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FORTRESS BUILDING PRODUCTS
TEST REPORT

SCOPE OF WORK
STRUCTURAL PEFORMANCE TESTING ON THE *AL13 PUREVIEW* LEVEL GUARDRAIL SYSTEM

REPORT NUMBER
L8171.01-119-19 R0

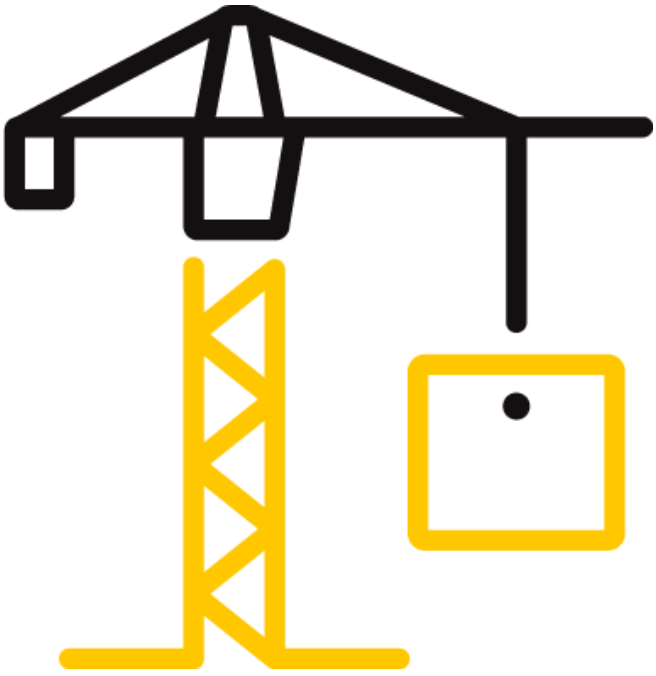
TEST DATES
01/04/21 - 01/05/21

ISSUE DATE
03/18/21

RECORD RETENTION END DATE
01/05/25

PAGES
30

DOCUMENT CONTROL NUMBER
RT-R-AMER-Test-2846 (02/09/18)



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Report No.: L8171.01-119-19 R0
Date: 03/18/21

REPORT ISSUED TO

FORTRESS BUILDING PRODUCTS
1720 North First Street
Suite B
Garland, TX 75040

SECTION 1

SCOPE

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by Fortress Building Products to perform structural performance testing in accordance with the 2015 National Building Code (NBC) of Canada and 2018 International Residential Code (IRC) on their *Al13 PureView* level aluminum guardrail system. All tests performed were to evaluate structural performance of the guardrail assembly to carry and transfer imposed loads to the supporting structure. The test specimens evaluated included the infill, rails, rail brackets, and support posts. Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek test facility in York, Pennsylvania. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

SECTION 2

SUMMARY OF TEST RESULTS

The specimens met the 2015 NBC residential and 2018 IRC design load performance requirements.

For INTERTEK B&C:

COMPLETED BY:	Adam J. Schrum	**REVIEWED BY:**	V. Thomas Mickley, Jr., P.E.
TITLE:	Project Manager	**TITLE:**	Senior Staff Engineer
SIGNATURE:	Digitally Signed for: Adam Schrum by Amanda Ashby	**SIGNATURE:**	Digitally Signed by: Virgal Thomas Mickley, Jr.
DATE:	03/18/21	**DATE:**	03/18/21

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SECTION 3
TEST METHODS

The specimens were evaluated in accordance with the following:

2015, National Building Code of Canada, *Canadian Commission on Building and Fire Codes*

2018, *International Residential Code*®, International Code Council

Structural tests were performed according to Chapter 17 (Structural Tests and Special Inspections) of the 2018 *International Building Code*®, International Code Council.

Limitations
Testing is limited to satisfying the requirements of the 2015 National Building Code of Canada (residential) and the 2018, *International Residential Code*®.

Testing reported herein was performed using a safety factor of 2.5 x design load for NBC loads and horizontal IRC loads applied to the rail and 4.0 x design load for IRC loads applied to or transferred through the glass infill. Approval of the testing reported herein, and the use of the noted safety factors for the Canadian code is left up to the authority having jurisdiction.

SECTION 4
MATERIAL SOURCE/INSTALLATION

Test samples were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek B&C for a minimum of four years from the test completion date.

The guardrail assembly was installed and tested as a single railing section by surface mounting the posts to steel channels (simulated concrete). Transducers mounted to an independent reference frame were located to record movement of reference points on the guardrail system components (ends and mid-point) to determine net component deflections. See photographs in Section 11 for individual test setups.

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SECTION 5
EQUIPMENT

The guardrail was tested in a self-contained structural frame designed to accommodate anchorage of the guardrail assembly and application of the required test loads. The specimens were loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables, nylon straps, and load distribution beams were used to impose test loads on the specimens. Applied load was measured using an electronic load cell located in-line with the loading system. Electronic linear motion transducers were used to measure deflections.

SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Kevin J. Eichelberger	Intertek B&C
Adam J. Schrum	Intertek B&C

SECTION 7
TEST PROCEDURE

Each test specimen was inspected prior to testing to verify size and general condition of the materials, assembly, and installation. No potentially compromising defects were observed prior to testing.

An initial load, not exceeding 50% of design load, was applied and transducers were zeroed. Load was then applied at a steady uniform rate until reaching 2.0 times design load in no less than 10 seconds. After reaching 2.0 times design load, the load was released. After allowing a minimum period of one minute for stabilization, load was reapplied to the initial load level used at the start of the loading procedure, and deflections were recorded and used to analyze recovery. Load was then increased at a steady uniform rate until reaching 2.5 or 4.0 times design load or until failure occurred. The testing time was continually recorded from the application of initial test load until the ultimate test load was reached.

The test load adjustment factor was 2.5 x design load for NBC loads and horizontal IRC loads applied to the rail and 4.0 x design load for IRC loads applied to or transferred through the glass infill.

Deflection and permanent set were component deflections relative to their end-points; they were not overall system displacements. All loads and displacement measurements were horizontal, unless noted otherwise.

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SECTION 8
TEST SPECIMEN DESCRIPTION

Test specimens were assembled by an Intertek technician. Fortress Railing Products provided the test components with the following details:

PRODUCT	*AL13 PureView*
MATERIAL	Extruded Aluminum (unspecified alloy)
COLOR	Black
RAIL LENGTH	69-3/4 in (glass balusters) and 69-1/4 (full glass panel) - inside of post to inside of post
RAIL HEIGHT	- 42 in (nominal) - 40-1/2 in (glass balusters) 40 in (full glass panel) - top of top rail to bottom of bottom rail
TOP AND BOTTOM RAIL	1-1/8 in high by 1-5/8 in wide by 0.130 in thick rectangular aluminum extrusion with slotted holes for picket grommets (glass balustrade) or 9/32 in wide slot for rubber gasket (full glass panel)
IN-FILL	- 39 in high by 61-1/4 in wide by 1/4 in thick tempered glass full view panel - 39-13/16 in high by 3-3/4 in wide by 5/16 in thick tempered glass pickets
RAIL BRACKETS	1-1/4 in high by 2-1/16 in wide by 1-1/4 in deep cast aluminum brackets
POST	3 in square by 0.155 in thick aluminum tube, with raceway channels in each corner, connected to a 5-1/2 in square by 0.40 in thick aluminum base plate with a 1/4 in continuous fillet weld and four (one in each screw chase) 1/4-14 by 2-3/4" (0.185 in minor diameter) Phillips drive, pan head, stainless steel screws; the base plate included four 7/16 in diameter holes and one 1 in diameter hole

Fastening Schedule

CONNECTION	FASTENER
Rail Bracket to Post	Two #12-24 by 3/4" Torx drive, flat-head, coated steel screws
Rail Bracket to Rail	One #12-24 by 3/4" Torx drive, flat-head, coated steel screw on the protected side of the rail
Glass Panel or Picket to Top/Bottom Rail	Slip Fit - No mechanical connections
Post Mount to Substructure	Four 3/8 in Grade 5 hex-head bolts with nut and washer

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SECTION 9
TEST RESULTS

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target).

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure.

Test Series No. 1
6 ft (69-3/4 in) by 42 in *Al13 PureView* Level Guardrail with Glass Balusters

Test No. 1 - 01/04/21
IRC Design Load: 50 lb / 1 Square ft at Center of In-fill (on 2 Balusters) [1]
NBC Design Load: 112 lb / 11.81 Square in at Center of In-fill (on 2 Balusters)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load (IRC)	102	00:07	0.55
Initial Load	25	01:49	0.01
98% Recovery from 2.0 x Design Load (IRC)			
4.0x Design Load (IRC)	201	02:06	Achieved Load without Failure
2.5x Design Load (NBC)	282	02:13	Achieved Load without Failure

[1] *Load was applied through the worst case 11.81 square in loading plate.*

Test No. 2 - 01/04/21
IRC Design Load: 50 lb / 1 Square ft at Bottom of In-fill (on 2 Balusters) [1]
NBC Design Load: 112 lb / 11.81 Square in at Bottom of In-fill (on 2 Balusters)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load (IRC)	106	00:10	0.31
Initial Load	25	01:55	0.01
97% Recovery from 2.0 x Design Load (IRC)			
4.0x Design Load (IRC)	208	02:07	Achieved Load without Failure
2.5x Design Load (NBC)	289	02:13	Achieved Load without Failure

[1] *Load was applied through the worst case 11.81 square in loading plate.*

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Test No. 3 - 01/04/21
IBC Design Load: 50 plf x (69-3/4 ÷ 12 in/ft) = 290.6 lb Horizontal Uniform Load on Top Rail [1, 2]
NBC-Commercial Design Load: 51.4 plf x (69-3/4 ÷ 12 in/ft) = 298.8 lb Horizontal Uniform Load on Top Rail [1, 2]

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)			
			END	MID	END	NET [1]
Initial Load	60	00:00	0.00	0.00	0.00	0.00
2.0x Design Load (IBC)	583	00:59	0.85	1.96	0.92	1.08
Initial Load	60	03:48	0.14	0.19	0.10	0.07
94% Recovery from 2.0 x Design Load (IBC)						
2.5x Design Load (IBC)	729	04:43	Achieved Load without Failure			
2.5x Design Load (NBC)	747	04:45	Achieved Load without Failure			

[1] *Uniform load was simulated with quarter-point loading.*

[2] *Horizontal uniform load is not required for IRC or NBC - Residential loading conditions. Uniform loading was included in the test scope for informational purposes only.*

Test No. 4 - 01/04/21
IBC Design Load: 50 plf x (69-3/4 ÷ 12 in/ft) = 290.6 lb Vertical Uniform Load on Top Rail [1, 2]
NBC Design Load: 102.78 plf x (69-3/4 ÷ 12 in/ft) = 597.4 lb Vertical Uniform Load on Top Rail [1, 2]

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	119	00:00	0.00
2.0x Design Load (IBC)	593	00:12	0.65
Initial Load	120	02:14	0.00
100% Recovery from 2.0 x Design Load (IBC)			
4.0x Design Load (IBC)	1174	02:46	Achieved Load without Failure
2.5x Design Load (NBC)	1514	03:00	Achieved Load without Failure

[1] *Uniform load was simulated with quarter-point loading.*

[2] *Vertical uniform load is not required for IRC loading conditions but is required for NBC-residential loading conditions.*

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Test No. 5 - 01/04/21
IRC Design Load: **200 lb Horizontal Concentrated Load at Midspan of Top Rail**
NBC Design Load: **225 lb Horizontal Concentrated Load at Midspan of Top Rail**

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)			
			END	MID	END	NET [1]
Initial Load	45	00:00	0.00	0.00	0.00	0.00
2.0x Design Load (IRC)	401	00:38	0.49	1.62	0.59	1.08
Initial Load	45	02:19	0.02	0.25	0.01	0.24
78% Recovery from 2.0 x Design Load (IRC)						
2.5x Design Load (IRC)	501	03:01	Achieved Load without Failure			
2.5x Design Load (NBC)	564	03:18	Achieved Load without Failure			

[1] *Net displacement was mid-rail displacement relative to the rail at the support posts.*

Test No. 6 - 01/04/21
IRC Design Load: **200 lb Vertical Concentrated Load at Midspan of Top Rail**
NBC Design Load: **225 lb Vertical Concentrated Load at Midspan of Top Rail**

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)			
			END	MID	END	NET
Initial Load	45	00:00	--	0.00	--	--
2.0x Design Load (IRC)	401	00:29	--	0.99	--	--
Initial Load	45	02:08	--	0.11	--	--
89% Recovery from 2.0 x Design Load (IRC)						
2.5x Design Load (NBC)	568	02:35	Achieved Load without Failure			
4.0x Design Load (IRC)	904	02:55	Achieved Load without Failure			

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Test No. 7 - 01/04/21
IRC Design Load: **200 lb Horizontal Concentrated Load at Ends of Top Rail (Brackets)**
NBC Design Load: **225 lb Horizontal Concentrated Load at Ends of Top Rail (Brackets)**

LOAD LEVEL [1]	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)	
			RAIL END #1	RAIL END #2
Initial Load	89	00:00	0.00	0.00
(2.0x Design Load) x 2 (IRC)	802	00:50	1.11	1.25
Initial Load	90	02:44	0.12	0.16
89% Recovery (Rail End #1) and 87% Recovery (Rail End #2) from 2.0 x Design Load (IRC)				
(2.5x Design Load) x 2 (IRC)	1002	03:38	Achieved Load without Failure	
(2.5x Design Load) x 2 (NBC)	1128	03:56	Achieved Load without Failure	

[1] *A spreader beam was used to impose loads on* both *ends of the railing system; therefore, loads were doubled.*

Test No. 8 - 01/04/21
IRC Design Load: **200 lb Vertical Concentrated Load at Ends of Top Rail (Brackets)**
NBC Design Load: **225 lb Vertical Concentrated Load at Ends of Top Rail (Brackets)**

LOAD LEVEL [1]	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)	
			RAIL END #1	RAIL END #2
Initial Load	88	00:00	0.00	0.00
(2.0x Design Load) x 2 (IRC)	807	00:30	0.07	0.07
Initial Load	90	02:13	0.01	0.01
86% Recovery (Rail End #1) and 86% Recovery (Rail End #2) from 2.0 x Design Load (IRC)				
(2.5x Design Load) x 2 (NBC)	1000	02:39	Achieved Load without Failure	
(4.0x Design Load) x 2 (IRC)	1131	02:47	Achieved Load without Failure	

[1] *A spreader beam was used to impose loads on* both *ends of the railing system; therefore, loads were doubled.*

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Test Series No. 2
6 ft (69-1/4 in) by 42 in *Al13 PureView* Level Guardrail with Full Glass Panel Infill

Test No. 1 - 01/05/21
IRC Design Load: 50 lb / 1 Square ft at Center of In-fill [1]
NBC Design Load: 112 lb / 11.81 Square in at Center of In-fill

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load (IRC)	101	00:08	0.19
Initial Load	27	01:45	0.02
89% Recovery from 2.0 x Design Load (IRC)			
4.0x Design Load (IRC)	208	01:58	Achieved Load without Failure
2.5x Design Load (NBC)	285	02:05	Achieved Load without Failure

[1] Load was applied through the worst case 11.81 square in loading plate.

Test No. 2 - 01/05/21
IRC Design Load: 50 lb / 1 Square ft at Bottom of In-fill [1]
NBC Design Load: 112 lb / 11.81 Square in at Bottom of In-fill

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load (IRC)	109	00:06	0.17
Initial Load	25	01:39	0.00
100% Recovery from 2.0 x Design Load (IRC)			
4.0x Design Load (IRC)	201	01:52	Achieved Load without Failure
2.5x Design Load (NBC)	283	01:57	Achieved Load without Failure

[1] Load was applied through the worst case 11.81 square in loading plate.

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Test No. 3 - 01/05/21
IRC Design Load: 50 lb / 1 Square ft at Edge of In-fill [1]
NBC Design Load: 112 lb / 11.81 Square in at Edge of In-fill

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load (IRC)	101	00:08	0.29
Initial Load	25	02:10	0.00
100% Recovery from 2.0 x Design Load (IRC)			
4.0x Design Load (IRC)	201	02:30	Achieved Load without Failure
2.5x Design Load (NBC)	285	02:39	Achieved Load without Failure

[1] Load was applied through the worst case 11.81 square in loading plate.

Test No. 4 - 01/05/21
IBC Design Load: 50 plf x (69-1/4 ÷ 12 in/ft) = 288.5 lb Horizontal Uniform Load on Top Rail [1, 2]
NBC-Commercial Design Load: 51.4 plf x (69-1/4 ÷ 12 in/ft) = 296.6 lb Horizontal Uniform Load on Top Rail [1, 2]

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)			
			END	MID	END	NET [1]
Initial Load	60	00:00	0.00	0.00	0.00	0.00
2.0x Design Load (IBC)	578	01:08	0.84	1.81	1.23	0.78
Initial Load	60	03:41	0.12	0.29	0.41	0.03
96% Recovery from 2.0 x Design Load (IBC)						
2.5x Design Load (IBC)	723	04:25	Achieved Load without Failure			
2.5x Design Load (NBC)	749	04:28	Achieved Load without Failure			

[1] Uniform load was simulated with quarter-point loading.

[2] Horizontal uniform load is not required for IRC or NBC - Residential loading conditions. Uniform loading was included in the test scope for informational purposes only.

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Test No. 5 - 01/05/21
IBC Design Load: **50 plf x (69-1/4 ÷ 12 in/ft) = 288.5 lb Vertical Uniform Load on Top Rail** [1, 2]
NBC Design Load: **102.78 plf x (69-1/4 ÷ 12 in/ft) = 593.1 lb Vertical Uniform Load on Top Rail** [1, 2]

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	120	00:00	0.00
2.0x Design Load (IBC)	579	01:05	0.05
Initial Load	120	03:38	0.03
40% Recovery from 2.0 x Design Load			
4.0x Design Load (IBC)	1162	04:06	Achieved Load without Failure
2.5x Design Load (NBC)	1494	04:17	Achieved Load without Failure

[1] *Uniform load was simulated with quarter-point loading.*

[2] *Vertical uniform load is not required for IRC loading conditions but is required for NBC-residential loading conditions.*

Test No. 6 - 01/05/21
IRC Design Load: **200 lb Horizontal Concentrated Load at Midspan of Top Rail**
NBC Design Load: **225 lb Horizontal Concentrated Load at Midspan of Top Rail**

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)			
			END	MID	END	NET [1]
Initial Load	50	00:00	0.00	0.00	0.00	0.00
2.0x Design Load (IRC)	400	00:37	0.52	1.40	0.58	0.85
Initial Load	50	03:03	0.00	0.07	0.00	0.07
92% Recovery from 2.0 x Design Load						
2.5x Design Load (IRC)	503	03:41	Achieved Load without Failure			
2.5x Design Load (NBC)	565	03:47	Achieved Load without Failure			

[1] *Net displacement was mid-rail displacement relative to the rail at the support posts.*

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Test No. 7 - 01/05/21
IRC Design Load: **200 lb Vertical Concentrated Load at Midspan of Top Rail**
NBC Design Load: **225 lb Vertical Concentrated Load at Midspan of Top Rail**

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)			
			END	MID	END	NET
Initial Load	45	00:00	--	0.00	--	--
2.0x Design Load (IRC)	401	00:18	--	0.06	--	--
Initial Load	45	01:56	--	0.01	--	--
83% Recovery from 2.0 x Design Load (IRC)						
2.5x Design Load (NBC)	574	02:13	Achieved Load without Failure			
4.0x Design Load (IRC)	904	02:28	Achieved Load without Failure			

Test No. 8 - 01/05/21
IRC Design Load: **200 lb Horizontal Concentrated Load at Ends of Top Rail (Brackets)**
NBC Design Load: **225 lb Horizontal Concentrated Load at Ends of Top Rail (Brackets)**

LOAD LEVEL [1]	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)	
			RAIL END #1	RAIL END #2
Initial Load	90	00:00	0.00	0.00
(2.0x Design Load) x 2 (IRC)	805	00:50	1.10	1.27
Initial Load	90	03:06	0.25	0.40
77% Recovery (Rail End #1) and 69% Recovery (Rail End #2) from 2.0 x Design Load (IRC)				
(2.5x Design Load) x 2 (IRC)	1004	03:47		
(2.5x Design Load) x 2 (NBC)	1128	04:00	Achieved Load without Failure	

[1] *A spreader beam was used to impose loads on* both *ends of the railing system; therefore, loads were doubled.*

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Test No. 9 - 01/05/21
IRC Design Load: **200 lb Vertical Concentrated Load at Ends of Top Rail (Brackets)**
NBC Design Load: **225 lb Vertical Concentrated Load at Ends of Top Rail (Brackets)**

LOAD LEVEL [1]	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)	
			RAIL END #1	RAIL END #2
Initial Load	90	00:00	0.00	0.00
(2.0x Design Load) x 2 (IRC)	806	00:33	0.04	0.06
Initial Load	90	02:19	0.01	0.01
75% Recovery (Rail End #1) and 83% Recovery (Rail End #2) from 2.0 x Design Load (IRC)				
(2.5x Design Load) x 2 (IRC)	1005	02:47	Achieved Load without Failure	
(2.5x Design Load) x 2 (NBC)	1143	03:00	Achieved Load without Failure	

[1] *A spreader beam was used to impose loads on* both *ends of the railing system; therefore, loads were doubled.*

Test No. 10 - 01/05/21
IRC Design Load: **200 lb Concentrated Load at Top of Stand-Alone [1] 3 in Post Mount (42 in High)**
NBC Design Load: **225 lb Concentrated Load at Top of Stand-Alone [1] 3 in Post Mount (42 in High)**

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	POST DISPLACEMENT (in)
Initial Load	20	00:00	0.00
2.0x Design Load (IRC)	200	00:42	0.41
Initial Load	20	01:39	0.06
85% Recovery from 2.0 x Design Load			
2.5x Design Load (IRC)	501	03:09	Achieved Load without Failure
2.5x Design Load (NBC)	564	03:18	Achieved Load without Failure
Ultimate Load	650	**Mode of Failure:** Weld Failure	

[1] *Post was conservatively tested without a railing attached.*

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TEST REPORT FOR FORTRESS BUILDING PRODUCTS
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Date: 03/18/21

SECTION 10
CONCLUSION

Using performance criteria of withstanding an ultimate load of 2.5 or 4.0 times design load, the test results substantiate compliance with the design load requirements of the referenced building codes for the guardrails detailed in the following table:

AL13 **ALUMINUM GUARDRAIL SYSTEM**	**GUARDRAIL TYPE**	**BALUSTER**	**SUPPORT POST**	**CODE OCCUPANCY CLASSIFICATION**
6 ft (69-3/4 in) by 42 in	Level / In-Line Application	Glass Balusters	3 in Square *Al13* Post Mount	2015 National Building Code of Canada - Residential and 2018 IRC
6 ft (69-1/4 in) by 42 in		Full Glass Panel		

Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

Reference Limitations in Section 3, Test Methods for additional information regarding installation and compliance.

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Report No.: L8171.01-119-19 R0
Date: 03/18/21

SECTION 11
PHOTOGRAPHS

Photo No. 1
In-Fill Load Test at Center of Two Glass Balustrades

Photo No. 2
In-Fill Load Test at Bottom of Glass Panel

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Photo No. 3
In-Fill Load Test at Edge of Glass Panel

Photo No. 4
Horizontal Uniform Test on Top Rail

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Photo No. 5
Vertical Uniform Test on Top Rail

Photo No. 6
Horizontal Concentrated Load Test at Midspan of Top Rail

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Photo No. 7
Vertical Concentrated Load Test at Mid-Span of Top Rail

Photo No. 8
Horizontal Concentrated Load Test at Ends of Top Rail (Brackets)

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Photo No. 9
Vertical Concentrated Load at Ends of Rail (Brackets)

Photo No. 10
Concentrated Load at Top of Stand-Alone Post

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Photo No. 11
Bracket to Rail to Post Attachment

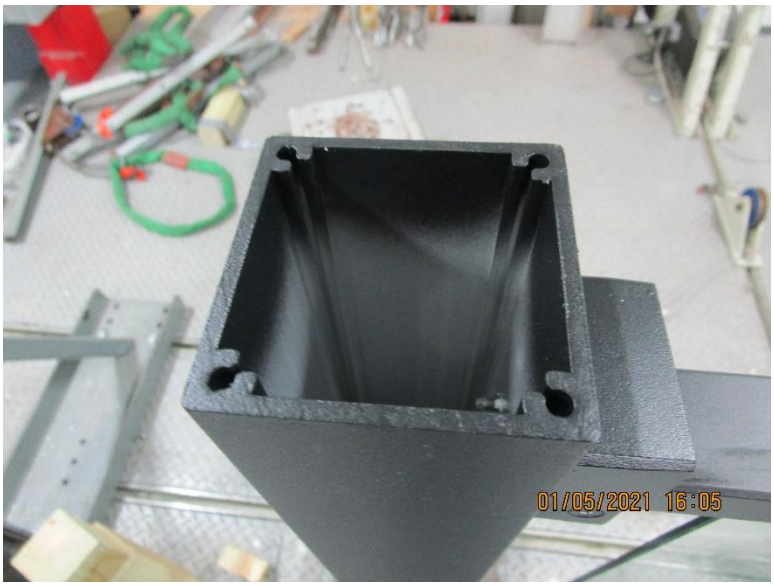

Photo No. 12
Post Mount

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TEST REPORT FOR FORTRESS BUILDING PRODUCTS
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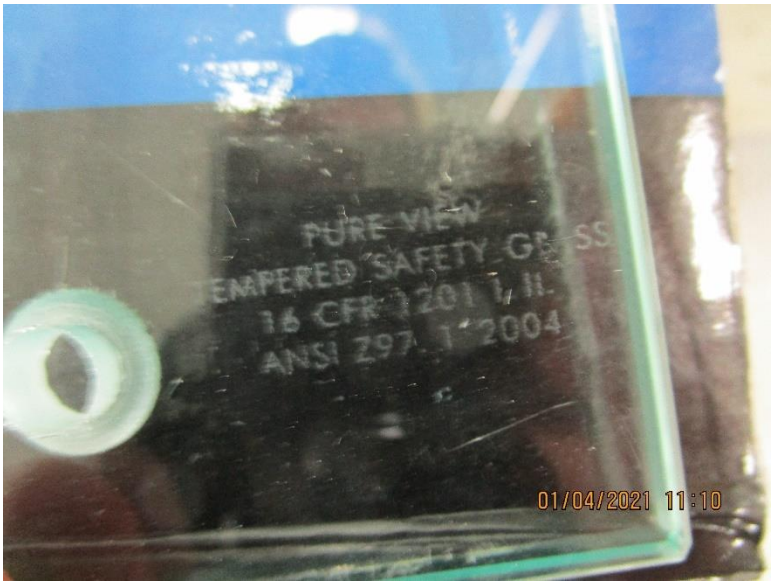

Photo No. 13
Glass Baluster Label

Photo No. 14
Glass Panel Label

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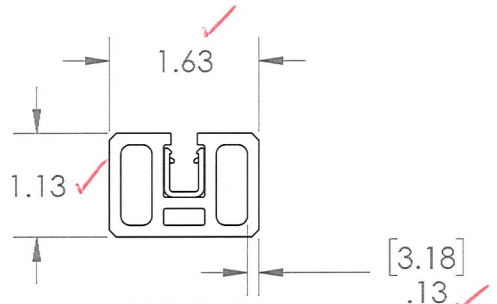
SECTION 12
DRAWINGS

The "As-Built" drawings for the *Al13 PureView* level guardrail system which follow have been reviewed by Intertek B&C and are representative of the project reported herein. Project construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.



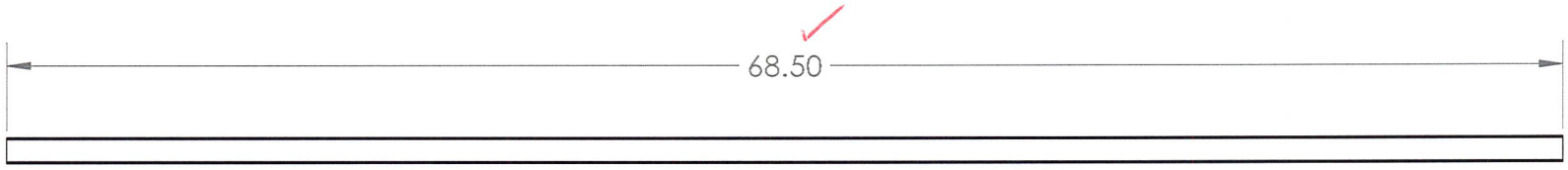
DETAIL A
SCALE 1 : 2

intertek

Test sample complies with these details.
Deviations are noted.

Report # L3171.01-119-19

Date 2/23/21 Tech AJS



REV	DATE	BY	DESCRIPTION
D	12/6/17	GL	Initial Drawing

FORTRESS™ — RAILING PRODUCTS —

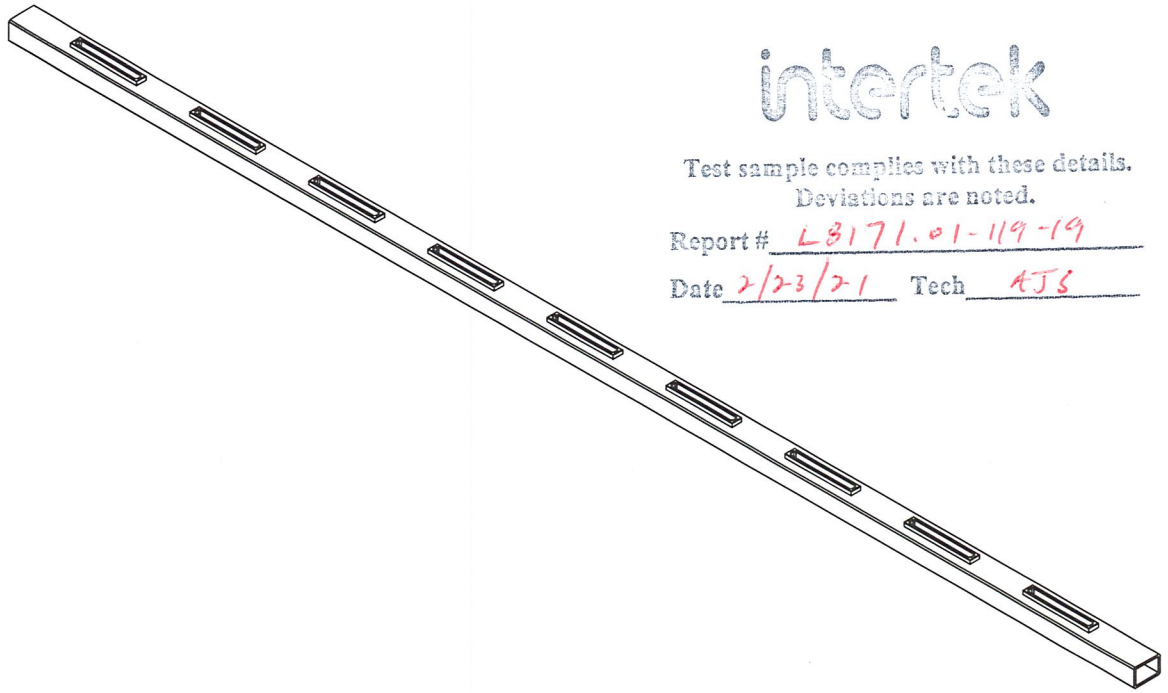
Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: PV-AL13 FGP RAILS-6'

DRAWN BY: geoffl | SCALE: 1 : 8

DATE: 12/06/2017 | DIVISION: Fortress Railing

Sheet: 1 OF 1 | ITEM #: | FILE NAME/PART #: R3531-01177A | REV: D

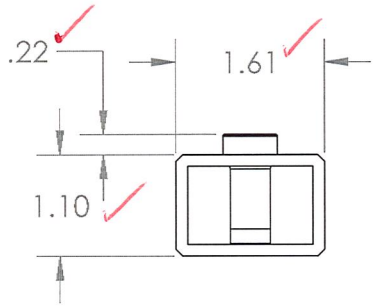


intertek

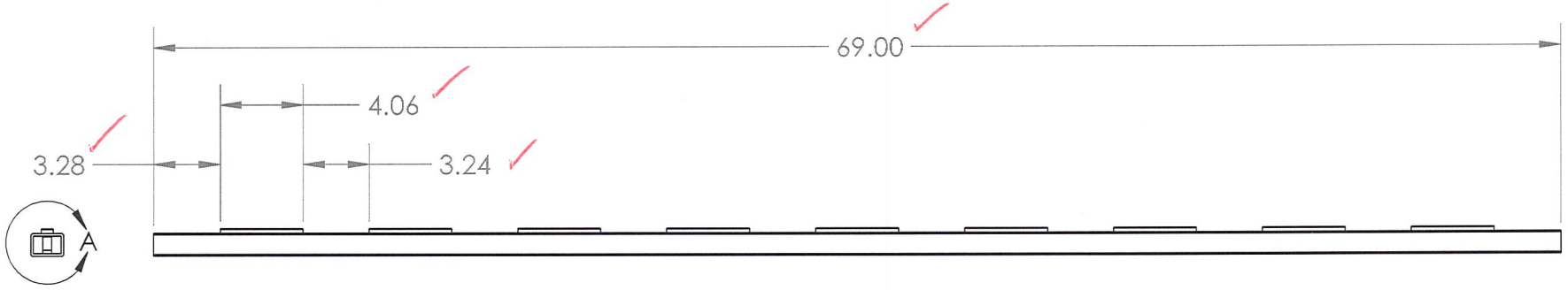
Test sample complies with these details.
Deviations are noted.

Report # L3171.01-119-19

Date 2/23/21 Tech AJS



DETAIL A
SCALE 1 : 2



REV	DATE	BY	DESCRIPTION
A	12/6/17	GL	Initial Drawing

FORTRESS —RAILING PRODUCTS—

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: PV-AL13 RAILS-6'

DRAWN BY: geoffl

DATE: 12/06/2017 DIVISION: Fortress Railing

SCALE: 1 : 8

Sheet: 1 OF 1

ITEM #: 5117209X

FILE NAME/PART #: R3531-01186A

REV: A

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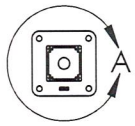
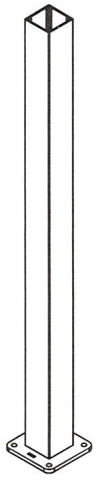
Test sample complies with these details.
Deviations are noted.

Report # L8171.01-119-19

Date 2/23/21 Tech AJS



DETAIL A
SCALE 1 : 2



REV	DATE	BY	DESCRIPTION
A	02/05/15	KF	Initial Drawing

FORTRESS RAILING PRODUCTS

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: AL13 PLUS-3"X45.5" SCREW BOSS POST ASSEMBLY

DRAWN BY: KevinF | SCALE: AS SHOWN

DATE: 11/08/2019 | DIVISION: Fortress Railing

Sheet: 1 OF 1 | ITEM #: | FILE NAME/PART #: R3235-08038A | REV: A

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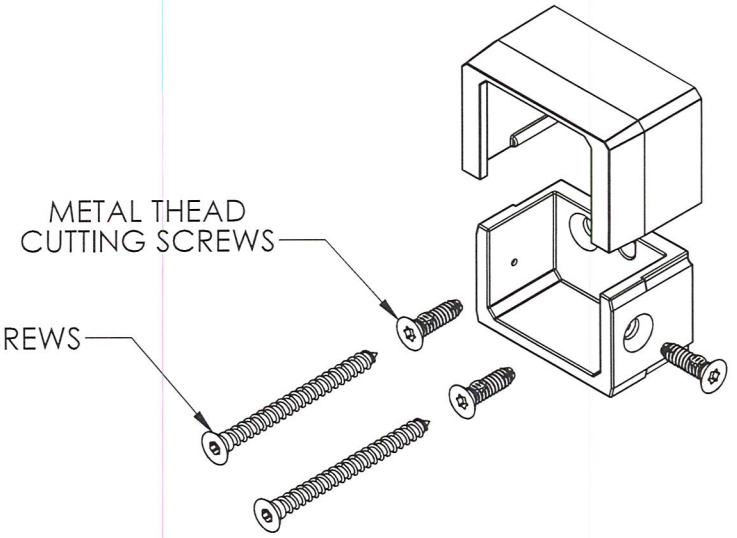
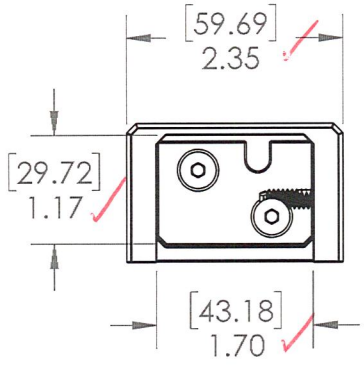
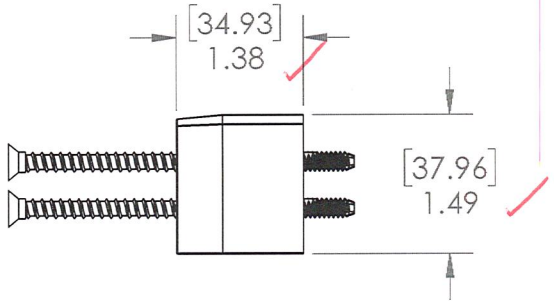
Test sample complies with these details.
Deviations are noted.

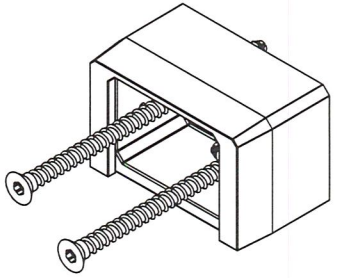
Report # L8171.01-119-19

Date 2/23/21 Tech AJS









REV	DATE	BY	DESCRIPTION
AA	02/05/15	ET	Initial Drawing

FORTRESS™ — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: EVOLVE EXTERNAL BRACKET

DRAWN BY: evant

DATE: 02/05/2016 DIVISION:

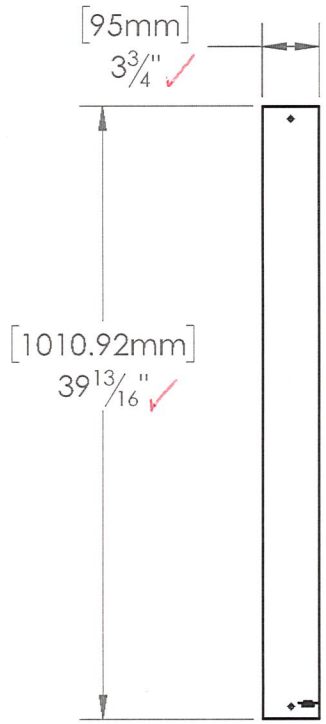
SCALE: 1 : 4

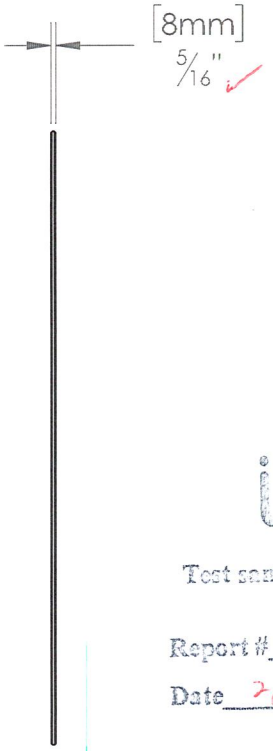
Sheet: 1 OF 1

ITEM #:

FILE NAME/PART #: R3234-00242A

REV: A





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Test sample complies with these details.
Deviations are noted.

Report # LB171.01-119-19

Date 2/23/21 Tech ATS

REV	DATE	BY	DESCRIPTION
C	12/10/20	KF	Initial Drawing

FORTRESS™ — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: PV-PLA-40"

DRAWN BY: KevinF

DATE: 12/10/2020

DIVISION: Fortress Railing

SCALE: 1:12

Sheet: 1 OF 1

ITEM #:

FILE NAME/PART #: R3532-01180A

REV: C

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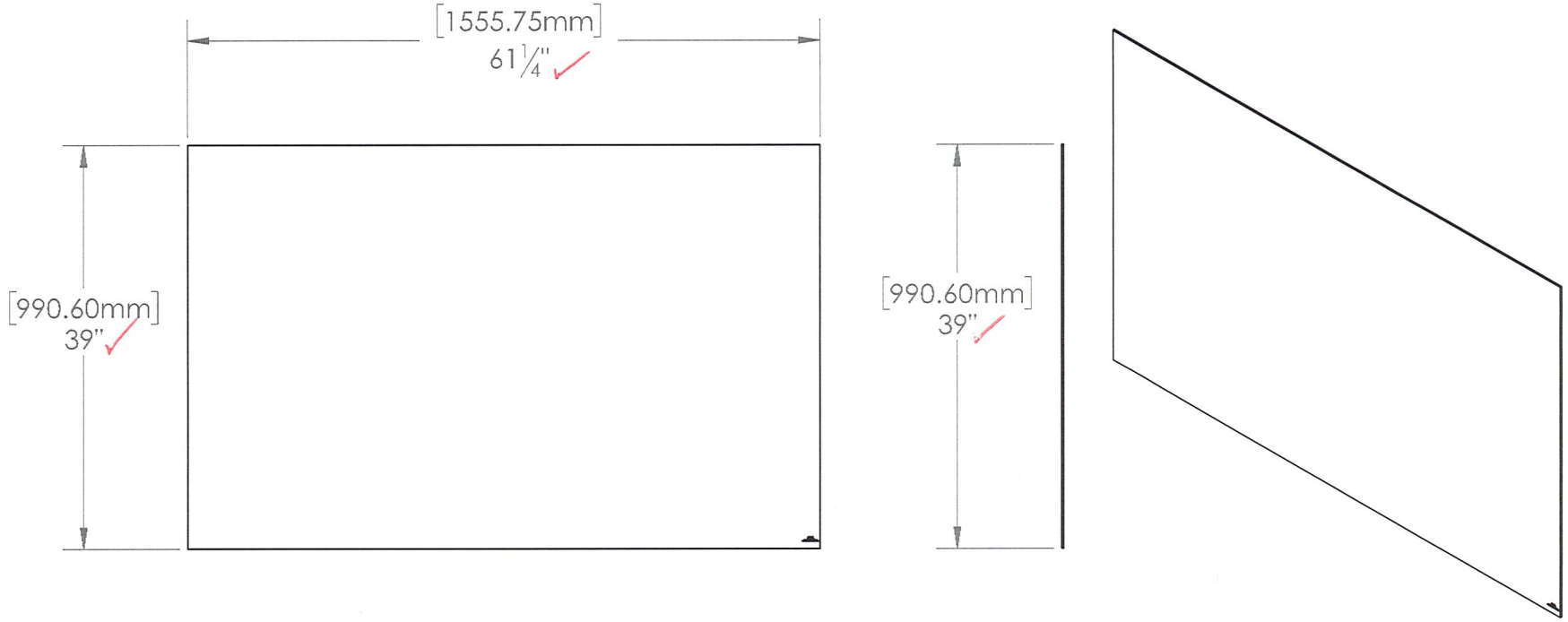
Test sample complies with these details.
Deviations are noted.

Report # E8171.01-119-19

Date 7/23/21 Tech AJS



REV	DATE	BY	DESCRIPTION
C	12/10/20	KF	Initial Drawing

FORTRESS RAILING PRODUCTS

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: PV -FGP 39" X 61.25"

DRAWN BY: KevinF

DATE: 12/10/2020 DIVISION:

SCALE: 1:16

Sheet: 1 OF 1

ITEM #:

FILE NAME/PART #: R3540-01171A

REV: C

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SECTION 13
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	03/18/21	N/A	Original Report Issue