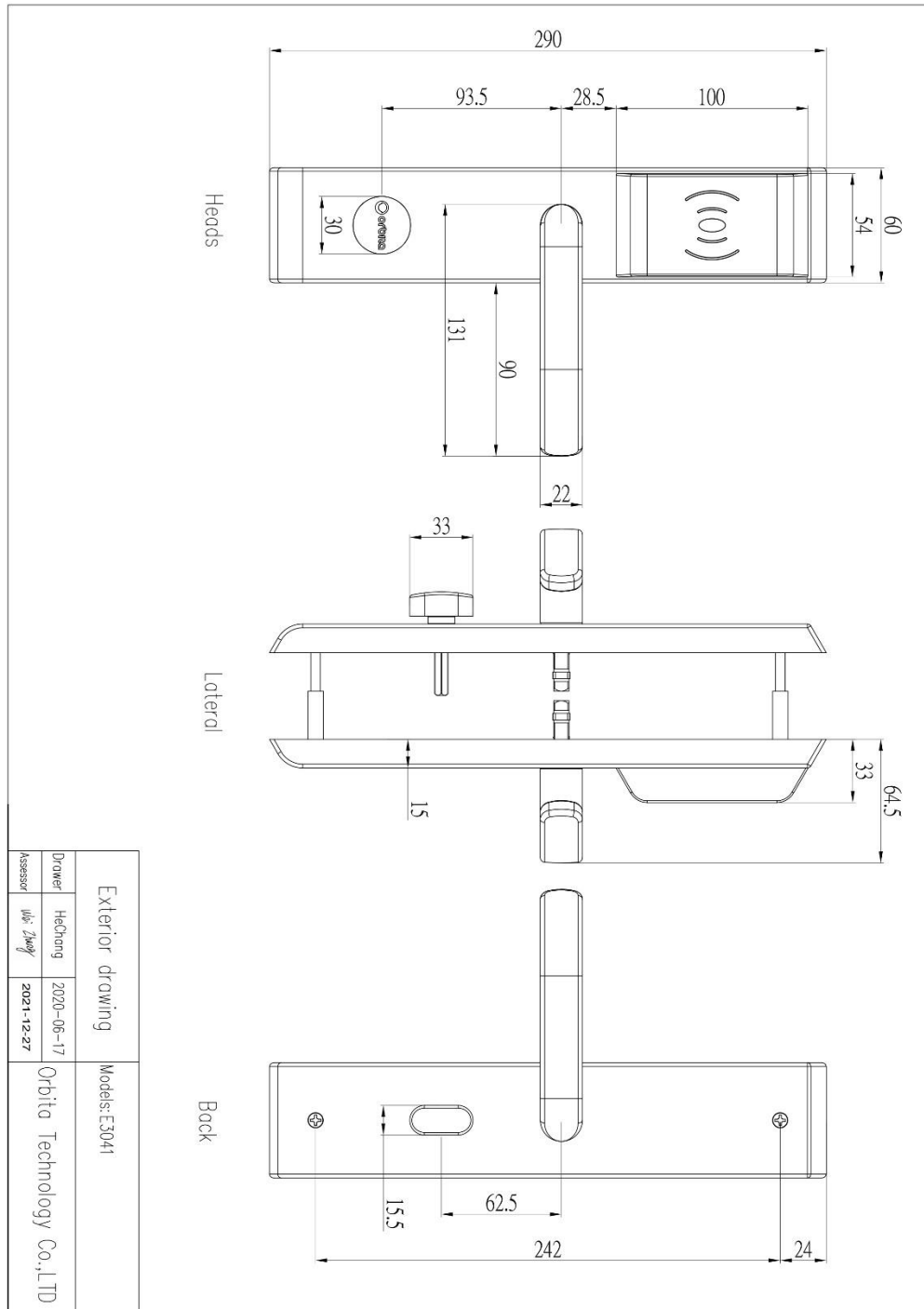


Dimension drawing of Hotel Lock, model E4031, model E4131 and model E4431

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Dimension drawing of Hotel Lock, model E3041 and model E3141

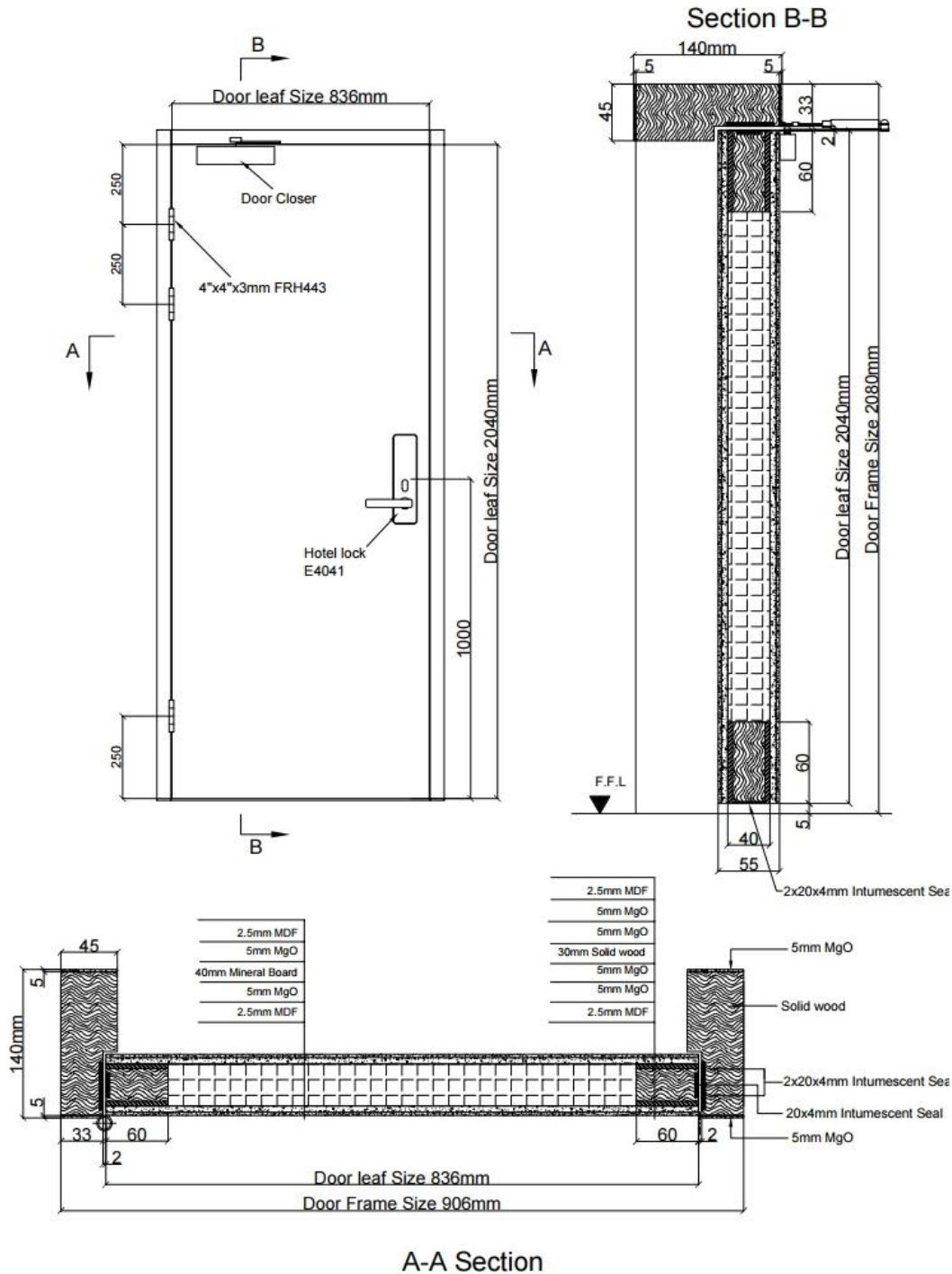
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SECTION 7

FIRE DOOR ASSEMBLY DRAWING



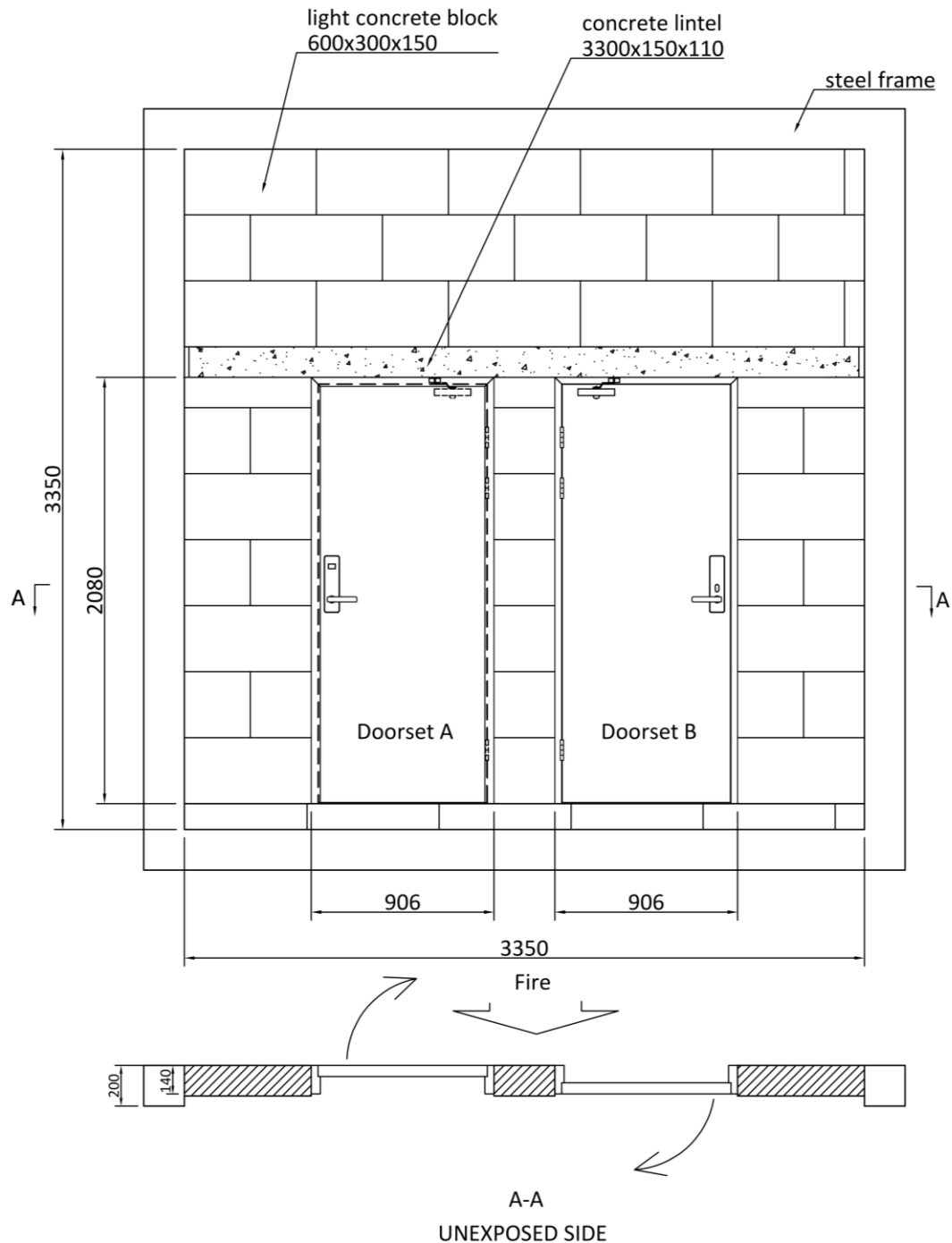
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SECTION 8

TEST WALL CONSTRUCTION



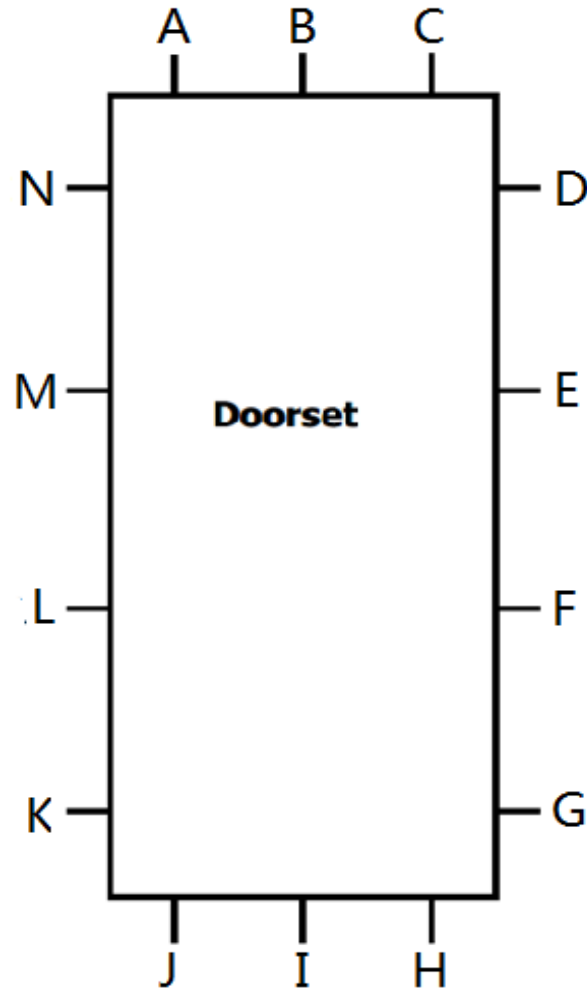
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SECTION 9

TEST MEASUREMENT DATA



EXPOSED SIDE

Clearance dimension in mm at each position of Doorset A													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
0.9	1.3	0.1	2.2	1.8	1.5	3.6	8.8	7.9	7.0	2.0	0.3	1.0	1.4

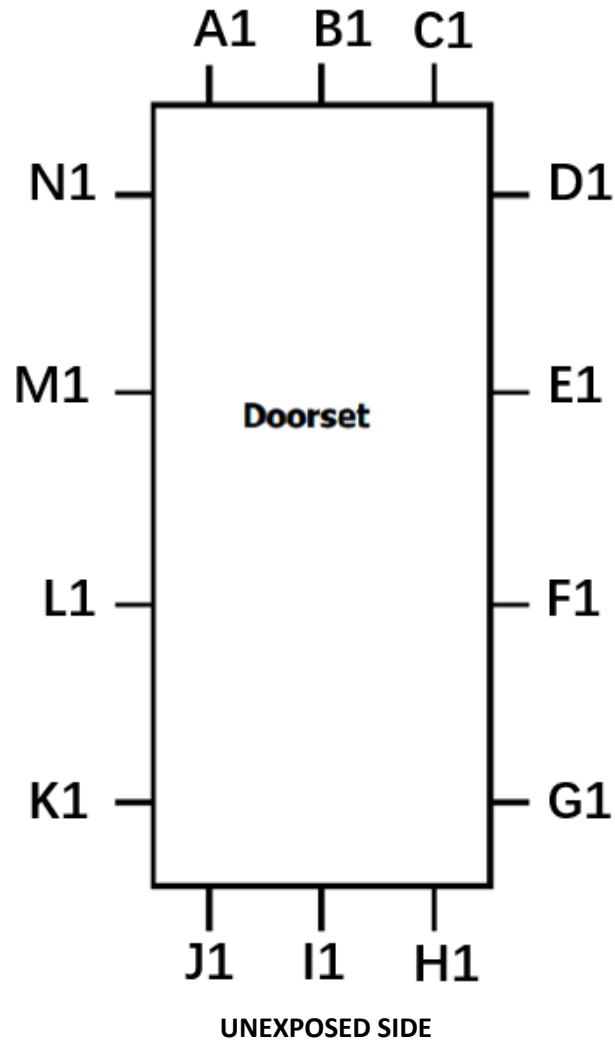
DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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Clearance dimension in mm at each position of Doorset B													
A1	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1	M1	N1
1.6	1.6	1.0	2.0	1.9	1.8	2.2	7.0	7.9	8.1	0.8	1.0	1.5	1.9

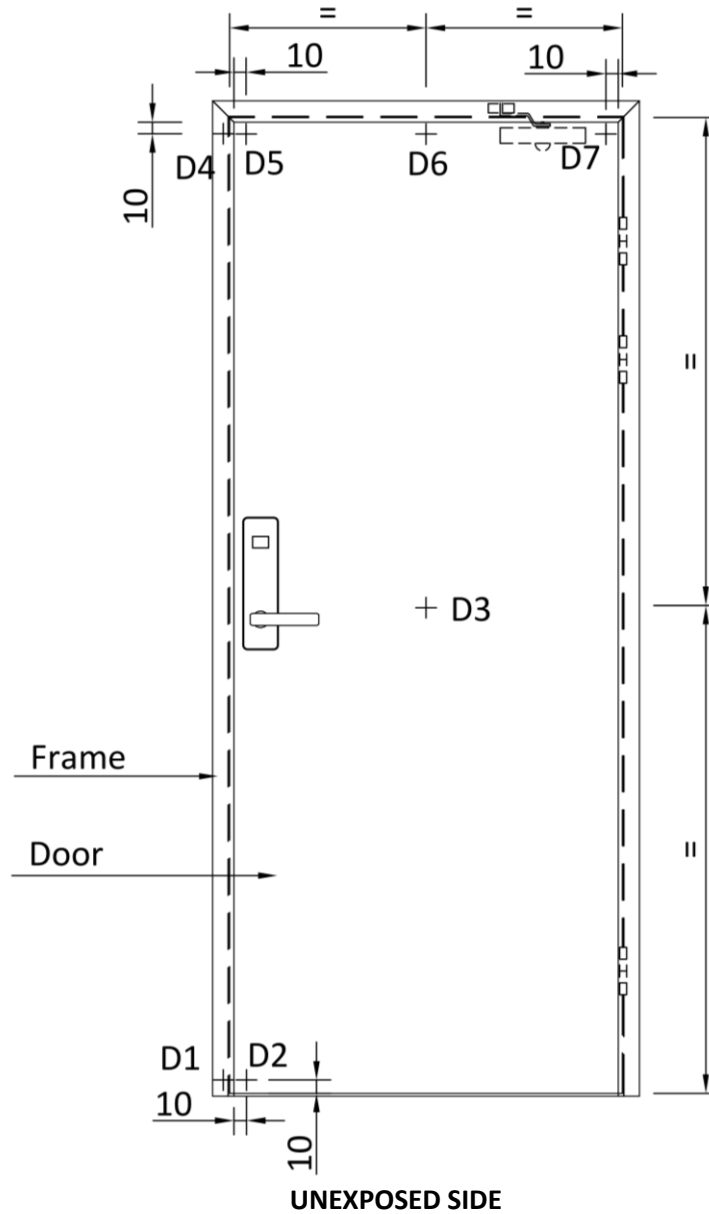
DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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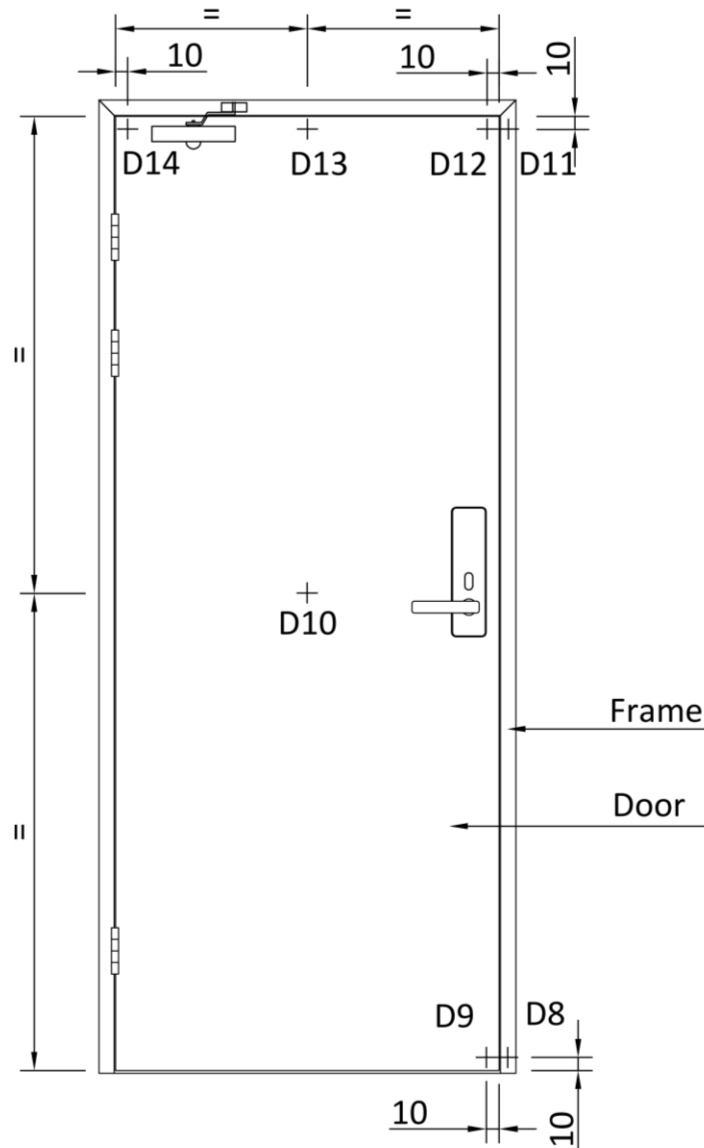


POSITION FOR MEASUREMENT OF HORIZONTAL DEFLECTION OF DOORSET A

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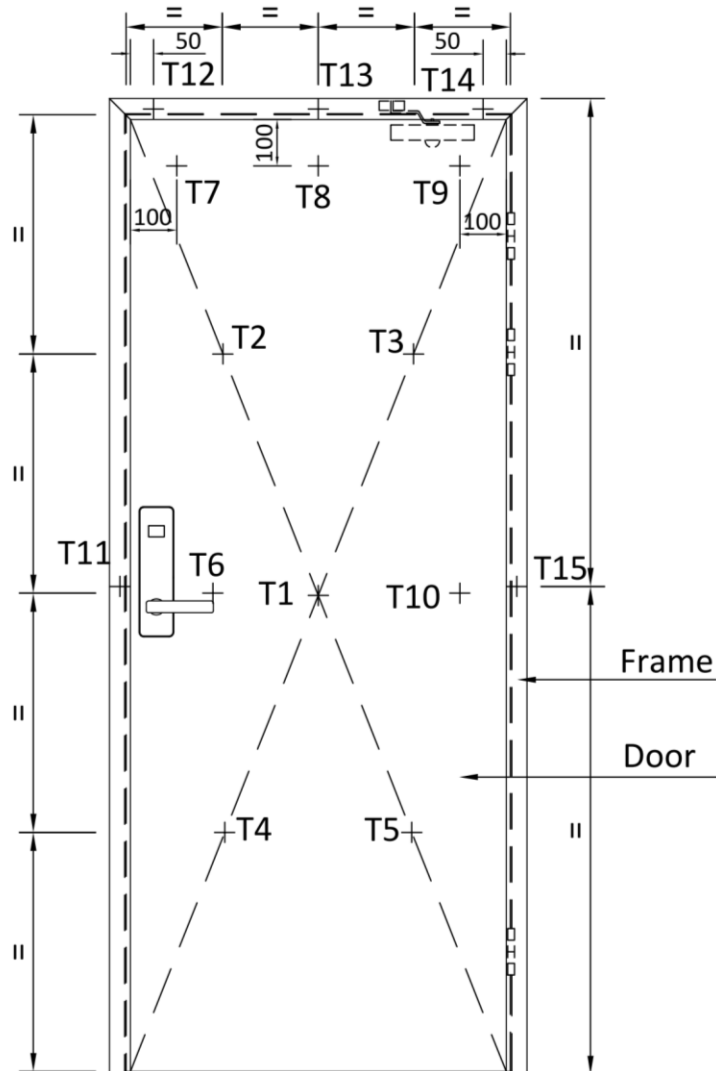
UNEXPOSED SIDE

POSITION FOR MEASUREMENT OF HORIZONTAL DEFLECTION OF DOORSET B

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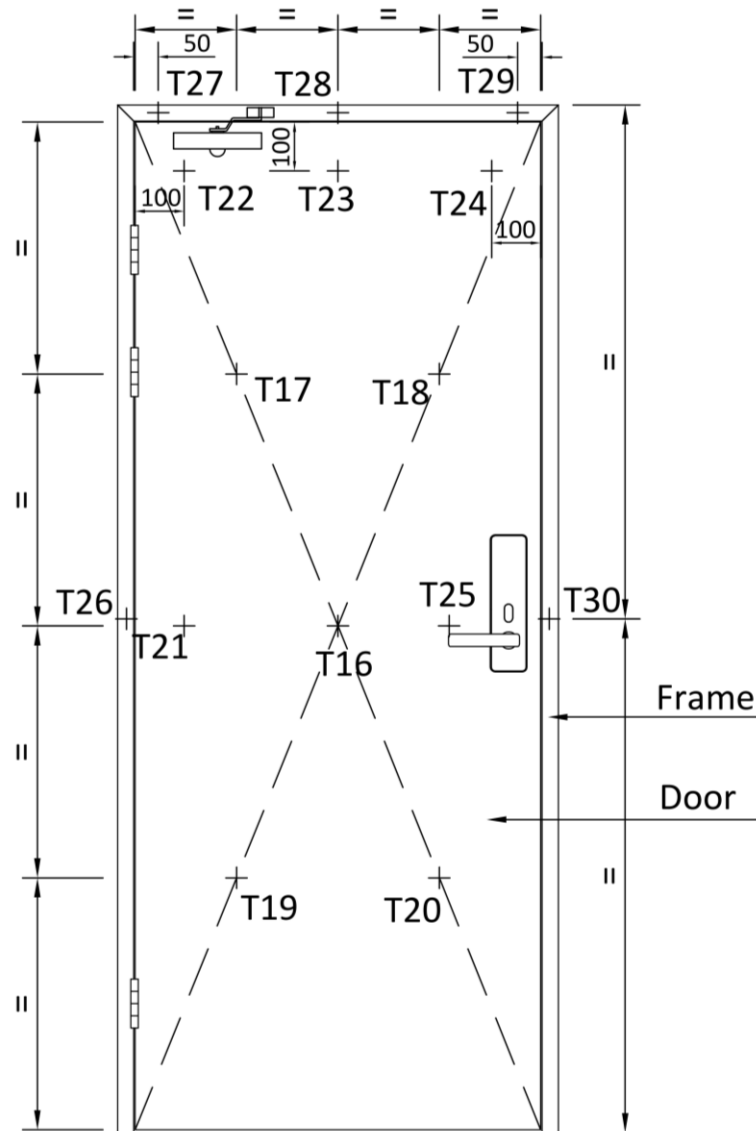


POSITION FOR MEASUREMENT OF UNEXPOSED TEMPERATURE OF DOORSET A

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POSITION FOR MEASUREMENT OF UNEXPOSED TEMPERATURE OF DOORSET B

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SECTION 10

TEST DATA

Standards: 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

Procedure: Part 1: Fire resistance test for doors, shutters and openable windows

Conditioning: According to EN 1363-1, Section 8

Equipment:

ITEM	ID
Vertical furnace	SH1097
Furnace pressure gauge	SH1097-15-1~2
Test Clock	SH1042
Furnace thermocouple	SH1097-4
Ambient temperature gauge	SH1097-11
Unexposed thermocouple	SH1097-12
Clearance Measurements	SH1057-1
Displacement Measurements	SH1377-1~11, SH1377-13~15
Force Gauge	SH1211

Heating Conditions: According to EN 1363-1, Section 5.1

Pressure Conditions: According to EN 1363-1, Section 5.2

Ambient Conditions: 10 to 40°C according to EN 1363-1, Section 5.6

Test Specimen: According to EN 1634-1, Section 6

Installation of test specimen: According to EN 1634-1, Section 7

Furnace Thermocouples: According to EN 1634-1, Section 9.1.1

Unexposed Face Thermocouples: According to EN 1634-1, Section 9.1.2

Thermocouples:

Thermocouple Pads: Length and width 30 mm, thickness 2.0 ± 0.5 mm, dry density 900 ± 90 kg/m²

Pressure Measurements: According to EN 1634-1, Section 9.2

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Test Observations for Doorset A:

Time		All observations are from the unexposed face unless noted otherwise.
Mins	Secs	
00	00	Test started.
01	08	Smoke issued from the top edge and the top of the hinge edge of the doorset.
01	42	Smoke issued from the hinge edge and the leading edge of the doorset.
02	00	Smoke issued from the bottom edge of the doorset.
04	30	Discoloration was observed on the top edge and the top right corner of the doorset.
13	53	There was an unidentified liquid emitted from the lock.
22	36	No significant change.
41	49	No significant change.
56	45	Darkening was observed on the top hinge position and the top right corner of the doorset.
67	35	Intermittent flame was observed on the top hinge position.
68	00	Test was discontinued at the request of the client. Neither sustained flame, ignition of cotton pad nor through opening were evident on the unexposed surface of doorset.

Test Observations for Doorset B:

Time		All observations are from the unexposed face unless noted otherwise.
Mins	Secs	
00	00	Test started.
01	08	Smoke issued from the top edge and the top of the hinge edge of the doorset.
02	11	Smoke issued from top of the leading edge of the doorset.
04	30	Discoloration was observed on the header.
06	10	Smoke issued from the leading edge of the doorset.
07	29	Smoke issued from the hinge edge of the doorset.
22	36	No significant change.
25	50	There was an unidentified liquid emitted from the lock.
41	49	No significant change.
68	00	Test was discontinued at the request of the client. Neither sustained flame, ignition of cotton pad nor through opening were evident on the unexposed surface of doorset.

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Temperature Data:

Mean furnace temperature together with temperature-time relationship specified in the standard

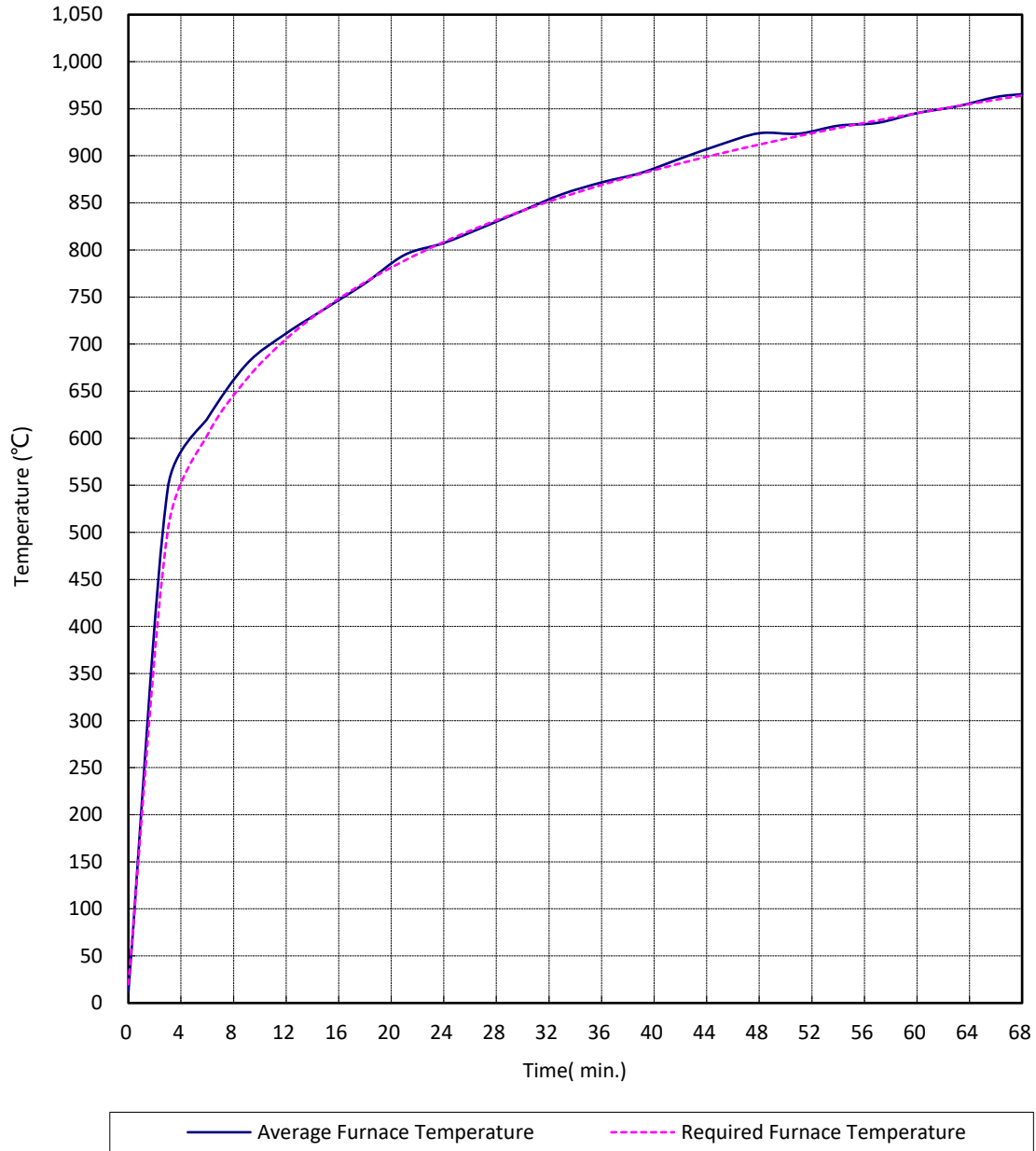
Time Mins	Specified Furnace Temperature (°C)	Furnace Mean Temperature (°C)
0	20	12
3	502	547
6	603	621
9	663	679
12	705	711
15	739	738
18	766	764
21	789	795
24	809	807
27	826	824
30	842	842
33	856	859
36	869	872
39	881	882
42	892	897
45	902	912
48	912	924
51	921	924
54	930	932
57	938	935
60	945	945
63	953	952
66	960	962
68	964	966

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Graph for mean furnace temperature and temperature-time curve specified in the standard



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Unexposed surface temperatures of Doorset A

Time Mins	T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	Mean Temperature (°C)
0	9	8	8	8	7	8
3	10	8	8	8	8	8
6	9	8	8	8	7	8
9	10	8	8	8	8	8
12	10	9	9	9	8	9
15	12	11	10	10	10	11
18	14	14	13	13	12	13
21	18	18	17	17	16	17
24	23	22	21	21	20	21
27	27	27	25	25	24	26
30	32	32	30	30	29	31
33	36	36	34	34	33	35
36	40	41	39	38	37	39
39	44	45	43	42	42	43
42	48	48	47	46	45	47
45	51	52	50	49	49	50
48	55	55	54	52	52	54
51	58	58	57	55	55	57
54	61	61	60	59	58	60
57	64	64	63	62	61	63
60	67	66	66	64	65	66
63	70	69	68	67	67	68
66	72	71	71	70	70	71
68	73	73	72	71	71	72

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Unexposed surface temperatures of Doorset A

Time Mins	T6 (°C)	T7 (°C)	T8 (°C)	T9 (°C)	T10 (°C)	T11 (°C)	T12 (°C)	T13 (°C)	T14 (°C)	T15 (°C)
0	8	8	9	9	7	7	7	7	7	8
3	8	9	10	13	8	7	7	9	9	8
6	8	8	11	11	7	7	8	14	12	8
9	8	9	11	12	8	7	9	15	15	8
12	8	9	11	12	8	7	9	16	18	8
15	10	12	13	14	10	7	9	16	20	8
18	13	16	17	17	14	7	9	16	20	8
21	18	21	22	23	18	8	10	15	20	8
24	22	26	27	29	23	8	10	15	20	8
27	27	32	33	35	27	8	10	15	20	8
30	32	37	38	41	32	8	11	14	19	8
33	36	42	43	46	37	8	11	14	19	9
36	41	47	48	50	41	9	12	14	19	9
39	45	51	52	55	46	9	13	15	19	9
42	49	55	56	58	50	9	14	15	19	10
45	52	58	59	62	53	10	15	16	20	10
48	56	62	63	65	57	11	16	16	21	10
51	59	65	66	68	60	11	17	17	22	11
54	62	68	69	72	63	12	18	18	24	12
57	65	70	71	74	67	13	20	19	26	13
60	67	73	74	77	70	14	21	21	29	14
63	70	76	76	79	73	15	23	22	30	15
66	72	78	78	81	75	16	25	24	34	16
68	73	80	79	83	76	17	26	25	35	17

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Unexposed surface temperatures of Doorset B

Time Mins	T16 (°C)	T17 (°C)	T18 (°C)	T19 (°C)	T20 (°C)	Mean Temperature (°C)
0	8	9	8	8	8	8
3	9	9	8	8	8	8
6	8	9	8	8	8	8
9	9	9	8	10	8	9
12	9	10	9	9	9	9
15	11	12	11	11	11	11
18	14	15	15	14	13	14
21	18	19	19	17	17	18
24	22	24	24	22	21	23
27	27	28	29	26	26	27
30	31	33	34	31	30	32
33	36	38	38	35	35	36
36	40	42	43	39	39	41
39	44	46	47	44	44	45
42	47	50	51	48	47	49
45	51	53	54	51	51	52
48	54	56	58	54	54	55
51	56	59	61	58	57	58
54	59	62	64	61	60	61
57	61	64	66	63	63	63
60	64	67	69	65	65	66
63	66	69	71	68	67	68
66	68	71	73	70	69	70
68	70	72	74	71	71	72

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Unexposed surface temperatures of Doorset B

Time Mins	T21 (°C)	T22 (°C)	T23 (°C)	T24 (°C)	T25 (°C)	T26 (°C)	T27 (°C)	T28 (°C)	T29 (°C)	T30 (°C)
0	8	8	8	9	9	8	8	8	8	8
3	8	8	8	9	9	9	19	18	16	9
6	8	8	8	9	9	9	32	46	25	9
9	9	9	9	9	9	9	38	50	33	10
12	9	9	9	9	10	11	66	60	42	11
15	11	11	11	11	11	15	68	68	59	13
18	13	14	16	15	14	21	64	73	74	16
21	17	18	21	21	18	24	60	68	71	24
24	22	22	27	27	23	25	61	57	74	36
27	26	27	32	33	28	26	60	50	67	43
30	31	32	37	38	33	28	54	46	65	48
33	36	37	41	43	37	30	50	43	65	51
36	41	42	45	47	42	33	49	41	61	53
39	45	46	49	51	46	36	51	41	64	56
42	49	50	53	54	50	38	55	41	66	58
45	52	54	56	58	54	42	59	42	61	60
48	56	57	60	61	57	45	59	45	61	61
51	59	61	63	65	60	49	59	58	63	62
54	62	64	66	68	63	52	59	58	70	65
57	64	67	68	71	66	56	63	55	69	66
60	66	69	71	74	68	58	69	53	64	68
63	69	72	73	76	70	61	73	53	62	70
66	71	74	75	78	72	65	77	55	62	73
68	72	76	76	79	74	67	78	57	62	75

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Horizontal Deflection of Doorset A (Positive values indicate movement into the furnace)

Time Mins	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)	D6 (mm)	D7 (mm)
0	0	0	0	0	0	0	0
10	0	-2	3	3	2	3	/
20	0	0	6	5	8	11	13
30	0	2	8	7	9	15	22
40	1	2	11	8	15	20	30
50	0	0	23	9	14	24	33
60	0	0	41	10	13	32	36
65	-3	-2	48	9	16	37	39

Note: "/" means: the measurement of the deflection was invalid due to the heavy smoke.

Door Closer Closing Force – Doorset A		
Highest gauge reading	Distance	Moment
(N)	(m)	(N.m)
58.3	0.77	45.0
58.1	0.77	
59.1	0.77	

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Horizontal Deflection of Doorset B (Positive values indicate movement into the furnace)

Time Mins	D8 (mm)	D9 (mm)	D10 (mm)	D11 (mm)	D12 (mm)	D13 (mm)	D14 (mm)
0	0	0	0	0	0	0	0
10	0	-8	-3	2	3	4	0
20	0	-6	3	6	8	11	13
30	0	-2	4	8	13	17	22
40	0	0	9	12	13	21	29
50	1	0	18	15	20	25	33
60	2	-4	33	18	25	30	35
65	3	-7	40	19	25	34	35

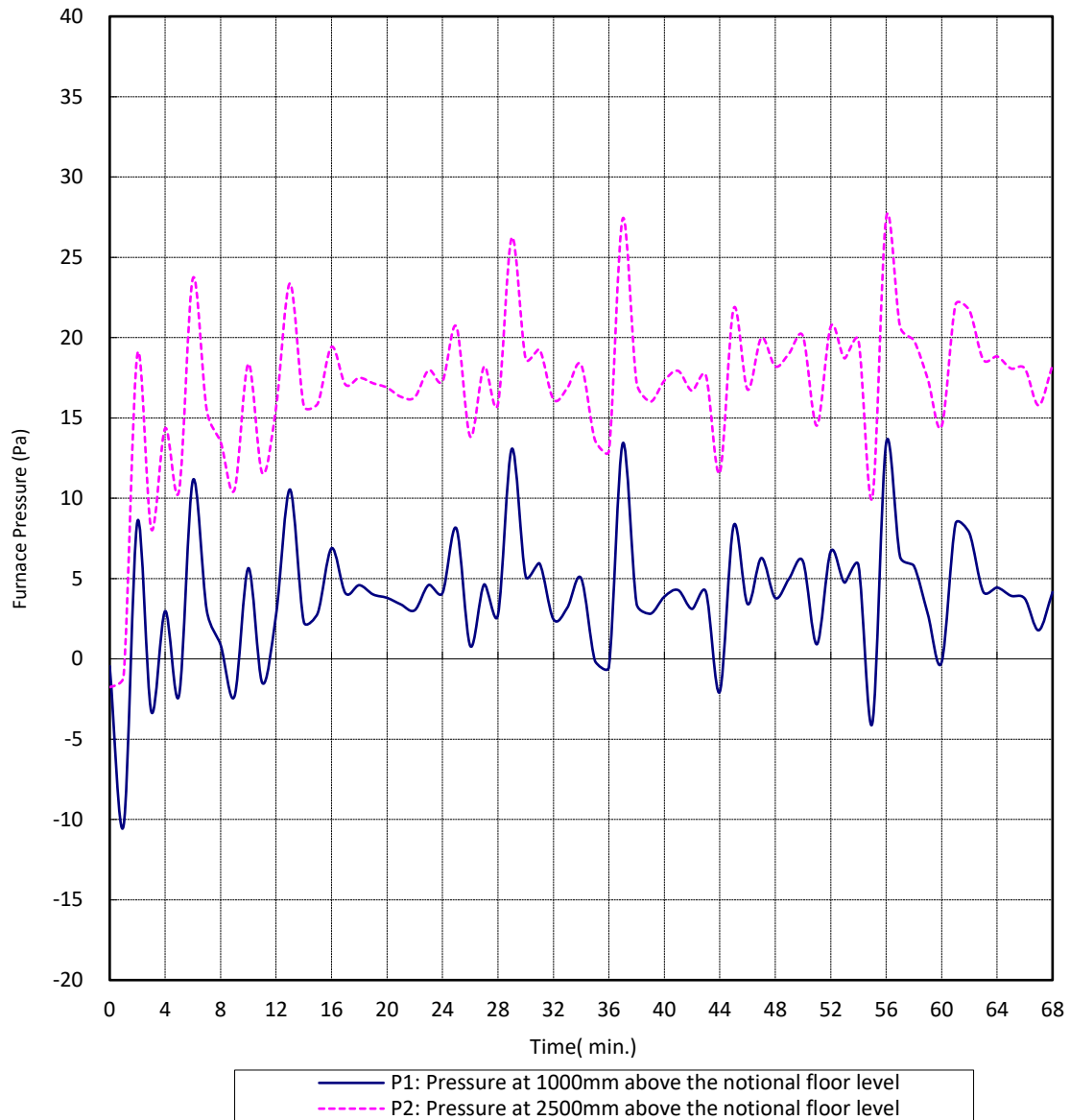
Door Closer Closing Force – Door B		
Highest gauge reading	Distance	Moment
(N)	(m)	(N.m)
60.2	0.77	46.2
60.0	0.77	
59.9	0.77	

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Graph of Furnace pressure



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SECTION 11 PHOTOGRAPHS



Fig. 1 Exposed Side Prior to the Fire Test



Fig. 2 Unexposed Side Prior to the Fire Test

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Fig. 3 Unexposed Side after 20 Minutes

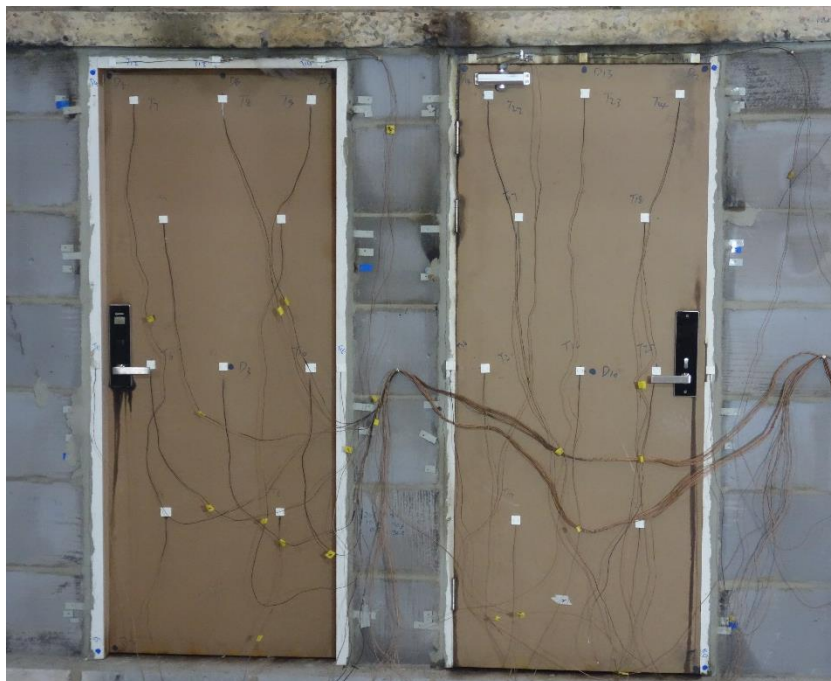


Fig. 4 Unexposed Side after 40 Minutes

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Fig. 5 Unexposed Side after 68 Minutes



Fig. 6 Exposed Side after 68 Minutes

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SECTION 12

REVISION LOG

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