TEST REPORT

REPORT NUMBER: 102040749COQ-004
ORIGINAL ISSUE DATE: June 23, 2015
REVISION DATE: September 5, 2019

EVALUATION CENTER

INTERTEK TESTING SERVICES NA LTD.
1500 BRIGANTINE DRIVE
COQUITLAM, BC V3K 7C1

RENDERED TO

FORTRESS RAILING PRODUCTS
1800 JAY ELL DRIVE SUITE 200
RICHERSON, TX 75081

PRODUCT EVALUATED:
95-1/4" Cable Rail Guardrail System with UB-05 Brackets

EVALUATION PROPERTY:
Load Requirements

Report of 95-1/4" Cable Rail Guardrail System with UB-05 Brackets for compliance with the applicable requirements of the following criteria:

- **2010 *National Building Code of Canada***
  - **Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6**
- **2012 *Ontario Building Code***
  - **Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6**
- **2006 *Alberta Building Code***
  - **Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6**
- **2012 *British Columbia Building Code***
  - **Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6**

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted a test program on a railing system submitted by Fortress Railing Products. The evaluation was carried out to determine whether their 95-1/4" Cable Rail Guardrail System with UB-05 Brackets would resist the required loads for dwelling units and exterior guards serving not more than 2 dwelling units, as specified in the following Building Codes:

- 2010 *National Building Code of Canada* (NBC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards*
  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
- 2012 Ontario Building Code (OBC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards*
  - Section 9.8.8.6, *Guards Designed Not to Facilitate Climbing*
- 2006 Alberta Building Code (ABC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards*
  - Section 9.8.8.6, *Design to Prevent Climbing*
- 2012 British Columbia Building Code (BCBC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards*
  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*

This evaluation was conducted in the month of May-June 2015.

3 Test Samples

3.1. SAMPLE SELECTION

The client submitted various railing components to assemble one (1) guard rail system to the Evaluation Center on May 19, 2015 (Coquitlam ID# VAN1505191311-001). Components submitted were brackets, posts, top and bottom rails, and in-fill cables.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The assembled railing system was identified as the following:

Table 1. Railing Details

Railing	Posts	Mounting Plate	In-Fill	Brackets
95-1/4" Cable Rail Guardrail System	1: 3" x 3" Fe^{26} Iron post 2: 4" x 4" treated wood post	5" x 5" x 1/4"	1/8" diameter 316 Marine Grade Stainless Steel Cable	UB-05

An Intertek representative assembled the railing per the manufacturer's installation instructions

(refer to Appendix B for installation instructions). Per the client's request, the railing was assembled using a 4 in. x 4 in. treated wood post on one end, which was restrained during testing to evaluate the connection. The post to sub-structure fastener evaluation was not evaluated in this report; the aluminum post was mounted to a test frame using four 3/8 in. Grade 5 bolts.

Refer to Figure 1 below for the UB-05 Bracket.

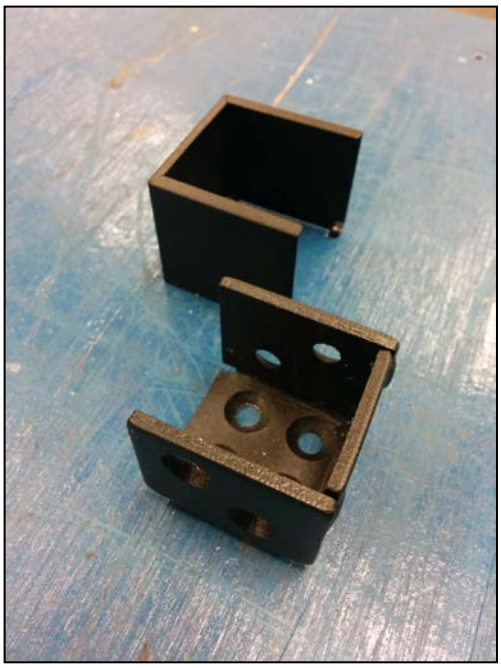

Figure 1. UB-05 Bracket

4 Testing and Evaluation Methods

The test specimen was loaded at a rate to achieve the specified loads between 10 seconds and 5 minutes. The specified test loads were held for one minute before the load was released. As per Section 9.8.8.2 of the 2010 NBC, 2012 OBC, 2006 ABC, and 2012 BCBC, the following tests were conducted for use within dwelling units and exterior guards serving not more than 2 dwelling units:

4.1 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.2. *LOADS ON GUARDS*

1) The minimum specified horizontal load applied inward or outward at the top of every required guard shall be 0.5 kN/m or a concentrated load of 1.0 kN applied at any point

2) Individual elements within the *guard*, including solid panels and pickets, shall be designed for a concentrated load of 0.5 kN applied over an area of 300 mm x 300 mm located at any point in the element or elements so as to engage 3 balusters.

3) The minimum specified load applied vertically at the top of every required *guard* shall be 1.5 kN/m.

4) None of the loads specified above need be considered to act simultaneously.

Notes:

1. A safety factor of 1.67-2.5 was applied to the above loads.

4.2 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.3 *HEIGHT OF GUARDS*

1) All guards shall be not less than 1070 mm high.

4.3 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.5 *OPENINGS IN GUARDS*

1) Openings through any guard shall be of a size that will prevent the passage of a spherical object having a diameter of 100 mm unless it can be shown that the location and size of openings that exceed this limit do not present a hazard.

4.4 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.6 *DESIGN OF GUARDS TO NOT FACILITATE CLIMBING*

1) Guards except those in industrial occupancies and where it can be shown that the location and size of openings do not present a hazard, shall be designed so that no member, attachment or opening facilitates climbing.

2) Guards shall be deemed to comply with Sentence (1) where all elements protruding from the vertical and located within the area between 140 mm and 900 mm above the floor or walking surface protected by the guard conform to one of the following clauses:
a) they are located more than 450mm horizontally and 20 mm vertically, or
b) they provide not more than 15 mm horizontal offset,
c) they do not provide a toe-space more than 45mm horizontally and 20 mm vertically, or
d) they present more than a 2-in-1 slope on the offset.

4.5 IN-FILL LOAD TEST

A load of 0.83 kN (187 lbf) was applied using a 300 mm x 300 mm square block on the center of the railing system normal to the in-fill. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and visible cracks in any component.

4.6 UNIFORM LOAD TEST

The top rail of the guardrail system was subjected to two separate tests where a maximum equivalent uniform load of 1.25 kN/m (86 plf) was applied horizontally and 3.75 kN/m (257 plf) was applied vertically. The loads were applied using quarter point loads. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and visible cracks in any component.

4.7 CONCENTRATED LOAD TEST

The top rail of the guardrail system was subjected to three separate tests where a concentrated load was applied at the following locations:

- 1.67 kN (375 lbs) horizontally at the centre of the guardrail.
- 1.88 kN (421 lbs) horizontally at the top rail adjacent to the Fe[26] iron post connection to verify the connection capacity
- 2.5 kN (562 lbs) horizontally at the top rail adjacent to the wood post connection to verify the connection capacity

4.8 HEIGHT OF GUARDS

The railing formed a protective barrier not less than 1070 mm (42 in.) high.

4.9 OPENINGS IN GUARDS

Openings in the guards measured 78 mm (3.1 in.) between cables. The 1/8 in. diameter cables were tightened per the installation instructions using a Loos & Co. Professional Tension Gauge, Model PT-CR (provided by client); refer to Figure 2 below for Loos & Co. tension gauge.

Figure 2. Loos & Co. Professional Tension Gauge, Model PT-CR

Per the client's specifications, the tension in the cables was tightened to 200 lbs and 250 lbs. The 100 mm (4 in.) diameter sphere was loaded against the cables, and the force at which the sphere penetrated through the cable was then measured using an Artech S-type load cell. The average of 3 readings was reported.

When cables were tightened to 200 lbs tension, the railing prevented a 100 mm (4 in.) diameter sphere from passing through at a max load of 5.1 lbs.

When cables were tightened to 250 lbs tension, the railing prevented a 100 mm (4 in.) diameter sphere from passing through at a max load of 7.0 lbs.

The acceptable minimum loads to prevent a 100 mm (4 in.) diameter sphere to penetrate through the railing's in-fill cables is subject to evaluation and approval by the Authority Having Jurisdiction (AHJ).

4.10 DESIGN TO PREVENT CLIMBING

No member, attachment or opening located between 140 mm and 900 mm above the floor or walking surface protected by the guards facilitated climbing.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The product test results are shown in Table 1 below and a copy of the test data is located in Appendix A.

Table 1. Test Results[1]

Section	Property	Result	Requirement	Pass/Fail
9.8.8.2	In-fill Load	187 lbs	187 lbs	Pass
	Vertical Uniform Load	257 plf	257 plf	Pass
	Horizontal Uniform Load	86 plf	86 plf	Pass
	Mid-span Concentrated Load	375 lbs	375 lbs	Pass
	Adjacent to Fe[26] Iron Post Connection Concentrated Load	421 lbs	421 lbs	Pass
	Adjacent to Wood Post Connection Concentrated Load	562 lbs	562 lbs	Pass
9.8.8.3	Height of Guards	1102 mm	≥ 1070 mm	Pass
9.8.8.5	Openings in Guards	Cable Rail prevents passage of 100 mm diameter sphere up to max load of 7.0 lbs	Openings shall prevent the passage of a spherical object having a diameter of 100 mm	See Note 2
9.8.8.6	Design to Not Facilitate Climbing	No elements protruding from the vertical between 140 mm and 900 mm	No elements from the vertical between 140 mm and 900 mm that facilitate climbing	Pass

Note 1 - Per the client's request, the railing was assembled using a 4 in. x 4 in. treated wood post on one end, which was restrained during testing to evaluate the connection.

Note 2 – When cables were tightened to 200 lbs tension, the railing prevented a 100 mm (4 in.) diameter sphere from passing through at a max load of 5.1 lbs. When cables were tightened to 250 lbs tension, the railing prevented a 100 mm (4 in.) diameter sphere from passing through at a max load of 7.0 lbs.

The acceptable minimum loads to prevent a 100 mm (4 in.) diameter sphere to penetrate through the railing's in-fill cables is subject to evaluation and approval by the Authority Having Jurisdiction (AHJ).

6 Conclusion

The Fortress Railing Products 95-1/4" Cable Rail Guardrail System with UB-05 Brackets identified and evaluated in this report have been tested to the load requirements for guards within dwelling units and in exterior guards serving not more than 2 dwelling units, as specified in the following Building Codes:

- 2010 *National Building Code of Canada* (NBC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards (See note below)*
  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
- 2012 Ontario Building Code (OBC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards (See note below)*
  - Section 9.8.8.6, *Guards Designed Not to Facilitate Climbing*
- 2006 Alberta Building Code (ABC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards (See note below)*
  - Section 9.8.8.6, *Design to Prevent Climbing*
- 2012 British Columbia Building Code (BCBC)
  - Section 9.8.8.2, *Loads On Guards*
  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards (See note below)*
  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*

Note: The acceptable minimum loads to prevent a 100 mm (4 in.) diameter sphere to penetrate through the railing's in-fill cables is subject to evaluation and approval by the Authority Having Jurisdiction (AHJ).

The product test results are presented in Section 5 of this report.

INTERTEK TESTING SERVICES NA LTD.

Reported by:

Chris Chang, P.Eng.
Engineer, Building Products

Reviewed by:

Dan Lungu, P. Eng.
Engineer, Manufactured Housing

Reviewed by:

Kal Kooner, P. Eng.
Manager, Building Products

APPENDIX A: Test Data (3 pages)

Company	Fortress Railing Products	Technician(s)	Chris Chang
Project No.	G102040749	Reviewer	Kal Kooner / Dan Lungu
Models	Cable Rail	Start/End Date	May 25, 2015
Product Name	Same as above	Sample ID	VAN1505191311-001
Standard	**2010 NBC/2012 OBC/2006 ABC/2012 BCBC, Section 9.8.8.2, 9.8.8.3, 9.8.8.5, 9.8.8.6**		

Test Data Package

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Test:	**Loads on Guards**			Project:	G102040749
Date:	25-May-15			Eng/Tech:	Chris Chang
Client:	Fortress Railing Products			Reviewer:	Kal Kooner / Dan Lungu
Product:	**Cable Rail - Fe26 Posts - UB05 brackets**				
Post Spacing:	7.938	ft	2.42	m	
Height of Guard:	43.375	in	1102	mm	
Opening in Guard:	3.0625	in	78	mm	

Method: 2010 National Building Code of Canada, 9.8.8.2 Loads on Guards
2012 Ontario Building Code, 9.8.8.2 Loads on Guards
2006 Alberta Building Code, 9.8.8.2 Loads on Guards
2012 British Columbia Building Code, 9.8.8.2 Loads on Guards

Safety Factor: 1.67 (based on a resistance factor Ø = 0.9 for steel)
1.875 (based on a resistance factor Ø = 0.8 for shear connection)
2.50 (based on a resistance factor Ø = 0.6 for aluminum to wood connection)

Equipment: Artech 5000 lbf Load Cell (Intertek ID# P60690, cal due November 2015)
Vaisala Temp/RH Indicator (Intertek ID# 9-0176, cal due July 2015)
Stopwatch (Intertek ID# P60624, cal due July 2015)
Mitutoyo Digital Caliper (Intertek ID# P60005, cal due May 2016)

Time/Temp/RH: 10:45AM / 22.0°C / 48.0%

Direction	Test	Design Load (Inward/ Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Deflections (in.)	Pass/Fail
Outward	Individual Elements (over 12 in. x 12 in.)	112	187	-	-	187	1.496	**Pass**
	Vertical Uniform Load (per ft)	103	257	2023	1019	2039	0.121	**Pass**
	Horizontal Uniform Load (per ft)	34	86	674	340	680	2.371	**Pass**
	Midspan Horizontal Concentrated Load	225	375	-	-	375	2.015	**Pass**
	Top Rail Adjacent to Steel Connection Concentrated Load	225	421	-	-	421	0.585	**Pass**
	Top Rail Adjacent to Wood Connection Concentrated Load	225	562	-	-	562	0.200	**Pass**

Direction	Test	Design Load (Inward/ Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent Quarter-Point Load (kN)	Required Proof Load (kN)	Deflections (mm)	Pass/Fail
Outward	Individual Elements (over 300 mm in. x 300 mm)	0.50	0.83	-	-	0.83	38.0	**Pass**
	Vertical Uniform Load (per m)	1.50	3.75	2.74	4.54	9.07	3.1	**Pass**
	Horizontal Uniform Load (per m)	0.50	1.25	0.91	1.51	3.02	60.2	**Pass**
	Midspan Horizontal Concentrated Load	1.00	1.67	-	-	1.67	51.2	**Pass**
	Top Rail Adjacent to Alum Connection Concentrated Load	1.00	1.88	-	-	1.88	14.9	**Pass**
	Top Rail Adjacent to Wood Connection Concentrated Load	1.00	2.50	-	-	2.50	5.1	**Pass**

Test:	**Dimensional Checks**			Project:	G102040749
Date:	25-May-15			Eng/Tech:	Chris Chang
Client:	Fortress Railing Products			Reviewer:	Kal Kooner / Dan Lungu
Product:	**Cable Rail - Fe26 Posts - UB05 brackets**				
Post Spacing:	7.938	ft	2.42	m	
Height of Guard:	43.375	in	1102	mm	
Opening in Guard:	3.0625	in	78	mm	

Method: 2010 National Building Code of Canada
2012 Ontario Building Code
2006 Alberta Building Code
2012 British Columbia Building Code
9.8.8.3 Height of Guards
9.8.8.5 Openings in Guards
9.8.8.6 Design of Guards to Not Facilitate Climbing / Guards Designed Not to Facilitate Climbing / *Design to Prevent Climbing*

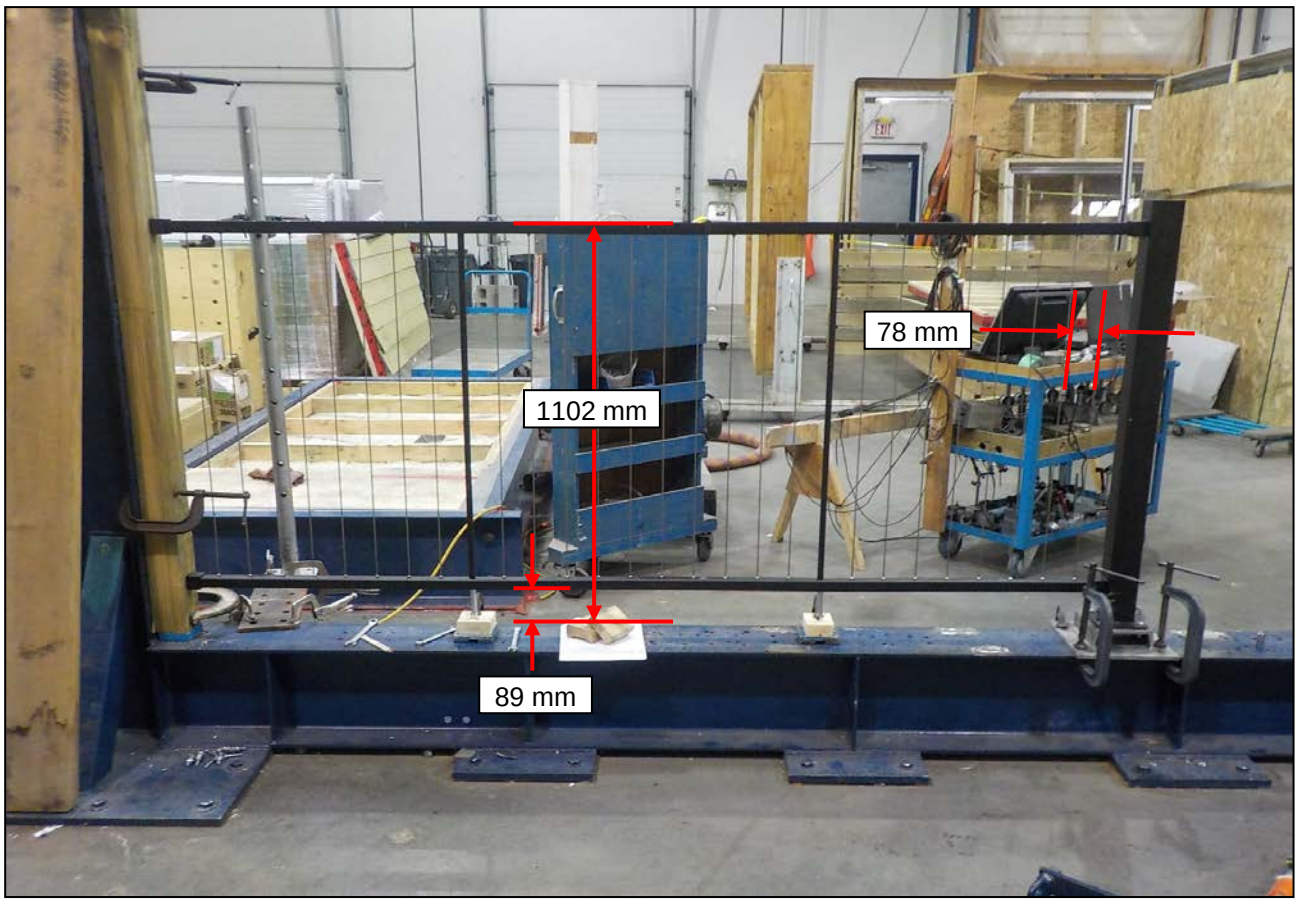
Time/Temp./RH: 10:45AM / 22.0°C / 48.0%

Equipment: Vaisala Temp/RH Indicator (Intertek ID# 9-0176, cal due July 2015)
Tape Measure (Intertek ID# P60494, cal due August 2015)

Description	Result	Requirement	Pass/Fail
9.8.8.3 Height of Guards	1102 mm	≥ 1070 mm	**Pass**
9.8.8.5 Openings in Guards	Cable Rail prevents passage of 100 mm diameter sphere up to 7.0 lbs	Shall prevent the passage of a 100 mm diameter spherical object	**See Note**
9.8.8.6 Design of Guards to Not Facilitate Climbing / Guards Designed Not to Facilitate Climbing	No elements protruding from the vertical between 140 mm and 900 mm that facilitate climbing	No elements protruding from the vertical between 140 mm and 900 mm that facilitate climbing	**Pass**

Note 1 - When cables were tightened to 200 lbs tension, the railing prevented a 100 mm (4 in.) diameter sphere to pass up to a max load of 5.1 lbs. When cables were tightened to 250 lbs tension, the railing prevented a 100 mm (4 in.) diameter sphere to pass up to a max load of 7.0 lbs.

The acceptable minimum loads to prevent a 100 mm (4 in.) diameter sphere to penetrate through the railing's in-fill cables is subject to evaluation and approval by the Authority Having Jurisdiction (AHJ).



APPENDIX B: Installation Instructions (5 pages)

Installation Instructions for Fortress Vertical Cable Panel System with UB-05 Brackets and Fe^{26} Posts

It is the responsibility of the installer to meet all code and safety requirements, and to obtain all required building permits. The deck and railing installer should determine and implement appropriate installation techniques for each installation situation. Fortress Railing Products and its distributors shall not be held liable for improper or unsafe installations.

Fortress Fe^{26} Posts must always be secured to the deck framing. Fortress Fe^{26} Posts should never be attached to only the deck boards.

Read Instructions Completely Before Starting Installation

Note

When cutting Fortress railing, it is very important to complete the following at cut points.
- Remove all metal shavings from the cut area
- File any sharp edges left by cutting. Thoroughly wipe and remove any filings, grime or dirt from the railing.
- Apply two coats of Fortress zinc based touch-up paint to the cut area. If touch up is at rail ends, allow paint to dry before connecting bracket to post.
- Be sure to remove any metal shavings from the surface of deck, patio or balcony to prevent stains on the deck surface.

Torx Safety Tips

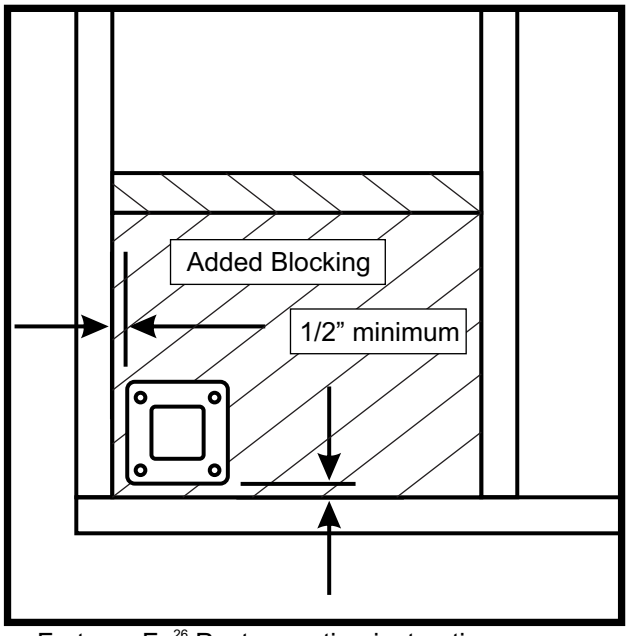
- Always pre-drill holes with a 3/16” drill bit.
- Always use the lowest speed setting on drill.
- To reduce chance of bit breakage, start tightening with drill on low torque setting and work up until screw is secured.

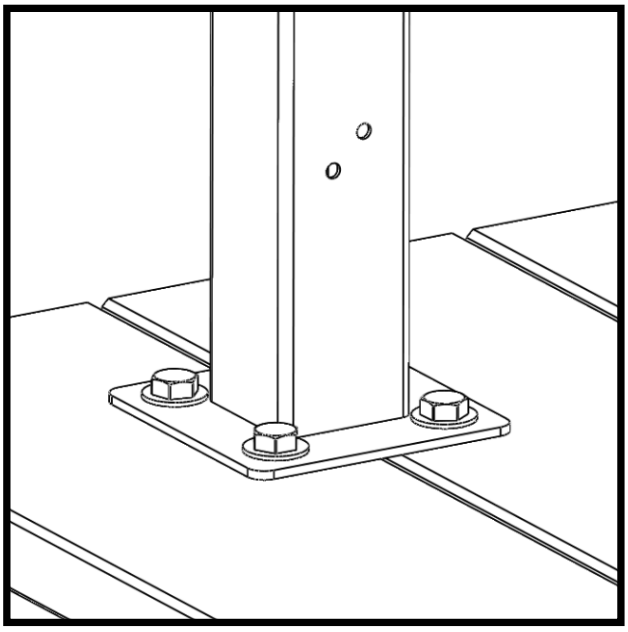
Required Materials

Miter saw with cut off blade or Metal Cutting Reciprocating Saw, Drill, 3/16” Drill Bits, T-25 Driver Bit, Drill Bit Extender, Tape Measure, Socket Set, Speed Square and Touch Up Paint

Mount Fe^{26} Posts*

- Wood Blocking tied to deck frame must be installed and constructed with treated dimensional lumber with a minimum thickness of 1-1/2”.
- Position the edge of Fe^{26} Post base plate a minimum of ½” from the inside edge of rim joist.
- Mount Fe^{26} Posts at appropriate points based on panel length.
- Attach Fe^{26} Posts with 3/8” X 3-1/2” Hex Head Galvanized Bolts.





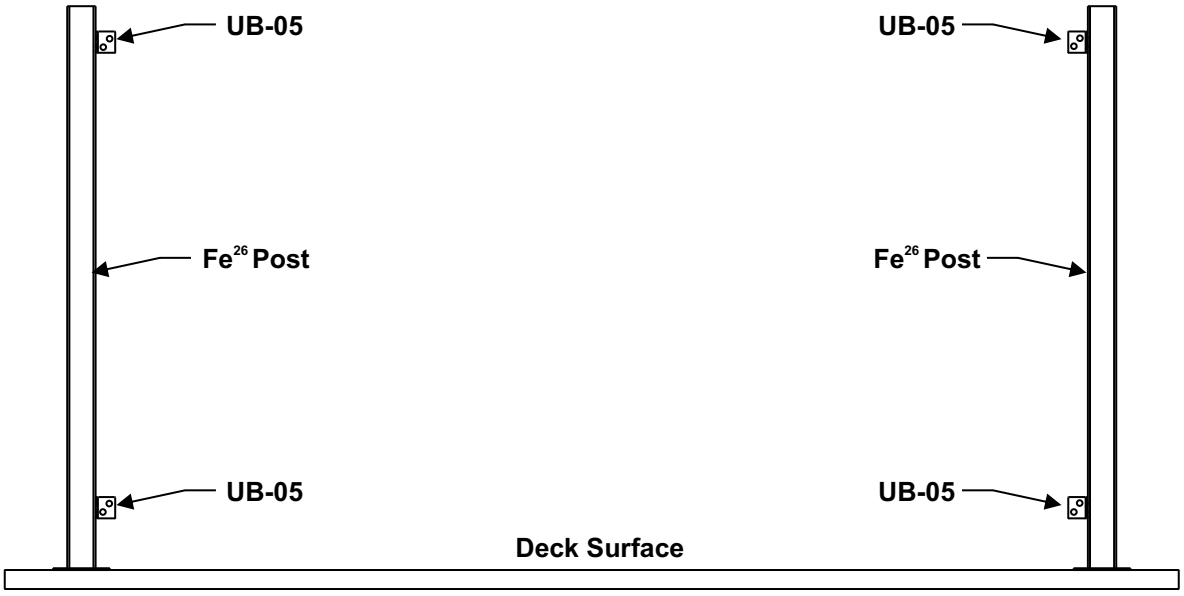
*Reference Fortress Fe^{26} Post mounting instructions

For technical assistance, please email: technicalhelp@fortressrailing.com
Hours of Operation Monday through Friday 8:00 AM to 5:00 PM, CST
Phone: 1-8449092999 Fax: 972-372-0924

Fortress Vertical Cable System Installation with Fe[26] UB-05 Brackets

Install Posts and UB-05 brackets. Brackets should be spaced according to the height of Fortress Vertical Cable Panel system being installed. Fortress Vertical Cable Panels are 34” or 40” systems.

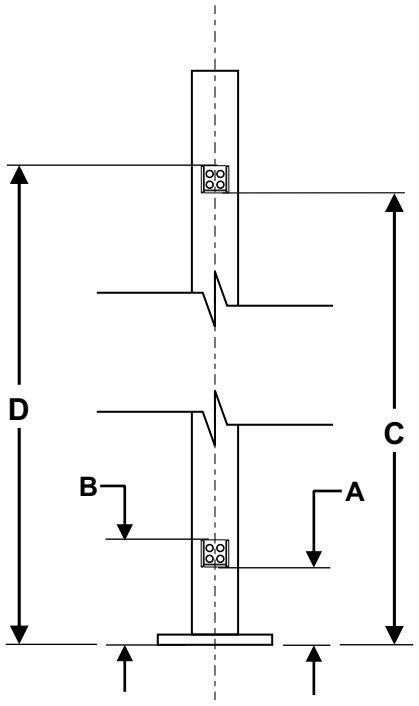
Reference Fe[26] UB-05 instructions for bracket installation.



UB-05 Bracket Top and Bottom Locations for Fortress Vertical Cable System Installations

Pre-Drilling with a 3/16” drill bit is required.

Rail Panel Height	Pre-Drill Dimensions			
	A*	B	C	D
34”	3-5/8”	5-1/8”	36-3/8”	37-7/8”
40”	3-5/8”	5-1/8”	42-3/8”	43-7/8”

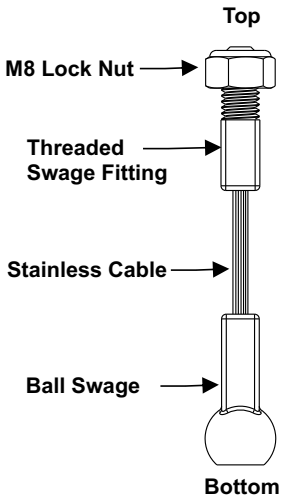


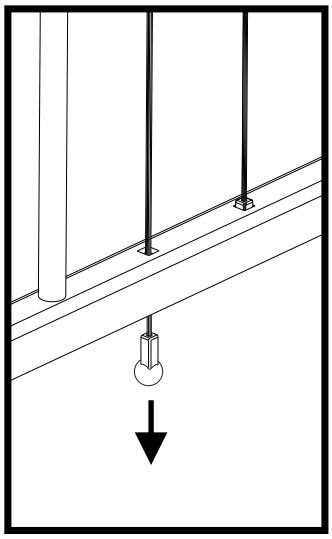
***Dimension A positions bottom edge of rail 3-3/4” above deck surface.**
***Dimension A is measured from the bottom surface of post base.**

Remove all metal shavings from deck, post base cover, post, and panel before bracket is screwed to post to prevent rust stains.

Measure and Cut Fortress Vertical Cable System

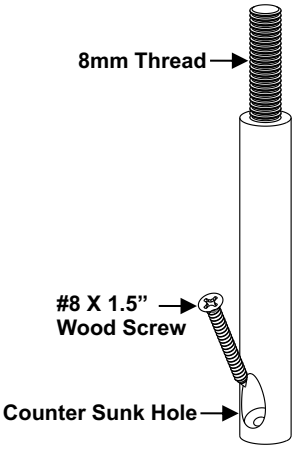
• Measure the distance between the installed UB-05 Brackets.
• Using a metal cutting blade, cut the rail at the four cutting mark locations from previous step. It is advisable to make a practice cut on a scrap piece of rail before proceeding with the finish cuts.
• Cut Rails so that there is a equal distance between the last cable and the end of rails.
• File cut edges and coat with 2 coats of Fortress zinc based touch-up paint.
• Vertical Supports and Cables can be relocated to maintain even spacing.
• To remove a cable, completely remove the hex nut located in the Top Rail and pull the cable assembly through the bottom rail.

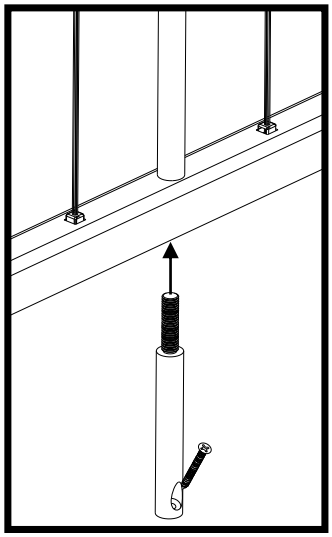




Install Fortress Vertical Cable I-Supports

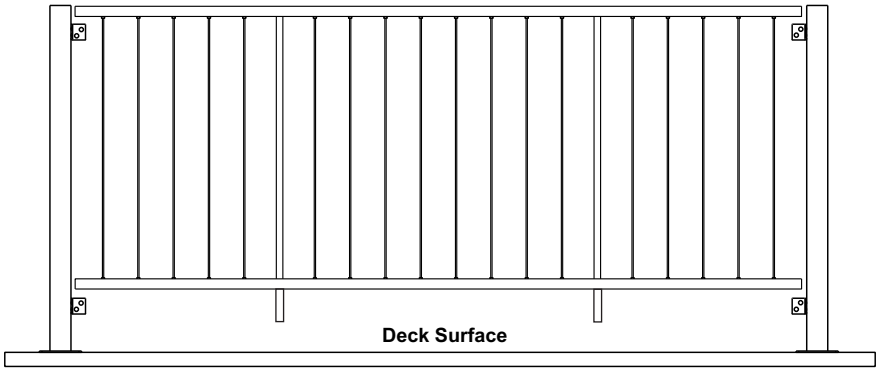
• For installations that span 24” or more Fortress Vertical Cable I-Supports are required.
• For installations with spans up to 6’ one Vertical Support and I-Support is required.
• For installations with spans 6’ to 8’ two Vertical Supports and I-Supports are required
• Position Vertical Support(s) so that they are centered or equally spaced across the span.
• Replace the 8mm Hex Bolt that secures the Vertical Support to the Bottom Rail with the I-Support assembly.
• Hand tighten the I-Support to the Vertical Support and position counter sunk hole so that it accessible.
• Secure I-Support to deck with the included #8 X 1.5” Flat Head Wood Screw.





Install Fortress Vertical Cable System into the Fe[26] UB-05 Brackets

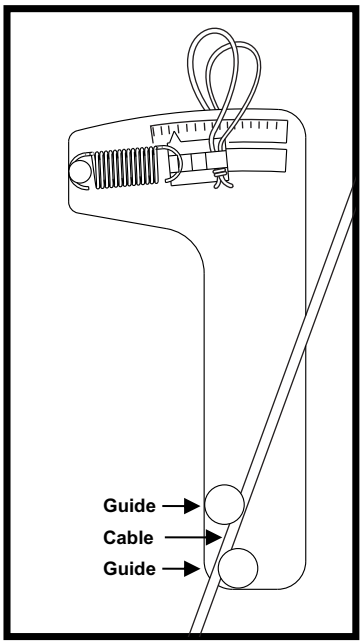
• Insert top and bottom rails into installed brackets.
• Using a 3/16” drill bit pre-drill the top and bottom rails at each UB-05 Bracket. Secure top and bottom rails to UB-05 Brackets with supplied T-25 Thread Cutting Screws. Only one screw is required to secure the rail at each UB-05 bracket.

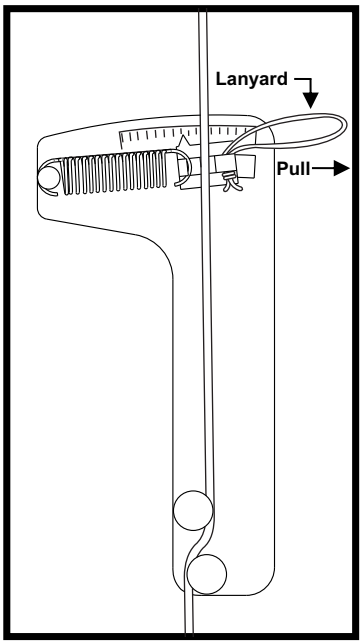


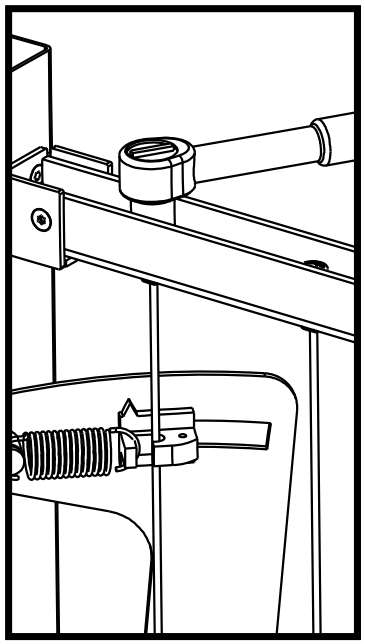
Tightening the Fortress Vertical Cable System

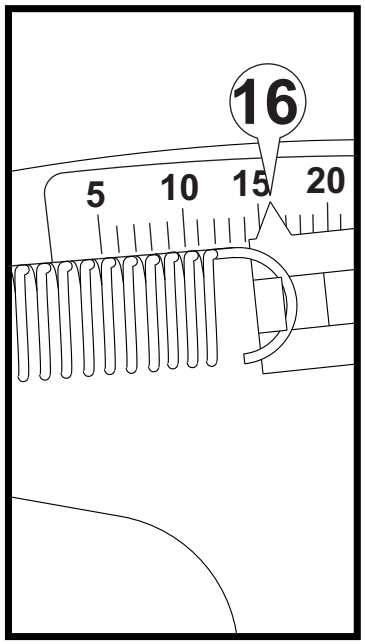
DO NOT Over Tighten Cables

- A properly tensioned Fortress Vertical Cable System cable should be tensioned to **250 lbs** of tension.
- Use a Fortress Cable Tension Gauge to accurately tension the cables.
- See images below for information on how to load cable into the tension gauge.
- Position cable between lower guides.
- Pull the lanyard and extend the spring until the cable is engaged with the hook in the indicator slide.
- The Fortress Vertical Cable System uses 1/8” diameter cable.
- Use a13mm Socket Wrench to tighten the cables in the sequence shown below.
- Tighten cable until the indicator arrow aligns with the 16 on the tension gauge.

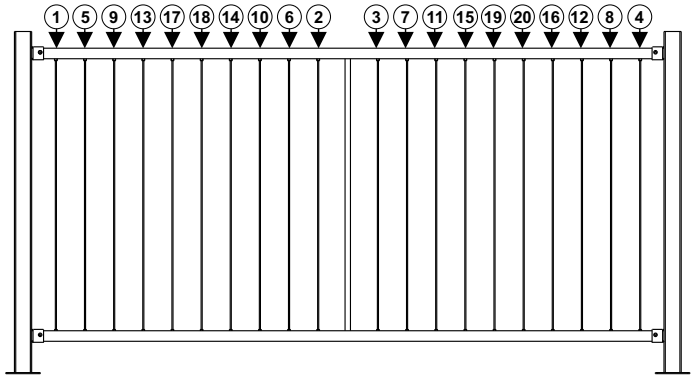




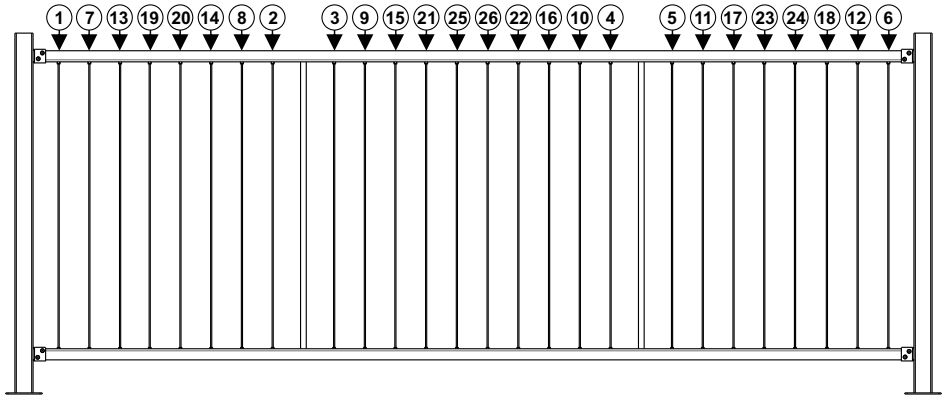




6’ Rail Sequence

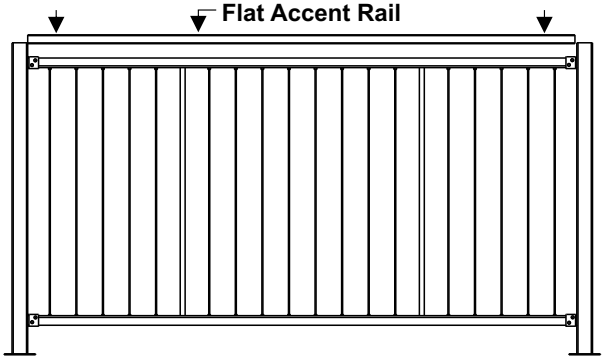


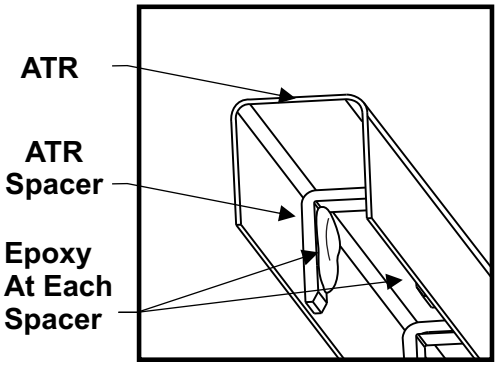
8’ Rail Sequence



Install Flat Accent Top Rail (ATR) - Option 1

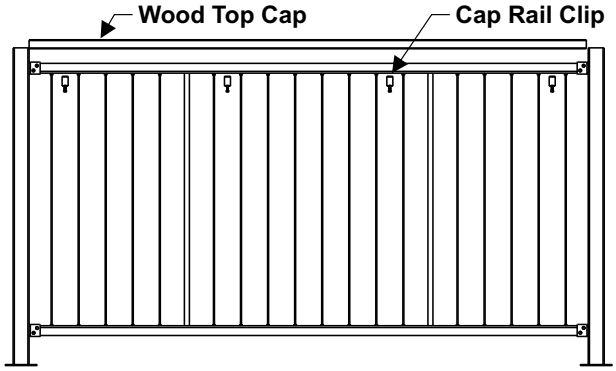
• Measure the distance between posts.
• A minimum of two ATR Spacers are required in order to ensure proper fit of ATR.
• Transfer that measurement to the ATR and cut a equal distance from each end of ATR. Check the fit of ATR.
• File any rough edges from cuts and apply zinc based touch up paint.
• Apply a quarter sized drop of epoxy to the side walls of each ATR Spacer. Follow cure times specified on epoxy packaging.
• Install ATR onto rail and wipe away any excess epoxy with a clean cloth.
• Let epoxy cure. Do not apply any force to installed ATR for 2 hours.

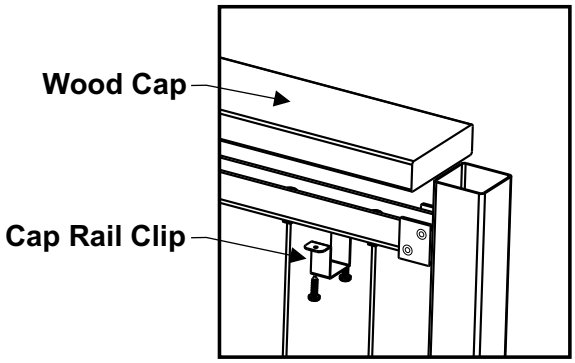




Install Wood Top Cap - Option 2

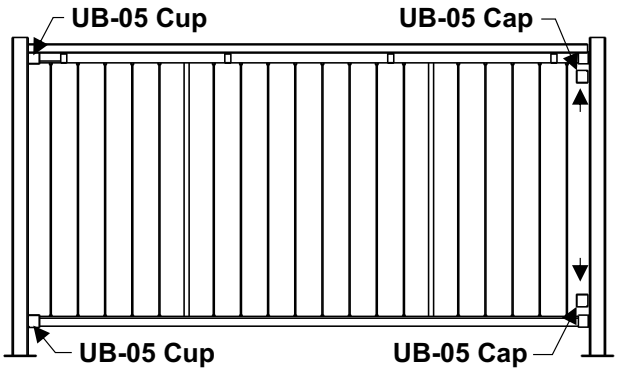
• Use a Wood Top Cap to finish the Top Rail.
• Cut Wood Top Cap to length and secure to Top Rail with Fortress Cap Rail Clips.
• Cap Rail Clips should be equally spaced along the length of Wood Top Cap **(Max Spacing is 28")**.

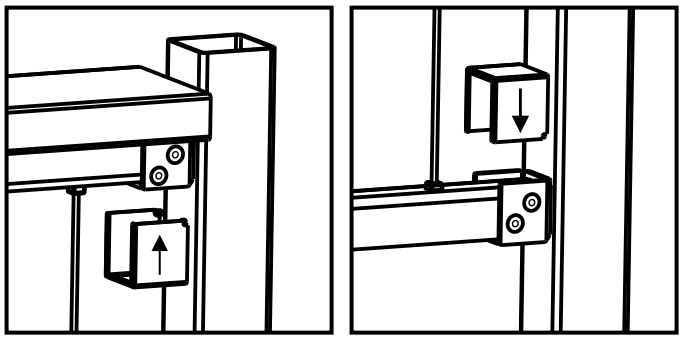




Install UB-05 Caps

• When using a Wood Top Cap and installing the UB-05 Caps on the Top Rail, the Caps should be installed upside down as shown.
• If using a Fortress Flat Accent Rail, UB-05 Caps will not be used on the Top Rail.





REVISION SUMMARY

REVISION #	DATE	PAGES	REVISION
0	06/23/15	N/A	Original Report Issue
1	09/05/19	All	Removed results for 300 lb cable tension per client request