



Project No.: 210102

Date: March 5th, 2021

Fortress Building Products
1720 North 1st Street
Garland, Texas, USA 75020

Attention: Kevin Flatt, Innovations Engineering Manager, (kevinf@fortressbp.com)

Dear Mr. Flatt;

Re: Review of Intertek Test Report for "AL13 HOME (PUREVIEW) GUARDRAIL SYSTEM"
Intertek Report Number: L2777.02-119-19-R0
Intertek Document Control Number: RT-R-AMER-Test-2846 (02/09/18)
Products Tested: AL13 HOME (PUREVIEW) GUARDRAIL SYSTEM

Background:

Steenhof Building Services Group (SBSG) was retained by Fortress Building Products to perform a review of Intertek's structural load tests conducted on the *AL13 Home (Pureview) Guardrail System*. This report provides third-party verification that the tested metal system and its components can withstand the prescribed loads in the following Canadian standards:

- 1. National Building Code of Canada 2015 (NBCC)**
- 2. Ontario Building Code 2012, Revision 2015 (OBC)**
- 3. Alberta Building Code 2019 (ABC)**
- 4. British Columbia Building Code 2018 (BCBC)**

Test Results:

The findings of the tests are presented in the Intertek test report number L277.02-119-19-R0 dated January 12, 2021. The extent of the test included load testing on full glass panel and glass baluster guard in-fills, the mid-span and ends (brackets) of the guard top rail, the cantilevered aluminum posts. Connection of the supports to the supporting substrates was not included.

The report indicated the *AL13 Home Pureview Guardrail System* and its components were tested. The guard system was tested for loads in both the horizontal and vertical direction. The guard system was tested for deflection to 2.0 times the prescribed loads in the Provincial and National Building Codes noted above. Measurements were recorded for the two load directions noted above.

All components of the *AL13 Home Pureview Guardrail System* were tested for strength to 2.5 times the design loads set out in the Provincial and National Building Codes noted above. All components achieved this loading without failure. The guardrail system had a maximum lateral deformation of 2" at 2.0 times the design loads and a minimum deformation recovery of 76%. The guardrail system had a maximum Vertical deformation of 2" at 2.0 times the design loads and a minimum deformation recovery of 70%.

The test results indicated the guardrail test specimens tested were able to withstand all the prescribed loads in Part 4 of all Provincial and National Building Codes. The above listed provincial codes share the exact same loads that are listed in Subsection 4.1.5.14: Loads on Guards and Handrails in the NBCC. The specimens were tested in excess of the loads specified in Sentences 1(c) and 7(a) and (b) in Clause 4.1.5.14. An excerpt from the relevant Subsection is provided below.

4.1.5.14. Loads on Guards and Handrails

(See Note A-4.1.5.14 and 4.1.5.15.(1).)

- 1) *The minimum specified horizontal load applied outward at the minimum required height of every guard shall be*
 - a) *3.0 kN/m for open viewing stands without fixed seats and for means of egress in grandstands, stadia, bleachers, and arenas,*
 - b) *A concentrated load of 1.0 kN applied at any point, so as to produce the most critical effect, for access ways to equipment platforms, contiguous stairs and similar areas where the gathering of many people is improbable, and*
 - c) *0.75 kN/m or a concentrated load of 1.0 kN applied at any point so as to produce the most critical effect, whichever governs for locations other than those described in Clauses (a) and (b).*
- 2) *The minimum specified horizontal load applied inward at the minimum required height of every required guard shall be half that specified in Sentence (1).*
- 3) *Individual elements within the guard, including solid panels and pickets, shall be designed for a load of 0.5 kN applied outward over an area of 100mm by 100mm located at any point in the element or elements so as to produce the most critical effect.*
- 4) *The size of the opening between any two adjacent vertical elements within a guard shall not exceed the limits required by Part 3 when each of these elements is subjected to a specified live load of 0.1 kN applied in opposite directions in the in-plane direction of the guard so as to produce the most critical effect.*
- 5) *The loads required in Sentence (3) need not be considered to act simultaneously with the loads provided for in Sentences (1), (2), and (6).*
- 6) *The minimum specified load applied vertically at the top of every required guard shall be 1.5 kN/m and need not be considered to act simultaneously with the horizontal load provided for in Sentence (1).*
- 7) *Handrails and their supports shall be designed and constructed to withstand the following loads, which need not be considered to act simultaneously:*
 - a) *A concentrated load not less than 0.9 kN applied at any point and in any direction for all handrails, and*
 - b) *A uniform load not less than 0.7 kN/m applied in any direction to handrails not located within dwelling units.*

It should be noted that the specified loads in Sentences 1 (a) in Subsection 4.1.5.14. do not apply since the posts and brackets were not tested at this level.

Additionally, the test results indicated the tested specimens were able to withstand the prescribed loads in Part 9 of all Provincial Building Codes and the National Building Code. The guard system is 42" high with a maximum opening of 3-5/8", which complies with the Part 9 requirements of the Provincial and National Building Codes.

The following is an excerpt from Part 9 of the National Building Code of Canada, Volume 1.

9.8.8.2. Loads on Guards

(See Note A 9.8.8.2.)

- 1) Except as provided in Sentences (2) and (4), guards shall be designed to resist the specified loads prescribed in Table 9.8.8.2.

Table 9.8.8.2.			
Specified Loads on Guards			
<i>Forming Part of Sentence 9.8.8.2.(1)</i>			
Location of Guard	Minimum Design Load		
	<i>Horizontal Load Applied Inward or Outward at any Point at the Minimum Required Height of the Guard</i>	<i>Horizontal Load Applied Outward on elements Within the Guard, Including Solid Panels and Balusters</i>	<i>Evenly Distributed Vertical Load Applied at the Top of the Guard</i>
<i>Guards within dwelling units and exterior guards serving not more than 2 dwelling units</i>	<i>0.5 kN/m (34 lbf/ft) or a concentrated load of 1.0 kN (224 lbf) applied at any point ⁽¹⁾</i>	<i>0.5 kN (112 lbf) applied over a maximum width of 300mm (11 ¾") and a height of 300mm (11 ¾") ⁽²⁾</i>	<i>1.5 kN/m (103 lbf/ft)</i>
<i>Guards serving access ways to equipment platforms and similar areas where the gathering of many people is improbable</i>	<i>Concentrated load of 1.0 kN (224 lbf) applied at any point</i>	<i>Concentrated load of 0.5 kN (112 lbf) applied at any point on individual elements</i>	<i>1.5 kN/m (103 lbf/ft)</i>
<i>All other guards</i>	<i>0.75 kN/m (52 lbf/ft) or a concentrated load of 1.0 kN (224 lbf) applied at any point ⁽¹⁾</i>	<i>Concentrated load of 0.5 kN (112 lbf) applied at any point on individual elements</i>	<i>1.5 kN/m (103 lbf/ft)</i>
<i>Column</i>	<i>1</i>	<i>2</i>	<i>3</i>

Notes to Table 9.8.8.2.:

- (1) The loads that create the most critical condition shall apply.
- (2) See Sentence (2).

- 2) For guards within dwelling units and within houses with a secondary suite including their common spaces and for exterior guards serving not more than 2 dwelling units, where the width and spacing of balusters are such that 3 balusters can be engaged by a load imposed over a 300mm width, the load shall be imposed so as to engage 3 balusters.
- 3) None of the loads specified in Table 9.8.8.2. need be considered to act simultaneously.
- 4) For guards within dwelling units and within houses with a secondary suite including their common spaces and for exterior guards serving not more than 2 dwelling units, Table 9.8.8.2. need not apply where the guard construction used has been demonstrated to provide effective performance.

9.8.8.3. Height of Guards

(See Note A-9.8.8.3.)

- 1) Except as provided in Sentences (2) to (4), all guards shall be not less than 1,070 mm high.
- 2) All guards within dwelling units or within houses with a secondary suite including their common spaces shall be not less than 900mm high.
- 3) Exterior guards serving not more than one dwelling unit or a house with a secondary suite including their common spaces shall be not less than 900mm high where the walking surface served by the guard is not more than 1,800mm above the finished ground level.
- 4) Guards for flights of steps, except in required exit stairs, shall not be less than 900mm high.
- 5) The height of guards for flights of steps shall be measured vertically from the top of the guard to a line drawn through the tread nosing served by the guard.

9.8.8.5. Openings in Guards

- 1) Except as permitted by Sentences (2) and (3), openings through guards shall be of a size that prevents the passage of a spherical object having a diameter of 100mm. (See Note A-9.8.8.5.(1) and (2).)

-
- 2) *Except where they serve storage garages, guards in industrial occupancies are permitted to consist of*
 - a) *A top railing, and*
 - b) *One or more horizontal intermediate rails spaced such that the size of the openings through the guard prevents the passage of a spherical object having a diameter of 535mm. (See Note A-9.8.8.5.(1) and (2).)*
 - 3) *Openings through any guard that is not required by Article 9.8.8.1. and that serves an occupancy other than an industrial occupancy shall be of a size that*
 - a) *Prevents the passage of a spherical object having a diameter of 100mm, or*
 - b) *Permits the passage of a spherical object having a diameter of 200mm. (See Note A-9.8.8.5.(3).)*

9.8.8.6. Design of Guards to Not Facilitate Climbing

- 1) *Except for guards in industrial occupancies, guards required by Article 9.8.8.1. that protect a level located more than 4.2m above the adjacent level shall be designed so that no member, attachment, or opening located between 140mm and 900mm above the level protected by the guard facilitates climbing (See Note A-9.8.8.6.(1).)*

Discussion:

Additionally, SBSG completed structural calculations regarding the strength, deflection, and fatigue limits of the top rails, posts, and brackets. The calculations were carried out according to the known material properties of the Grade 6061-T6 aluminum post with a yield strength of 40ksi (276MPa) and Modulus of Elasticity 9990ksi (68.9GPa). Our calculations confirm the metal posts and brackets are able resist the previously noted imposed live loads set out in Part 4 and Part 9 of the Canadian Provincial and National Building Codes.

The maximum spacing of the posts shall not be exceeded for the type, size, and specified use as presented in Section 10 of the sealed Intertek Report.

The anchorage of this system to the existing substrate is unique for each project. The anchorage of this guard system in various buildings and project applications shall be designed by a qualified design professional licensed to practice in their respective jurisdictions.

Conclusion:

We trust that this report satisfactorily addresses compliance to Canadian Building Codes of the AL13 Home Pureview Guardrail System.

Please do not hesitate to contact us should you have any questions or comments regarding the report.

Sincerely,

Griff Ferguson

STEENHOF Building Services Group
Griff Ferguson, B.A.Sc., P.Eng.
Structural Team Lead

J. Steenhof

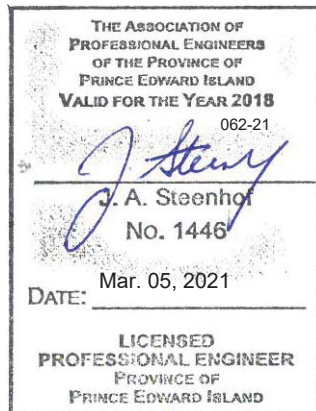
STEENHOF Building Services Group
Jack Steenhof, M.A.Sc., P.Eng.
President

Mason White

STEENHOF Building Services Group
Mason White, B.A.Sc.,
Engineering Intern

Attachments:

1. Intertek Test Report L2777.02-119-19-R0



FORTRESS BUILDING PRODUCTS TEST REPORT

SCOPE OF WORK

STRUCTURAL PERFORMANCE TESTING ON THE *AL13 HOME (PUREVIEW)* GUARDRAIL SYSTEM

REPORT NUMBER

L2777.02-119-19-R0

TEST DATES

09/26/20 - 12/21/20

ISSUE DATE

01/12/21

RECORD RETENTION END DATE

10/23/24

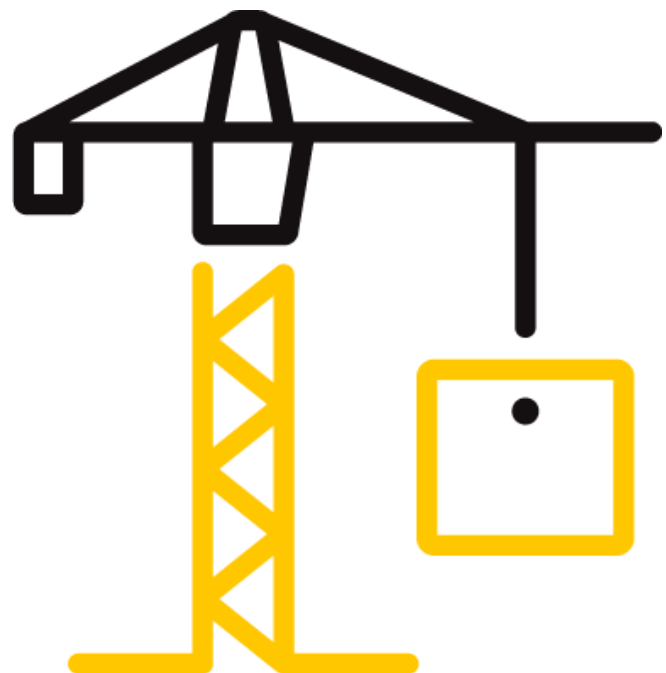
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DOCUMENT CONTROL NUMBER

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TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

REPORT ISSUED TO

FORTRESS BUILDING PRODUCTS

1720 North First Street

Suite B

Garland, TX 75040

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Fortress Building Products to perform structural performance testing in accordance with the 2015 National Building Code of Canada on their *A113 Home Pureview* aluminum guardrail system. This report is in conjunction with Intertek Report No. L2777.01-119-19 which includes structural performance testing of the 3 in post mount. 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.

SECTION 2

SUMMARY OF TEST RESULTS

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

For INTERTEK B&C:

COMPLETED BY:	Adam J. Schrum
TITLE:	Project Manager
SIGNATURE:	
DATE:	01/12/21

REVIEWED BY:	V. Thomas Mickley, Jr., P.E.
TITLE:	Senior Staff Engineer
SIGNATURE:	
DATE:	01/12/21

AJS:vtm/aas

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TEST REPORT FOR FORTRESS BUILDING PRODUCTS

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Date: 01/12/21

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*

Limitations

Testing is limited to satisfying the residential requirements of the 2015 National Building Code of Canada.

Testing reported herein was performed using a safety factor of 2.5. Approval of the testing reported herein, and the use of this safety factor is left up to the authority having jurisdiction.

SECTION 4

MATERIAL SOURCE/INSTALLATION

Test samples were provided by the client.

The guardrail assembly was installed and tested as a single railing section by surface mounting the posts to steel channels (simulated concrete) for the level guardrails and by directly securing the posts to a rigid steel test fixture, which rigidly restrained the posts from deflecting for the stair guardrails. 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.

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.

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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 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.

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.

SECTION 8

TEST SPECIMEN DESCRIPTION

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

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

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PRODUCT	AL13 Home PureView
MATERIAL	Extruded Aluminum (unspecified alloy)
COLOR	White
RAIL LENGTH	<ul style="list-style-type: none"> - 69 or 69-1/2 in (inside of post to inside of post) (level) - 76 in (inside of post to inside of post) (stair)
RAIL HEIGHT	<ul style="list-style-type: none"> - 41 in (top of top rail to bottom of bottom rail) (level) - 40 in (top of top rail to bottom of bottom rail; measured parallel to the baluster) (stair) - 42 in (nominal)
TOP RAIL CAP	<ul style="list-style-type: none"> - Flat: 1-5/8 in high by 2-3/8 in wide by 0.070 in thick aluminum extrusion - Round: 2-1/16 in high by 2-3/8 in wide by 0.070 in thick contoured aluminum extrusion
TOP RAIL SPACER	<ul style="list-style-type: none"> - 1-7/16 in high by 2-3/16 in wide by 0.070/0.060 in thick aluminum extrusion (continuous) (used in guardrail system with the Flat top rail) - 1-7/16 in high by 2-3/16 in wide by 1-3/4 in long by 0.070/0.060 in thick aluminum extrusion (six equally spaced, level/glass panel; seven equally spaced, level/glass balusters; six equally spaced, stair /glass balusters) (used in guardrail system with the Round top rail)
TOP RAIL SUBRAIL / BOTTOM RAIL	<ul style="list-style-type: none"> - Glass Picket System: 1-1/4 in high by 1-1/4 in wide by 0.110/0.140 in thick aluminum extrusion with slotted holes for picket grommets - Glass Panel System: 1-1/4 in high by 1-1/4 in wide by 0.075/0.085 in thick aluminum extrusion with 9/32 in wide slot for glass panel and rubber gasket
IN-FILL	<ul style="list-style-type: none"> - 3-3/4 in wide by 5/16 in thick tempered glass pickets - 39 in high by 61-1/4 in wide by 1/4 in thick tempered glass full view panel
RAIL BRACKETS	<ul style="list-style-type: none"> - Level: 1-1/2 in high by 1-5/8 in wide by 1 in deep (0.160/0.200 in wall) cast aluminum brackets - Stair: Two piece, cast aluminum hinged bracket
POST	<ul style="list-style-type: none"> - 3 in square by 0.125 in thick aluminum tube connected to a 5-1/2 in square by 0.40 in thick aluminum base plate with a 1/4 in continuous fillet weld; the base plate included four 7/16 in diameter holes and one 1 in diameter hole - 2 in square by 0.125 in thick aluminum tube (with screw chases in each corner) connected to a 4-1/2 in square by 0.40 in thick aluminum base plate with a 1/4 in continuous fillet weld and four 5/16-20 in by 2-3/4 in stainless steel screws (one in each screw chase); the base plate included four 7/16 in diameter holes, one 3/4 in diameter hole and four 5/16 in diameter countersunk holes

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Fastening Schedule

CONNECTION	FASTENER
Rail Bracket to Post	Two #12-24 by 3/4" Torx drive, flat-head, Type F thread cutting screws
Rail Bracket to Rail	Two #12-24 by 3/4" Torx drive, flat-head, Type F thread cutting screws
Hinged Bracket Connection	Two-piece fastener consisting of one, 1-1/2 in long pan head smooth outside shank female threaded pin and one, #8-32 by 1/4" pan head screw
Rail Spacer to Rail	#10-16 by 1/2" (0.127 in minor diameter) hex head, self-drilling screws(two per piece, one protected side and one exterior side when spacer is non-continuous; six per piece, equally spaced and staggered (protected side/exterior side) when spacer is continuous)
Glass Panel or Picket to Top/Bottom Rail	Slip Fit - No mechanical connections
Top Rail Cap to Top Rail Spacer	Snap fit and adhered with 1 in square pieces of 3M two-sided tape
Steel Post Mount to Substructure	Four 3/8 in Grade 5 hex-head bolts with nut and washer

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 REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test Series No. 1

6 ft (69 in) by 42 in *AI13 Home* Level Guardrail with *PureView* Full Glass Panel, Flat Accent Top Rail Cap and 3 in Post Mount

Test No. 1 - 10/23/20

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	228	00:22	0.64
Initial Load	25	01:55	0.01
98% Recovery from 2.0 x Design Load			
2.5x Design Load	284	02:37	Achieved Load without Failure

Test No. 2 - 10/23/20

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	229	00:33	0.72
Initial Load	25	01:59	0.02
97% Recovery from 2.0 x Design Load			
2.5x Design Load	283	02:29	Achieved Load without Failure

Test No. 3 - 10/23/20

Design Load: 112 lb / 11.81 Square ft at Center of 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	231	00:39	0.74
Initial Load	25	02:01	0.02
97% Recovery from 2.0 x Design Load			
2.5x Design Load	282	02:30	Achieved Load without Failure

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test No. 4 - 10/23/20

Design Load: 102.78 plf x (69 ÷ 12 in/ft) = 591 lb Vertical Uniform Load on Top Rail ¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	120	00:00	0.00
2.0x Design Load	1182	00:46	0.18
Initial Load	120	02:30	0.04
78% Recovery from 2.0 x Design Load			
2.5x Design Load	1485	03:29	Achieved Load without Failure

¹ Uniform load was simulated with quarter-point loading.

Test No. 5 - 10/23/20

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	455	00:23	0.62	1.30	0.80	0.59
Initial Load	50	01:50	0.00	0.01	0.01	0.01
98% Recovery from 2.0 x Design Load						
2.5x Design Load	573	02:21	Achieved Load without Failure			

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

Test No. 6 - 10/23/20

Design Load: 225 lb 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	100	00:00	0.00	0.00
(2.0x Design Load) x 2	904	01:19	1.33	1.71
Initial Load	100	03:14	0.03	0.04
98% Recovery (Rail End #1) and 98% Recovery (Rail End #2) from 2.0 x Design Load				
(2.5x Design Load) x 2	1133	04:14	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 REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

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Test Series No. 2

6 ft (69 in) by 42 in A113 Home Level Guardrail with PureView Full Glass Panel, Round Accent Top Rail Cap and 3 in Post Mount

Test No. 1 - 10/22/20

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	225	00:17	0.62
Initial Load	25	01:50	0.00
100% Recovery from 2.0 x Design Load			
2.5x Design Load	289	02:14	Achieved Load without Failure

Test No. 2 - 10/22/20

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	227	00:25	0.70
Initial Load	25	02:00	0.01
99% Recovery from 2.0 x Design Load			
2.5x Design Load	282	02:25	Achieved Load without Failure

Test No. 3 - 10/22/20

Design Load: 112 lb / 11.81 Square in at Center of 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	230	00:27	0.97
Initial Load	25	02:17	0.04
96% Recovery from 2.0 x Design Load			
2.5x Design Load	286	02:50	Achieved Load without Failure

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test No. 4 - 10/22/20

Design Load: 102.78 plf x (69 ÷ 12 in/ft) = 591 lb Vertical Uniform Load on Top Rail ¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	120	00:00	0.00
2.0x Design Load	1186	00:59	0.30
Initial Load	120	02:43	0.09
70% Recovery from 2.0 x Design Load			
2.5x Design Load	1482	04:02	Achieved Load without Failure

¹ Uniform load was simulated with quarter-point loading.

Test No. 5 - 10/22/20

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	451	00:37	0.69	1.68	0.98	0.85
Initial Load	50	04:33	0.03	0.10	0.10	0.04
95% Recovery from 2.0 x Design Load						
2.5x Design Load	567	05:19	Achieved Load without Failure			

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

Test No. 6 - 10/22/20

Design Load: 225 lb 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	100	00:00	0.00	0.00
(2.0x Design Load) x 2	902	01:07	1.56	2.04
Initial Load	100	02:50	0.14	0.33
91% Recovery (Rail End #1) and 84% Recovery (Rail End #2) from 2.0 x Design Load				
(2.5x Design Load) x 2	1132	04:29	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 REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test Series No. 3

6 ft (69-1/2 in) by 42 in A113 Home Level Guardrail with PureView Glass Balusters, Flat Accent Top Rail Cap and 3 in Post Mount

Test No. 1 - 09/26/20

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	243	00:13	1.33
Initial Load	25	01:54	0.04
97% Recovery from 2.0 x Design Load			
2.5x Design Load	297	02:09	Achieved Load without Failure

Test No. 2 - 09/26/20

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	225	00:13	0.88
Initial Load	25	01:57	0.02
98% Recovery from 2.0 x Design Load			
2.5x Design Load	291	02:12	Achieved Load without Failure

Test No. 3 - 09/26/20

Design Load: 102.78 plf x (69-1/2 ÷ 12 in/ft) = 595 lb Vertical Uniform Load on Top Rail¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	120	00:00	0.00
2.0x Design Load	1194	01:05	0.96
Initial Load	120	02:33	0.17
82% Recovery from 2.0 x Design Load			
2.5x Design Load	1493	03:56	Achieved Load without Failure

¹ Uniform load was simulated with quarter-point loading.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test No. 4 - 09/26/20

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	465	00:19	0.76	1.32	0.80	0.54
Initial Load	50	01:55	0.10	0.10	0.10	0.00
100% Recovery from 2.0 x Design Load						
2.5x Design Load	573	02:25	Achieved Load without Failure			

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

Test No. 5 - 09/26/20

Design Load: 225 lb 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	100	00:00	0.00	0.00
(2.0x Design Load) x 2	906	00:33	1.65	1.81
Initial Load	100	02:16	0.33	0.43
80% Recovery (Rail End #1) and 76% Recovery (Rail End #2) from 2.0 x Design Load				
(2.5x Design Load) x 2	1134	03:03	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. 6 - 09/26/20

Design Load: 23 lb Applied to Two Adjacent Pickets, in Opposite Directions

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISTANCE BETWEEN PICKETS (in)
Zero Load	0	00:00	3.6250
Design Load	23	00:10	3.6875
Total Deflection			0.0625

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test Series No. 4

6 ft (69-1/2 in) by 42 in A113 Home Level Guardrail with PureView Glass Balusters, Round Accent Top Rail Cap and 3 in Post Mount

Test No. 1 - 09/26/20

Design Load: 112 lb / 11.81 Square in at Center of In-fill (on 2 Pickets)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	237	00:14	1.26
Initial Load	25	02:34	0.03
98% Recovery from 2.0 x Design Load			
2.5x Design Load	296	02:51	Achieved Load without Failure

Test No. 2 - 09/26/20

Design Load: 112 lb / 11.81 Square in at Bottom of In-fill (on 2 Pickets)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	226	00:09	0.95
Initial Load	25	01:53	0.01
99% Recovery from 2.0 x Design Load			
2.5x Design Load	298	02:05	Achieved Load without Failure

Test No. 3 - 09/26/20

Design Load: 102.78 plf x (69-1/2 ÷ 12 in/ft) = 595 lb Vertical Uniform Load on Top Rail¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	120	00:00	0.00
2.0x Design Load	1193	00:36	0.94
Initial Load	124	02:06	0.11
88% Recovery from 2.0 x Design Load			
2.5x Design Load	1493	03:05	Achieved Load without Failure

¹ Uniform load was simulated with quarter-point loading.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test No. 4 - 09/26/20

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	461	00:20	0.62	1.29	0.67	0.65
Initial Load	50	01:52	0.00	0.02	0.01	0.02
97% Recovery from 2.0 x Design Load						
2.5x Design Load	574	02:14	Achieved Load without Failure			

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

Test No. 5 - 09/26/20

Design Load: 225 lb 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	100	00:00	0.00	0.00
(2.0x Design Load) x 2	906	00:50	1.38	1.43
Initial Load	100	02:50	0.02	0.02
99% Recovery (Rail End #1) and 99% Recovery (Rail End #2) from 2.0 x Design Load				
(2.5x Design Load) x 2	1130	03:46	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. 6 - 09/26/20

Design Load: 23 lb Applied to Two Adjacent Balusters, in Opposite Directions

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISTANCE BETWEEN PICKETS (in)
Zero Load	0	00:00	3.6250
Design Load	23	00:10	3.6875
Total Deflection			0.0625

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test Series No. 5

6 ft (76 in) By 42 in by 35° Al13 Home Stair Guardrail with PureView Glass Balusters, Flat Accent Top Rail Cap and 3 in Post Mount

Test No. 1 - 10/15/20

Design Load: 112 lb / 11.81 Square in at Center of In-fill (on 2 Pickets)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	228	00:38	1.19
Initial Load	25	02:02	0.04
97% Recovery from 2.0 x Design Load			
2.5x Design Load	283	02:30	Achieved Load without Failure

Test No. 2 - 10/15/20

Design Load: 112 lb / 11.81 Square in at Bottom of In-fill (on 2 Pickets)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	235	00:20	1.25
Initial Load	25	01:53	0.00
100% Recovery from 2.0 x Design Load			
2.5x Design Load	285	02:12	Achieved Load without Failure

Test No. 3 - 10/15/20

Design Load: 102.78 plf x (76 ÷ 12 in/ft) = 651 lb Vertical Uniform Load on Top Rail¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	130	00:00	0.00
2.0x Design Load	1312	01:35	1.75
Initial Load	130	03:25	0.29
83% Recovery from 2.0 x Design Load			
2.5x Design Load	1641	04:43	Achieved Load without Failure

¹ Uniform load was simulated with quarter-point loading.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test No. 4 - 10/15/20

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	456	00:35	0.24	0.83	0.06	0.68
Initial Load	50	02:57	0.04	0.03	0.00	0.01
99% Recovery from 2.0 x Design Load						
2.5x Design Load	573	03:25	Achieved Load without Failure			

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

Test No. 5 - 10/15/20

Design Load: 225 lb 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	100	00:00	0.00	0.00
(2.0x Design Load) x 2	914	00:45	0.57	0.38
Initial Load	100	02:18	0.03	0.03
95% Recovery (Rail End #1) and 92% Recovery (Rail End #2) from 2.0 x Design Load				
(2.5x Design Load) x 2	1126	03:10	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. 6 - 10/15/20

Design Load: 23 lb Applied to Two Adjacent Balusters, in Opposite Directions

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISTANCE BETWEEN PICKETS (in)
Zero Load	0	00:00	3.6250
Design Load	23	00:10	3.6875
Total Deflection			0.0625

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test Series No. 6

6 ft (76 in) By 42 in by 35° A113 Home Stair Guardrail with PureView Glass Balusters, Round Accent Top Rail Cap and 3 in Post Mount

Test No. 1 - 10/16/20

Design Load: 112 lb / 11.81 Square in at Center of In-fill (on 2 Pickets)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	228	00:20	1.17
Initial Load	25	01:40	0.12
90% Recovery from 2.0 x Design Load			
2.5x Design Load	282	02:03	Achieved Load without Failure

Test No. 2 - 10/16/20

Design Load: 112 lb / 11.81 Square in at Bottom of In-fill (on 2 Pickets)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	230	00:21	1.15
Initial Load	25	02:13	0.03
97% Recovery from 2.0 x Design Load			
2.5x Design Load	282	02:45	Achieved Load without Failure

Test No. 3 - 10/16/20

Design Load: 102.78 plf x (76 ÷ 12 in/ft) = 651 lb Vertical Uniform Load on Top Rail¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	130	00:00	0.00
2.0x Design Load	1307	01:09	2.00
Initial Load	130	02:48	0.41
80% Recovery from 2.0 x Design Load			
2.5x Design Load	1627	04:22	Achieved Load without Failure

¹ Uniform load was simulated with quarter-point loading.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test No. 4 - 10/16/20

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	453	00:54	0.23	1.13	0.05	0.99
Initial Load	50	02:53	0.03	0.10	0.01	0.08
92% Recovery from 2.0 x Design Load						
2.5x Design Load	568	03:45	Achieved Load without Failure			

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

Test No. 5 - 10/16/20

Design Load: 225 lb 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	100	00:00	0.00	0.00
(2.0x Design Load) x 2	907	00:46	0.72	0.50
Initial Load	100	02:24	0.04	0.06
94% Recovery (Rail End #1) and 88% Recovery (Rail End #2) from 2.0 x Design Load				
(2.5x Design Load) x 2	1135	03:22	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. 6 - 10/16/20

Design Load: 23 lb Applied to Two Adjacent Balusters, in Opposite Directions

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISTANCE BETWEEN PICKETS (in)
Zero Load	0	00:00	3.6250
Design Load	23	00:10	3.6875
Total Deflection			0.0625

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

Test Series No. 7

2 in Square Post Mount Installed in Simulated Concrete (Steel C-Channel)

Test No. 1 - 12/21/20

Design Load: 225 lb Concentrated Load at Top of Stand-Alone ¹ 2 in Post (42 in High)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	POST DISPLACEMENT (in)
Initial Load	50	00:00	0.00
2.0x Design Load	453	00:47	3.06
Initial Load	50	02:06	0.91
70% Recovery from 2.0 x Design Load			
2.5x Design Load	564	02:45	Achieved Load without Failure
Ultimate Load	613	Mode of Failure: Weld Failure	

SECTION 10

CONCLUSION

Using performance criteria of withstanding an ultimate load of 2.5 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 HOME ALUMINUM GUARDRAIL SYSTEM	GUARDRAIL TYPE	BALUSTER	ACCENT TOP RAIL CAP	SUPPORT POST	CODE OCCUPANCY CLASSIFICATION
6 ft (69 in) by 42 in	Level / In-Line Application	PureView Full Glass Panel	Flat	3 in Square A/13 Post Mount Or 2 in Square A/13 Post Mount	2015 National Building Code of Canada - Residential
6 ft (69-1/2 in) by 42 in			Round		
6 ft (76 in) by 42 in by 35°	Stair	PureView Glass Balusters	Flat		
			Round		

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

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

SECTION 11

PHOTOGRAPHS



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



Photo No. 2
In-Fill Load Test at Bottom of Two Balustrades

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21



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



Photo No. 4
Vertical Uniform Test on Top Rail

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21



Photo No. 5
Concentrated Load Test at Midspan of Top Rail



Photo No. 6
Concentrated Load Test at Ends of Top Rail (Brackets)

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21



Photo No. 7

Concentrated Load Test at Top of Stand-Alone 2 in Post Mount (42 in high)



Photo No. 8

Two-Piece Cast Aluminum Stair Bracket

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21



Photo No. 9
Cast Aluminum Level Rail Bracket

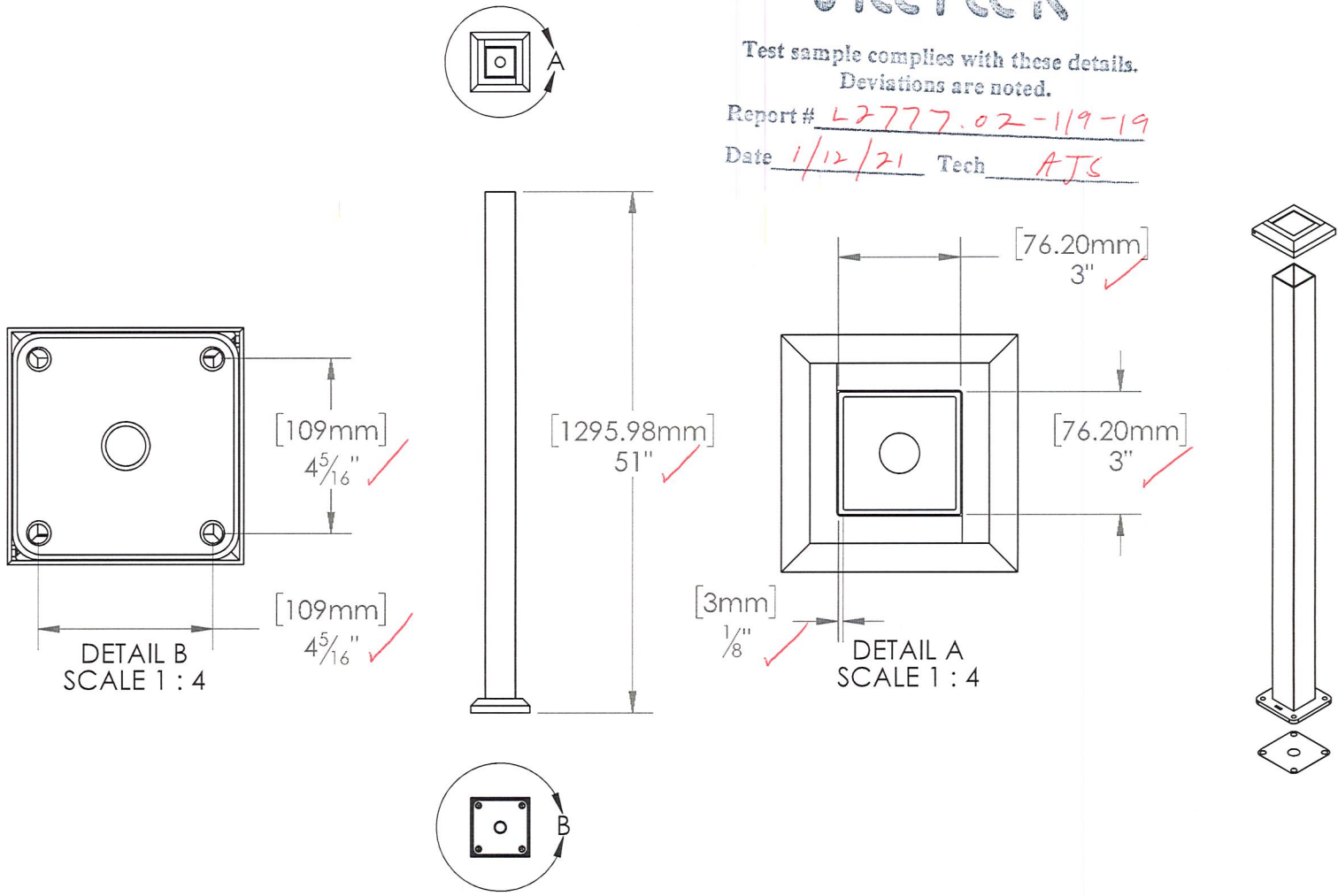
SECTION 12 **DRAWINGS**

The "As-Built" drawings for the *A13 Home Pureview* 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.

intertek

Test sample complies with these details.
Deviations are noted.

Report # L2777.02-119-19
Date 1/12/21 Tech AJS



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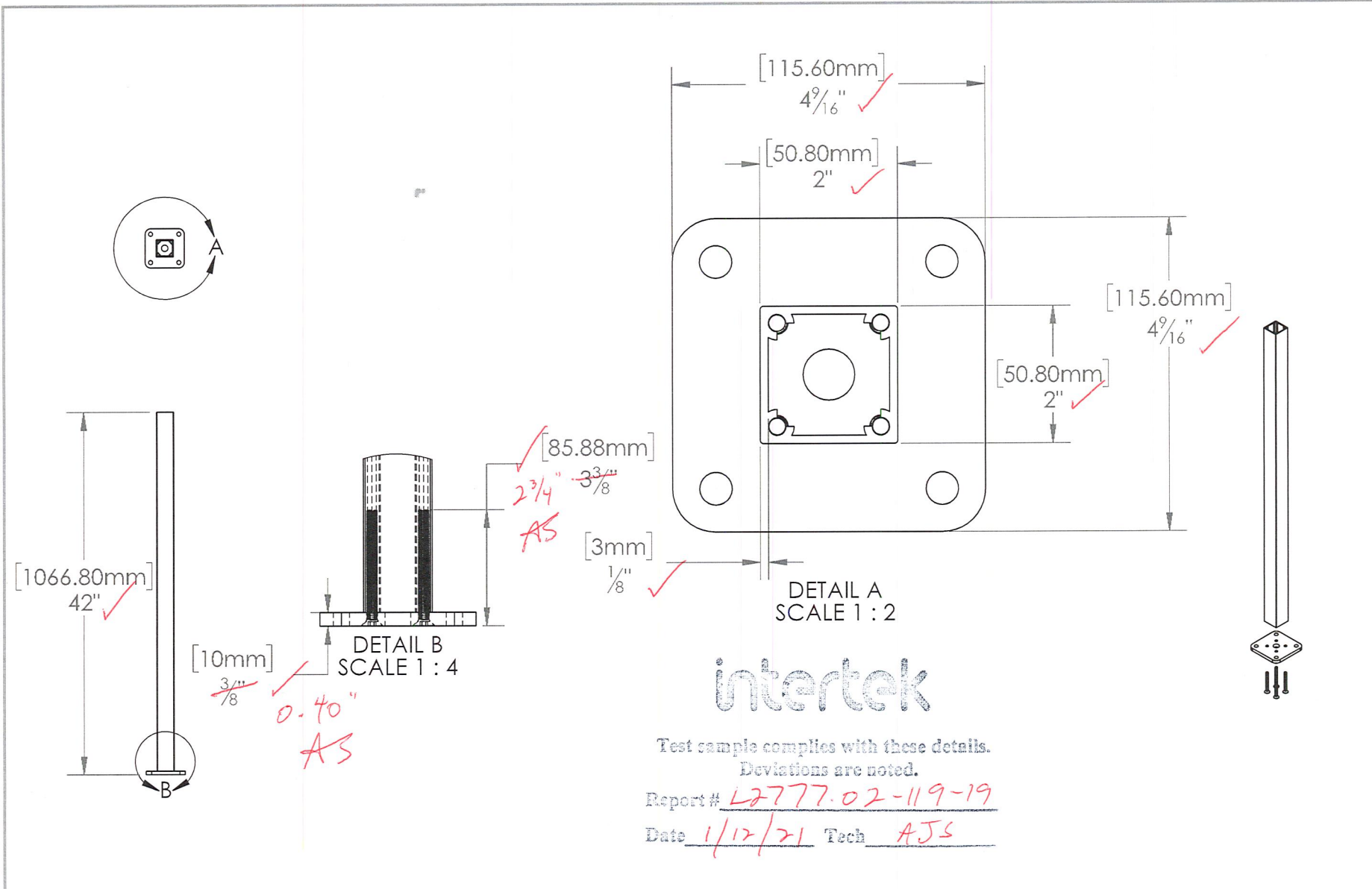


Fortress Railing

1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

REV	DATE	BY	DESCRIPTION
A	12/03/19	KF	Initial Drawing
DESCRIPTION: AL13 HOME POST 3" X 51" BLANK w/ BASE CVR			
DRAWN BY: KevinF			SCALE: AS SHOWN
DATE: 12/03/2019		DIVISION: Fortress Railing	
ITEM #:	FILE NAME/PART #:	REV:	
5935103X	R3935-06298A	A	



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 Deviations are noted.
 Report # L2777.02-119-19
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FORTRESS
 —RAILING PRODUCTS—
 Fortress Railing
 1720 N 1st Street
 Garland, TX 75040

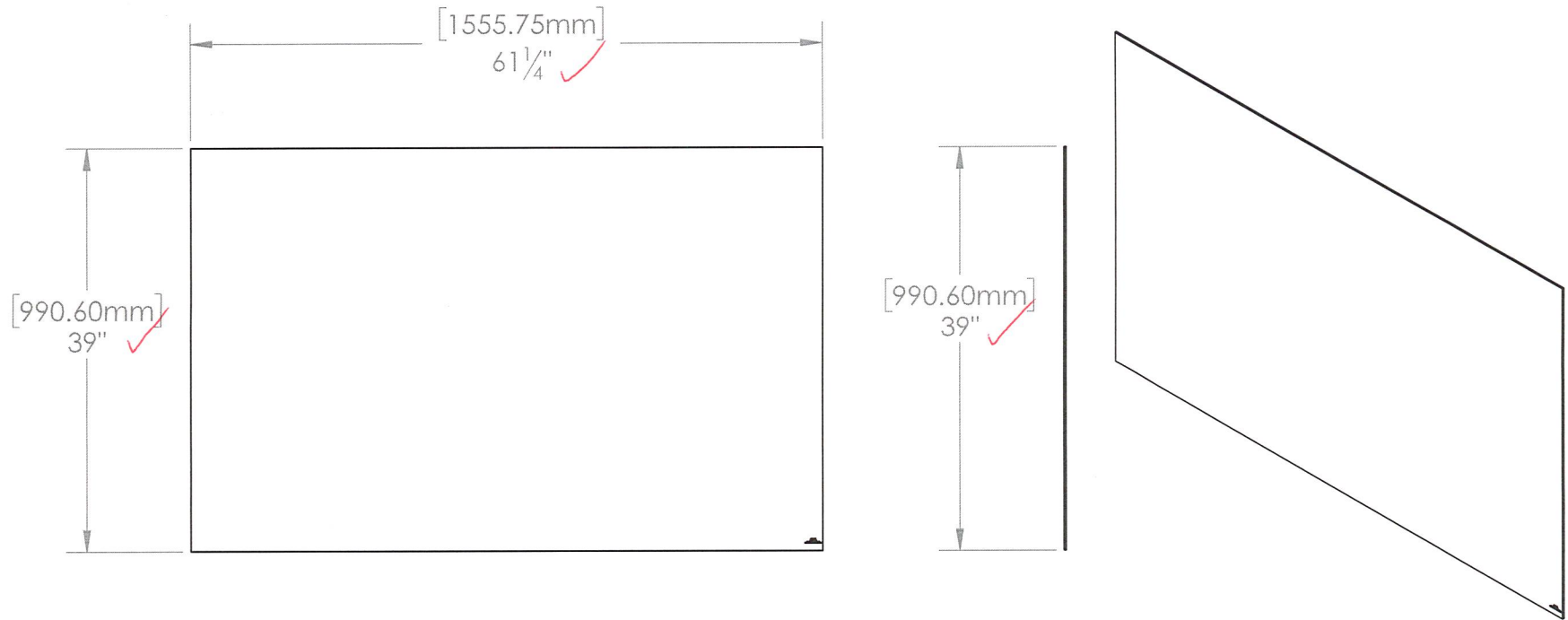
REV	01/11/21	KF	Initial Drawing
DATE		BY	DESCRIPTION
DESCRIPTION: AL13 HOME POST 2" X 42" BLANK BASEPLATE WELDMENT			
DRAWN BY:	KevinF	SCALE:	AS SHOWN
DATE:	01/11/2021	DIVISION:	Fortress Railing
ITEM #:		FILE NAME/PART #:	R3935-11580A
Sheet:	1 OF 1	REV:	



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Report # L2777.02-119-19

Date 12/16/20 Tech ATS



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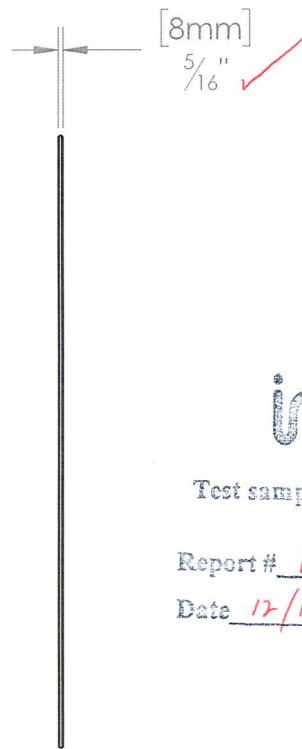
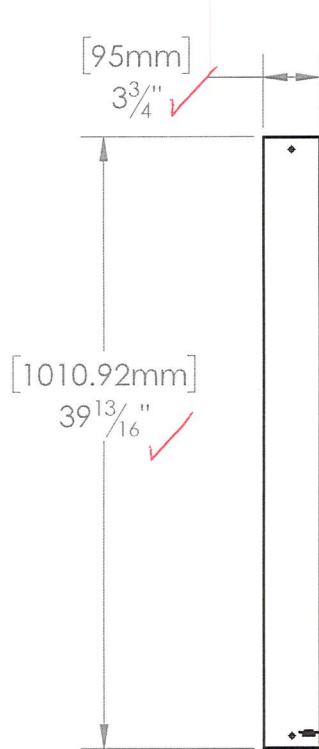


Fortress Railing

1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

C	12/10/20	KF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: PV -FGP 39" X 61.25"			
DRAWN BY: KevinF		SCALE: 1:16	
DATE: 12/10/2020		DIVISION:	
ITEM #:	FILE NAME/PART #:	REV:	
	R3540-01171A	C	



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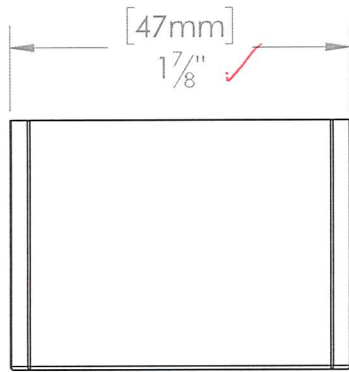


Fortress Railing

1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

C	12/10/20	KF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: PV-PLA-40"			
DRAWN BY: KevinF		SCALE: 1:12	
DATE: 12/10/2020	DIVISION: Fortress Railing		REV: C
ITEM #:	FILE NAME/PART #: R3532-01180A		

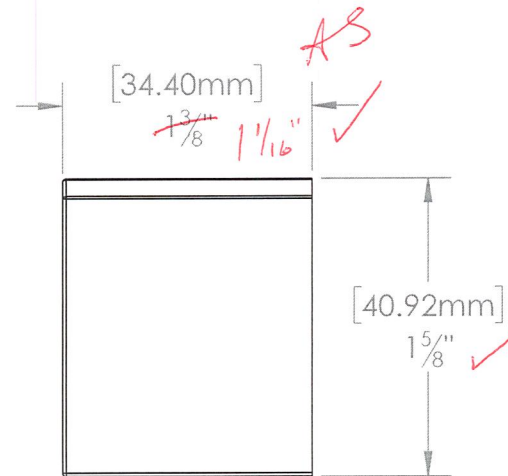
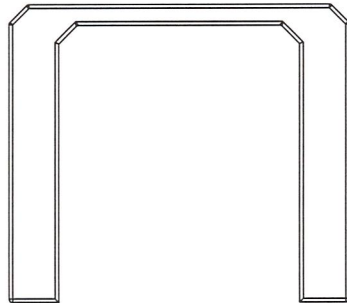
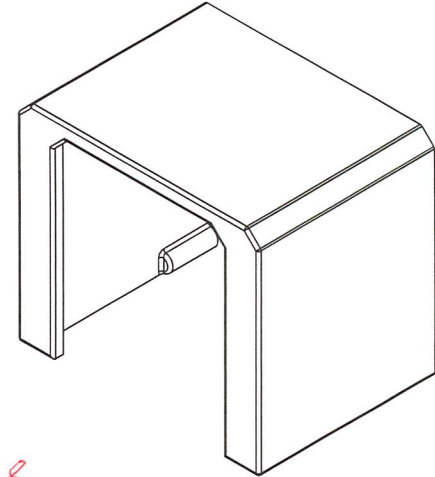


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Report # L2777.02-119-19

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Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

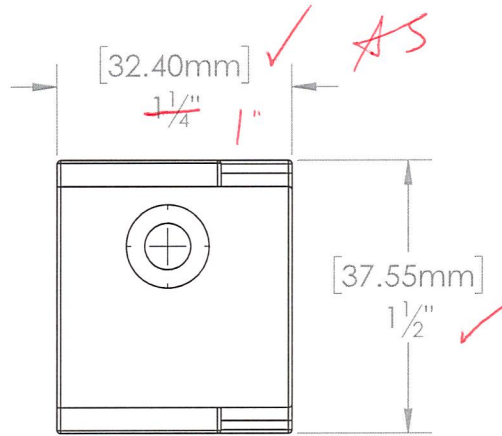
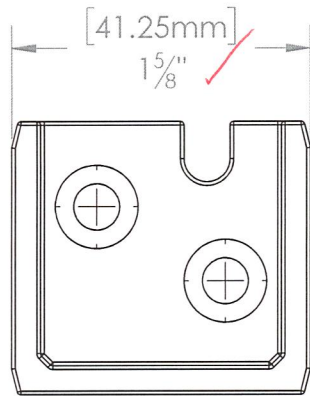
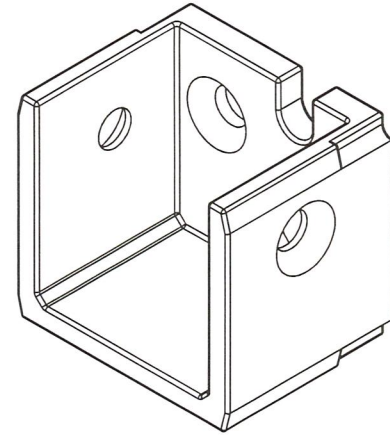
EC	1/3/19	GL	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION:			
AL13 HOME BRACKET CAP			
DRAWN BY:	KevinF		SCALE:
DATE:	01/03/2019	DIVISION:	RAILING
ITEM #:	FILE NAME/PART #:	REV:	
	R3934-03621A	E	

SIGNATURE	
PRINTED NAME	
COMPANY	
DATE	

intertek

Test sample complies with these details.
Deviations are noted.

Report # L2777.02-119-19
Date 12/16/20 Tech AJS



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Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

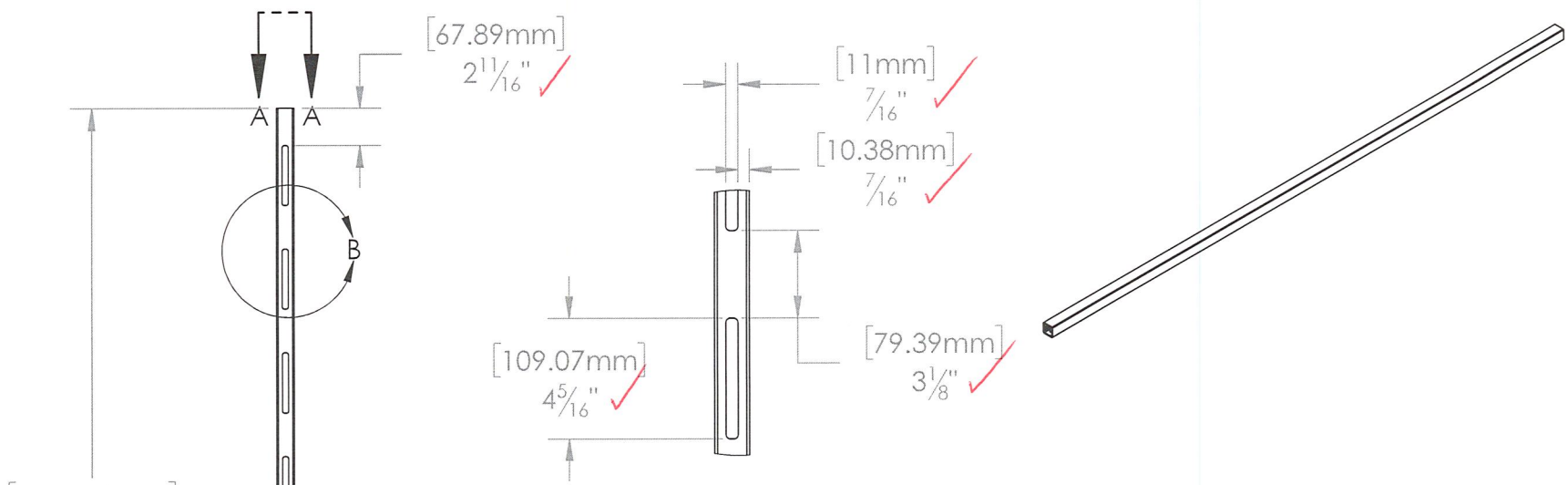
EC	8/12/20	JH	STANDARDIZED
REV	DATE	BY	DESCRIPTION

DESCRIPTION:
AL13 HOME BRACKET CUP

DRAWN BY: KevinF
DATE: 01/03/2019 DIVISION: RAILING

ITEM #: FILE NAME/PART #:
R3934-03618A SIGNOFF

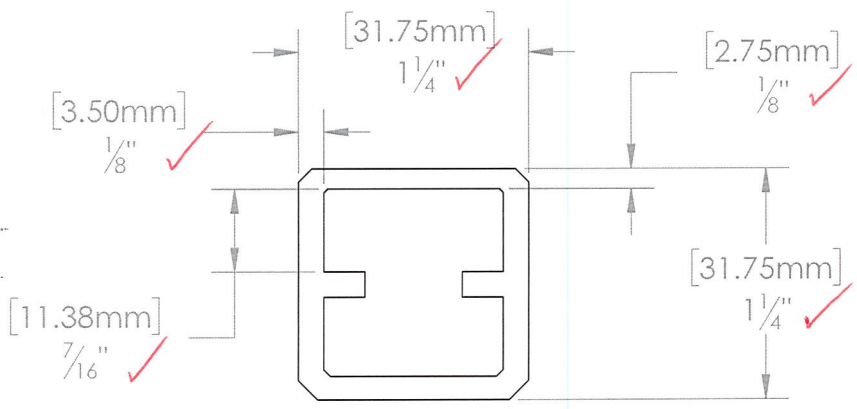
SCALE:
1:1
REV:
E



DETAIL B
SCALE 1 : 6

intertek

Test sample complies with these details.
Deviations are noted.
Report # L2777.02-119-19
Date 12/16/20 Tech AJS



SECTION A-A
SCALE 1 : 1

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Fortress Railing
1720 N 1st Street
Garland, TX 75040

REV	DATE	BY	DESCRIPTION
A	09/08/2020	TF	Initial Drawing

DESCRIPTION:
AL13 HOME PV RAIL

DRAWN BY: TylerF
DATE: 09/08/2020 DIVISION: Fortress Railing

SCALE:
AS SHOWN

ITEM #:
FILE NAME/PART #:
R3931-09839A

REV:
A

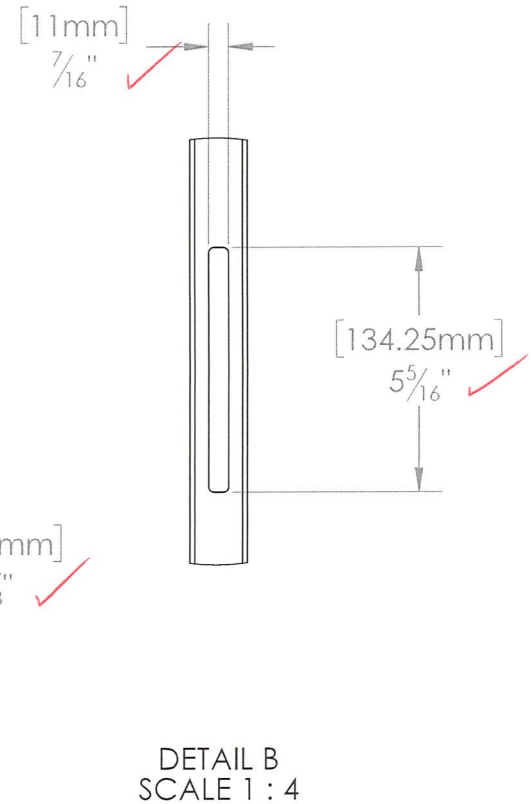
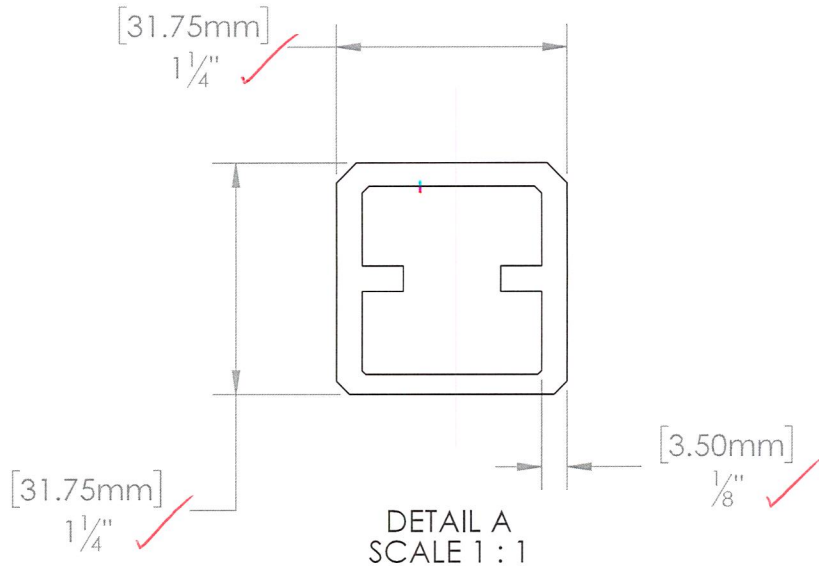
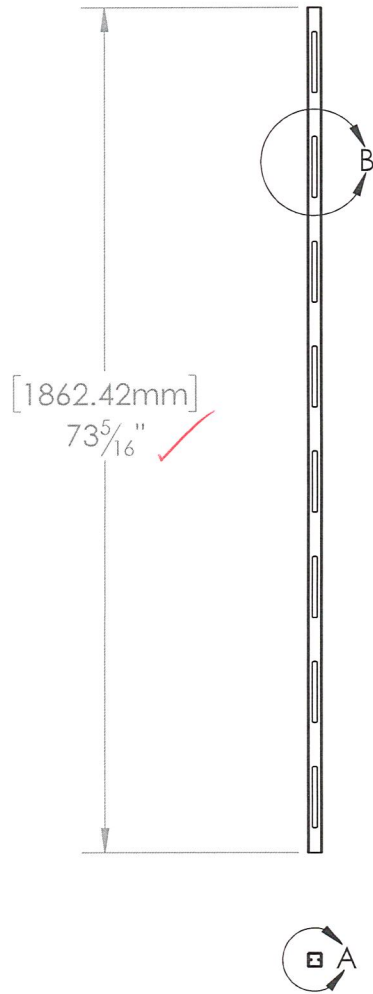
Sheet: 1 OF 1

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Test sample complies with these details.
Deviations are noted.

Report # L27777.02-119-19

Date 12/10/20 Tech AJS



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Fortress Railing

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Sheet: 1 OF 1

REV	DATE	BY	DESCRIPTION
A	12/11/20	KF	Initial Drawing

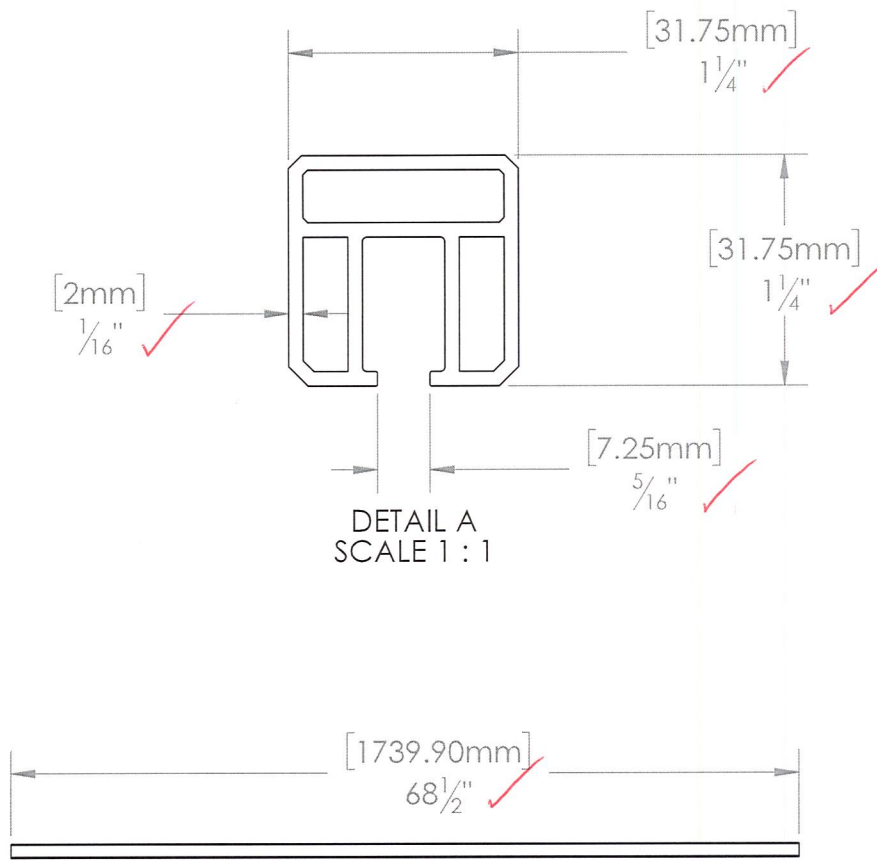
DESCRIPTION:
AL13 HOME PV STAIR RAIL

DRAWN BY: KevinF
DATE: 12/11/2020 DIVISION: Fortress Railing

SCALE:
1:16

ITEM #:
FILE NAME/PART #:
R3931-09448A

REV:
A



intertek

Test sample complies with these details.
Deviations are noted.

Report # L2777.02-119-19

Date 12/16/20 Tech AJS



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Fortress Railing
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Sheet: 1 OF 1

REV	DATE	BY	DESCRIPTION
4	12/11/20	KF	Initial Drawing

DESCRIPTION:
AL13 HOME FULL GLASS RAIL

DRAWN BY: KevinF
DATE: 12/11/2020 DIVISION: Fortress Railing

SCALE:
1:16

ITEM #:
FILE NAME/PART #:
R3931-09289A

REV:
4



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TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: L2777.02-119-19-R0

Date: 01/12/21

SECTION 13

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	01/12/21	N/A	Original Report Issue