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FORTRESS RAILING PRODUCTS
TEST REPORT

SCOPE OF WORK
STRUCTURAL PERFORMANCE TESTING ON *FE26* 2 IN AND 3 IN MODIFIED OUTSIDE CORNER FASCIA POST MOUNT SYSTEMS

REPORT NUMBER
J8451.01-119-19 R0

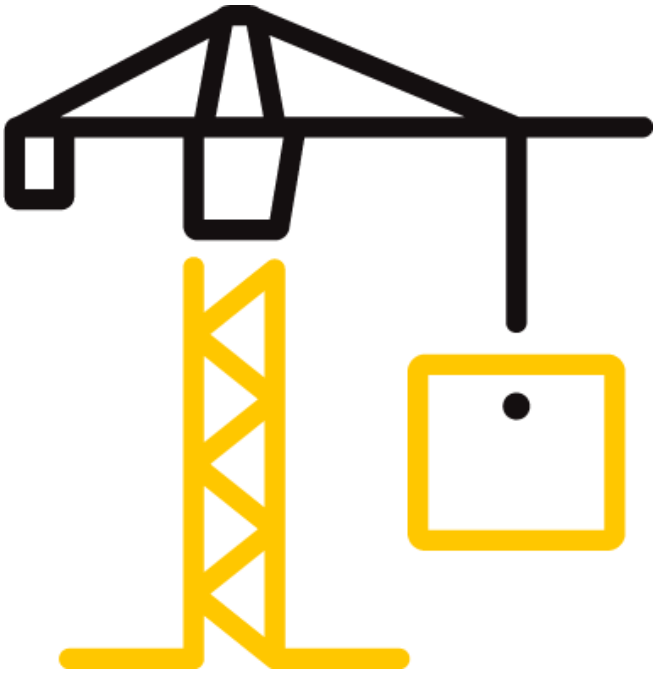
TEST DATE(S)
07/19/19 - 08/01/19

ISSUE DATE
10/08/19

RECORD RETENTION END DATE
08/01/23

PAGES
21

DOCUMENT CONTROL NUMBER
ATI 00645 (07/24/17)
RT-R-AMER-Test-2794



130 Derry Court
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TEST REPORT FOR FORTRESS RAILING PRODUCTS
Report No.: J8451.01-119-19 R0
Date: 10/08/19

REPORT ISSUED TO
FORTESS 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 testing in general accordance with ICC-ES™ AC273 on their modified *Fe26* 2 in and 3 in Outside Corner fascia post mount systems. 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:

COMPLETED BY:	Adam J. Schrum	**REVIEWED BY:**	V. Thomas Mickley, Jr., P.E.
TITLE:	Lead Technician	**TITLE:**	Senior Staff Engineer
SIGNATURE:	Digitally Signed by: Adam J. Schrum	**SIGNATURE:**	Digitally Signed by: Virgal Thomas Mickley, Jr.
DATE:	10/08/19	**DATE:**	10/08/19

VTM:vtm/aas

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SECTION 2
TEST METHOD(S)

The specimens were tested using the methods described in Section 4.2.5 of 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

Limitations
All tests performed were to evaluate structural performance of the post mount assembly to carry and transfer imposed loads to the supports. 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 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.

SECTION 4
LIST OF OFFICIAL OBSERVERS

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

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SECTION 5
TEST PROCEDURE

Tests were performed per ICC-ES™ AC273, Section 4.2.5 in a self-contained structural frame designed to accommodate anchorage of the post mount assembly and application of the required test loads. Each specimen was loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables and nylon straps 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 fascia post mount assemblies were installed and tested as a single post section by directly securing the fascia mount bracket to a rigid steel test frame. The post mount assemblies were assembled by an Intertek B&C technician. Transducers mounted to an independent reference frame were located to record movement of reference points on the post mount system (point of loading) to determine 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 each load test 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. Increased load until failure occurred.

Unless otherwise noted, all loads and displacement measurements were normal to the post (horizontal). The test results apply only to the post mount assembly.

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SECTION 6
TEST SPECIMEN DESCRIPTION

The fascia post mount bracket systems are comprised of steel fascia mount brackets 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.

Fortress Railing Products provided the test specimens with the following details:

PRODUCT/BRACKET	*Fe26* Outside Corner Fascia Mount Bracket
FASCIA MOUNT BRACKET	*Fe26* 2 in Fascia Mount Bracket: See drawings in Section 10
	Fe26 3 in Fascia Mount Bracket: See drawings in Section 10
FASTENERS	M6-1.75 by 24mm self-drilling, hex-head screws (four in bracket/post)
	3/8 in Gr. 5 bolts with nut and washers (eight in bracket to substructure)
POST(S)	2 in square by 0.100 in wall *Fe26* post
	3 in square by 0.075 in wall *Fe26* post

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).

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

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TEST REPORT FOR FORTRESS RAILING PRODUCTS
Report No.: J8451.01-119-19 R0
Date: 10/08/19

Test Series No. 1
2 in *Fe26* Post Mounts installed in Outside Corner Fascia Post Mount Brackets

Test No. 1 - Test Date: 07/19/19
Concentrated Load at Top of Post Mount (42 in High) to Failure

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	200	00:21	1.74
Ultimate Load	798	02:05	**Result**: Post began to buckle above bracket

Deflection Evaluation:
Maximum post deflection at 200 lb = 1.74 in
Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3" > 1.74" \therefore ok$

[1] *Deflection limit calculation based on worse case 36 in railing height to satisfy One- and Two-Family Dwelling requirements.*

Test No. 2 - Test Date: 07/19/19
Concentrated Load at Top of Post Mount (42 in High) to Failure

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	200	00:20	1.69
Ultimate Load	785	02:03	**Result**: Post began to buckle above bracket

Deflection Evaluation:
Maximum post deflection at 200 lb = 1.69 in
Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3" > 1.69" \therefore ok$

[1] *Deflection limit calculation based on worse case 36 in railing height to satisfy One- and Two-Family Dwelling requirements.*

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TEST REPORT FOR FORTRESS RAILING PRODUCTS
Report No.: J8451.01-119-19 R0
Date: 10/08/19

Test No. 3 - Test Date: 07/31/19
Concentrated Load at Top of Post Mount (42 in High) to Failure

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	201	00:14	1.87
Ultimate Load	797	01:02	**Result**: Post began to buckle above bracket
Deflection Evaluation: Maximum post deflection at 201 lb = 1.87 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3" > 1.87" \therefore ok$			

[1] *Deflection limit calculation based on worse case 36 in railing height to satisfy One- and Two-Family Dwelling requirements.*

Test Series No. 2
3 in *Fe26* Post Mounts installed in Outside Corner Fascia Post Mount Brackets

Test No. 1 - Test Date: 08/01/19
Concentrated Load at Top of Post Mount (42 in High) to Failure

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	201	00:36	1.09
Ultimate Load	933	02:25	**Result**: Post began to buckle above bracket
Deflection Evaluation: Maximum post deflection at 201 lb = 1.09 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3" > 1.09" \therefore ok$			

[1] *Deflection limit calculation based on worse case 36 in railing height to satisfy One- and Two-Family Dwelling requirements.*

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TEST REPORT FOR FORTRESS RAILING PRODUCTS
Report No.: J8451.01-119-19 R0
Date: 10/08/19

Test No. 2 - Test Date: 08/01/19
Concentrated Load at Top of Post Mount (42 in High) to Failure

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	200	00:28	0.97
Ultimate Load	885	02:18	**Result**: Post began to buckle above bracket
Deflection Evaluation: Maximum post deflection at 200 lb = 0.97 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3" > 0.97" \therefore ok$			

[1] Deflection limit calculation based on worse case 36 in railing height to satisfy One- and Two-Family Dwelling requirements.

Test No. 3 - Test Date: 08/01/19
Concentrated Load at Top of Post Mount (42 in High) to Failure

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	200	00:20	1.24
Ultimate Load	936	01:57	**Result**: Post began to buckle above bracket
Deflection Evaluation: Maximum post deflection at 200 lb = 1.24 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3" > 1.24" \therefore ok$			

[1] Deflection limit calculation based on worse case 36 in railing height to satisfy One- and Two-Family Dwelling requirements.

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SECTION 8
CONCLUSIONS

2 in *Fe26* Post with Outside Corner Fascia Post Mount Bracket

SPECIMEN NO.	ULTIMATE LOAD (lbs)	DEVIATION FROM AVERAGE
1	798	0.6%
2	785	-1.0%
3	797	0.5%
Average:	793	
Standard Deviation:	7	
Coefficient of Variation:	0.9%	

3 in *Fe26* Post with Outside Corner Fascia Post Mount Bracket

SPECIMEN NO.	ULTIMATE LOAD (lbs)	DEVIATION FROM AVERAGE
1	933	1.6%
2	885	-3.6%
3	936	2.0%
Average:	918	
Standard Deviation:	29	
Coefficient of Variation:	3.1%	

The fascia post mount assemblies reported herein meet the structural performance requirements of Section 4.2.5 of ICC-ES™ AC273 for use in One- and Two-Family Dwellings (IRC) and All Use Groups (IBC) as stipulated in the following table:

***FE26* FASCIA MOUNT BRACKET SYSTEM**	**APPLICABLE BUILDING CODE**	
	IRC - One- and Two-Family Dwellings	**IBC - All Use Groups**
	Meets or Does Not Meet the Requirements of Section 4.2.5 of AC273 [1]	**Allowable Post Spacing per Section 4.2.5 of AC273 [2] (ft)**
2 in Post with Outside Corner Fascia Mount Bracket	Meets the Requirements	6 ft - 4 in
3 in Post with Outside Corner Fascia Mount Bracket	Meets the Requirements	7 ft - 4 in

[1] *Test load requirements = 200 lbs (design load) x 2.5 (safety factor) = 500 lbs.*
[2] *Allowable post spacing (center-to-center of post) = Average Ultimate load / (50 plf x 2.5 safety factor)*

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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TEST REPORT FOR FORTRESS RAILING PRODUCTS
Report No.: J8451.01-119-19 R0
Date: 10/08/19

SECTION 9
PHOTOGRAPHS

Photo No. 1
Outside Corner Bracket and Post Installed in Simulated Concrete

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Photo No. 2
Concentrated Load Test at Top of Post Mount at 42 in

Photo No. 3
Typical Failure - Buckling of Post above Bracket

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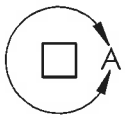
SECTION 10
DRAWINGS

The "As-Built" drawings for the *Fe26* 2 in and 3 in Outside Corner fascia post mounts 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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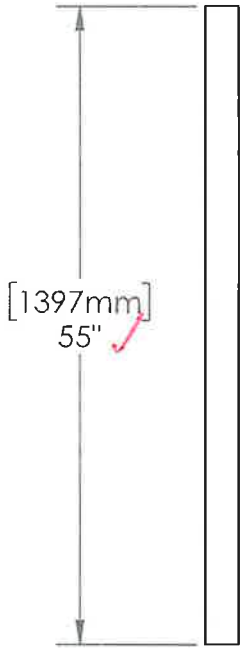
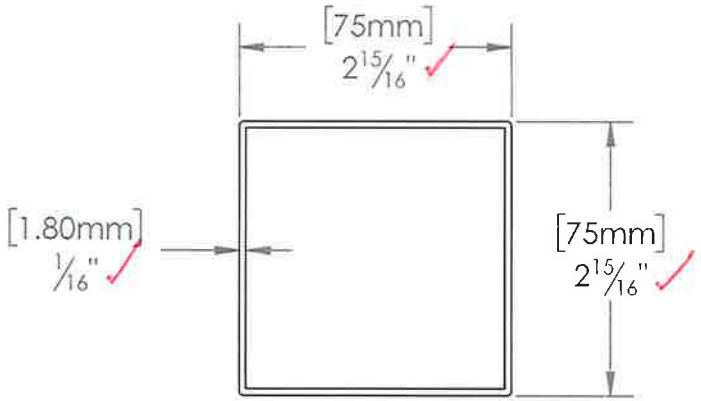
Test sample complies with these details.
Deviations are noted.

Report # J8451.01-149-19

Date 10/4/19 Tech AJS





DETAIL A
SCALE 1 : 2

FORTRESS — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

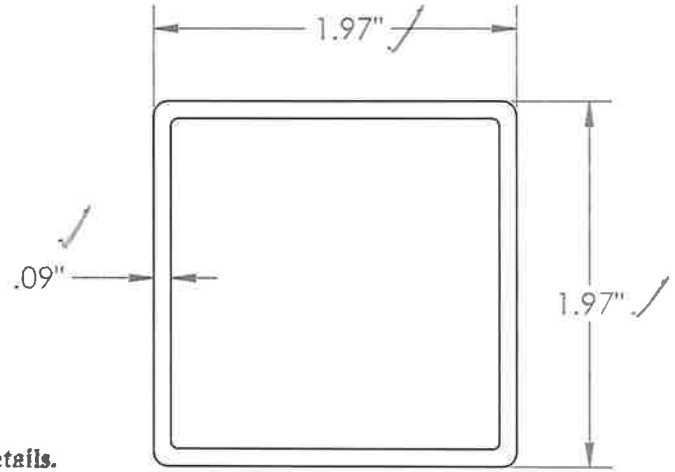
REV	DATE	BY	DESCRIPTION
B	02/05/15	KF	Initial Drawing

DESCRIPTION: FE26 POST 3"X55"

DRAWN BY: KevinF | SCALE: 1:16

DATE: 10/01/2019 DIVISION: Fortress Railing

Sheet: 1 OF 1 | ITEM #: 5335516X | FILE NAME/PART #: R3135-00964A | REV: B



DETAIL A
SCALE 1 : 1

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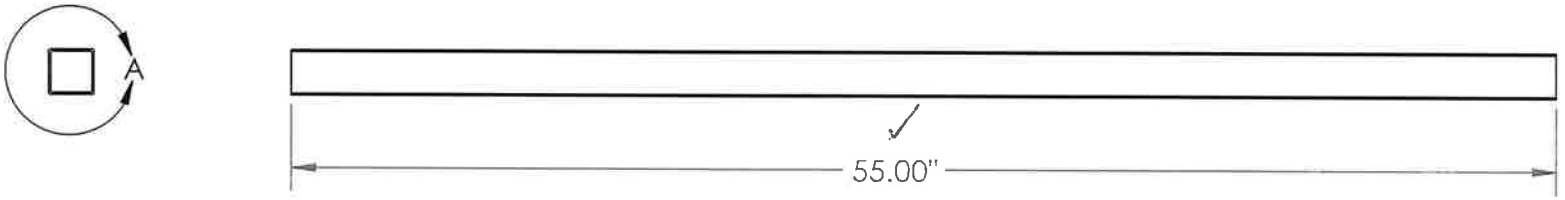
Test sample complies with these details.
Deviations are noted.

Report # J345(0)-119-19

Date 10/7/19 Tech AJS



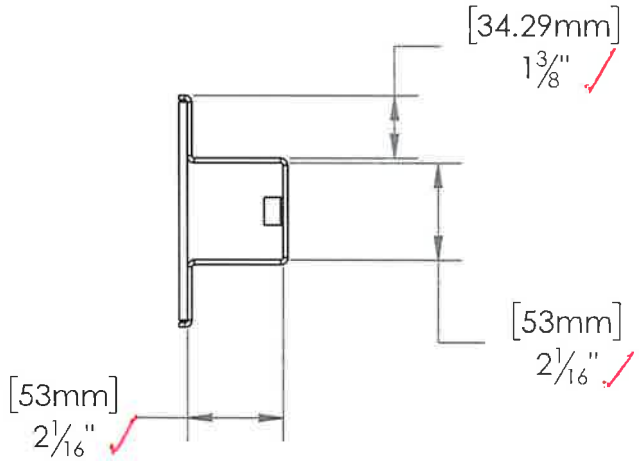
FORTRESS RAILING PRODUCTS

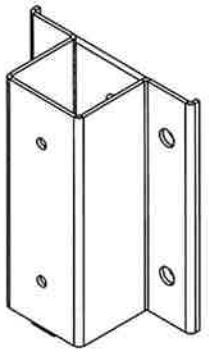
Fortress Railing
1720 N 1st Street
Garland, Tx 75040

REV	DATE	BY	DESCRIPTION
A	05/22/17	KB	Initial Drawing

DESCRIPTION: FE26-POST 2"X55" (13GA)
DRAWN BY: kevin
DATE: 05/22/2017 DIVISION: Fortress Railing
SCALE: AS SHOWN

Sheet: 1 OF 1
ITEM #: 5335515X
FILE NAME/PART #: R3135-00961A
REV: A





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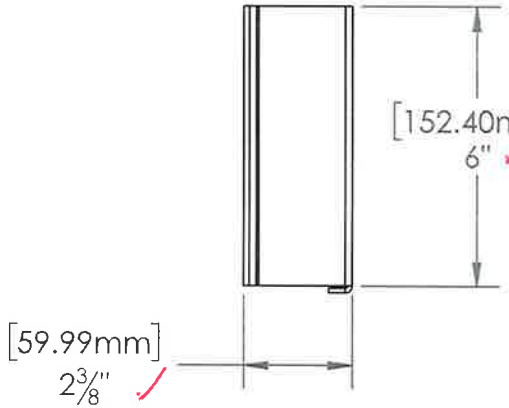
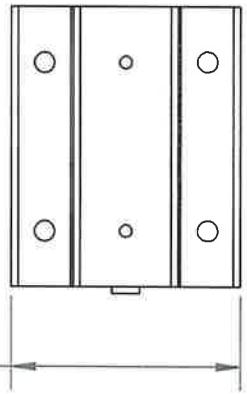
Test sample complies with these details.
Deviations are noted.

Report # J8451.01-119-19

Date 10/4/19 Tech AJS





REV	DATE	BY	DESCRIPTION
B	09/20/19	KF	Initial Drawing

FORTRESS — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

DESCRIPTION: FE26-FM BRKT STRAIGHT 2" WELDED PLATES

DRAWN BY: KevinF

DATE: 09/20/2019 DIVISION: Fortress Railing

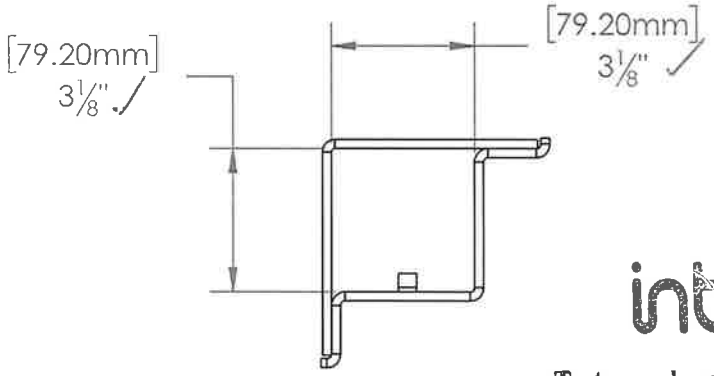
SCALE: 1 : 4

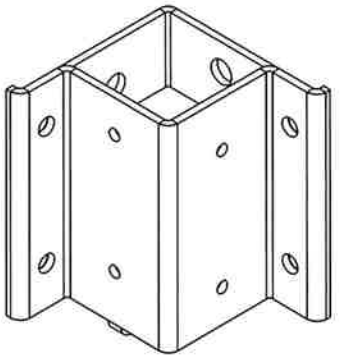
Sheet: 1 OF 1

ITEM #:

FILE NAME/PART #: R3139-03326A

REV: B





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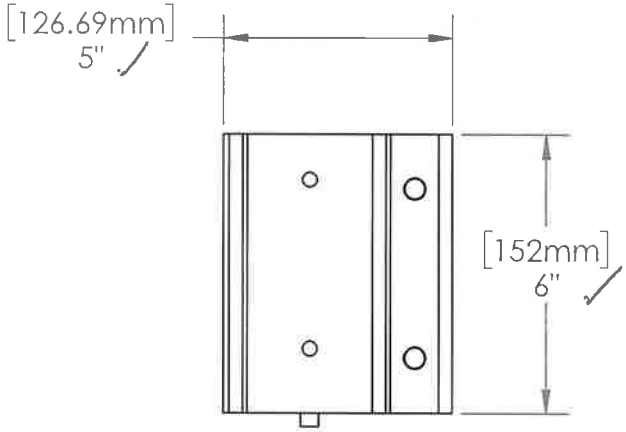
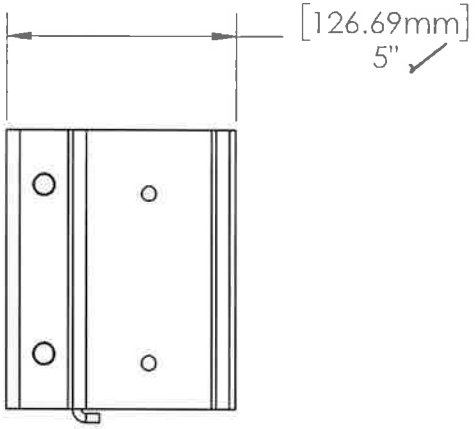
Report # J9451.01-119-19

Date 10/4/19 **Tech** AJS





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Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

REV	DATE	BY	DESCRIPTION
B	09/20/19	KF	Initial Drawing

DESCRIPTION: FE26-FM BRKT INSIDE CNR 3" WELDED PLATES

DRAWN BY: KevinF

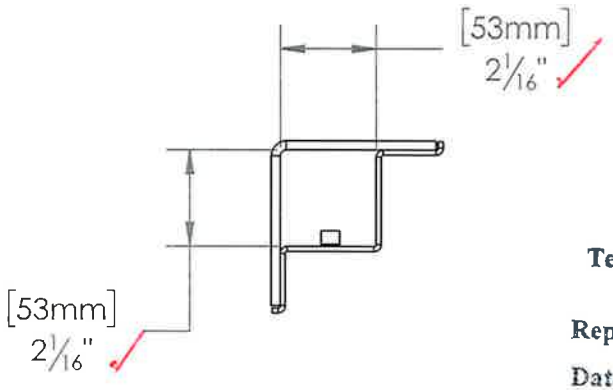
DATE: 09/20/2019 DIVISION: Fortress Railing

SCALE: 1 : 4

ITEM #:

FILE NAME/PART #: R3139-03341A

REV: B



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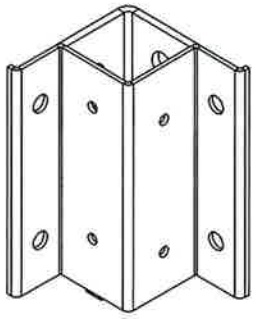
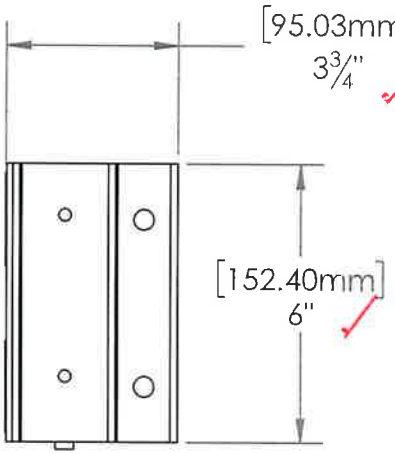
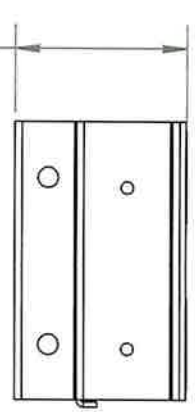
Test sample complies with these details.
Deviations are noted.

Report # J8451-01-119-19

Date 10/4/19 **Tech** AJS







FORTRESS — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

REV.	DATE	BY	DESCRIPTION
B	09/20/19	KF	Initial Drawing

DESCRIPTION: FE26-FM BRKT INSIDE CNR 2" WELDED PLATES
DRAWN BY: KevinF
DATE: 09/20/2019 DIVISION: Fortress Railing
SCALE: 1 : 4
ITEM #:
FILE NAME/PART #: R3139-03338A
REV: B

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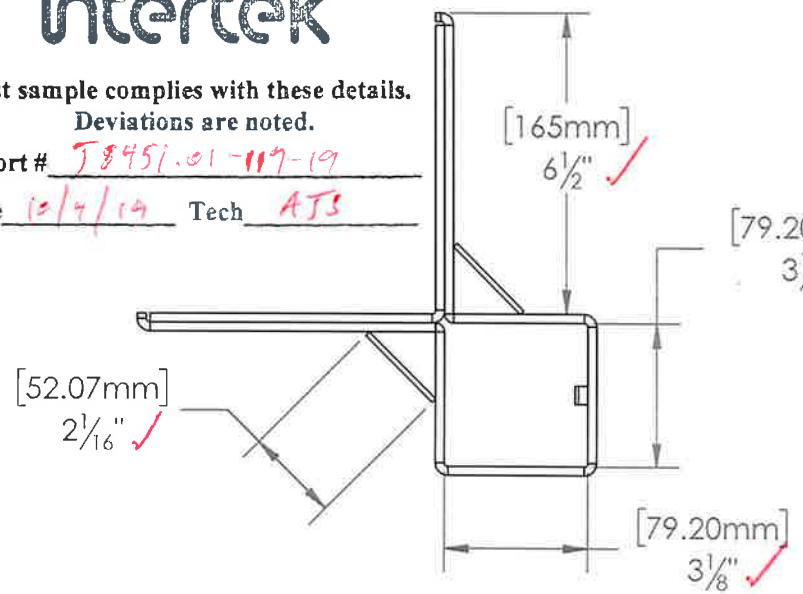
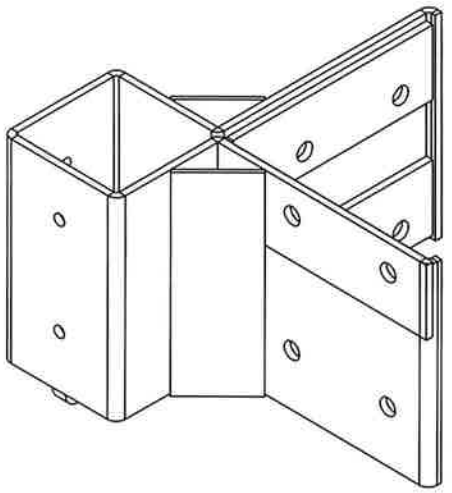
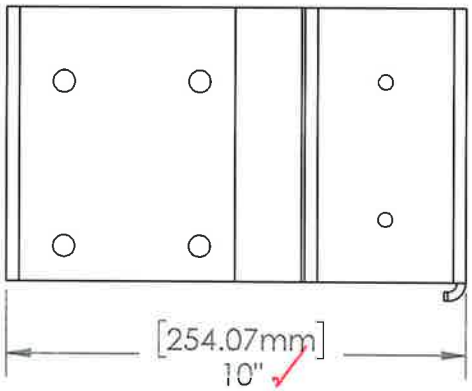
Test sample complies with these details.
Deviations are noted.

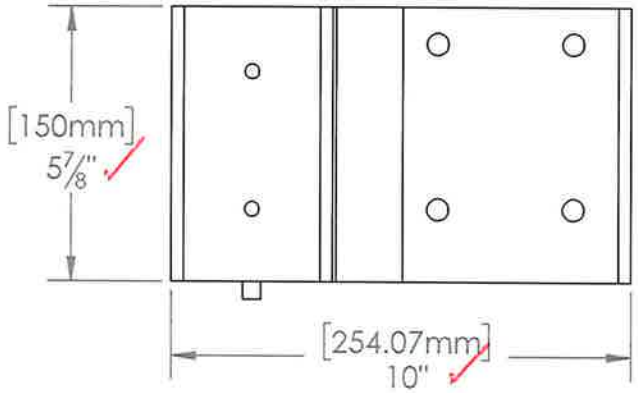
Report # J8451.01-117-19

Date 10/4/19 Tech AJS









FORTRESS — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

REV	DATE	BY	DESCRIPTION
D	09/20/19	KF	Initial Drawing

DESCRIPTION: FE26-FM BRKT OUTSIDE CNR 3" WELDED PLATES

DRAWN BY: KevinF | SCALE: 1 : 4

DATE: 09/20/2019 DIVISION: Fortress Railing

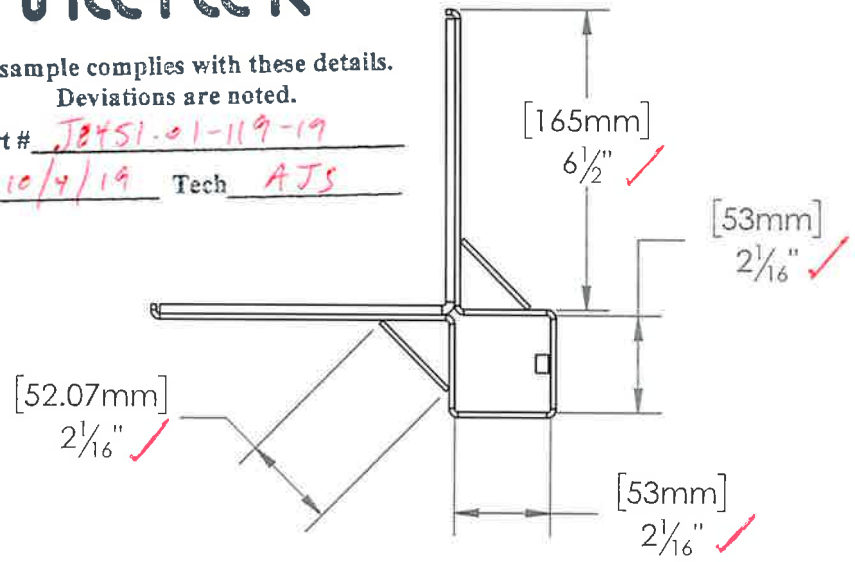
Sheet: 1 OF 1 | ITEM #: | FILE NAME/PART #: R3139-03335A | REV: D

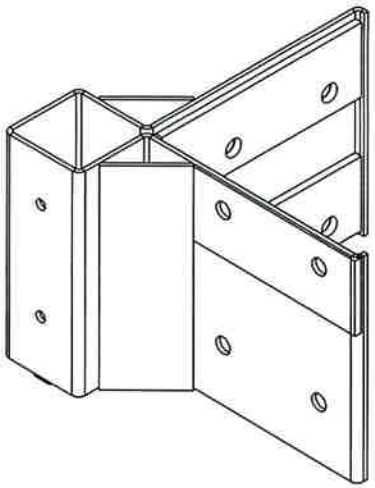
intertek

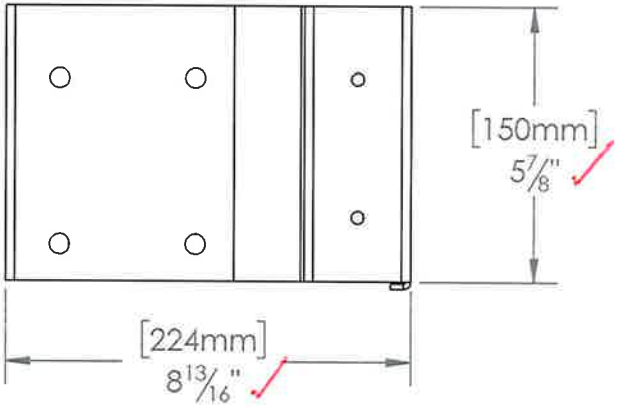
Test sample complies with these details.
Deviations are noted.

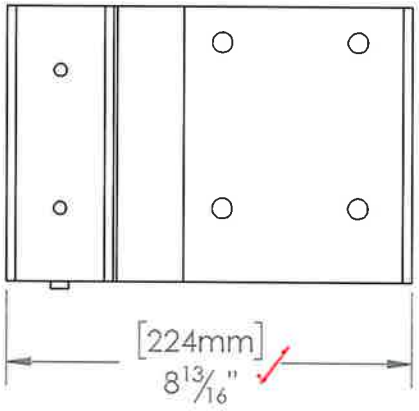
Report # J8451.01-119-19

Date 10/4/19 Tech AJS









FORTRESS — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

Sheet: 1 OF 1

REV	DATE	BY	DESCRIPTION
D	09/20/19	KF	Initial Drawing

DESCRIPTION: FE26-FM BRKT OUTSIDE CNR 2" WELDED PLATES

DRAWN BY: KevinF

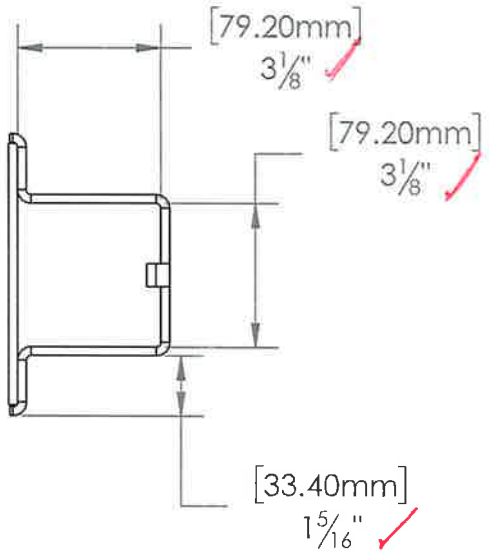
DATE: 09/20/2019 DIVISION: Fortress Railing

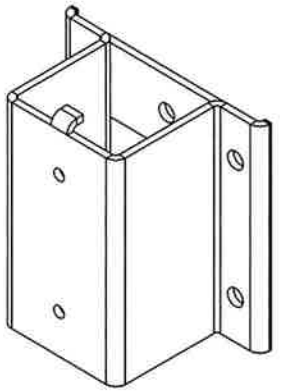
SCALE: 1 : 4

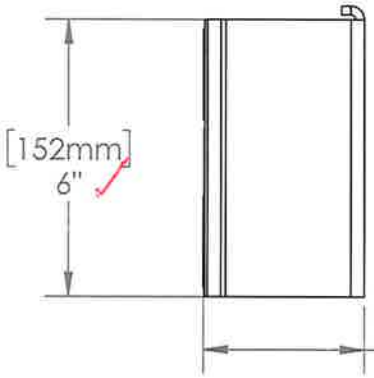
ITEM #:

FILE NAME/PART #: R3139-03332A

REV: D





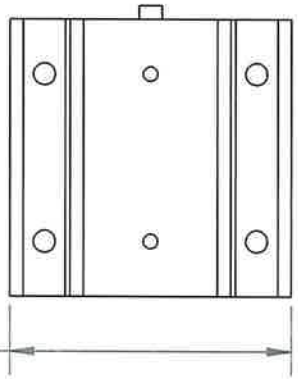


intertek

Test sample complies with these details.
Deviations are noted.

Report # J8451.01-119-19

Date 10/4/19 **Tech** AJS



FORTRESS — RAILING PRODUCTS —

Fortress Railing
1720 N 1st Street
Garland, Tx 75040

REV	DATE	BY	DESCRIPTION
B	09/20/19	KF	Initial Drawing

DESCRIPTION: FE26-FM BRKT STRAIGHT 3" WELDED PLATES

DRAWN BY: KevinF | DATE: 09/20/2019 | DIVISION: Fortress Railing | SCALE: 1 : 4

Sheet: 1 OF 1 | ITEM #: | FILE NAME/PART #: R3139-03329A | REV: B

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SECTION 11
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	10/08/19	N/A	Original Report Issue