

FORTRESS BUILDING PRODUCTS TEST REPORT

SCOPE OF WORK

ICC-ES AC273 TESTING ON FE26 LEVEL RAILING WITH COLONIAL ACCENT TOP RAIL CAP

REPORT NUMBER

K9338.01-119-19 R0

TEST DATES

06/29/20

ISSUE DATE

09/17/20

RECORD RETENTION END DATE

06/29/24

PAGES

19

DOCUMENT CONTROL NUMBER

ATI 00645 (07/24/17)

RT-R-AMER-Test-2794

© 2017 INTERTEK



TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

REPORT ISSUED TO

FORTRESS BUILDING PRODUCTS

1720 North First Street

Suite B

Garland, Texas 75040

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Fortress Building Products to perform structural testing in accordance with ICC-ES™ AC273 on their 10 ft by 36 in *Fe26 Traditional* level railing with *Colonial Accent* top rail cap. This report is in conjunction with Intertek Report No.'s J0101.02-119-19 which includes structural performance testing of the *Fe26* post mount, and B2564.01-119-19 and J7825.01-119-19 which include assembly fastener testing of the wood 4x4 and *Fe26* post mounts respectively. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek 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:

COMPLETED BY:	Adam J. Schrum
TITLE:	Project Manager
SIGNATURE:	
DATE:	09/17/20

REVIEWED BY:	V. Thomas Mickley, Jr., P.E.
TITLE:	Senior Staff Engineer
SIGNATURE:	
DATE:	09/17/20

AJS:vtm/aas

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample(s) tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

SECTION 2

TEST METHODS

The specimens were evaluated in accordance with the following:

ICC-ES™ AC273 (March 1, 2008 - editorially revised February 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

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, posts, 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.

Testing is limited to satisfying the IRC - One- and Two-Family Dwellings requirements of ICC-ES™ AC273.

Test specimens were not sampled or selected by a third-party inspection agency as required by Section 2.4 of ICC-ES™ AC273.

Tensile testing was not conducted, and certificates of conformance were not provided in order to verify the material specifications as required by Section 4.1 of ICC-ES™ AC273.

SECTION 3

MATERIAL SOURCE

Test samples were provided by the client.

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

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

SECTION 4

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Kevin J. Eichelberger	Intertek B&C

SECTION 5

TEST PROCEDURE

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.

The railing assembly was installed and tested as a single railing section by directly securing (surface-mounting) the base of the *Fe26* post mounts to a rigid steel test frame (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.

As a worse-case scenario, no support block on the bottom rail was used for testing.

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.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

SECTION 6

TEST SPECIMEN DESCRIPTION

The *Fe26 Traditional* guardrail system is comprised of pre-galvanized formed steel top and bottom rails, pickets spaced between the rail members, and posts. 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 Traditional</i> level railing with <i>Colonial Accent</i> top rail cap
COLOR	Black
MATERIAL	Steel
RAIL LENGTH	117-3/4 in (inside of post to inside of post)
RAIL HEIGHT	34-1/2 in (top of top rail to bottom of bottom rail)
TOP/BOTTOM RAIL	1 in square by 0.055 in thick rail
TOP RAIL CAP	1-5/8 in wide by 1-7/16 in high by 0.045 in thick steel <i>Colonial Accent</i> contoured cap with 1-1/4 in wide by 1-1/8 in high by 1-5/8 in long by 0.120 in thick inverted U-shaped steel spacer blocks (seven total, spaced 6-1/4 in on-center from each end and 17-1/2 in on-center)
BALUSTERS	5/8 in square by 0.040 in thick steel picket
RAIL BRACKETS	<i>UB-04</i> steel brackets attached the rails to the post mounts
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 Yellow 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
Top Rail Cap to Spacer Block	Tack welded
Spacer Block to Top Rail	<i>JB Weld ClearWeld</i> quick-setting epoxy
Steel Post Mount to Substructure	Four 3/8 in Grade 5 hex-head bolts with washer

* 5/32 in diameter pre-drill used

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

SECTION 7

TEST RESULTS

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.

10 ft (117-3/4 in) by 36 in Fe26 Traditional Level Railing with Colonial Accent Top Rail Cap with a 4x4 Wood Post on One End and a 3 in Square Steel Post Mount on the Other End Limited to Use in IRC - One- and Two-Family Dwellings / ICC-ES™ AC273

Test Specimen No. 1 of 3

Test No. 1 - Test Date: 06/29/20

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 - 129	00:31 - 01:37	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 06/29/20

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 - 133	00:27 - 01:44	Sustained load equal to or greater than 125 lb for one full minute without failure

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

Test No. 3 - Test Date: 06/29/20

Design Load: 200 lb Concentrated 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	01:02	0.28	2.04	0.02	1.89
500 lb (2.50 x D.L.)	500 - 505	02:12 - 03:19	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 1.89 in on a 10 ft rail (117-3/4 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{36}{24} + \frac{117.75}{96}\right) = 2.73" \geq 1.89" \therefore ok$$

and

$$\frac{h}{12} = \frac{36}{12} = 3.00" \geq 1.89" \therefore ok$$

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

Test No. 4 - Test Date: 06/29/20

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

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	RESULT
1000 lb (2.50 x D.L.) x 2	1000 - 1010	01:13 - 02:21	Each end sustained 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.

Test Specimen No. 2 of 3

Test No. 1 - Test Date: 06/29/20

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 - 130	00:38 - 01:46	Sustained load equal to or greater than 125 lb for one full minute without failure

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

Test No. 2 - Test Date: 06/29/20

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.)	126 - 130	00:20 - 01:27	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 3 - Test Date: 06/29/20

Design Load: 200 lb Concentrated 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	00:55	0.18	1.97	0.02	1.87
500 lb (2.50 x D.L.)	501 - 506	02:05 - 03:13	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 1.87 in on a 10 ft rail (117-3/4 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{36}{24} + \frac{117.75}{96}\right) = 2.73" \geq 1.87" \therefore ok$$

and

$$\frac{h}{12} = \frac{36}{12} = 3.00" \geq 1.87" \therefore ok$$

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

Test No. 4 - Test Date: 06/29/20

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

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	RESULT
1000 lb (2.50 x D.L.) x 2	1000 - 1010	01:10 - 02:20	Each end sustained 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.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

Test Specimen No. 3 of 3

Test No. 1 - Test Date: 06/29/20

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.)	126 - 134	00:26 - 01:44	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 06/29/20

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 - 133	00:37 - 01:46	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 3 - Test Date: 06/29/20

Design Load: 200 lb Concentrated 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	00:44	0.20	1.94	0.02	1.83
500 lb (2.50 x D.L.)	502 - 507	01:33 - 02:44	Result: Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 1.83 in on a 10 ft rail (117-3/4 in)

Limits per AC273:

$$\left(\frac{h}{24} + \frac{l}{96}\right) = \left(\frac{36}{24} + \frac{117.75}{96}\right) = 2.73" \geq 1.83" \therefore ok$$

and

$$\frac{h}{12} = \frac{36}{12} = 3.00" \geq 1.83" \therefore ok$$

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

Test No. 4 - Test Date: 06/29/20

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

LOAD LEVEL ¹	TEST LOAD (lb)	E.T. (min:sec)	RESULT
1000 lb (2.50 x D.L.) x 2	1003 - 1016	00:59 - 02:07	Each end sustained 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.

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

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 One- and Two-Family Dwellings (IRC).

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

SECTION 9

PHOTOGRAPHS

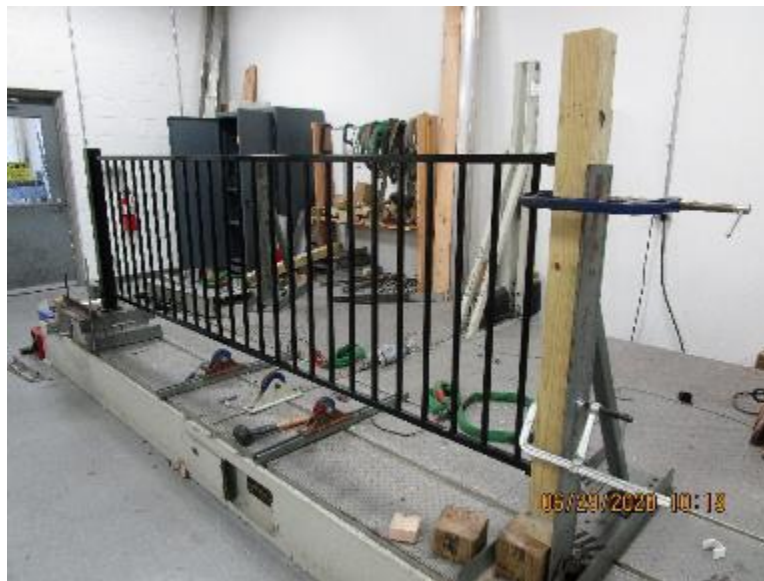


Photo No. 1
Assembled Guardrail installed in Test Fixture

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20



Photo No. 2

JB Weld Applied in Colonial Accent Top Rail Cap

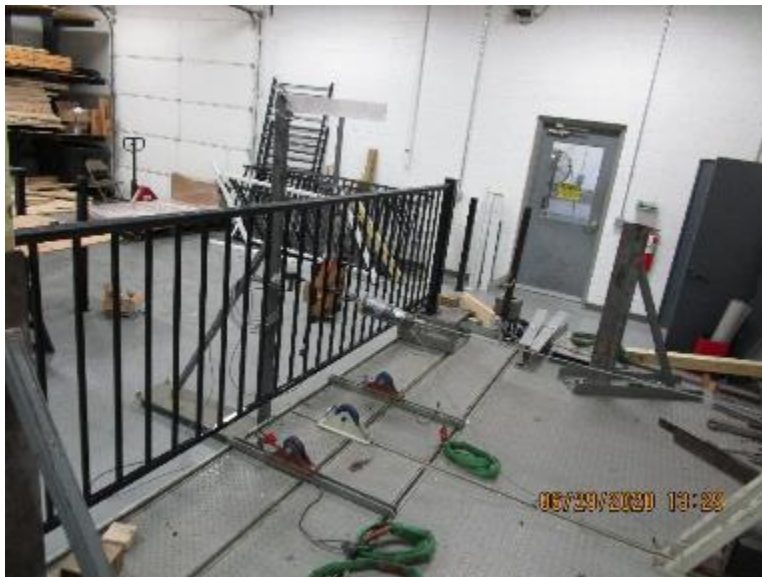


Photo No. 3

In-Fill Load Test at Center of Two Pickets

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20



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



Photo No. 5
Concentrated Load Test at Mid-Span of Top Rail

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20



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



Photo No. 7
Bottom Rail Bracket and Post Mount Connection

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

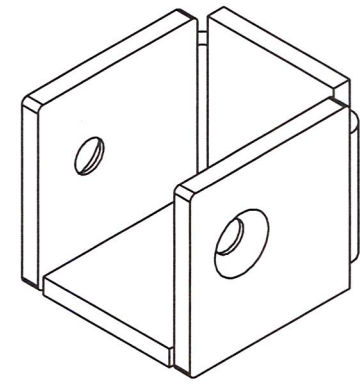
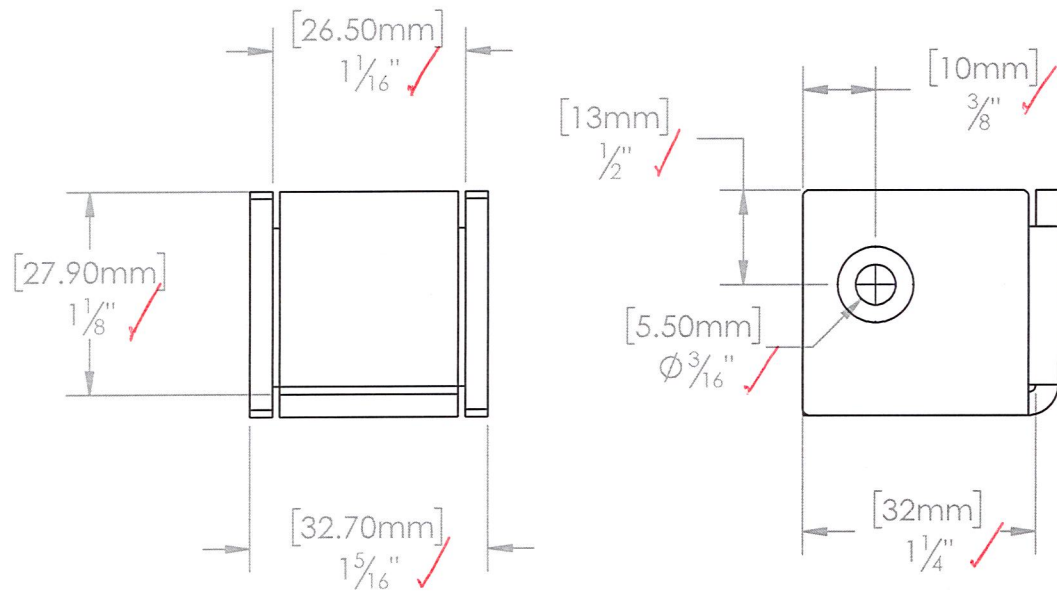
Date: 09/17/20



Photo No. 8
Top Rail Bracket and Connections

SECTION 10 **DRAWINGS**

The "As-Built" drawings for the *Fe26 Traditional* level railing with *Colonial Accent* top rail cap 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 # K9338-01-119-19
 Date 9/8/20 Tech AJS

This drawing and the information contained on this drawing are the property of Fortress Iron, LP, Garland, TX, USA, and is not to be copied electronically or manually, or reproduced in any manner, or divulged to other sources, without the expressed written permission of an authorized representative of Fortress Iron, LP.



Fortress Railing
 1720 N 1st Street
 Garland, Tx 75040

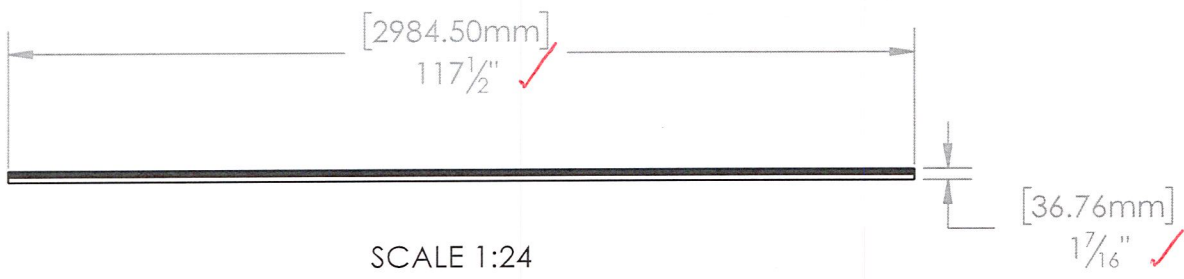
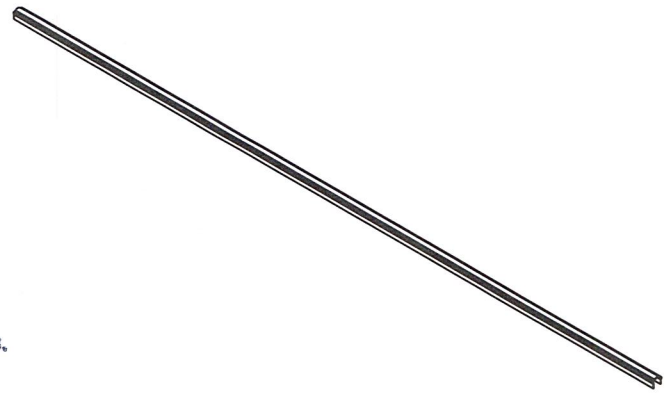
Sheet: 1 OF 1

E	04/27/2020	TF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: FE-26 UB-04 CUP			
DRAWN BY: TylerF		SCALE: AS SHOWN	
DATE: 04/27/2020	DIVISION: Railing		
ITEM #:	FILE NAME/PART #:	REV:	
	UB-04	E	

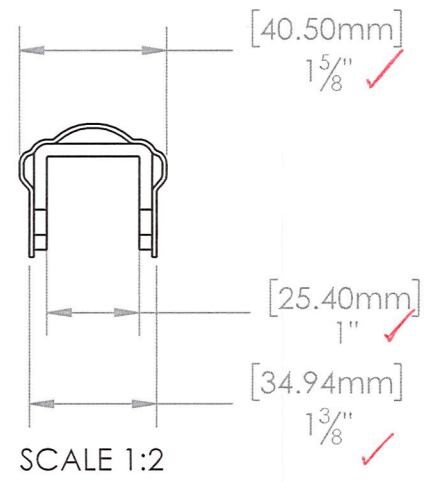
intertek

Test sample complies with these details.
Deviations are noted.

Report # K9338.01-119-19
Date 9/8/20 Tech AJS



SCALE 1:24



SCALE 1:2

This drawing and the information contained on this drawing are the property of Fortress Iron, LP, Garland, TX, USA, and is not to be copied electronically or manually, or reproduced in any manner, or divulged to other sources, without the expressed written permission of an authorized representative of Fortress Iron, LP.



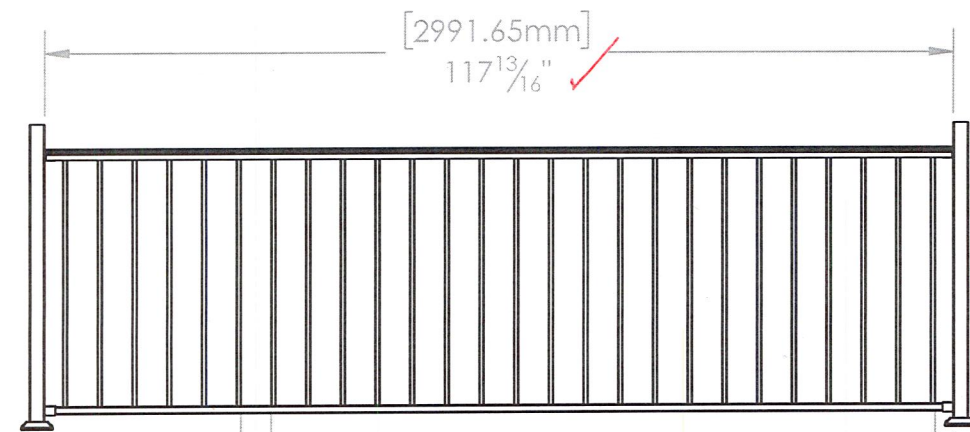
Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

ITEM #:
53405108

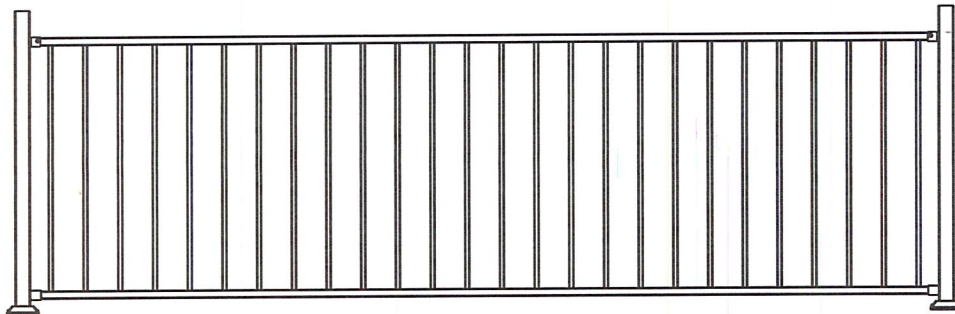
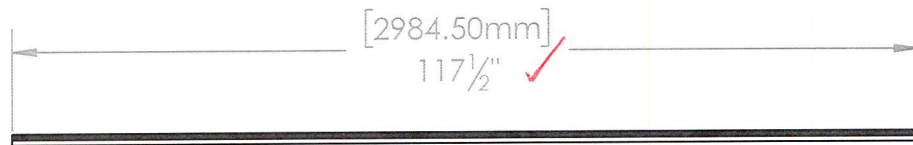
FILE NAME/PART #:
Fe26 8ft ATR

A	04/27/2020	TF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: FE26-ATR COLONIAL ROUND 10'			
DRAWN BY: TylerF		SCALE: AS SHOWN	
DATE: 04/27/2020		DIVISION: Fortress Railing	
REV: A			

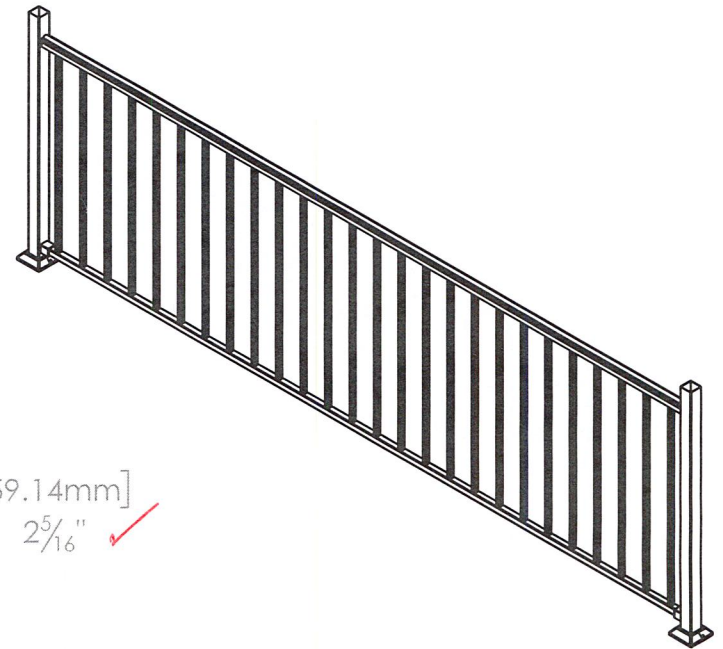


[98.43mm]
3 7/8\"/>

[59.14mm]
2 5/16\"/>



[914.40mm]
36\"/>



intertek

Test sample complies with these details.
Deviations are noted.

Report # K9338.01-119-19

Date 9/8/20 Tech AJS

This drawing and the information contained on this drawing are the property of Fortress Iron, LP, Garland, TX, USA, and is not to be copied electronically or manually, or reproduced in any manner, or divulged to other sources, without the expressed written permission of an authorized representative of Fortress Iron, LP.



Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

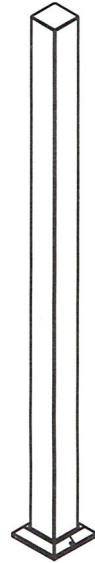
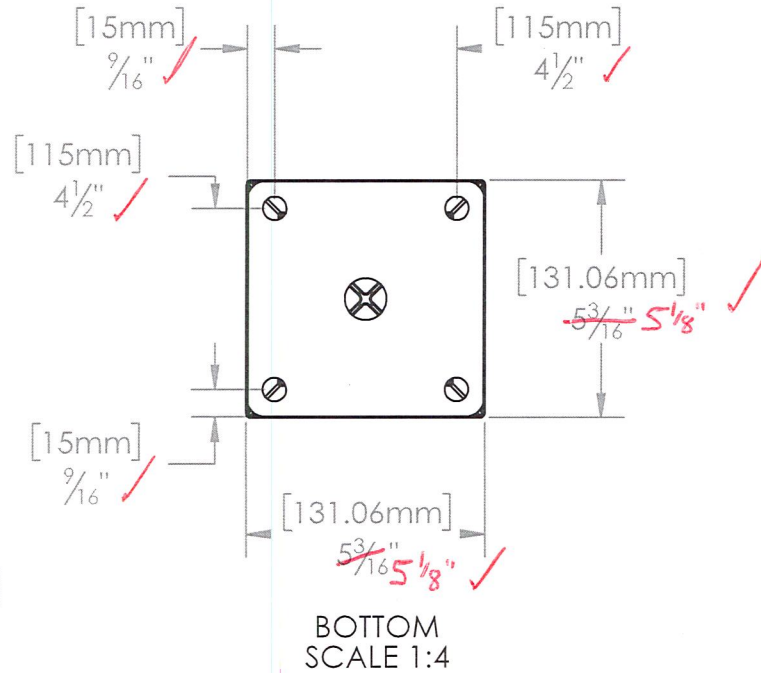
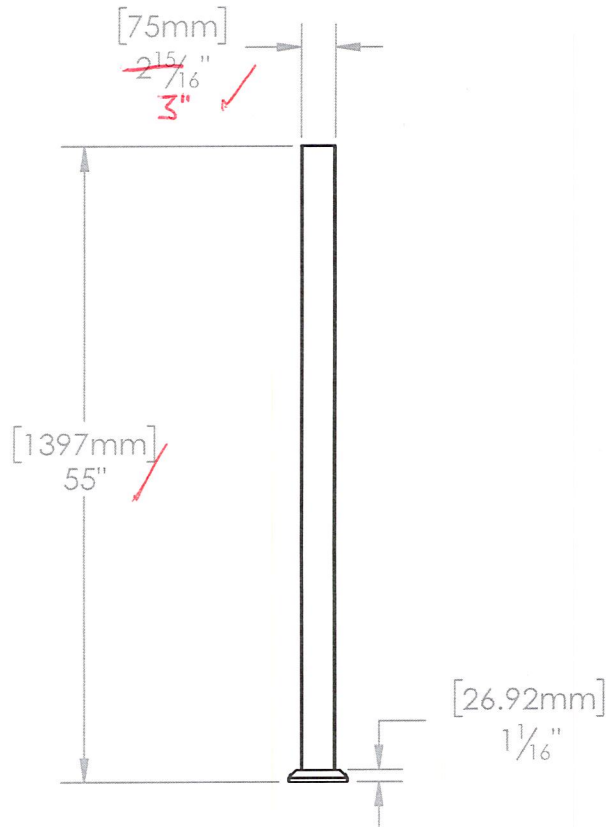
B	04/24/20	TF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION: FE26-TRADITIONAL 34"X10'			
DRAWN BY: TylerF		SCALE: AS SHOWN	
DATE: 04/24/2020		DIVISION:	
ITEM #: 53134120	FILE NAME/PART #: Fe26 34in x 10ft with ATR		REV: B

intertek

Test sample complies with these details.
Deviations are noted.

Report # K9338.01-119-19

Date 9/8/20 Tech AJS



BOTTOM
SCALE 1:4

This drawing and the information contained on this drawing are the property of Fortress Iron, LP, Garland, TX, USA, and is not to be copied electronically or manually, or reproduced in any manner, or divulged to other sources, without the expressed written permission of an authorized representative of Fortress Iron, LP.



Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

B	04/27/2020	TF	Initial Drawing
REV	DATE	BY	DESCRIPTION
DESCRIPTION:			
FE26 PLUS POST 3"X55" W/5.25			
BASE COVER			
DATE:	02/05/2016	DIVISION:	Fortress Railing
SCALE:	AS SHOWN		
ITEM #:	5330355X	FILE NAME/PART #:	Fe26 3in x 55in post
REV:	B		



Total Quality. Assured.

130 Derry Court
York, Pennsylvania 17406

Telephone: 717-764-7700
Facsimile: 717-764-4129
www.intertek.com/building

TEST REPORT FOR FORTRESS BUILDING PRODUCTS

Report No.: K9338.01-119-19 R0

Date: 09/17/20

SECTION 11

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/17/20	N/A	Original Report Issue