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TL-827

Report Number: J240313001-1

EN 1634-1:2014/A1:2018

Fire Resistance Test for Doorset incorporating Building Hardwares

A report to:

Guangdong Jinlian'an Technology Co., Ltd.

Issue Date:	May 23, 2024
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1. SUMMARY

Product:	Fire-resisitance doorset with building hardwares
Manufactured by:	Guangdong Jinlian'an Technology Co., Ltd.
Model:	Door closer: J-095

The performance of the specimen was judged against the criteria for integrity and insulation, as required by EN 1634-1:2014/A1:2018, and the results obtained were as follows:

Integrity (E)	Sustained flaming	183 min no failure
	Gap gauge	183 min no failure
	Cotton pad	Not evaluated
Insulation (I_2)	Door leaf	24 min
	Door frame	97 min

The test was discontinued after a period of 183 minutes at request of the sponsor.

2. SIGNATURES

Test performed by:

Singh Zhang

Name: Singh Zhang
Date: 23-May-24
Title: Project Engineer
KAS Quality Service

Report authorised by:

Credy Chen

Name: Credy Chen
Date: 23-May-24
Title: Technical Manager
KAS Quality Service

3. CONTENTS

4. TEST DETAILS

Applicant Information	
Applicant Name:	Guangdong Jinlian'an Technology Co., Ltd.
Applicant Address:	New Central District of Jinli Town, Gaoyao District, Zhaoqing City

Sample Information	
Product:	Fire-resisitance doorset with building hardwares
Trade Mark:	/
Model and/or type reference:	Door closer: J-095
Manufacturer:	Guangdong Jinlian'an Technology Co., Ltd.
Manufacturer Address:	New Central District of Jinli Town, Gaoyao District, Zhaoqing City
Sample ID:	S240313001-01
Date of receipt of test samples:	Apr 15, 2024
Situation of receipt samples:	Good

Testing Information	
Standard:	EN 1634-1:2014/A1:2018 & EN 1363-1:2020
Non-standard method or requirement:	/
Testing Laboratory name:	KAS Quality Service (Guangzhou) Co., Ltd.
Address:	Chenziwei, Xinsha Village Committee, Muzhou Town, Xinhui District, Jiangmen, Guangdong 529143, China.
Date (s) of performance of tests:	Apr 17, 2024
Other reports to be used in conjunction with this report:	/

5. TEST OBJECTIVE

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, to determine 180 minutes fire resistance performance of a single leaf metal doorset, which incorporated various items of building hardware.

The test utilised the general principles for fire resistance testing given in EN 1363-1:2020 Fire resistance tests Part 1: General Requirements.

The specific purpose of the test was to evaluate the effects of the inclusion of the various items of building hardware into a previously tested doorset construction. Because of this, no direct field of application for the doorset is included in this report.

6. TEST SPECIMEN

A set of doorset sample was submitted to KAS directly from the sponsor. Sample was received at KAS on Apr 15, 2024.

6.1 Single leaf metal doorset:

The single leaf metal doorset had overall nominal dimensions of 2100 mm high x 1000 mm wide x 100 mm thick. The doorset incorporated a single door leaf of overall dimensions 2050 mm high x 913 mm wide x 45 mm thick, which comprised of a core of 40 mm thick Fire-resistant cotton, and sandwiched by 0.8 mm thick Galvanized steel sheet on both sides. The door leaf stiffeners were comprised of 30 x 40 x 2.75 mm thick Galvanized steel plate.

The door leaf was hung within the door frame by three stainless steel butt hinges ‘LIKCOO / SS002’. The door leaf was provided with a lockset ‘KinLong / SSN12730’ which was incorporated a set of lever handle and a 70 mm long cylinder. The door leaf was provided with a door closer ‘J-095’, that was supplied by ' Guangdong Jinlian'an Technology Co., Ltd.’, surface mounted on the right top of the unexposed side of the door leaf. The lockset was latched but unlocked during the test.

The test doorset was builded into a specimen support system according to manufacturer's instruction by KAS. The test construction was shown in Appendix A, Figure A.1. The doorset was opening away from the heating conditions of test.

Table 1 Test specimen description

Refer to Figure B.1 to B.2, unless stated otherwise, all values are nominal, and all information in Table 1 is supplied by the client.

Door Leaf	Type	Single leaf single swing steel doorset	
Door Leaf	Nominal Size	913 mm x 2050 mm x 45 mm *	
	Facing	Material:	0.8 mm thick Galvanized steel plate
	Core	Material:	Fire-resistant cotton
		Thickness:	40 mm
	Stiffener	Material:	Galvanized steel plate
		Size:	30 x 40 x 2.75 mm
Door Frame	Material:	1.2 mm Galvanized steel plate	
	Rebate:	20 mm *	
	Nominal Size:	2100 mm x 1000 mm x 100 mm *	
Hardware	Hinge	Brand:	LIKCOO
		Model:	SS002

		Material:	Stainless steel 304
		Size:	3 nos. of 4" x 3" x 3 mm *
		Supplier:	LIKCOO LOCKS CO.LTD
	Lockset	Brand:	KinLong
		Model:	SSN12730
		Body size:	24 x 235 x 89mm
		Status during the test:	Latched but unlocked during the test *
	Lever handle	Brand:	KinLong Virtues
		Model:	SSN12730
		Material:	304 stainless steel
		Size:	54 x 141 x 60mm
	Cylinder	Brand:	KinLong
		Model:	SSN12730
		Material:	304 stainless steel
		Size:	70 mm
		Supplier:	Guangdong Kinlong Hardware Products Co., Ltd.
		Protection case material:	304 stainless steel
		Protection case size:	54 mm
	Door closer	Supplier	Guangdong Jinlian'an Technology Co., Ltd
		Model:	J-095
		Material:	Aluminum
		Size:	233 x 62 x 42 mm
		Location:	Installed at the unexposed side of door leaf

Specimen Supporting Construction

1. Masonry Wall		
Density	:	1980 kg/m^3
Thickness	:	200 mm
2. Mortar		
Material	:	Cement: Sand
Mix Ratio	:	1:4

* Verified by the laboratory before the test;

Measured by the test laboratory.

After installation, the specimens were stored in the test laboratory. Throughout this period of the storage, both the temperature and relative humidity of laboratory were measured and recorded as being within a range of from 31.8 °C to 34.0°C and 45% to 50% respectively.

7. TEST EQUIPMENT AND PROCEDURE

The test was conducted in accordance with the procedure specified in EN 1634-1:2014/A1:2018. The ambient temperature of the area was measured and recorded at comment of test. The test data were shown in Table 3.

7.1 Furnace Temperature Control

The furnace opening size is 3.4 x 3.4 m. 9 mineral insulated thermocouples, which were distributed uniformly in the furnace and were kept at 100 ± 50 mm away from the exposed surface of test specimen, were provided to monitor the mean temperature of the furnace.

The mean temperature of the furnace was controlled as close as the standard temperature/time curve specified in Clause 5.1 of EN 1363-1:2020.

The locations and reference numbers of the furnace thermocouples were shown in Figure 1.

7.2 Furnace Pressure Control

Two pressure sensors were provided to monitor and control the furnace pressure after the first five minutes of testing the furnace atmospheric pressure so that it complied with the requirements of Clause 5.2 of EN 1363-1:2020. The pressure condition was assumed a linear pressure gradient of 8.5 Pa per 1 m and a neutral pressure axis at a height of approximately 0.5 m above the notional floor. The pressure at the top of test specimen was controlled within 20 Pa.

The locations and reference numbers of the pressure sensor were shown in Figure 1.

7.3 Unexposed Surface Temperature Monitoring

The unexposed face temperature of the specimen was monitored by thermocouples as follows:

Thermocouples 1 to 5:	At five positions on the unexposed face of the specimen, one approximately at the centre and one at the approximate centre of each quarter section of specimen.
Thermocouples 6 to 9:	At four positions on the unexposed face of the door leaf, four approximately at 100 mm from the door leaf top corner and two at mid height.
Thermocouples 10 to 13:	At four positions on the unexposed face of the door frame, two positioned at approximated 50 mm from each vertical edge of top frame, and two at mid-height of vertical frames.

The locations and reference numbers of various unexposed surface thermocouples were shown in Figure 4.

7.4 Integrity Monitoring

Cotton pads and gap gauges were available to evaluate the impermeability of specimen to hot gases. The occurrence of sustained flaming more than 10 s on the unexposed face was also checked to determine compliance with the integrity criterion.

7.5 Deflection of specimen

The horizontal deflection at recommended positions of the specimen was measured throughout the test by means of a straight steel ruler paralleled to the unexposed face via a taut fine steel wire. Recommended positions for measuring deflection were shown in Figure 3.

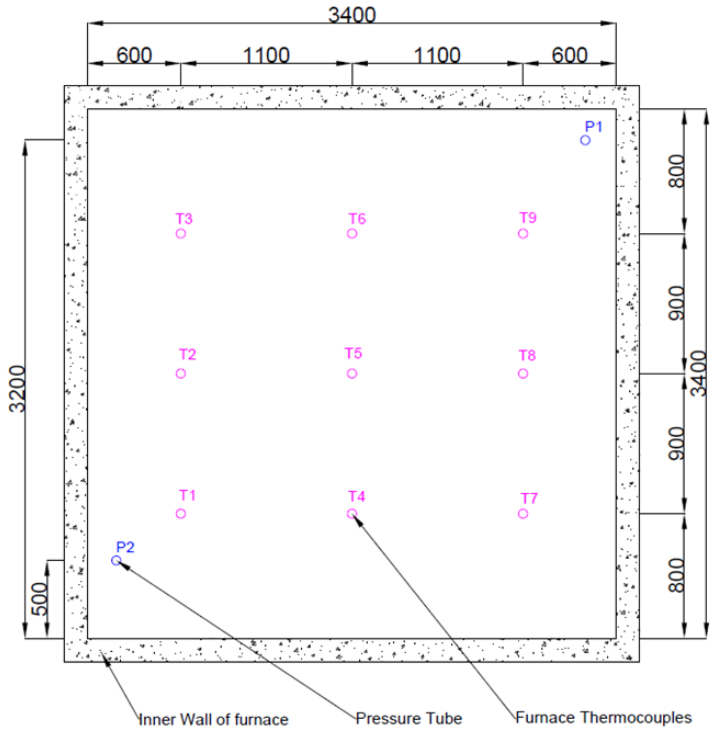


Figure 1 Location of Furnace Thermocouples and Pressure Sensors

8. TEST RESULT

8.1 Pre-test examination and preparation

8.1.1 Gap measurements

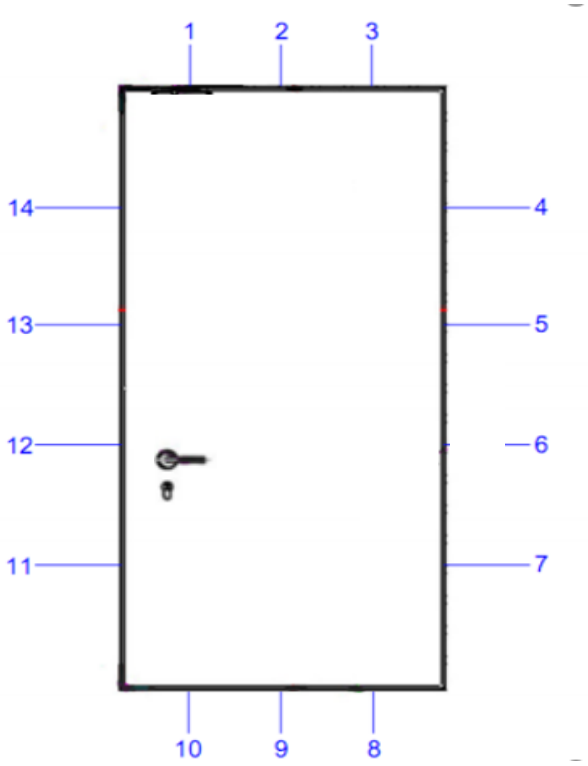


Figure 2 Initial Clearance Measurement Positions (View from unexposed side)

Initial Clearances at positions													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.5	1.7	1.5	1.5	1.4	1.5	1.7	1.7	2.0	1.5	1.7	1.2	1.4	1.4

All dimensions are in mm.

8.1.2 Closing force measurements

Prior to the fire resistance test, the doorset were subjected to 25 times manually operated opening and closing and measured the closing force according to Clause 10.1.3 of EN 1634-1.

Doorset	Closing force
Single door	21.7 N

8.2 Observations

Observations made during the test are given in Table 2 and unless stated were the unexposed face.

Table 2 Observations

Time mm: ss	Observations
0:00	The test commences.
2:00	Smoke released from left and right edge of doorset.
25:00	**The average temperature rose more than 140°C measured by thermocouple No.1-5; Insulation failure had occurred.**
28:13	The fire sealant flow out from the right edge of doorset. The door leaf deformed into the furnace.
40:23	Liquid flow out from the door closer.
41:00	The surface of doorset began to turn black.
183 :08	No integrity failure had occurred. The test was terminated after a period of 183 minutes at request of the sponsor.

8.3 Deflection

The horizontal deflection at recommended positions of the specimen was measured during the test.

Recommended positions for measuring deflection were shown in Figure 3. And the test data was shown in below tables.

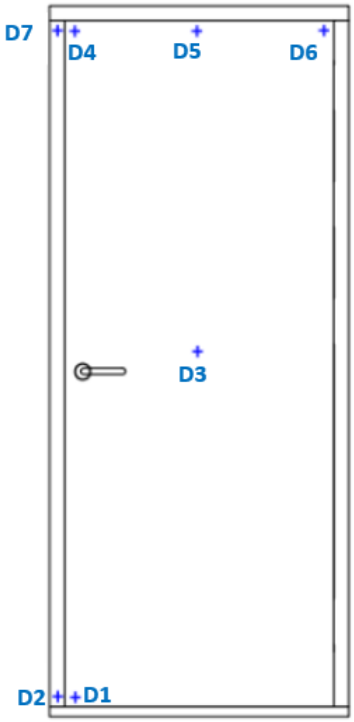


Figure 3 Positions for measuring horizontal deflection (View from unexposed side)

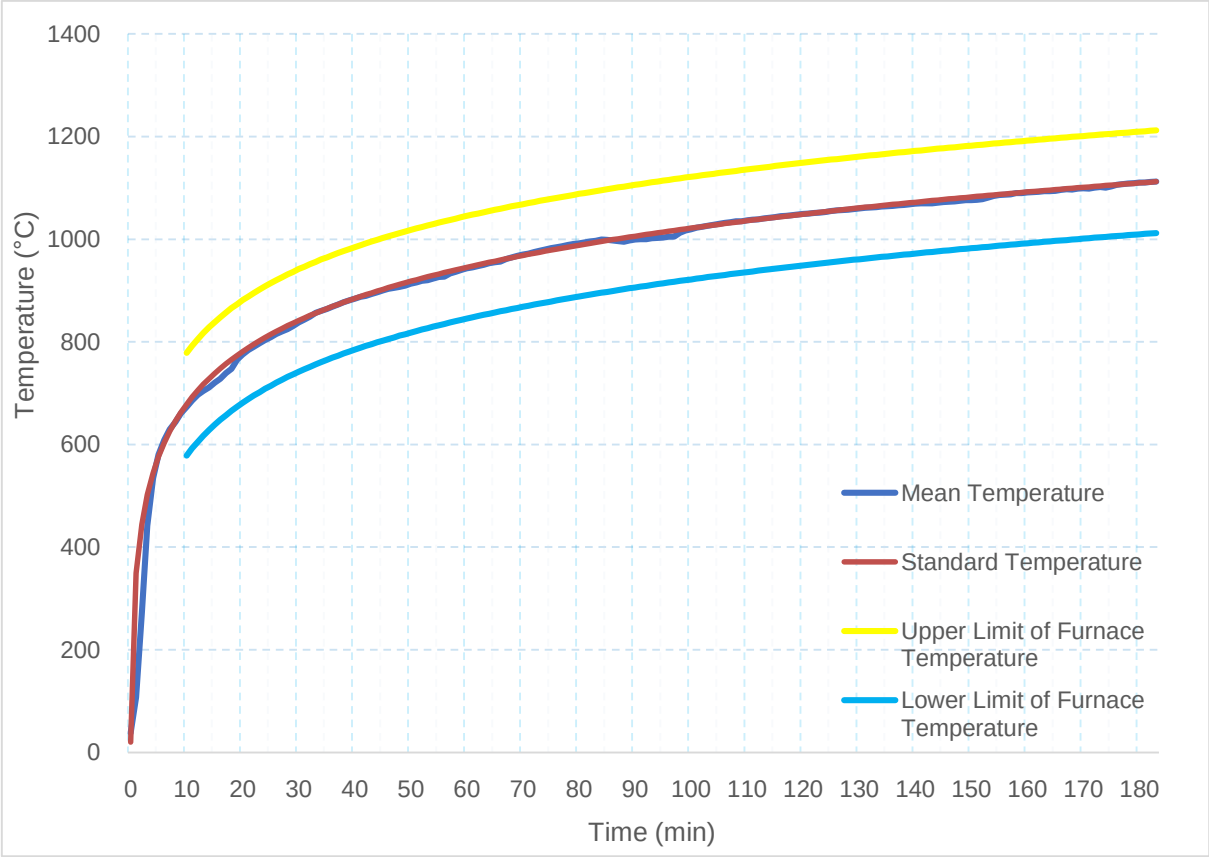
Time	Deflection at positions (mm)						
Minutes	D1	D2	D3	D4	D5	D6	D7
0	0	0	0	0	0	0	0
30	-20	-3	26	8	-10	5	6
60	-20	-3	16	3	-10	6	11
90	-22	-3	16	3	-10	7	11
120	-10	13	14	5	-5	2	6
150	-5	17	14	5	30	11	1
180	-5	17	14	5	30	11	1

Positive deflection indicate movement towards to the heat condition.

8.4 Temperature Recorded

8.4.1 Furnace temperature

The mean furnace temperature recorded was plotted against time in Graph 1 with the specified curve for comparison.



Graph 1 Furnace Mean Temperature / Time Curve

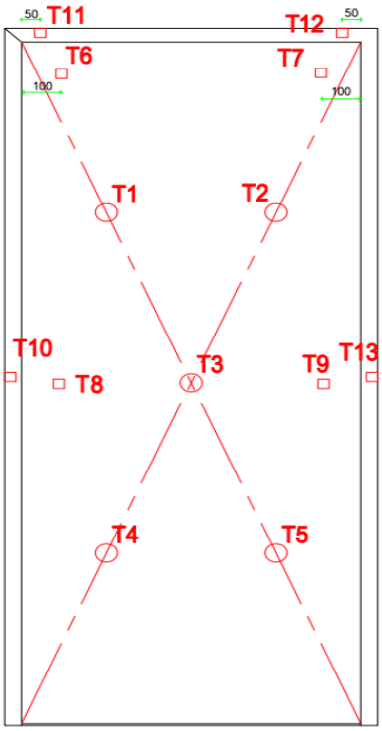
The mean furnace temperature and standard temperature was recorded in Table 3 for comparison.

Table 3 Furnace mean temperature and standard temperature (Unit: °C)

Time Min	Mean Temp.	Standard Temp.	Diff%	Ambient Temp.
0	38.0	20.0	/	31.8
20	775.6	781.4	-4.6	32.5
40	884.3	884.7	-2.2	32.5
60	943.2	945.3	-1.5	33.0
80	992.3	988.4	-1.1	33.4
100	1019.4	1021.8	-0.9	33.9
120	1049.2	1049.0	-0.7	34.0
140	1069.3	1072.1	-0.6	34.0
160	1091.4	1092.1	-0.6	33.7
183	1112.4	1112.2	-0.5	34.0

8.4.2 Unexposed face temperatures

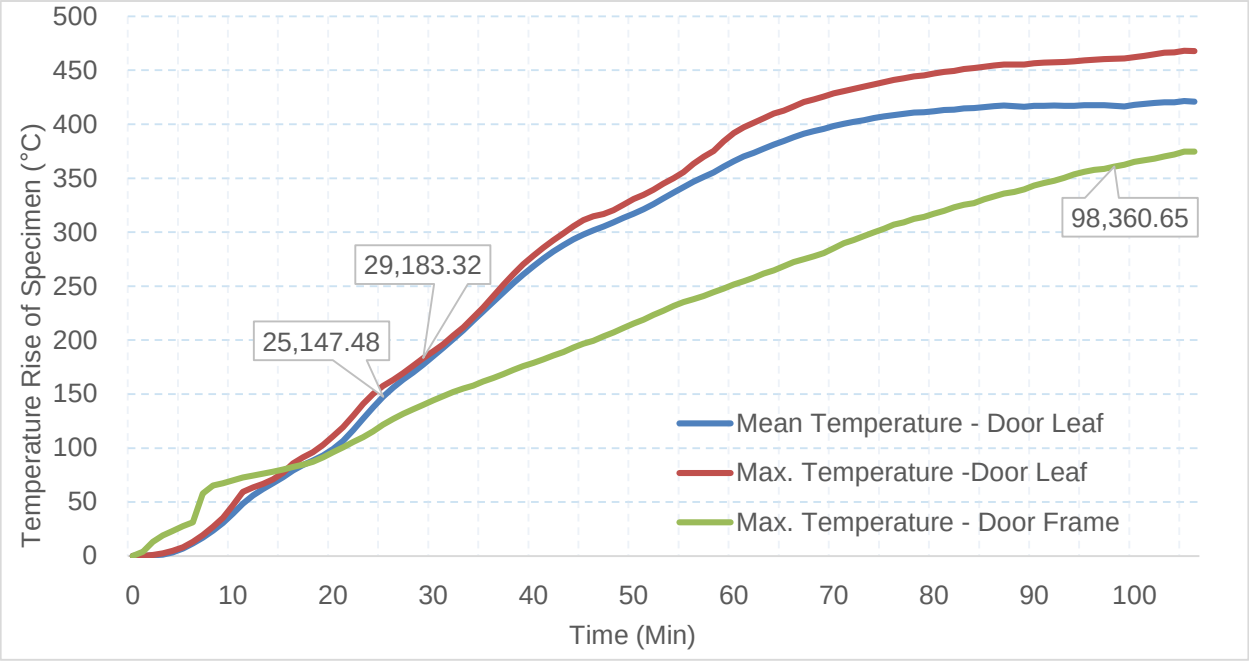
The locations and reference numbers of various unexposed surface thermocouples were shown in Figure 4.



T1 to T5 : to determine Doorset Door Leaf mean temperature rise.
T1 to T9 : to determine Doorset Door Leaf maximum temperature rise.
T10 to T13 : to determine Doorset Door Frame maximum temperature rise.

Figure 4 Locations and reference numbers of thermocouple on unexposed surface

The mean and maximum temperatures raise of the unexposed face of the doorset were shown in Graph 2.



Graph 2 The mean and maximum temperatures raises/time curve of doorset

The door leaf mean temperature rise for insulation (140°C rise) was exceeded after 25 mins. The door leaf maximum temperature rise for insulation (180°C rise) was exceeded after 29 mins. The door frame maximum temperature rise for insulation (360°C rise) was exceeded after 98 mins.

The individual temperatures recorded on the unexposed face of the doorset were shown in Table 4.

Table 4 Individual temperatures recorded on the unexposed face of the doorset

Area	Position at door leaf										
Time / Min	T1	T2	T3	T4	T5	T6	T7	T8	T9	Mean	Max
0	33.0	33.3	35.4	33.1	34.7	32.4	32.7	22.6	32.6	33.9	35.4
10	64.9	80.1	69.8	72.5	77.9	63.9	49.0	34.2	42.3	73.0	80.1
20	117.2	133.8	134.8	133.0	145.7	97.6	98.7	74.4	92.4	132.9	145.7
30	206.0	221.2	225.1	218.3	223.9	118.5	129.4	69.2	115.0	218.9	225.1
40	303.4	301.4	313.5	306.3	287.6	143.5	155.7	132.5	142.0	302.4	313.5
50	342.2	349.9	366.2	351.0	346.1	180.1	201.9	219.2	192.2	351.1	366.2
60	389.5	395.4	427.2	390.0	395.4	234.6	255.1	266.6	256.3	399.5	427.2
70	426.7	419.7	464.1	420.4	430.0	267.9	277.5	287.2	263.4	432.2	464.1
80	435.0	429.9	482.4	435.5	447.2	279.9	298.9	304.2	278.6	446.0	482.4
90	437.1	431.9	491.8	440.7	453.5	290.4	314.3	312.3	291.5	451.0	491.8
100	435.3	431.1	497.6	442.2	452.3	303.5	320.9	317.3	299.0	451.7	497.6
106	437.3	434.6	503.3	444.4	455.0	310.1	324.8	319.3	309.5	454.9	503.3

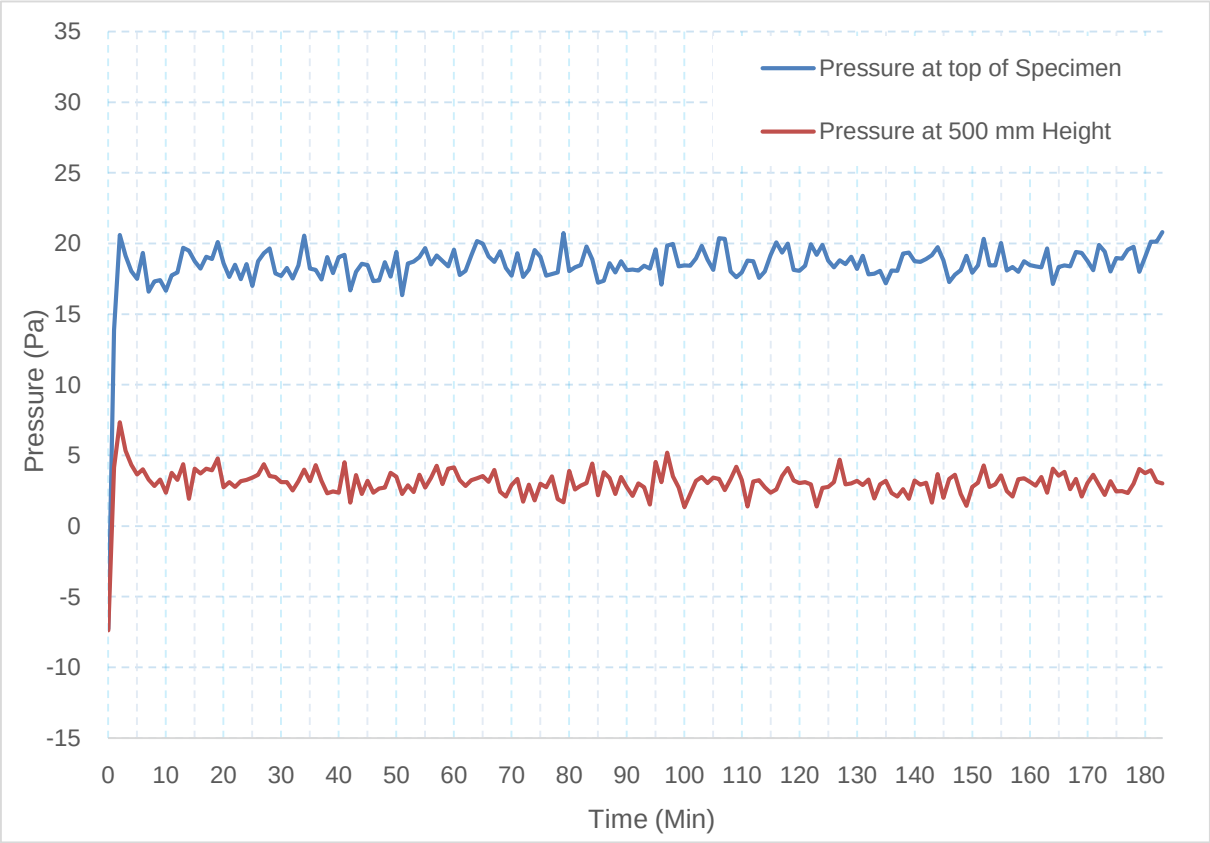
Area	Position at door frame				
Time / Min	T10	T11	T12	T13	Max
0	33.0	30.8	31.1	32.4	33.0
10	95.2	75.2	62.6	102.5	102.5
20	100.4	99.4	97.5	128.5	128.5
30	119.0	132.0	114.2	176.7	176.7
40	167.9	179.0	140.9	211.3	211.3
50	223.0	220.4	172.3	247.8	247.8
60	272.2	258.2	206.7	284.0	284.0
70	312.4	289.6	238.4	317.4	317.4
80	346.2	316.9	270.0	349.6	349.6
90	373.1	345.7	297.7	375.8	375.8
100	395.0	368.1	320.5	397.7	397.7
106	404.7	379.5	331.1	407.2	407.2

Note,

For safety reason, the unexposed temperature of doorset was only monitored for 106 minutes.

8.5 Furnace Pressure

The furnace pressure was recorded and shown in Graph 3.



Graph 3 Furnace Pressure / Time Curve

9. PERFORMANCE CRITERIA

The performance of the specimen was assessed against the criteria for integrity and insulation in accordance with Clause 11 of EN 1363-1:2020 and Clause 11 of EN 1634-1:2014+A1:2018. The performance criteria for failure were given as follow:

Integrity (E):

These are the times in completed minutes for which the test specimen continues to maintain its separating function during the test without:

a) causing the ignition of a cotton pad when applied; or

b) permitting the penetration of a gap gauge as follows:

i) whether the 6 mm gap gauge can be passed though the test specimen such that the gauge projects into the furnace, and can be moved a distance of 150 mm along the gap; or

ii) whether the 25 mm gap gauge can be passed though the test specimen such that the gauge projects into the furnace.

c) resulting in sustained flaming for a period of time greater than 10 seconds.

Insulation (I):

This is the time in completed minutes for which the test specimen continues to maintain its separating function during the test without developing temperatures on its unexposed surface which:

a) increase the average temperature above the initial average temperature by more than 140°C; or

b1) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180 °C; [Supplementary procedure - Classification I_1]

b2) increase at perimeter frame member of the doorset or openable window above the initial average temperature by more than 360 °C; and any other location (including the roving thermocouple) above the initial average temperature by more than 180 °C; [Normal procedure - Classification I_2]

The performance criteria ‘insulation’ shall automatically be assumed not to be satisfied when the ‘integrity’ criterion ceases to be satisfied.

10. TEST CONCLUSIONS

Product:	Fire-resisitance doorset with building hardwares
Manufactured by:	Guangdong Jinlian'an Technology Co., Ltd.
Model:	Door closer: J-095

Had been tested 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 and EN 1363-1:2020 Fire resistance tests Part 1: General Requirements.

by KAS Quality Service (Guangzhou) Co., Ltd. which is an IAS accredited Testing Laboratory (NO. TL-827).

at Chenziwei, Xinsha Village Committee, Muzhou Town, Xinhui District, Jiangmen, Guangdong 529143, China.

Conclusion:

The performance of the specimen was judged against the criteria for integrity and insulation, as required by EN 1634-1:2014/A1:2018, and the results obtained were as follows:

Integrity (E)	Sustained flaming	183 min no failure
	Gap gauge	183 min no failure
	Cotton pad	Not evaluated
Insulation (I_2)	Door leaf	24 min
	Door frame	97 min

The test was discontinued after a period of 183 minutes at request of the sponsor.

Limitation of result.

1. The results only relate to the behaviour of the specimen of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

2. 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, edge or end conditions other than those allowed under the field of direction application in the relevant test method was not cover by this report.

3. 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.

4. Decision rule for statement(s) of conformity is based on Binary Statement for Simple Acceptance Rule (w=0) of ILAC G8: 09/2019.

APPENDIX A SUPPORTING CONSTRUCTION

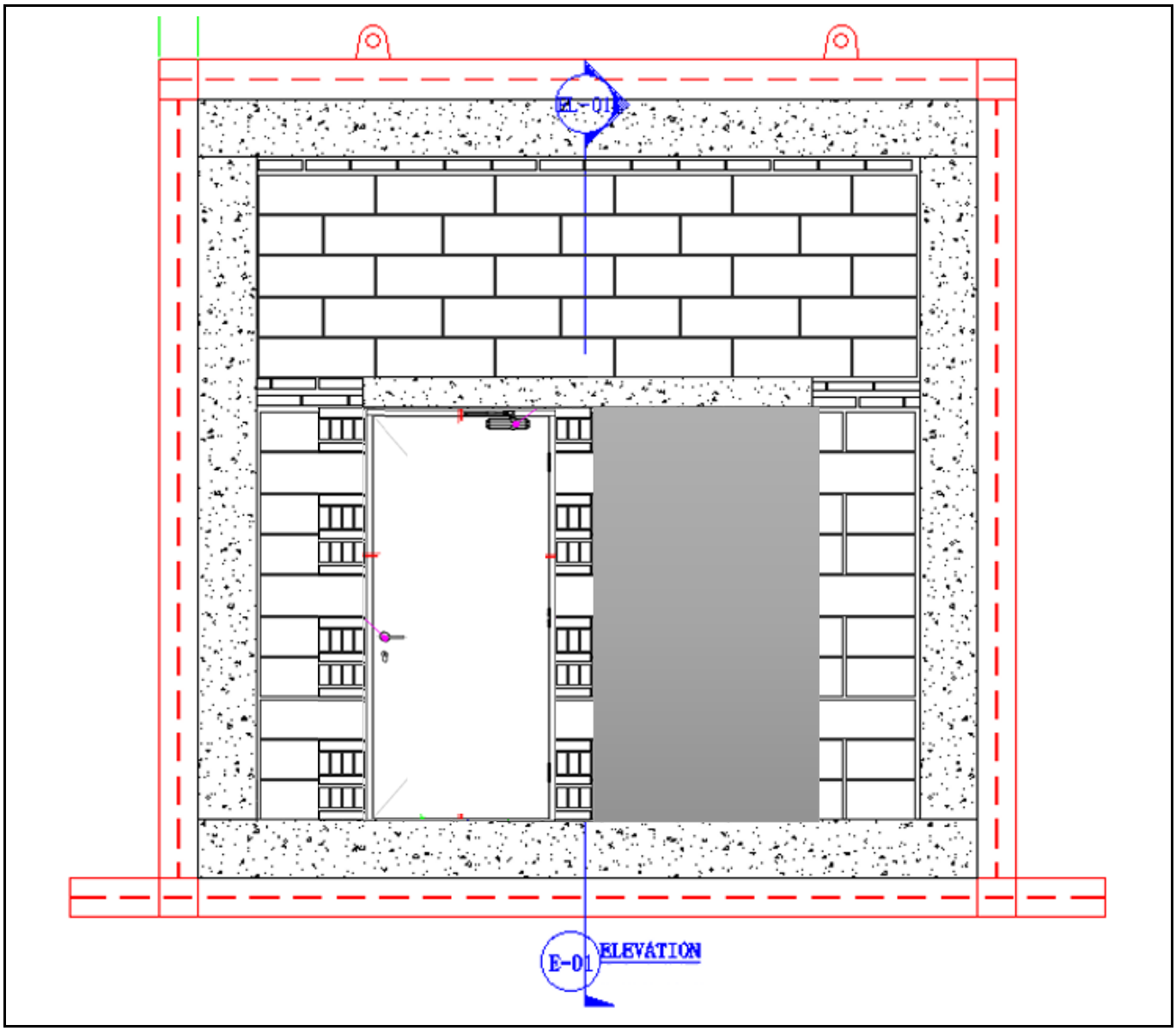


Figure A.1 Supporting Constructions Drawing (View from unexposed side)

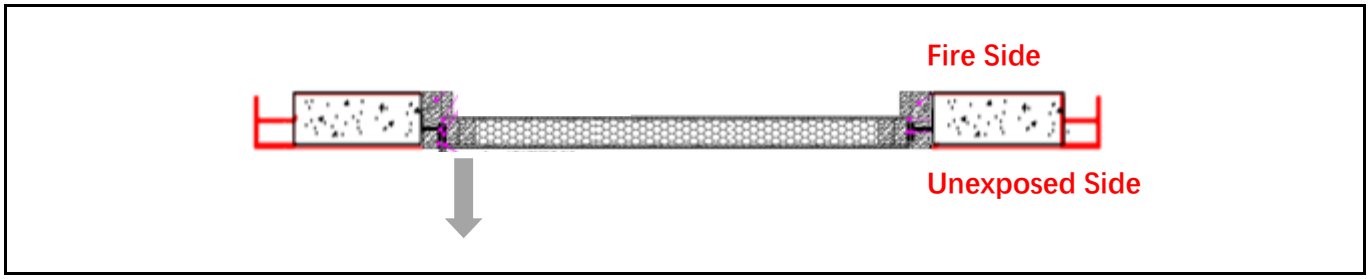


Figure A.2 Supporting Constructions Drawing (Plan view)

APPENDIX B TEST SPECIMEN CONSTRUCTION

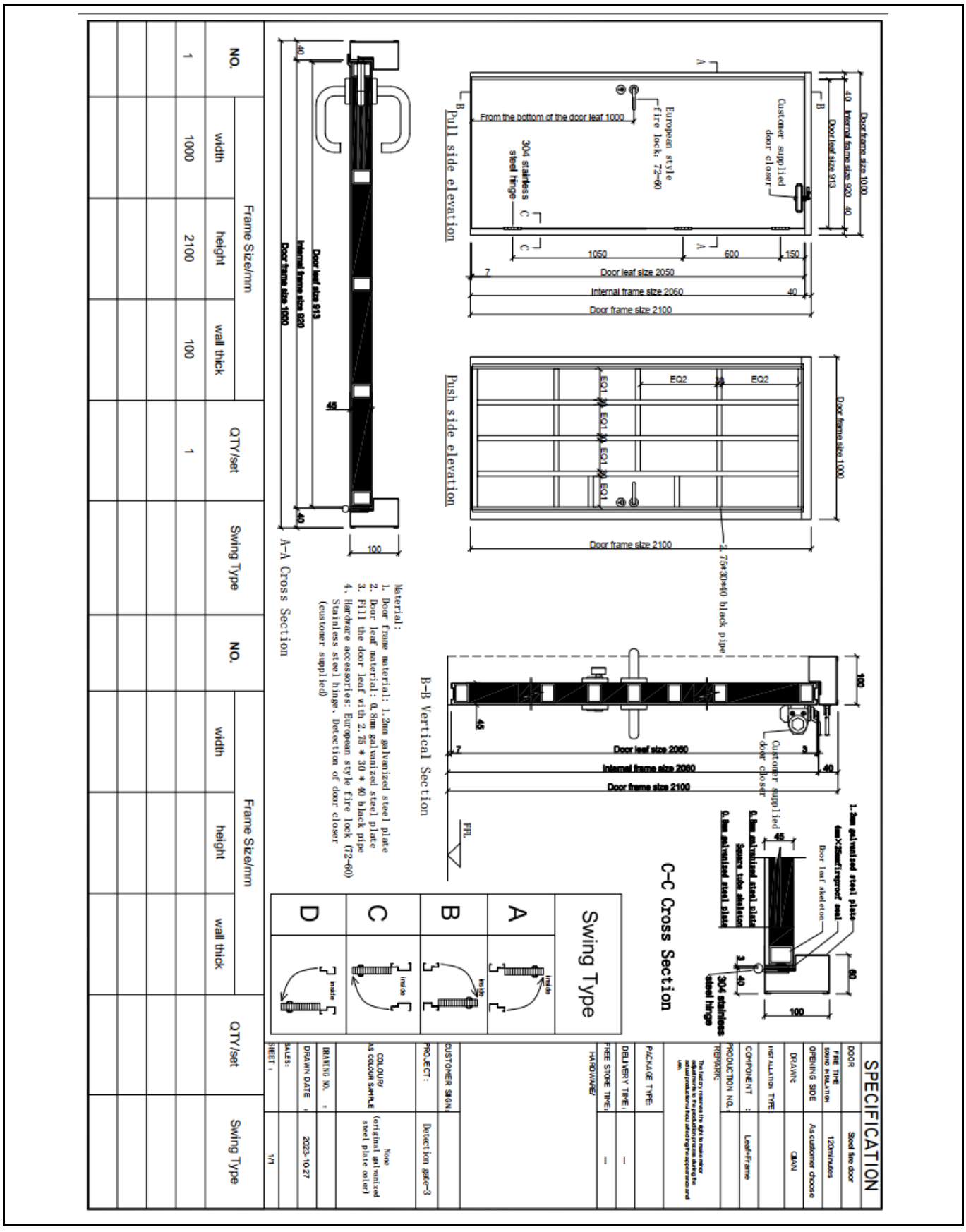


Figure B.1 Doorset drawing

序号	名称	材质	数量
1	机壳	ADC12	*1
2	中盖	ADC12	*2
3	中盖动密封圈	丁晴胶	*2
4	中盖静密封圈	丁晴胶	*1
5	滚针轴承	轴承钢	*2
6	齿轮垫片	铁	*2
7	齿轮	20CR	*1
8	调速阀	易车铁	*3
9	调速油芯动密封圈	丁晴胶	*2
10	活塞	20CR	*1
11	滤网	不锈钢	*1
12	单向阀	易车铁	*1
13	单向阀钢珠	铬钢	*2
14	端盖静密封圈	丁晴胶	*2
15	头盖	6061铝合金	*1
16	内弹簧	60硅	*1
17	弹簧	60硅	*1
18	调力螺母	铁	*1
19	调力螺杆	铁	*1
20	调力螺杆封密胶圈	丁晴胶	*1
21	尾盖	铁	*1
22	装饰盖板	不锈铁	*1
23	液压油	55#45	
24	调速阀弹簧	82B	*1

金连安门控

名称	J-095闭门器分解图	设计	李湛明	材料	数量	共 张
编号	J-095	制图	刁海平			第 张
日期	2023.7.17	审核		单位	mm	
		确认		比例	1:2	
				材料		
				部门		

Figure B.2 Door closer drawing

APPENDIX C TEST PHOTOGRAPHS

Unexposed face (Test before)

Exposed face (Test before)

After 30 min (Unexposed Side)

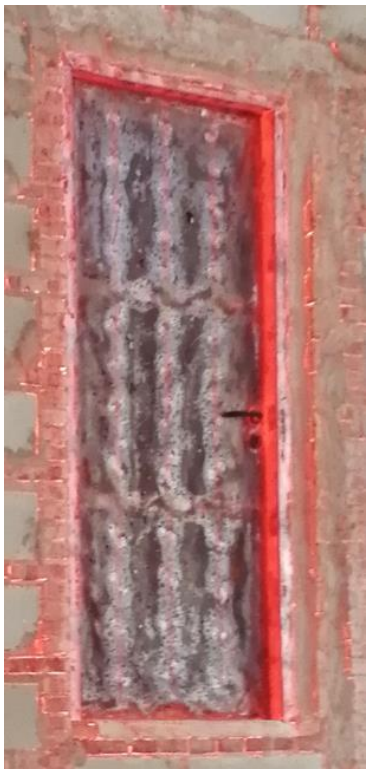
After 60 min (Unexposed Side)

After 90 min (Unexposed Side)

After 120 min (Unexposed Side)

After 150 min (Unexposed Side)

After 183 min (Unexposed Side)



After 183 min (Exposed Side)

REVISION HISTORY

Revision No.	Date	Changes	Author	Reviewer
Original	5/23/2024	First issue	Singh Zhang	Credy Chen

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The End of Report