Intertek

TEST REPORT

REPORT NUMBER: AU13014016-1
ORIGINAL ISSUE DATE: February 23, 2013

EVALUATION CENTER

Intertek Testing Services Ltd., Shanghai Jinqiao Branch
Building T52-8, No. 1201 Gui Qiao Road,
Jinqiao Development Area, Pudong District
Shanghai 201206

RENDERED TO

BESTKO Precision Limited
UNIT 303, BLOCK A, PO LUNG CENTRE,
11 WANG CHIU ROAD, KOWLOON BAY, HONG KONG

PRODUCT EVALUATED
Pivot Hinge
Model: WJ306

EVALUATION PROPERTY
Fire Resistance

Report of Testing Pivot Hinge in Wooden Door Assembly for compliance with the applicable requirements of the following criteria: *EN 1634-1:2008, Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware – Part 1: Fire resistance tests for doors, shutters and openable windows*.

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2 Introduction

Intertek Testing Services has conducted an evaluation for BESTKO Precision Limited to determine the fire resistance characteristics of the Pivot Hinge – WJ306 in Wooden Door Assembly. This test was designed to demonstrate evaluation on the Pivot Hinge of nine types including WJ306BL.80, WJ306BR.80, WJ306BL.60, WJ306BR.60, WJ306BSL.80, WJ306BSR.80, WJ306BSL.60, WJ306BSR.60 and WJ306. This evaluation began on January 27, 2013 and was completed on February 6, 2013.

The test was conducted in accordance with EN 1634-1:2008 "Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware – Part 1: Fire resistance tests for doors, shutters and openable windows".

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. Samples were not independently selected for testing. Samples were received at the Evaluation Center on January 27, 2013.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

Door	Type	Single Swing Wooden Door (Fully-insulated)
	Nominal Size	780 mm wide by 2061 mm high by 64 mm thick
Frame	Nominal Size	874 mm wide by 2118 mm high
Hardware	Latch	Euro Mortise Lockset , Model Number: S6072-01
	Pivot Hinges	Stainless Steel Pivot Hinge, Quantity: Two Model Number: WJ306

The sample ID number is S1301127.001- 002.

Specification of the series:

Model No.	Specification
WJ306	100x32x5+ 95x32x5mm
WJ306BL.80	100x32x5+ 95x32x5mm
WJ306BR.80	100x32x5+ 95x32x5mm
WJ306BL.60	90x26x5+ 85x26x4mm
WJ306BR.60	90x26x5+ 85x26x4mm
WJ306BSL.80	100x32x5+ 95x32x5mm
WJ306BSR.80	100x32x5+ 95x32x5mm
WJ306BSL.60	90x26x5+ 85x26x4mm
WJ306BSR.60	90x26x5+ 85x26x4mm

The largest size and the maximum thickness of the hinge is selected for the test to cover the other model provided that the configuration is same.

The drawings of the stainless steel pivot hinge, fire door assembly, and test wall construction can be found in Appendices A, B and C respectively. A comprehensive description of the stainless steel pivot hinge for certification is maintained on Intertek file.

4 Testing and Evaluation Methods

The test was conducted in accordance with EN 1634-1:2008 "Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware – Part 1: Fire resistance tests for doors, shutters and openable windows", and EN 1363-1:1999 "Fire Resistance Tests – Part 1: General Requirements".

The test assembly was installed in a steel restraint frame which allowed the sample to be moved in front of the furnace for the fire exposure. The test door was oriented to open into the furnace, and was built into a concrete masonry unit partition, with fully mortared joints. The nominal dimensions of the test wall were 3 m high by 3 m wide. The test measurement data was shown in Appendix D.

After positioning the assembly frame over the furnace opening, the burners were ignited and the timer was started when any of the furnace thermocouples exceeded 50°C. 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 Appendix D.

5 Testing and Evaluation Results

5.1. INTEGRITY

The assembly withstood the fire resistance test without passage of flame or gases hot enough to ignite cotton waste for 93 minutes. No through openings or penetrations were evident at the conclusion of the fire exposure portion of the test and the door latch remained engaged to the strike. During the 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 93 minutes.

5.2. INSULATION

Transmission of heat through the assembly during the fire resistance test did not raise the average temperature on the unexposed surface by more than 140°C, and did not raise the maximum temperature on the unexposed surface by more than 180°C. 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.

This assembly passed the insulation portion of the test of 93 minutes. A full set of test data is included in Appendix E, and photographs have been presented in Appendix F.

6 Conclusion

The pivot hinge – WJ306 and single wooden door assembly identified in this report has been tested in accordance with EN 1634-1:2008 "Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware – Part 1: Fire resistance tests for doors, shutters and openable windows". This test was designed to demonstrate evaluation on the Pivot Hinge of nine types including WJ306BL.80, WJ306BR.80, WJ306BL.60, WJ306BR.60, WJ306BSL.80, WJ306BSR.80, WJ306BSL.60, WJ306BSR.60 and WJ306.

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

Integrity	Sustained flaming	93 minutes
	Gap gauge	93 minutes
	Cotton pad	93 minutes
Insulation		93 minutes

The test was discontinued after a period of 93 minutes at the request of the sponsor.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by:
Star Shi
Engineer, Building Products

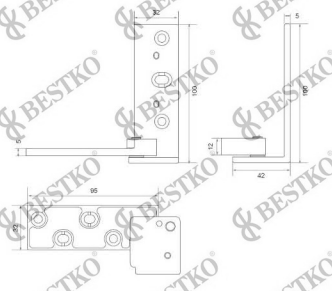
Reviewed by:
Sun Sun
Technical Supervisor, Building Products

7 Appendix A: Pivot Hinge Drawings

Model: WJ306
Description: Concealed Pivot 80kg

Image

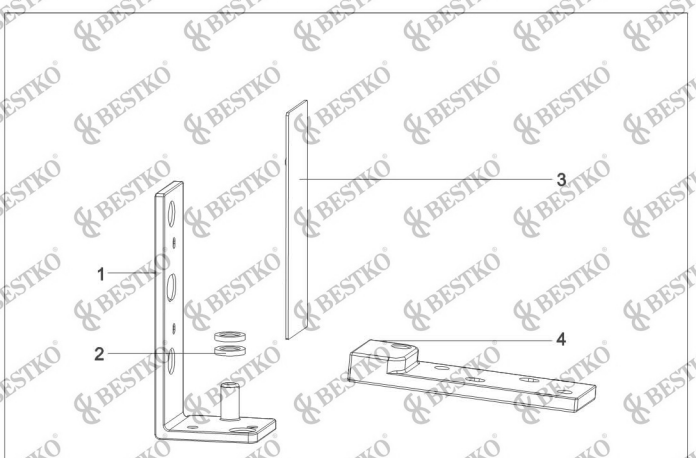
Dimension



Notch Preparation

Model of WJ306

Concealed Pivot - WJ306 (80kg loading)

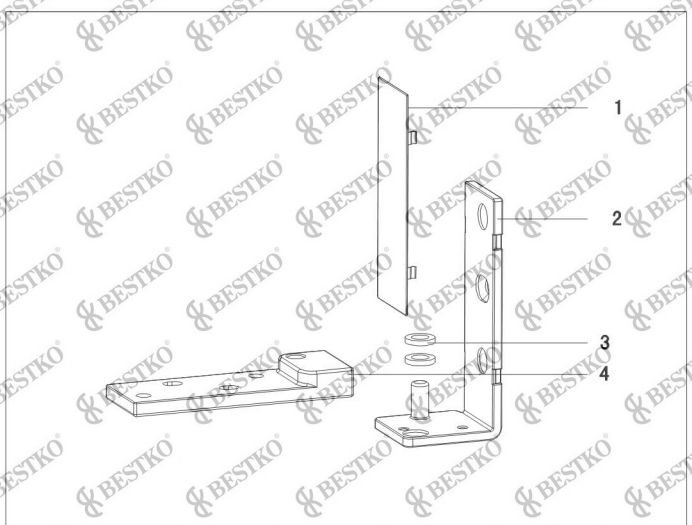


metal washer #2 on bottom pivot only

No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ302-1	pivot body (jamb side)	SUS304	2	
2	WJ305-3	metal washer	SUS420 (tempered)	2	
3	WJ305-4	cover plate	ABS	2	chrome
4	WJ302-2	pivot body (door side)	SUS304	2	

Model of WJ306

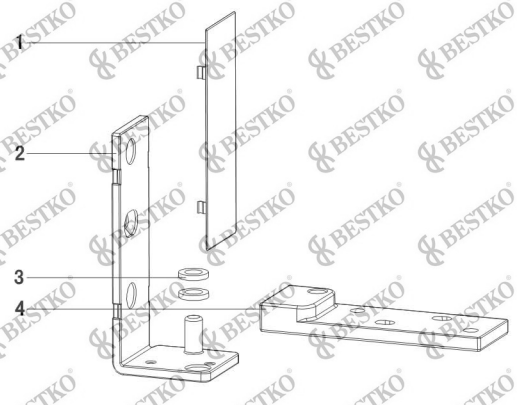
Concealed Pivot - WJ306BL.80 (80kg loading)



No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.80-2	cover plate	SUS304	1	
2	WJ306BL.80-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-11	metal washer	SUS420 (tempered)	2	chrome
4	WJ306AL.80-3	pivot body (door side)	SUS303	1	

Model of WJ306BL.80

Concealed Pivot - WJ306BR.80 (80kg loading)

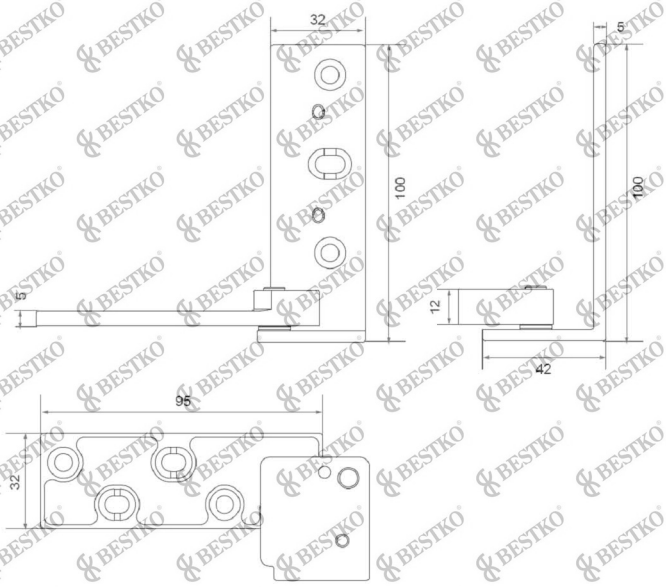


No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.80-2	cover plate	SUS304	1	
2	WJ306BR.80-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-11	metal washer	SUS420 (tempered)	2	chrome
4	WJ306AR.80-3	pivot body (door side)	SUS303	1	

Model of WJ306BR.80

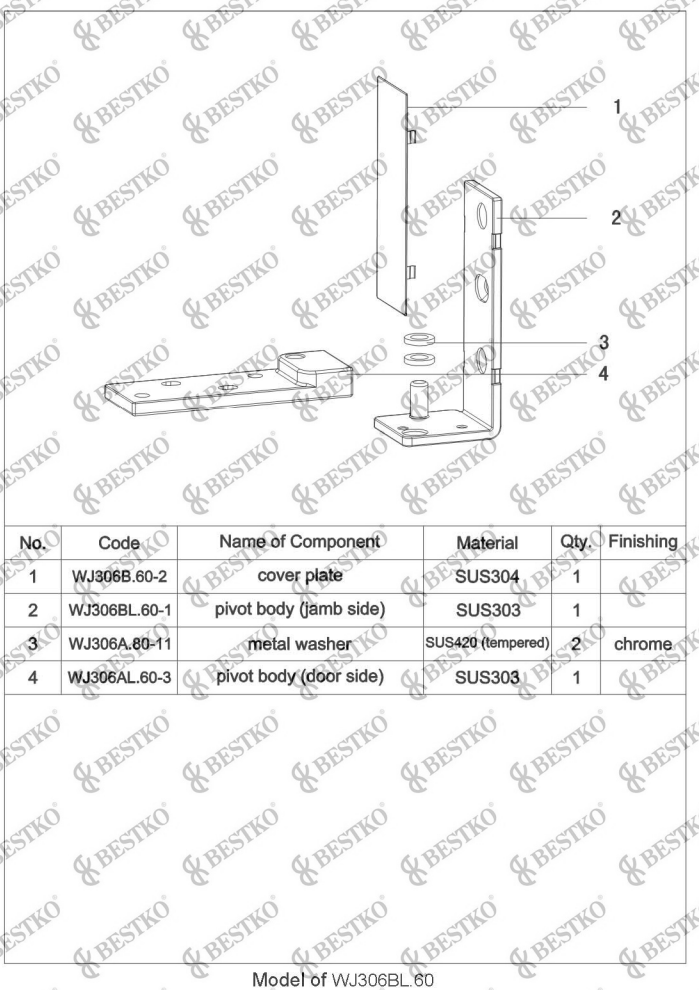
Dimension Drawing

Model	:	WJ306BL.80	WJ306BR.80
Description	:	Concealed Pivot	Concealed Pivot
Loading	:	80kg	80kg
Feature	:	Free Swing	Free Swing



Model of WJ306BL.80 and WJ306BR.80

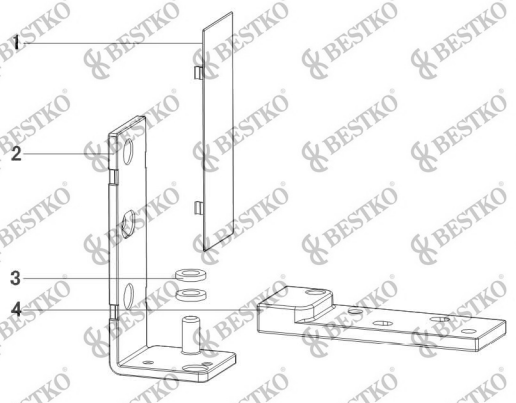
Concealed Pivot - WJ306BL.60 (60kg loading)



No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.60-2	cover plate	SUS304	1	
2	WJ306BL.60-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-11	metal washer	SUS420 (tempered)	2	chrome
4	WJ306AL.60-3	pivot body (door side)	SUS303	1	

Model of WJ306BL.60

Concealed Pivot - WJ306BR.60 (60kg loading)



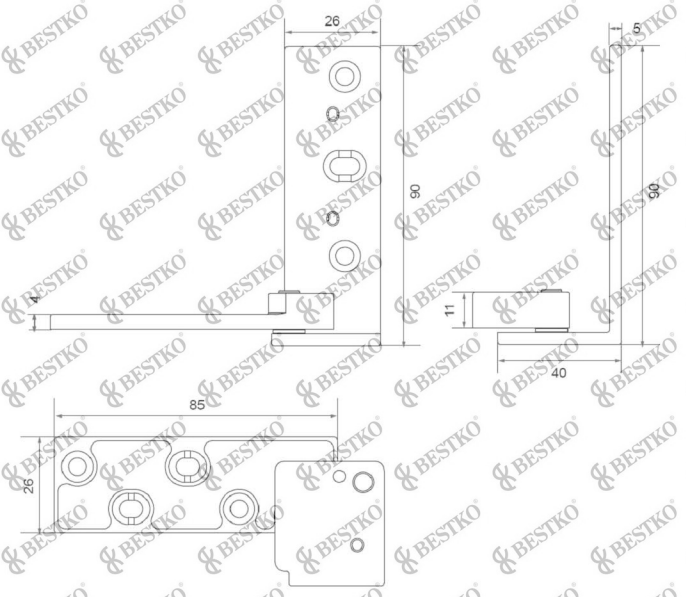
No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.60-2	cover plate	SUS304	1	
2	WJ306BR.60-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-11	metal washer	SUS420 (tempered)	2	chrome
4	WJ306AR.60-3	pivot body (door side)	SUS303	1	

Model of WJ306BR.60

BESTKO

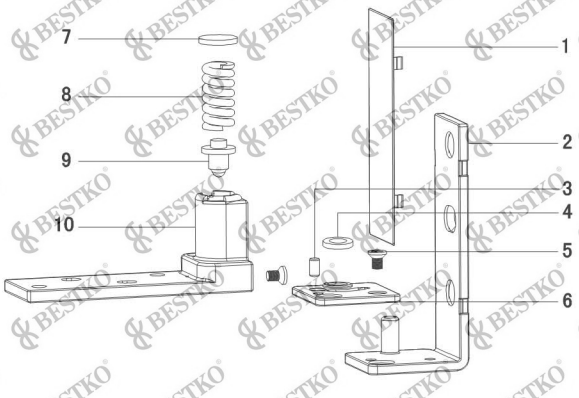
Dimension Drawing

Model	:	WJ306BL.60	WJ306BR.60
Description	:	Concealed Pivot	Concealed Pivot
Loading	:	60kg	60kg
Feature	:	Free Swing	Free Swing



Model of WJ306BL.60 and WJ306BR.60

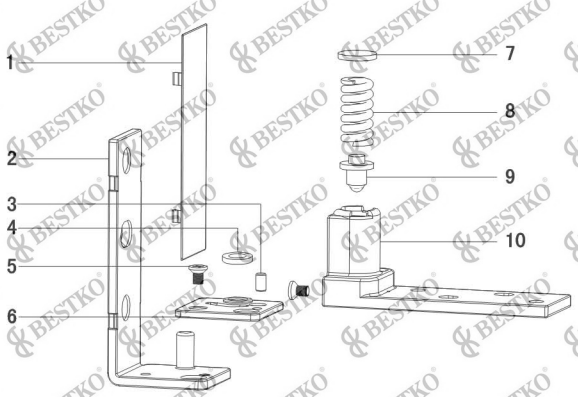
Concealed Pivot - WJ306BSL.80 (80kg loading)



No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.80-2	cover plate	SUS304	1	
2	WJ306BL.80-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-10	bush	SUS303	1	
4	WJ306A.80-11	metal washer	SUS420 (tempered)	1	chrome
5	T011-105	set screw	SUS303	2	
6	WJ306AL.80-5	hold-open plate	SUS420 (tempered)	1	chrome
7	WJ306A.80-9	fixing plate	SUS304	1	
8	WJ306A.80-7	compression spring	manganese	1	
9	WJ306A.60-8	hold-open piston	SUS420 (tempered)	1	chrome
10	WJ306AL.80-4	pivot body (door side)	SUS303	1	

Model of WJ306BSL.80

Concealed Pivot - WJ306BSR.80 (80kg loading)



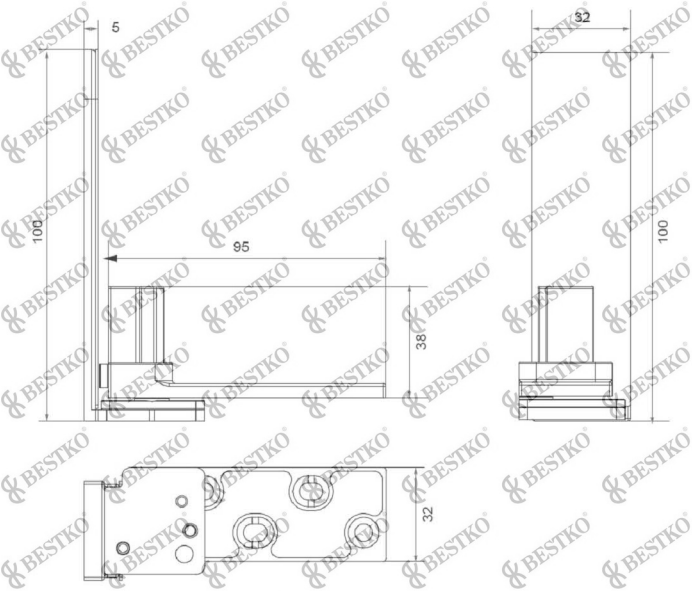
No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.80-2	cover plate	SUS304	1	
2	WJ306BR.80-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-10	bush	SUS303	1	
4	WJ306A.80-11	metal washer	SUS420 (tempered)	1	chrome
5	T011-105	set screw	SUS303	2	
6	WJ306AR.80-5	hold-open plate	SUS420 (tempered)	1	chrome
7	WJ306A.80-9	fixing plate	SUS304	1	
8	WJ306A.80-7	compression spring	manganese	1	
9	WJ306A.60-8	hold-open piston	SUS420 (tempered)	1	chrome
10	WJ306AR.80-4	pivot body (door side)	SUS303	1	

Model of WJ306BSR.80

BESTKO

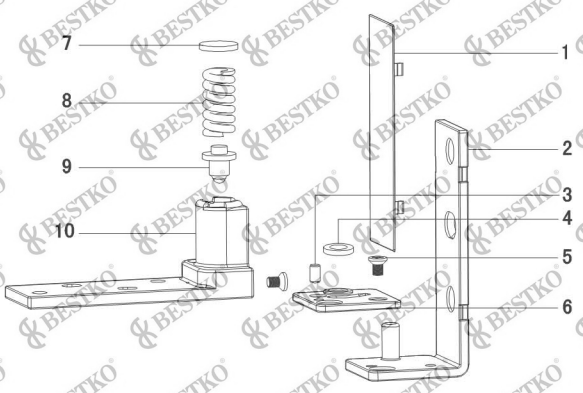
Dimension Drawing

Model	:	WJ306BSL.80	WJ306BSR.80
Description	:	Concealed Pivot	Concealed Pivot
Loading	:	80kg	80kg
Feature	:	Hold-Open	Hold-Open



Model of WJ306BSL.80 and WJ306BSR.80

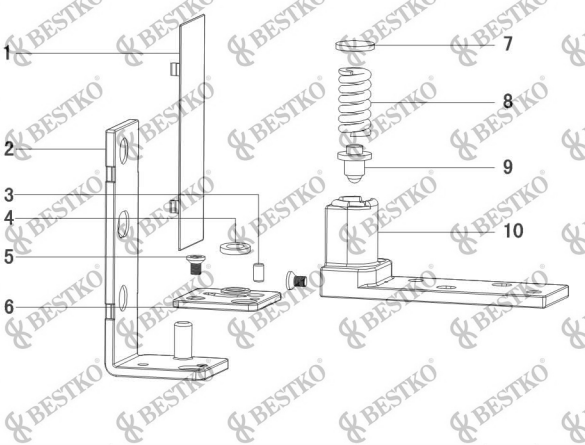
Concealed Pivot - WJ306BSL.60 (60kg loading)



No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.60-2	cover plate	SUS304	1	
2	WJ306BL.60-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-10	bush	SUS303	1	
4	WJ306A.80-11	metal washer	SUS420 (tempered)	1	chrome
5	T011-105	set screw	SUS303	2	
6	WJ306AL.60-5	hold-open plate	SUS420 (tempered)	1	chrome
7	WJ306A.60-9	fixing plate	SUS304	1	
8	WJ201A-4	compression spring	manganese	1	
9	WJ306A.60-8	hold-open piston	SUS420 (tempered)	1	chrome
10	WJ306AL.60-4	pivot body (door side)	SUS303	1	

Model of WJ306BSL.60

Concealed Pivot - WJ306BSR.60 (60kg loading)



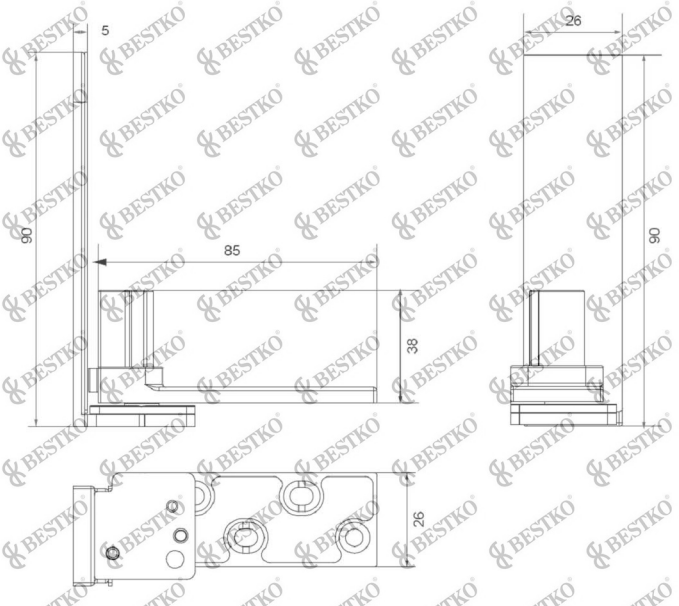
No.	Code	Name of Component	Material	Qty.	Finishing
1	WJ306B.60-2	cover plate	SUS304	1	
2	WJ306BR.60-1	pivot body (jamb side)	SUS303	1	
3	WJ306A.80-10	bush	SUS303	1	
4	WJ306A.80-11	metal washer	SUS420 (tempered)	1	chrome
5	T011-105	set screw	SUS303	2	
6	WJ306AR.60-5	hold-open plate	SUS420 (tempered)	1	chrome
7	WJ306A.60-9	fixing plate	SUS304	1	
8	WJ201A-4	compression spring	manganese	1	
9	WJ306A.60-8	hold-open piston	SUS420 (tempered)	1	chrome
10	WJ306AR.60-4	pivot body (door side)	SUS303	1	

Model of WJ306BSR.60

BESTKO

Dimension Drawing

Model	:	WJ306BSL.60	WJ306BSR.60
Description	:	Concealed Pivot	Concealed Pivot
Loading	:	60kg	60kg
Feature	:	Hold-Open	Hold-Open



Model of WJ306BSL.60 and WJ306BSR.60

Installation Guide

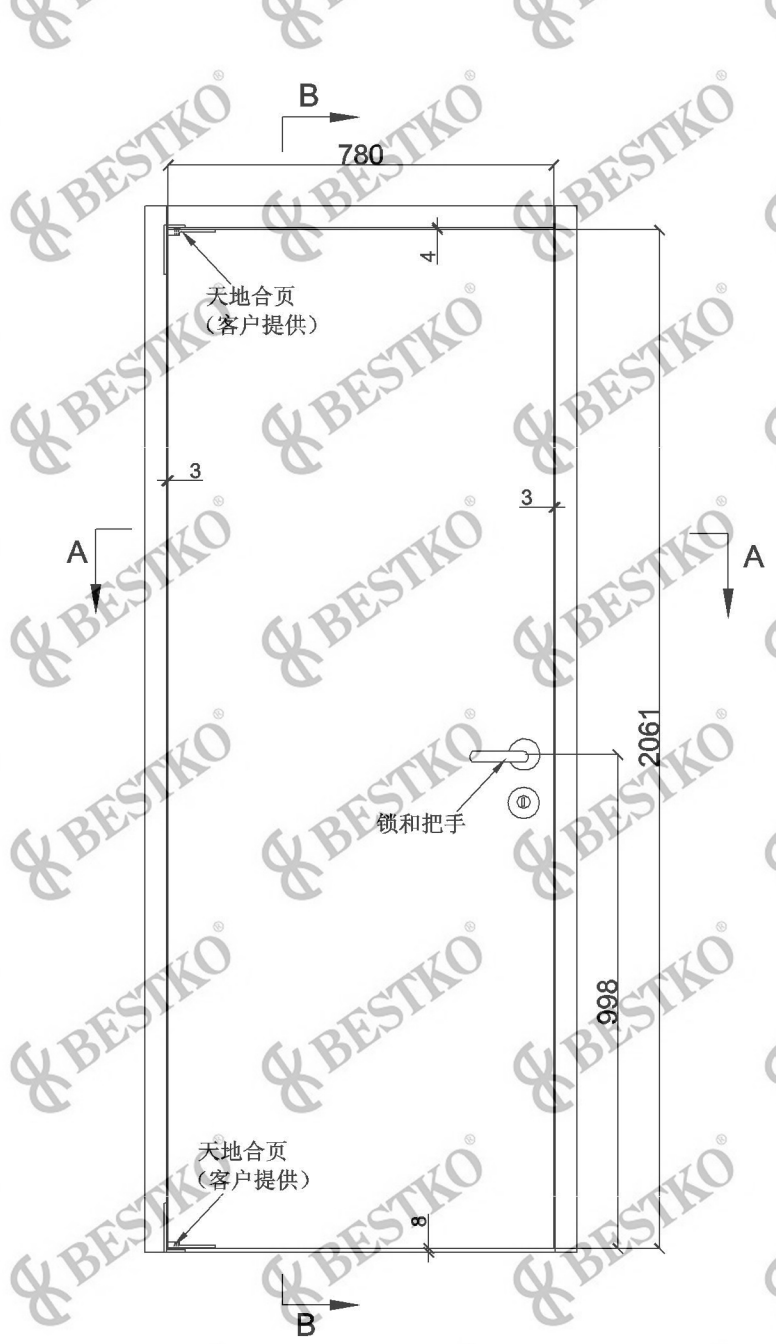
1. Prepare notches on door leaf and door jamb with template provided.

2. Fix pivot body onto door leaf(top and bottom).

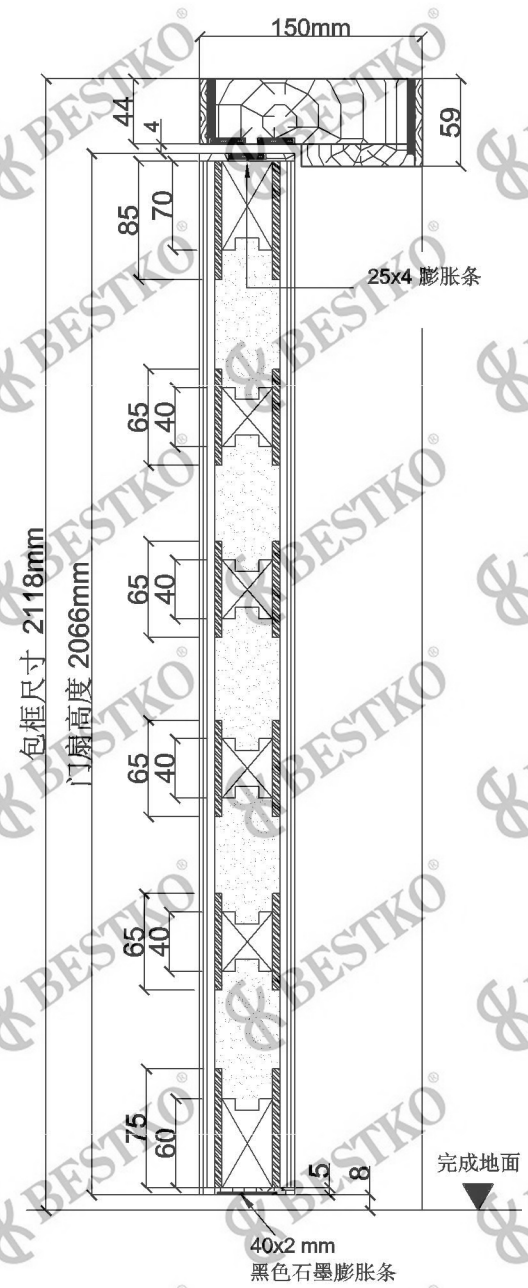
3. Make sure metal washers had been installed onto bottom pivot. Fix pivot onto door jamb.

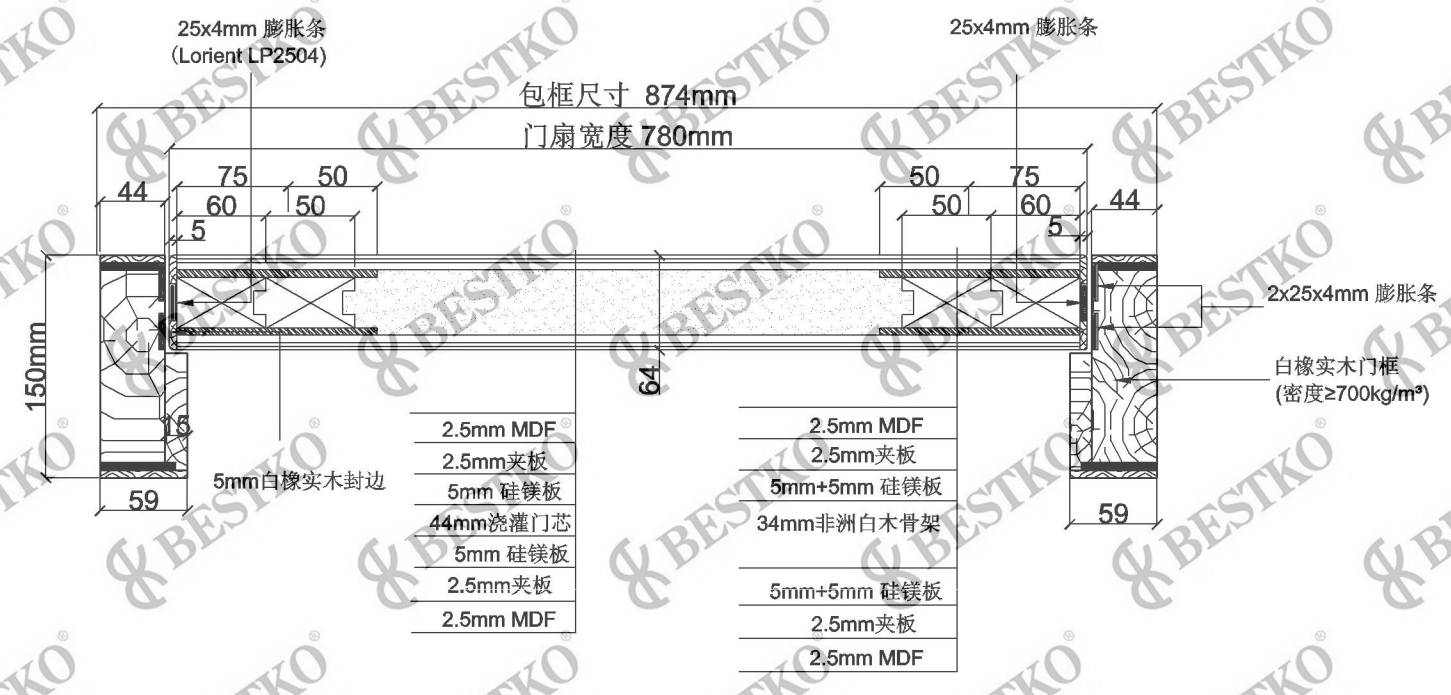
4. Remove the set screw(for hold-open version only), fix the cover plates properly and installation is done.

8 Appendix B: Fire Door Assembly Drawings

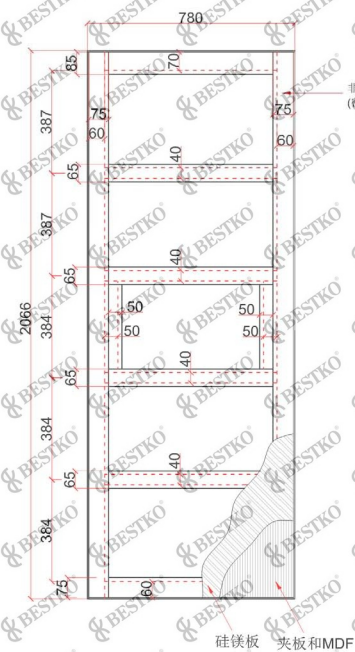


B-B 剖面

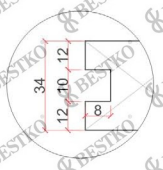




A-A 剖面



门芯骨架

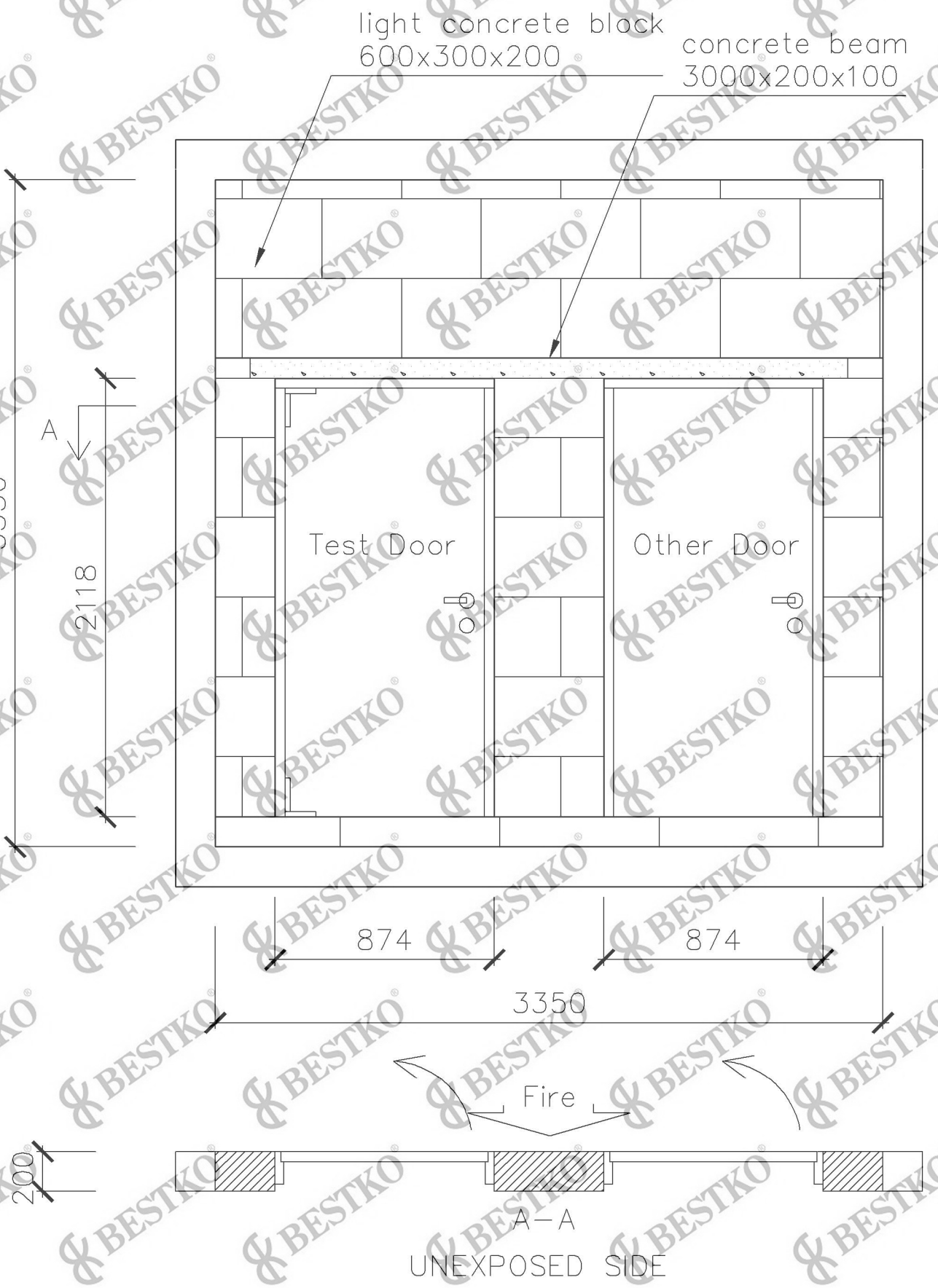


骨架开槽规格

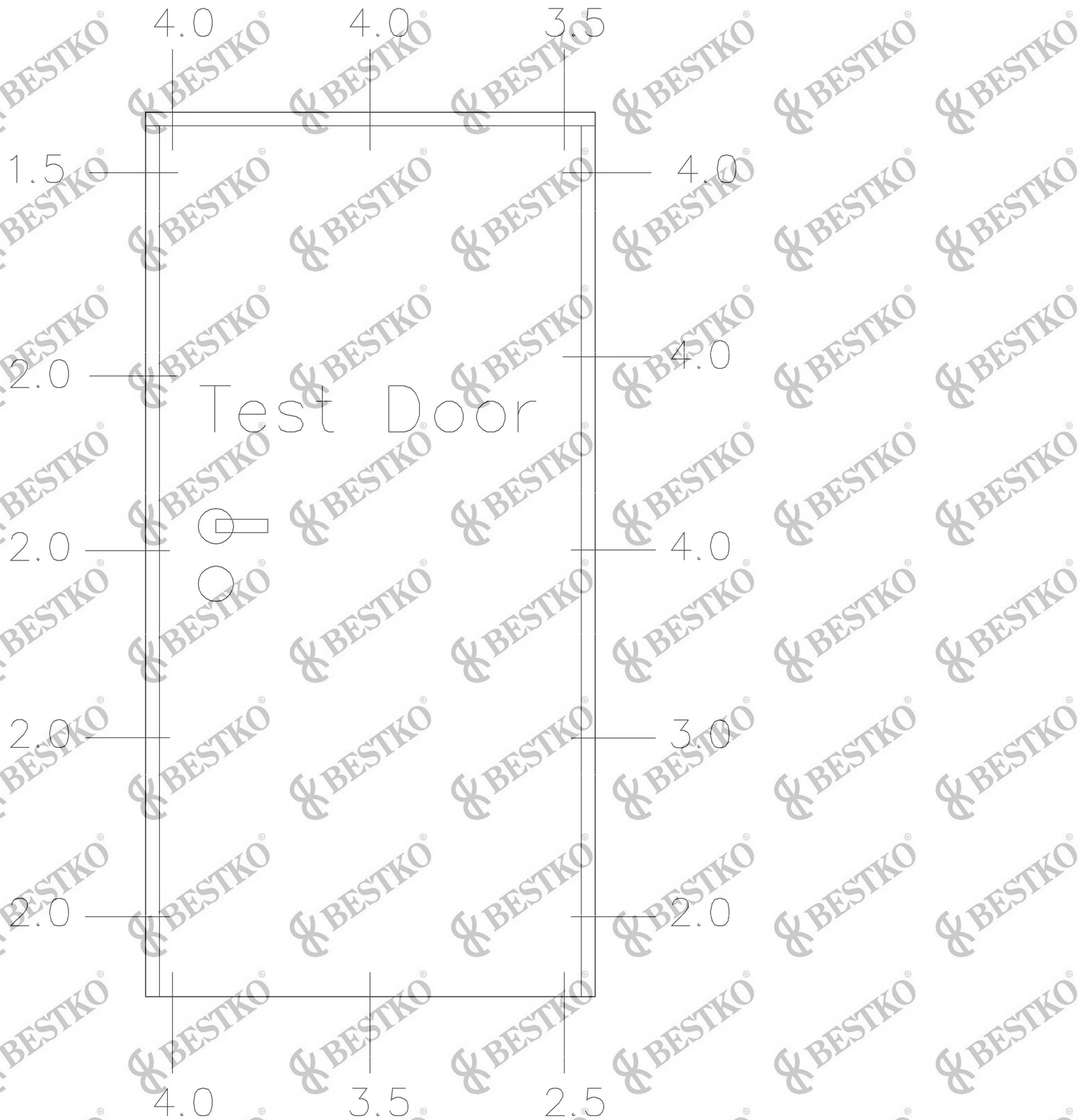
注意事项：

1、五金中的锁挡板、锁扣板、锁体、铰链、隐藏式插销，须用2mm白色膨胀垫片。

9 Appendix C: Test Wall Construction Drawing



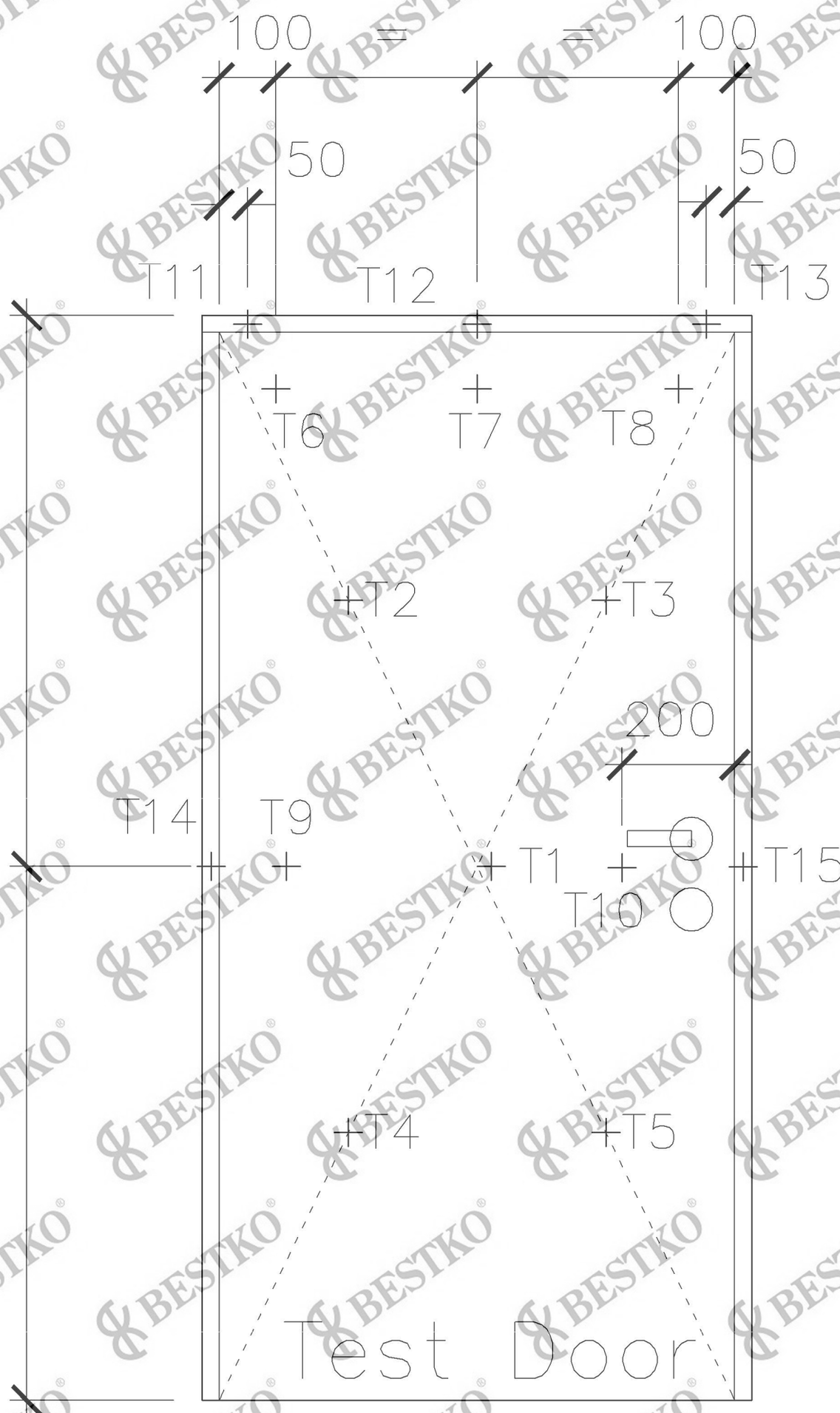
10 Appendix D: Test Measurement Data



Exposed Side

DOOR ASSEMBLY INITIAL CLEARANCES

POSITION FOR MEASUREMENT OF HORIZONTAL DEFLECTION



POSITION FOR MEASUREMENT OF UNEXPOSED TEMPERATURE

11 Appendix E: Test Data

Intertek

Test: Fire Resistance
Test Date: 2013.2.6
Job No: AU13014016-1
Client: BESTKO Precision Limited
Sample: Pivot Hinge - WJ306
Sample ID: S1301127.001- 002
Standards: EN1634-1:2008 Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware
Procedure: Part 1: Fire resistance tests for doors, shutters and openable windows
Conditioning: According to EN 1363-1, Section 8
Equipment:

Reviewer: Sun Sun
Eng/Tech: Star Shi

Item	ID	Cal Due Date
Vertical furnace	SH1098	n/a
Furnace pressure gauge	SH1097-15	2013.4.27
Test Clock	SH1042	2013.8.20
Furnace thermocouple 1-3	SH1097-1~3	2013.4.27
Ambient temperature gauge	SH1097-11	2013.4.27
Unexposed thermocouple	SH1097-12~14	2013.4.27
Clearance Measurements	SH1057-1	2013.12.13
Displacement Measurements	SH1034	2013.6.18

Heating Conditions: According to EN 1363-1, Section 5.1
Pressure Conditions: According to EN 1363-1, Section 5.2
Ambient Conditions: 20 ± 10°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
Thermocouple Pads: Length and width 30 ± 0.5 mm, thickness 2.0 ± 0.5 mm, density 900 ± 100 kg/m^3
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

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

Intertek

Test: Fire Resistance
Test Date: 2013.2.6
Job No: AU13014016-1
Client: BESTKO Precision Limited
Sample: Pivot Hinge - WJ306
Sample ID: S1301127.001- 002
Standards: EN1634-1:2008 Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware
Procedure: Part 1: Fire resistance tests for doors, shutters and openable windows
Performance Criteria: According to EN 1634-1, Section 11.1
Gap gauges per 10.4.5.3 of EN 1363-1
Flaming per 10.4.5.4 of EN 1363-1

Reviewer: Sun Sun
Eng/Tech: Star Shi

Time (min'sec")	Cotton Pad Check	6mm Gap Gauge Distance (mm)	25mm Gap Gauge "Pass Through"	Performance Observations
Initial	--	0	No Pass	The test starts when any of the furnace thermocouples exceeds 50°C
4'0"	--	0	No Pass	Heavy smoke comes out from the hinge side, top and lock edge of the door leaf.
16'0"	--	0	No Pass	No smoking is observed. The area of top of the door leaf turns dark.
30'0"	--	0	No Pass	The area of hinge edge of the door leaf turns dark.
60'0"	--	0	No Pass	Little smoke comes out from the top of the door leaf.
90'0"	No ignition	0	No Pass	The area of lock of the door leaf turns dark.
93'0"	--	0	No Pass	Sustained flame comes out from the top edge of the door, integrity failure is deemed to occur.
Requirement	No ignition	≤150	No "Pass Through"	No excessive openings, Sustained flaming, etc.

Intertek

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Reviewer: Sun Sun
Eng/Tech: Star Shi

Procedure: Part 1: Fire resistance tests for doors, shutters and openable windows
Performance Criteria: According to EN 1634-1, Section 11.2

2) Insulation: Average temperature rise 140 ° C according to EN1363-1. Maximum temperature rise 180°C according to EN 1363-1, Section 11.3, and of the frame of the door or shutter assembly shall be 360 ° C according to EN 1634-1, Section 11.2.3. Unexposed temperatures according to EN 1634-1, Section 9.1.2.3, and and EN 1363-1, Section 9.1.2.3.

Time(Minutes)	Ambient (°C)	T1 (°C)	T2 (°C)	T3 (°C)	T4 (°C)	T5 (°C)	T6 (°C)	T7 (°C)
Initial	9	9	9	9	9	9	9	9
5	9	9	10	12	9	9	19	21
10	9	9	10	13	9	9	15	14
15	9	9	10	13	9	9	34	14
20	9	9	11	16	12	10	39	15
25	9	11	15	22	18	15	39	23
30	9	14	21	31	23	20	40	30
35	9	20	29	39	30	25	46	38
40	9	26	36	45	35	30	50	44
45	9	34	43	49	40	34	53	49
50	9	39	48	53	44	37	55	53
55	9	44	51	55	47	40	57	55
60	9	46	52	57	46	41	59	56
65	9	48	53	59	47	43	60	56
70	9	52	56	61	51	47	60	59
75	9	53	56	61	52	49	61	60
80	9	53	57	62	51	49	61	60
85	9	54	58	62	53	54	62	61
90	9	55	58	63	58	59	63	62
93	9	58	60	64	62	62	63	63
Temperature Rise (°C)		49	51	55	53	53	54	54

Average temperature rise 52 °C
Maximum temperature rise 61 °C
Maximum temperature rise(Frame) 58 °C

Intertek

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Procedure: Part 1: Fire resistance tests for doors, shutters and openable windows
Performance Criteria: According to EN 1634-1, Section 11.2

Reviewer: Sun Sun
Eng/Tech: Star Shi

2) Insulation: Average temperature rise 140 ° C according to EN1363-1. Maximum temperature rise 180°C according to EN 1363-1, Section 11.3, and of the frame of the door or shutter assembly shall be 360 ° C according to EN 1634-1, Section 11.2.3, Unexposed temperatures according to EN 1634-1, Section 9.1.2.3, and and EN 1363-1, Section 9.1.2.3.

Time(Minutes)	T8 (°C)	T9 (°C)	T10 (°C)	T11 (°C)	T12 (°C)	T13 (°C)	T14 (°C)	T15 (°C)
Initial	9	9	9	9	9	9	9	9
5	13	12	9	13	15	16	9	11
10	12	10	9	12	15	15	9	10
15	12	10	9	12	16	16	9	11
20	15	10	10	12	16	16	9	11
25	32	11	14	12	17	17	9	11
30	47	13	18	12	18	18	10	12
35	55	16	24	12	20	20	10	13
40	58	19	29	13	22	22	10	15
45	60	24	33	15	24	24	11	16
50	62	28	37	16	24	24	12	18
55	63	33	40	17	25	25	14	21
60	65	36	42	20	27	27	16	23
65	65	40	44	24	29	29	19	24
70	67	45	48	29	30	30	24	26
75	67	49	49	33	33	33	29	28
80	68	51	50	34	36	36	30	29
85	68	52	52	34	39	39	30	31
90	69	53	53	45	40	40	32	32
93	70	55	55	67	42	41	32	33
Temperature Rise (°C)	61	48	46	58	33	32	23	24

Intertek

Test: Fire Resistance
Test Date: 2013.2.6
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Client: BESTKO Precision Limited
Sample: Pivot Hinge - WJ306
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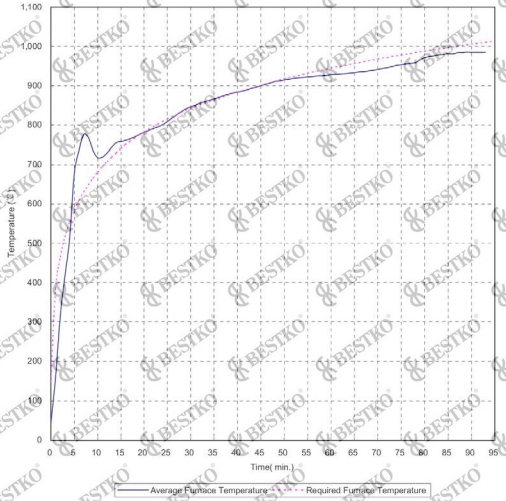
Standards: EN1634-1:2008 Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware
Procedure: Part 1: Fire resistance tests for doors, shutters and openable windows
Performance Criteria: According to EN 1634-1, Section 9.3

Reviewer: Sun Sun
Eng/Tech: Star Shi

Time(Minutes)	Maximum perpendicular displacement where a positive measurement indicates movement towards the furnace (mm)						
	D1	D2	D3	D4	D5	D6	D7
Initial	0	0	0	0	0	0	0
10	0	0	4	0	0	0	0
20	0	0	4	0	0	0	0
30	0	0	4	0	0	0	0
40	0	0	5	0	0	0	0
50	0	0	7	0	2	3	2
60	0	0	8	0	2	3	5
70	0	0	8	0	4	3	10
80	0	0	8	0	4	3	10

Intertek

Test:	Fire Resistance	Reviewer:	Sun Sun
Test Date:	2013.2.6		
Job No:	AU13014016-1		
Client:	BESTKO Precision Limited	Eng/Tech:	Star Shi
Sample:	Pivot Hinge - WJ306		
Sample ID:	S1301127.001- 002		
Standards:	EN1634-1:2008 Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware		
Procedure:	Part 1: Fire resistance tests for doors, shutters and openable windows		
Measurement of Furnace Conditions:	Pressure and temperature according to EN 1363-1, Section 10.4.2 and 10.4.3		



12 Appendix F: Test Photographs

Fig. 1 - Exposed Side Prior to the Fire Test

Fig. 2 – Unexposed Side after 4 Minutes

Fig. 3 – Unexposed Side after 16 Minutes

Fig. 4 – Unexposed Side after 30 Minutes

Fig. 5 – Unexposed Side after 60 Minutes

Fig. 6 – Unexposed Side after 90 Minutes

Fig. 7 – Unexposed Side after 93 Minutes

Fig. 8 - Exposed Side after 93 Minutes

13 Revision Page

Revision No.	Date	Changes	Author	Reviewer
0	February 23, 2013	First issue	Star Shi	Sun Sun

END OF DOCUMENT