

# FORTRESS RAILING PRODUCTS TEST REPORT

## SCOPE OF WORK

STRUCTURAL PERFORMANCE TESTING ON THE *AL13* AND *AL13 HOME* STRUCTURAL POSTS  
SUPPORTED BY VARIOUS *FE26* BRACKETS

## REPORT NUMBER

J7912.01-119-19 R1

## TEST DATE(S)

06/24/19 - 08/15/19

## ISSUE DATE

10/21/19

## REVISED DATE

12/02/19

## RECORD RETENTION END DATE

08/15/23

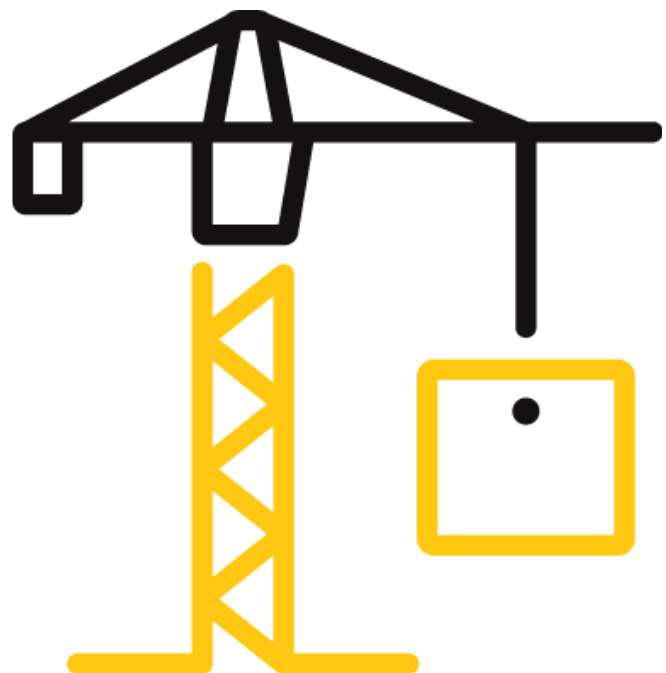
## PAGES

24

## DOCUMENT CONTROL NUMBER

RT-R-AMER-Test-2846 (02/09/18)

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## TEST REPORT FOR FORTRESS RAILING PRODUCTS

Report No.: J7912.01-119-19 R1

Date: 10/21/19

### REPORT ISSUED TO

#### FORTRESS RAILING PRODUCTS

1720 North 1<sup>st</sup> Street  
Garland, Texas 75040

### SECTION 1

#### SCOPE


Intertek Building & Construction (B&C) was contracted by Fortress Railing Products to perform structural performance testing on their *AL13* and *AL13 Home* structural posts supported by *Fe26* brackets. This report is in conjunction with Steenhof Building Services Group Report No. 190502 which includes evaluation of the test results for Canadian building codes. 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, Pennsylvania.

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:

<b>COMPLETED BY:</b>	Adam J. Schrum
<b>TITLE:</b>	Lead Technician
<b>SIGNATURE:</b>	 Digitally Signed by: Adam J. Schrum
<b>DATE:</b>	12/02/19

<b>REVIEWED BY:</b>	V. Thomas Mickley, Jr., P.E.
<b>TITLE:</b>	Senior Staff Engineer
<b>SIGNATURE:</b>	 Digitally Signed by: Virgal Thomas Mickley, Jr.
<b>DATE:</b>	12/02/19

AJS:vtm/aas

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### SECTION 2

#### TEST METHOD(S)

The specimens were evaluated in accordance with the following:

**2018**, *International Residential Code*<sup>®</sup>, International Code Council

**2018**, *International Building Code*<sup>®</sup>, International Code Council

**2015**, *National Building Code of Canada*

**2012**, *Ontario Building Code*

**2018**, *British Columbia Building Code*

**2014**, *Alberta Building Code*

Structural tests were performed according to Chapter 17 (Structural Tests and Special Inspections) of IBC 2018.

#### Limitations

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

### SECTION 3

#### MATERIAL SOURCE/INSTALLATION

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.

The bracket was directly secured onto the surface of a rigid steel fixture (to simulate anchorage into concrete). Transducers mounted to an independent reference frame were located to record movement of reference point on the post mount system (top of post) to determine component deflections. See photographs in Section 10 for individual test setups.

### SECTION 4

#### EQUIPMENT

The specimens were loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables, nylon straps, and load distribution beams were used to impose test loads on the specimens. Applied load was measured using an electronic load cell located in-line with the loading system. Electronic linear motion transducers were used to measure deflections. Reference photos in Section 10 for test setup.

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### SECTION 5

#### LIST OF OFFICIAL OBSERVERS

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

### SECTION 6

#### 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.

Load was increased at a steady uniform rate until failure occurred. The testing time was continually recorded from the application of initial test load until the ultimate test load was reached. All loads and displacement measurements were horizontal, unless noted otherwise. Purpose of testing was to determine the ultimate load capacity of the post and bracket assembly. Test loads were in excess of the loads specified in Parts 4 and 9 of the NBCC, OBC, BCBC and ABC.

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**SECTION 7**

**TEST SPECIMEN DESCRIPTION**

Fortress Railing Products provided the fully-assembled test specimens with the following details:

<b>FASCIA MOUNT BRACKET</b>	<i>Fe26 2</i> in In-line Bracket: See drawings in Section 11
	<i>Fe26 3</i> in In-line Bracket: See drawings in Section 11
	<i>Fe26 2</i> in Outside Corner Bracket: See drawings in Section 11
	<i>Fe26 3</i> in Outside Corner Bracket: See drawings in Section 11
	<i>Fe26 2</i> in Inside Corner Bracket: See drawings in Section 11
	<i>Fe26 3</i> in Inside Corner Bracket: See drawings in Section 11
<b>SURFACE MOUNT PLATE</b>	5-9/16 in square by 0.40 in thick steel base plate with a 3/8 in continuous fillet weld; the base plate included four 1/2 in diameter holes and one 1 in diameter hole
<b>POST(S)</b>	<i>AL13</i> : 3 in square by 0.188 in thick aluminum post with raceway channels in each corner
	<i>AL13 Home</i> : 3 in square by 0.125 in thick aluminum post
	<i>AL13 Home</i> : 2 in square by 0.125 in thick aluminum post
<b>FASTENERS</b>	M6-1.75 by 24mm self-drilling, hex-head screws (four in each fascia mount bracket attaching the bracket to the post)
	3/8 in Gr. 5 bolts with nut and washers (four in-line bracket, inside corner bracket, and surface mount to substructure; eight outside corner bracket to substructure)
	1/4 in by 2-3/4 in hex drive thread cutting screws (four per surface mount post attaching base plate to post)

**SECTION 8**

**TEST RESULTS**

**Key to Test Results Tables:**

Ultimate Load: Maximum load the post mount achieved prior to failure.

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

Displacement at 200 lb: Deflection of post at load application point.

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**3 in AL13 Posts**

Test Dates – 06/24/19 and 07/18/19

BRACKET TYPE	ULTIMATE LOAD (lb) <sup>1</sup>	E.T. (min:sec)	DISPLACEMENT AT 200 LB (in)	MODE OF FAILURE
In-Line	1422	03:18	1.13	Post buckled at base, above bracket
Outside Corner	1551	03:14	0.98	Post buckled at base, above bracket; bracket began tearing
Inside Corner	1161	02:26	0.83	Post buckled at base, above bracket
Surface Mount	1087	01:52	0.43	Not Recorded

<sup>1</sup> Load applied at 42 in from the top of bracket

**3 in AL13 Home Posts**

Test Date - 08/15/19

BRACKET TYPE	ULTIMATE LOAD (lb) <sup>1</sup>	E.T. (min:sec)	DISPLACEMENT AT 200 LB (in)	MODE OF FAILURE
In-Line	803	01:25	1.22	Post buckled at base, above bracket
Outside Corner	989	02:30	1.05	Post buckled at base, above bracket; bracket began tearing
Inside Corner	899	01:00	0.90	Post buckled at base, above bracket

<sup>1</sup> Load applied at 42 in from the top of bracket

**2 in AL13 Home Posts**

Test Date - 08/15/19

BRACKET TYPE	ULTIMATE LOAD (lb) <sup>1</sup>	E.T. (min:sec)	DISPLACEMENT AT 200 LB (in)	MODE OF FAILURE
In-Line	511	01:18	0.91	Post buckled at base, above bracket
Outside Corner	544	01:36	1.37	
Inside Corner	545	01:23	1.27	

<sup>1</sup> Load applied at 36 in from the top of bracket

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**SECTION 9  
CONCLUSION**

The post and bracket assemblies reported herein meet the structural performance requirements of One- and Two-Family Dwellings (IRC) for use with maximum rail heights equal to the load application height. Post and bracket assemblies are capable of supporting the live loads specified in the NBCC, OBC, BCBC and ABC. Reference Steenhof Building Services Group Report No. 190502 dated 10/11/19 for additional information.

The post mount assemblies reported herein also meet the structural performance requirements of All Use Groups (IBC) for allowable post spacings stipulated in the following table unless noted otherwise:

POST MOUNT	BRACKET TYPE	ALLOWABLE CENTER-TO-CENTER POST SPACING <sup>1, 2</sup>
<b>3 in AL13 Posts</b>	In-Line	11 ft - 4 in
	Outside Corner	12 ft - 4 in
	Inside Corner	9 ft - 3 in
	Surface Mount	8 ft - 3 in
<b>3 in AL13 Home Posts</b>	In-Line	6 ft - 5 in
	Outside Corner	7 ft - 10 in
	Inside Corner	7 ft - 2 in
<b>2 in AL13 Home Posts <sup>3, 4</sup></b>	In-Line	4 ft - 0 in
	Outside Corner	4 ft - 4 in
	Inside Corner	4 ft - 4 in

<sup>1</sup> Allowable post spacing (center-to-center of post) = Ultimate load / (50 plf x 2.5 safety factor).

<sup>2</sup> Center-to-center spacing is based on post strength only. Allowable post spacing shall not exceed the lesser of the noted center-to-center post spacing or the allowable length of the guardrail to which it is attached.

<sup>3</sup> Not evaluated for use in IBC All Use Groups applications (minimum 42 in rail height); Evaluated for maximum rail height of 36 in only.

<sup>4</sup> 2 in AL13 Home post and listed bracket are suitable for use in Canadian Codes Part 9 Buildings only. Spacings indicated are for posts that support handrails or posts that support guards where the maximum fall height is 1,800mm (5'-11") and the guard serves only one dwelling unit.

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### SECTION 10 PHOTOGRAPHS



**Photo No. 1**  
**Concentrated Load Test on Inside Corner Bracket**



**Photo No. 2**  
**Outside Corner Bracket Attachment**



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**Photo No. 3**  
**Concentrated Load Test on Outside Corner Bracket**



**Photo No. 4**  
**In-Line Bracket Attachment**

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**Photo No. 5**  
**Concentrated Load Test on In-Line Bracket**



**Photo No. 6**  
**Concentrated Load Test on Surface Mount Post**

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**Photo No. 7**  
**Typical Bucking Failure**



**Photo No. 8**  
**Typical Tearing of Outside Corner Bracket**



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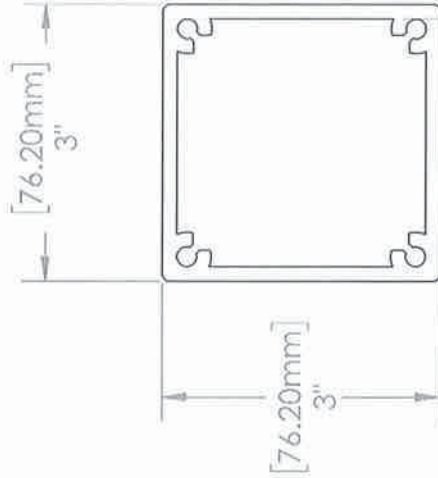
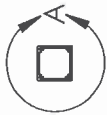
### SECTION 11 DRAWINGS

The "As-Built" drawings for the support posts and 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.

# intertek

Test sample complies with these details.  
Deviations are noted.

Report # 57512-01-119-19  
Date 09/19/19 Tech ATS

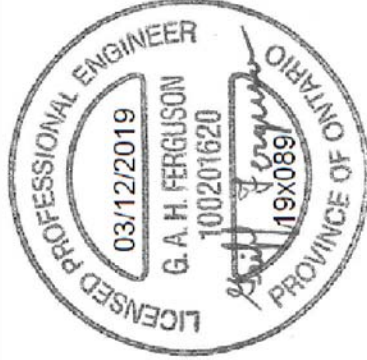


DETAIL A  
SCALE 1 : 2

[4mm]  
3/16"



Dec. 4, 2019



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

DESCRIPTION: AL13 POST 3" X 55" (FASCIA)  
DRAWN BY: KevinF  
DATE: 09/20/2019 DIVISION: Fortress Railing  
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REV: A

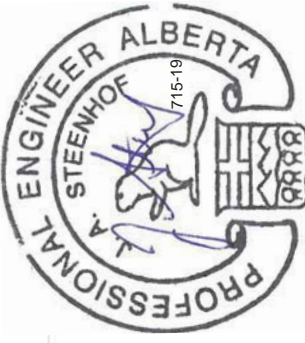
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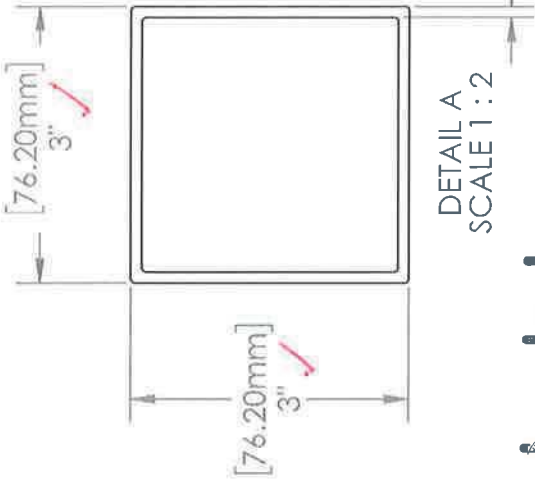
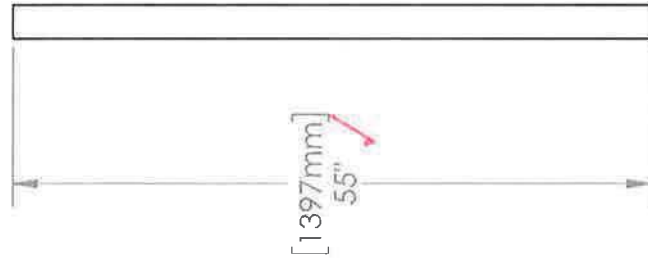
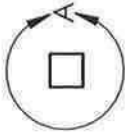
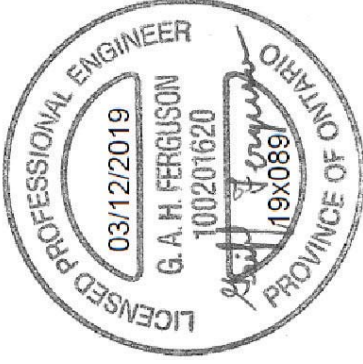
Sheet: 1 OF 1

5133902X





Dec. 4, 2019



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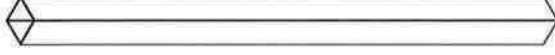
**intertek**

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Report # J7912.01-119-10

Date 10/9/19 Tech ATS



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REV	DATE	BY	DESCRIPTION
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DESCRIPTION: AL13 HOME POST 3" X 55" (FASCIA)			
DRAWN BY: KevinF			
DATE: 09/20/2019 DIVISION: Fortress Railing			
SCALE: 1 : 16			
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5935503X R3935-09060A			
Sheet: 1 OF 1			
REV: 1			

Sheet: 1 OF 1

# intertek

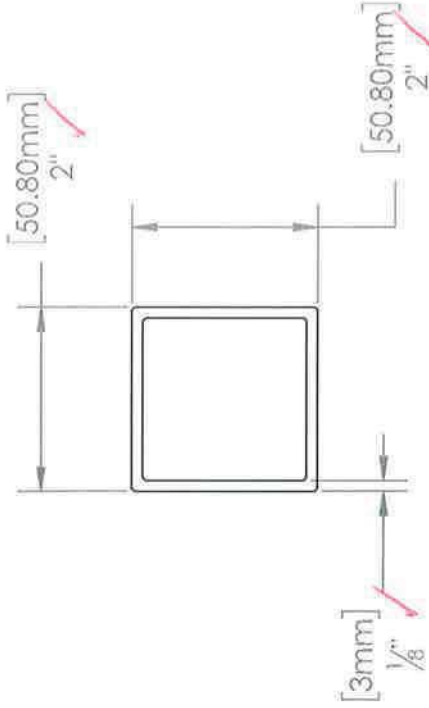
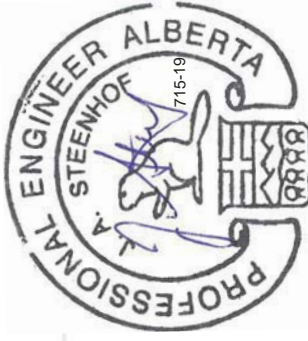
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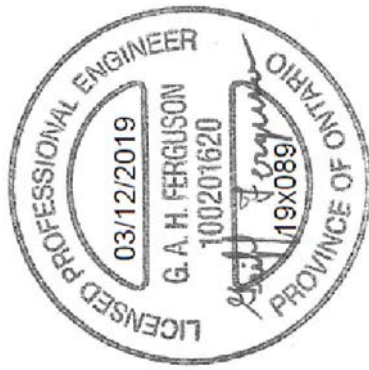
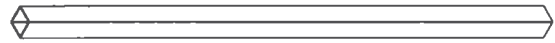
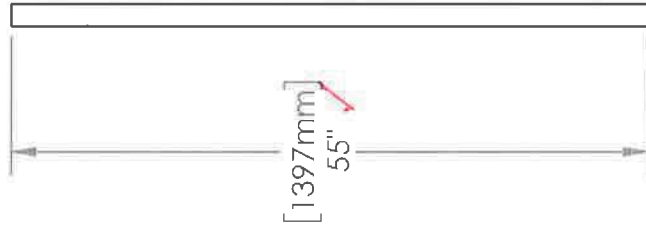
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DETAIL A  
SCALE 1 : 2



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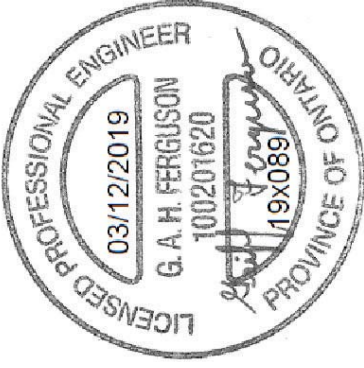
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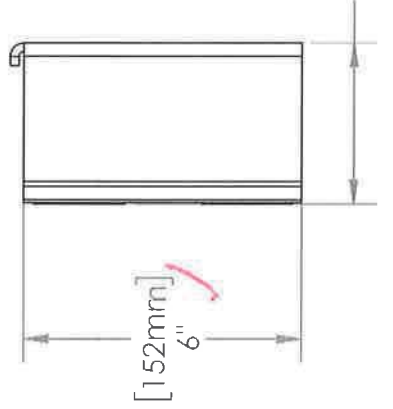
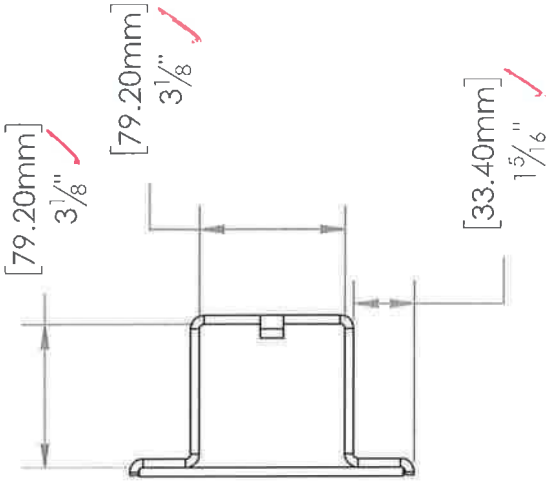
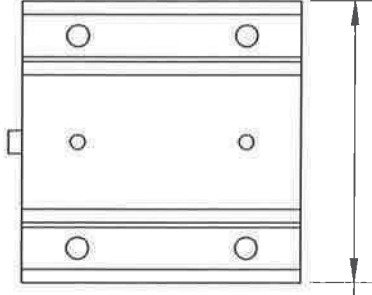
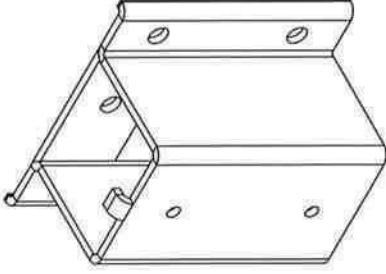
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AL13 HOME POST 2" X 55" (FASCIA)

DRAWN BY: Kevin F  
DATE: 09/20/2019 DIVISION: Fortress Railing  
ITEM #: FILE NAME/PART #: R3935-09054A  
SCALE: 1 : 16  
REV: 1

Sheet: 1 OF 1



Dec. 4, 2019



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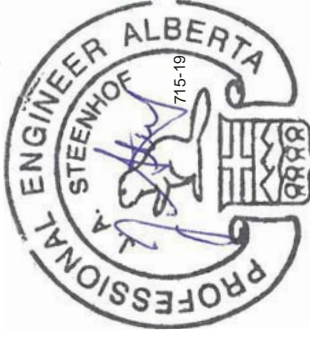
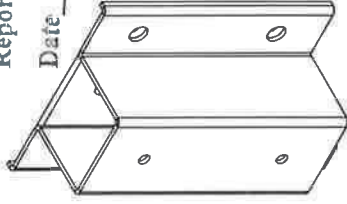
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			DRAWN BY: KevinF
			DATE: 09/20/2019 DIVISION: Fortress Railing
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			REV: B



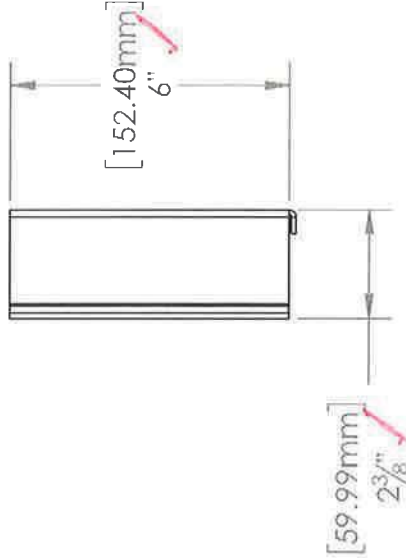
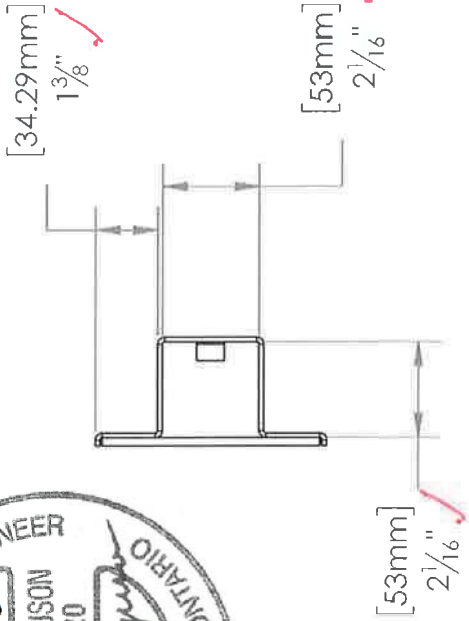
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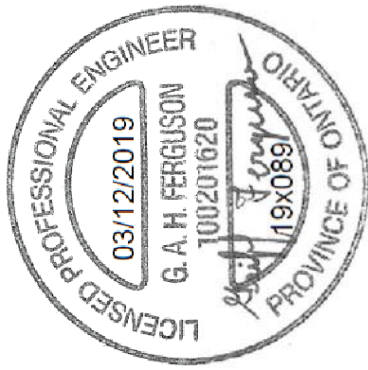
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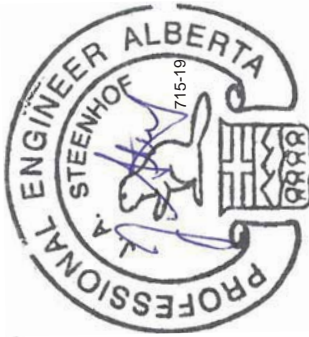
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DRAWN BY: Kevin F  
DATE: 09/20/2019 DIVISION: Fortress Railing  
SCALE: 1:4  
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REV: B

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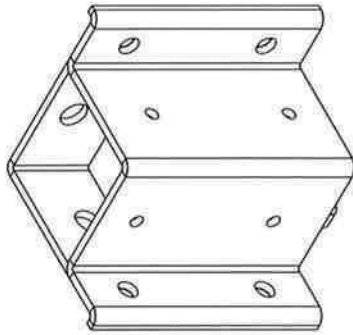




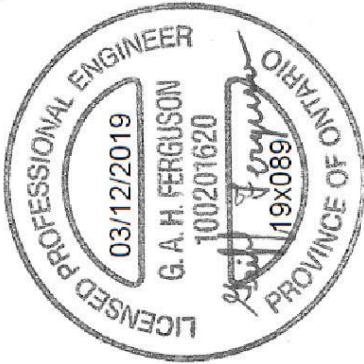
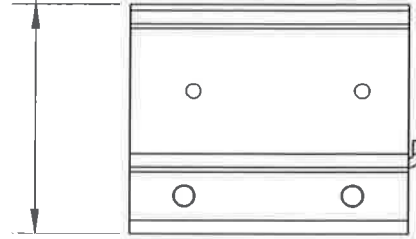
Dec. 4, 2019



Dec. 4, 2019 # 32620 715-19



[126.69mm]  
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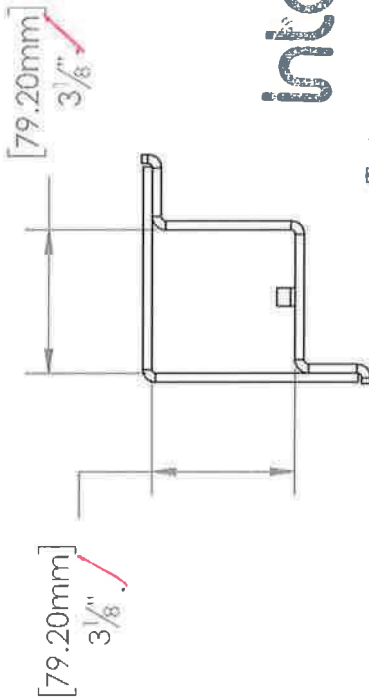


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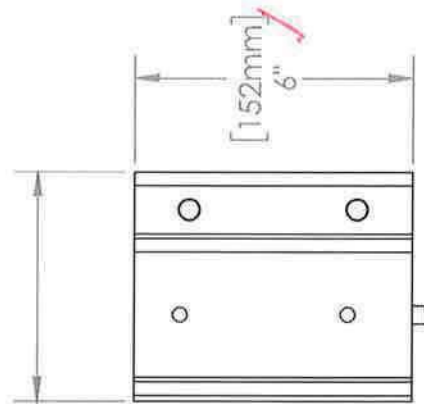
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[126.69mm]  
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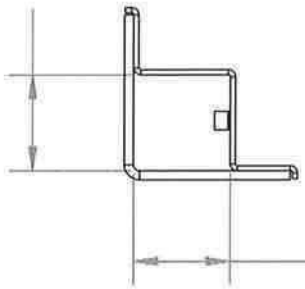
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DESCRIPTION: FE26-FM BRKT INSIDE CNR 3" WELDED PLATES  
 DRAWN BY: KevinF  
 DATE: 09/20/2019 DIVISION: Fortress Railing  
 SCALE: 1:4  
 ITEM #: FILE NAME/PART #: R3139-03341A  
 REV: B  
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[53mm]  $2\frac{1}{16}$ " ✓



[53mm]  $2\frac{1}{16}$ " ✓

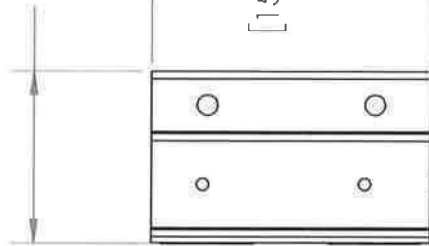
# intertek

Test sample complies with these details.  
Deviations are noted.

Report # J7912-01-119-19

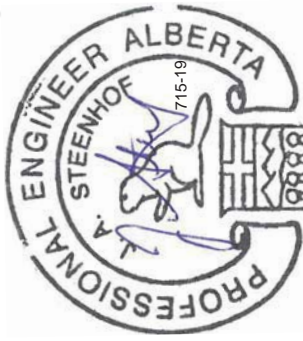
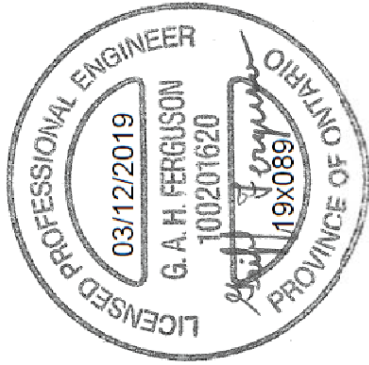
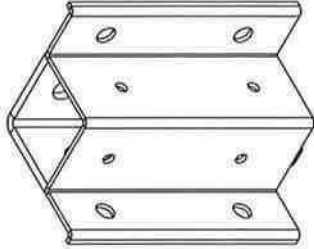
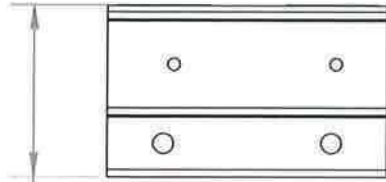
Date 10/4/19 Tech AJS

[95.03mm]  $3\frac{3}{4}$ " ✓



[152.40mm] 6" ✓

[95.03mm]  $3\frac{3}{4}$ " ✓



Dec. 4, 2019



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

**Fortress Railing**

1720 N 1st Street  
Garland, Tx 75040

DESCRIPTION: FE26-FM BRKT INSIDE CNR 2" WELDED PLATES  
DRAWN BY: KevinF  
DATE: 09/20/2019 DIVISION: Fortress Railing  
SCALE: 1:4

ITEM #: R3139-03338A  
FILE NAME/PART #:  
REV: B



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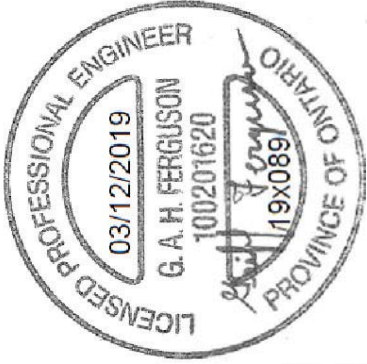
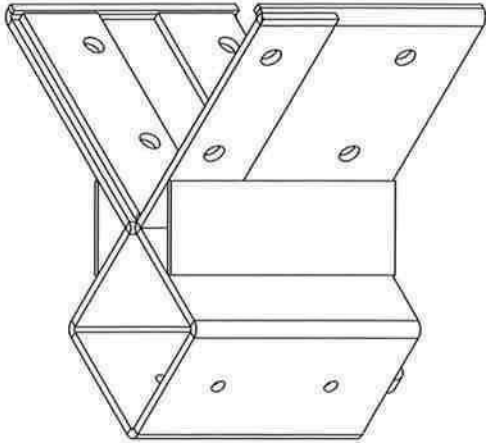
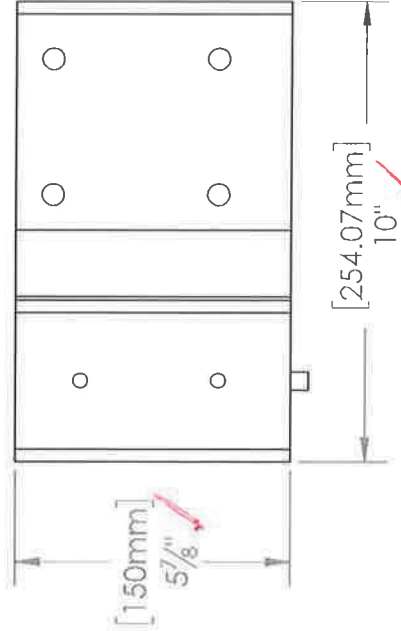
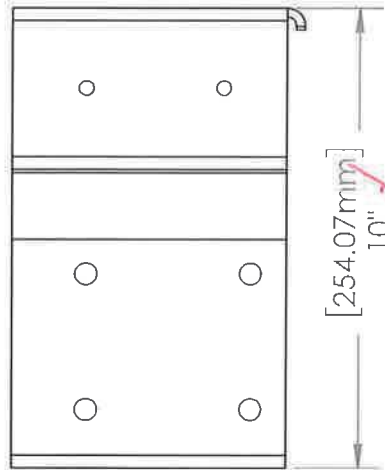
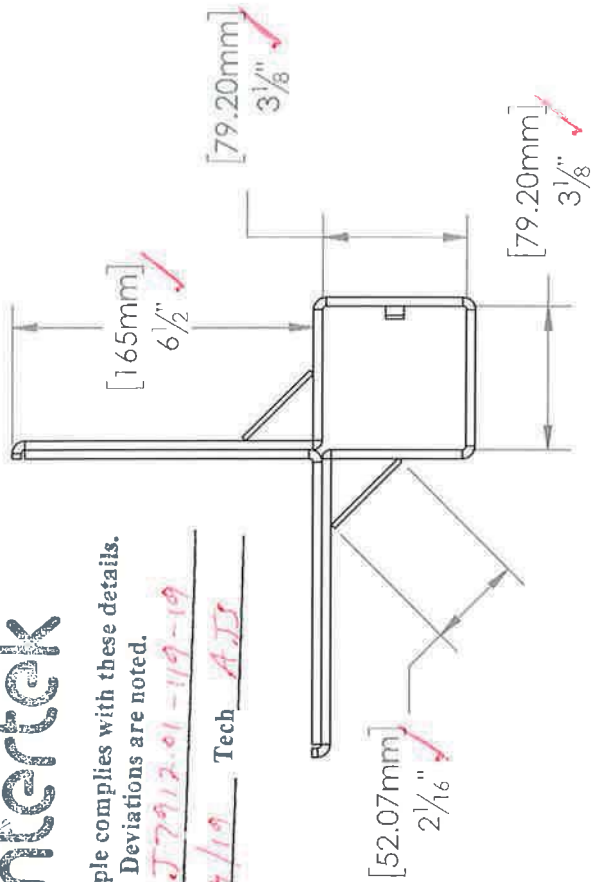
Sheet: 1 OF 1

# intertek

Test sample complies with these details.  
Deviations are noted.

Report # J7912-01-119-19

Date 10/4/19 Tech AJS



Dec. 4, 2019



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

DESCRIPTION: FE26-FM BRKT OUTSIDE CNR 3" WELDED PLATES  
DRAWN BY: KevinF  
DATE: 09/20/2019 DIVISION: Fortress Railing  
SCALE: 1:4  
ITEM #: FILE NAME/PART #: R3139-03335A  
REV: D

**Fortress Railing**  
1720 N 1st Street  
Garland, TX 75040



Sheet: 1 OF 1

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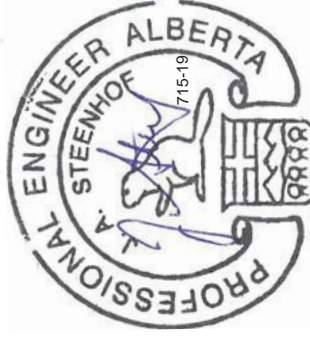
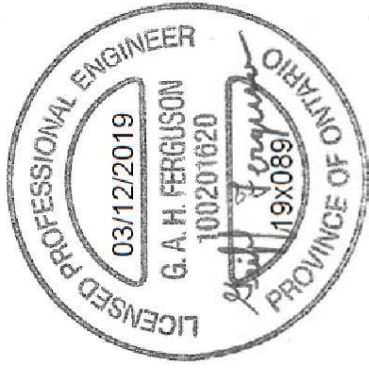
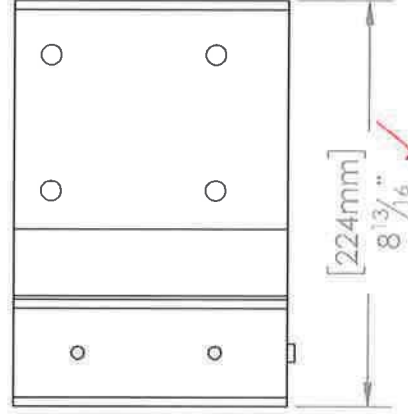
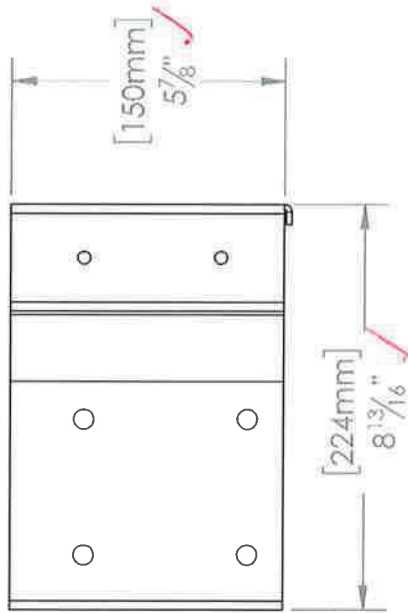
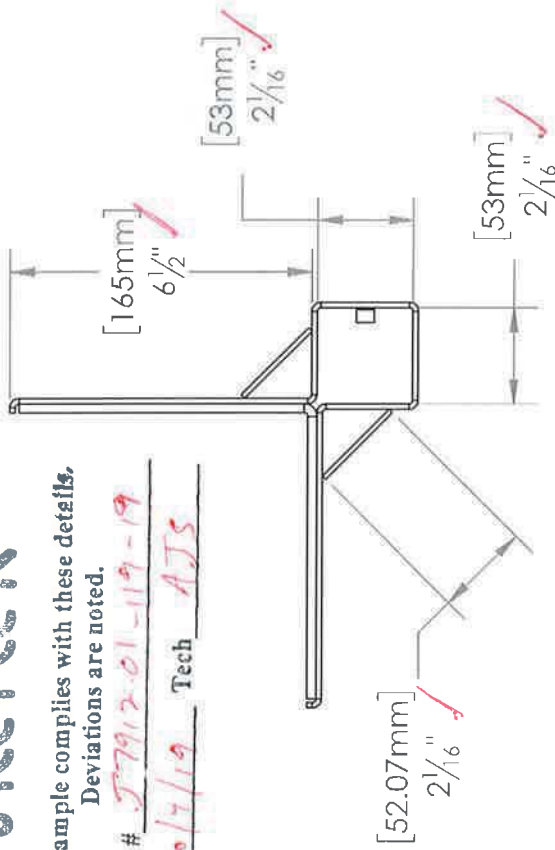
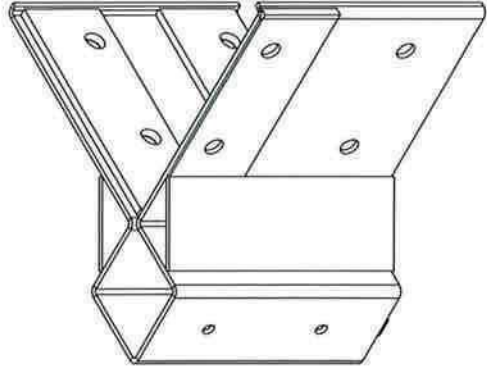


# intertek

Test sample complies with these details.  
Deviations are noted.

Report # 57912-01-119-19

Date 10/4/19 Tech AJS



Dec. 4, 2019



D	09/20/19	KF	Initial Drawing		
REV	DATE	BY	DESCRIPTION		
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 #:				REV:
	R3139-0332A				D

**Fortress Railing**

1720 N 1st Street  
Garland, Tx 75040



Sheet: 1 OF 1

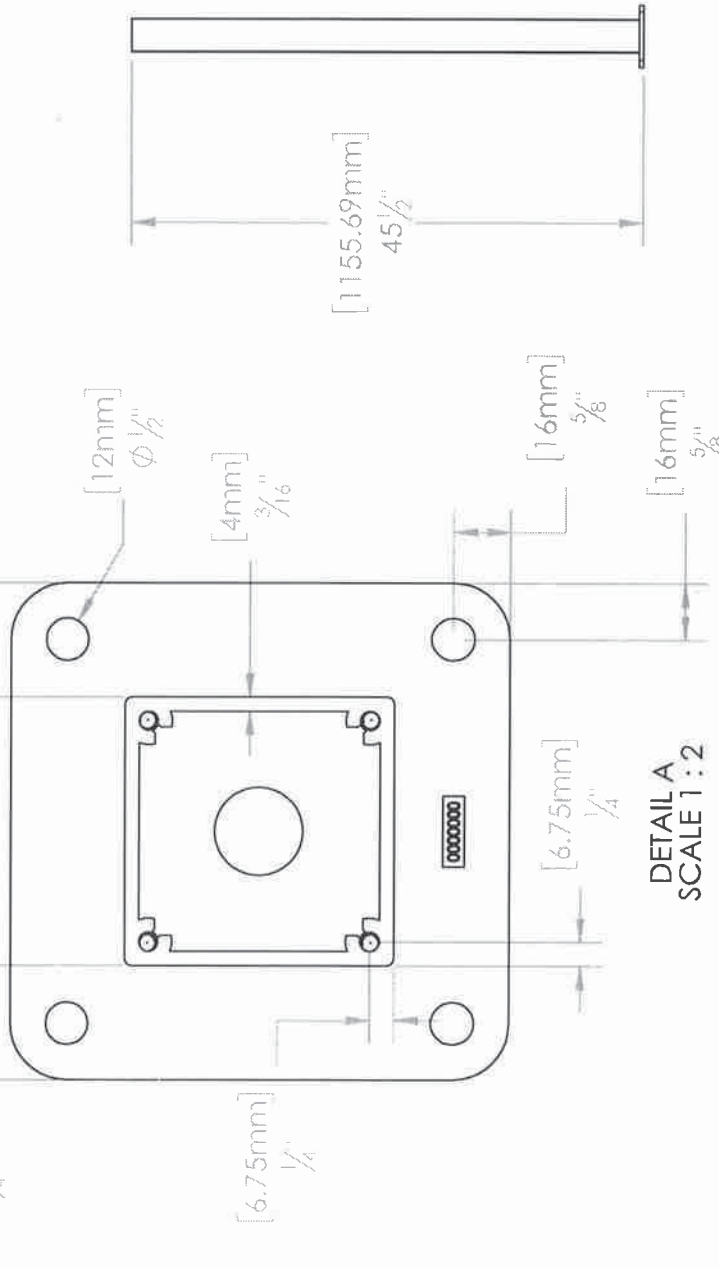
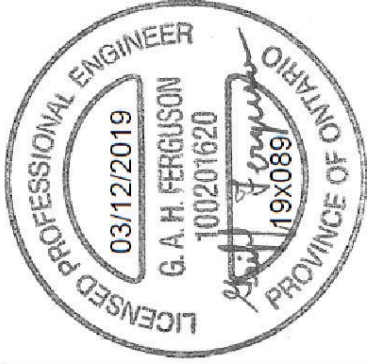
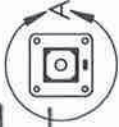
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Test sample complete with test details.  
Deviations are noted.

Report # 17912

Date 11/11/19 Tech CR



Dec. 4, 2019



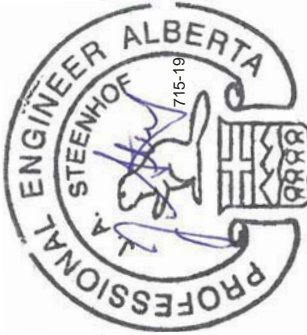
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A 02/05/15 KF Initial Drawing  
REV DATE BY DESCRIPTION  
DESCRIPTION: AL13 PLUS-37X45.5" SCREW BOSS POST ASSEMBLY  
DRAWN BY: KevinF  
DATE: 11/09/2019 DIVISION: Fortress Railing SCALE: AS SHOWN  
ITEM #: FILE NAME/PART #: R3235-08038A REV: A

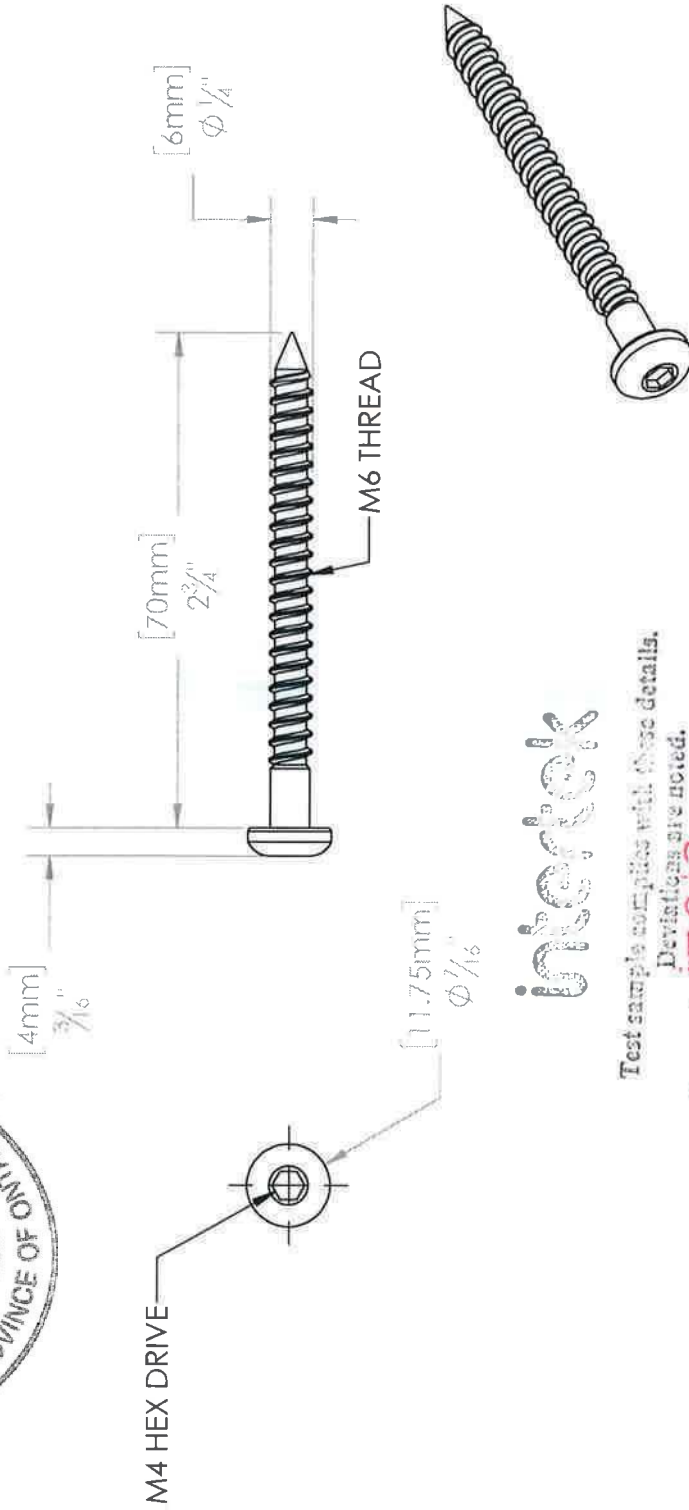
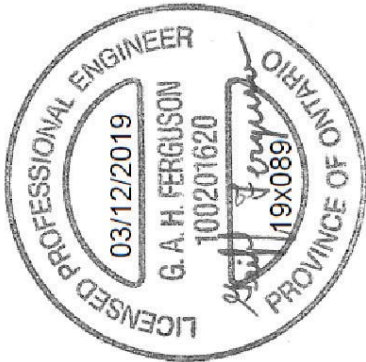
**Fortress Railing**  
1720 N 1st Street  
Garland, Tx 75040



Sheet 1 OF 1



Dec. 4, 2019



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Test sample complies with these details.  
Deviations are noted.

Report # 17912  
Date 11/17/19 Tech SEP

Note: Not intended for use for attachment to wood substrates

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REV	DATE	BY	DESCRIPTION
A	11/08/19	KF	Initial Drawing
DESCRIPTION: M6 X 70MM PAN HEAD WOOD SCREW			
DRAWN BY: KevinF		SCALE: AS SHOWN	
DATE: 11/08/2019		DIVISION: Fortress	
ITEM #: FILE NAME/PART #:			REV: A
			C9191-08035A

Fortress Railing  
1720 N 1st Street  
Garland, TX 75040



Sheet: 1 OF 1



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## TEST REPORT FOR FORTRESS RAILING PRODUCTS

Report No.: J7912.01-119-19 R1

Date: 10/21/19

### SECTION 12

#### REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	10/21/19	N/A	Original Report Issue
1	11/27/19	5, 6, 10	Added A13 Surface Mount Post, Updated Fasteners Description