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WAFERLOCK Corp.

TEST REPORT

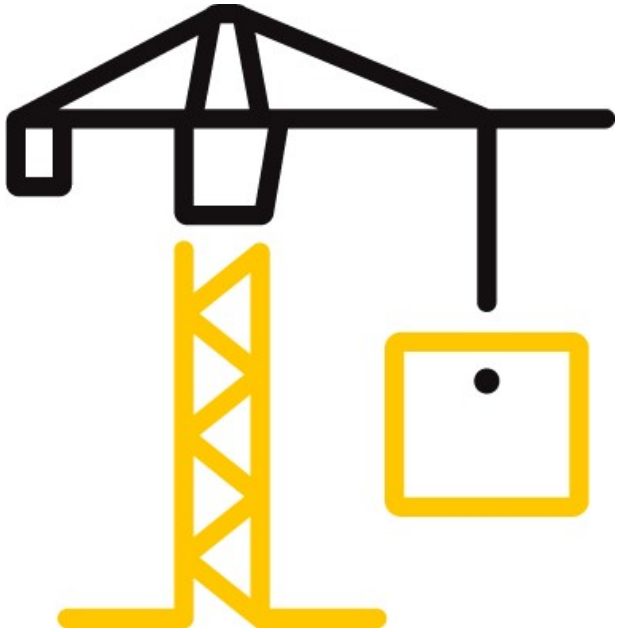
SCOPE OF WORK
EN 1634-1:2014+A1:2018 TESTING ON ELECTRONIC LOCK, MODEL L701, L700

REPORT NUMBER
210609086GZU-001

TEST DATE(S)
2021-07-30

ISSUE DATE **[REVISED DATE]**
2021-08-13 2021-11-16

PAGES
35



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Report No.: 210609086GZU-001
Report Date: 2021-08-13

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5. All the tests results give the statement of conformity refer to the decision rule of “Procedure 2 “Accuracy Method” as stated in the IEC Guide 115:2007.

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

REPORT ISSUED TO

WAFERLOCK Corp.
No. 16, Keyuan 2nd Rd., Xitun Dist., Taichung City 407, Taiwan (R.O.C.)

SECTION 1

SCOPE

Intertek has conducted an evaluation for WAFERLOCK Corp. to determine the fire resistance characteristics of the Electronic lock, Model L701 in Single Leaf Single Action Wooden Composite Fire Door. This test was designed to demonstrate evaluation on the electronic lock of two types including Model L701 and Model L700. This evaluation began on 06/09/21 and was completed on 11/05/21. The test was conducted on 07/30/21.

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.

Report Authorized:

Authorized By: Harrison Li
Harrison Li
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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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

SECTION 2
SUMMARY OF TEST RESULTS

Product Name: Electronic lock
Model: L701 & L700

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

Doorset A: Opening into the furnace

PERFORMANCE CRITERIA	RESULTS	
Integrity	Sustained flaming	68 minutes, no failure
	Gap gauge	68 minutes, no failure
	Cotton pad	68 minutes, no failure
Insulation		68 minutes, no failure

Doorset B: Opening away from the furnace

PERFORMANCE CRITERIA	RESULTS	
Integrity	Sustained flaming	68 minutes, no failure
	Gap gauge	68 minutes, no failure
	Cotton pad	68 minutes, no failure
Insulation		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 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 1363-1:2020, *Fire resistance tests - Part 1: General requirements*

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Report No.: 210609086GZU-001
Report Date: 2021-08-13

SECTION 4
MATERIAL SOURCE/INSTALLATION

Test specimen were provided to Intertek directly by the client and were not independently selected for testing. Test specimens were received at the Evaluation Center on 05/24/21 and 11/01/21.

Electronic Lock, Model L701 was tested. The specification of Model L701 and Model L700 was provided by the client.

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.

ASSEMBLY UNITS			DESCRIPTION					
Door	Type		Single Leaf Single Action Swing Timber Composite Fire Door Assembly					
	Nominal Size		836	mm wide	2040	mm high	55	mm thick
	Facing		2.5mm MDF (medium density fiberboard), density of 816kg/m^3					
	Sub-facing		5mm Magnesium oxide board, density of 1339kg/m^3					
	Core	Material	MgO fire core board					
		Thickness	40mm, Density: 452kg/m^3					
	Stile		60mm x 30mm solid meranti wood, density of 731kg/m^3					
	Rail		60mm x 30mm solid meranti wood, density of 731kg/m^3					
Frame	Nominal Size		906	mm wide	2080	mm high	140	mm depth
	Material		Facing: 5mm Magnesium oxide board, density of 1339kg/m^3					
			Fire retardant meranti wood, density of 731kg/m^3					
Hardware	Lock (Test Specimen)	Lock type	Electronic lock, Model: L701					
		Lock case	155mm x 84.4mm x 13.8mm					
		Backset	55	mm	Latch Throw	11	mm	
		Bedding material	Lock case is protected by 2mm thick fireproof board (material is solidum silicate with fiberglass mesh)					
		Latch Operation	Latch: Engaged		Deadbolt: Disengaged			
	Hinge	Material and type	Stainless Steel, Model: FRH443					
		Size	4” x 4” x 3mm, Quantity: 3					
		Bedding material	Hinge is protected by 2mm thick fireproof board (material is solidum silicate with fiberglass mesh)					

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

	Door Closer		Model: 603
			Installation: Surface mounted on opening face of door leaf
Intumescent Seal	Type 1	Model	RP2004W2100, 20mm x 4mm
		Location	One strip is at right, left and top edge of door leaf. Two strips are at right, left and top of door frame. Two strips are at bottom of door leaf.

The sample ID number assigned by the test lab is S210609086GZU.001 & S211103155GZU.001.

Documents and samples of electronic lock including Model L701 and Model L700 were checked, and found these locks have the similar design, and the same material. The difference between these two locks was induction panel. Model L701 with button shell was selected to test to cover the other model.

The drawings of the Electronic lock, model L701 and model L700, 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 Electronic lock are maintained on Intertek file.

These two identical doorsets were installed in a steel restraint frame. The test door was built into a concrete masonry unit partition, with fully mortared joints. The test sample placed 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 identical doorsets were mounted in one test frame. One doorset (A) was mounted so that the leaf swung towards the fire and the other doorset (B) was mounted so that the leaf swung away from the fire. Both door doorsets were tested at the same time.

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 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 is presented in the drawing of Section 9.

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

SECTION 5
TEST RESULTS

Integrity

Doorset A
The assembly 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 and the door latch remained engaged to the strike. During this 68 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 68 minutes.

Doorset B
The assembly 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 and the door latch remained engaged to the strike. During this 68 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 68 minutes.

Insulation

Doorset A

Transmission of heat through the assembly 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 assembly therefore met the criteria of the test standards for insulation performance of 68 minutes.

Doorset B

Transmission of heat through the assembly 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.

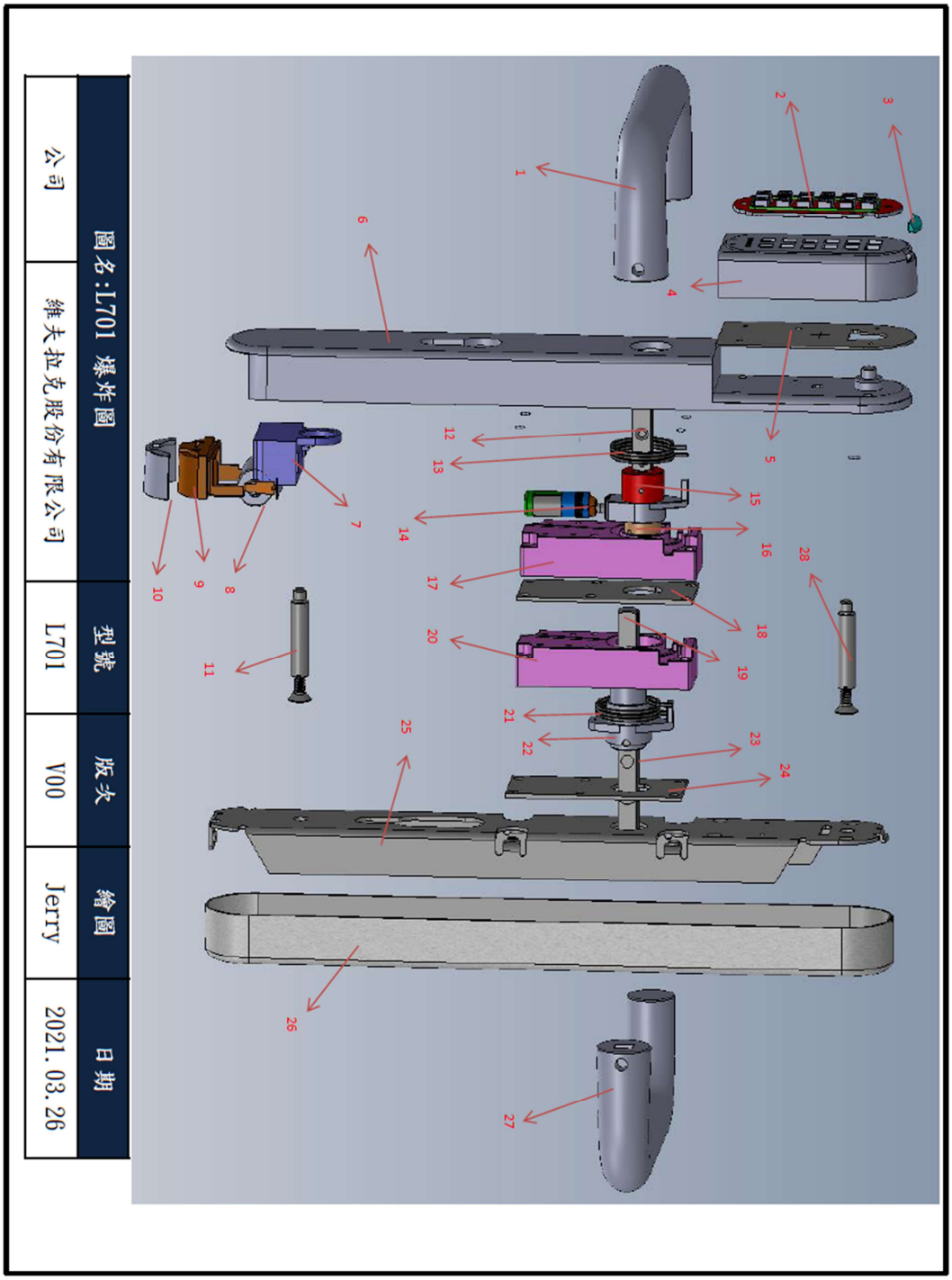
This assembly therefore met the criteria of the test standards for insulation performance of 68 minutes.

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

Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

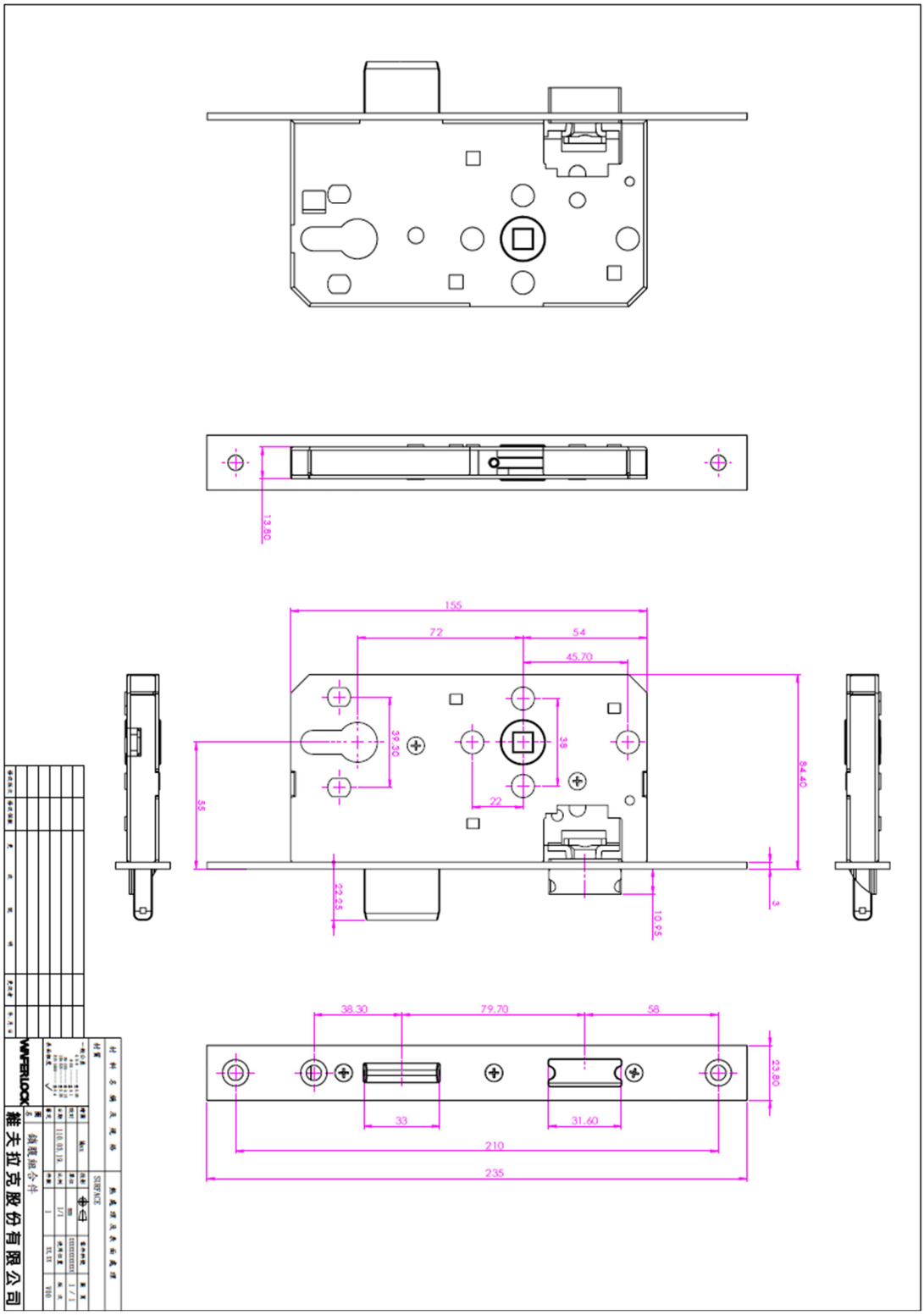
SECTION 6
SAMPLE DRAWINGS



Exploded Drawing of Model L701

Test Report

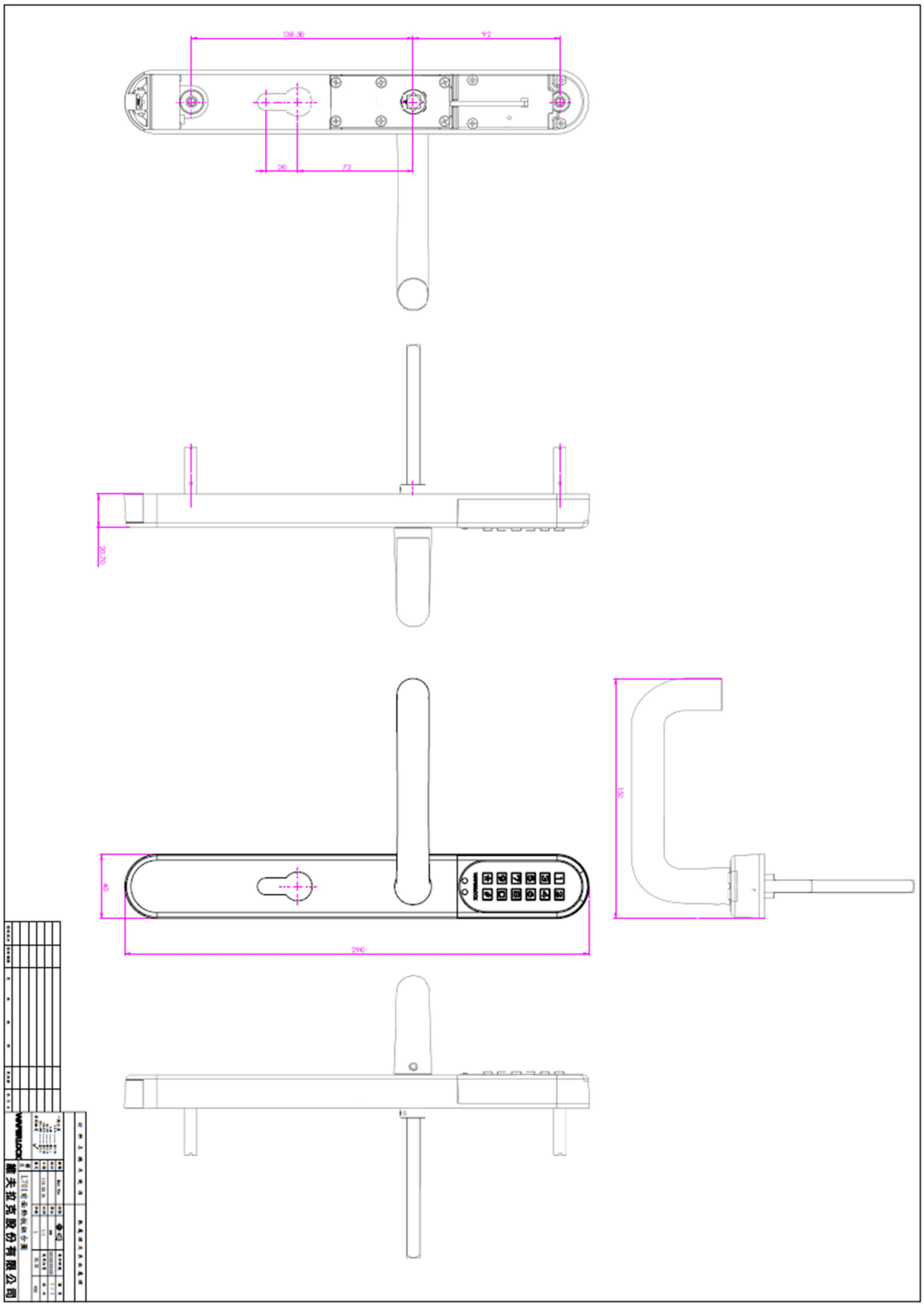
Report No.: 210609086GZU-001
Report Date: 2021-08-13



Drawing of Lock Case for Model L701 & Model L700

Test Report

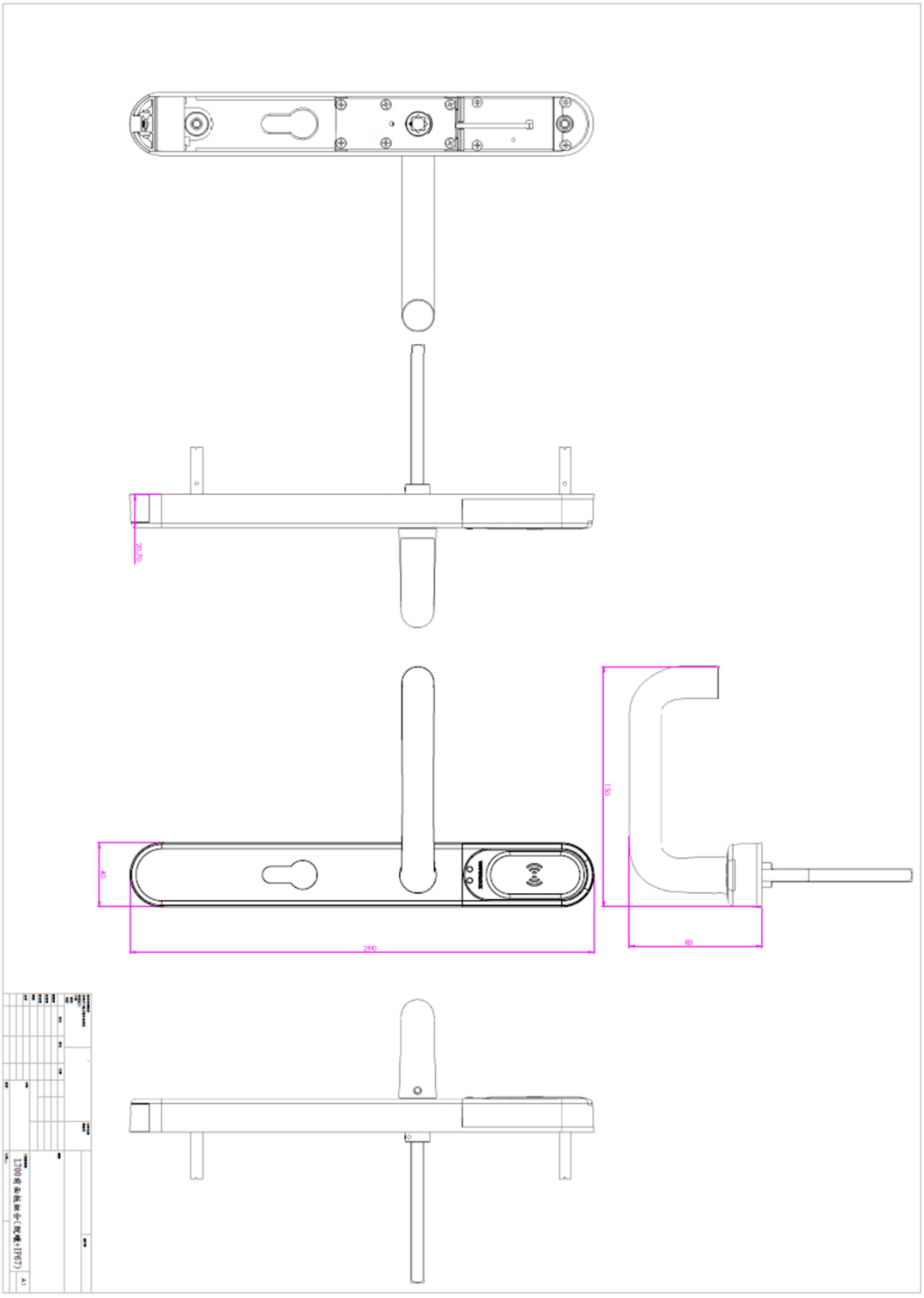
Report No.: 210609086GZU-001
Report Date: 2021-08-13



Drawing of Front Panel and Level Handle of Model L701

Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13



Drawing of Front Panel and Level Handle of Model L700

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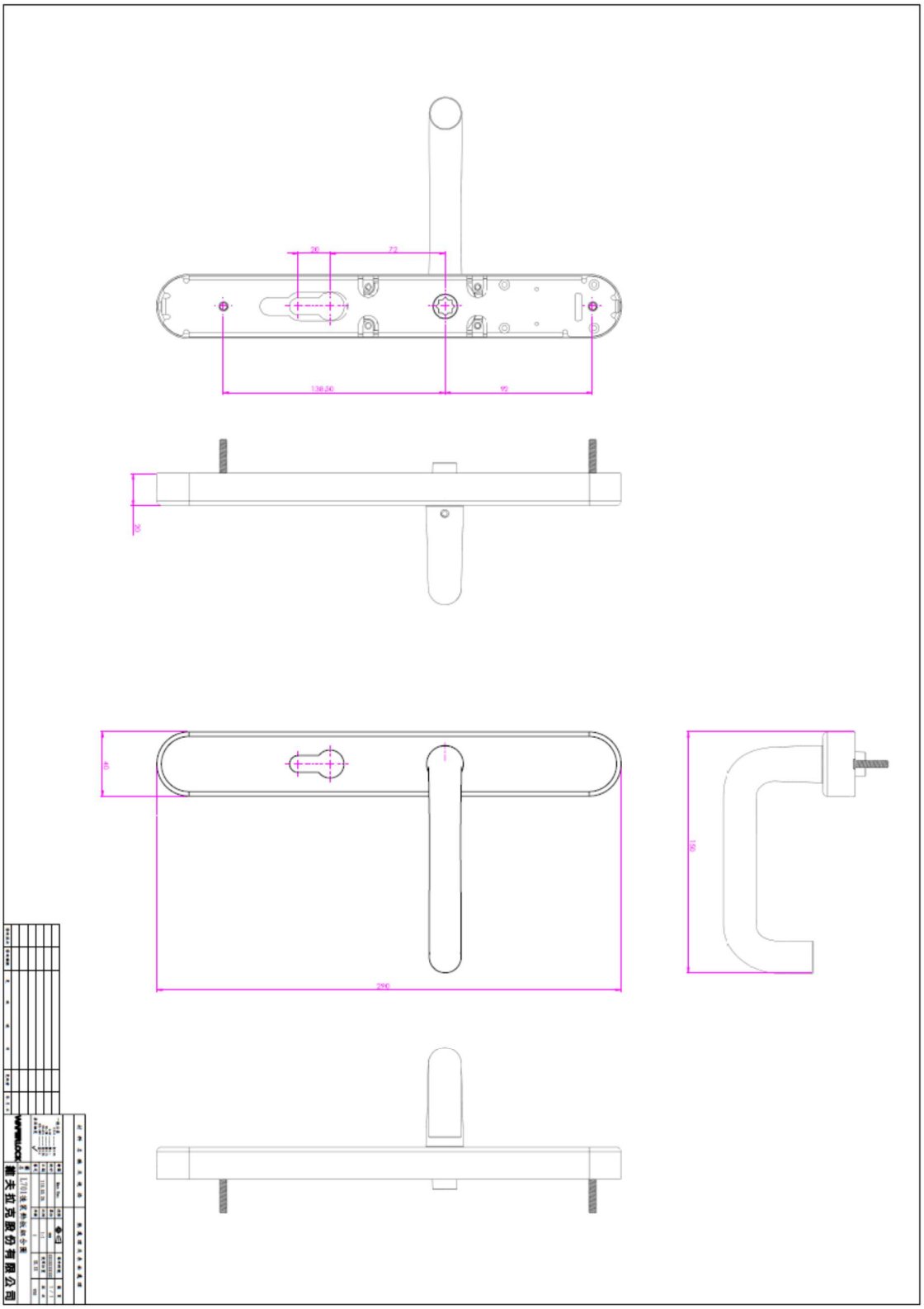
Report Date: 2021-08-13



Drawing of Back Panel and Level Handle of Model L701 & Model L700

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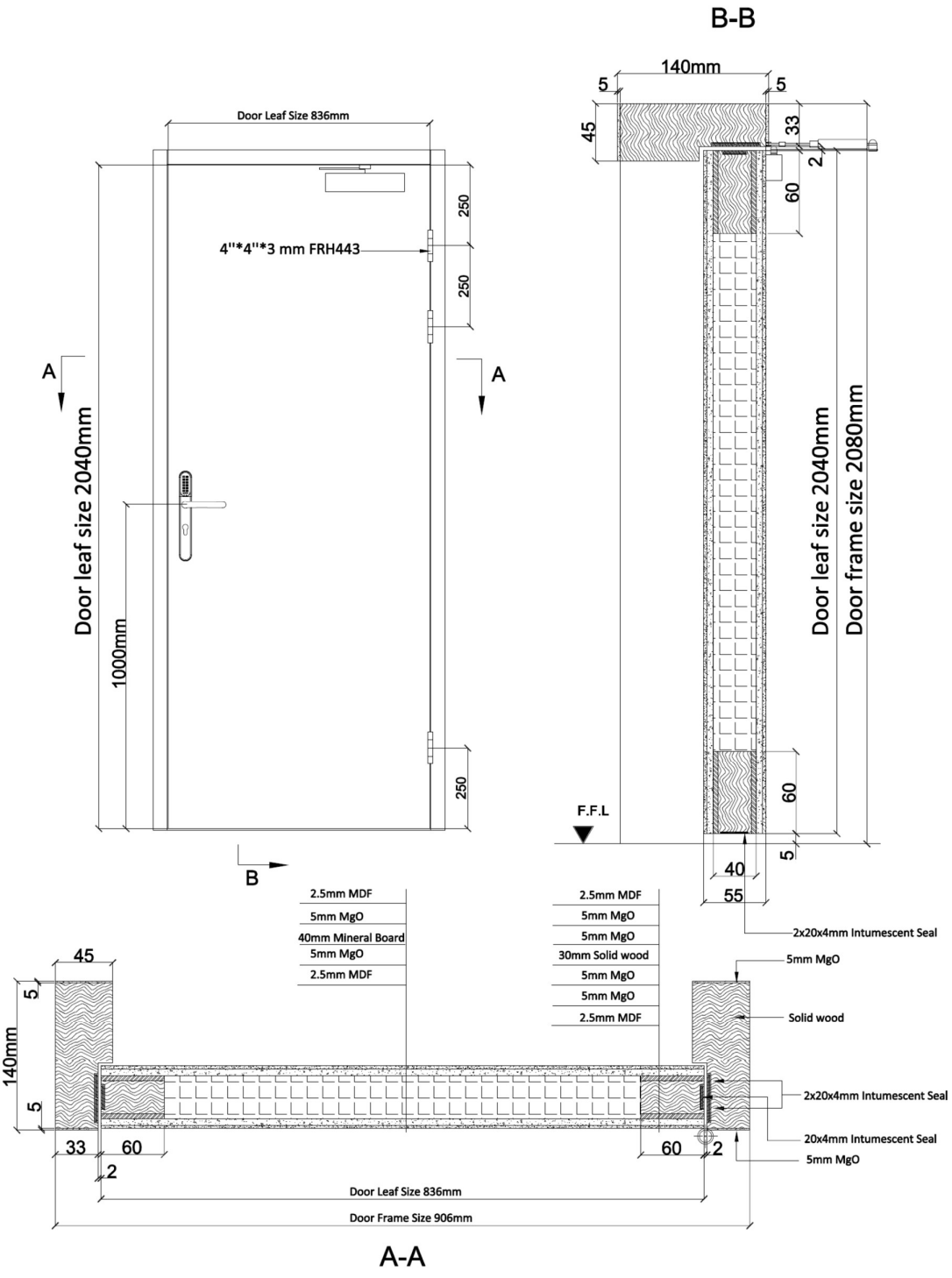
Report Date: 2021-08-13

SECTION 7

FIRE DOOR ASSEMBLY DRAWING



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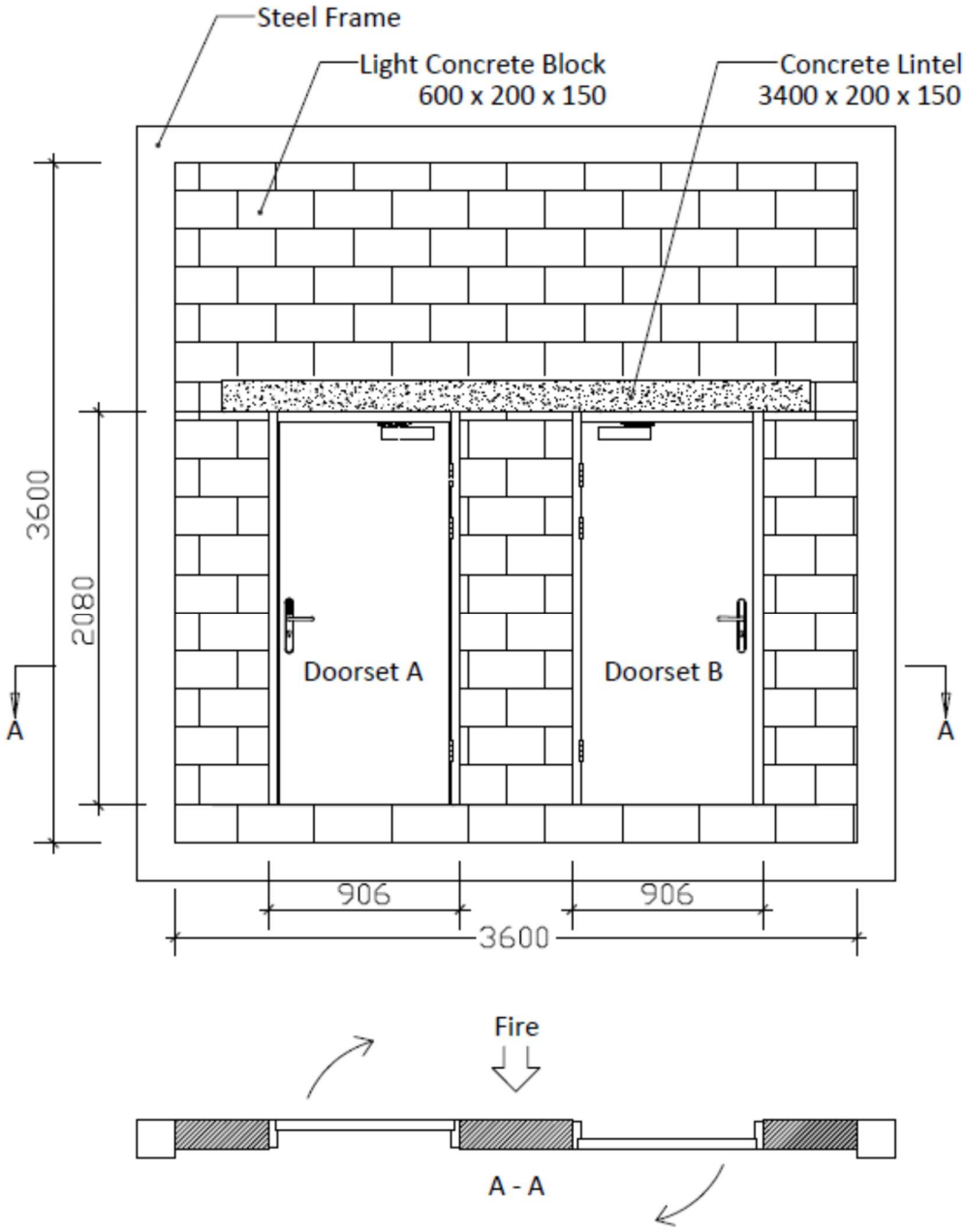
Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

SECTION 8

TEST WALL CONSTRUCTION



UNEXPOSED SIDE

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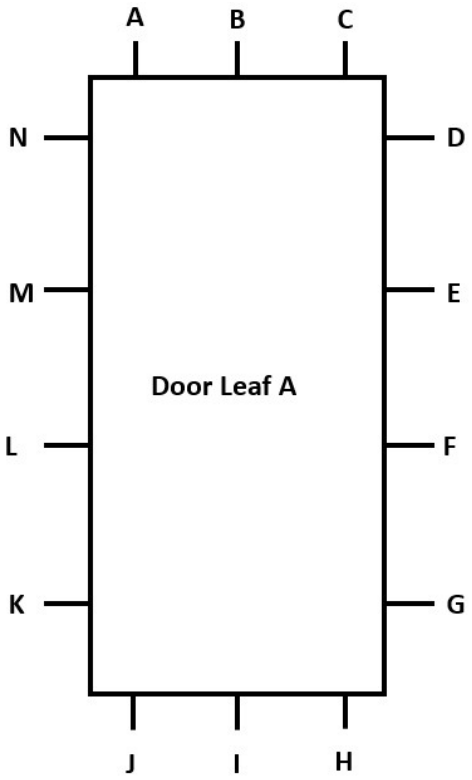
Report No.: 210609086GZU-001
Report Date: 2021-08-13

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
3.6	3.4	4.6	0.1	0.1	0.1	2.0	4.9	7.5	6.6	0.1	0.1	0.1	0.1

DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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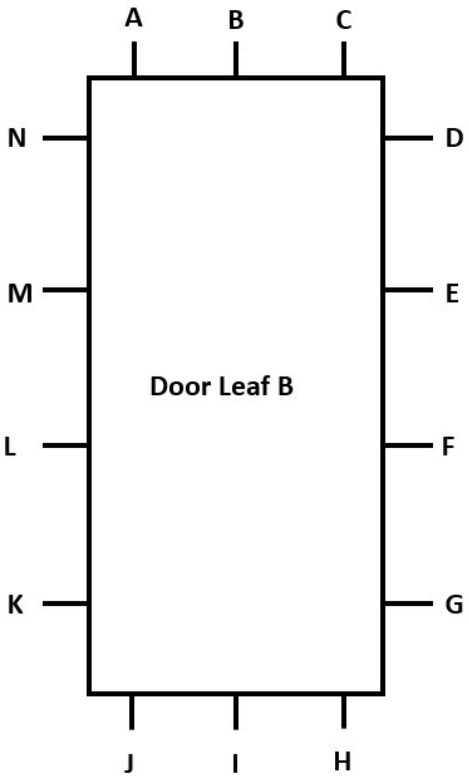
Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13



UNEXPOSED SIDE

Clearance dimension in mm at each position													
A	B	C	D	E	F	G	H	I	J	K	L	M	N
3.2	3.0	2.4	0.1	0.1	0.1	1.4	5.1	5.3	5.1	0.1	0.1	0.1	0.1

DO NOT SCALE

DOOR ASSEMBLY INITIAL CLEARANCES

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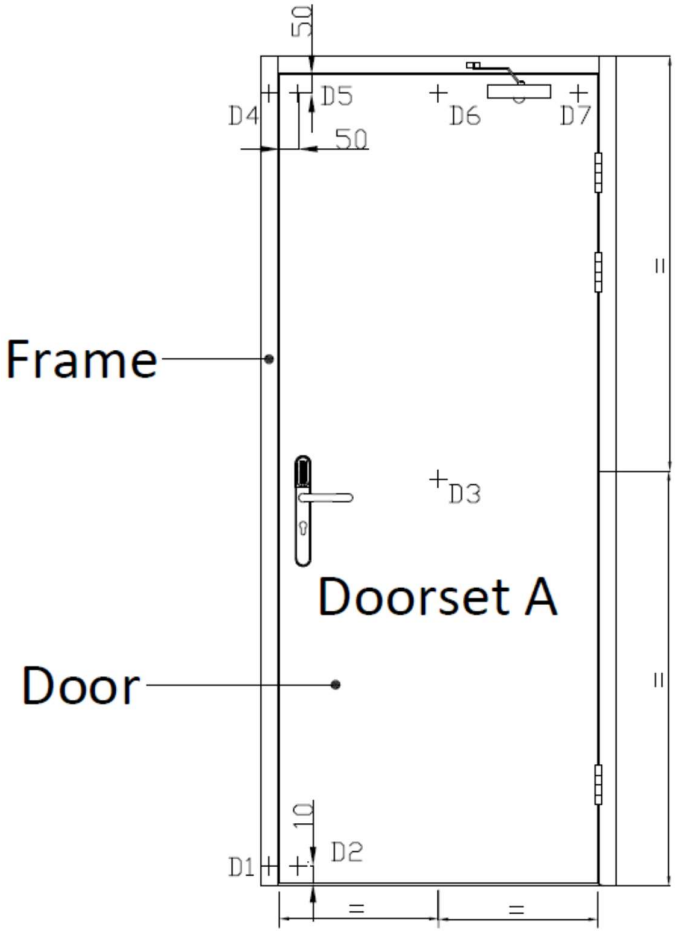
Report No.: 210609086GZU-001
Report Date: 2021-08-13



UNEXPOSED SIDE

POSITON FOR MEARSURMENT OF HORZITONAL DEFLECTION OF DOORSET A

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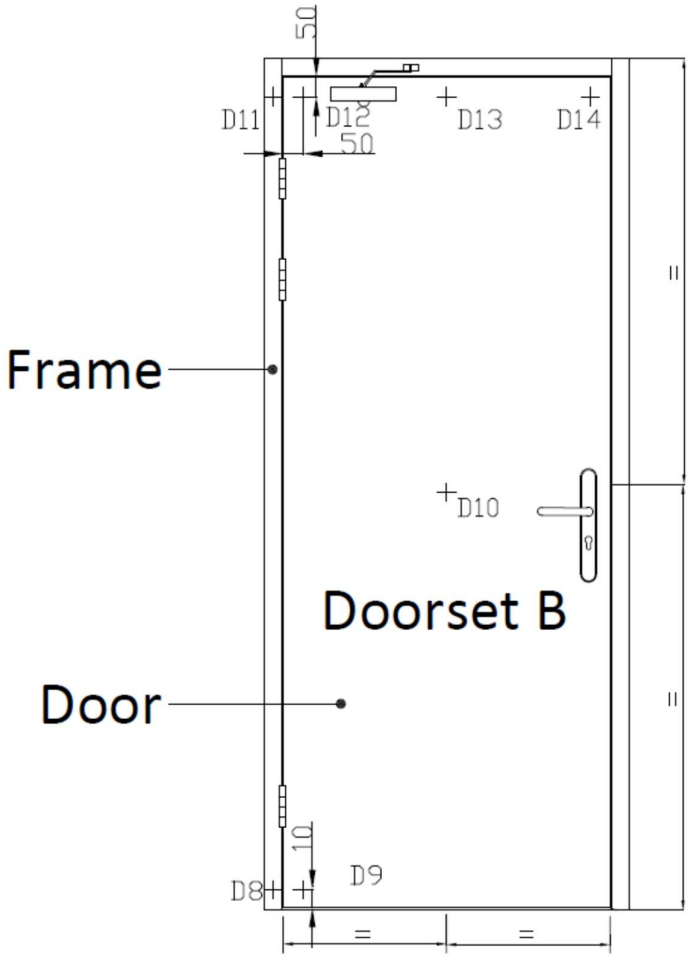
Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

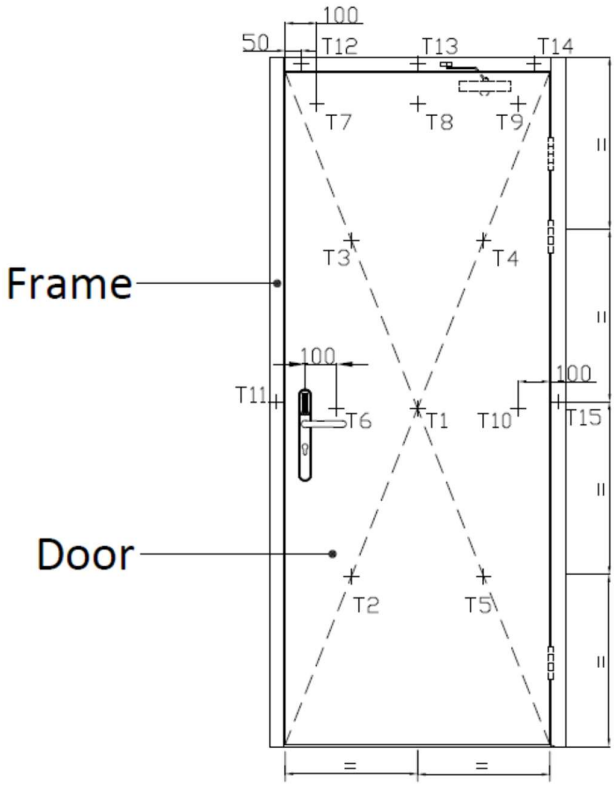


UNEXPOSED SIDE

POSITON FOR MEARSURMENT OF HORZITONAL DEFLECTION OF DOORSET B

Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13



POSITON FOR MEARUSEMENT OF UNEXPOSED TEMPERATURE OF DOORSET A

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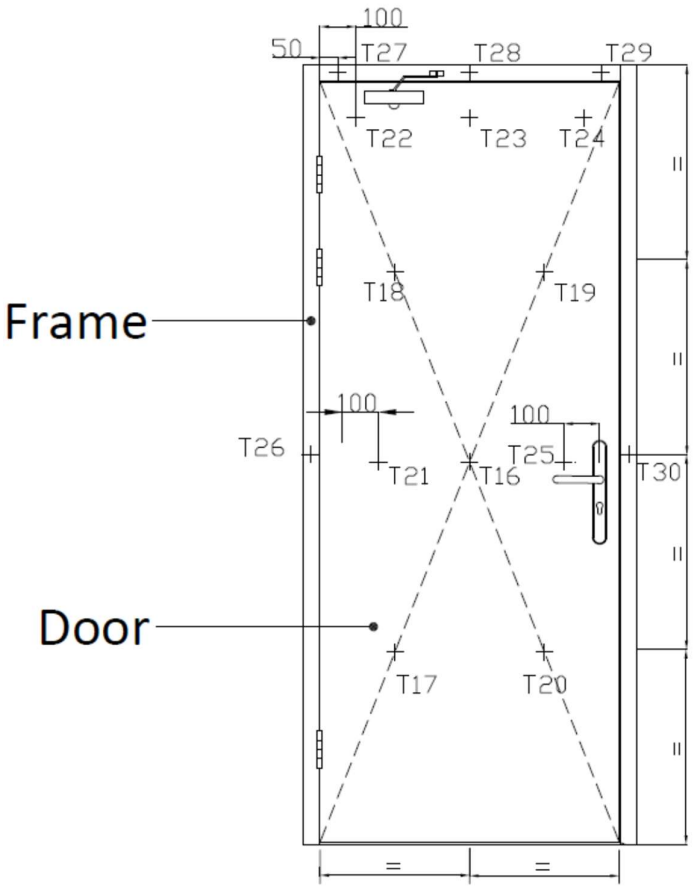
Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13



POSITON FOR MEARUSEMENT OF UNEXPOSED TEMPERATURE OF DOORSET B

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

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 EN1363-1, Section 8

Equipment:

ITEM	ID
Vertical furnace	BPGZ119-02-01
Furnace pressure gauge	BPGZ119-02-03 ~05
Test Clock	BPGZ119-02-41
Furnace thermocouple	BPGZ119-02-15 ~23
Ambient temperature gauge	BPGZ119-02-33
Unexposed thermocouple	BPGZ119-02-34~36
Clearance Measurements	BPGZ119-02-39
Displacement Measurements	BPGZ119-02-40
Digital push-pull gauge	BPGZ033-11

Heating Conditions: According to EN 1363-1, Section 5.1
Pressure Conditions: According to EN1363-1, 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
Thermocouple Pads: Length and width 30 mm, thickness 2.0 ± 0.5 mm, dry density 900 ± 90 kg/m^3
Pressure Measurements: According to EN 1634-1, Section 9.2

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Report No.: 210609086GZU-001
Report Date: 2021-08-13

Test Observations:

Time		All observations are from the unexposed face unless noted otherwise.
Mins	Secs	
00	00	Test started.
01	50	Smoke issued from the bottom edge of doorset A and doorset B.
02	24	Smoke issued from the lock of doorset A.
04	29	A lot of smoke issued from the bottom of each doorsets.
09	09	There was an unidentified liquid emitted from bottom of lock of each doorsets.
16	21	There was an unidentified liquid emitted from key hole of doorset A lock.
18	50	Smoke issued from the top edge of lock of doorset A.
38	21	The keyhole of lock of doorset A burned black.
43	53	Smoke issued from keyhole of lock of doorset A increased obviously.
45	16	Smoke issued from the top edge of lock of doorset B.
53	47	The keyhole of lock of doorset A burned black obviously.
60	00	Smoke still issued from the top, hinge edge of each doorsets.
63	00	A cotton pad was applied on the right top of doorset A and the pad was not ignited.
65	49	A cotton pad was applied on the left top of doorset B and the pad was not ignited.
68	00	Test was discontinued.

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

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	34
2	446	196
4	546	493
6	604	637
8	645	695
10	679	717
12	705	737
14	729	764
16	748	780
18	766	793
20	781	807
22	796	819
24	809	824
26	821	842
28	832	853
30	842	868
32	852	873
34	861	883
36	869	894
38	877	902
40	885	910
42	892	920
44	899	929
46	906	942
48	912	948
50	918	954
52	924	959
54	930	964
56	935	969
58	940	973
60	945	979
62	950	982
64	955	986
66	960	990
68	964	994

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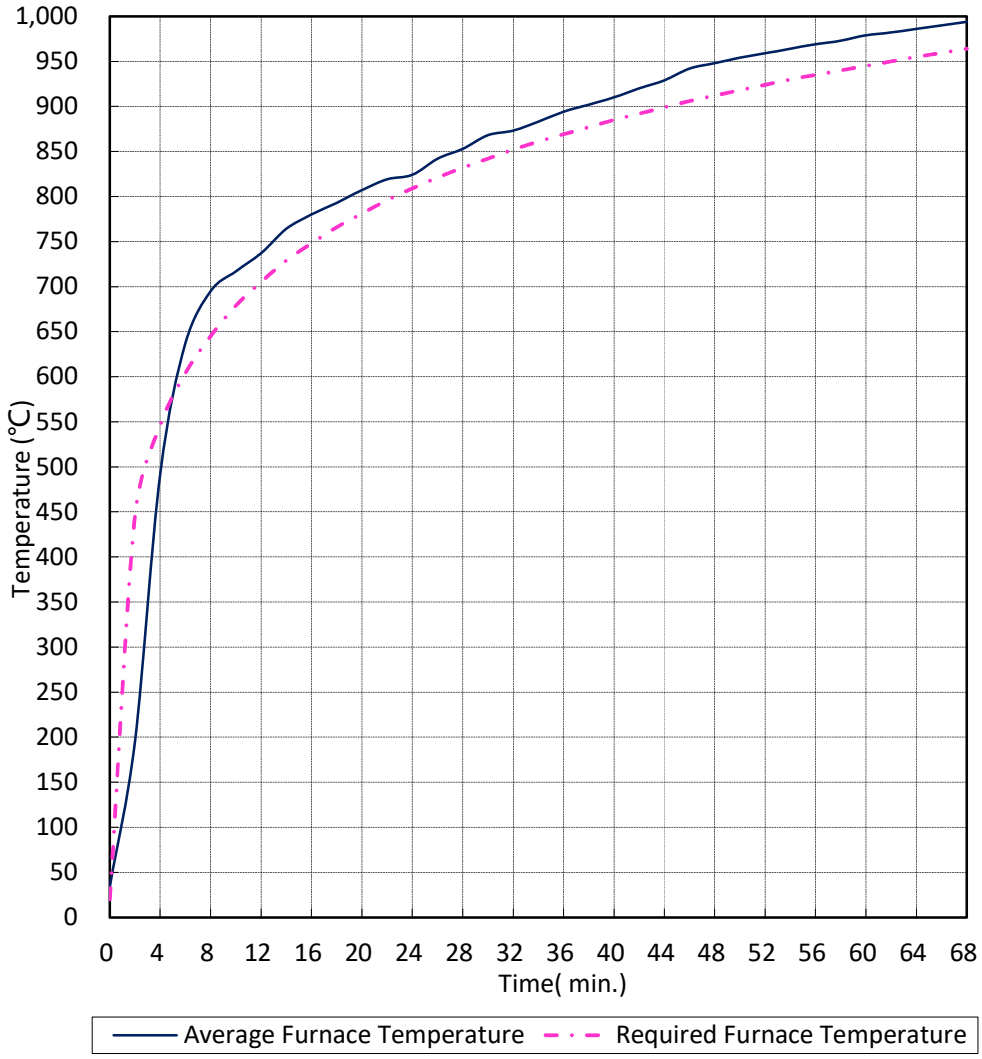
Graph for mean furnace temperature and temperature - time curve specified in the standard



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Unexposed surface temperatures

Doorset A

Time Mins	T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	Mean temperature (°C)
0	30	30	29	30	30	30
5	31	32	30	32	39	33
10	30	30	30	30	30	30
15	32	31	31	32	32	32
20	36	33	35	35	35	35
25	41	35	39	40	38	39
30	46	38	45	45	42	43
35	52	45	50	50	47	49
40	58	54	55	55	51	55
45	62	59	59	59	55	59
50	67	61	63	63	59	63
55	70	60	67	67	62	65
60	74	63	70	70	65	68
65	77	66	73	72	68	71
68	79	63	75	73	68	72

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

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	31	32	30	30	32	31	29	29	27	30
5	32	38	35	30	38	32	30	33	31	31
10	31	35	33	29	34	33	31	30	33	32
15	32	35	34	30	37	40	37	28	33	34
20	35	38	37	33	41	43	46	28	34	35
25	39	44	41	38	46	46	50	29	35	34
30	44	50	44	42	50	47	54	31	35	34
35	49	57	48	47	55	47	55	32	36	34
40	53	63	52	52	60	45	58	34	37	34
45	57	67	55	56	64	47	60	35	39	35
50	61	72	59	59	68	44	63	36	40	35
55	63	75	62	63	70	47	66	37	42	34
60	66	78	65	67	73	49	70	38	45	33
65	69	81	67	69	76	51	76	39	47	34
68	69	83	68	70	76	51	79	39	49	34

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

Doorset B

Time Mins	T16 (°C)	T17 (°C)	T18 (°C)	T19 (°C)	T20 (°C)	Mean temperature (°C)
0	30	31	32	32	34	32
5	33	33	33	34	36	34
10	30	31	34	34	35	33
15	32	32	36	34	36	34
20	36	35	40	37	39	37
25	40	40	45	45	42	42
30	42	45	51	49	46	47
35	47	50	56	82	51	57
40	50	55	61	84	56	61
45	53	60	66	91	61	66
50	58	64	70	91	65	70
55	61	68	74	90	70	73
60	64	73	78	80	73	74
65	66	77	82	80	76	76
68	67	78	83	80	78	77

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Test Report

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Report Date: 2021-08-13

Unexposed surface temperatures

Time Mins	T21 (°C)	T22 (°C)	T23 (°C)	T24 (°C)	T25 (°C)	T26 (°C)	T27 (°C)	T28 (°C)	T29 (°C)	T30 (°C)
0	34	35	31	27	28	29	32	27	31	28
5	34	36	33	28	49	63	66	32	36	30
10	34	35	32	28	64	78	91	40	35	30
15	35	35	34	30	70	82	98	54	35	27
20	38	36	36	33	70	83	96	63	40	24
25	42	39	39	44	67	70	90	55	45	16
30	46	45	39	50	74	71	86	56	50	15
35	50	49	41	52	72	76	71	62	56	20
40	54	53	43	55	71	77	68	58	62	26
45	58	56	44	59	73	78	67	58	65	24
50	61	60	43	61	78	81	67	57	70	25
55	65	63	46	62	96	78	70	56	74	29
60	70	64	49	65	128	86	77	59	77	46
65	73	67	50	70	140	87	77	61	80	58
68	75	68	50	74	166	86	79	62	81	60

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

Horizontal Deflection (Positive values indicate movement into the furnace)

Doorset A

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	1	0	0	2	0	0	-2
20	0	0	0	-2	-2	0	-13
30	0	0	0	0	-2	-2	-10
40	0	3	0	0	-5	0	-9
50	1	2	2	0	0	0	-8
55	1	3	2	0	-2	0	-10
60	0	3	5	0	0	0	-5
68	0	2	5	0	0	3	-5

Doorset B

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	-6	0	2	0	-5	-2	-3
20	-7	-2	5	-3	-8	0	-3
30	-6	-3	5	-6	-8	0	-3
40	-5	-2	5	-4	-7	1	-2
50	-5	-3	5	-5	-7	1	0
55	-5	-2	5	-5	-7	1	0
60	-5	0	5	-5	-5	2	3
68	-7	0	6	-5	-5	5	-1

Door Closer Closing Force

Door Closer Closing Force			
Doorset	Highest gauge reading (N)	Distance (m)	Moment (N.m)
Doorset A	58.3	0.70	41.7
	59.1	0.70	
	61.2	0.70	
Doorset B	60.1	0.70	41.8
	60.4	0.70	
	58.6	0.70	

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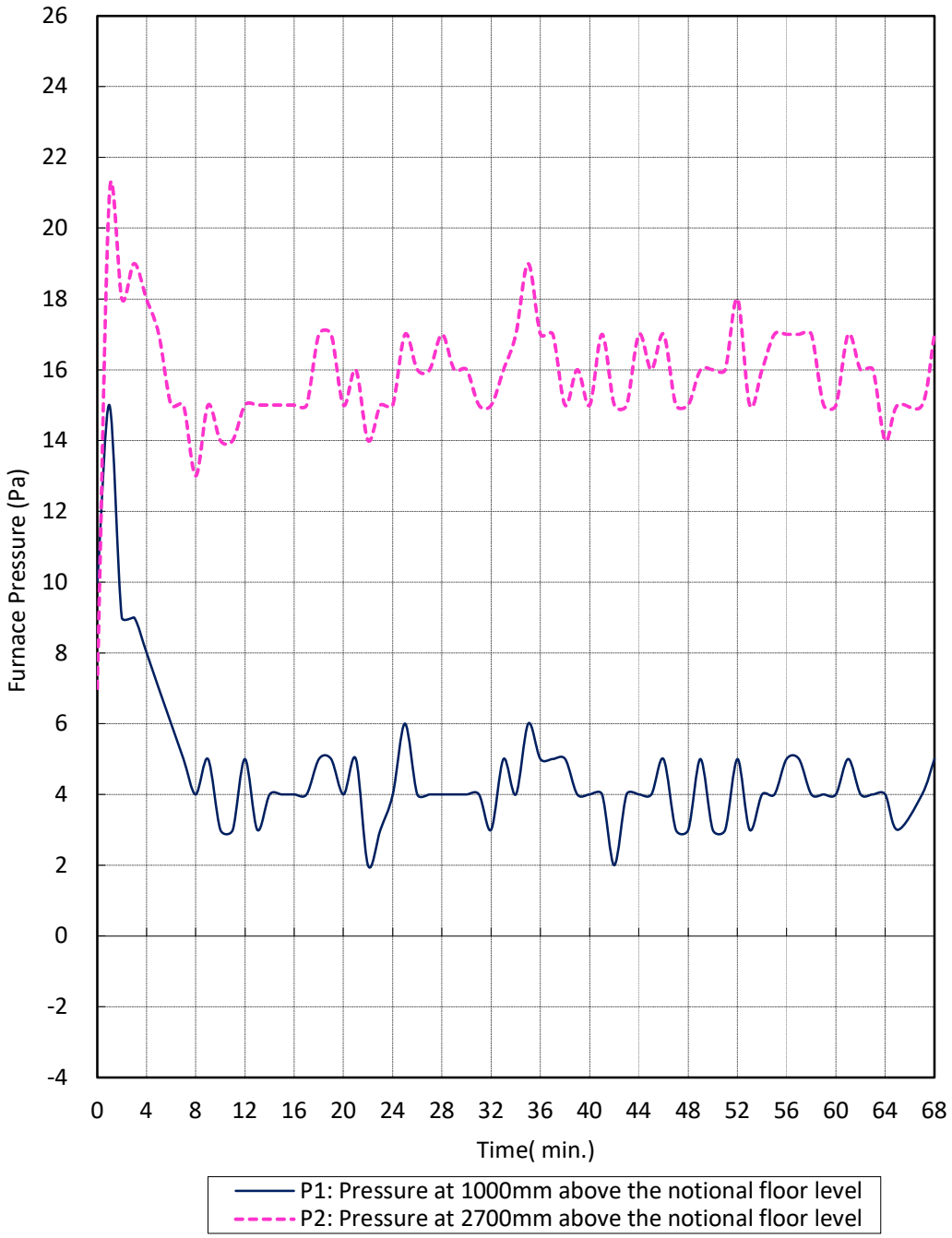
Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

Furnace pressure



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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

SECTION 11
PHOTOGRAPHS

Photo No. 1
Exposed Side Prior to the Fire Test

Photo No. 2
Unexposed Side Prior to the Fire Test

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

Photo No. 3
Unexposed Side after 10 Minutes

Photo No. 4
Unexposed Side after 40 Minutes

Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

Photo No. 5
Unexposed Side after 68 Minutes

Photo No. 6
Exposed Side of Doorset A after 68 Minutes

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Test Report

Report No.: 210609086GZU-001
Report Date: 2021-08-13

Photo No. 8
Exposed Side of Doorset B after 68 Minutes

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SECTION 12
REVISION LOG

Revision No.	Date	REVISION	Reviser	Reviewer
0	2021-08-11	Original Report Issue	/	/
1	2021-11-16	New model L700 was evaluated and added as requested	Kevin Pan	Harrison Li

Note: The report 210609086GZU-001 with revision No.0 will be replaced with No.1 report, it will be effective from 2021-11-16, and the revision No.0 report will be invalid.

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