

GUANGDONG YOHOME DOOR CO.,LTD

TEST REPORT

SCOPE OF WORK

NFPA 252 (2022), CAN / ULC S104 (2015) (R2020), UL 10(C) (2016) ED.3 (R:27 MAY 2021) AND UL 10B (2008) (R2020) TESTING ON UL 45MINS SINGLE LEAF WOODEN FIRE DOOR AND METAL FRAME, MODEL: YH-04

REPORT NUMBER

240115012GZC-001 R1

TEST DATE(S)

2024-01-31

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2024-02-28

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2024-03-29

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Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

TTRF_NFPA 252_b

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Test Report

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REPORT ISSUED TO

GUANGDONG YOHOME DOOR CO., LTD

2108, Block 4, Jiabang Guojin Center, No. 1, Pingzhou Shilong South Road, Guicheng Street, Nanhai District, Foshan City, Guangdong Province, China

SECTION 1

SCOPE

Intertek has conducted an evaluation for GUANGDONG YOHOME DOOR CO., LTD to determine the fire resistance performance on the UL 45mins single leaf wooden fire door and metal frame, model YH-04 for a 45-minute rating. This evaluation began on December 4, 2023 and was completed on February 28, 2024. The test was conducted on January 31, 2024. Test location: C2-1, Heping Xu, Yongning Street, Zengcheng District, Guangzhou, China.

The test was conducted in accordance with NFPA 252 (2022) and UL 10(c) (2016) Ed.3 (R:27 May 2021) under positive furnace pressure. This test was also designed to demonstrate evaluation according to CAN / ULC S104 (2015) (R2020) and UL 10(b) (2008) (R2020) under neutral furnace pressure. All the conditions of acceptance applying to the test door in NFPA 252 (2022), UL 10(c) (2016) Ed.3 (R:27 May 2021) under positive furnace pressure, and in CAN / ULC S104 (2015) (R2020) and UL 10(b) (2008) (R2020) under neutral furnace pressure were taken into account simultaneously in this test.

This report doesn't constitute certification of this product nor an opinion or endorsement by this laboratory.

Report Authorized:

Authorized By:

Jason Xu

Jason Xu
Reviewer

Completed By:

Kevin Pan

Kevin Pan
Project Engineer

Noted: If you have any questions for the report, please contact: lillian.lf.he@intertek.com

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SECTION 2

SUMMARY OF TEST RESULTS

Product Name	Model
UL 45mins single leaf wooden fire door and metal frame	YH-04

TEST RESULT:

TITLE	RESULTS
Fire resistance with hose stream test	Met the requirements for a 45-minute exposure period with hose stream

SECTION 3

TEST METHODS

The specimen was evaluated in accordance with the following:

NFPA 252 (2022), *Standard Methods of Fire Tests of Door Assemblies*

CAN / ULC S104 (2015) (R2020), *Standard Method for Fire Tests of Door Assemblies*

UL 10(c) (2016) Ed.3 (R:27 May 2021), *Standard for Positive Pressure Fire Tests of Door Assemblies*

UL 10(b) (2008) (R2020), *Standard for Fire Tests of Door Assemblies*

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SECTION 4

MATERIAL SOURCE/INSTALLATION

The specimen was randomly selected by Intertek B&C personnel at the manufacturer of GUANGDONG YOHOME INDUSTRIAL CO., LTD, located at No. 280 Hefu Road, Hecheng Street, Gaoming District, Foshan City, Guangdong Province, China. The specimen was witnessed during production and signed prior to shipment on 4-Jan-2024, 5-Jan-2024, 8-Jan-2024 and 14-Jan-2024. The specimen was received at the Evaluation Center on January 26, 2024.

The subject test specimen was a traceable sample selected from the manufacturer's facility. Intertek selected the specimen and had verified the composition, manufacturing techniques and quality assurance procedures. All values quoted below are nominal, unless tolerances are given.

DOOR ASSEMBLY DESCRIPTION		
Door Leaf	Type	Single acting, single leaf wooden composite door
	Nominal Size	1024 mm wide by 2405 mm high by 45 mm thick
	Facing	4.5 mm thick plywood, Density of 650 kg/m ³
	Sub-facing	5 mm thick Magnesium oxide fireproof board, Density of 1200 kg/m ³
	Core	25 mm thick Magnesium oxide fireproof board, Density of 550 kg/m ³
	Rail	One strip 44 mm x 25 mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at the top of door leaf.
		One strip 44 mm x 25 mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at the bottom of door leaf.
		One strip 42 mm x 25 mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at 789 mm from the top and the bottom of door leaf respectively.
	Stile	One strip 47 x 25mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at leading edge of door leaf.
		One strip 47 x 25 mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at hinge edge of door leaf.
		One strip 42 mm x 25 mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at 150 mm from the leading edge and hinge edge of door leaf respectively.
	Lock Block	Two strips of 280 mm x 52 mm x 25 mm Flame retardant solid wood (Kapur Wood), density of 850 kg/m ³ , located at 854 mm from the bottom edge of door leaf, adjacent to leading edge and hinge edge respectively.

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DOOR ASSEMBLY DESCRIPTION			
Frame	Nominal Size		1100 mm wide by 2450 mm high by 110 mm deep
	Material		1.0 mm thick Galvanized steel, Dx 51d 80z
	Installation		Cement mortar grouted and installed in an aerated concrete block wall opening by six (6) sets of sheet iron and nail on each frame jamb, spaced approx. 470 mm and at a distance of approx. 50 mm from top and bottom of frame jamb. The clearances between the door frame and the wall were filled with mineral wool and clad with quick-setting cement on the exposed side.
Hardware	UL Certified Lock	Lock type:	Single point locks and latch of the mortise lock, Model: ML024
		Latch throw:	3/4"
		Backset:	2-3/4"
		Latch operation:	Latch bolt: Engaged; Dead bolt: Disengaged
	UL Certified Hinge	Material:	Model: SSA002-4.5" x 4.0" x 3.0, Ball Bearing Hinges, SS304
		Size:	4.5" x 4.0" x 3.0 mm
		Quantity:	4 pcs
	UL Certified Automatic drop seal	Model:	M-15/30 EK
		Location:	Mortise mounted at bottom of door leaf
Smoke Seal		Type: Winged corner seal Model: PS 1212 P flex Location: One strip mortise mounted on jambs and header of frame stop.	
Intumescent Seal	Type 1	Model: YZ1504 Size: 4 x 15mm Bedding Material: 1.0mm thick Galvanized steel, size of T1.0 x W14 x H6 mm Location: One strip mortise mounted on jambs and header of frame rabbet.	
	Type 2	Model: YZ2004 Size: 4 x 20mm Location: One strip mortise mounted on the hinge edge, leading edge and top edge of door leaf.	

The sample ID number assigned by the test lab is S240115012GZU.001.

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The drawings of fire door assembly and test wall construction can be found in Section 7 and 8 respectively.

A comprehensive description of the UL 45mins single leaf wooden fire door and metal frame, model YH-04 for certification is maintained on Intertek file.

The test assembly was installed in a steel restraint frame and the hardware was installed by the client. The test assembly was placed in front of the furnace for fire exposure and was moved away from the furnace for the hose stream test. The test door was built into a concrete masonry unit partition, with fully mortared joints. The door clearances were adjusted so that they complied with installation instruction provided by the customer. The test measurement data was shown in Section 9.

The test door was mounted so as to open into the furnace chamber.

The nominal dimensions of the test wall were 3.6 m high by 3.6 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 40in. (1016 mm) above the bottom of the door. Periodic observations were made of the surfaces of the test assembly during the fire resistance test.

Immediately after the Fire Endurance Test, the assembly frame was moved into position for the Hose Stream Test. The exposed surface of the test assembly was subjected to the impact, erosion, and cooling effects of a hose stream described in the test standards.

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.

SECTION 5

TEST RESULTS

Fire Endurance Test

The measured deflection did not exceed the allowable deflection limit of one time the door thickness during the 45-minute fire endurance test. The edge adjacent to the door frame and did not move from its original position in a direction perpendicular to the plane of the doors for a distance greater than the door thickness during the 45-minute fire test. The actual measurements are presented in test data in Section 10.

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During the 45-minute fire exposure period no significant flaming was observed on the unexposed face of the assembly, nor gases hot enough to ignite the cotton pad. This assembly therefore met the criteria of the test standards for flaming. No through openings or penetrations were evident at the conclusion of the fire exposure portion of the test.

This assembly therefore met the criteria of the fire endurance test for 45-minute.

Hose Stream Test

According to test methods, Hose Stream Test should be conducted for 16.2 seconds based on a total assembly area of 2.7 square meters and a required duration of 6 seconds per square meter of assembly area. The hose stream water pressure was 207 kPa.

After the hose stream, no through openings were apparent and the door latch remained engaged to the strike. The measured deflection of the edge adjacent to the door frame neither exceeds the allowable deflection limit of 1-1/2 times the door thickness, nor more than 73 mm after the hose stream test.

This assembly therefore met the hose stream portion of the test.

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

SECTION 6 CONCLUSION

The UL 45mins single leaf wooden fire door and metal frame, model YH-04 identified in this report has been tested in accordance with NFPA 252 (2022) and UL 10(C) (2016) ED. 3 (R:27 MAY 2021) under positive furnace pressure. This test has also demonstrated evaluation according to CAN / ULC S104 (2015) (R2020) and UL 10(B) (2008) (R2020) under neutral furnace pressure.

The UL 45mins single leaf wooden fire door and metal frame, model YH-04 met the requirements for a 45-minute exposure period with hose stream.

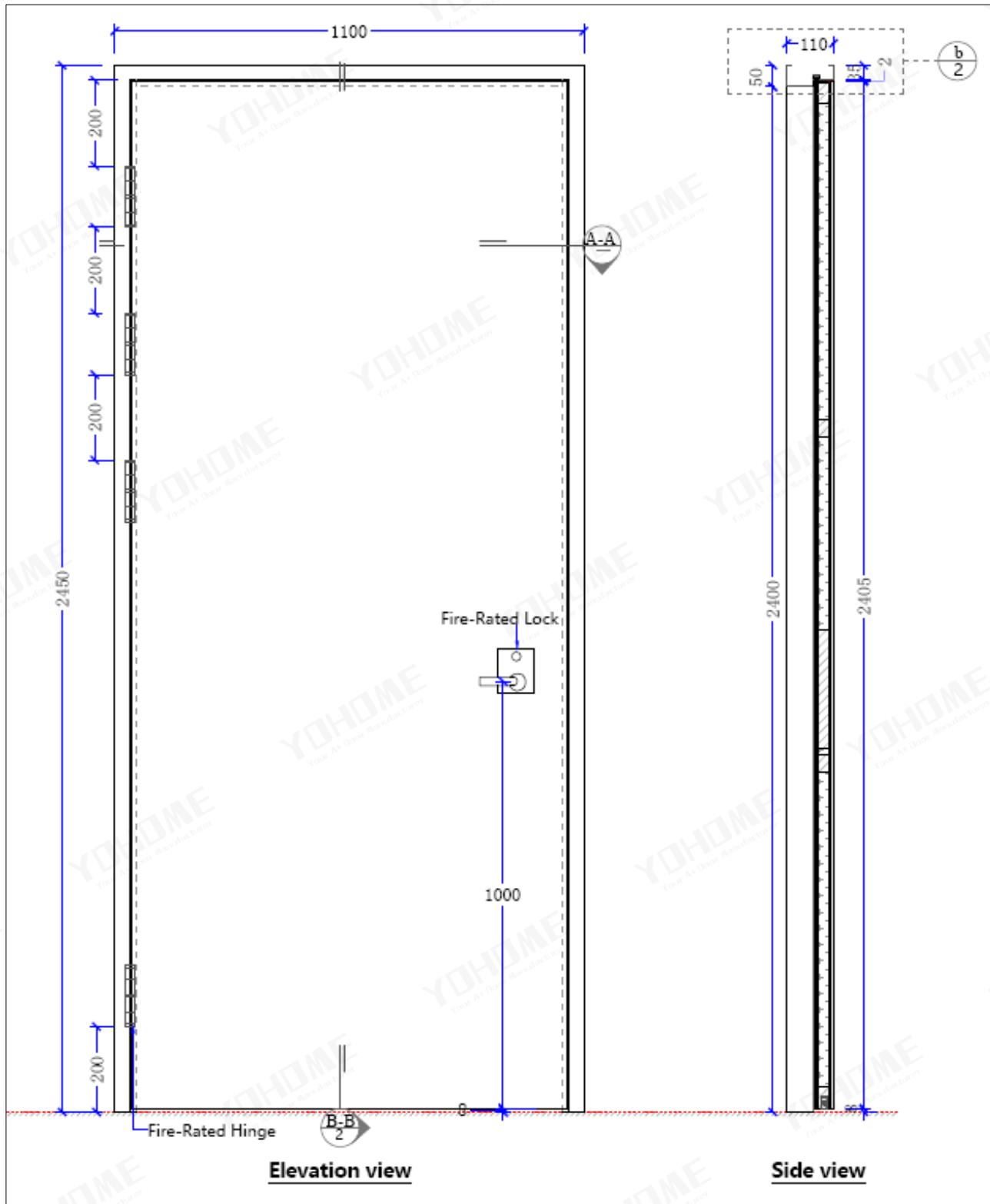
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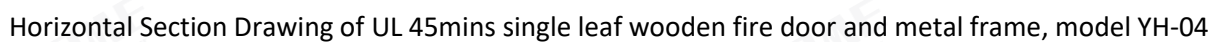
SECTION 7

FIRE DOOR ASSEMBLY DRAWINGS



Drawing of UL 45mins single leaf wooden fire door and metal frame, Model YH-04

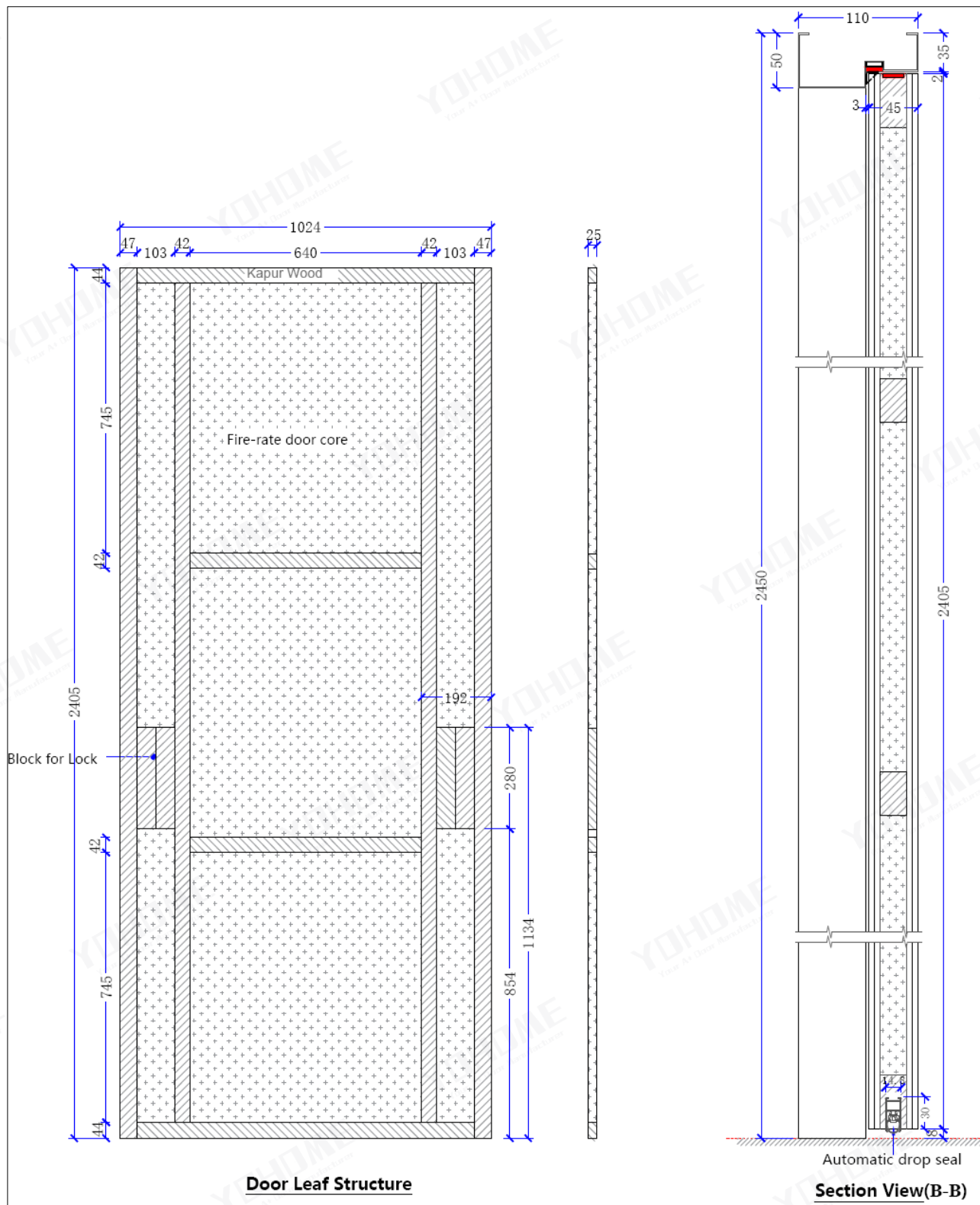
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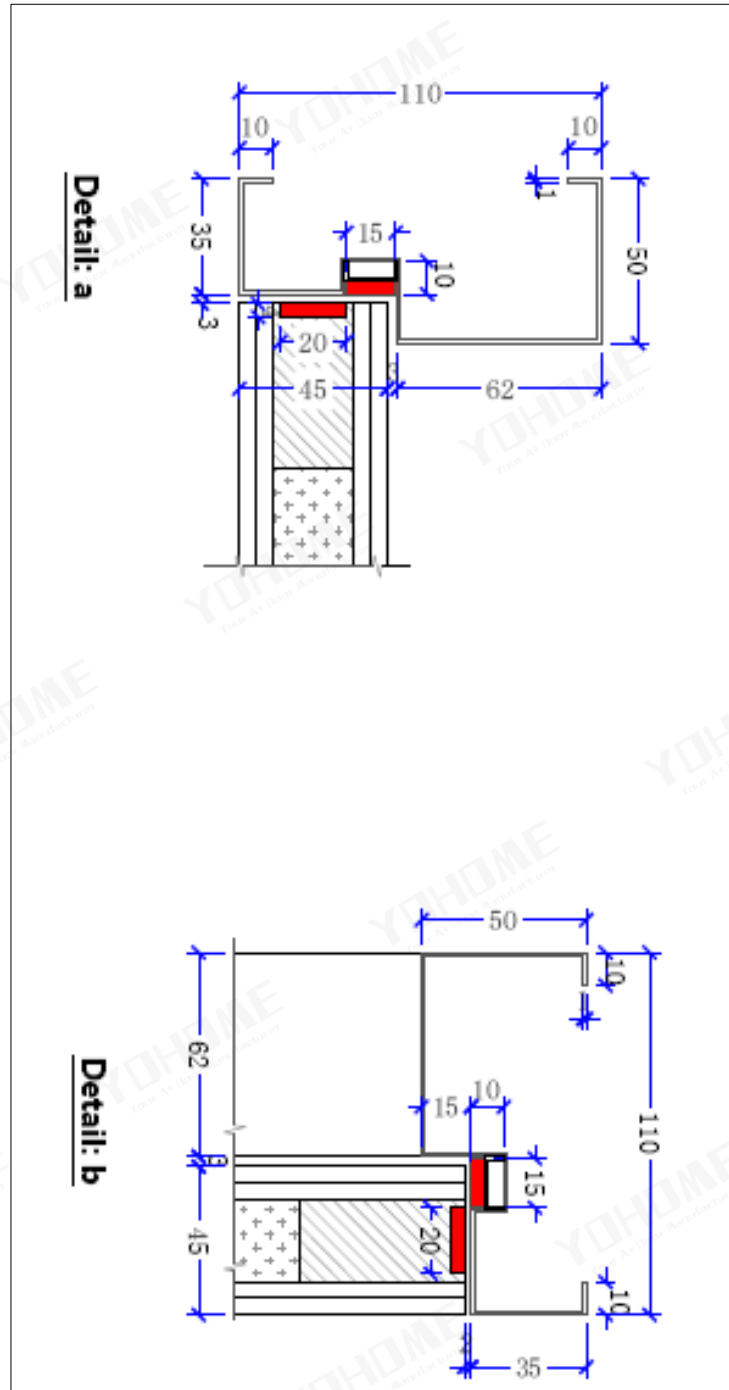


Interior Structure Drawing of UL 45mins single leaf wooden fire door and metal frame, model YH-04

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Detail Drawing of Jamb and Header of the frame

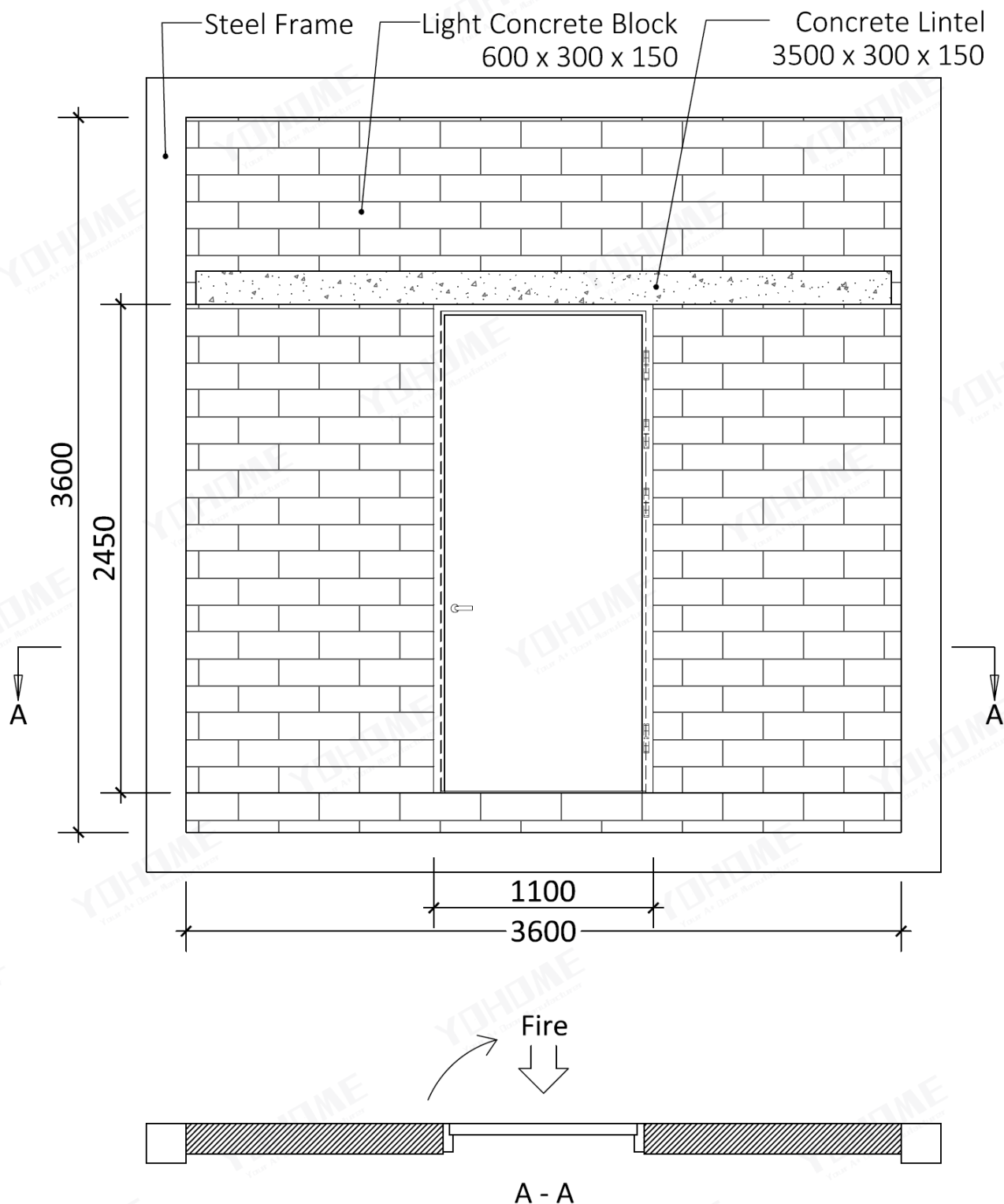
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SECTION 8

TEST WALL CONSTRUCTION



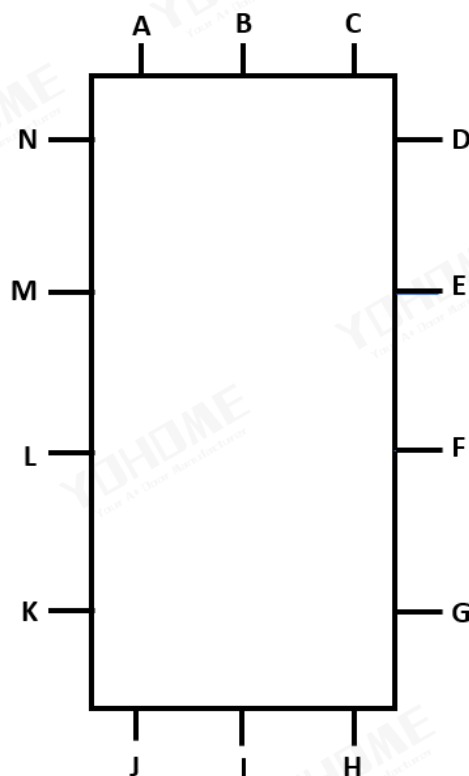
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SECTION 9

TEST MEASUREMENT DATA



EXPOSED SIDE

Clearance dimension in mm at each position													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
1.4	1.5	2.2	3.8	4.0	5.4	5.1	7.6	7.8	6.3	2.1	4.4	2.7	1.8

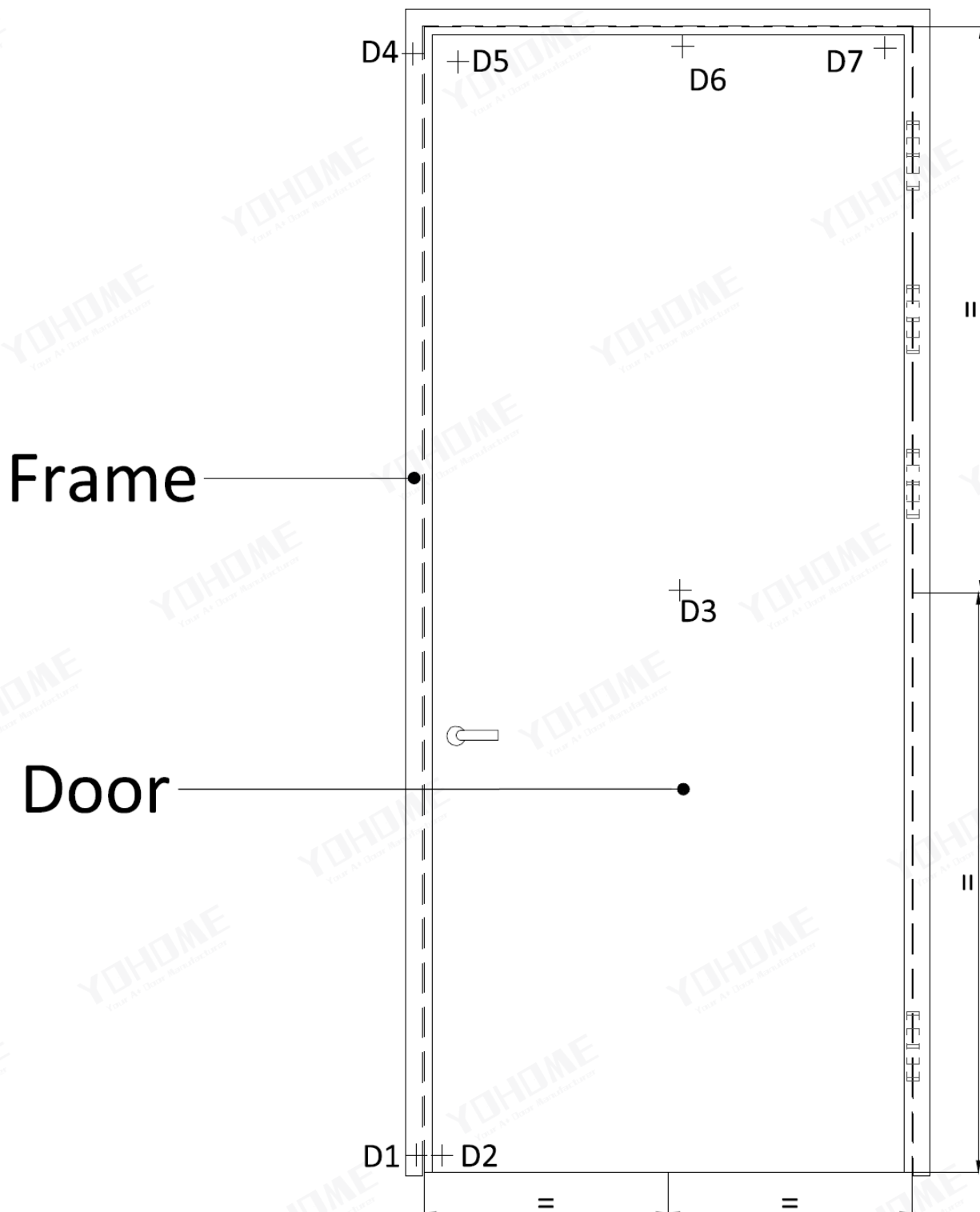
DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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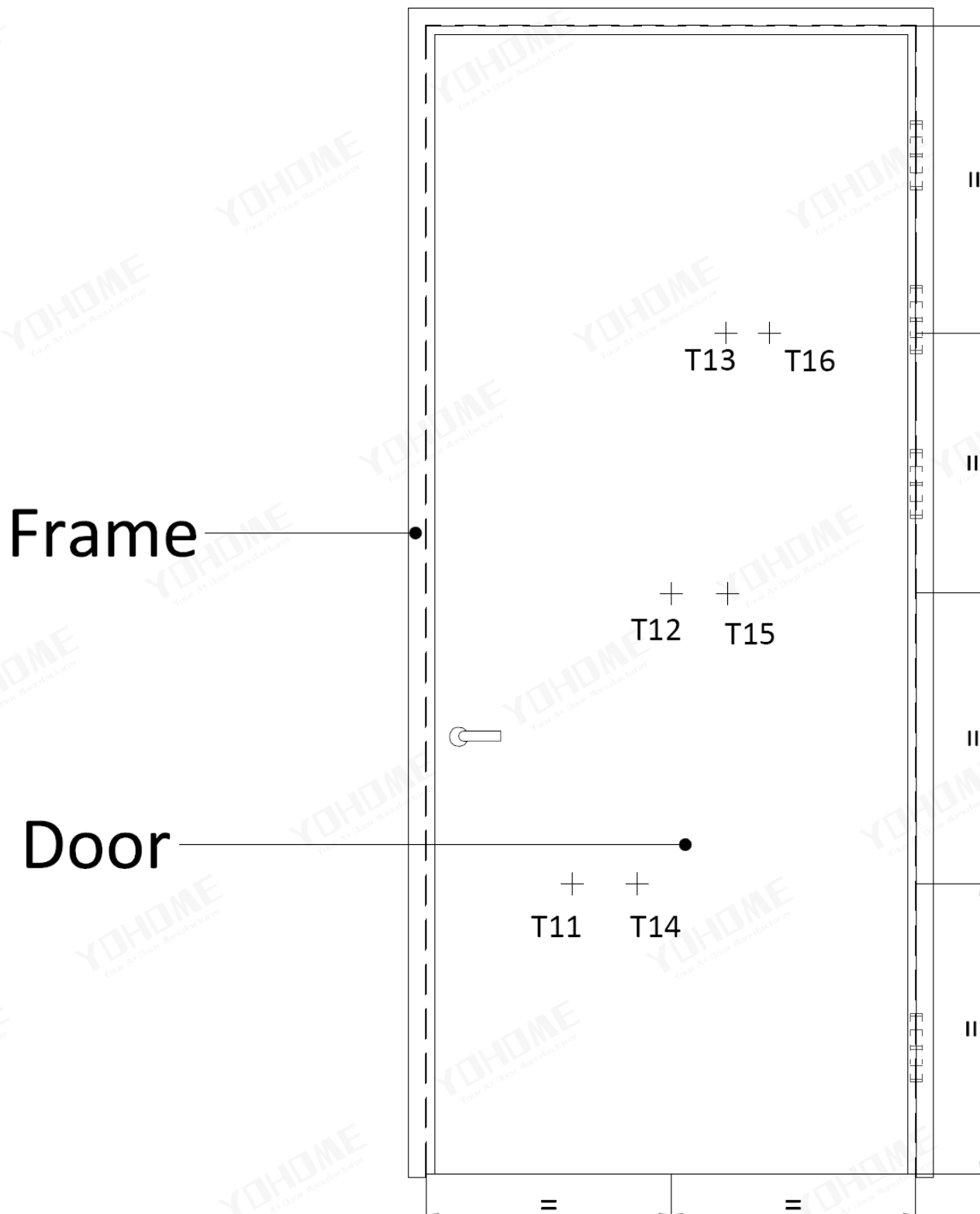
UNEXPOSED SIDE

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: NFPA 252(2022) Fire Tests of Door Assemblies

Equipment:

ITEM	ID
Vertical furnace	BPGZ119-02-01
Oxygen Analyzer	BPGZ119-02-02
Furnace pressure gauge	BPGZ119-02-03 ~05
Ambient temperature gauge	BPGZ119-02-33
Water Pressure gauge	BPGZ119-02-38
Displacement Measurements	BPGZ119-02-40
Test Clock	BPGZ119-02-41
Furnace thermocouple	BPGZ125-01~09
Unexposed thermocouple	BPGZ119-09~11
Clearance Measurements	BPGZ030-15

Temperature-Time Curve:	According to NFPA 252, Section 4.1
Furnace Temperatures:	According to NFPA 252, Section 4.2
Unexposed Temperatures:	According to NFPA 252, Section 4.3, measured in the first 30 minutes
Thermocouple Pads:	Length and width 152 ± 3 mm, thickness 10.2 ± 1.3 mm, conductivity 0.055 W/mK at 65°C
Construction and Size:	According to NFPA 252, Section 5.1
Mounting:	According to NFPA 252, Section 5.2
Clearances:	According to NFPA 252, Section 5.3
Test Wall:	According to NFPA 252, Section 5.4
Hose Stream:	According to NFPA 252, Section 6.2

Other Evaluation Standard:

UL 10(b) (2008) (R2020)	DESCRIPTION
Positive Pressure	No requirement.
Neutral pressure	The pressure in the furnace chamber is to be 0 ± 0.01 inches of water at the top of the door.
Thermocouple	For unexposed temperatures, thermocouple shall be a wire diameter of not more than 0.7mm. Each thermocouple is to be brazed to the center of the surface of the face of a copper disk 12mm in diameter and 0.2mm thick.
Thermocouple Pads	Length and width 152 ± 3 mm, thickness 9.5 ± 1.6 mm, dry weight of 67 ± 24 g, conductivity 0.053 W/mK at 66°C, modified Brinnell hardness (on soft face) of 2.25 to 4.5.
Cotton Pad Check	No Requirement.
Hose Stream	Immediately after to within 3 minutes of the fire endurance test.

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CAN / ULC S104 (2015) (R2020)	DESCRIPTION
Positive pressure	No requirement.
Neutral pressure	The pressure in the furnace chamber shall be controlled such that a pressure of 0 ± 2.5 Pa is maintained at the top of the test assembly.
Thermocouple	For unexposed temperatures, thermocouple lead under the pad shall be not greater than 1 mm in diameter and shall be electrically insulated with heat resistant and moisture resistant coatings.
Thermocouple Pads	Length and width 150 ± 3 mm, thickness 10 ± 1 mm, density 500 ± 10 kg/m ³ , thermal conductivity 0.055 W/m·K at 66°C.
Cotton Pad Check	No Requirement.
Hose Stream	Within 3.5min of the termination of the fire test, directed first at the bottom and then at all parts of the exposed surface, changes in direction being made slowly.

UL 10(c) (2016) Ed.3 (R:27 May 2021)	DESCRIPTION
Positive pressure	After less than 5 minutes, 40 in. (1016 mm) or less from the bottom of the test assembly.
Neutral pressure	No requirement.
Thermocouple	For unexposed temperatures, thermocouple shall be a wire diameter of not more than 0.7mm. Each thermocouple is to be brazed to the center of the surface of the face of a copper disk 12mm in diameter and 0.2mm thick.
Thermocouple Pads	Length and width 30 ± 0.5 mm, thickness 2 ± 0.5 mm, density of 900 ± 100 kg/m ³ , thermal conductivity 0.053 W/mK at 66°C, modified Brinnell hardness (on soft face) of 2.25 to 4.5.
Cotton Pad Check	100mm square by 20mm thick, consist of new undyed and soft cotton fibers without any admixture of artificial fibers, weighing of 3 to 4g, dried at 100°C for at least 30min. Attached by wire clips to a 100mm square frame of 1mm diameter wire.
Hose Stream	Immediately after and within 3 minutes of the fire endurance test.
Oxygen Percentage readings	The oxygen percentage is to be determined by centering a minimum of one 1/4-in (6.4-mm) inside diameter stainless steel tube containing eight 1/16-inch (1.6-mm) diameter holes in the damper plenum, approximately half way between the furnace and the exhaust damper. The tube is then to be connected to an oxygen analyzer which has an accuracy of ± 2.0 percent in the range of 0 to 10 percent. Locating more than one probe in the plenum and averaging the readings is permitted.

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Fire Endurance Test Observations:

Time		All observations are from the unexposed face unless noted otherwise.
Mins	Secs	
00	00	Test started.
00	56	Smoke issued from top edge of the door.
01	15	Smoke issued from the leading edge of the door.
01	52	Smoke issued from the bottom edge of the door.
02	40	Smoke issued from the lock cylinder of the door.
07	52	The lever handle was blackened.
14	30	The top left corner and top right corner of the doorset were blackened.
17	27	Unidentified liquid emitted from the lock.
25	28	The lever handle position surrounding was blackened.
30	00	No significant change.
45	00	Test was discontinued at the request of the sponsor. Neither ignition of cotton pad, sustained flame nor through openings were evident on doorset. The test assembly was moved into the position for hose stream test.

Hose Stream Test Observations:

Time		All observations are from the unexposed face unless noted otherwise.
Mins	Secs	
46	30	Hose stream test started.
46	47	Hose stream test was discontinued. No through openings that permitted a projection of water from the stream beyond the unexposed surface during the time of the hose stream test.

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Temperature Data:

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

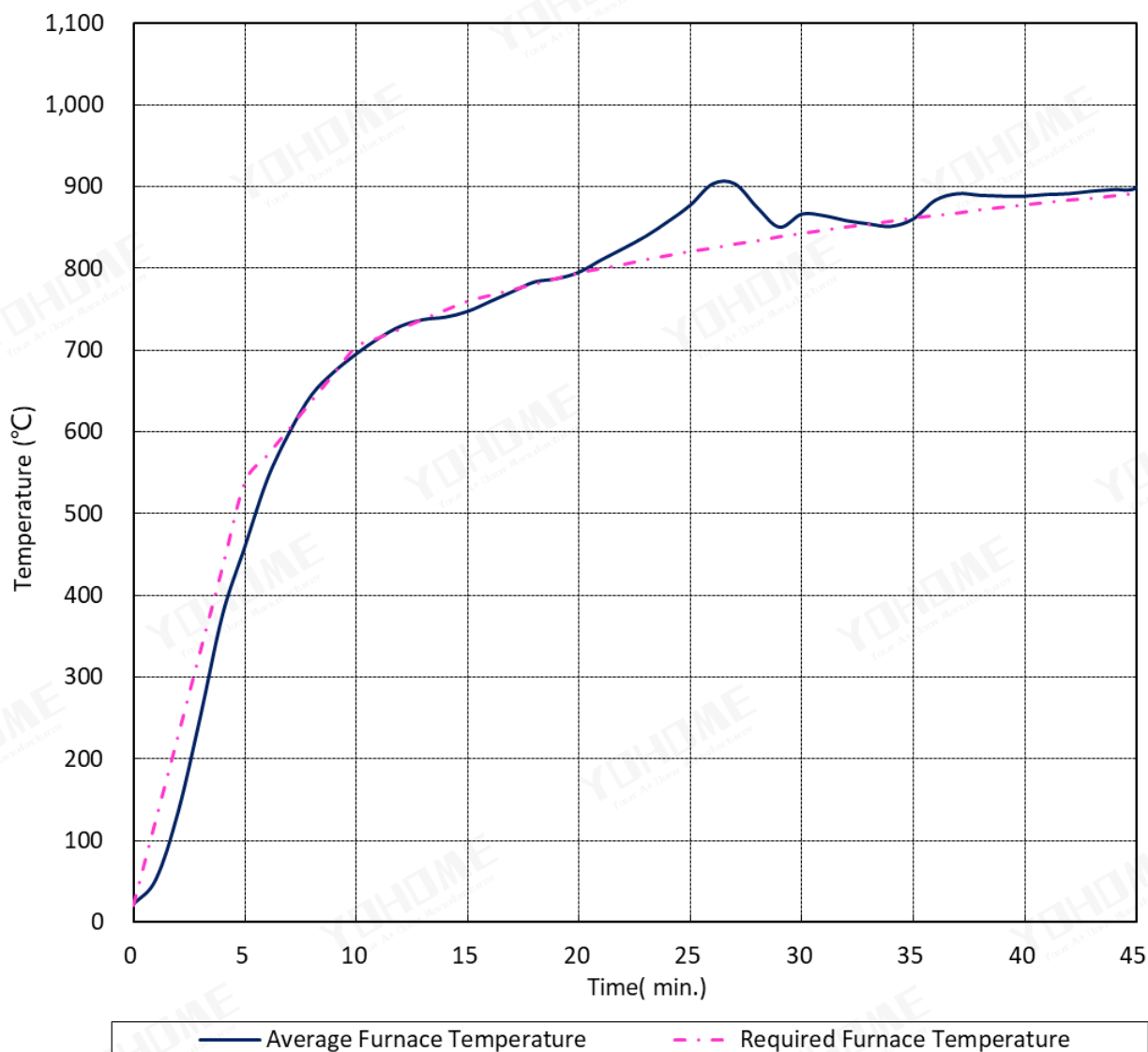
Time Mins	Specified Furnace Temperature/ °C	Furnace Mean Temperature/ °C
0	20	22
3	331	251
6	571	541
9	671	673
12	726	729
15	760	747
18	781	783
21	800	810
24	816	857
27	830	903
30	843	866
33	854	854
36	865	883
39	875	888
42	884	891
45	892	898

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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 the door leaf

Time Mins	T11 (°C)	T12 (°C)	T13 (°C)	T14 (°C)	T15 (°C)	T16 (°C)
0	23	20	21	22	21	25
3	21	17	18	22	22	25
6	23	19	19	24	22	25
9	23	21	20	24	25	26
12	25	23	22	27	29	28
15	28	27	24	32	37	31
18	34	34	31	39	45	39
21	42	43	41	46	53	49
24	51	50	49	52	45	57
27	58	57	56	59	50	63
30	64	63	62	59	55	69
33	69	67	68	66	58	73
36	73	70	76	71	60	75
39	79	72	81	73	60	76
42	82	74	83	69	60	77
45	83	77	88	69	60	78

Thermocouple Pads for T11, T12, T13 comply with the requirements of NFPA 252.

Thermocouple Pads for T14, T15, T16 comply with the requirements of UL 10C.

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Horizontal Deflection (Positive values indicate movement into the furnace)

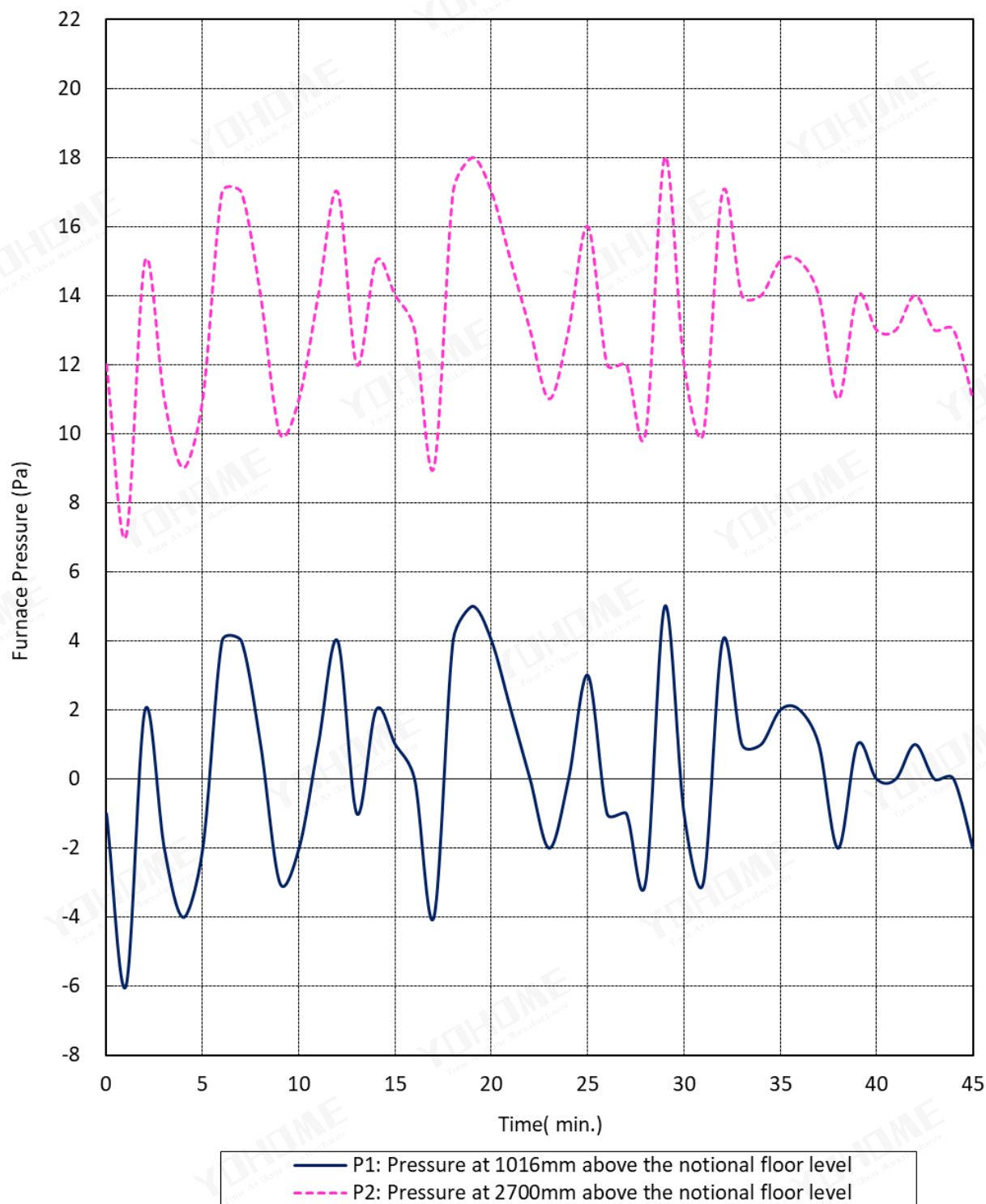
Time Mins	Door Frame Separation at Latch for Single Door (mm)	Maximum Pair Meeting Edge Displacement (mm)	Displacement perpendicular to door plane (mm)						
			D1	D2	D3	D4	D5	D6	D7
Deflection during fire endurance test:									
Initial	< 12.7	N/A	0	0	0	0	0	0	0
20	< 12.7	N/A	2	8	23	0	10	10	10
40	< 12.7	N/A	0	5	40	10	20	30	20
Requirement	< 12.7	N/A	Any portion of the edges adjacent to door frame shall not move more than the thickness of the door.						
Deflection after hose stream test:									
Hose Stream	< 12.7	N/A	<67.5						
Requirement	< 12.7	N/A	Any portion of the edges adjacent to door frame shall not move more than the 1-1/2 times thickness of the door.						

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Furnace Pressure

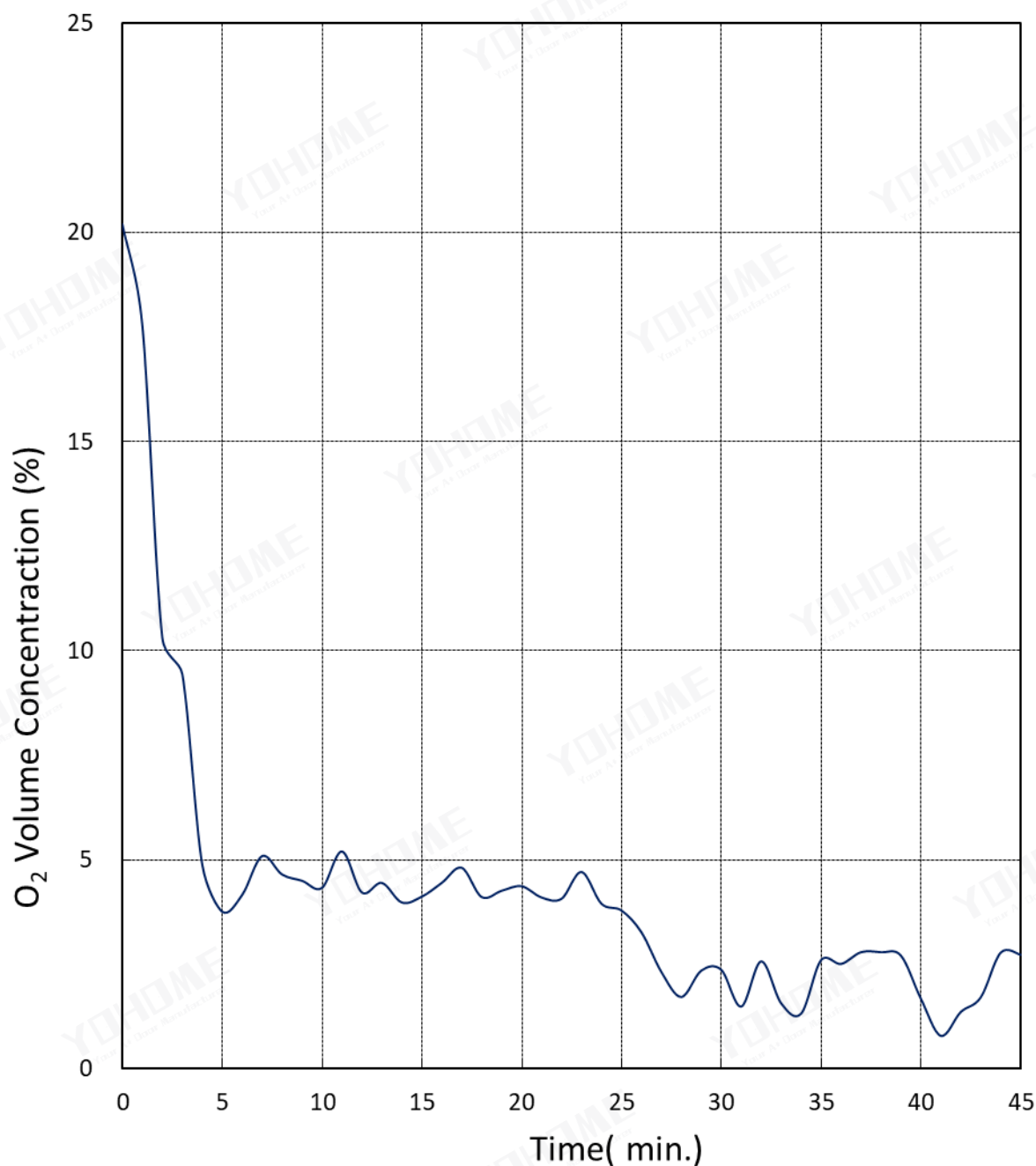


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Oxygen concentration inside furnace



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SECTION 11

PHOTOGRAPHS



Photo No. 1
Exposed Side Prior to the Fire Test

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Photo No. 2
Unexposed Side Prior to the Fire Test

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Photo No. 3
Unexposed Side after 15 Minutes

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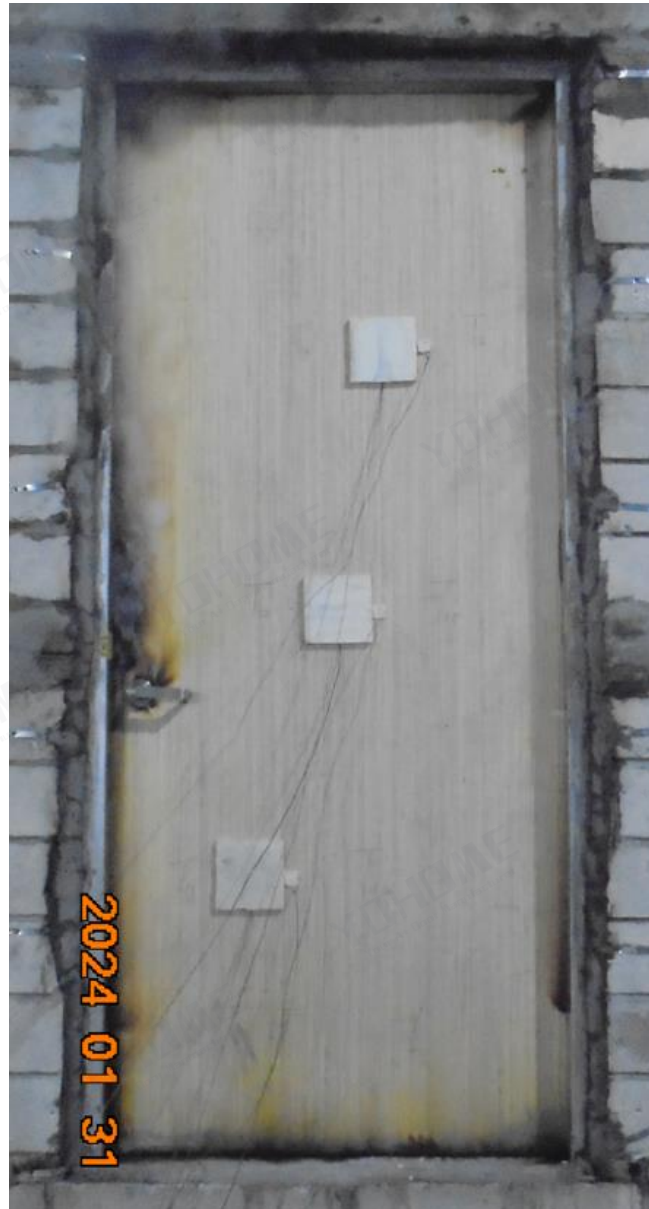


Photo No. 4
Unexposed Side after 30 Minutes

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Photo No. 5
Unexposed Side after 45 Minutes

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Photo No. 6
Exposed Side after 45 Minutes

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Photo No. 7
Exposed Side during Hose Stream Test

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Photo No. 8
Exposed Side after Hose Stream Test

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Photo No. 9
Unexposed Side after Hose Stream Test

SECTION 12 REVISION LOG

Revision No.	Date	REVISION	Reviser	Reviewer
0	2024-02-28	Original Report Issue	/	/
1	2024-03-29	Corrected solid wood type from "Spruce lumber" to "Kapur Wood" in Page 5 and updated the door drawing accordingly in Page 10 and 11.	Kevin Pan	Jason Xu

Note: The report 240115012GZC-001 with revision No. 1 will replace revision No. 0 report, it will be effective from 2024-03-29, and the revision No. 0 report will be invalid.

*****End of Report*****