

FORTRESS RAILING PRODUCTS TEST REPORT

SCOPE OF WORK

ICC-ES AC273 TESTING ON *FE26 PLUS* GUARDRAIL WITH *UB-05* BRACKETS

REPORT NUMBER

J7825.01-119-19 R0

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TEST REPORT FOR FORTRESS RAILING PRODUCTS

Report No.: J7825.01-119-19 R0

Date: 03/30/20

REPORT ISSUED TO

FORTRESS RAILING PRODUCTS

1720 North 1st Street
Garland, Texas 75040

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Fortress Railing Products to perform structural performance testing in accordance with ICC-ES™ AC273 on their 6 ft by 42 in *Fe26 Plus* guardrail with *UB-05* brackets. This report is in conjunction with Intertek report No.'s J7470.02-103-15 and J0101.02-119-19 which include product sampling information and structural performance testing of the 3 in Fe26 surface mount posts respectively. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at the Intertek B&C test facility in York, PA.

Intertek B&C in York, Pennsylvania has demonstrated compliance with ISO/IEC International Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. (IAS). Intertek B&C is accredited to perform all testing reported herein.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

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TITLE:	Project Manager
SIGNATURE:	
DATE:	03/30/20

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DATE:	03/30/20

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SECTION 2

TEST METHODS

The specimens were evaluated in accordance with the following:

ICC-ES™ AC273 (March 1, 2008 - editorially revised March 2016) , *Acceptance Criteria for Handrails and Guards*

ICC-ES™ AC273 was developed by the ICC Evaluation Service, Inc. (ICC-ES™) as acceptance criteria to evaluate compliance with the following building codes:

2015 *International Building Code*®, International Code Council

2015 *International Residential Code*®, International Code Council

The specimens were also evaluated in accordance with the following:

ASTM D1761-12, *Standard Test Methods for Mechanical Fasteners in Wood*

Limitations

All tests performed were to evaluate structural performance of the railing assembly to carry and transfer imposed loads to the supports (posts). The test specimen evaluated included the pickets, rails, rail brackets, and attachment to the supporting structure. Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

In lieu of material testing, Fortress Railing Products provided mill certificates traceable to the tested products.

SECTION 3

MATERIAL SOURCE

The specimens were selected by Intertek B&C personnel. The specimens were tagged prior to shipment on 06/10/19, (Reference Intertek B&C Test Specimen Selection Report No. J7470.02-103-15, dated 06/10/19). See photograph in Section 9 for typical sampling mark.

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.

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SECTION 4

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Kevin Flatt	Fortress Railing Products
Rob Holthaus	Fortress Railing Products
Adam J. Schrum	Intertek B&C

SECTION 5

TEST PROCEDURE

Assembly Fastener Testing

Assembly fastener tests were performed per ICC-ES™ AC273, Section 4.2.7 to simulate a 90 degree bracket loading condition, which addresses a situation when the guardrail system is to be installed with the top rails in a corner condition.

Short sections of the top rail were attached in accordance with Fortress Railing Products installation instructions to short sections of posts. Specimens were assembled by an Intertek B&C technician. Rail brackets were secured to the post and to the rail as described in the Fastening Schedule in Section 6.

The testing machine was fitted with a post section at the bottom to accommodate anchorage of the rail and bracket. The top rail had a hole drilled in it to attach to the clevis which was then attached to the test machine's crosshead. The bottom post section was attached rigidly to the base of the test machine.

Testing was performed using a computer-monitored and -controlled SATEC Unidrive, Model MII 50 UD Universal Testing Machine. Tests were run at a crosshead speed of 0.05 in/min, and each specimen was tested in tension to its ultimate load capacity.

Structural Performance Testing of Assembled Railing Systems

Railing assembly tests were performed per ICC-ES™ AC273, Section 4.2.1 in a self-contained structural frame designed to accommodate anchorage of a rail 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. Deflections were measured to the nearest 0.01 in using electronic linear displacement transducers.

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The railing assembly was installed and tested as a single railing section by surface mounting the steel post mount to a steel channel (simulated concrete) or by directly securing the 4x4 posts to rigid steel stanchions, which kept the posts from deflecting. The railing was assembled by an Intertek B&C technician. Transducers mounted to an independent reference frame were located to record movement of reference points on the railing system components (ends and mid-point) to determine net component deflections. See photographs in Section 9 for test setups.

The 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. One specimen was used for all load tests which were performed in the order reported. Each design load test was performed using the following procedure:

1. Zeroed transducers and load cell at zero load;
2. Increased load to specified test load in no less than ten seconds; and
3. Held test load for no less than one minute.

Unless otherwise noted, all loads and displacement measurements were normal to the rail (horizontal). The test results apply only to the railing assembly between supports and anchorage to the support.

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SECTION 6

TEST SPECIMEN DESCRIPTION

The *Fe26 Plus* guardrail system is comprised of pre-galvanized formed steel top and bottom rails, pickets spaced between the rail members, and posts. Test specimens consisted of one product color: Black. Drawings are included in Section 10 to verify the overall dimensions and other pertinent information of the tested product, its components, and any constructed assemblies. Photographs are provided in Section 9.

SERIES/MODEL	<i>Fe26 Plus</i> guardrail system
COLOR	Black
MATERIAL	Seamless Grade A, pre-galvanized steel tubing with at least a G60 zinc powder-coating
RAIL LENGTH	72-1/2 in (inside of post to inside of post)
RAIL HEIGHT	40 in (top of top rail to bottom of bottom rail)
TOP/BOTTOM RAIL	1-1/4 in square by 0.062 in thick wall
PICKET	3/4 in square by 0.045 in thick steel picket
RAIL ATTACHMENT	<i>UB-05</i> steel collar brackets
POST	3 in square by 0.075 in thick steel tube connected to a 5-1/8 in square by 0.30 in thick steel base plate with a 3/16 in continuous fillet weld; the base plate included four 1/2 in diameter holes and one 15/16 in diameter hole
	Preservative treated Southern Pine 4x4 wood post

Fastening Schedule

CONNECTION	FASTENER
Rail Bracket to Steel Post*	Two #12-24 by 3/4 in, Torx drive, flat-head, Type F thread cutting point, steel screws
Rail Bracket to Wood Post	Two #12-10 by 2-1/2 in (0.153 in minor diameter) Torx drive, flat-head, Type A point, steel screws
Rail Bracket to Rail*	One #12-24 by 3/4 in, Torx drive, flat-head, Type F thread cutting point, steel screw
Post Mount to Substructure	Four 3/8 in Grade 5 hex-head bolts with washer

* 5/32 in diameter pre-drill used

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SECTION 7

TEST RESULTS

Assembly Fastener Testing

Test Date: 07/26/19

3 in Square Steel Post Mount

SAMPLE NO.	ULTIMATE LOAD (lb)	DEVIATION FROM AVERAGE	MODE OF FAILURE
1	1291	-2.5%	Material Yield
2	1181	-10.8%	
3	1392	+5.1%	
4	1309	-1.1%	
5	1447	+9.3%	
AVERAGE	1324		
ALLOWABLE CAPACITY ¹	441	≥ 200 lb ∴ OK	

¹ Average ultimate load divided by a factor of safety of three (3.0)

Preservative Treated Southern Pine 4x4 Post

SAMPLE NO.	ULTIMATE LOAD (lb)	DEVIATION FROM AVERAGE	MODE OF FAILURE
1	1719	-1.9%	Material Yield
2	1748	-0.3%	
3	1599	-8.8%	
4	1843	+5.1%	
5	1855	+5.8%	
AVERAGE	1753		
ALLOWABLE CAPACITY ¹	584	≥ 200 lb ∴ OK	

¹ Average ultimate load divided by a factor of safety of three (3.0)

The maximum design load rating required for guardrail systems for use in IRC - One- and Two-Family Dwellings and for rail lengths up to and including 8 ft. for use in IBC - All Use Groups is 200 lb. Therefore, fasteners / connectors reported herein meet the performance requirements of ICC-ES™ AC273 for use in corner conditions.

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Structural Performance Testing of Assembled Railing Systems

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target). Where more than one value is reported, the test load was the range (min. - max.) that was held during the time indicated in the test.

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure. Where more than one value is reported, the time was the range (start-end) that the designated load level was reached and sustained.

**6 ft (72-1/2 in) by 42 in Fe26 Plus Railing with UB-05 Brackets Installed in SYP 4x4 Post on One End and 3 in Square Steel Post Mount on the Other End
IBC - All Use Groups / ICC-ES™ AC273**

Specimen No. 1 of 3

Test No. 1 - Test Date: 06/26/19

Design Load: 50 lb / 1 Square ft of In-Fill at Center of Two Pickets

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
125 lb (2.50 x D.L.)	128 - 137	00:24 - 01:27	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 06/26/19

Design Load: 50 lb / 1 Square ft of In-Fill at Bottom of Two Pickets

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
125 lb (2.50 x D.L.)	131 - 140	00:10 - 01:14	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 3 - Test Date: 06/26/19

Design Load: 50 plf X (72.5 in ÷ 12 in/ft) = 302 lb Horizontal Uniform Load On Top Rail ^{1, 2}

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
755 lb (2.50 x D.L.)	753 ³ - 772	01:02 - 02:04	Withstood load equal to or greater than 755 lb for one full minute without failure

¹ Uniform loads were not applied at a 45° angle in accordance with Section 4.2.3 of ICC-ES™ AC273.

Uniform loads were applied in the horizontal and vertical directions separately.

² Uniform load was simulated with quarter point loading.

³ Test load dropped below the target load level for one second during the one minute hold period.

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Test No. 4 - Test Date: 06/26/19

Design Load: 50 plf X (72.5 in ÷ 12 in/ft) = 302 lb Vertical Uniform Load On Top Rail ^{1, 2}

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
755 lb (2.50 x D.L.)	745 ³ - 786	00:56 - 01:59	Withstood load equal to or greater than 755 lb for one full minute without failure

¹ Uniform loads were not applied at a 45° angle in accordance with Section 4.2.3 of ICC-ES™ AC273. Uniform loads were applied in the horizontal and vertical directions separately.

² Uniform load was simulated with quarter point loading.

³ Test load dropped below the target load level for three seconds during the one minute hold period.

Test No. 5 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Horizontal Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)			
			END	MID	END	NET ¹
200 lb (D.L.)	200	00:25	0.17	0.67	0.02	0.58
500 lb (2.50 x D.L.)	500 - 517	00:46 - 01:49	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 0.58 in on a 6 ft rail (72.5 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{42}{24} + \frac{72.5}{96}\right) = 2.51" > 0.58" \therefore OK$$

and

$$\frac{h}{12} = \frac{42}{12} = 3.5" > 0.58" \therefore OK$$

¹ Each end displacement was measured at the center of the support. Net displacement was the rail displacement relative to the supports.

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Test No. 6 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Vertical Load at Mid-Span of Top Rail ¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)			
			END	MID	END	NET
200 lb (D.L.)	200	00:16	--	0.13	--	--
500 lb (2.50 x D.L.)	505 - 520	00:33 - 01:42	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 0.13 in on a 6 ft rail (72.5 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{42}{24} + \frac{72.5}{96}\right) = 2.51" > 0.13" \therefore OK$$

and

$$\frac{h}{12} = \frac{42}{12} = 3.5" > 0.13" \therefore OK$$

¹ Loading condition not required for ICC-ES AC273-16

Test No. 7 - Test Date: 06/26/19

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

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
1000 lb (2.50 x D.L.) x 2	986 ² - 1022	00:40 - 01:43	Result: Each end withstood load equal to or greater than 500 lb for one full minute without failure

¹ Load was imposed on both ends of rail using a spreader beam; therefore, loads were doubled.

² Test load dropped below the target load level for two seconds during the one minute hold period.

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Test No. 8 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Vertical Load at Ends of Top Rail (Brackets) ³

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
1000 lb (2.50 x D.L.) x 2	927 ² - 1039	00:44 - 01:46	Result: Each end withstood load equal to or greater than 500 lb for one full minute without failure

¹ Load was imposed on both ends of rail using a spreader beam; therefore, loads were doubled.

² Test load dropped below the target load level for nine seconds during the one minute hold period.

³ Loading condition not required for ICC-ES AC273-16

Specimen No. 2 of 3

Test No. 1 - Test Date: 06/26/19

Design Load: 50 lb / 1 Square ft of In-Fill at Center of Two Pickets

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
125 lb (2.50 x D.L.)	129 - 138	00:16 - 01:19	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 06/26/19

Design Load: 50 lb / 1 Square ft of In-Fill at Bottom of Two Pickets

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
125 lb (2.50 x D.L.)	129 - 136	00:12 - 01:24	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 3 - Test Date: 06/26/19

Design Load: 50 plf X (72.5 in ÷ 12 in/ft) = 302 lb Horizontal Uniform Load On Top Rail ^{1, 2}

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
755 lb (2.50 x D.L.)	753 ³ - 778	00:51 - 01:54	Withstood load equal to or greater than 755 lb for one full minute without failure

¹ Uniform loads were not applied at a 45° angle in accordance with Section 4.2.3 of ICC-ES™ AC273. Uniform loads were applied in the horizontal and vertical directions separately.

² Uniform load was simulated with quarter point loading.

³ Test load dropped below the target load level for one second during the one minute hold period.

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Test No. 4 - Test Date: 06/26/19

Design Load: 50 plf X (72.5 in ÷ 12 in/ft) = 302 lb Vertical Uniform Load On Top Rail ^{1, 2}

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
755 lb (2.50 x D.L.)	738 ³ - 796	00:41 - 01:44	Withstood load equal to or greater than 755 lb for one full minute without failure

¹ Uniform loads were not applied at a 45° angle in accordance with Section 4.2.3 of ICC-ES™ AC273. Uniform loads were applied in the horizontal and vertical directions separately.

² Uniform load was simulated with quarter point loading.

³ Test load dropped below the target load level for two seconds during the one minute hold period.

Test No. 5 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Horizontal Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)			
			END	MID	END	NET ¹
200 lb (D.L.)	201	00:18	0.19	0.68	0.02	0.58
500 lb (2.50 x D.L.)	504 - 517	00:37 - 01:39	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 201 lb = 0.58 in on a 6 ft rail (72.5 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{42}{24} + \frac{72.5}{96}\right) = 2.51" > 0.58" \therefore OK$$

and

$$\frac{h}{12} = \frac{42}{12} = 3.5" > 0.58" \therefore OK$$

¹ Each end displacement was measured at the center of the support. Net displacement was the rail displacement relative to the supports.

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Test No. 6 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Vertical Load at Mid-Span of Top Rail ¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)			
			END	MID	END	NET
200 lb (D.L.)	200	00:16	--	0.12	--	--
500 lb (2.50 x D.L.)	502 - 520	00:29 - 01:31	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 0.12 in on a 6 ft rail (72.5 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{42}{24} + \frac{72.5}{96}\right) = 2.51" > 0.12" \therefore OK$$

and

$$\frac{h}{12} = \frac{42}{12} = 3.5" > 0.12" \therefore OK$$

¹ Loading condition not required for ICC-ES AC273-16

Test No. 7 - Test Date: 06/26/19

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

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
1000 lb (2.50 x D.L.) x 2	991 ² - 1019	00:46 - 01:48	Result: Each end withstood load equal to or greater than 500 lb for one full minute without failure

¹ Load was imposed on both ends of rail using a spreader beam; therefore, loads were doubled.

² Test load dropped below the target load level for four seconds during the one minute hold period.

Test No. 8 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Vertical Load at Ends of Top Rail (Brackets) ³

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
1000 lb (2.50 x D.L.) x 2	996 ² - 1043	00:35 - 01:41	Result: Each end withstood load equal to or greater than 500 lb for one full minute without failure

¹ Load was imposed on both ends of rail using a spreader beam; therefore, loads were doubled.

² Test load dropped below the target load level for one second during the one minute hold period.

³ Loading condition not required for ICC-ES AC273-16

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Specimen No. 3 of 3

Test No. 1 - Test Date: 06/26/19

Design Load: 50 lb / 1 Square ft of In-Fill at Center of Two Pickets

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
125 lb (2.50 x D.L.)	127 - 132	00:18 - 01:27	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 06/26/19

Design Load: 50 lb / 1 Square ft of In-Fill at Bottom of Two Pickets

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
125 lb (2.50 x D.L.)	127 - 132	00:22 - 01:24	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 3 - Test Date: 06/26/19

Design Load: 50 plf X (72.5 in ÷ 12 in/ft) = 302 lb Horizontal Uniform Load On Top Rail ^{1, 2}

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
755 lb (2.50 x D.L.)	750 ³ - 773	01:01 - 02:05	Withstood load equal to or greater than 755 lb for one full minute without failure

¹ Uniform loads were not applied at a 45° angle in accordance with Section 4.2.3 of ICC-ES™ AC273. Uniform loads were applied in the horizontal and vertical directions separately.

² Uniform load was simulated with quarter point loading.

³ Test load dropped below the target load level for one second during the one minute hold period.

Test No. 4 - Test Date: 06/26/19

Design Load: 50 plf X (72.5 in ÷ 12 in/ft) = 302 lb Vertical Uniform Load On Top Rail ^{1, 2}

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	RESULT
755 lb (2.50 x D.L.)	753 ³ - 777	00:35 - 01:40	Withstood load equal to or greater than 755 lb for one full minute without failure

¹ Uniform loads were not applied at a 45° angle in accordance with Section 4.2.3 of ICC-ES™ AC273. Uniform loads were applied in the horizontal and vertical directions separately.

² Uniform load was simulated with quarter point loading.

³ Test load dropped below the target load level for one second during the one minute hold period.

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Test No. 5 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Horizontal Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)			
			END	MID	END	NET ¹
200 lb (D.L.)	201	00:19	0.20	0.69	0.03	0.58
500 lb (2.50 x D.L.)	501 - 516	00:34 - 01:40	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 201 lb = 0.58 in on a 6 ft rail (72.5 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{42}{24} + \frac{72.5}{96}\right) = 2.51" > 0.58" \therefore OK$$

and

$$\frac{h}{12} = \frac{42}{12} = 3.5" > 0.58" \therefore OK$$

¹ Each end displacement was measured at the center of the support. Net displacement was the rail displacement relative to the supports.

Test No. 6 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Vertical Load at Mid-Span of Top Rail ¹

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)			
			END	MID	END	NET
200 lb (D.L.)	200	00:16	--	0.12	--	--
500 lb (2.50 x D.L.)	502 - 517	00:27 - 01:30	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 0.12 in on a 6 ft rail (72.5 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{42}{24} + \frac{72.5}{96}\right) = 2.51" > 0.12" \therefore OK$$

and

$$\frac{h}{12} = \frac{42}{12} = 3.5" > 0.12" \therefore OK$$

¹ Loading condition not required for ICC-ES AC273-16

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Test No. 7 - Test Date: 06/26/19

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

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
1000 lb (2.50 x D.L.) x 2	997 ² - 1025	00:38 - 01:41	Result: Each end withstood load equal to or greater than 500 lb for one full minute without failure

¹ Load was imposed on both ends of rail using a spreader beam; therefore, loads were doubled.

² Test load dropped below the target load level for one second during the one minute hold period.

Test No. 8 - Test Date: 06/26/19

Design Load: 200 lb Concentrated Vertical Load at Ends of Top Rail (Brackets) ³

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
1000 lb (2.50 x D.L.) x 2	993 ² - 1041	00:31 - 01:32	Result: Each end withstood load equal to or greater than 500 lb for one full minute without failure

¹ Load was imposed on both ends of rail using a spreader beam; therefore, loads were doubled.

² Test load dropped below the target load level for two seconds during the one minute hold period.

³ Loading condition not required for ICC-ES AC273-16

SECTION 8

CONCLUSION

When installed between adequate supports, the railing assemblies reported herein meet the structural performance requirements of Section 4.2.1 of ICC-ES™ AC273 for use in IBC - All Use Groups Applications.

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 9 PHOTOGRAPHS



Photo No. 1
Typical Sampling Mark

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Photo No. 2
Assembly Fastener Test Setup

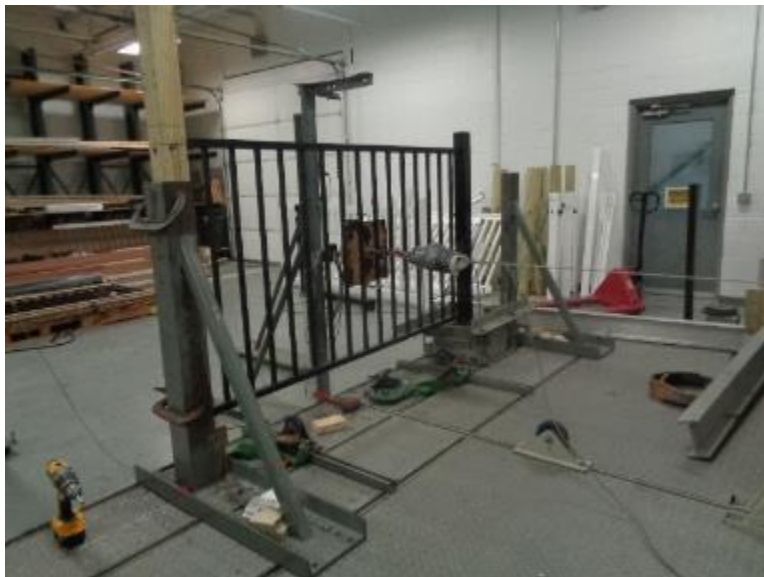


Photo No. 3
In-Fill Load Test at Center of Two Pickets

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Photo No. 4
In-Fill Load Test at Bottom of Two Pickets

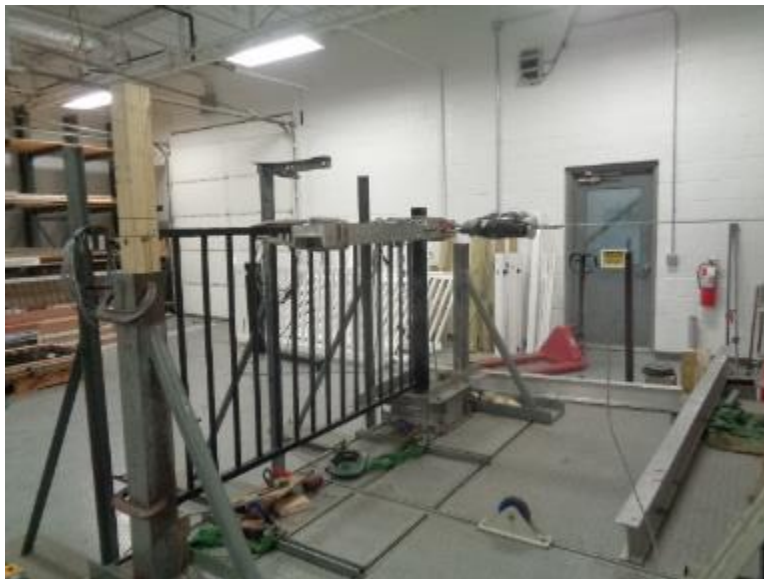


Photo No. 5
Horizontal Uniform Load Test on Top Rail

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Photo No. 6
Vertical Uniform Load Test on Top Rail



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

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Photo No. 8

Vertical Concentrated Load Test at Mid-Span of Top Rail



Photo No. 9

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

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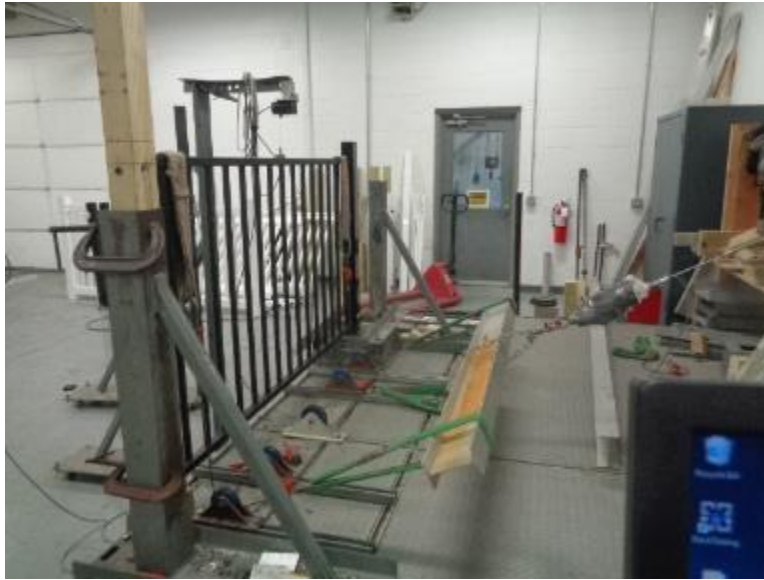


Photo No. 10

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



Photo No. 11

Top Rail Collar Bracket and Connections



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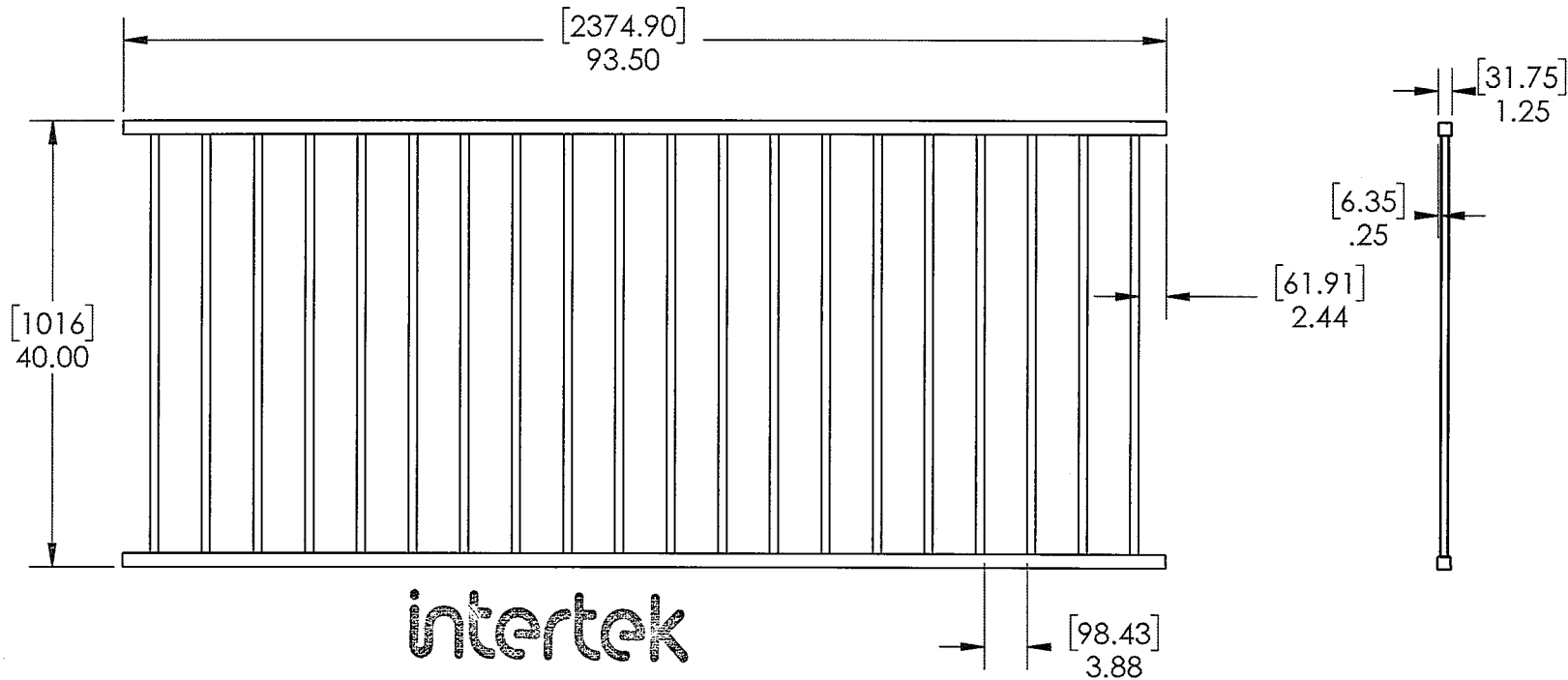
TEST REPORT FOR FORTRESS RAILING PRODUCTS

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SECTION 10 DRAWINGS

The "As-Built" drawings for the *Fe26 Plus* guardrail with *UB-05* brackets 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.



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Test sample complies with these details.
Deviations are noted.

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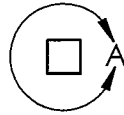


Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

C2	12/15/17	ET	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: FE26 PLUS-TRADITIONAL 40"X8'			
DRAWN BY: evant		SCALE: 1: 16	
DATE: 12/15/2017	DIVISION: Fortress Railing		REV: C
ITEM #: 650007	FILE NAME/PART #: R3736-02571A		

3614093X

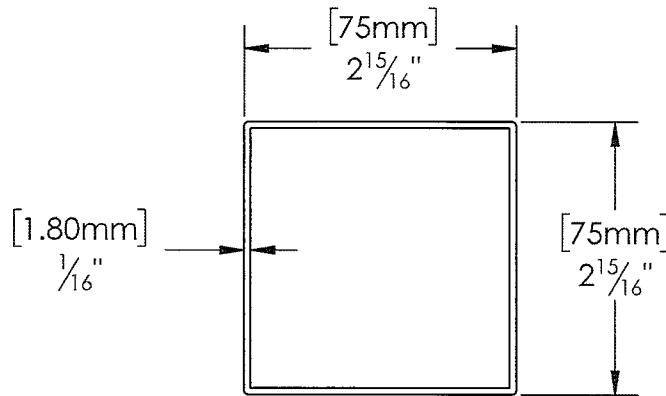
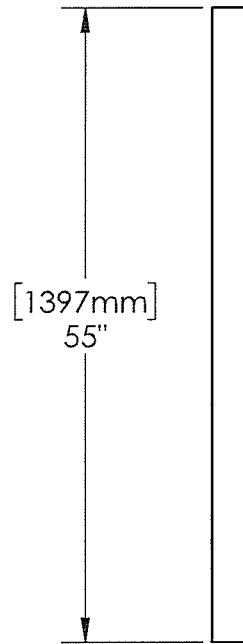


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Test sample complies with these details.
Deviations are noted.

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DETAIL A
SCALE 1 : 2



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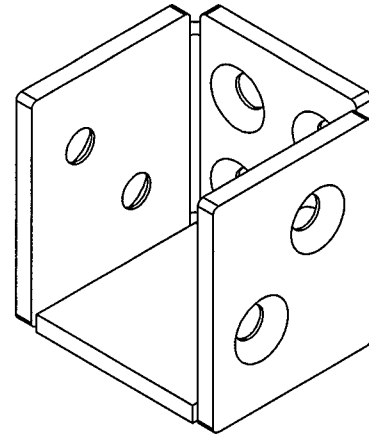
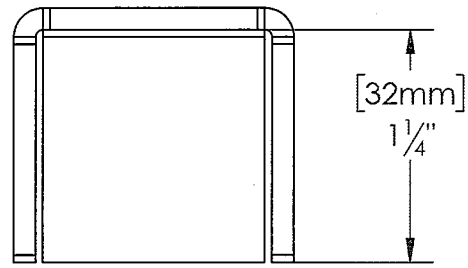
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Garland, Tx 75040

Sheet: 1 OF 1

ITEM #:
5335516X

FILE NAME/PART #:
R3135-00964A

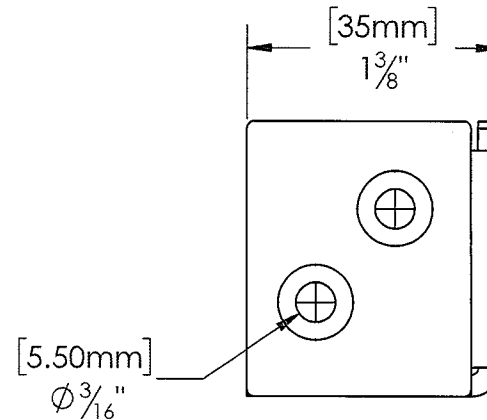
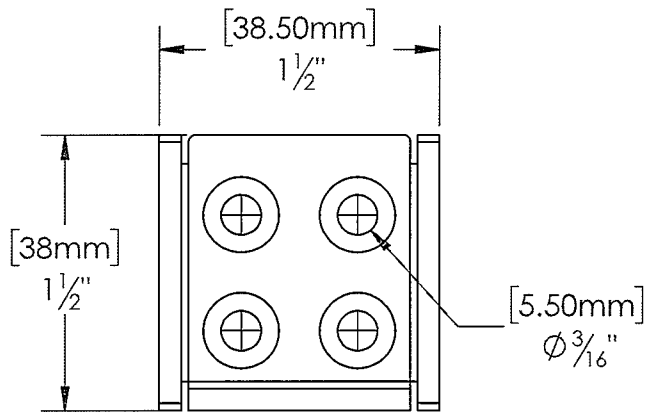
B	02/05/15	KF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: FE26 POST 3"X55"			
DRAWN BY: KevinF			SCALE: 1:16
DATE: 10/01/2019		DIVISION: Fortress Railing	
REV: B			



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Test sample complies with these details.
Deviations are noted.

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Sheet: 1 OF 1

C	10/08/19	KF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: UB-05 UNIVERSAL BRACKET 1.25" BRACKET			
DRAWN BY: KevinF		SCALE: 1:1	
DATE: 10/08/2019		DIVISION: Fortress Rail	
ITEM #:	FILE NAME/PART #:		REV:
	R3134-00189A		C



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SECTION 11

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	03/30/20	N/A	Original Report Issue