

DECK SUPPLY SERVICES LLC TEST REPORT

SCOPE OF WORK

STRUCTURAL PERFORMANCE TESTING ON THE 8 FT BY 36 IN *RALEIGH*, ALUMINUM GUARDRAIL SYSTEM WITH THE 2-1/2 IN SQUARE POST AND CABLE INFILL

REPORT NUMBER

T1684.01-119-19 R1

TEST DATE

12/15/25

ISSUE DATE

03/02/26

REVISED DATE

03/11/26

RECORD RETENTION END DATE

12/15/29

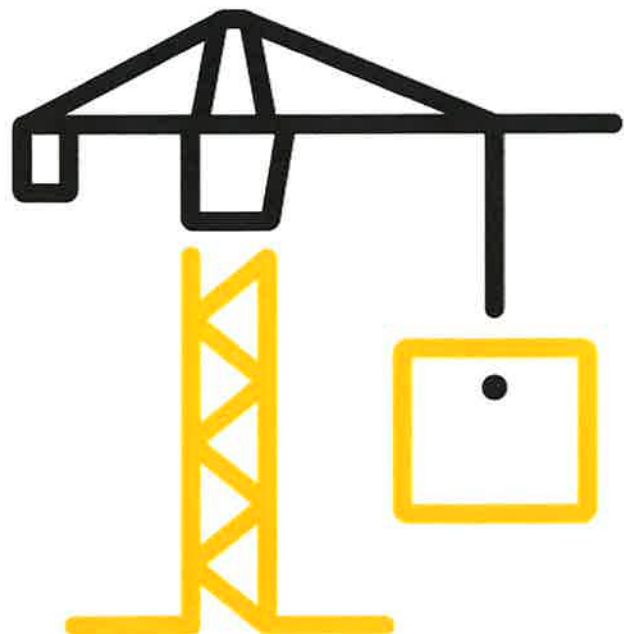
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Report No.: T1684.01-119-19 R1

Date: 03/02/26 Revised Date: 03/11/26

REPORT ISSUED TO DECK SUPPLY SERVICES LLC

233 E. Walcott Rd.
Walcott, IA 52773

SECTION 1 SCOPE

Intertek Building & Construction (B&C) was contracted by Deck Supply Services LLC to perform structural performance testing in accordance with the 2024 IRC on their 8 ft by 36 in Raleigh aluminum guardrail system with the 2-1/2 in square Post and cable infill. 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 specimen met the 2024 IRC design load performance requirements.

For INTERTEK B&C:

COMPLETED BY:	Jeffrey C. Jones
TITLE:	Technician II
SIGNATURE:	 <small>Digitally Signed by: Jeffrey Jones</small>
DATE:	03/11/26

REVIEWED BY:	V. Thomas Mickley, Jr., P.E.
TITLE:	Senior Staff Engineer
SIGNATURE:	 <small>Digitally Signed by: Virgal Thomas Mickley, Jr</small>
DATE:	03/11/26

JCJ:vtm/aas

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TEST METHODS

The specimen was evaluated in accordance with the following:

2024, International Residential Code® (IRC), International Code Council

2024, International Residential Code® (IRC), International Code Council

Structural tests were performed according to Chapter 17 (Structural Tests and Special Inspections) of IBC 2024.

SECTION 4

MATERIAL SOURCE/INSTALLATION

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

The 8 ft by 36 in guardrail assembly was installed and tested as a single railing section by directly securing the posts into the surface of a rigid steel channel (to simulate anchorage into concrete) with four 3/8 in bolts. 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 specimen was 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 specimen. 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
Jeffrey C. Jones	Intertek B&C

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TEST SPECIMEN DESCRIPTION

Deck Supply Services LLC provided the test specimens with the following details:

PRODUCT	<i>Raleigh</i>
TYPE	Aluminum guardrail system
GUARDRAIL LENGTH	95-5/8 in (inside of post to inside of post) 8 ft (nominal)
GUARDRAIL HEIGHT	35 in (top of top rail to bottom of bottom cable) 36 in (nominal)
TOP RAIL	1-1/4 in high by 1-13/16 in wide by 0.070 in thick contoured 6005-T5 extruded aluminum
IN-FILL	Eleven, horizontal 1/8 in 1x19 stainless steel cables equally spaced
INTERMEDIATE SUPPORT BALUSTERS ¹	3/4 in square by 1-3/4 in long by 0.030/0.050 in thick 6063 extruded aluminum picket attached to top rail with baluster plug 1-3/4 square by 1-1/2 in high cast aluminum cap and base
RAIL BRACKETS	Cast aluminum collar brackets with accompanying cover
SUPPORT POST	2-1/2 in square by 0.120 in thick, 6005-T5 extruded aluminum post attached to a 4-1/2 in square by 5/16 in thick 6005-T5 aluminum base plate with 1/4 in fillet weld all around. The base plate included four, 13/32 in wide by 17/32 in long slotted holes at each corner
FASTENERS	Top Rail Bracket to Post: Three, #8-18 by 3/4 in (0.115 in minor diameter) square drive, pan head, self-drilling, stainless steel screws Top Rail to Bracket: Three, #8-18 by 3/4 in (0.115 in minor diameter) square drive, flat head, self-drilling, stainless steel screws Baluster Plug to Top Rail One, #8-18 by 3/4 in (0.115 in minor diameter) square drive, flat head, self-drilling, stainless steel screw Support Baluster to Cap and Base: One, #8-18 by 3/4 in (0.115 in minor diameter) square drive, flat head, self-drilling, stainless steel screw Support Baluster to Baluster Plug: Compression fit; No mechanical connection Support Baluster Base to Deck Surface: One, #8-18 by 2 in (0.115 in minor diameter) square drive, flat head, self-drilling, stainless steel screw

¹ Two intermediate balusters equally spaced along the length of the rail.



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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 analyse 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.



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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

**8 ft (95-5/8 in) by 36 in *Raleigh* Level/In-Line Aluminum Guardrail System with Cable Infill
IRC One- and Two-Family Dwellings**

Test No. 1

Test Date: 12/15/25

Design Load: 50 lb / 1 Square ft at Center Top of Intermediate Support Baluster

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	104	00:06	0.57
Initial Load	28	01:35	0.04
93% Recovery from 2.0 x Design Load			
2.5x Design Load	128	01:44	Achieved Load without Failure

Test No. 2

Test Date: 12/15/25

Design Load: 50 lb / 1 Square ft at Center of Intermediate Support Baluster

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	108	00:08	0.58
Initial Load	28	01:39	0.01
98% Recovery from 2.0 x Design Load			
2.5x Design Load	131	01:51	Achieved Load without Failure



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Test No. 3

Test Date: 12/15/25

Design Load: 50 lb / 1 Square ft at Center of Cable In-fill (on 4 Cables)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	103	00:25	0.83
Initial Load	26	01:39	0.00
100% Recovery from 2.0 x Design Load			
2.5x Design Load	129	01:48	Achieved Load without Failure

Test No. 4

Test Date: 12/15/25

Design Load: 50 lb / 1 Square ft at Edge of Cable In-fill Adjacent to Post (on 4 Cables)

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	104	00:07	0.25
Initial Load	29	01:38	0.00
100% Recovery from 2.0 x Design Load			
2.5x Design Load	128	01:46	Achieved Load without Failure

Test No. 5

Test Date: 12/15/25

Design Load: 50 lb / 1 Square ft at Bottom at Intermediate Support Baluster

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
Initial Load	25	00:00	0.00
2.0x Design Load	113	00:06	0.36
Initial Load	26	01:40	0.00
100% Recovery from 2.0 x Design Load			
2.5x Design Load	141	01:49	Achieved Load without Failure

¹ Net displacement was the bottom rail displacement relative to its ends.

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Test No. 6

Test Date: 12/15/25

Design Load: 200 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	40	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	403	00:43	0.56	3.93	0.62	3.34
Initial Load	41	02:12	0.07	0.60	0.02	0.56
83% Recovery from 2.0 x Design Load						
2.5x Design Load	503	02:54	Achieved Load without Failure			

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

Test No. 7

Test Date: 12/15/25

Design Load: 200 lb Vertical Concentrated Load at Midspan of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	40	00:00	0.00
2.0x Design Load	404	00:17	0.30
Initial Load	43	01:34	0.07
77% Recovery from 2.0 x Design Load			
2.5x Design Load	521	01:44	Achieved Load without Failure

Test No. 8A

Test Date: 12/15/25

Design Load: 200 lb Concentrated Load at Ends of Top Rail (Brackets) (Horizontal)

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)	
			RAIL END NO. 1	RAIL END NO. 2
Initial Load	80	00:00	0.00	0.00
(2.0x Design Load) x 2	806	00:44	2.15	1.77
Initial Load	80	02:21	1.03	0.45
52% (Rail End No. 1) and 75% (Rail End No. 2) Recovery from 2.0 x Design Load				
(2.5x Design Load) x 2	1005	02:45	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. 8B

Test Date: 12/15/25

Design Load: 200 lb Horizontal Concentrated Load at Top of Post Mount ²

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	POST DISPLACEMENT (in)	
			POST NO. 1	POST NO. 2
Initial Load	80	00:00	0.00	0.00
(2.0x Design Load) x 2	806	00:44	2.15	1.77
Initial Load	80	02:21	1.03	0.45
52% (Post No. 1) and 75% (Post No. 2) Recovery from 2.0 x Design Load				
(2.5x Design Load) x 2	1005	02:45	Achieved Load without Failure ³	

¹ A spreader beam was used to impose loads on both posts; therefore, loads were doubled.

² Load was applied to the end of the top rail (brackets) and transferred to the posts through the brackets at a height of 36 in measured from the bottom of the base plate.

³ The post mount meets the requirements for Residential, One- and Two-Family Dwelling applications.

Test No. 9

Test Date: 12/15/25

Design Load: 200 lb Concentrated Load at Ends of Top Rail (Brackets) (Vertical)

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	RAIL DISPLACEMENT (in)
Initial Load	79	00:00	0.00
(2.0x Design Load) x 2	813	00:14	0.11
Initial Load	80	01:41	0.00
100% Recovery from 2.0 x Design Load			
(2.5x Design Load) x 2	1024	02:54	Achieved Load without Failure

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

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 8 ft by 36 in Raleigh aluminum guardrail with cable infill reported herein.

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

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SECTION 11

PHOTOGRAPHS



Photo No. 1

In-Fill Load Test at Top of Intermediate Support Baluster



Photo No. 2

In-Fill Load Test at Center of Intermediate Support Baluster

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Photo No. 3

In-Fill Load Test at Center of Cable Infill



Photo No. 4

In-Fill Load Test at Edge of Cable Infill Adjacent to Post

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Photo No. 5

In-Fill Load Test at Bottom of Intermediate Support Baluster



Photo No. 6

Horizontal Concentrated Load Test at Midspan of Top Rail

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Photo No. 7
Vertical Concentrated Load Test at Midspan of Top Rail



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

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Photo No. 9

Concentrated Load Test at Ends of Top Rail (Brackets) (Vertical)



Photo No. 10

Cast Aluminum Bracket for Top Rail

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Photo No. 11
Support Baluster insert into Top Rail



Photo No. 12
Support Baluster to Floor



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SECTION 12

DRAWINGS

The "As-Built" drawings for the 8 ft by 36 in Raleigh aluminum guardrail with cable infill, 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.