BQT SOLUTIONS (SEA) PTE LTD.

TEST REPORT

SCOPE OF WORK
EN 1634-1 (2014) TESTING ON ELECTRONIC DEAD BOLTING STRIKE, MODEL OF YD30

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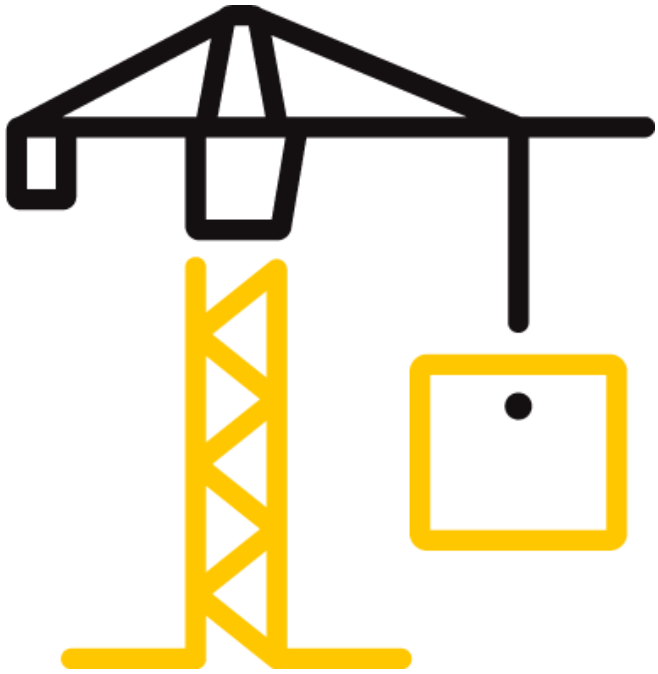

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REPORT ISSUED TO

BQT SOLUTIONS (SEA) PTE LTD.
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SECTION 1

SCOPE

Intertek has conducted an evaluation for BQT Solutions (SEA) Pte Ltd. to determine the fire resistance characteristics of Electronic dead bolting strike, Model of YD30 in Single Leaf Single Action Steel Fire Door. This test was designed to demonstrate evaluation on the Electronic dead bolting strike of two types including Model YD30 and Model YD30M. This evaluation began on May 15, 2018 and was completed on July 30, 2018. The test was conducted on July 30, 2018.

The test was conducted in accordance with EN 1634-1:2014, 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.

For INTERTEK B&C:

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SECTION 2
SUMMARY OF TEST RESULTS

Product Name: Electronic dead bolting strike
Series/Model: YD30 and YD30M

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

Door A

PERFORMANCE CRITERIA	RESULTS	
Integrity	Sustained flaming	260 minutes
	Gap gauge	260 minutes
	Cotton pad	260 minutes
Insulation		18 minutes

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

Door B

PERFORMANCE CRITERIA	RESULTS	
Integrity	Sustained flaming	260 minutes
	Gap gauge	260 minutes
	Cotton pad	260 minutes
Insulation		19 minutes

The evaluation was discontinued after a period of 260 minutes at the request of the sponsor.

SECTION 3
TEST METHOD

The specimen was evaluated in accordance with the following:

EN 1634-1:2014, *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 1363-1:2012, *Fire resistance test – Part 1: General Requirements*

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SECTION 4
MATERIAL SOURCE/INSTALLATION

Test specimens were provided to Intertek directly by the client and were not independently selected for testing. Test specimens were received at the Evaluation Center on May 3, 2018.

Electronic dead bolting strike, YD30 was tested. The specifications YD30 was provided by the client.

TESTED ASSEMBLY DESCRIPTION		
Door	Type	Single Leaf Single Action Swing Steel Fire Door
	Nominal Size	836 mm wide by 2040 mm high by 45 mm thick
	Main materials	Faces: 1.2 mm galvanized steel sheet Q235A Door core: Aluminum silicate fiber with the density of 120 kg/m^3 Steel stiffener: 44 mm x 22 mm x 1.4 mm, Q235A, Spacing: 155 mm; Edge Channel Steel: 44 mm x 22 mm x 3 mm, galvanized steel sheet Q235A.
Frame	Nominal Size	Material: 1.4 mm galvanized steel sheet Q235A 940 mm wide by 2117 mm high by 150 mm thick
Hardware	Electronic dead bolting Strike	Model: YD30 Two bolt pins were disengaged, no power supply during test. Installation: Lock case was mortised into the vertical jamb at the top of doorset with 80 mm away from the rabbet of top jamb and the strike plate was installed into the leaf.
	Mortise lock	Model: CML 820 F20 Latch bolt: Engaged Dead bolt: Disengaged
	Hinge	Model of 4.5”x4”x3.4mm, Stainless Steel 304 Quantity: 4 Location: refer to the door assembly drawing
	Door closer	Surface mounted standard installation on the pull side door with Power Size 3. Model: DORMA TS68

The sample ID number assigned by the test lab is S180515001SHF-001~002.

Documents and drawing of two models of Electronic dead bolting strike, YD30 and YD30M were checked and found that these strike locks have similar design and similar materials but different choices on size and function. Model YD30 with largest cut out size and full function was selected to test to cover YD30M.

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The Document Register List, drawing 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 Electronic dead bolting strike, Model of YD30 and YD30M are maintained on Intertek file.

The test assembly was installed in a steel restraint frame. The test door was built into a concrete masonry unit partition, with fully mortared joints. The test assembly moved in front of the furnace for the fire exposure. Prior to the commencement of the EN 1634-1 fire test, the specimen to be test was 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 test doors were mounted in one test wall. The test door B opened into the furnace while the test door A open away from the furnace.

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 at a maximum of 500 mm above notional floor level. Periodic observations were made of the surfaces of the test assembly during the fire resistance test.

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

SECTION 5
TEST RESULTS

Integrity

The assembly of door A and door B withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 260 minutes. No through openings or penetrations were evident at this 260 minutes fire exposure portion of the test and the door latch remained engaged to the strike. During this 260 minutes fire exposure period no significant flaming was observed on the unexposed face of the assembly.

This assembly of door A and door B therefore also met the criteria of the test standards for integrity performance of 260 minutes.

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Insulation

Transmission of heat through the assembly of door A during the fire resistance test of 18 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 18 minutes.

After exposed to the fire for a period of 18 minutes, the temperature of T2 on unexposed surface increased by more than 180°C, insulation failure was deemed to occur.

The assembly of door A passed the insulation portion of the test of 18 minutes.

Transmission of heat through the assembly of door B during the fire resistance test of 19 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 19 minutes.

After exposed to the fire for a period of 19 minutes, the average temperature on unexposed surface increased by more than 140°C, insulation failure was deemed to occur.

After exposed to the fire for a period of 19 minutes, the temperature of T17 on unexposed surface increased by more than 180°C, insulation failure was deemed to occur.

The assembly of door B passed the insulation portion of the test of 19 minutes.

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

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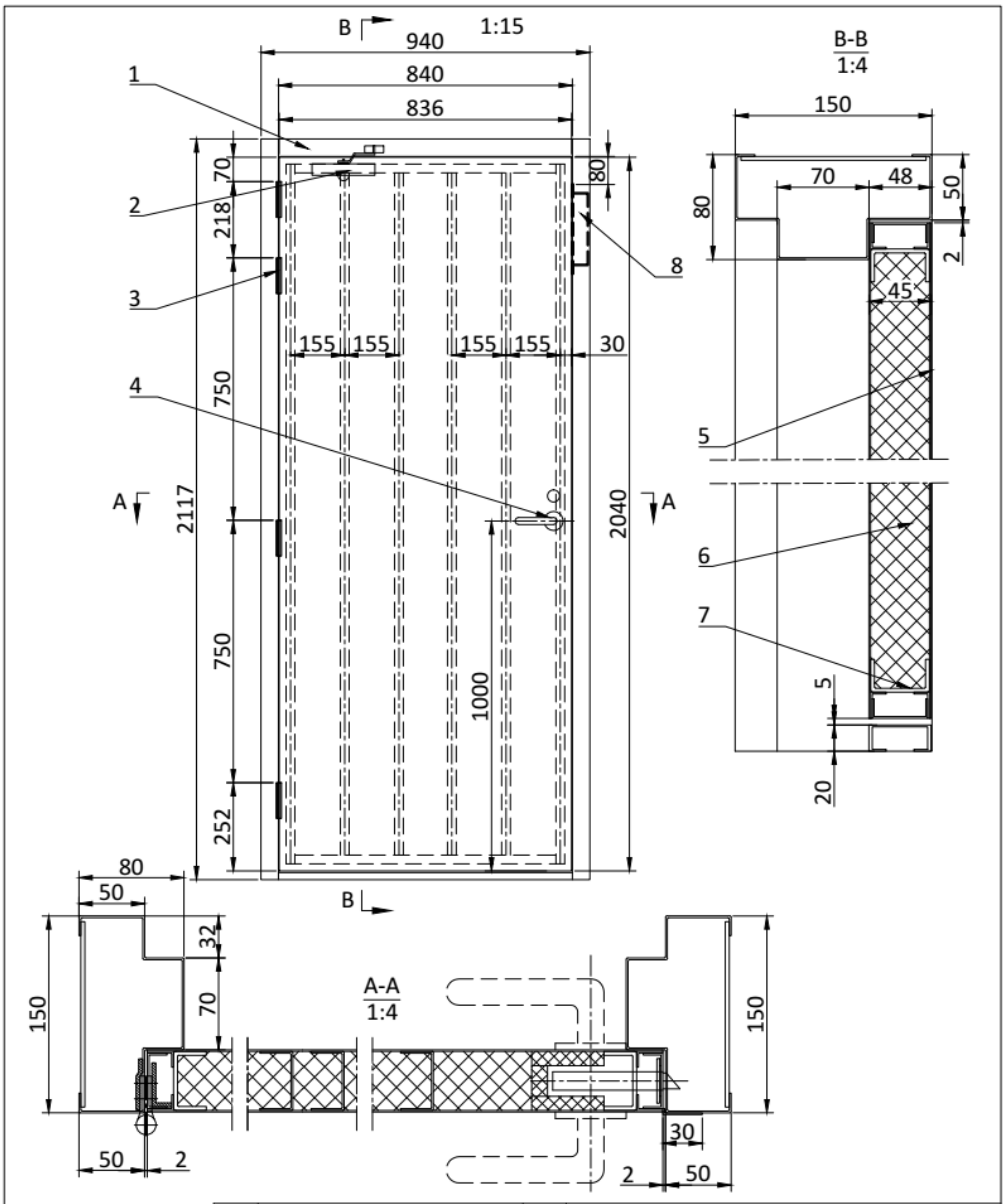
SECTION 6

DOCUMENT REGISTER LIST

Model No.	Document Ref.	Document Title	Issue	Date
YD30	YD30_exploded_bom	Explode drawing	20100701	20180629
YD30	YD30_dimensional_drawing	Dimensional drawing	20180629	20180629
YD30	YD30 installation and operating instructions	Installation and operating instructions	20180822	20180822
YD30	CapBoard	Circuit Diagrams	20120910	20180809
YD30	MicroBoard	Circuit Diagrams	20121009	20180809
YD30	SwitchBoard	Circuit Diagrams	20170112	20180809
YD30	CE mark	CE mark	20180809	20180809
YD30M	YD30M_exploded_bom	Explode drawing	20100701	20180629
YD30M	YD30M_dimensional_drawing	Dimensional drawing	20180629	20180629
YD30M	YD30M installation and operating instructions	Installation and operating instructions	20180822	20180822

SECTION 7

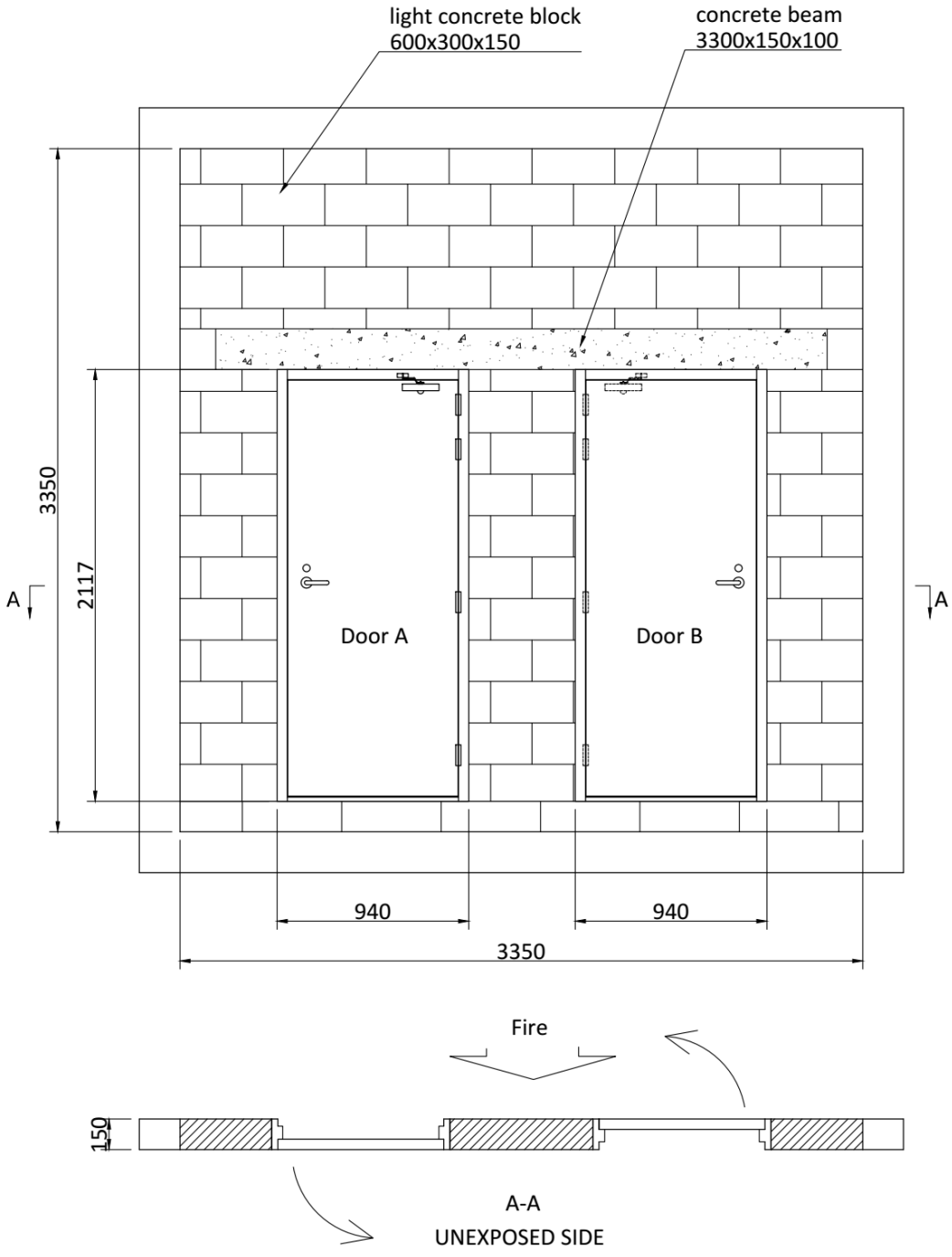
FIRE DOOR ASSEMBLY DRAWING



NO.	Component	QTY	Specification
8	Electronic dead bolting lock	1	YD30
7	Stiffener		3.0mm/1.4mm Q235A Galvanized steel sheet
6	Aluminum silicate wool		120 kg/m^3
5	Facing	2	1.2mm Q235A Galvanized steel sheet
4	Mortise Lock	1	CML 820 F20
3	Hinge	4	ANAN JL/HY 4.5"X4"X3.4mm SS304
2	Door closer	1	DORMA TS 68
1	Frame	1	1.4mm Q235A Galvanized steel sheet

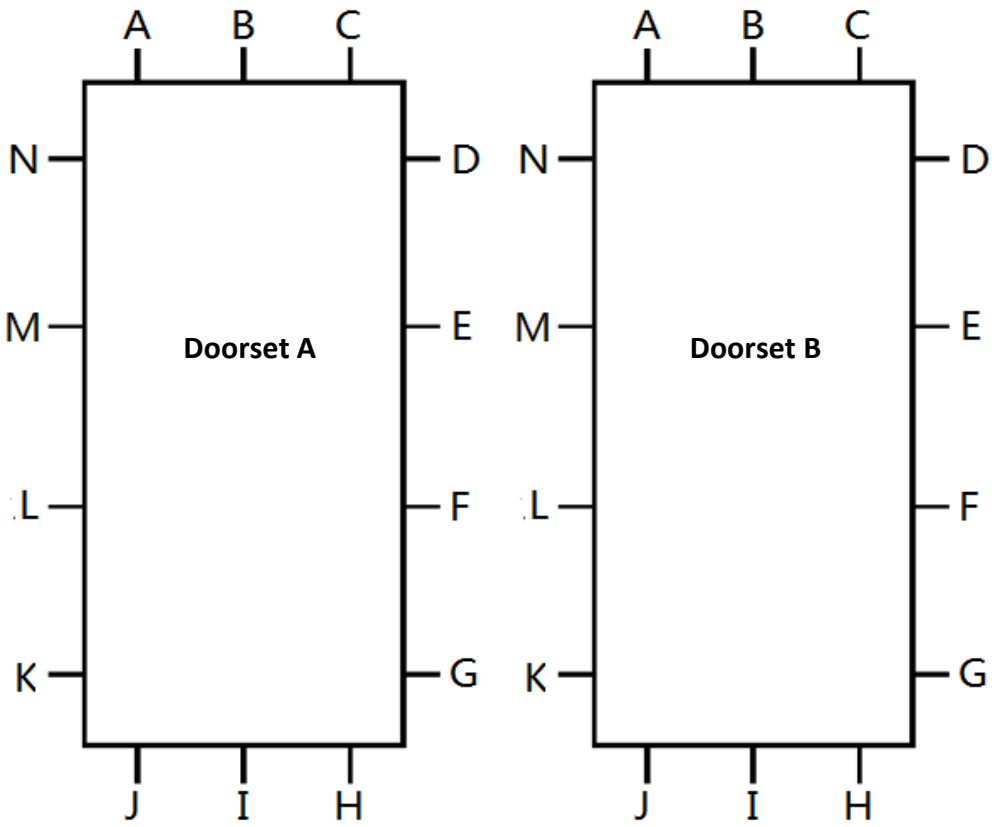
SECTION 8

TEST WALL CONSTRUCTION



SECTION 9

TEST MEASUREMENT DATA



UNEXPOSED SIDE **EXPOSED SIDE**

Clearance dimension in mm at each position (Door A)													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
2.2	3.0	2.8	3.0	2.8	3.0	1.0	3.8	4.8	5.0	1.8	1.8	2.0	2.0

Clearance dimension in mm at each position (Door B)													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
2.8	2.6	2.0	3.2	3.0	2.8	1.8	3.8	3.8	4.0	2.0	2.0	2.2	2.2

DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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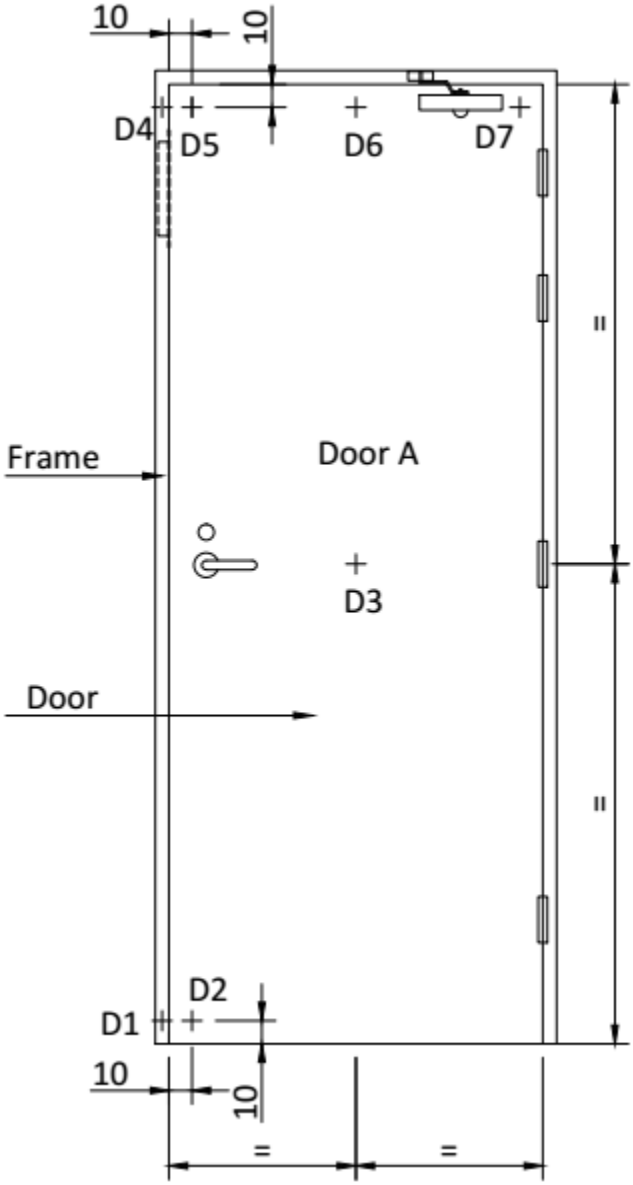

UNEXPOSED SIDE

POSITON FOR MEASUREMENT OF HORZITONAL DEFLECTION OF DOOR A

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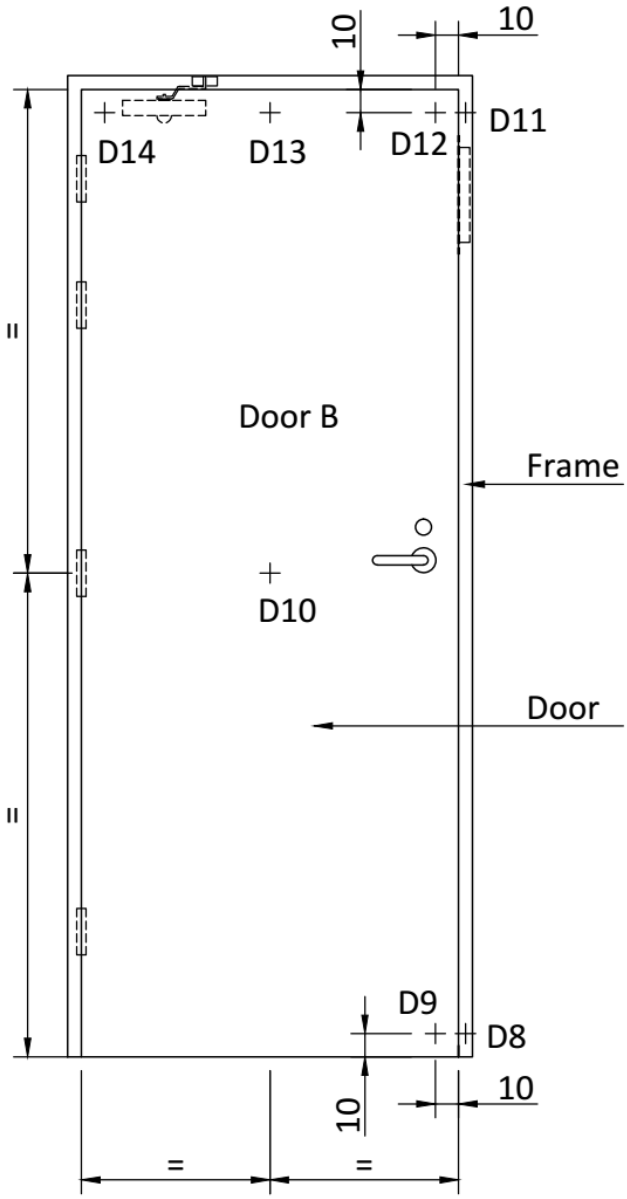
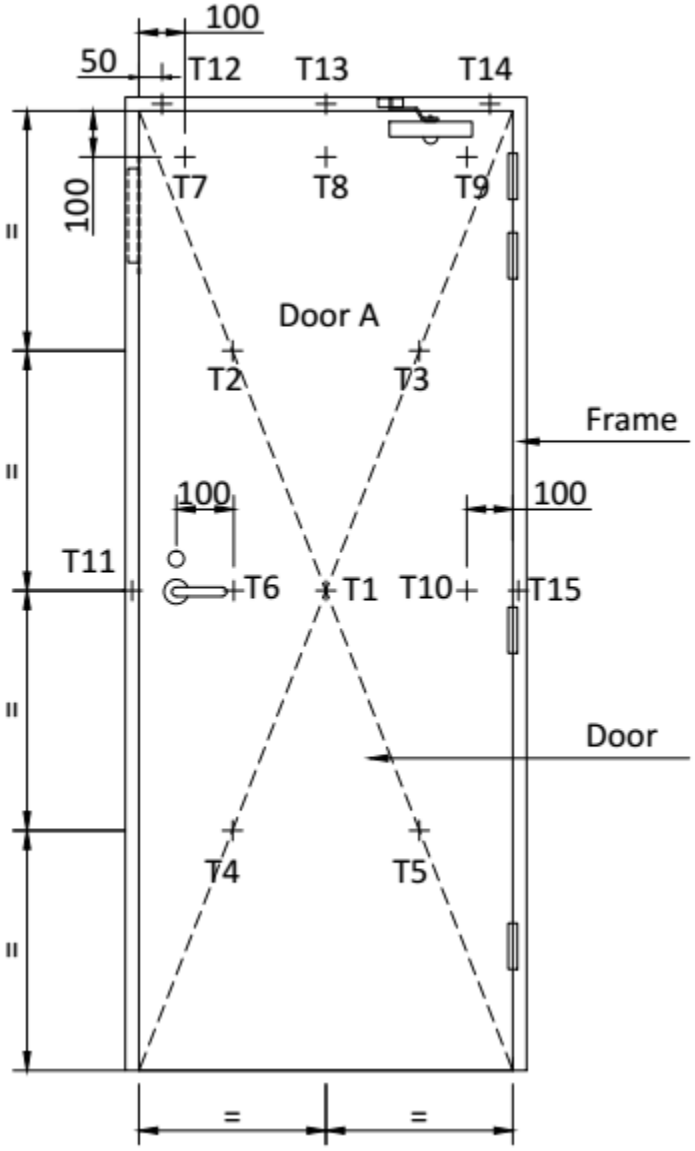


UNEXPOSED SIDE

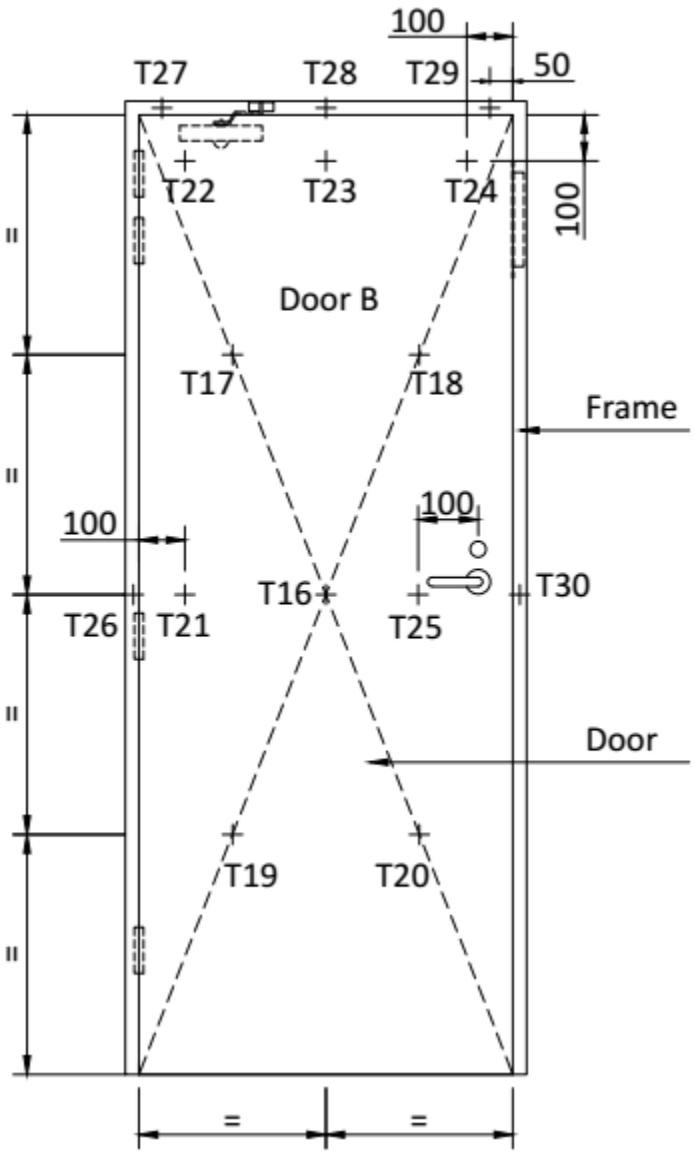
POSITON FOR MEASUREMENT OF HORZITONAL DEFLECTION OF DOOR B

Issue Date: 08/28/18 Intertek Report No.: 180515001SHF-BP-1



POSITON FOR MEASUREMENT OF UNEXPOSED TEMPERATURE OF DOOR A

Issue Date: 08/28/18 Intertek Report No.: 180515001SHF-BP-1



POSITON FOR MEASUREMENT OF UNEXPOSED TEMPERATURE OF DOOR B

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SECTION 10
TEST DATA

Standards: EN 1634-1:2014, 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 EN1363-1, Section 8

Equipment:

ITEM	ID
Vertical furnace	SH1097
Furnace pressure gauge	SH1097-15
Test Clock	SH1042
Furnace thermocouple	SH1097-4~6
Ambient temperature gauge	SH1097-11
Unexposed thermocouple	SH1097-12~14
Clearance Measurements	SH1057-1
Displacement Measurements	SH1163
Dynamometer	SH1066

Heating Conditions: According to EN 1363-1, Section 5.1
Pressure Conditions: According to EN1363-1, Section 5.2
Ambient Conditions: 10~40°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
Thermocouple Pads: Length and width 30 mm, thickness 2.0 ± 0.5 mm, dry density 900 ± 90 kg/m^2
Pressure Measurements: According to EN 1634-1, Section 9.2
Deflection Measurements: According to EN 1634-1, Section 9.3
Pre-test Examination: According to EN 1634-1, Section 10.1
Test Procedure: According to EN 1634-1, Section 10.2

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Test Observations:

Time		All observations are from the unexposed face unless noted otherwise.
Mins	**Secs**	
00	00	Test starts.
25	42	Smoke issues from the hinge edge of door A.
35	24	The latch edge of door B turns black.
48	27	Discolouration is observed on the door closer side of door A.
51	02	Unidentified liquid emitted from the door closer of door A.
90	00	No significant change on door A and door B.
121	16	The door closer of door A turns black.
180	00	No significant change on door A and door B.
260	00	The test is discontinued.

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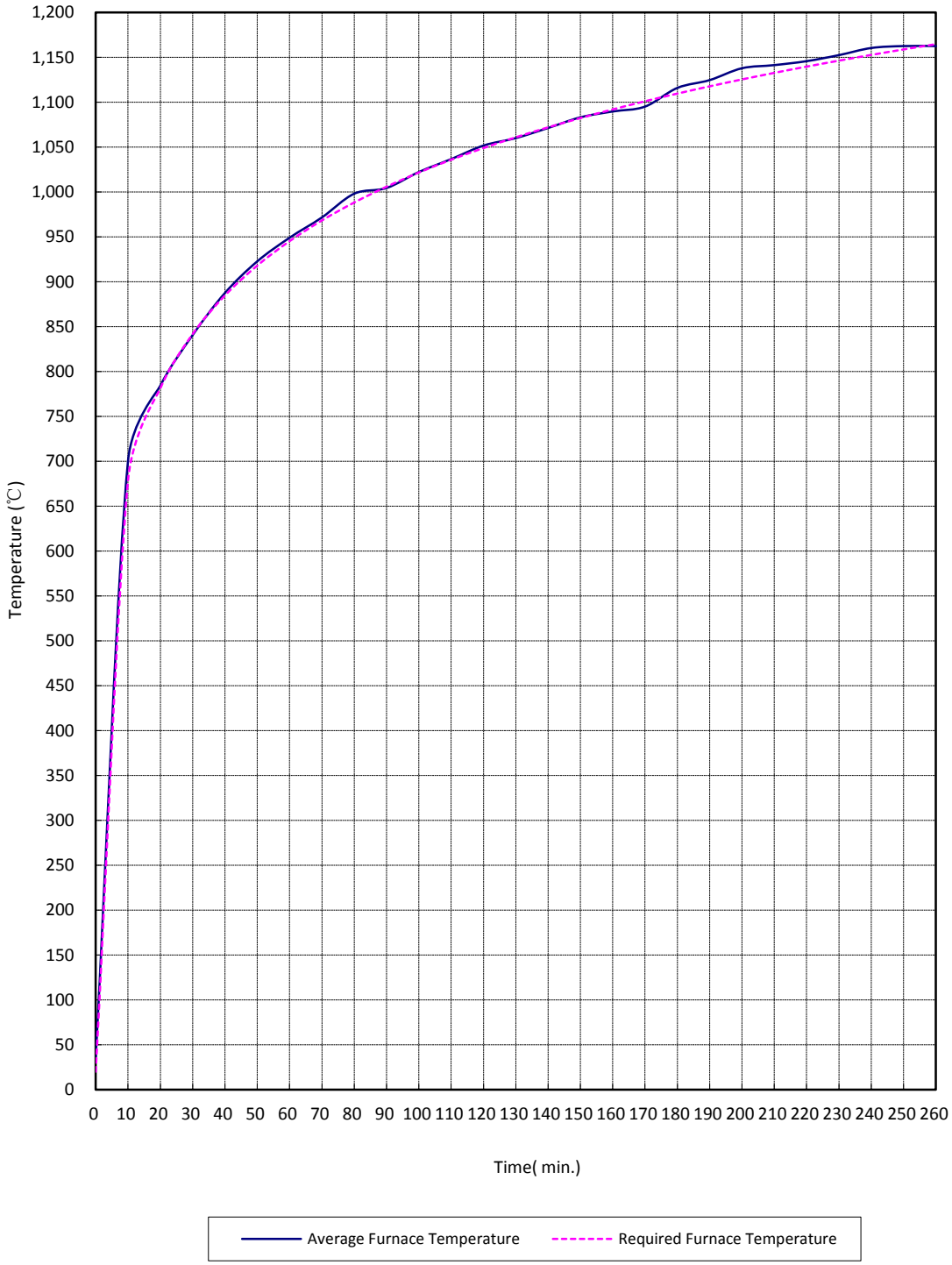
Temperature Data:

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

Time Mins	Specified Furnace Temperature (°C)	Furnace Mean Temperature (°C)
0	20	36
10	678	700
20	781	784
30	842	841
40	885	888
50	918	923
60	945	949
70	968	972
80	988	998
90	1006	1005
100	1022	1022
110	1036	1037
120	1049	1052
130	1061	1060
140	1072	1071
150	1082	1083
160	1092	1090
170	1101	1095
180	1110	1116
190	1118	1125
200	1126	1138
210	1133	1141
220	1140	1146
230	1146	1153
240	1153	1161
250	1159	1163
260	1165	1163

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



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Unexposed surface temperatures of door A

Time Mins	T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	Mean Temperature (°C)
0	35	35	35	35	34	35
1	35	35	35	35	34	35
2	35	36	35	35	35	35
3	35	37	36	36	36	36
4	37	41	39	39	38	39
5	39	46	42	44	42	42
6	42	51	46	49	47	47
7	45	58	51	56	54	53
8	49	66	56	62	62	59
9	54	75	61	68	70	65
10	60	85	66	74	79	73
11	66	95	71	81	89	81
12	73	107	77	89	100	89
13	81	120	84	98	112	99
14	90	134	92	109	124	110
15	100	148	100	120	135	121
16	111	162	110	130	146	132
17	122	176	120	140	157	143
18	134	192	132	150	172	156
19	145	216	144	160	183	170
20	157	228	154	170	194	181
21	168	237	165	179	206	191
22	178	245	174	189	217	201
23	190	251	182	199	229	210
24	199	257	190	207	240	218
25	208	263	197	216	249	226
26	216	268	202	224	256	233
27	222	274	207	232	262	240
28	228	279	213	238	267	245
29	233	284	217	244	270	250
30	238	289	221	251	275	255

Note: After 30 min, all thermocouples are removed from unexposed surface of doorset.

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Unexposed surface temperatures of door A

Time Mins	T6 (°C)	T7 (°C)	T8 (°C)	T9 (°C)	T10 (°C)	T11 (°C)	T12 (°C)	T13 (°C)	T14 (°C)	T15 (°C)
0	34	34	34	35	34	34	34	34	33	33
1	34	35	35	35	35	38	36	36	33	33
2	34	36	35	35	35	38	41	39	34	33
3	35	40	37	36	35	37	48	43	36	33
4	37	47	40	38	36	38	56	46	39	34
5	40	57	45	41	38	38	67	50	43	34
6	45	67	51	45	40	39	76	52	45	35
7	50	78	57	50	44	39	84	54	47	36
8	56	89	63	56	48	42	94	56	50	37
9	63	100	70	62	52	45	96	58	53	38
10	70	111	77	69	58	48	97	61	55	40
11	77	121	84	76	64	53	98	65	59	41
12	84	131	92	84	70	56	99	69	62	43
13	93	142	100	92	77	60	101	73	68	47
14	102	152	110	100	84	64	103	78	73	51
15	112	163	119	109	92	69	110	83	79	55
16	123	173	129	118	102	74	116	90	84	59
17	134	182	139	128	112	76	119	94	87	62
18	144	191	149	137	123	78	121	78	89	65
19	153	199	159	148	133	80	123	83	92	68
20	162	207	168	158	143	81	124	87	93	72
21	170	214	176	168	152	85	125	89	95	75
22	177	221	184	177	160	86	126	90	96	77
23	184	227	191	185	168	87	127	90	97	81
24	190	232	197	193	175	90	128	91	97	84
25	196	237	204	200	182	89	130	92	98	86
26	203	242	211	208	188	92	131	100	98	87
27	207	246	217	215	194	93	134	110	99	89
28	212	251	223	222	199	93	136	116	101	91
29	216	254	229	229	203	95	139	120	103	93
30	220	258	234	237	208	95	142	123	105	95

Note: After 30 min, all thermocouples are removed from unexposed surface of doorset.

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Unexposed surface temperatures of door B

Time Mins	T16 (°C)	T17 (°C)	T18 (°C)	T19 (°C)	T20 (°C)	Mean Temperature (°C)
0	35	35	35	34	34	34
1	35	35	36	34	34	35
2	35	35	37	34	34	35
3	35	36	39	34	34	36
4	35	39	42	35	36	37
5	37	42	45	37	38	40
6	39	46	49	40	40	43
7	41	52	54	43	44	47
8	45	58	60	47	48	52
9	49	67	67	52	53	58
10	55	77	75	58	59	65
11	62	89	86	66	66	74
12	71	102	97	74	74	84
13	81	117	110	83	84	95
14	92	132	123	93	94	107
15	104	147	137	105	106	119
16	116	162	150	116	117	132
17	128	176	164	128	129	145
18	140	190	183	140	142	159
19	152	203	196	151	153	171
20	164	216	210	162	165	183
21	176	228	224	173	177	196
22	187	240	238	183	188	207
23	198	251	251	194	200	219
24	208	261	263	204	211	229
25	217	270	274	213	222	239
26	226	278	284	222	232	249
27	235	286	293	231	242	257
28	242	293	302	238	250	265
29	248	299	310	245	258	272
30	255	304	318	251	266	279

Note: After 30 min, all thermocouples are removed from unexposed surface of doorset.

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Unexposed surface temperatures of door B

Time Mins	T21 (°C)	T22 (°C)	T23 (°C)	T24 (°C)	T25 (°C)	T26 (°C)	T27 (°C)	T28 (°C)	T29 (°C)	T30 (°C)
0	34	34	35	35	34	33	33	33	33	32
1	34	35	38	40	34	33	33	34	33	33
2	34	35	40	44	35	33	33	34	35	33
3	34	37	43	46	35	33	34	35	36	33
4	36	41	48	52	48	33	34	36	38	33
5	39	45	54	58	51	33	35	37	39	33
6	44	51	60	65	59	33	36	38	39	33
7	50	57	66	72	63	33	37	39	41	33
8	57	64	73	80	71	33	38	40	42	33
9	65	72	81	87	79	33	39	40	44	33
10	74	80	90	96	85	33	40	40	44	33
11	83	90	101	105	96	34	41	40	46	33
12	96	102	113	115	108	34	42	40	47	34
13	110	114	126	126	114	34	44	40	48	34
14	124	127	140	138	127	35	45	40	50	34
15	139	141	155	150	146	35	46	40	51	35
16	153	154	169	163	151	35	48	41	51	35
17	167	168	183	176	167	36	51	42	53	36
18	181	181	197	192	175	37	53	44	53	36
19	194	193	210	206	198	37	55	46	55	37
20	206	205	223	220	204	38	56	50	58	37
21	218	217	236	234	216	39	58	55	61	38
22	230	229	248	247	237	40	61	58	65	39
23	241	239	260	259	249	41	64	62	68	40
24	252	250	270	270	253	42	66	65	72	41
25	261	259	280	280	273	43	69	67	75	42
26	270	269	290	290	282	45	71	70	78	44
27	278	278	298	299	291	46	73	73	80	46
28	285	286	307	307	303	47	75	75	83	50
29	292	295	315	317	312	49	78	77	86	54
30	298	303	322	326	319	50	80	79	89	58

Note: After 30 min, all thermocouples are removed from unexposed surface of doorset.

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Horizontal Deflection of door 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	-18	22	0	-10	2	3
20	0	-18	23	0	2	11	3

Horizontal Deflection of door 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	1	15	0	3	8	7
20	0	4	28	0	9	7	13

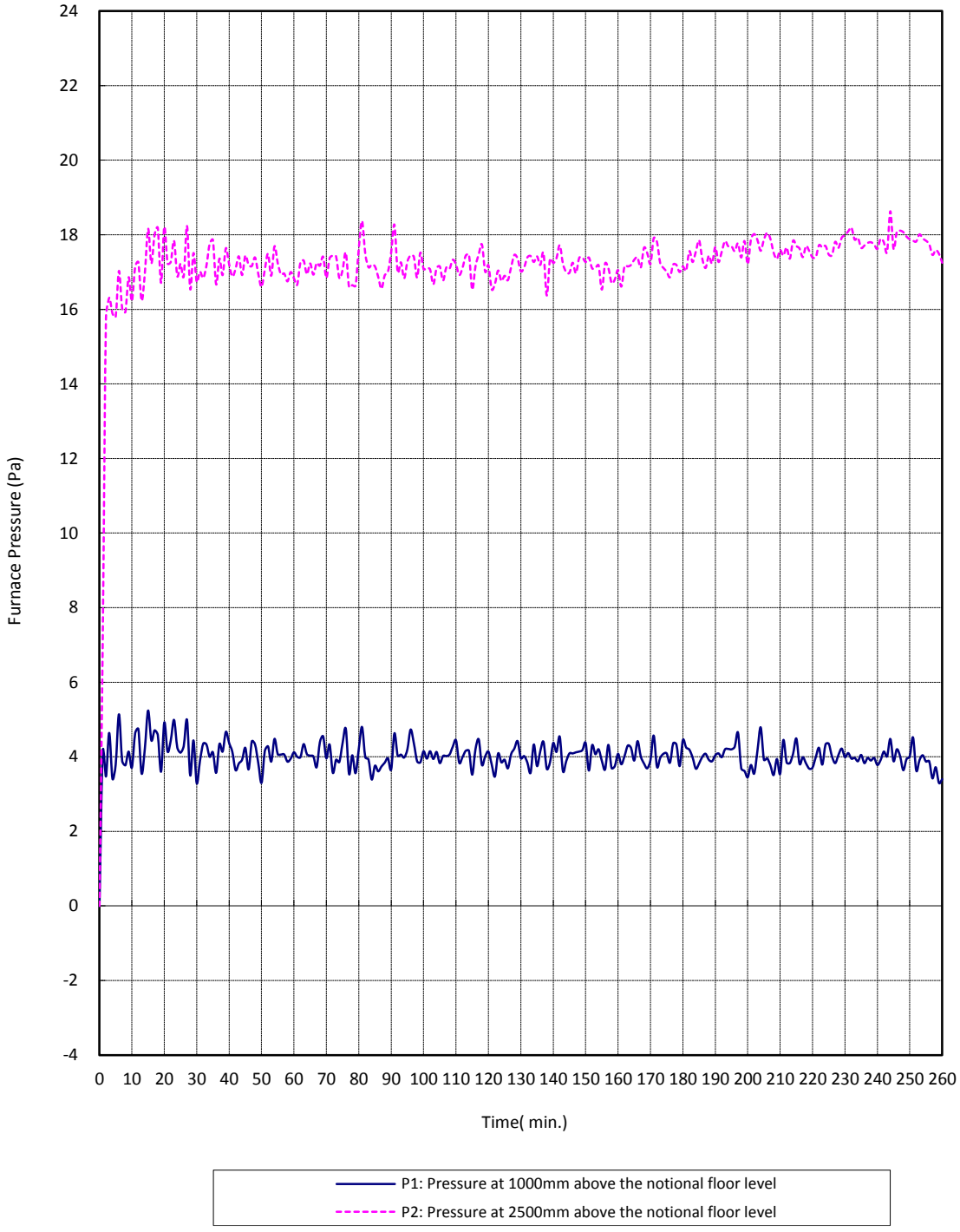
Note: After 20 min, measurement of deflection is discontinued.

Closing Force:

Door Closer Closing Force – door A		
Highest gauge reading (N)	Distance (m)	Moment (N.m)
59.3	0.7	40.1
55.2	0.7	
57.5	0.7	

Door Closer Closing Force – door B		
Highest gauge reading (N)	Distance (m)	Moment (N.m)
65.2	0.7	45.8
67.6	0.7	
63.4	0.7	

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

Fig. 3 Unexposed Side after 120 Minutes

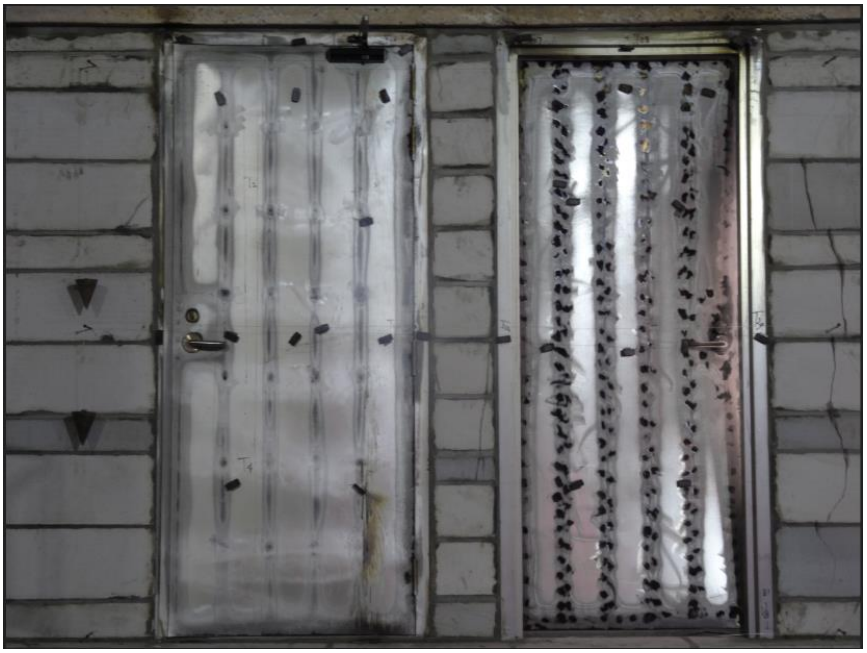

Fig. 4 Unexposed Side after 180 Minutes

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Fig. 5 Unexposed Side after 260 Minutes

Fig. 6 Exposed Side after test

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SECTION 12

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	08/28/18	Original Report Issue	N/A