

RYOBI LIMITED TEST REPORT

SCOPE OF WORK

EN 1634-1:2014+A1:2018 TESTING ON DOOR CLOSER, MODEL OF 9903/9903F

REPORT NUMBER

190919009SHF-001

TEST DATE

2019-11-01

ISSUE DATE

2019-11-15

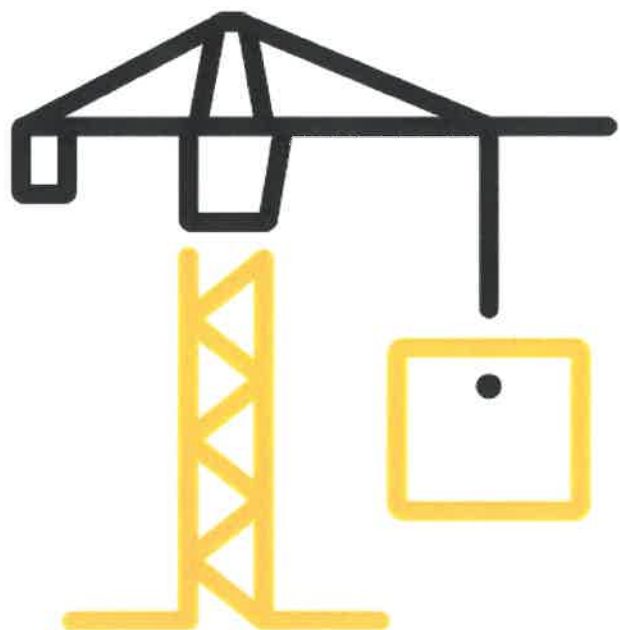
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REPORT ISSUED TO

RYOBI LIMITED

5-2-8 Toshima, Kita-ku, Tokyo, 114-8518, Japan

SECTION 1


SCOPE


Intertek has conducted an evaluation for RYOBI LIMITED to determine the fire resistance characteristics of Door closer, Model of 9903/9903F in Single Leaf Single Action Swing Steel Fire Door. This evaluation began on September 19, 2019 and was completed on November 15, 2019. The test was conducted on November 01, 2019.

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.

For INTERTEK B&C:

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SECTION 2

SUMMARY OF TEST RESULTS

Product Name: Door closer

Series/Model: 9903/9903F

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

PERFORMANCE CRITERIA	RESULTS
Integrity	Sustained flaming 120 minutes
	Gap gauge 120 minutes
	Cotton pad 120 minutes
Insulation	19 minutes

The test was discontinued after a period of 120 minutes at the request of the sponsor.

SECTION 3

TEST METHOD

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 1363-1:2012, Fire resistance tests – Part 1: General Requirements

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SECTION 4

MATERIAL SOURCE/INSTALLATION

The specimen was provided by the client and was not independent selected for testing. Test specimen was received at the evaluation centre on September 18, 2019.

A description of the test assembly is given in the table below. The description of the specimen is based on a survey of the specimen and information provided by the sponsor of the test. All values quoted below are nominal, unless tolerances are given.

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				
	Facing	Material	1.2 mm Q235A Galvanized steel sheet			
	Stiffener	Steel stiffener:	1.4 mm thick Galvanized steel sheet Q235A Spacing: 155 mm			
		Edge Channel Steel:	3 mm thick galvanized steel sheet Q235A			
	Core	Material:	Aluminum silicate wool			
Density:		120 kg/m ³				
Frame	Nominal Size		940	2117	150	
			mm wide	mm high	mm deep	
	Material		1.4mm thick Galvanized steel sheet Q235A			
Hardware	Lock	Lock type:	Mortise Lock, model of Z/S-01			
		Lock case size:	166 mm x 85.5 mm x 14 mm			
		Backset:	55 mm	Latch throw:	12 mm	
		Latch Operation:	Latch:	Engaged	Dead Bolt:	Disengaged
	Hinge	Model:	JL/HY-4.5" *4" *3.4			
		Size:	4.5" x4.0" x3.4mm			
		Material	SS201			
		Quantity:	4 for each leaf			
	Door closer	Model:	9903/9903F			
		Installation:	Surface mounted standard installation with fixed power size 3 in the pull side of doorset			
		Remark	9903F is another model that used in Hong Kong market			

The sample ID number assigned by the test lab is S190919009SHF.001.

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The drawings of fire door assembly, hardware and test wall construction can be found in section 6, 7 and 8 respectively.

The test assembly was installed in a steel restraint frame. The test assembly was built into a concrete masonry unit partition, with fully mortared joints. The test sample 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.

The test door was oriented to open away from the furnace.

The nominal dimensions of the test wall were 3 m high by 2 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.

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SECTION 5

TEST RESULTS

Integrity

The assembly withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 120 minutes. No through openings or penetrations were evident at this 120 minutes fire exposure portion of the test and the door latch remained engaged to the strike. During this 120 minutes fire exposure period no significant flaming was observed on the unexposed face of the assembly.

This assembly therefore met the criteria of the test standards for integrity performance of 120 minutes.

Insulation

Transmission of heat through the assembly 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 temperature of T3 on unexposed surface increased by more than 180°C, insulation failure was deemed to occur.

This assembly therefore met the criteria of the test standards for insulation performance 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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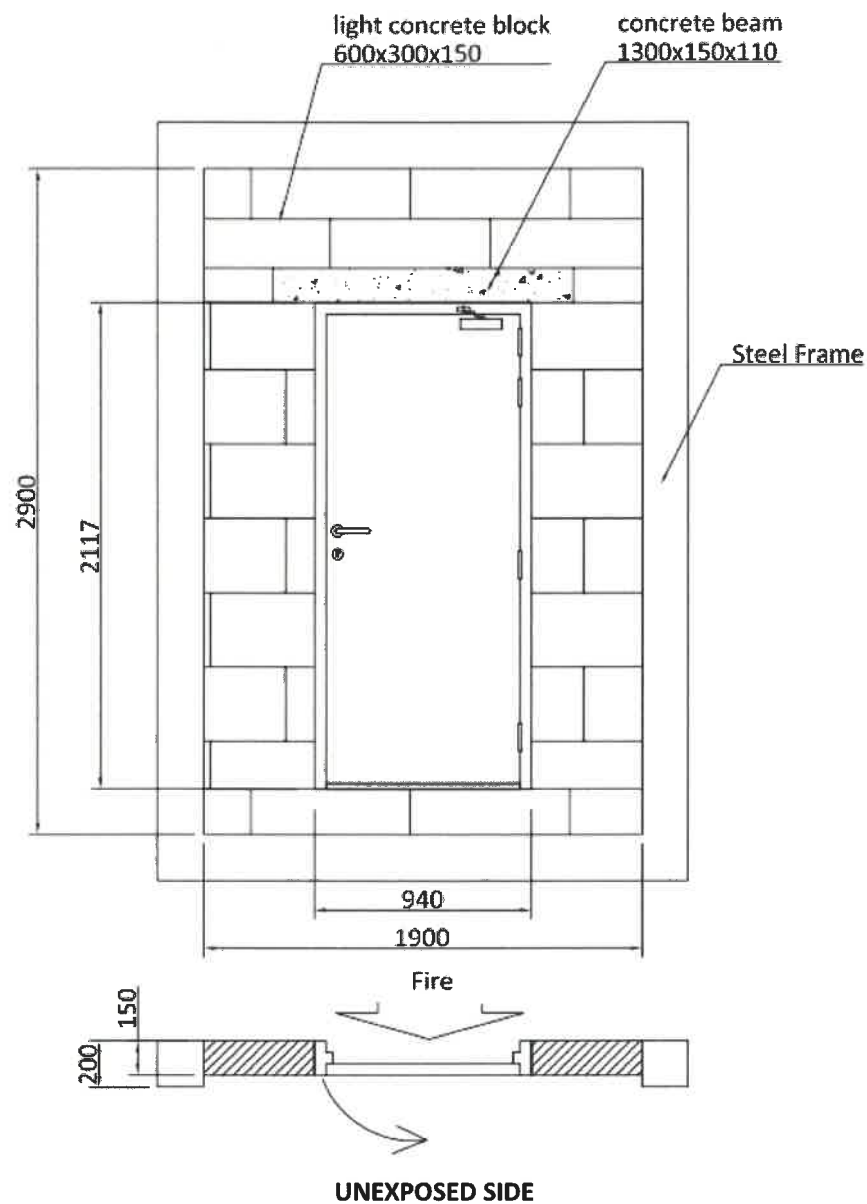
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SECTION 8

TEST WALL CONSTRUCTION



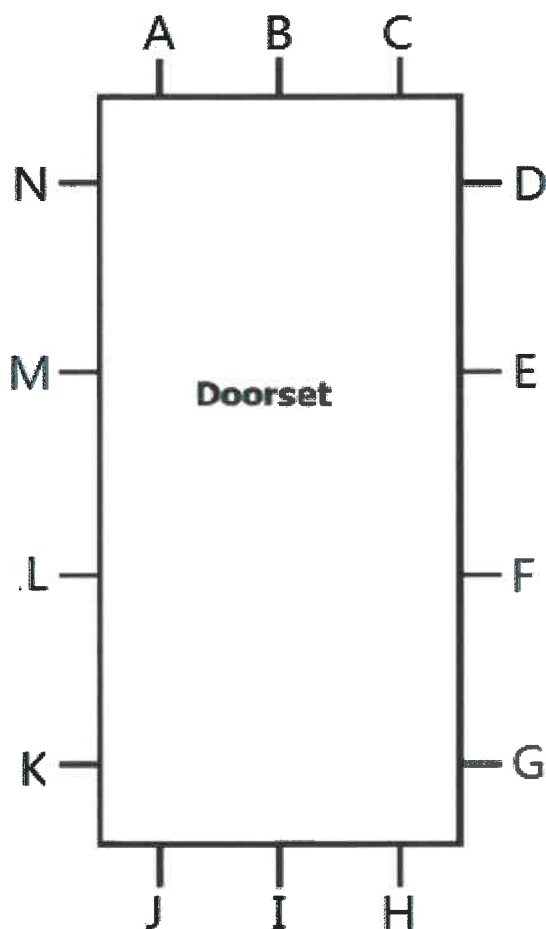
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SECTION 9

TEST MEASUREMENT DATA



UNEXPOSED SIDE

Clearance dimension in mm at each position													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
2.5	2.0	2.0	1.5	2.5	1.5	0.5	5.0	5.0	4.5	1.2	2.5	2.7	0.8

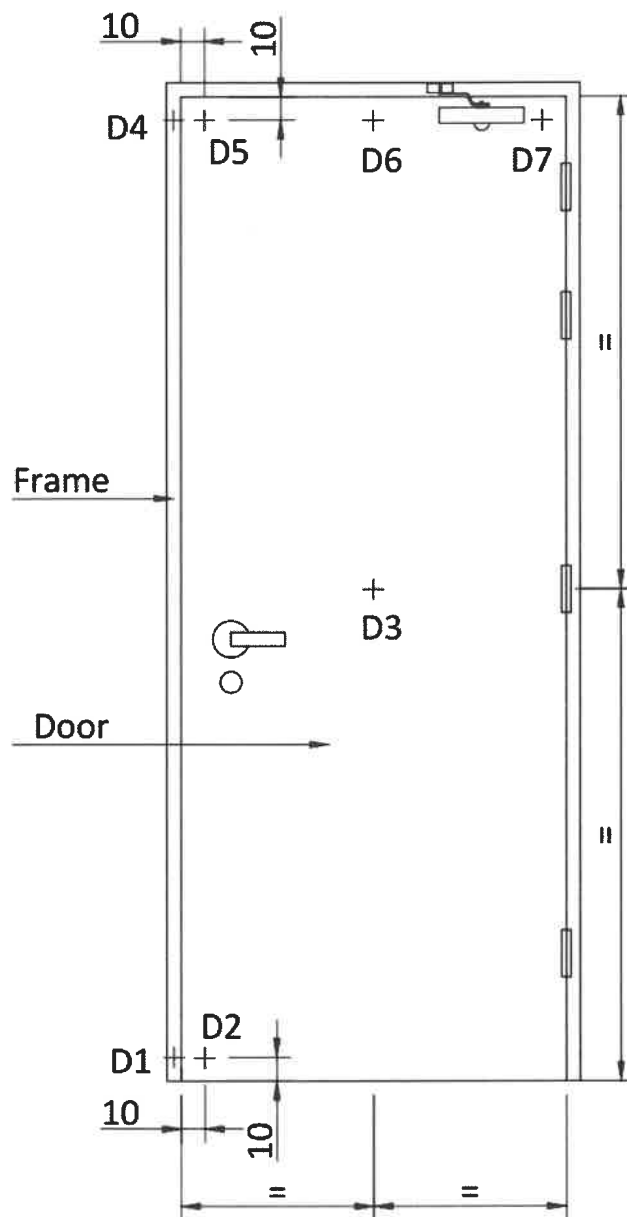
DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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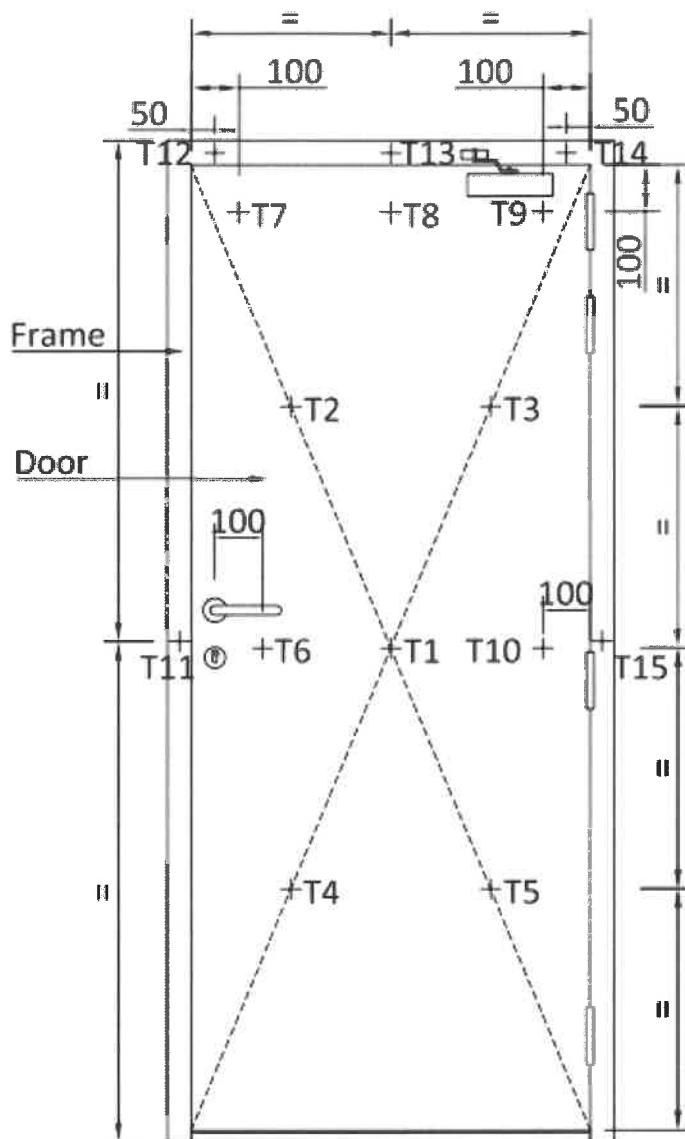
UNEXPOSED SIDE

POSITION FOR MEASUREMENT OF HORIZONTAL DEFLECTION

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POSITION FOR MEASUREMENT OF UNEXPOSED TEMPERATURE

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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 door and shutter assemblies and openable windows

Conditioning: According to EN1363-1, Section 8

Equipment:

ITEM	ID
Vertical furnace	SH1098
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
Force Gauge	SH1066

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

Pressure Conditions: According to EN 1363-1, 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 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

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 started.
15	00	No significant change.
19	00	Smoke issued from the lock.
19	31	The temperature of T3 rose more than 180 °C.
59	32	Unknown liquid leaked from the door closer.
100	00	No significant change.
119	10	A cotton pad was applied above door closer and the pad was not ignited.
120	00	Test was discontinued.

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Temperature Data:

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

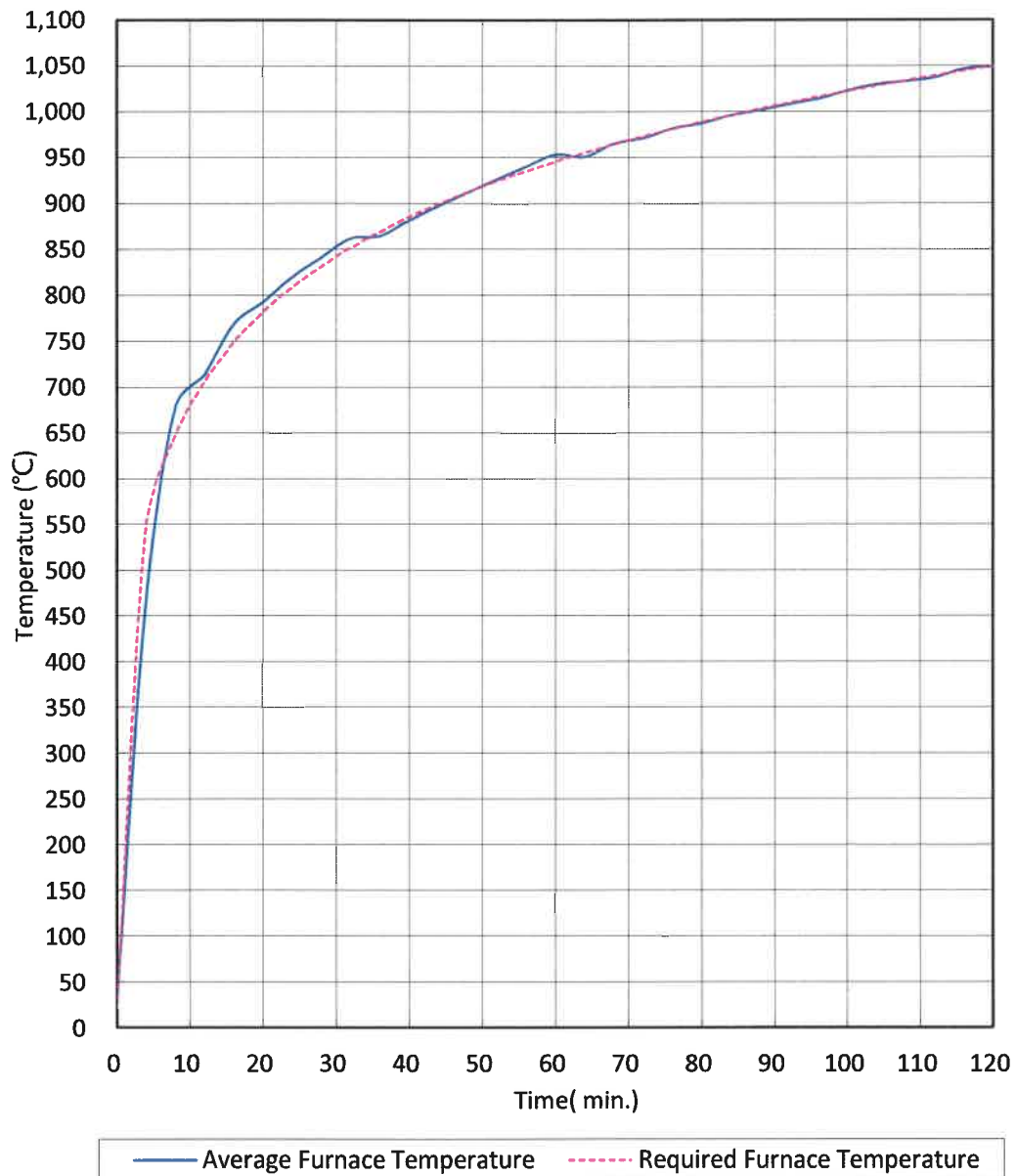
Time Mins	Specified Furnace Temperature (°C)	Furnace Mean Temperature (°C)
0	20	23
4	544	536
8	645	631
12	705	694
16	748	751
20	781	785
24	809	805
28	832	829
32	851	847
36	869	866
40	885	883
44	899	897
48	912	906
52	924	922
56	935	932
60	945	943
64	955	956
68	964	966
72	973	978
76	981	981
80	988	984
84	996	993
88	1003	1001
92	1009	1008
96	1016	1015
100	1022	1020
104	1028	1025
108	1033	1035
112	1039	1038
116	1044	1046
120	1049	1048

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



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Unexposed surface temperatures

Time Mins	T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	Mean Temperature (°C)
0	20	19	19	18	18	19
4	20	20	24	21	22	21
8	33	34	51	35	44	40
12	54	62	94	61	77	70
16	85	104	150	93	107	108
18	104	129	182	103	125	128
19	114	142	198	108	135	140
20	125	156	212	115	145	150
24	171	213	261	153	188	197
28	212	255	299	196	224	237
32	245	287	328	234	251	269
36	270	310	346	262	274	292
40	287	340	361	282	293	313
44	298	362	377	298	310	329
48	306	366	387	310	321	338
52	310	370	387	323	311	340
56	316	373	389	337	317	346
60	316	374	374	347	326	347
64	318	377	372	357	334	352
68	320	379	375	368	340	356
72	323	379	377	382	344	361
76	324	381	378	388	348	364
80	326	383	380	389	354	366
84	329	385	384	393	360	370
88	331	386	385	395	365	372
92	331	389	387	396	370	375
96	334	391	390	398	374	377
100	336	392	392	401	376	380
104	336	393	394	403	378	381
108	337	395	394	404	381	382
112	337	395	395	405	384	383
116	339	395	396	407	386	385
120	340	395	397	409	387	386

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Unexposed surface temperatures

Time Mins	T6 (°C)	T7 (°C)	T8 (°C)	T9 (°C)	T10 (°C)	T11 (°C)	T12 (°C)	T13 (°C)	T14 (°C)	T15 (°C)
0	18	19	19	19	19	18	18	18	18	17
4	20	23	21	24	20	21	32	21	25	19
8	36	43	35	43	30	26	44	27	37	26
12	67	70	58	65	50	41	62	37	48	37
16	95	105	89	93	77	67	72	48	59	55
19	122	133	119	116	102	87	76	60	67	72
20	132	141	128	123	112	89	80	63	70	76
24	188	174	166	150	151	93	85	76	77	97
28	246	201	199	172	187	96	89	93	82	105
32	296	226	228	192	214	101	91	102	87	115
36	328	247	252	211	236	110	94	111	91	127
40	362	266	271	228	255	123	100	125	97	140
44	394	286	290	246	272	136	129	143	101	155
48	415	303	301	260	288	151	146	164	123	170
52	420	318	307	274	301	169	161	186	143	185
56	428	329	316	288	311	187	177	207	158	201
60	431	336	324	298	319	206	194	226	173	216
64	435	343	330	306	326	224	209	245	189	230
68	438	348	334	311	332	240	225	261	204	243
72	439	351	336	317	335	257	241	277	219	255
76	444	354	338	322	338	273	257	290	233	267
80	447	358	340	327	342	287	272	302	247	277
84	449	359	342	333	346	300	285	313	259	288
88	451	361	342	336	349	312	297	323	270	298
92	453	363	345	340	351	323	308	333	280	308
96	455	365	346	343	353	335	319	342	289	317
100	457	365	348	347	355	347	328	350	298	325
104	459	366	349	350	357	358	337	357	305	333
108	461	367	350	352	358	368	345	364	312	339
112	463	366	350	354	358	375	352	370	318	346
116	463	367	351	356	360	383	359	375	324	351
120	465	368	352	358	361	389	365	380	330	357

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Horizontal Deflection (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	-15	15	0	-6	1	-1
20	0	-15	18	0	-1	2	0
30	0	-14	21	0	0	2	-1
40	0	-14	19	0	0	5	-1
50	0	-15	14	0	-2	3	-1
60	0	-16	8	0	-2	5	0
75	0	-17	6	0	-3	4	-1
90	0	-17	5	0	-3	5	2
105	0	-16	4	0	-5	5	0

Note: The deflection was not measured after 105 mins, in consideration of safety.

Closing Force of Door Closer:

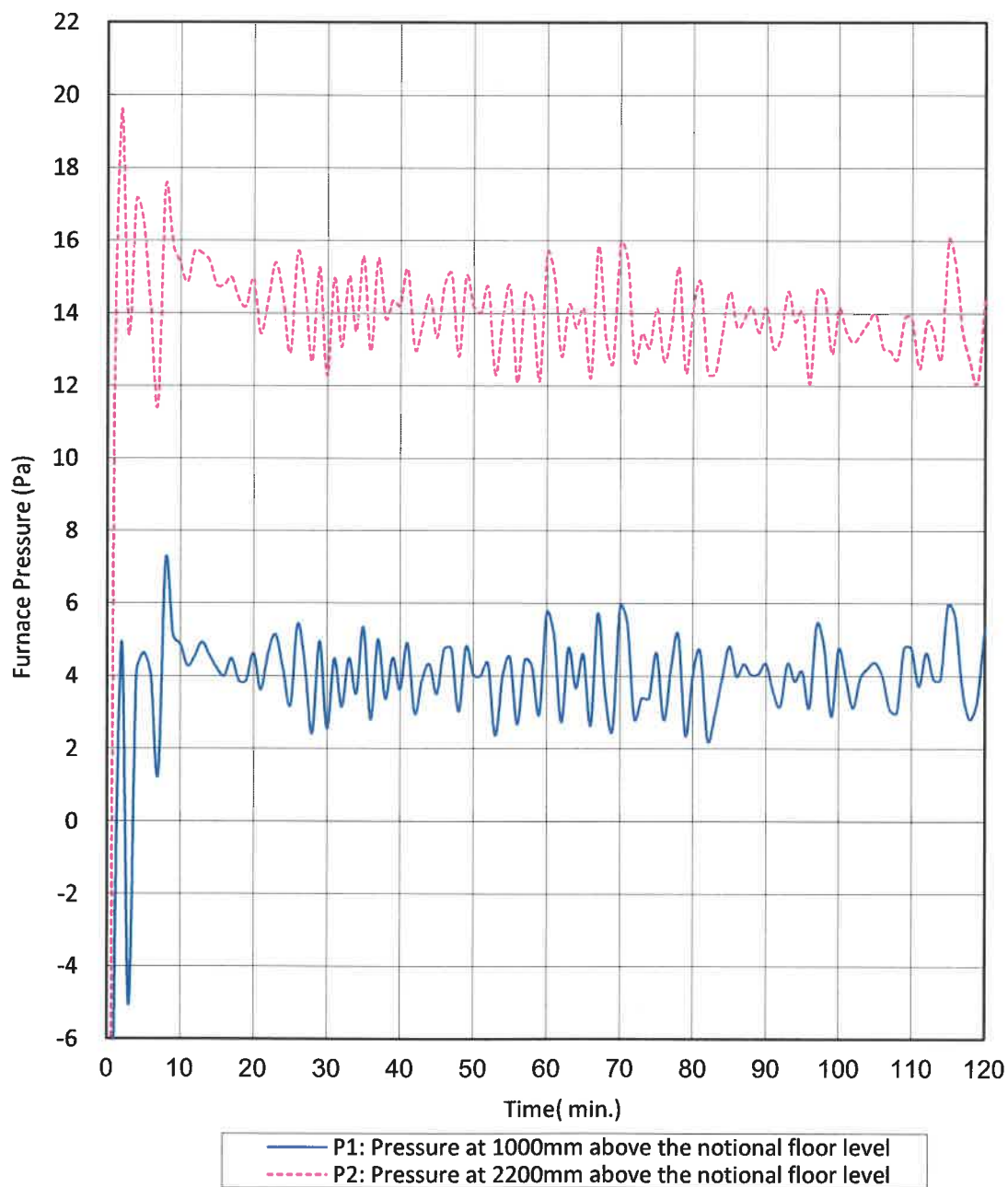
Closing Force		
Highest gauge reading (N)	Distance (m)	Moment (N.m)
66.3	0.66	44.0
65.9		
67.9		

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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 30 Minutes



Fig. 4 Unexposed Side after 60 Minutes

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Fig. 5 Unexposed Side after 90 Minutes



Fig. 6 Unexposed Side after 119 Minutes

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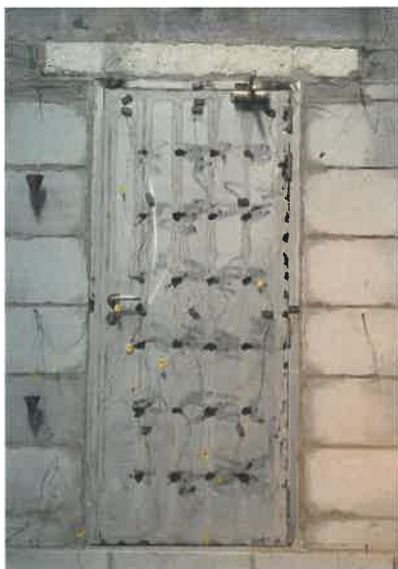


Fig. 7 Unexposed Side after 120 Minutes



Fig. 8 Exposed Side after 120 Minutes

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SECTION 12

REVISION LOG

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