

LIV BUILDING PRODUCTS TEST REPORT

SCOPE OF WORK

LIVE LOADS RESISTANCE TESTING OF SURFACE MOUNTED INVISIRAIL® GUARD SYSTEM WITH PRESSURE TREATED SPF AND CEDAR WOODEN TOP-RAILS TO IRC 2018

REPORT NUMBER

103670754TOR-002

TEST DATE(S)

10/18/18 - 10/19/18

ISSUE DATE

10/30/18

RECORD RETENTION END DATE

09/29/23

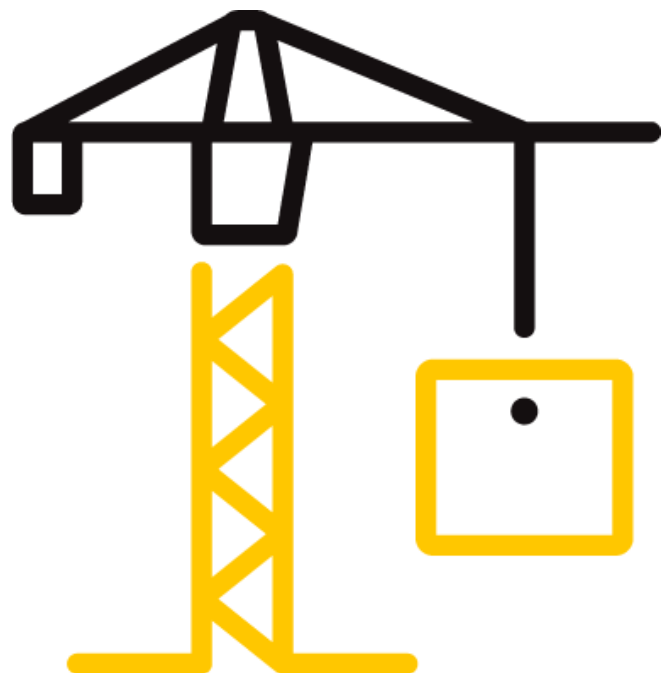
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TEST REPORT FOR LIV BUILDING PRODUCTS

Report No.: 103670754tor-002

Date: 10/30/18

REPORT ISSUED TO

LIV BUILDING PRODUCTS

6050 Owen Road
Uxbridge ON, L6P 1R1
Canada

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by LIV Building Products (LIV) to conduct live load resistance testing of the surface mounted InvisiRail® Guard System with wooden pressure treated SPF and cedar top rails. The scope of the testing was to determine the guard system resistance to the specified Live Loads as prescribed in the following code:

- 2018 International Residential Code (IRC), Sentence R301.5 d, f, h, and Table R301.5.


Testing was conducted at Intertek test facility in Mississauga, ON, from October 18th, 2018 to October 19th 2018.


SECTION 2

SUMMARY OF TEST RESULTS

The LIV surface mounted InvisiRail® Guard System with wooden pressure treated SPF and cedar top rails achieved the results presented in section 7 of this report.

For INTERTEK B&C:

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SECTION 3**TEST METHOD(S)**

The samples were evaluated in accordance with the following:

- 2018 International Residential Code (IRC), Sentence R301.5 d, f, h, and Table R301.5.

SECTION 4**EQUIPMENT**

Calibration of test equipment was performed by Intertek B&C in accordance with ISO 17025 requirements.

Equipment Calibration		
Instrument/Equipment	Asset #	Calibration Due Date
2K Load Cell with Digital Indicator	280-01-0774	Jan-15-2019
2K Load Cell with Digital Indicator	280-01-0773	Jan-15-2019
Stop Watch	273-01-1201	Apr-13-2019
Digimatic indicator	280-01-0836	Mar-26-2019
Tape Measure	280-01-1222	Aug-7-2019
Powerfist 24" stroke Hydraulic Ram	N/A	N/A
Electric Hydraulic Pump	N/A	N/A

SECTION 5**TEST SAMPLE****5.1 SAMPLE SELECTION**

An assembled guard system installed on an SPF wooden deck frame was submitted to Intertek directly from the client on 2nd October 2018. Samples were not independently selected for testing. Tests were performed at the Intertek laboratory in Mississauga, Ontario.

5.2 SAMPLE DESCRIPTION AND ASSEMBLY

The "L" shaped guard assembly consisted of four (4) surface mounted InvisiRail® stainless steel posts, three (3) tempered glass infill and wooden top rails. Posts were spaced 1870 mm and 1030 mm along the length and 1297 mm on the shorter 90° return section. The post installed at the 90° corner, was installed at a 45° angle. The guard assembly was installed on a wooden frame constructed with 2 in. x 6 in. and 6 in. x 6 in. SPF wood, the overall deck frame measured 1520 mm x 3123 mm.

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Posts were anchored to a 21.5mm thick composite deck board and 6 in. x 6 in SPF wood joists using six (6) 3/8 in. x 6 in. U2 Construction Screw™. The height of the guard measured 1100 mm from the surface of the composite deck board to the top of the wooden rails. Tests were conducted with Pressure Treated SPF and Cedar top rails installed.

5.3 ASSEMBLY DESCRIPTION

The Surface Mounted InvisiRail Guard System component descriptions and key dimensions are summarized in the table below.

Guard Assembly Description						
Drawing Number	Drawing Title	Part Description/Function	Part Dimensions (mm)			Reported Material
			Length	Width	Nominal Thickness	
1406.0793	SS Post with Flange Mount in 1080 mm	Post fitted inside and fully welded to 121 mm x 64 mm x 10mm thick SS plate consisting of six(6) 12 mm dia. holes	1245	85 to 38 taper	8	Stainless Steel
1804.2390	SS Holder for Top Rail	Supports the top rail and bolted to SS Post using a single M8x1.5x25. socket head bolt with nut.	See Drawing for Dimensions			Stainless Steel
1707.1962	SS angled Block Spacer	Bolted to the SS Post installed at the corner, using a single M8x1.25x37 socket head bolt.	See Drawings for Dimensions			Stainless Steel
1110.3096	SS clamp Notch 10 mm	Clamps (4 per glass infill) located 70 mm up from lower edge of glass, and 61 mm down from upper edge of glass on both sides. Held together by two (2) M6x1.0x10 Countersink screw type.	64	45	6.3	Stainless Steel
N/A	Wooden Top Rail	Secured to "SS Holder for Top Rail" using four (4) #8 x 1.25 in. screws and held together at the 45° mitre joint by two (2) #8x 3 in. screws.	1420	137	25	Cedar wood
N/A	Wooden Top Rail		1420	137	25	Cedar wood
N/A	Wooden Top Rail		3060	137	25	SPF pressure Treated
N/A	Wooden Top Rail		3060	137	25	SPF pressure Treated
N/A	InvisiRail Glass Panel	Tempered glass Supported by four(4) SS clamp Notch 10 mm with a glass retaining Pin, retaining Pin Bushing	1773	984	10	Tempered Glass
	InvisiRail Glass Panel		1202	984	10	Tempered Glass
	InvisiRail Glass Panel		974	984	10	Tempered Glass
N/A	N/A	Glass Retaining Pin	20 by 8 OD			Stainless Steel
N/A	N/A	Retaining Pin Bushing	8 by 12 OD			Plastic

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SECTION 6

TESTING AND EVALUATION

6.1 SAMPLE PREPARATION

The guard system was received assembled at the Intertek laboratory in Mississauga, Ontario; no sample preparation was required since the samples were tested as received.

6.2 CONDITIONING

Samples were tested in the laboratory under ambient conditions. No specific conditioning parameters were required before testing.

6.3 PROCEDURE

Concentrated Load Test

Concentrated loads were applied horizontally and vertically along the top of the guard at various points; loads were applied separately and sequentially and did not act concurrently with any other live load requirements. Live loads and factored live loads were applied over a 100 mm x 100 mm square platen and held for one (1) minute, whereupon deflection was recorded at the point of application of the load. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

Factored loads

The applicable factored loads to be applied were based on the Live loads in Table R301.5 of the 2018 International Residential Code increased by a safety factor of 3.0 for guard with wooden components.

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SECTION 7

TEST RESULTS

Guard Assembly With Wooden Top Rail Installed (Testing Conducted with Cedar Top Rail)						
Test		Specified load kN (lbf)	Deflection at Specified load mm (In.)	Applied Safety Factor	Factored load Applied kN (lbf)	Pass/Fail
Horizontal infill load applied on the top edge of the glass over a width of 100 mm x height of 100 mm		0.224 (50)	10.1 (0.4)	4	0.89 (200)	Pass
Vertical concentrated load applied at the top of the guard, mid span of the largest span		0.89 (200)	0.5 (0.02)	2.5	2.22 (500)	Pass
Top of Post end post (return corner disconnected)		0.89 (200)	36.9 (1.5)	2.5	2.22 (500)	Pass
Cedar Wood Top Rail						
Horizontal concentrated load applied at the top Rail	Mid Span of the largest span	0.89 (200)	11.70 (0.46)	3.0	2.68 (600)	Pass
	Adjacent to corner Post, Return corner Restrained	0.89 (200)	2.36 (0.09)	3.0	2.68 (600)	Pass
	Adjacent to corner Post, return corner Unrestrained	0.89 (200)	6.42 (0.25)	3.0	2.68 (600)	Pass
	Adjacent to Post (End Post)	0.89 (200)	30.90 (1.22)	3.0	2.68 (600)	Pass
Pressure Treated SPF Wood Top Rail						
Horizontal concentrated load applied at the top Rail	Mid Span of the largest span	0.89 (200)	7.45 (0.30)	3.0	2.68 (600)	Pass
	Adjacent to corner Post, Return corner Restrained	0.89 (200)	2.55 (0.10)	3.0	2.68 (600)	Pass
	Adjacent to corner Post, return corner Unrestrained	0.89 (200)	4.68 (0.18)	3.0	2.68 (600)	Pass
	Adjacent to Post (End Post)	0.89 (200)	21.01 (0.83)	3.0	2.68 (600)	Pass

After release of the loads there was no evidence of disengagement or visible cracks in any components of the guard rail system.

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SECTION 8

CONCLUSION

Intertek has conducted testing for LIV Building Products on the Surface Mounted InvisiRail® Guard System with Pressure Treated SPF and Cedar Wood Top Rails. The scope of the testing was to assess the ability of the guard system to resist the specified Live Loads as prescribed in the 2018 International Residential Code, Sentence R301.5 d, f, h, and Table R301.5. Safety factors as outlined in this report were applied to the specified Live Loads.

The LIV Surface Mounted InvisiRail® Guard System, using the components detailed in Section 5.3 of this report, has demonstrated resistance to the Live Loads prescribed in the 2018 International Residential Code (IRC), as documented in this report.

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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SECTION 9

PICTURE

Photo of Assembled Guard with Cedar Top Rail Installed



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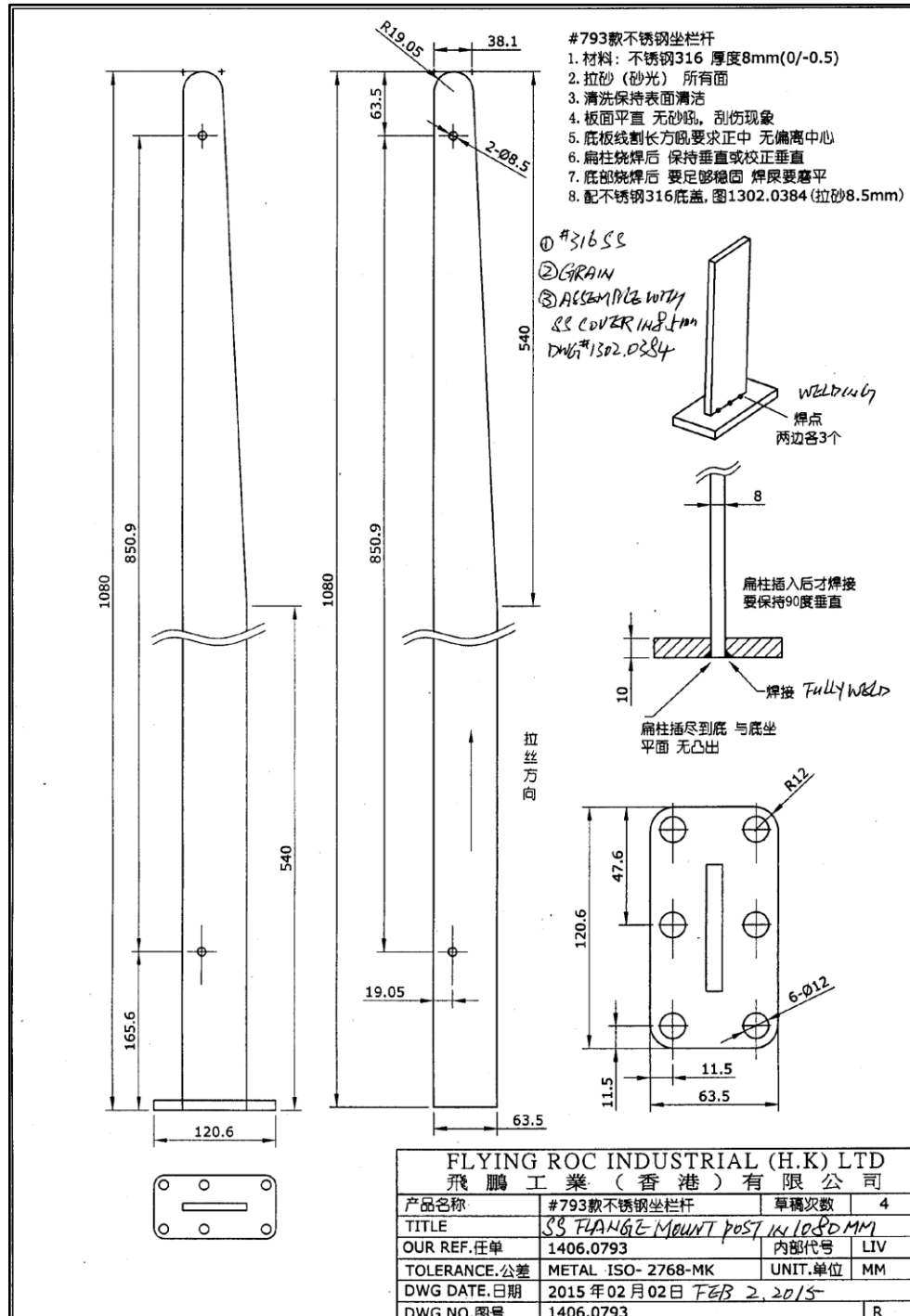
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SECTION 10

APPENDIX -DRAWINGS

SS Flange Mount Post in 1080 mm

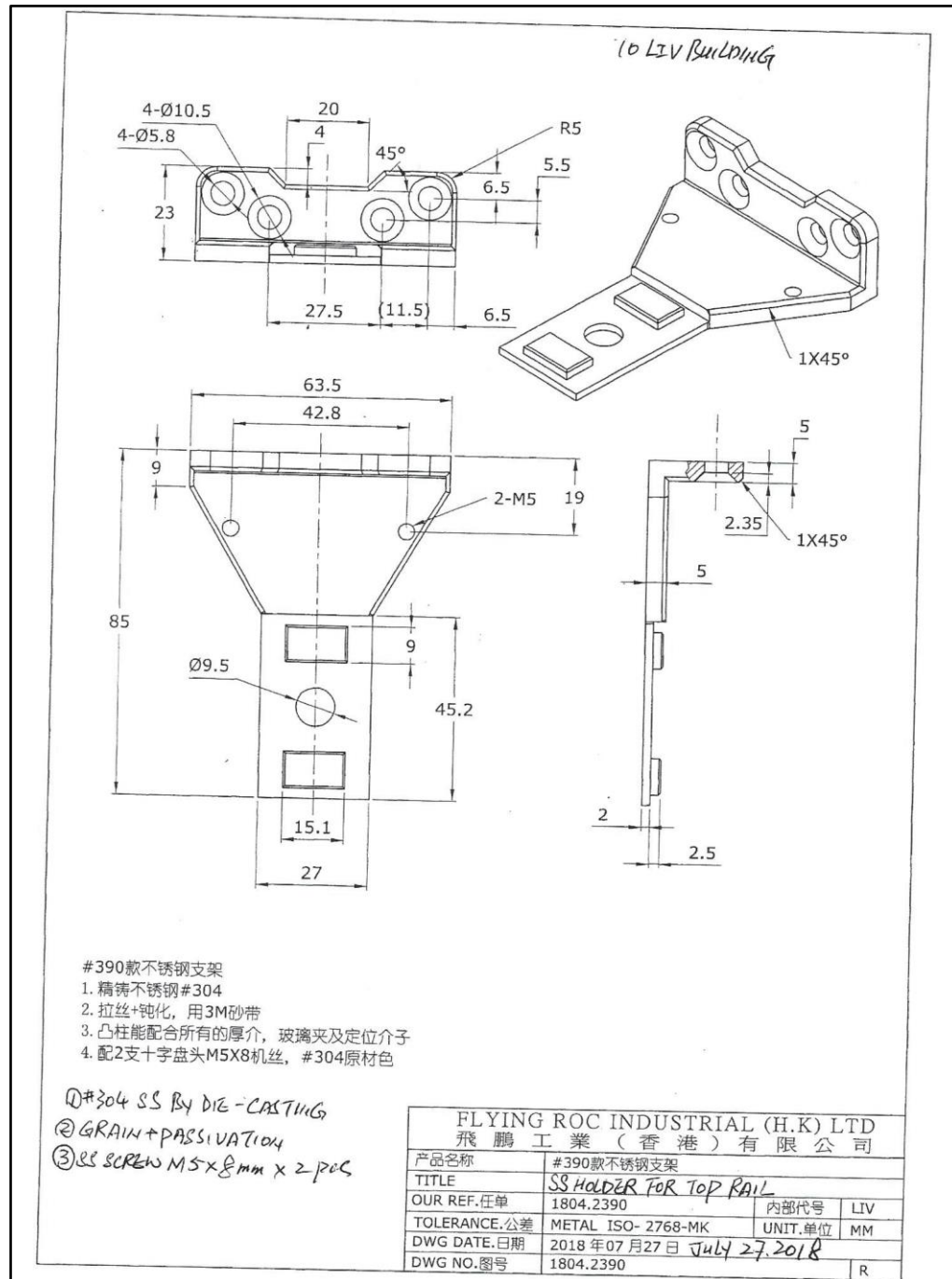


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SS Holder for Top Rail

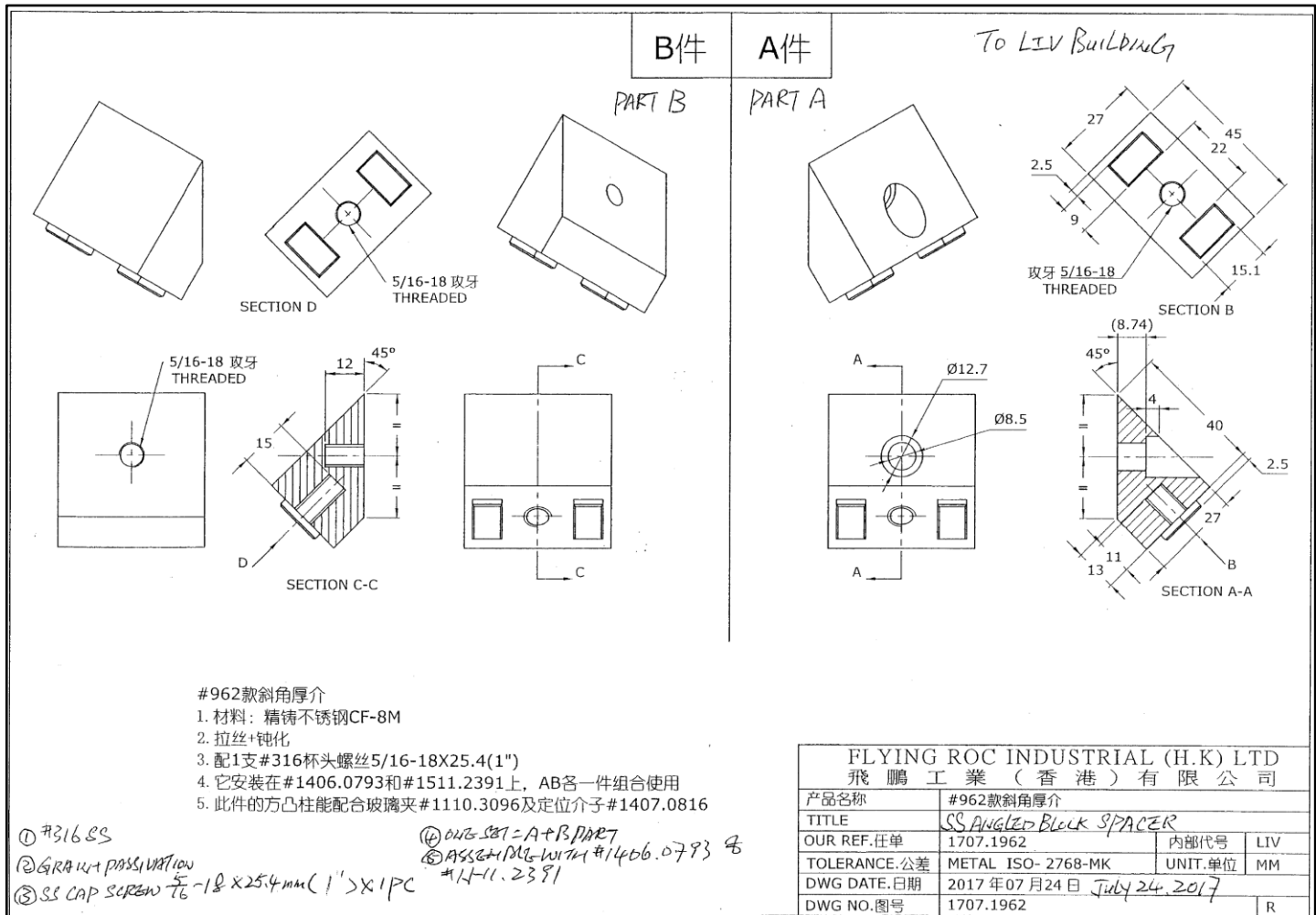


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SS Angled Block Spacer

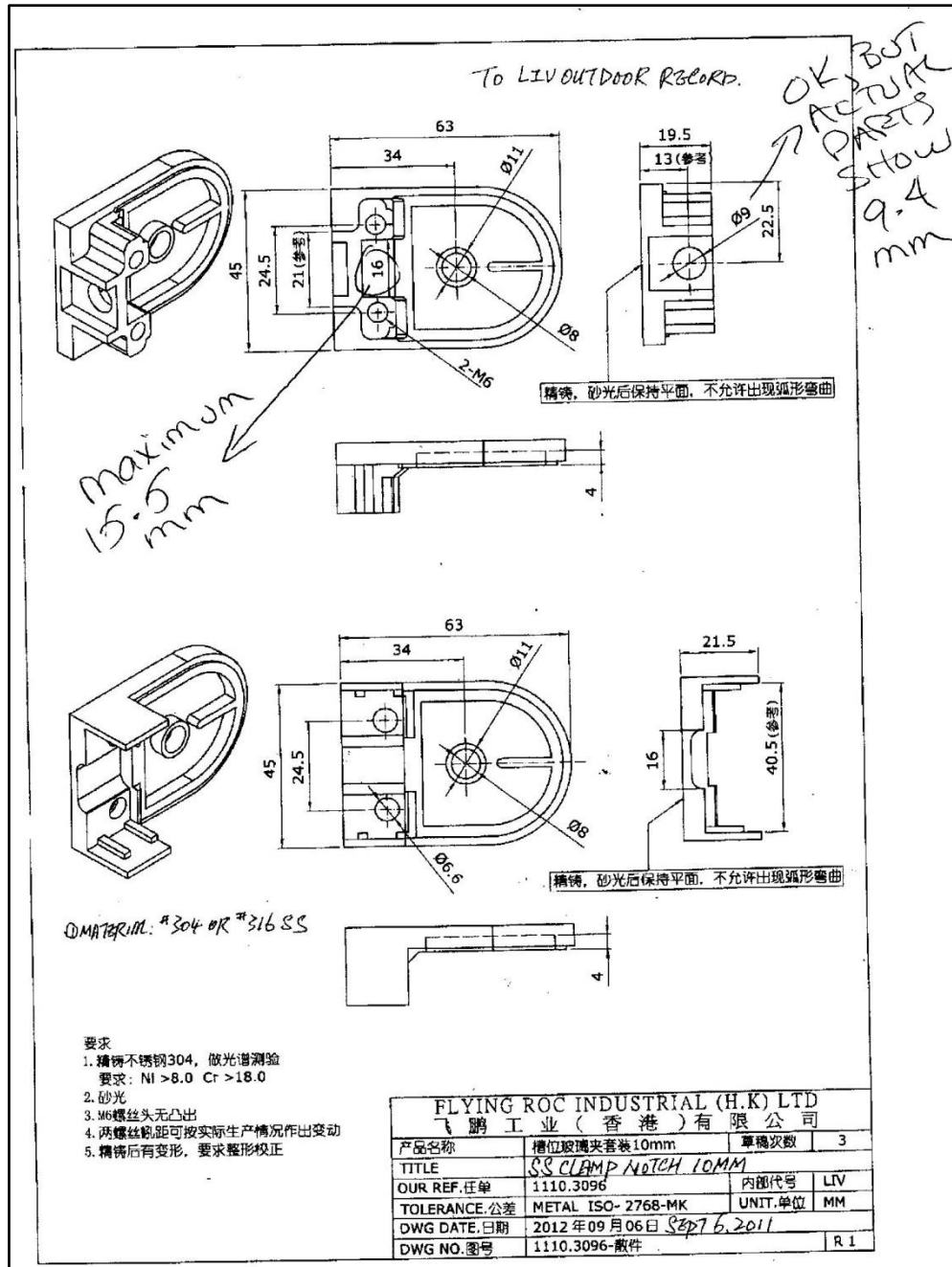


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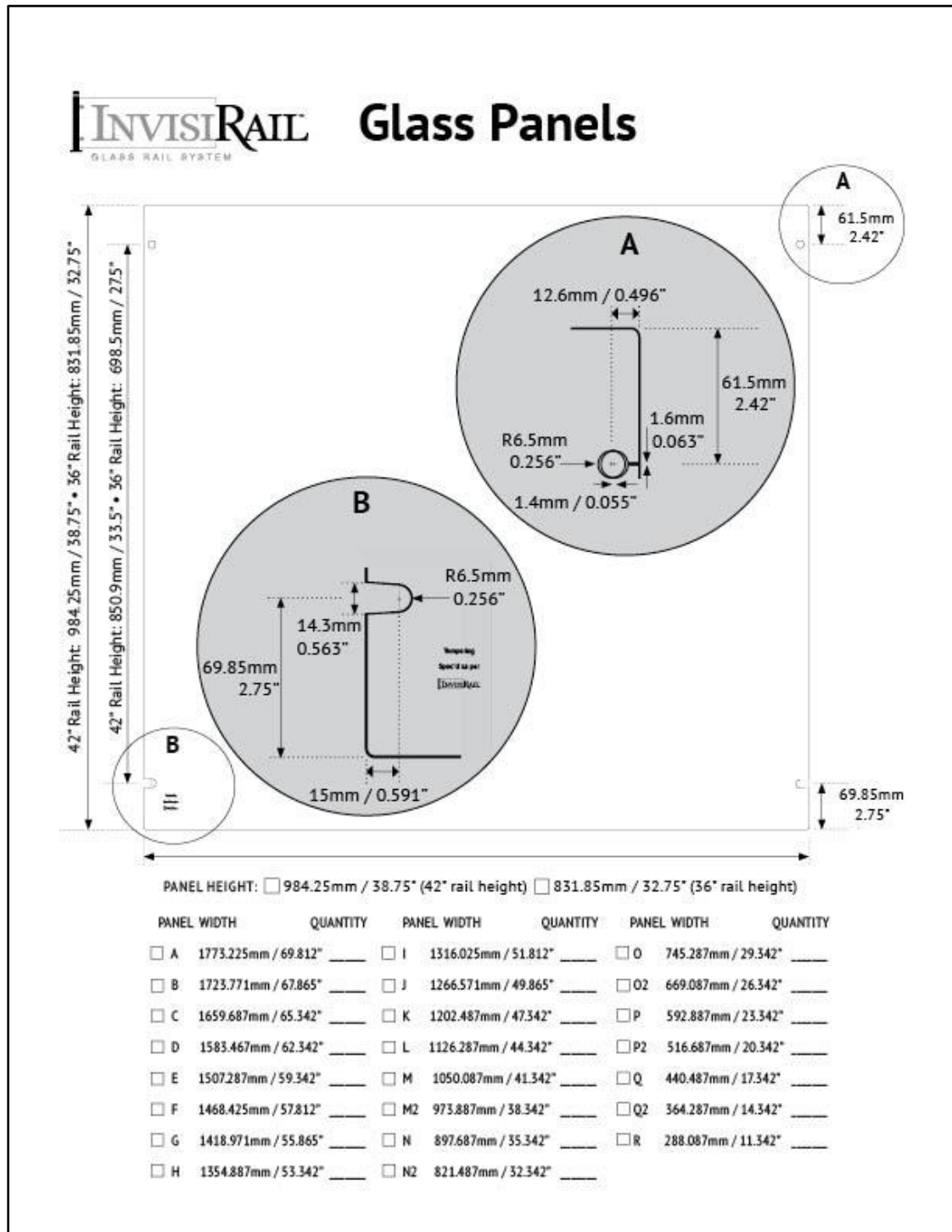
SS Clamp Notch 10 mm



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SECTION 11

REVISION LOG

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