

LIV BUILDING PRODUCTS TEST REPORT

SCOPE OF WORK

LOAD RESISTANCE TESTING OF INVISIRAIL® GUARD SYSTEM WITH MINERAL-PVC AND WOOD/HDPE COMPOSITE TOP RAILS.

REPORT NUMBER

103670754-TOR-005B

TEST DATE(S)

12/03/18 - 12/12/18

ISSUE DATE

12/21/18

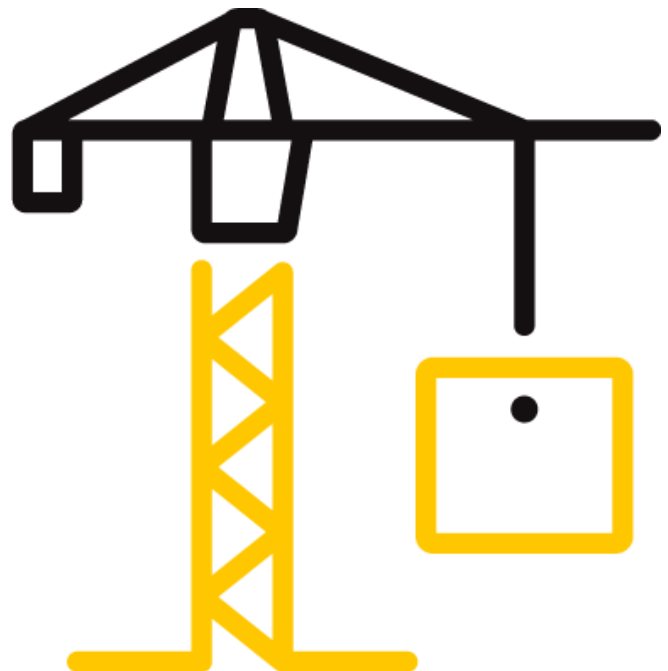
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DOCUMENT CONTROL NUMBER

GFT-OP-10c (AUGUST 27, 2018)

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TEST REPORT FOR LIV BUILDING PRODUCTS

Report No.: 103670754-TOR-005B

Date: 12/21/18

REPORT ISSUED TO

LIV BUILDING PRODUCTS

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Uxbridge ON, L6P 1R1

Canada

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by LIV Building Products (LIV), to perform load resistance testing on the InvisiRail® Guard System with Mineral – PVC and Wood/HDPE Composite top-rails. The scope of the testing was to assess the resistance of the guard system to the specified loads prescribed in:

- 2018 International Residential Code (IRC), Sentence R301.5 d, f, h, and Table R301.5.
- ASTM D7032 *“Standard Specification for Establishing Performance Ratings for Wood- Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards and Handrails”* Section 6.2.2.

Testing was conducted at Intertek test facility in Mississauga, ON, from December 3rd, 2018 to December 12th 2018.

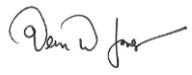
This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.


SECTION 2

SUMMARY OF TEST RESULTS

The InvisiRail® Guard System with Mineral- PVC and Wood/HDPE Composite top-rails achieved the results presented in section 10 of this report.

For INTERTEK B&C:

COMPLETED BY:	Tyrone Williams
TITLE:	Technician, Building Products
SIGNATURE:	 Vern Jones for Tyrone Williams
DATE:	12/21/18

REVIEWED BY:	Joe DeRose, P. Eng.
TITLE:	Project Engineer, Evaluation Services
SIGNATURE:	
DATE:	12/21/18

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SECTION 3

TEST METHOD(S)

The specimens were evaluated in accordance with the following:

- 2018 International Residential Code (IRC), Sentence R301.5 d, f, h, and Table R301.5.
- ASTM D7032 *"Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards and Handrails"*, Section 6.2.2.

SECTION 4

MATERIAL SOURCE/INSTALLATION

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

SECTION 5

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 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Joe DeRose	Intertek B&C

Note: The above observer(s) witnessed a portion of the test program.

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SECTION 7**TEST PROCEDURE****Infill Load Test**

Test Loads were applied over a 100 mm x 100 mm square platen normal to the in-fill at the intersection of the top edge and horizontal center line of the in-fill. Loads were applied and held for one (1) minute, whereupon deflection of the in-fill at the point of maximum deflection was recorded. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

Concentrated Load Test

Concentrated test loads were applied separately and sequentially at the following three critical locations: *vertically on the top rail at mid-span between posts, horizontally on the top rail adjacent to a post, and horizontally on top of a single post*. A 200 lbf load increased by the end-use adjustment factor was 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. The load was increased to 500 lbf increased by the end-use adjustment factor and held for one (1) minute. The load applied on the rail adjacent to the post was applied to the opposite post from which the top-of-post-test was performed on. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

SECTION 8**TEST CALCULATIONS**

The test loads identified in ASTM D7032 Section 6.2.2 were increased based on the end-use adjustment factors provided by LIV. The applied loads were determined as follows:

Mineral – PVC Deck Board (Recycled A with No UV Inhibitors)

- For deflection criteria the loads were increased by 21% (46% loss of MOE at elevated temperature less 25%). The 200 lbf concentrated load was increased to 242 lbf.
- For strength criteria the loads were increased 13% (38% loss of strength at elevated temperature less 25%) The 500 lbf concentrated load was increased to 565 lbf.

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Wood/HDPE Composite Deck Board, loads were increased as follows:

- For deflection criteria the test loads were increased by 17% (42% loss of MOE at elevated temperature less 25%). The 200 lbf concentrated load was increased to 234 lbf.
- For strength criteria the test loads were increased by 15% (40% loss of strength at elevated temperature less 25%). The 500 lbf concentrated load was increased to 575 lbf.

SECTION 9**TEST SPECIMEN DESCRIPTION**

The “L” shaped guard assembly consisted of four (4) surface mounted InvisiRail® stainless steel posts, three (3) tempered glass infill and top rails. Posts were spaced 1870 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. headers and 6 in. x 6 in. SPF wood joists, the overall deck frame measured 1520 mm x 3123 mm.

Posts were anchored through a 21.5mm thick composite deck board into 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 rails.

Tests were conducted with Mineral – PVC Deck Board and Wood/HDPE Composite top-rails.

The InvisiRail Guard System component descriptions and key dimensions are summarized in the table on the following page.

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Guard Assembly Description						
Drawing Number	Drawing Title	Part Description/Function	Part Dimensions (mm)			Reported Material
			Length	Width	Nominal Thickness	
1406.0793	SS Post with Surface Flange Mount	Post fitted inside and perimeter welded to 121 mm x 64 mm x 10mm thick SS plate with consisting of six(6) 12 mm dia. holes	1080	85 to 38 taper	8	Stainless Steel
1804.2390	SS Holder for Top Rail	Supports the top rail and is bolted to SS Post using a single M8x1.5x25. socket head bolt with nut.	See Drawing for Dimensions			Stainless Steel
N/A	N/A	Top Rails-Secured to "SS Holder for Top Rail" using four (4) #8 x 1.25 in. screws	1420	139	21	Mineral – PVC Deck Board (Recycled A with No UV Inhibitors)
N/A	N/A		1960	139	21	
N/A	N/A		1420	139	21	Wood/HDPE composite deck board
N/A	N/A		1960	139	21	
N/A	InvisRail 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
			1202	984	10	
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
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
N/A	N/A	Retaining Pin Bushing	8 by 12 OD			Plastic

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SECTION 10
TEST RESULTS

TEST		SPECIFIED LOAD WITH END-USE ADJUSTMENT (lbf)	DEFLECTION (in.)	ALLOWABLE DEFELCTION (in)	REQUIRED FACTORED LOAD INCLUDING END-USE ADJUSTMENT (lbf)	APPLIED LOAD (lbf)	PASS/ FAIL
MINERAL – PVC TOP RAIL							
Infill Load Test- Applied to the glass infill area, distributed over 100 mm x 100 mm area.		50	0.68	Not Required	200 (Per IRC)	500	Pass
Horizontal load applied at the minimum required height of the guard	Top Rail-mid Span	242	0.63	2.42	565 (Per ASTM D7032 Section 6.24)	565	Pass
	Adjacent to corner Post, Return corner Restrained	242	0.14	Not Required		565	Pass
	Adjacent to corner Post, return corner Unrestrained	242	0.15			565	Pass
	Adjacent to Post End post of the largest span	242	1.08			565	Pass
	Top of post-End post of the largest span	242	0.65	3.41		565	Pass
WOOD/HDPE COMPOSITE TOP RAIL							
Infill Load Test- Applied to the infill area of a baluster or panel railing system, distributed over 100 mm x 100 mm area.		125	0.79	Not Required	200 (Per IRC)	500	Pass
Horizontal load applied at the minimum required height of the guard	Top Rail-mid Span	234	0.59	2.42	575 (Per ASTM D7032 Section 6.24)	575	Pass
	Adjacent to corner Post, Return corner Restrained	234	0.11	Not Required		575	Pass
	Adjacent to corner Post, return corner Unrestrained	234	0.19			575	Pass
	Adjacent to Post End post of the largest span	234	1.25			575	Pass
	Top of post-End post of the largest span	234	1.26	3.41		575	Pass

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SECTION 11

CONCLUSION

Intertek has conducted testing for LIV Building Products on the InvisiRail® Guard System with Mineral- PVC and Wood/HDPE composite top-rails. The scope of the testing was to assess the resistance of the guard system to the specified loads prescribed in:

- 2018 International Residential Code (IRC), Sentence R301.5 d, f, h, and Table R301.5.
- ASTM D7032 *“Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards and Handrails”* Section 6.2.2.

The InvisiRail® Guard System, using the components detailed in Section 8 of this report, has demonstrated resistance to the specified loads as detailed 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 12

PHOTOGRAPHS

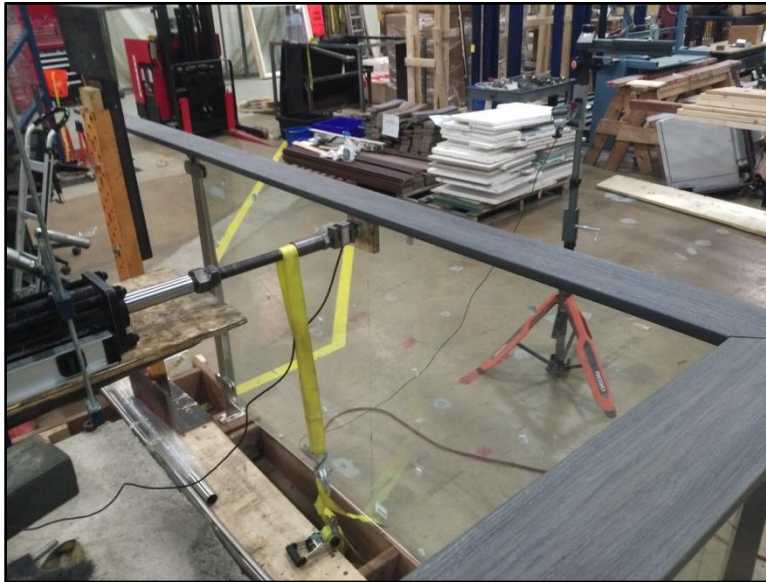


Photo No. 1
Infill Load Test



Photo No. 2
Top Rail Mid-Span Load Test

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Photo No. 3
Adjacent to Corner Post

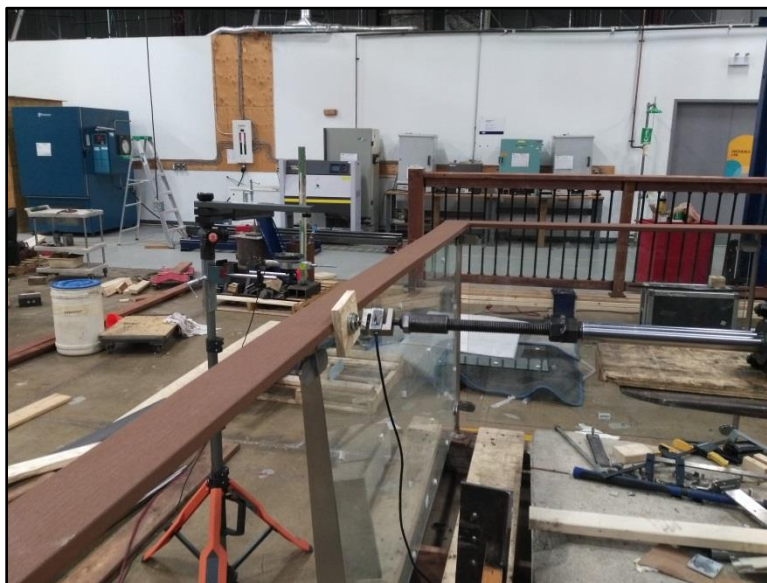


Photo No. 4
Adjacent to End Post

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Photo No. 5
Top of the End-Post

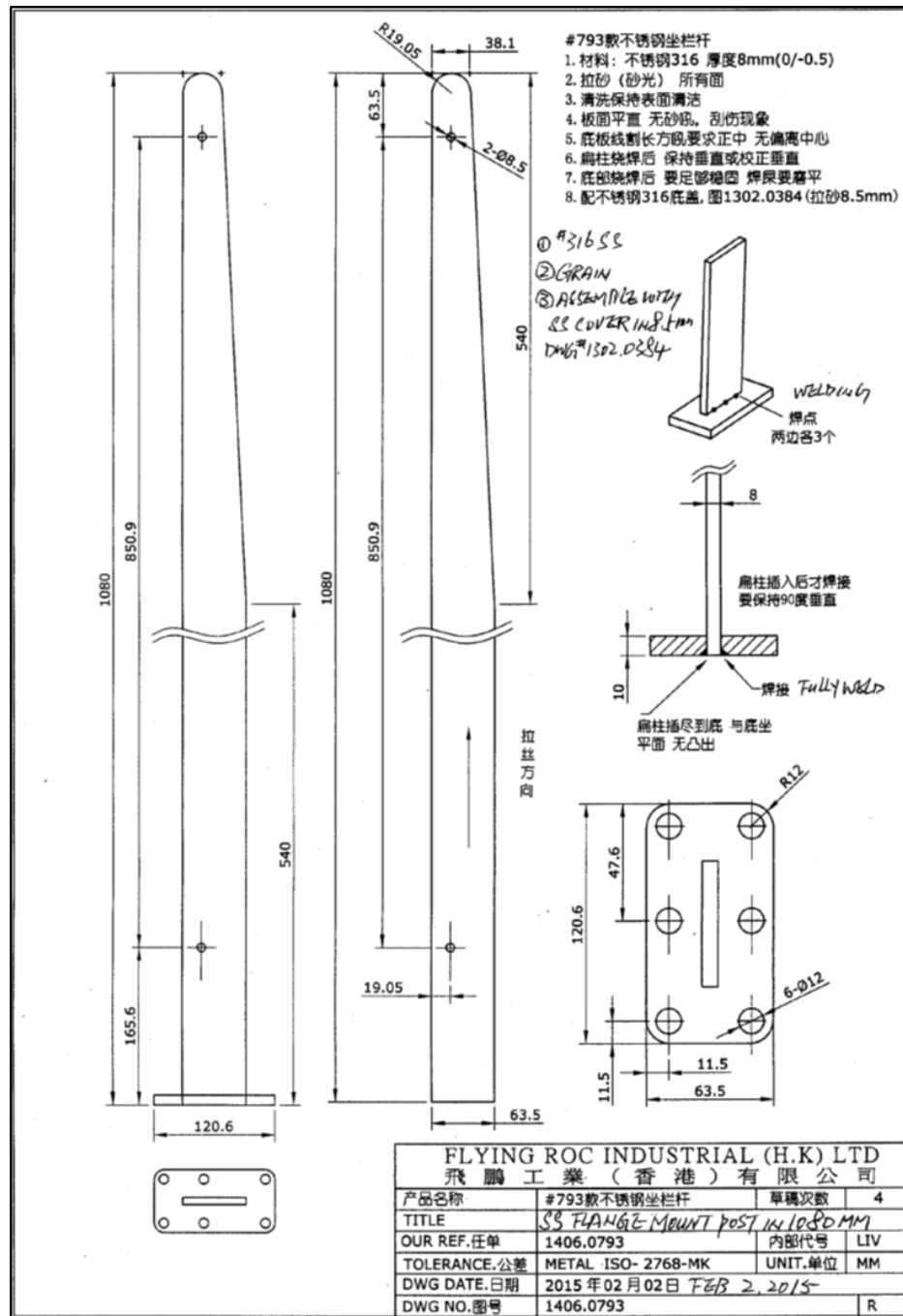
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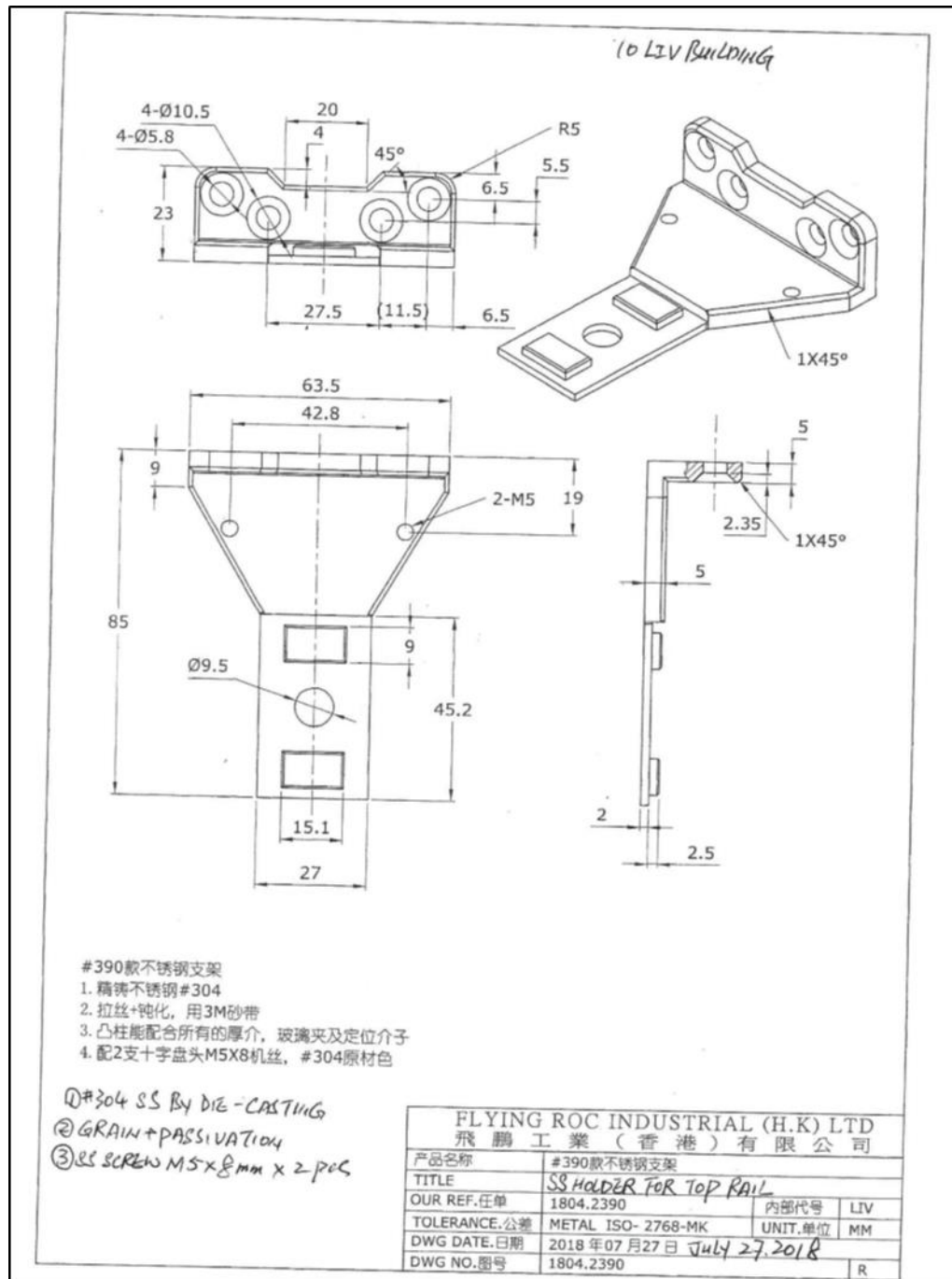
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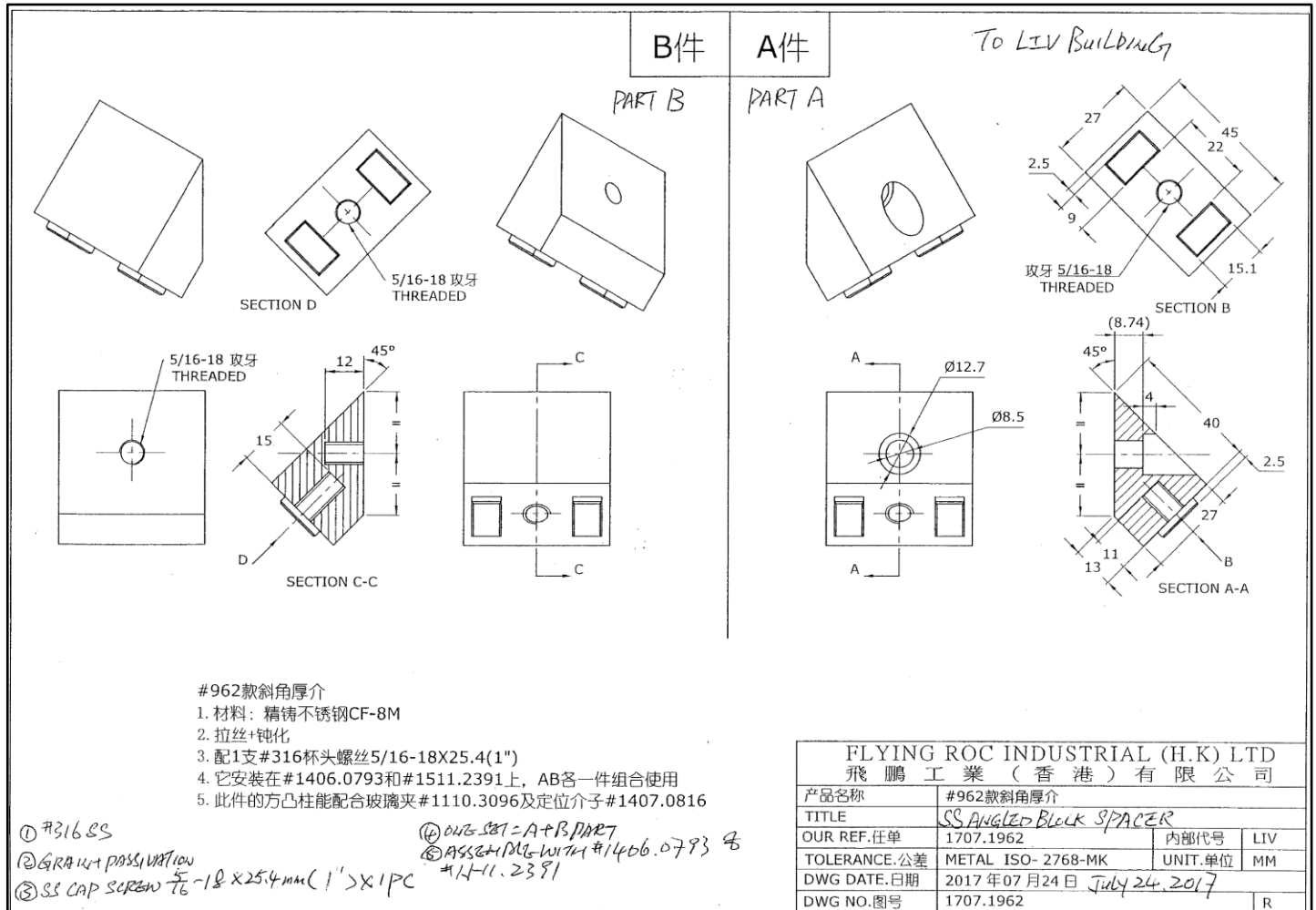
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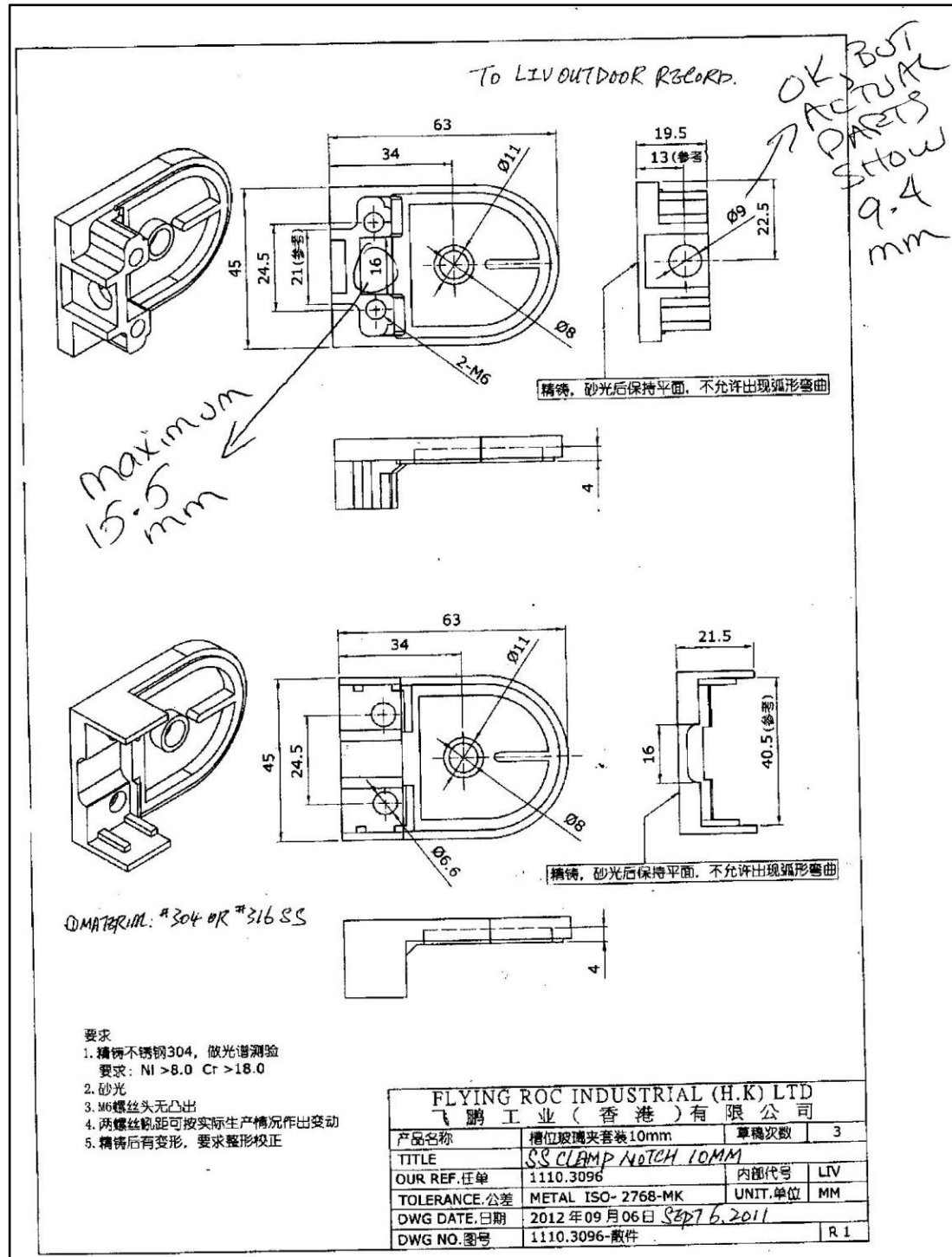
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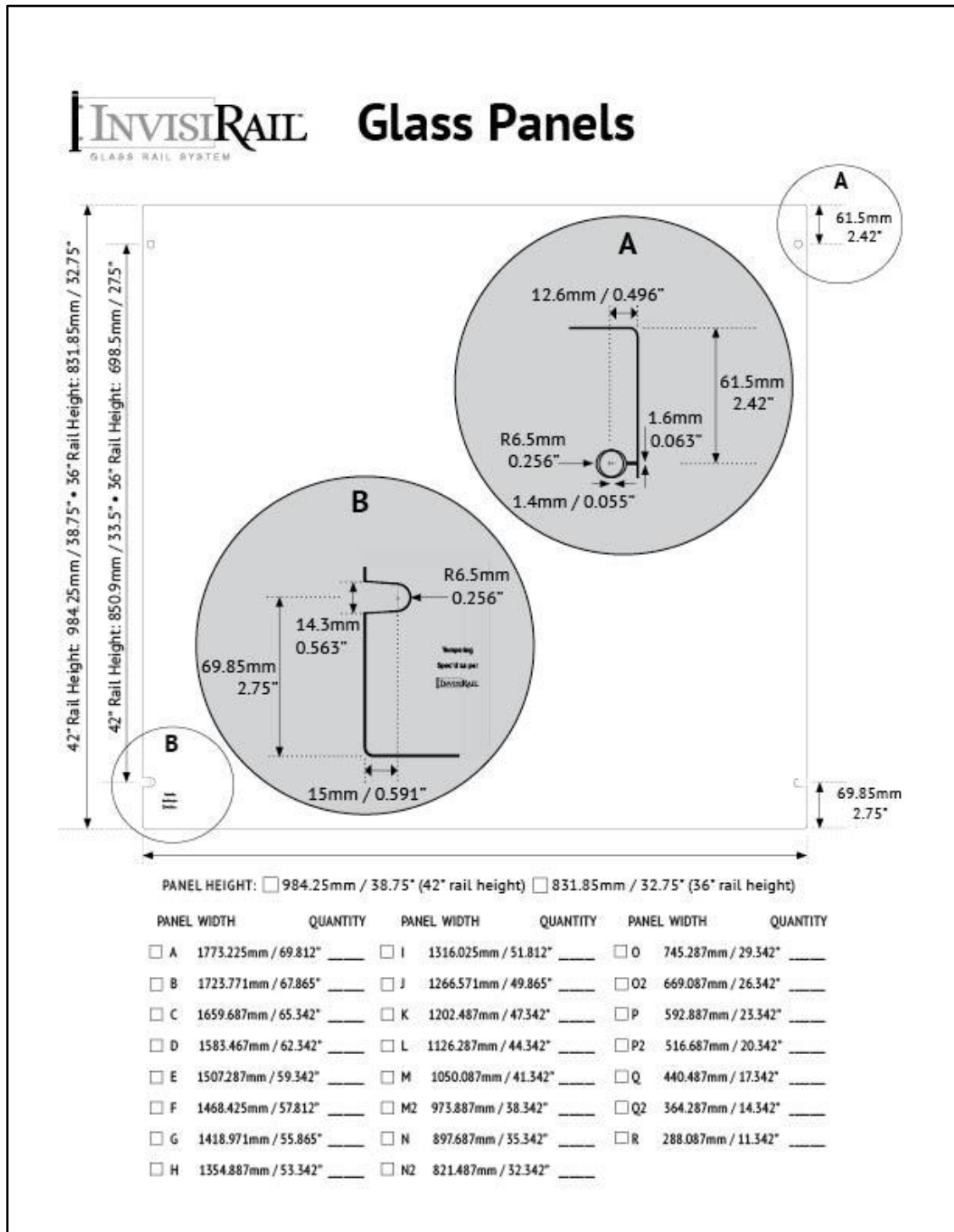
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SECTION 14

REVISION LOG

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