

TEST REPORT

Intertek

REPORT NUMBER: AU09054007-9
ORIGINAL ISSUE DATE: July 7, 2009

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:
Exit Device Lever Set – 2039AP

EVALUATION PROPERTY:
90 Minutes Fire Endurance

Report of Exit Device Lever Set – 2039AP for compliance with the applicable requirements of the following criteria:

- 1) **EN 1634-1:2000 Fire Resistance Tests for Door and Shutter Assemblies – Part 1**
- 2) **BS 476-22:1987 Fire Tests on Building Materials and Structures**
- 3) **BS 476-20:1987 Fire Tests on Building Materials and Structures**

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The test report only allows to be revised within the retention period unless further standard or the requirement was noticed.
Report Template Revision Date: 3th Feb. 2009



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2 Introduction

Intertek Testing Services has conducted an evaluation for Bestko Precision Limited on Exit Device Lever Set – 2039AP in a single swing wooden door assembly to determine the fire resistance characteristics for a 90 minutes rating. The test was carried out at an Intertek-approved testing facility. This evaluation began on June 12, 2009 and was completed on June 18, 2009.

The test was conducted in accordance with the following standards:

- 1) EN 1634-1: 2000 “Fire Resistance Tests for Door and Shutter Assemblies – Part 1: Fire Doors and Shutters”
- 2) BS 476-22:1987 “Fire Tests on Building Materials and Structures – Part 22: Methods for Determination of the Fire Resistance of Non-loadbearing Elements of Construction, Section 6: Fully Insulated Doorsets and Shutter Assemblies”
- 3) BS 476-20:1987 “Fire Tests on Building Materials and Structures – Part 20: Method for Determination of the Fire Resistance of Elements of Construction (General Principles)”

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 May 19, 2009.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

Door	Type	Single Swing Wooden Door (Fully-insulated)
	Nominal Size	812mm wide by 2080mm high by 54mm thick
Frame	Nominal Size	906mm wide by 2130mm high
Hardware	Latch	Exit Device Lever Set Model Number: 2039AP
	Hinges	2 Bearing Butt Hinge Quantity: Three Model Number: 4 x 3 x 3 – 2BB

The drawings of the test wall construction, fire door assembly, and hardware can be found in Appendices A, B, and C respectively.

4 Test Installation and Procedures

The test was conducted in accordance with EN 1634-1:2000, EN 1363-1:1999, BS 476-22:1987, and BS 476-20:1987. The test parameters were selected from the standard that would provide a worst-case testing condition.

The test assembly was installed in a steel restraint frame. The restraint frame was suspended by chains with rollers on an overhead beam 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 3m high by 3m 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 500mm above notional floor level. Periodic observations were made of the surfaces of the test assembly during the fire endurance 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 endurance test without passage of flame or gases hot enough to ignite cotton waste for 90 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.

5.2. Insulation

Transmission of heat through the assembly during the fire endurance 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. A full set of test data is included in Appendix E, and photographs have been presented in Appendix F.

6 Conclusion

The Exit Device Lever Set – 2039AP and single swing wooden door assembly identified in this report has been tested in accordance with following standards:

- 4) EN 1634-1: 2000 "Fire Resistance Tests for Door and Shutter Assemblies – Part 1: Fire Doors and Shutters"
- 5) BS 476-22:1987 "Fire Tests on Building Materials and Structures – Part 22: Methods for Determination of the Fire Resistance of Non-loadbearing Elements of Construction, Section 6: Fully Insulated Doorsets and Shutter Assemblies"
- 6) BS 476-20:1987 "Fire Tests on Building Materials and Structures – Part 20: Method for Determination of the Fire Resistance of Elements of Construction (General Principles)"

The test assembly met the requirements of the above standards for a 90 minutes exposure period.

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.

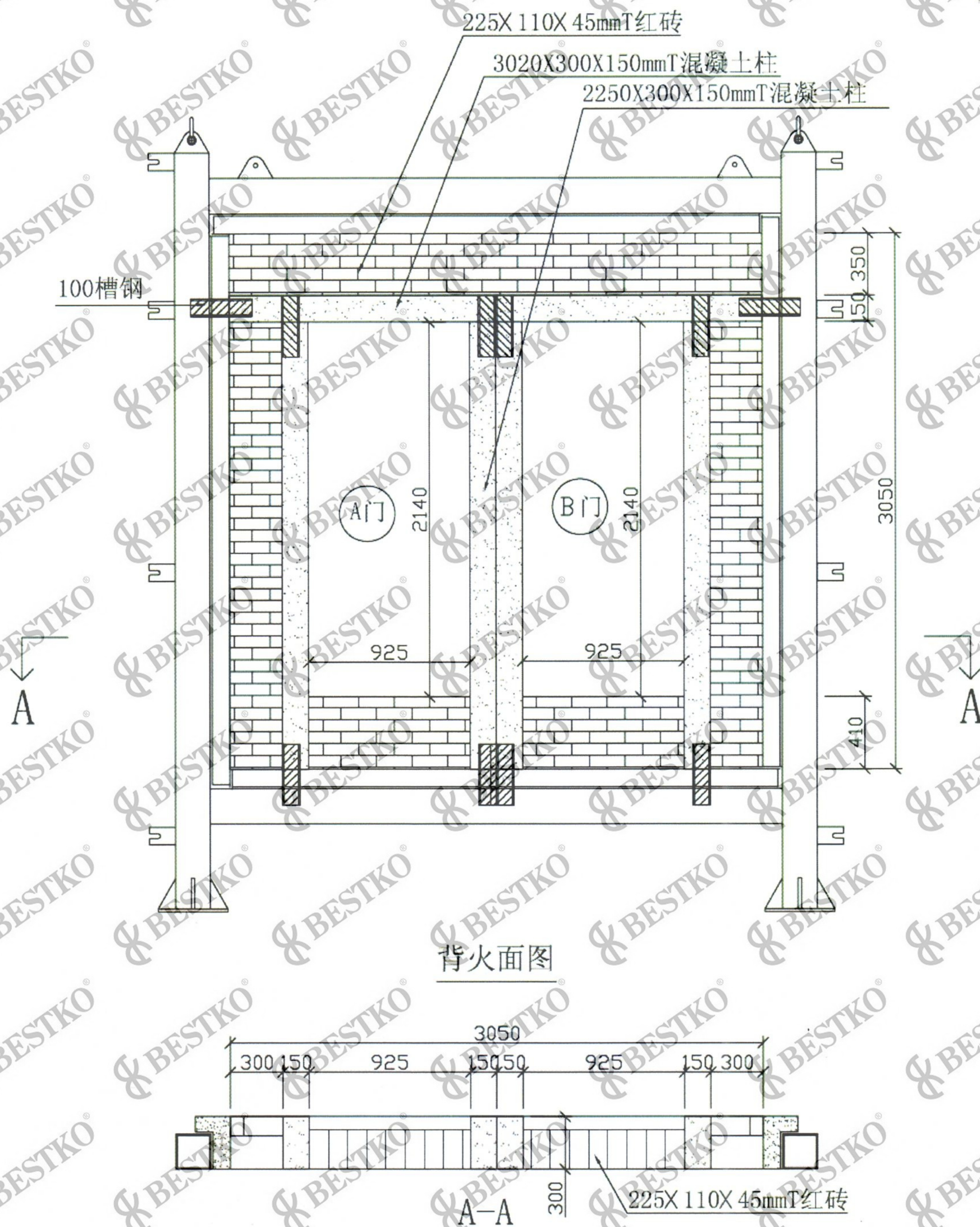
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Reported by:

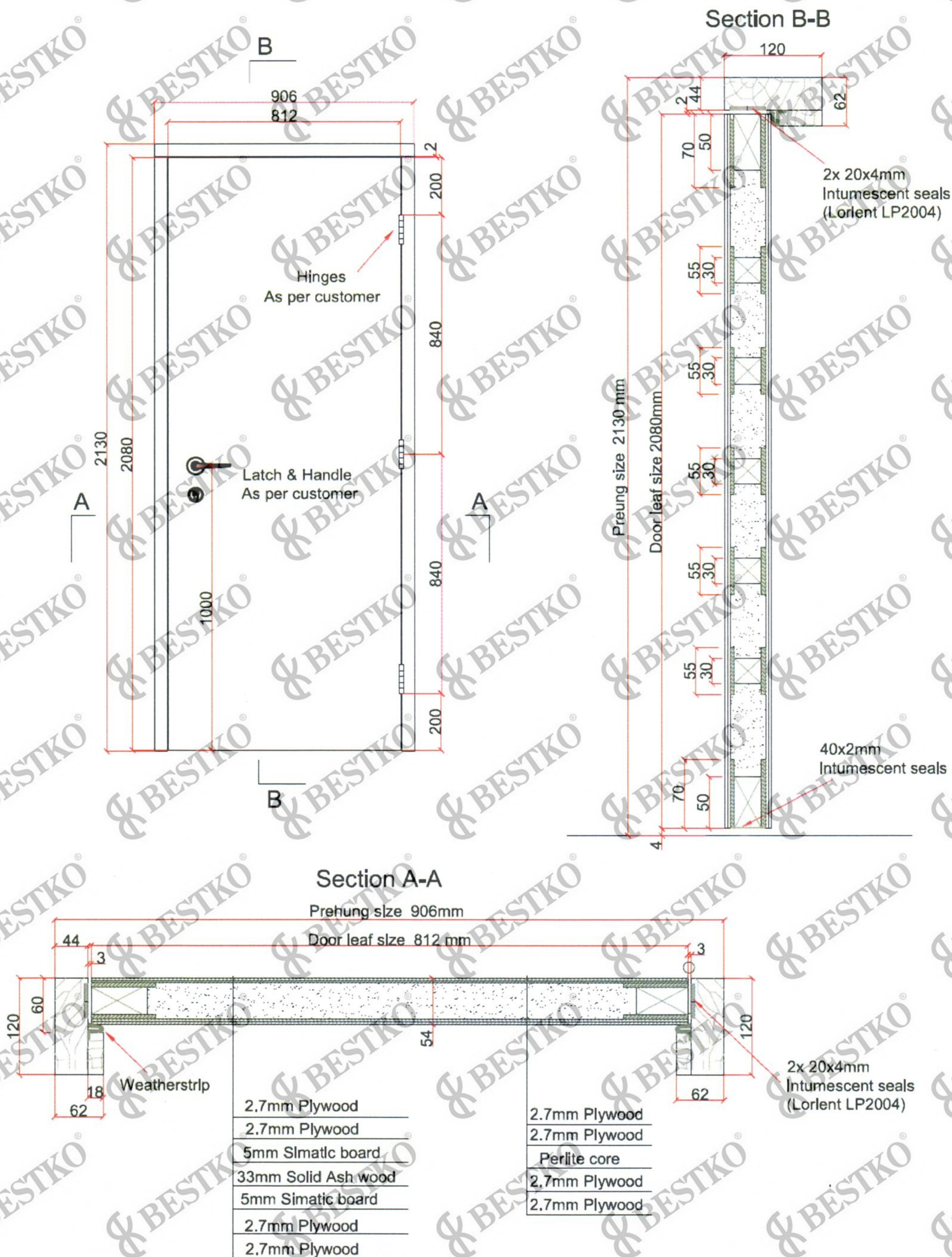

Sun Sun
Project Engineer, Building Products

Reviewed by:


Craig Lawson
Technical Manager, Building Products

APPENDIX A: Test Wall Construction Drawing (1 page)

APPENDIX B: Fire Door Assembly Drawings (2 pages)



Note: 1. Door frame & lipping using hardwood (Density $\geq 640\text{kg/m}^3$, Moisture content $\leq 12\%$).

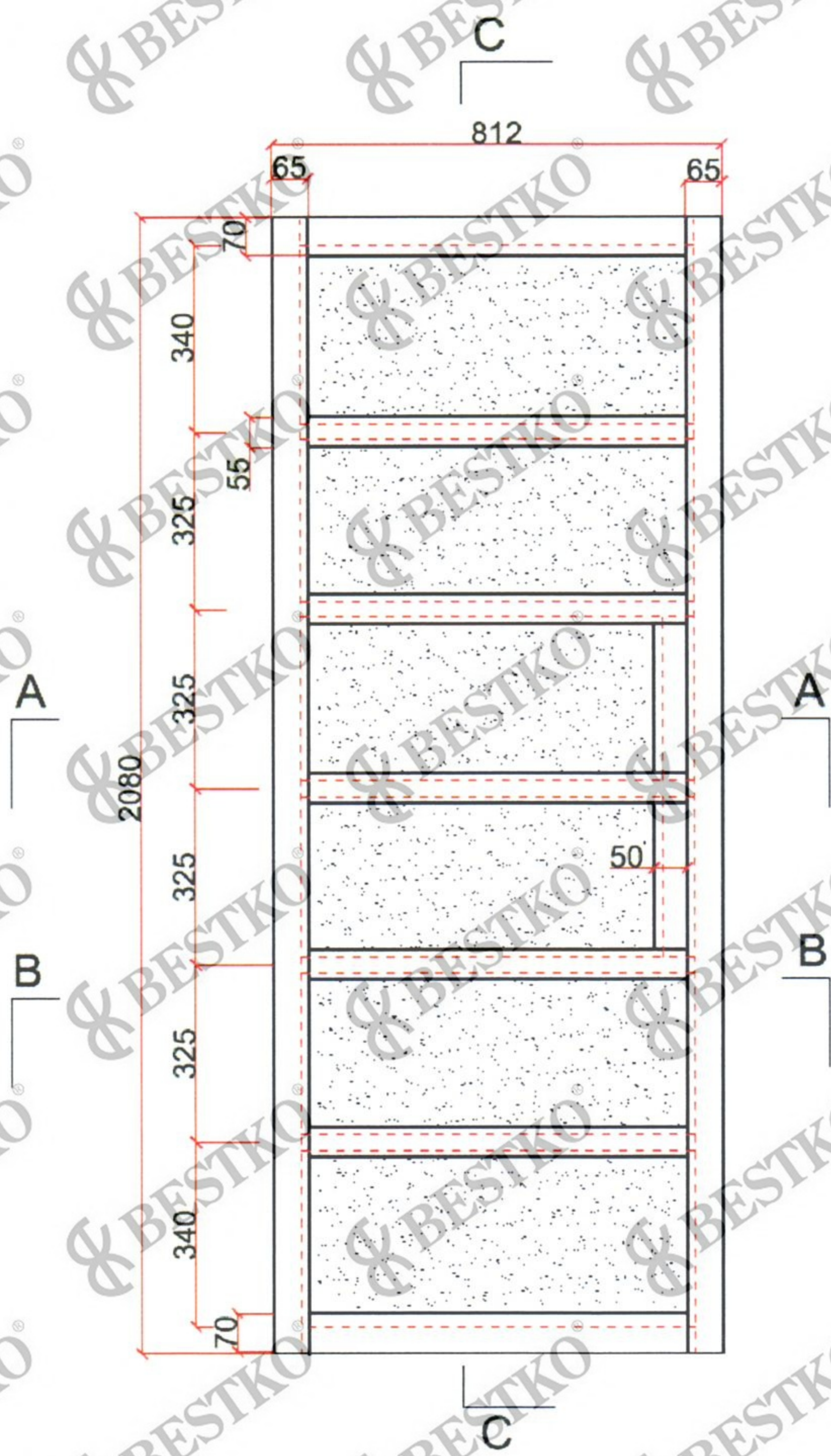
2. Ironmongery itself must be bedded on an intumescent gasket 2mm thk. (Intumescent seals Ltd).

3. The use of adhesive between plywood is UF, for lipping is PVAC, while all the other place is PU.

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Project No. AU09054007

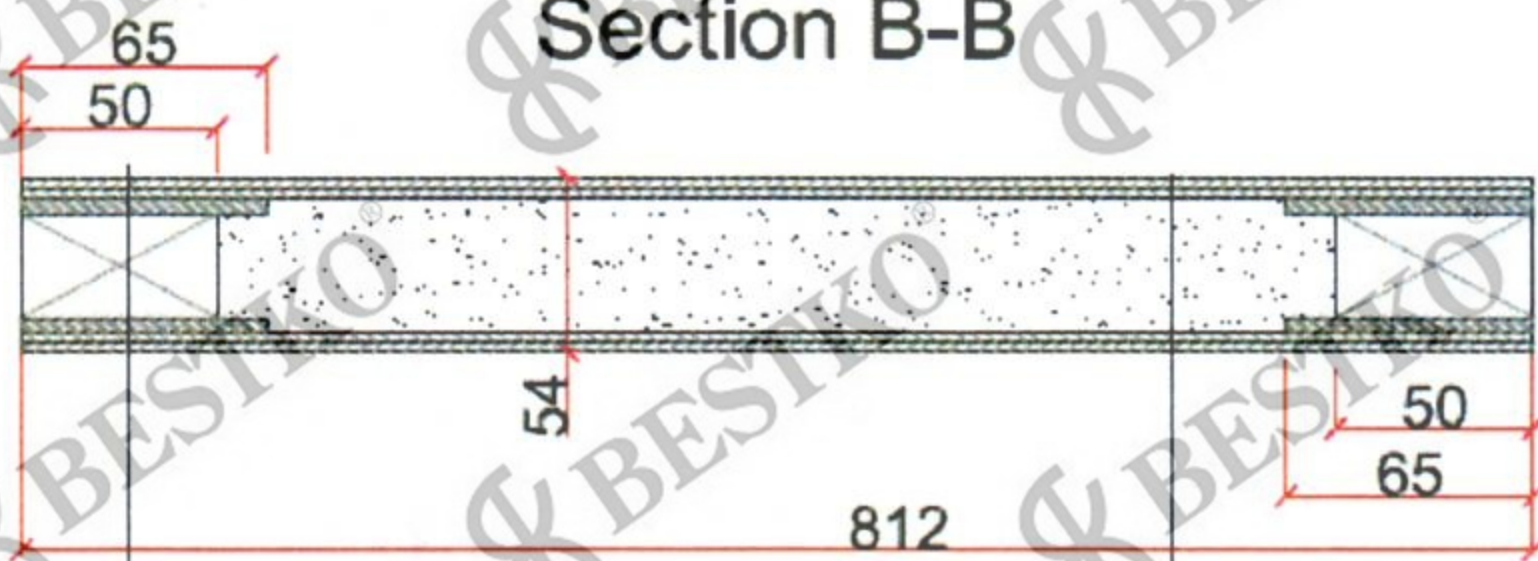
July 7, 2009



Section A-A



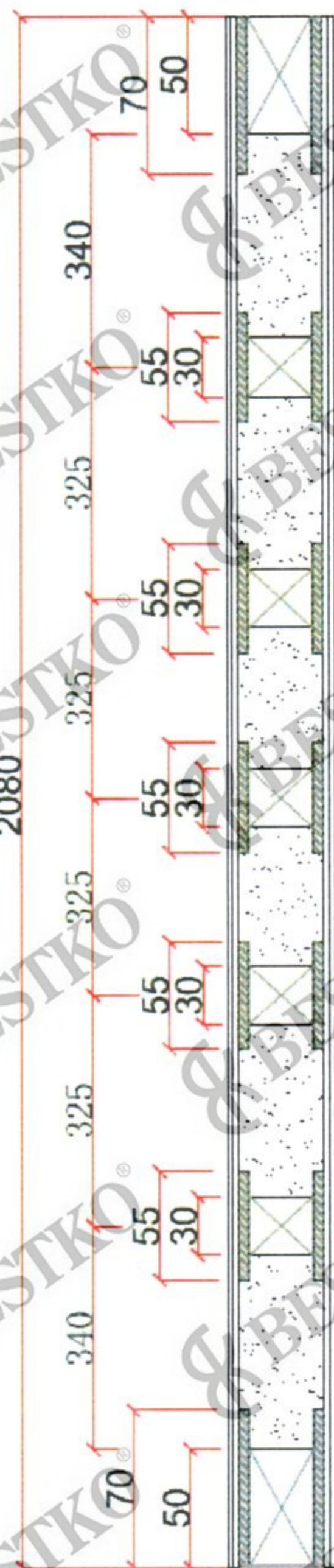
Section B-B



- 2.7mm Plywood
- 2.7mm Plywood
- 5mm Simatic board
- 33mm Solid Ash wood
- 5mm Simatic board
- 2.7mm Plywood
- 2.7mm Plywood

- 2.7mm Plywood
- 2.7mm Plywood
- Perlite core
- 2.7mm Plywood
- 2.7mm Plywood

Section C-C



40x2mm
Intumescent seals

APPENDIX E: Test Data (6 pages)

Intertek

Test: Fire Resistance
Start Date: 2009-06-12
Target Date: 2009-06-18
Job No: AU09054007-3
Client: Bestko Precision Limited
Sample: Exit Device Lever Set
Sample ID: 2039AP
Standards: EN1634-1:2000 Fire resistance tests for door and shutter assemblies
Procedure: Part 1: Fire doors and shutters
Conditioning: According to EN 1363-1, Section 8
Fire Rating: 90 minutes

Reviewer: 
Craig LawsonEng/Tech: 
Sun Sun

Pressure Rating: The neutral pressure plane shall be established 500mm above notional floor level

Equipment:

Item	ID	Cal Due Date
Furnace pressure gauge	930100	2009-7-22
Test Clock	930104	2009-6-18
Furnace thermocouple 1	S1800/DW001H	verified before use
Furnace thermocouple 2	S1800/DW002H	verified before use
Furnace thermocouple 3	S1800/DW003H	verified before use
Furnace thermocouple 4	S1800/DW004H	verified before use
Furnace thermocouple 5	S1800/DW005H	verified before use
Furnace thermocouple 6	S1800/DW006H	verified before use
Furnace thermocouple 7	S1800/DW007H	verified before use
Furnace thermocouple 8	S1800/DW008H	verified before use
Furnace thermocouple 9	S1800/DW009H	verified before use
Ambient temperature gauge	930931	2009-12-11
Unexposed thermocouple	BSTHERMO001ef	verified before use

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
Thermocouples: 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/m³
Pressure Measurements: According to EN 1634-1, Section 9.2
Deflection Measurements: According to EN 1634-1, Section 9.3
Pre-test Examination: According to EN 1634-1, Section 10.1
Test Procedure: According to EN 1634-1, Section 10.2

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Bestko Precision Limited
Project No. AU09054007

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Intertek

Test: Fire Resistance
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Client: Bestko Precision Limited
Sample: Exit Device Lever Set
Sample ID: 2039AP
Standards: EN1634-1:2000 Fire resistance tests for door and shutter assemblies
Procedure: Part 1: Fire doors and shutters
Performance Criteria: According to EN 1634-1, Section 11.1

Reviewer: 
Craig Lawson

Eng/Tech: 
Sun Sun

- 1) Integrity: Cotton pad according to 10.4.5.2 of EN 1363-1
Gap gauges per 10.4.5.3 of EN 1363-1
Flaming per 10.4.5.4 of EN 1363-1

Time(min)	Cotton Pad Check	6mm Gap Gauge Distance (mm)	25mm Gap Gauge "Pass Through"	Performance Observations
Initial	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
10	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
20	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
30	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
40	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
50	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
60	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
70	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
80	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
90	No ignition	0	No Pass	No excessive openings, sustained flaming, etc
Requirement	No ignition	150	No "Pass Through"	No excessive openings, sustained flaming, etc

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Client: Bestko Precision Limited
Sample: Exit Device Lever Set
Sample ID: 2039AP
Standards: EN1634-1:2000 Fire resistance tests for door and shutter assemblies
Procedure: Part 1: Fire doors and shutters
Performance Criteria: According to EN 1634-1, Section 11.2

Reviewer: 
Craig Lawson

Eng/Tech: 
Sun Sun

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 EN 1363-1, Section 9.1.2.3.

Time(min)	Ambient (°C)	S16 (°C)	S17 (°C)	S18 (°C)	S19 (°C)	S20 (°C)	S21 (°C)	S22 (°C)
Initial	31.7	32.8	33.1	33.6	31.9	32.8	31.6	33.2
5	33.4	33.0	33.1	34.8	32.0	32.7	32.0	32.9
10	32.7	50.7	51.0	51.7	36.9	47.4	59.7	41.4
15	32.7	70.0	66.4	60.5	46.0	61.9	73.1	61.7
20	32.7	76.4	71.1	65.8	56.3	68.2	77.5	75.6
25	31.4	78.0	74.0	69.4	65.0	71.7	76.8	78.6
30	30.9	80.0	76.0	73.3	69.8	74.0	77.9	77.3
35	30.9	82.6	78.5	76.7	74.3	76.4	82.2	80.1
40	30.9	84.1	80.6	78.3	77.6	78.2	83.3	82.8
45	30.4	85.1	81.7	79.7	79.4	79.8	84.1	83.9
50	30.4	85.6	82.7	79.8	79.6	80.5	84.1	83.4
55	30.4	85.8	83.5	80.4	80.6	81.6	84.3	84.3
60	31.6	85.7	83.4	80.8	80.4	81.6	84.9	84.9
65	31.6	85.9	83.8	81.0	80.5	82.2	84.9	85.0
70	32.7	86.2	84.4	81.6	81.6	84.0	82.9	85.7
75	32.7	86.2	84.4	82.8	82.2	86.4	82.6	86.4
80	32.7	86.4	85.1	83.9	83.5	90.0	84.0	86.7
85	30.9	86.5	86.1	85.6	85.6	94.9	86.3	87.5
90	30.9	87.0	87.6	90.7	90.6	101.0	90.9	94.6
Requirement	10-30	140	140	140	140	140	180	180

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Test: Fire Resistance
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Target Date: 2009-06-18
Job No: AU09054007-3
Client: Bestko Precision Limited
Sample: Exit Device Lever Set
Sample ID: 2039AP
Standards: EN1634-1:2000 Fire resistance tests for door and shutter assemblies
Procedure: Part 1: Fire doors and shutters
Performance Criteria: According to EN 1634-1, Section 11.2

Reviewer: 
Craig Lawson
Eng/Tech: 
Sun Sun

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 accor

Time	S23 (°C)	S24 (°C)	S25 (°C)	S26 (°C)	S27 (°C)	S28 (°C)	S29 (°C)	S30 (°C)
Initial	31.9	32.4	33.0	32.5	35.9	34.0	33.2	32.9
5	32.3	32.5	33.4	32.3	34.9	34.3	33.1	33.2
10	55.5	58.7	54.7	32.4	34.0	34.3	33.6	33.8
15	71.1	72.7	69.1	33.1	33.8	33.4	34.4	34.8
20	76.2	76.2	73.7	33.5	34.8	32.0	33.2	35.3
25	78.0	75.4	75.0	34.4	34.6	31.2	33.0	35.6
30	80.2	78.6	75.6	37.2	35.2	29.9	34.3	36.0
35	82.0	81.1	76.6	34.7	35.2	28.9	34.1	36.5
40	83.2	78.9	78.7	34.8	35.4	29.1	32.8	37.1
45	84.7	80.7	80.6	35.9	36.5	27.9	33.0	37.6
50	86.1	81.3	81.3	35.0	36.4	30.0	34.7	39.1
55	84.4	81.3	81.6	35.6	36.8	29.3	35.6	42.9
60	83.7	82.2	82.0	36.7	38.2	28.2	36.1	44.1
65	81.5	81.7	82.2	36.6	38.2	27.1	36.2	44.0
70	83.7	82.5	82.7	37.8	38.8	41.4	35.5	44.9
75	85.7	82.9	83.7	39.1	40.3	42.2	37.9	46.1
80	88.9	84.4	84.8	39.8	41.1	43.0	38.7	46.8
85	95.3	86.3	86.1	40.7	42.4	44.9	39.9	46.9
90	102.2	88.7	89.9	42.2	43.7	47.5	41.8	52.6
Requirement	10-30	180	180	360	360	360	360	360

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Bestko Precision Limited
Project No. AU09054007

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Test: Fire Resistance
Start Date: 2009-06-12
Target Date: 2009-06-18
Job No: AU09054007-3
Client: Bestko Precision Limited
Sample: Exit Device Lever Set
Sample ID: 2039AP
Standards: EN1634-1:2000 Fire resistance tests for door and shutter assemblies
Procedure: Part 1: Fire doors and shutters
Performance Criteria: According to EN 1634-1, Section 9.3
Deflection: Mandatory requirement, no performance criteria

Reviewer: 
Craig Lawson

Eng/Tech: 
Sun Sun

Time	Maximum perpendicular displacement where a positive measurement indicates movement towards the furnace (mm)							
	D8	D9	D10	D11	D12	D13	D14	
Initial	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
10	0.0	0.0	0.0	0.0	2.0	-1.0	0.0	
20	2.0	4.0	2.0	0.0	3.0	1.0	-4.0	
30	4.0	6.0	4.0	1.0	4.0	1.0	-5.0	
40	3.0	11.0	7.0	5.0	7.0	2.0	-4.0	
50	4.0	13.0	10.0	7.0	12.0	2.0	-3.0	
60	5.0	10.0	10.0	8.0	13.0	1.0	-4.0	
70	5.0	11.0	12.0	8.0	14.0	2.0	-3.0	
80	4.0	14.0	17.0	12.0	16.0	1.0	-3.0	
90	4.0	14.0	18.0	10.0	14.0	2.0	-2.0	

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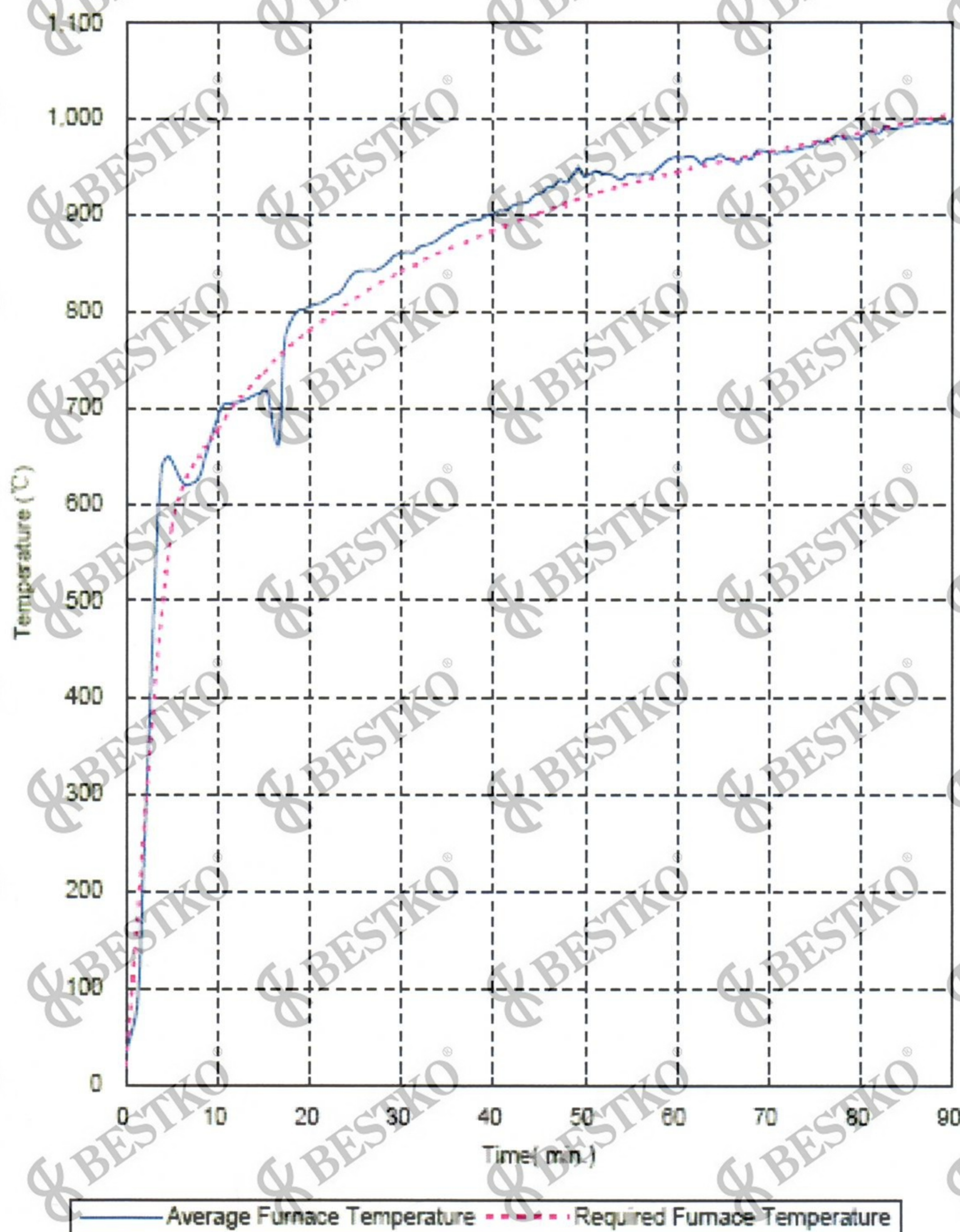
Bestko Precision Limited
Project No. AU09054007

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Test: Fire Resistance
Start Date: 2009-06-12
Target Date: 2009-06-18
Job No: AU09054007-3
Client: Bestko Precision Limited
Sample: Exit Device Lever Set
Sample ID: 2039AP
Standards: EN1634-1:2000 Fire resistance tests for door and shutter assemblies
Procedure: Part 1: Fire doors and shutters
Measurement of
Furnace
Conditions: Pressure and temperature according to EN 1363-1, Section 10.4.2 and 10.4.3

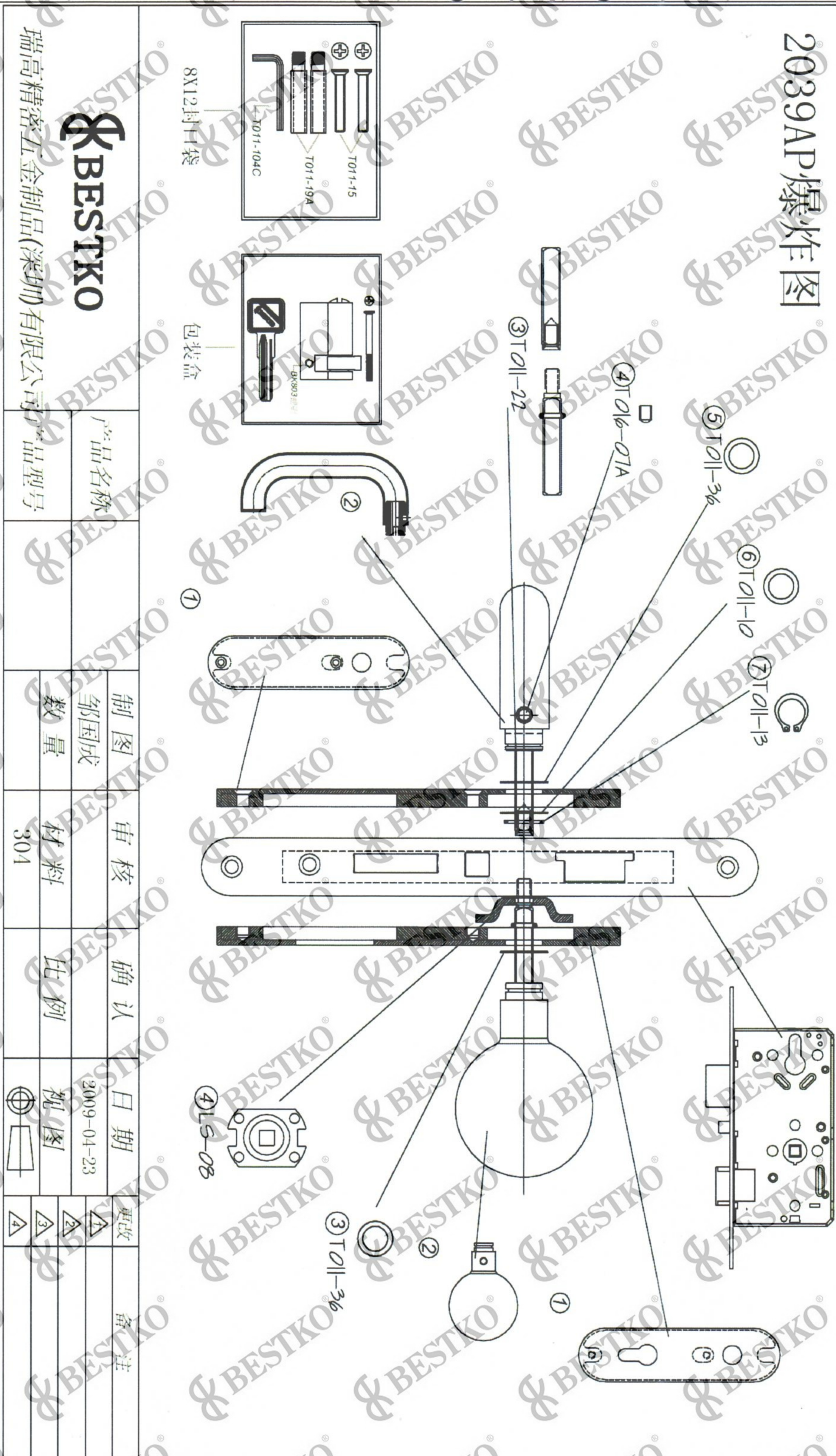
Reviewer: 
Craig Lawson
Eng/Tech: 
Sun Sun

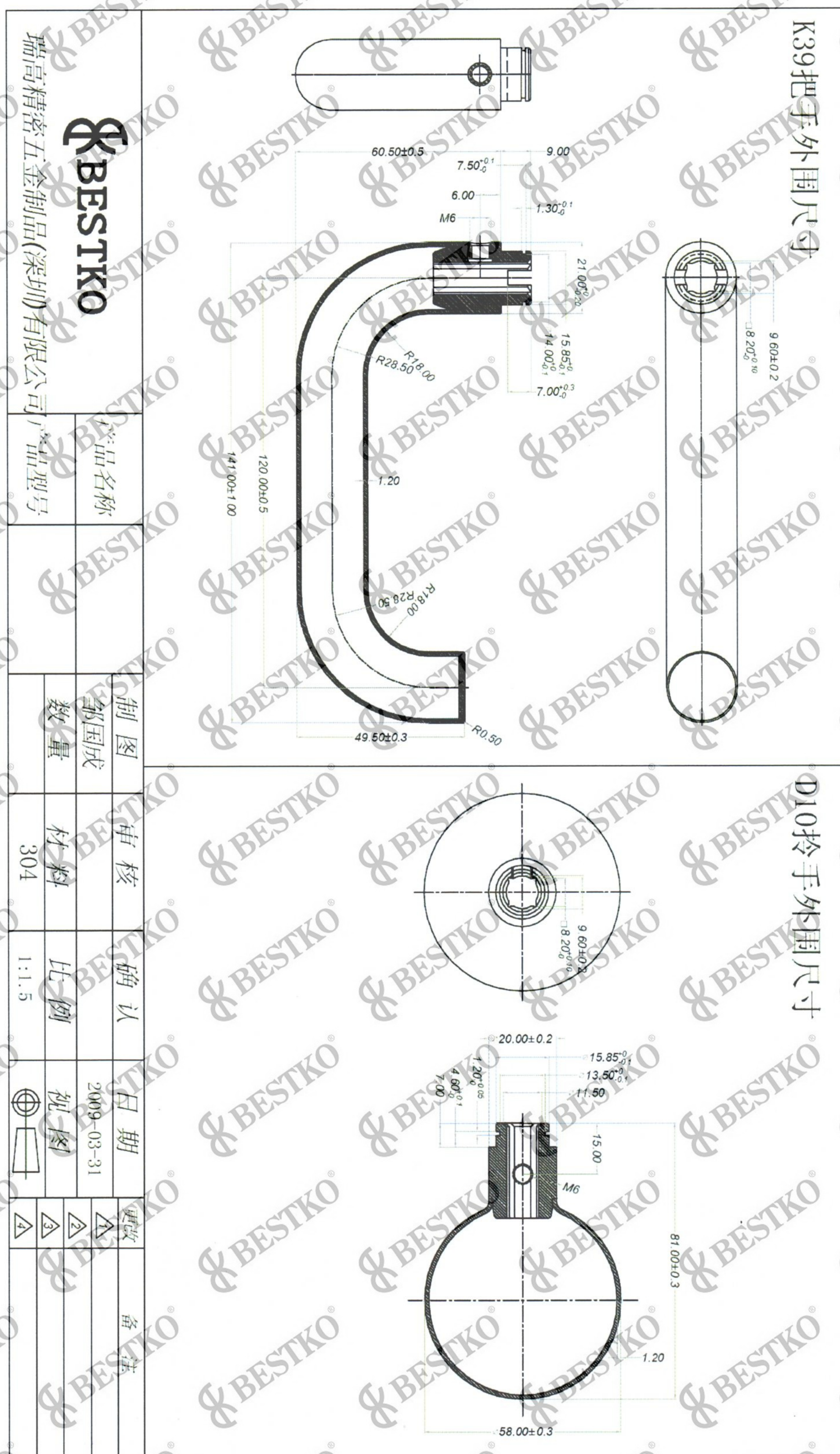


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26 June 2009

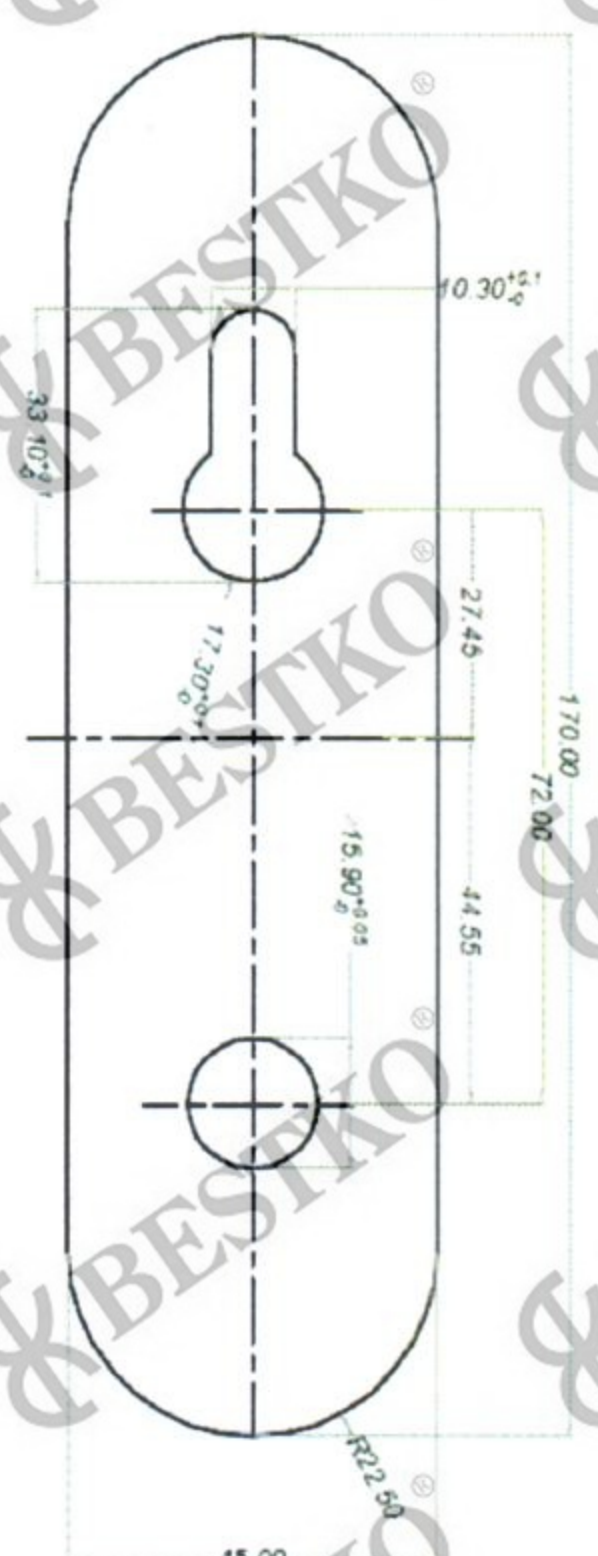
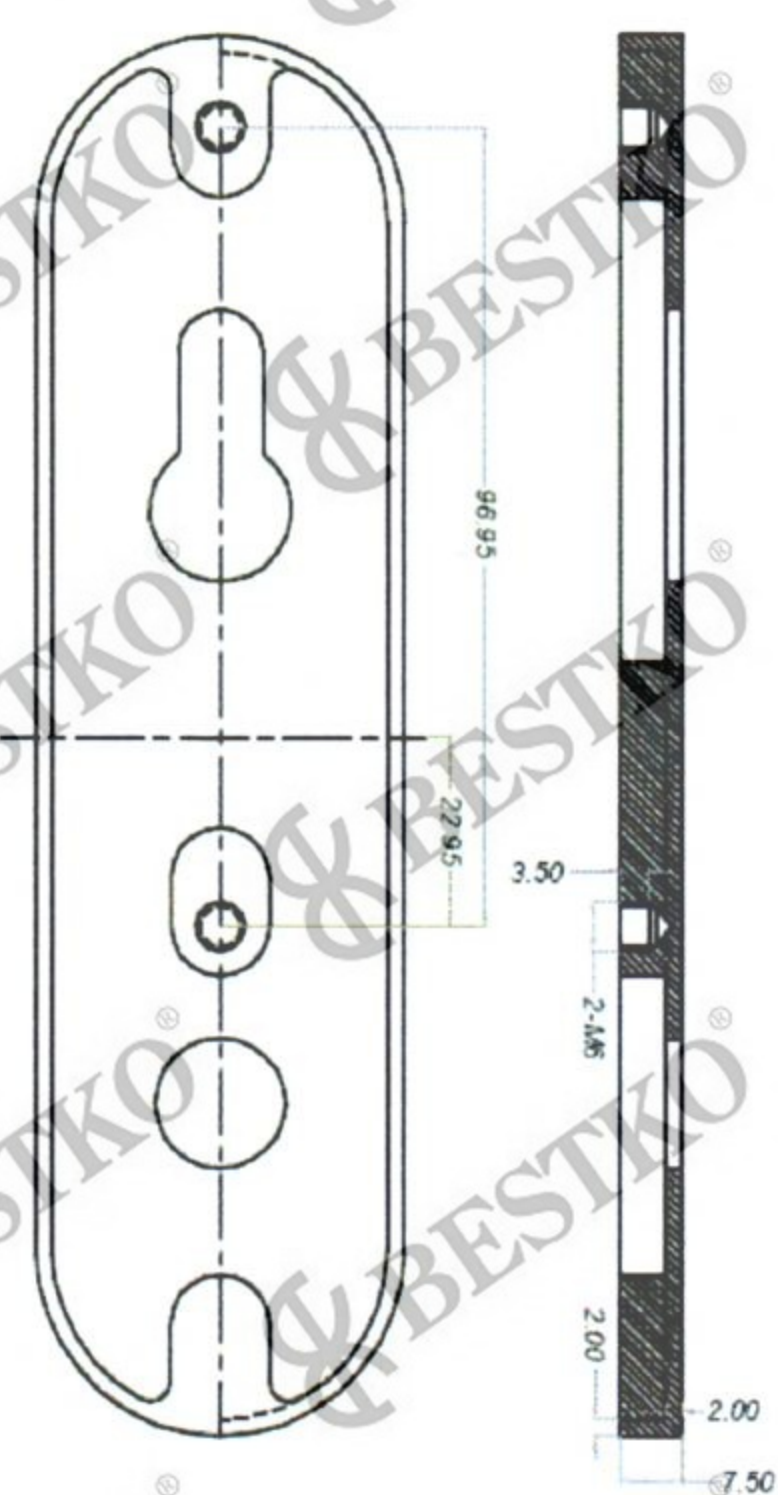
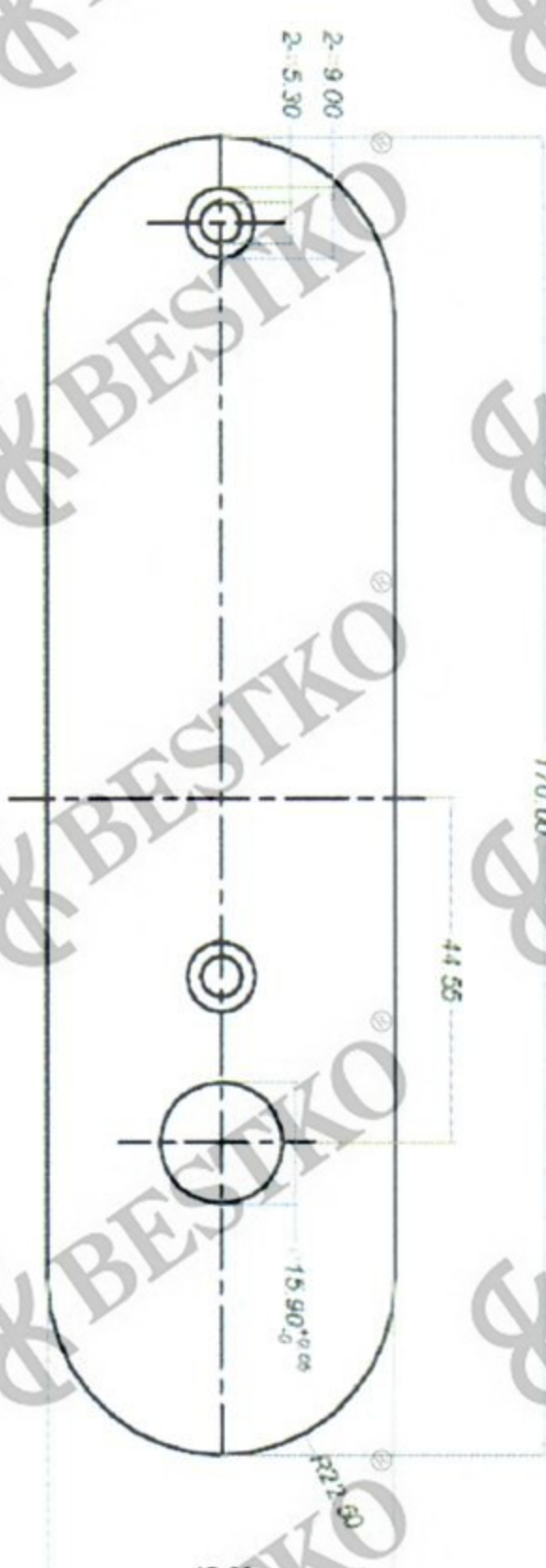
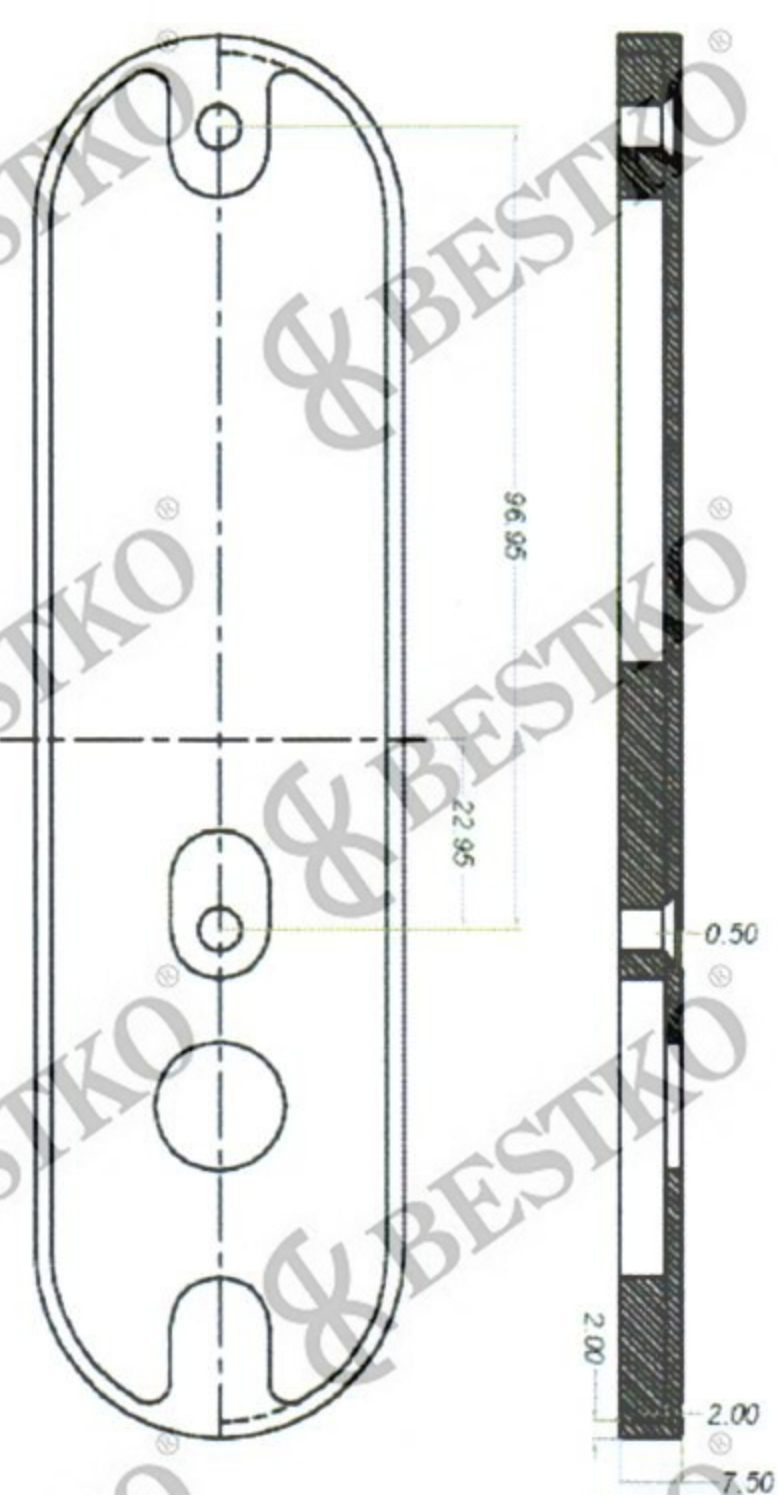
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APPENDIX C: Hardware Drawings (9 pages)





瑞高精密五金制品(深圳)有限公司										产品型号	
BESTKO										产品名称	
面板										制 图	
20										邹国成	
数量										审 核	
304										材 料	
比例										确 认	
1:1.5										日 期	
2009-03-31										视 图	
											
△										更改	
△										备注	
△											
△											



外围尺



July 7, 2009

5572AP三舌锁外围尺寸

The drawing shows the front and top views of the 5572AP three-leaf lock. The front view (top) shows a rectangular lock body with a total width of 235.00mm and a total height of 209.00mm. The mounting plate has a width of 24.00mm and a height of 13.50mm. The lock body has a width of 32.80mm and a height of 2.60mm. The top view (bottom) shows a rectangular lock body with a total width of 165.00mm and a total height of 87.50mm. The mounting plate has a width of 3.00mm and a height of 55.00mm. The lock body has a width of 72.00mm and a height of 38.00mm. The drawing includes a title block with the following information:

产品名称		产品型号		制图		审核		确认		日期		更改		备注	
5572AP		5572AP		邹国成		数量		材料		比例		1:1.5		视图	
5572AP		5572AP		304		1:1.5		2009-03-31		更改		1/1		备注	

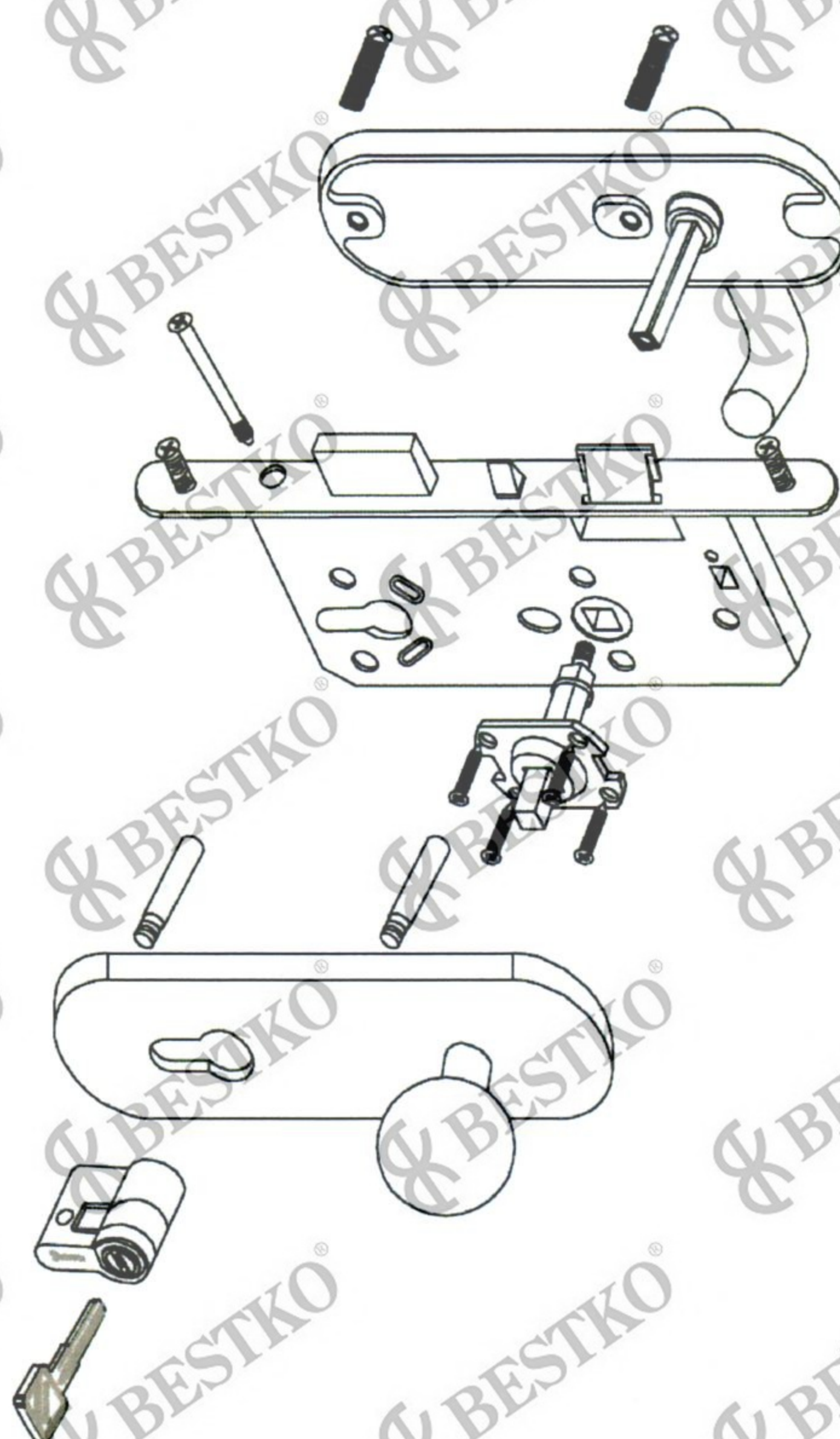
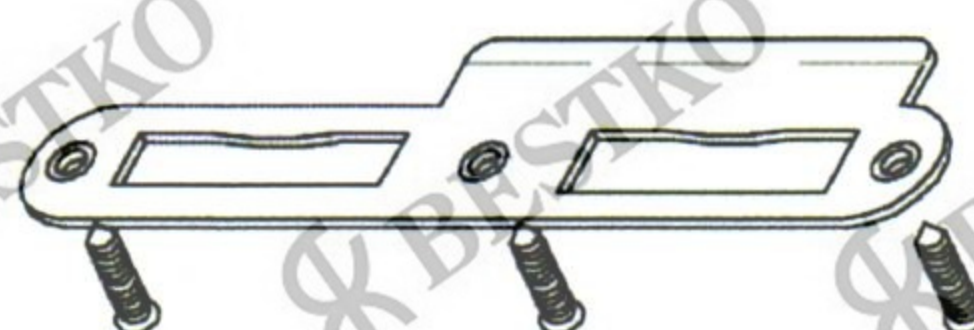


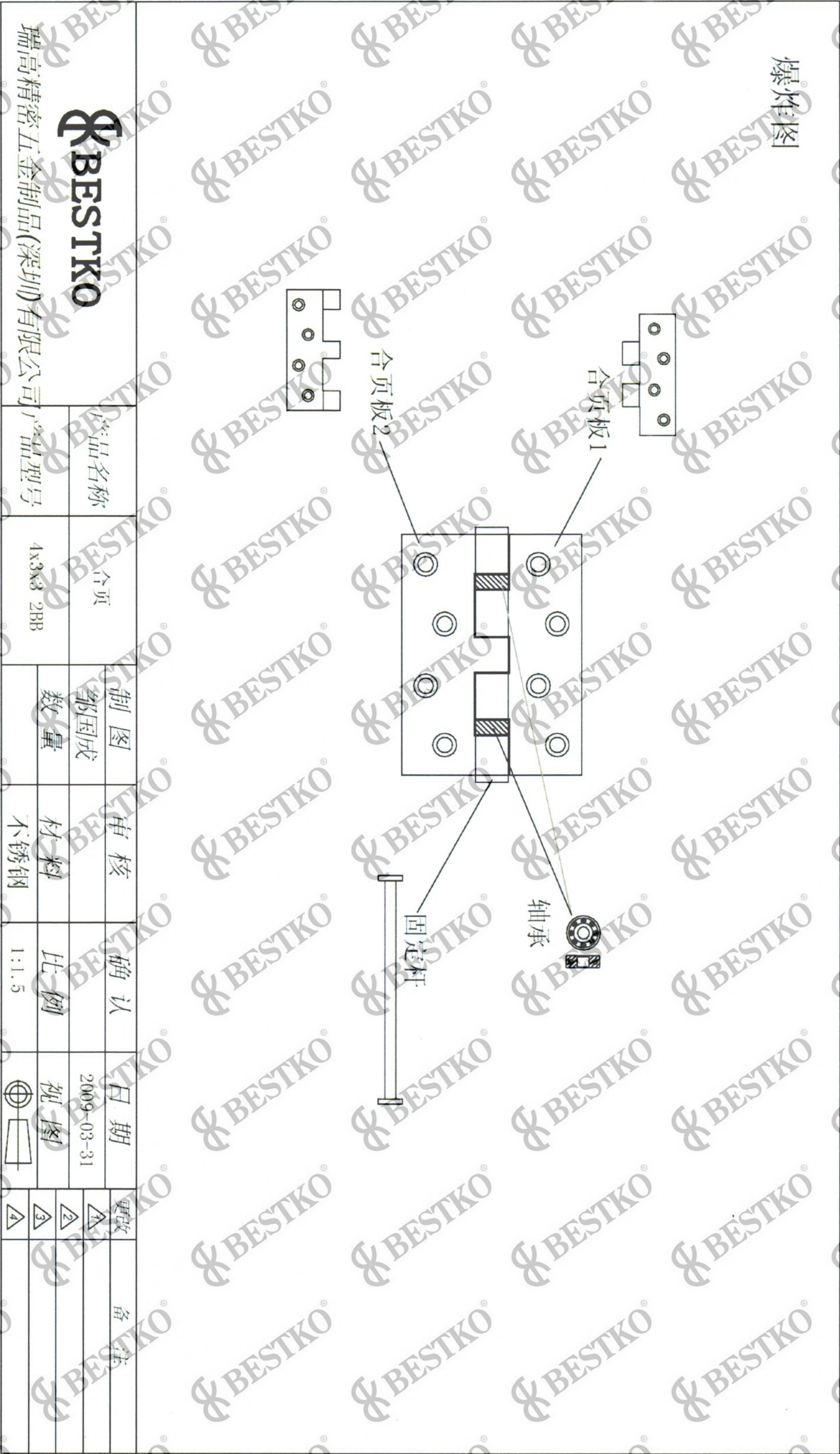
Bestko Precision Limited
Project No. AU09054007

July 7, 2009

BESTKO		瑞高精密五金制品有限公司	
产品名称		锁胆	
产品型号		BK803	
制图	数量	审核	材料
邹国成	304		
确认	比例	日期	视图
	1:1.5	2009-03-31	
更改	1	2	3
备注			

结构





Technical drawing of a rectangular plate with dimensions and hole specifications:

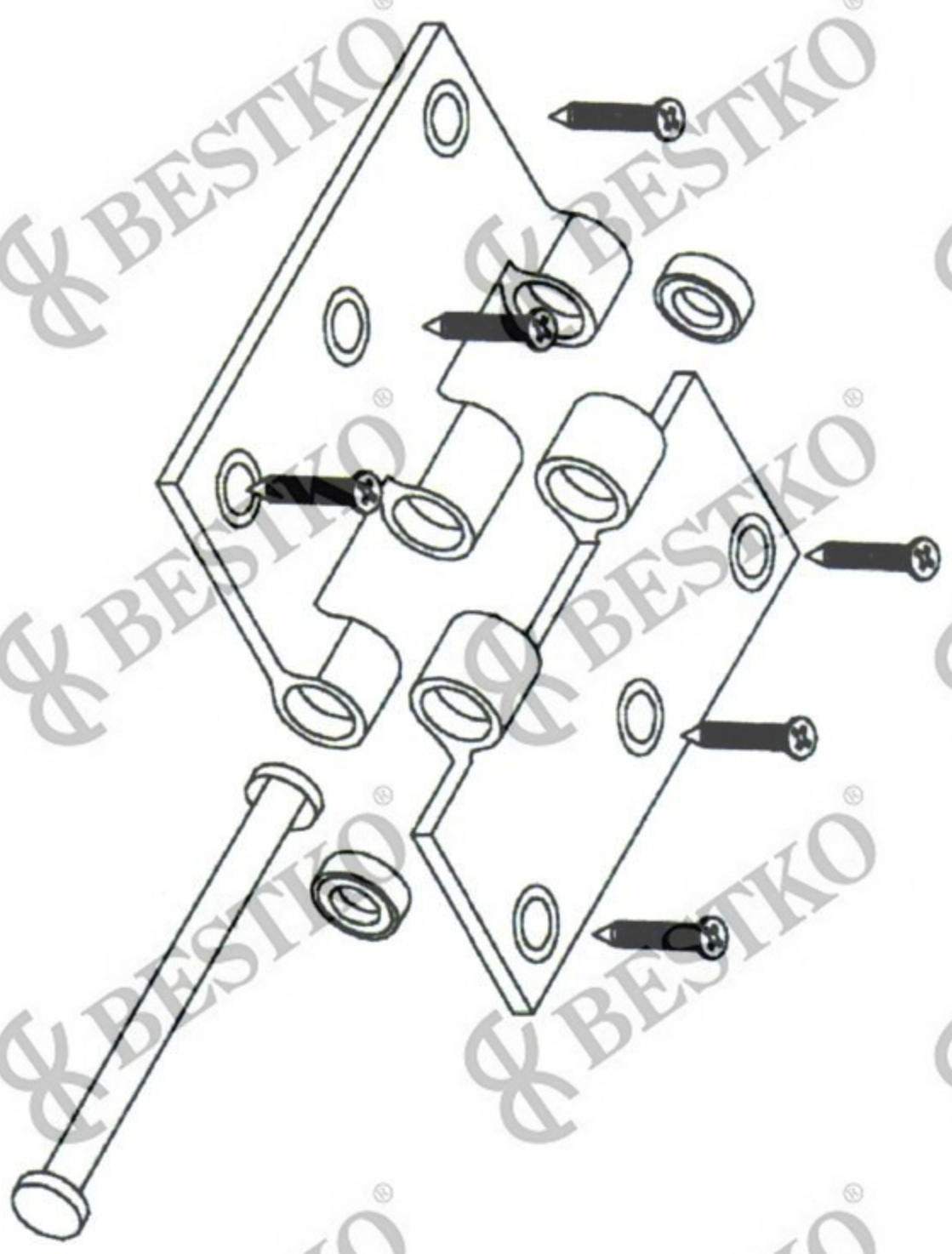
- Overall Dimensions:**
 - Width: 76.20
 - Height: 107.50
- Hole Specifications:**
 - Top-left hole: $\varnothing 14.00$
 - Bottom-left holes: $8-\varnothing 6.5$ and $8-\varnothing 10.00$
 - Right-side holes (vertical column): 37.75 , 63.75 , 12.75 , 88.75 , and 101.50
- Other Dimensions:**
 - Distance from top edge to first right-side hole: 18.25
 - Distance between right-side holes: 10.25
- Labels:**
 - 車承 (Carriage)



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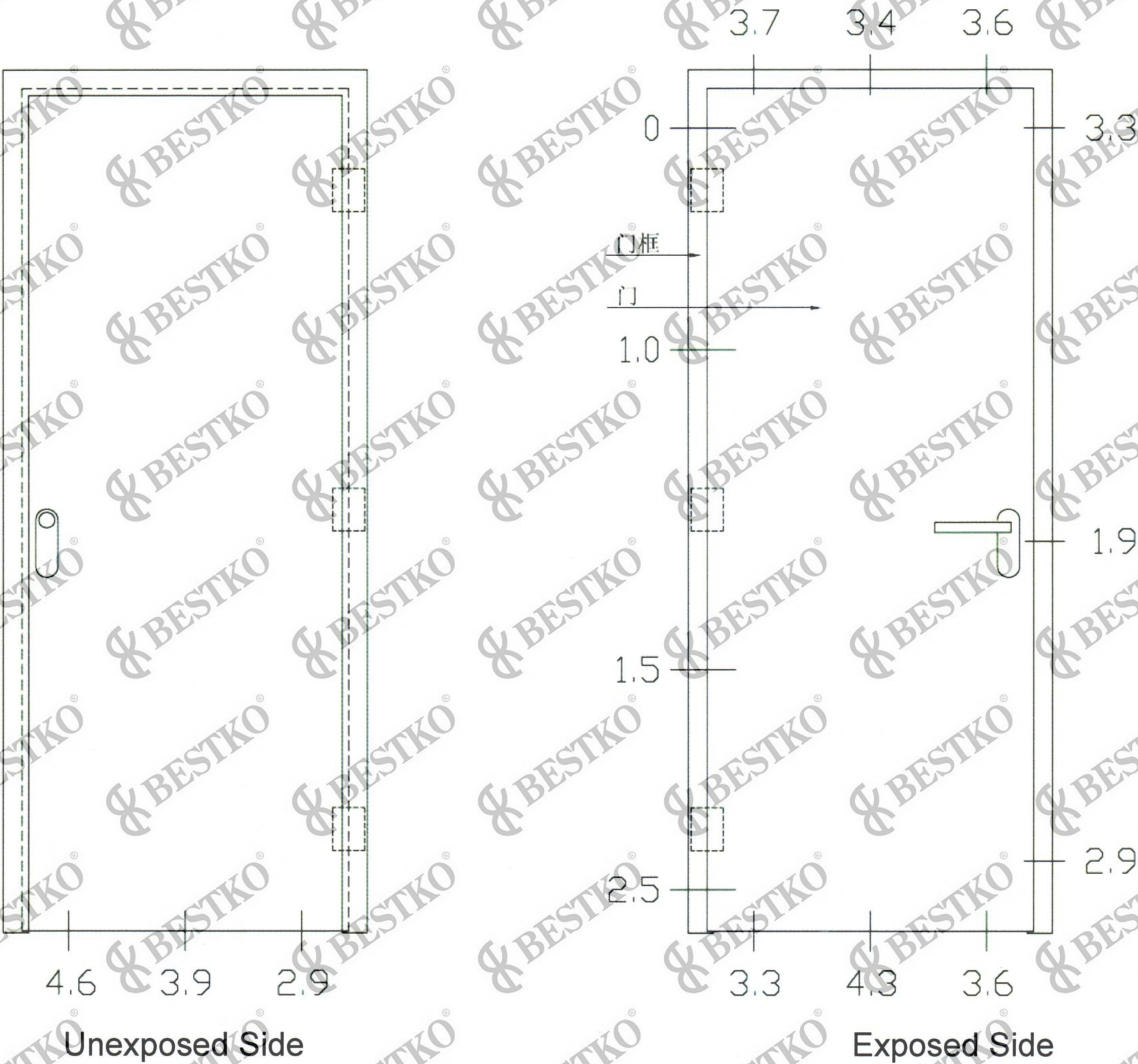
July 7, 2009

		瑞高精密五金制品(深圳)有限公司	
产品名称		产品型号	
合页		4x3x3 2BB	
制图	数量	审核	材料
邹国成			不锈钢
确认	比例	日期	视图
	1:1.5	2009-02-10	
更改	备注		
			
			
			
			



结构图

APPENDIX D: Test Measurement Data (3 pages)

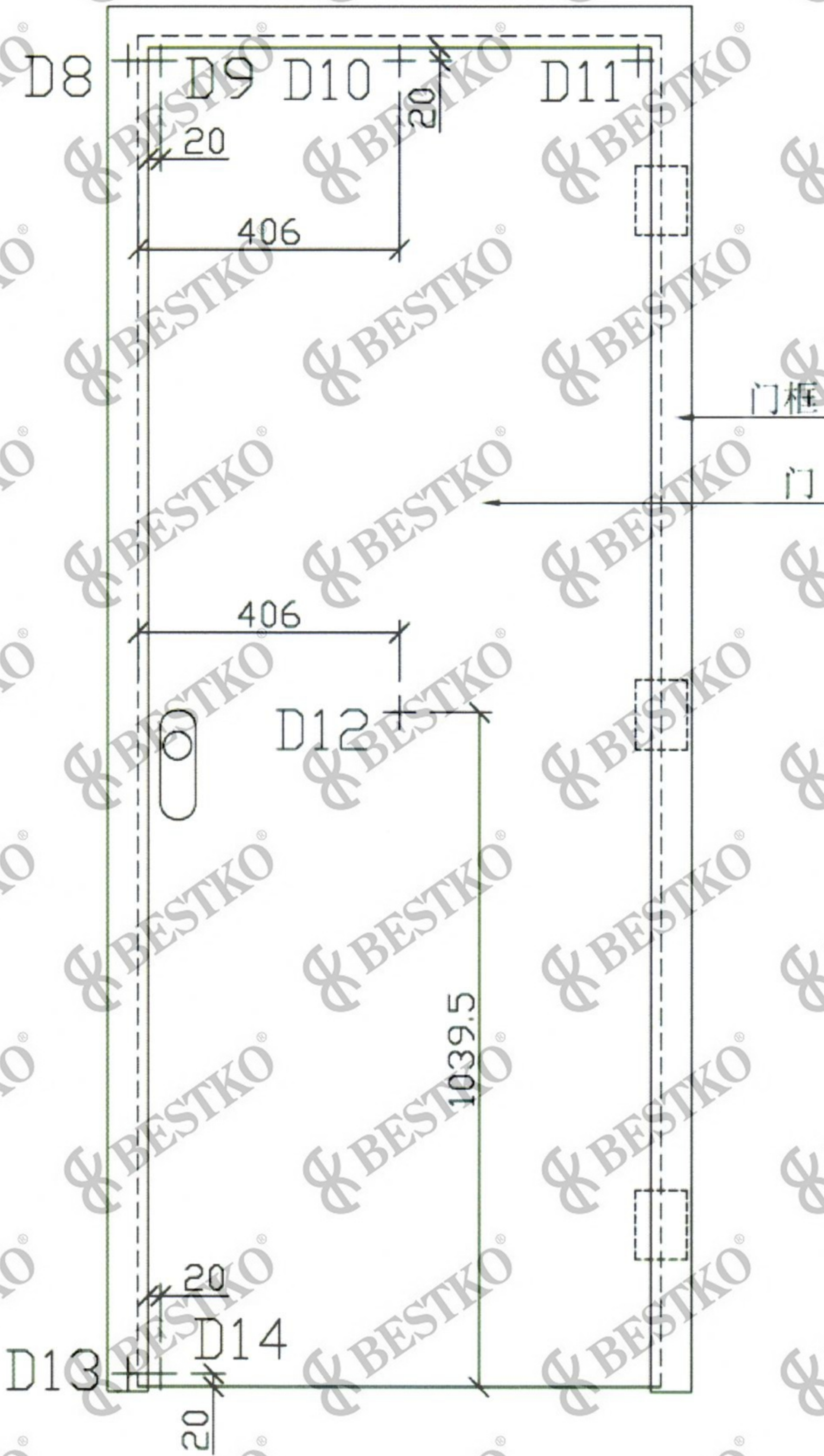


DOOR ASSEMBLY INITIAL CLEARANCES

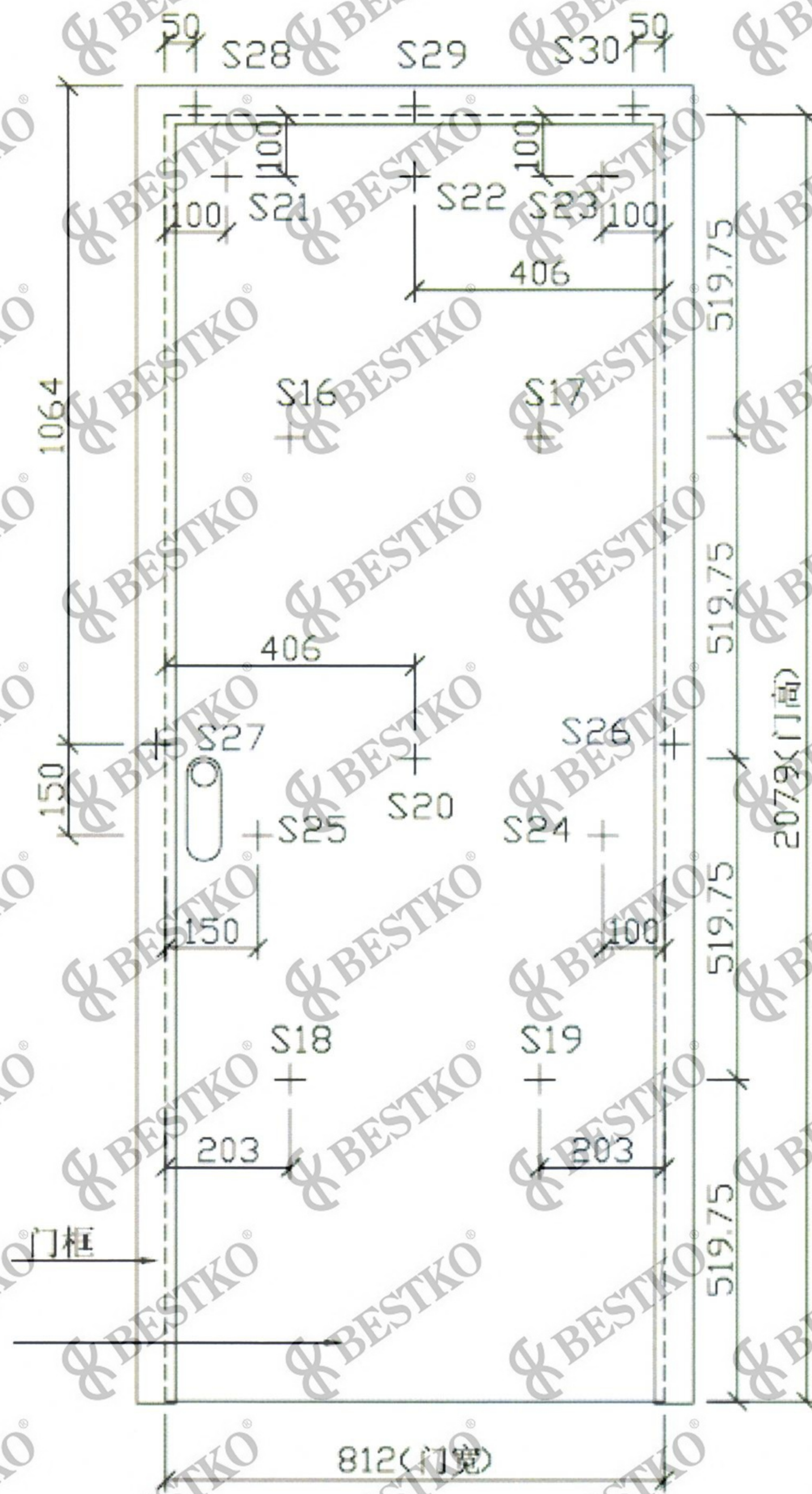
Intertek

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POSITION FOR MEASUREMENT OF HORIZONTAL DEFLECTION



POSITION FOR MEASUREMENT OF UNEXPOSED TEMPERATURE

APPENDIX F: Test Photographs (7 pages)



Fig 1 - Exposed Side Prior to the Fire Test

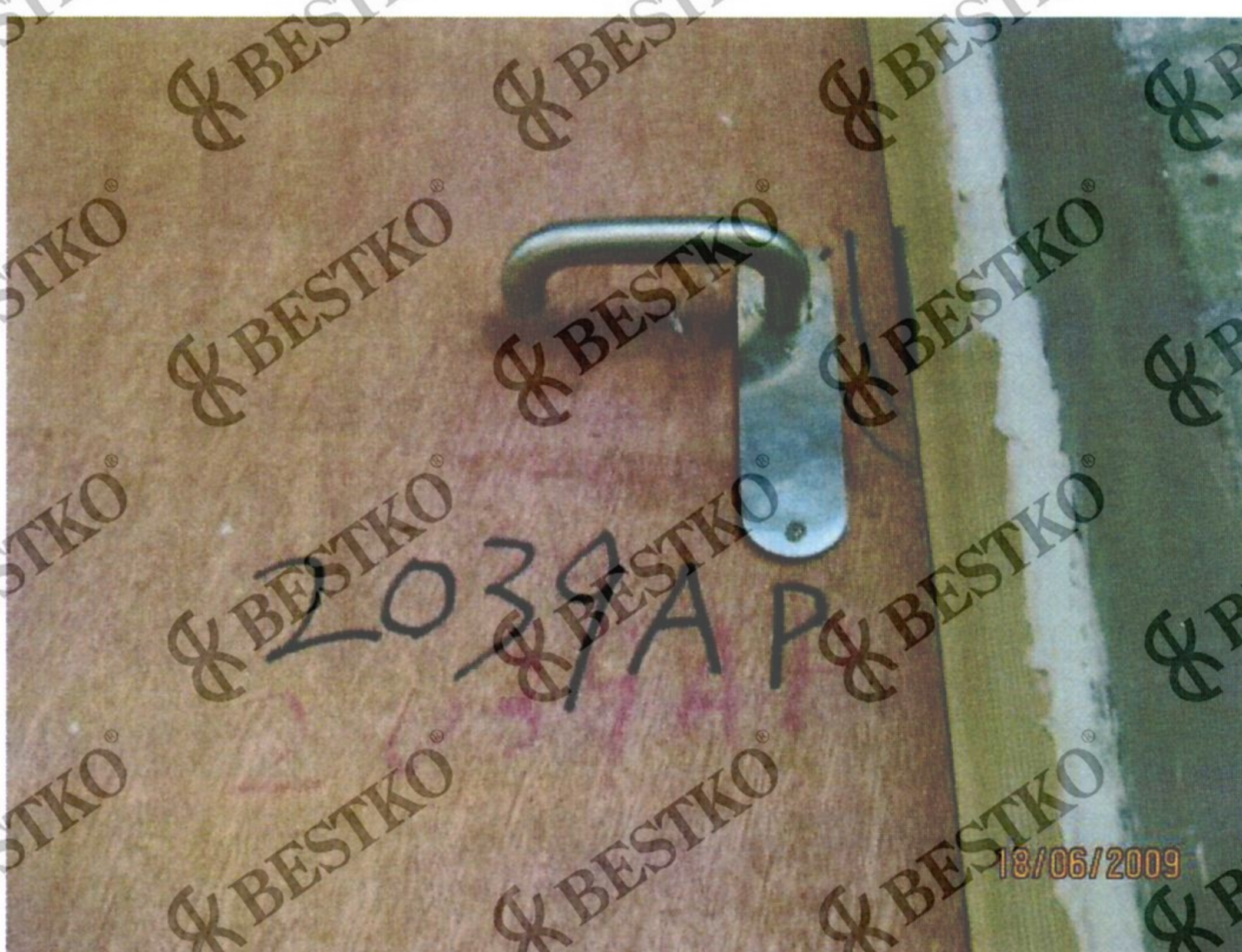


Fig 2 - Exposed Side Prior to the Fire Test

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July 7, 2009



Fig 3 - Unexposed Side Prior to the Fire Test



Fig 4 - Unexposed Side Prior to the Fire Test



Fig 5 – Unexposed Side after 38 Minutes



Fig 6 – Unexposed Side after 47 Minutes

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Fig 7 – Unexposed Side after 56 Minutes

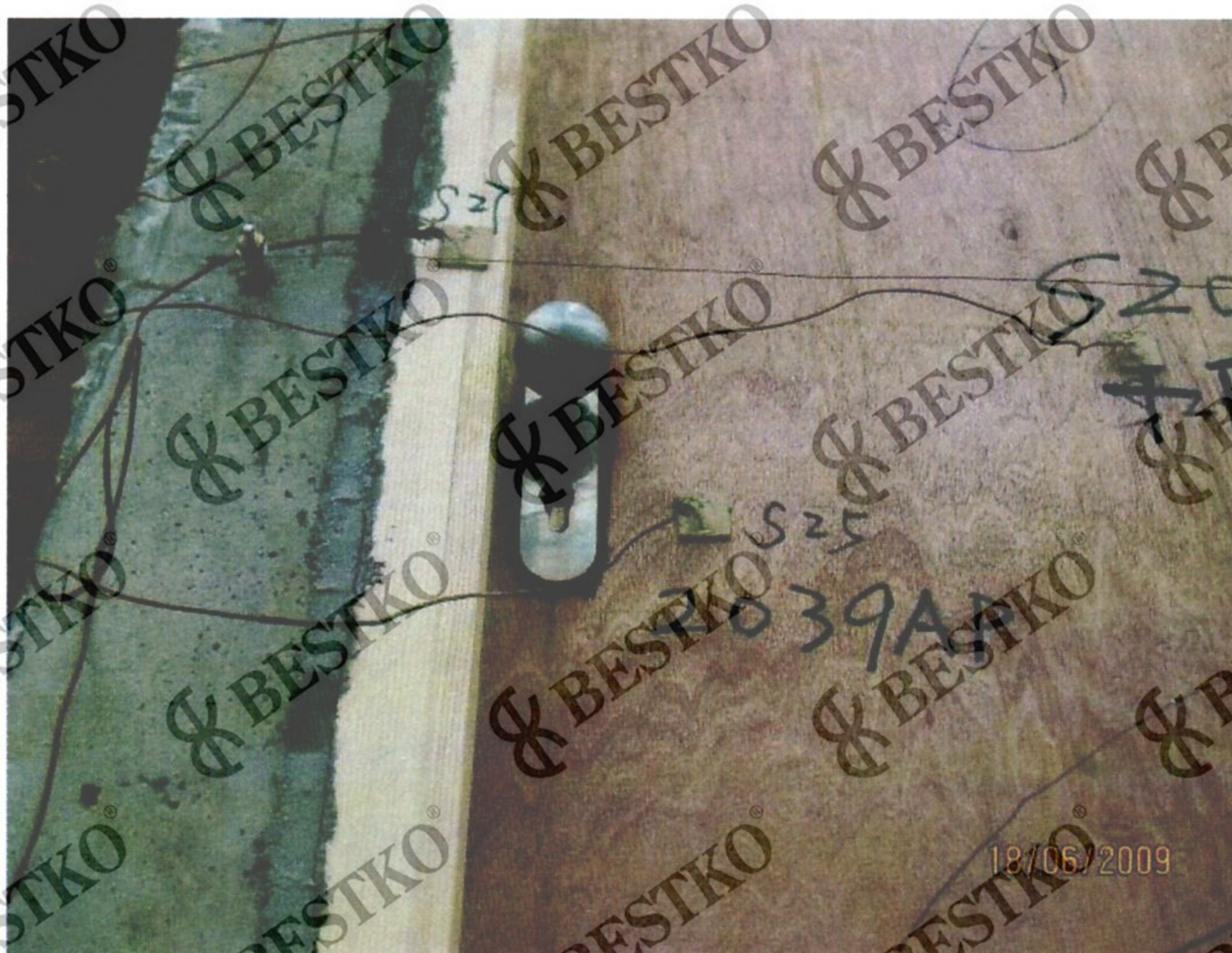


Fig 8 – Unexposed Side after 56 Minutes

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Fig 9 – Unexposed Side after 87 Minutes

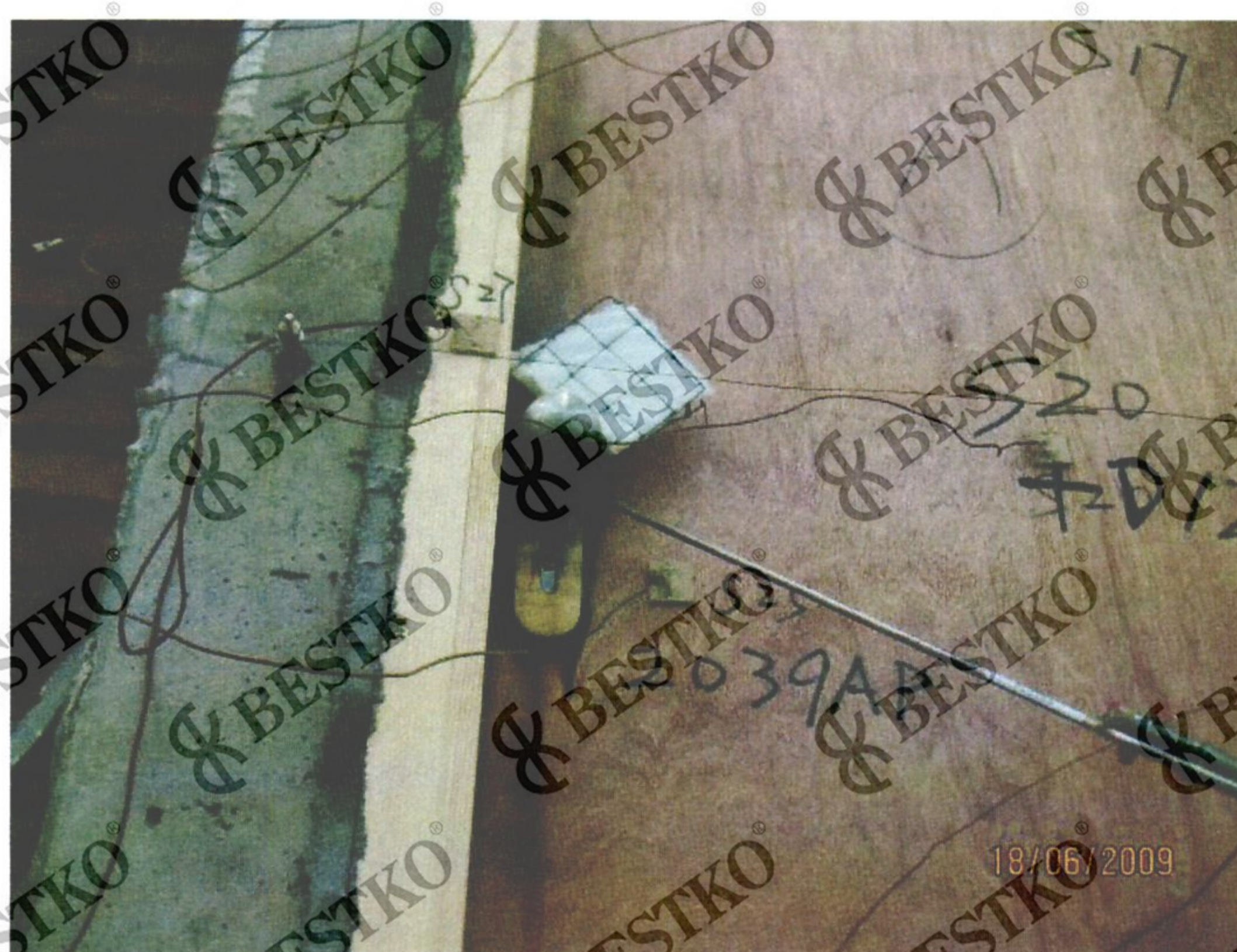


Fig 10 – Unexposed Side after 88 Minutes with Cotton Pad Check

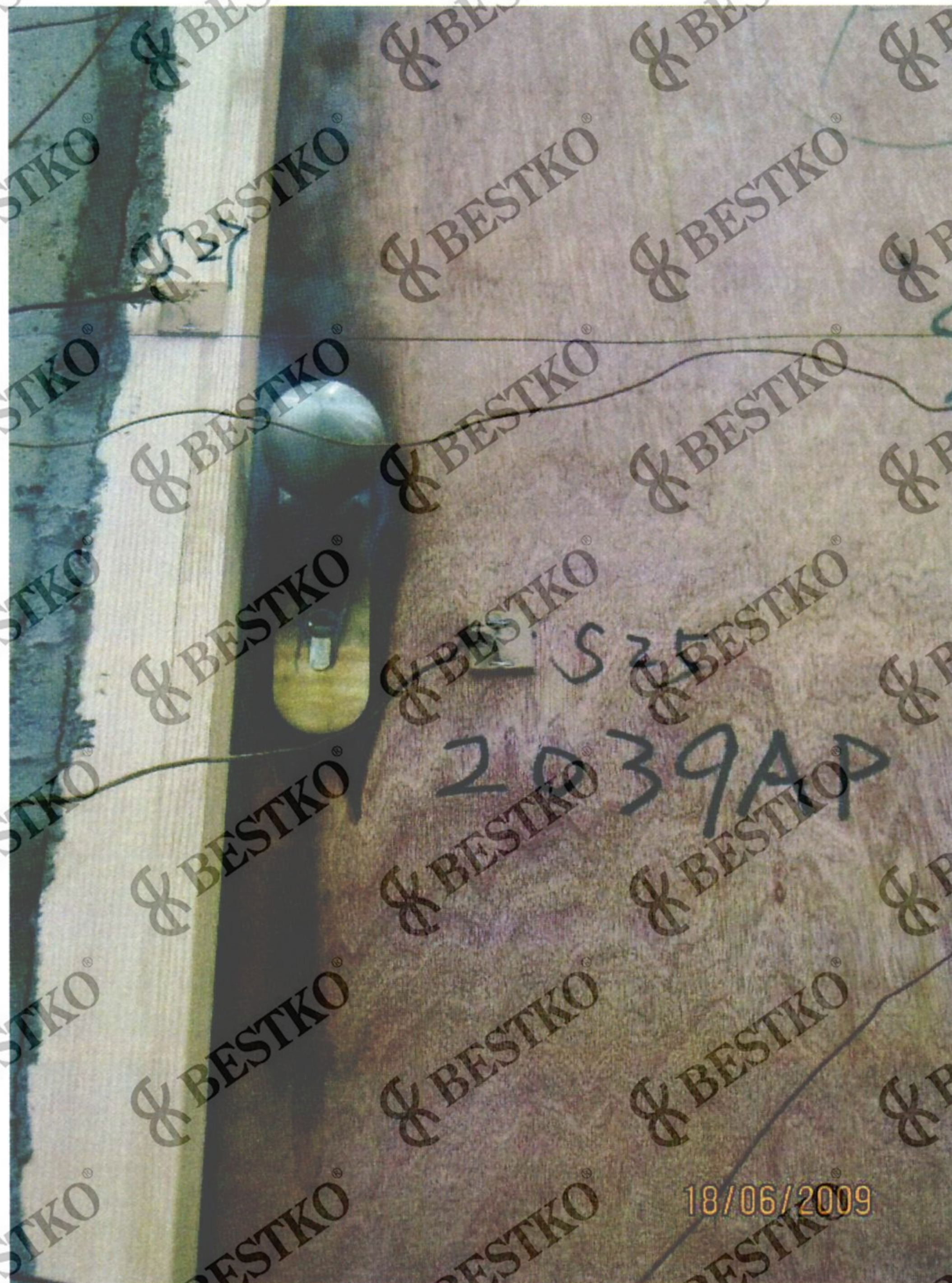


Fig 11 – Unexposed Side after 90 Minutes



Fig 12 - Unexposed Side after 90 Minutes



Fig 13- Exposed Side after the Fire Endurance Test



Fig 14 - Exposed Side after the Fire Endurance Test



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July 7, 2009

REVISION SUMMARY

DATE	SUMMARY
July 7, 2009	Initial report