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DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES

Section: 06 63 00 – Plastic Railings

REPORT HOLDER:

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REPORT SUBJECT:

DeckOrators® CXT Railing Systems

- Contemporary
- Colonial
- Graspable
- Classic
- Architectural

1.0 SCOPE OF EVALUATION

1.1 This Research Report addresses compliance with the following Codes:

- 2015 and 2012 *International Building Code®* (IBC)
- 2015 and 2012 *International Residential Code®* (IRC)

NOTE: This report references 2015 Code sections with [2012] Code sections shown in brackets where they differ.

1.2 *DeckOrators® CXT Railing Systems* have been evaluated for the following properties:

- Structural Performance
- Durability
- Surface Burning
- Decay Resistance
- Termite Resistance

1.3 *DeckOrators® CXT Railing Systems* have been evaluated for the following uses:

- Guards are provided as level guards for level walking areas such as decks, balconies, and porches, and as sloped guards for open sides of stairways.

- Guards are intended for exterior use at or near the open sides of elevated walking areas in buildings and walkways, including stairs and ramps, as required by the referenced codes.
- Guardrail systems recognized in this report may be used in One- and Two-Family Dwellings regulated by the IRC and all construction types regulated by the IBC in accordance with IBC Section 1406.3, Exception 2. Guardrails less than 42 inches high are limited to use in One- and Two-Family Dwellings (IRC). See Table 1 for additional restrictions based upon Use and Occupancy classification.

2.0 STATEMENT OF COMPLIANCE

DeckOrators® CXT Railing Systems comply with the Codes listed in Section 1.1, for the properties stated in Section 1.2 and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in Section 6.

3.0 DESCRIPTION

3.1 *DeckOrators® CXT railing systems* are offered in five styles (*Contemporary, Colonial, Graspable, Classic, and Architectural*) and are guardrails (guards) under the definitions of the referenced codes.

3.2 Level guards are provided in rail lengths up to 96 inches between supports and installed height of up to 42 inches. See Table 1 for qualified lengths and configurations.

3.3 Stair guards are provided in rail lengths up to 72 inches measured along the sloping length between supports and an installed height of up to 42 inches at the leading edge of the stair tread or landing. See Table 1 for qualified lengths and configurations.



3.4 *DeckOrators® CXT* railing systems are an assemblage of an extruded wood-plastic composite (WPC) material along with other metal, glass, and plastic parts. The WPC components are produced in three colors: White, Black and Bronze. Guardrail systems include:

3.4.1 Various top rails (see Figures 3, 4, 5, 9, 10, 18, 19);

3.4.1.1 The *Contemporary*, *Colonial*, and *Graspable* top rails are comprised of two parts: a co-extruded WPC inner rail (see Figure 2) combined with one of the following WPC profiles: *Contemporary* (see Figure 3), *Colonial* (see Figure 4), or *Graspable* (see Figure 5).

3.4.1.2 The *Light and Heavy* Architectural top and bottom rails are comprised of two parts: a Classic bottom rail (see Figure 11) and the *Classic Light or Heavy* top rails (see Figure 9 and 10). See also Figures 18 and 19.

3.4.2 Various bottom rails (See Figures 6, 11, 18, and 19);

3.4.3 Vertical Balusters (see Table 2);

3.4.4 Structural supports may be conventional wood framing. Co-extruded WPC post sleeves are used to sleeve a conventional 4x4 wood post. (see Figure 45);

3.4.5 Top and bottom rails are attached directly to structural supports with 304 stainless steel or molded plastic mounting brackets for level and stair applications. See Figures 7, 8, 12-17, and 20-22.

4.0 PERFORMANCE CHARACTERISTICS

4.1 The guardrail system described in this report has demonstrated the capacity to resist the design loadings specified in Chapter 16 of the IBC and Section R301 of the IRC when tested in accordance with ICC-ES AC174 and ASTM D 7032.

4.2 Structural performance has been demonstrated for a temperature range from -20°F to 125°F.

4.3 Materials used are deemed equivalent to preservative treated or naturally durable wood for resistance to weathering effects, decay, and attack from termites. The WPC material used in the guardrail system was evaluated for resistance to Formosan termites.

4.4 The WPC material used in the guardrail system has a flame spread index not exceeding 200 when tested according to ASTM E84.

5.0 INSTALLATION

5.1 *DeckOrators® CXT* Railing Systems must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation.

5.2 The top and bottom rails are attached directly to structural supports utilizing 304 stainless steel or plastic mounting brackets. See Tables 3 – 5 for fastening.

5.3 The top and bottom rails may be attached to conventional wood supports. Conventional wood supports including wood posts are outside the scope of this report.

5.4 4x4 conventional wood posts may be covered by WPC post sleeves, decorative caps, and moldings. See Figure 1.

5.5 Support blocks are installed between the lower rail and the deck surface. Two supports are used for rail lengths up to 6 ft, and three supports are used for rail lengths up to 8 ft (24-inch maximum spacing between supports).

5.6 *Traditional*, *Baroque*, and *Arc* aluminum balusters are secured to the top and bottom rails with stainless steel screws. See Table 5. All remaining balusters are secured to the top and bottom rail via plastic connectors. See Figures 27-28, 31-33, 35-39, and 42.

5.7 The wood in the supporting structure including support posts shall have a specific gravity of 0.50 or greater (Southern Yellow Pine or better) and a minimum thickness to allow full penetration of the bracket mounting screws.



6.0 CONDITIONS OF USE

6.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict, this report governs.

6.2 Guardrail systems recognized in this report may be used in One- and Two-Family Dwellings regulated by the IRC and all construction types regulated by the IBC in accordance with IBC Section 1406.3, Exception 2. Guardrails less than 42 inches high are limited to use in One- and Two-Family Dwellings (IRC). See Table 1 for additional restrictions based upon Use and Occupancy classification.

6.3 Conventional wood supports including support posts for guards are not within the scope of this report and are subject to evaluation and approval by the building official. Supports must satisfy the design load requirements specified in Chapter 16 of the IBC and must provide suitable material for anchorage of the rail brackets (See Section 5.3). Where required by the building official, engineering calculations and details prepared by a licensed design professional shall be provided.

6.4 Compatibility of fasteners and other metallic components with the supporting structure, including chemically-treated wood, is not within the scope of this report.

6.5 Glass used as balusters of guards, regardless of area or height above a walking surface, meets the definition of a hazardous location as defined by Section 2406.4 of the IBC and must be identified by permanent etching as required by Section 2406.3 of the IBC. Each glass baluster must bear the manufacturer's name and/or mark; type of glass (tempered), thickness (5/16"); size classification (U); drop height class (A); and the applicable test standard (ANSI Z97.1-2015 [2009]).

6.6 Guards utilizing glass balusters are not approved for use in wind-borne debris regions as defined by the IBC in accordance with Section 2407.1.4.

6.7 Only those types of fasteners and fastening methods described in this report have been evaluated for installation of *DeckOrators*® CXT railing systems; other methods of attachment are outside the scope of this report.

6.8 Compatibility of supporting construction materials with all fasteners, metal post mount components, and other hardware components is subject to approval by the code official.

6.9 Handrails – the *Graspable* rail system may be used where a handrail is required under the IRC when installed in accordance with R311.7.8 of the IRC and limited to a single guardrail assembly (I.e. no intermediate posts). Top rails including the *Graspable* rail shall not be used as a handrail where required by the IBC.

6.10 *DeckOrators*® CXT Railing Systems are manufactured by UFP Ventures II, Inc. in Prairie Du Chien, Wisconsin under a quality control program with inspections by Intertek.

7.0 SUPPORTING EVIDENCE

7.1 Drawings and installation instructions submitted by the manufacturer

7.2 Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ICC-ES AC174, Acceptance Criteria for Deck Board Span ratings and Guardrail Systems (Guards and Handrails), revised December 2014, with additional testing employing increased test loads that address IBC Section 2407.1.1 for the systems that utilize glass balusters.

7.3 Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ASTM D 7032-10a, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails).

7.4 Reports of testing demonstrating compliance with the performance requirements of ANSI Z97.1-2015 [2009], American National Standard for Safety Glazing Materials Used in Buildings, as required by Section 2406 of the IBC and Section R308 of the IRC.

7.5 Documentation of an Intertek approved quality control system for the manufacturing of products recognized in this report.



8.0 IDENTIFICATION

The WPC guardrail assemblies produced by UFP Ventures II, Inc. identified in this report shall be identified with labeling on the individual components or the packaging and shall include the following:

8.1 Name and/or trademark of manufacturer

8.2 The following statement: "ASTM D 7032 compliant. See CCRR-0171 at www.whdirectory.intertek.com for uses and performance levels.";

8.3 When applicable (see Table 1), the following statement: "For Use in One- and Two-Family Dwellings Only."; and

8.4 The Code Compliance Research Report mark and number (CCRR-0171):



9.0 OTHER CODES

This section is not applicable.

10.0 CODE COMPLIANCE RESEARCH REPORT USE

10.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

10.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

10.3 Reference to the <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.

This Code Compliance Research Report ("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, and the Client shall not use the Report in a misleading manner. Client further agrees and understands that reliance upon the Report is limited to the representations made therein. The Report is not an endorsement or recommendation for use of the subject and/or product described herein. This Report is not the Intertek Listing Report covering the subject product and utilized for Intertek Certification and this Report does not represent authorization for the use of any Intertek certification marks. 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.





TABLE 1 - Qualified Guardrail Systems and Use Categories

Railing System Dimensions ¹	Guardrail Type	Code Occupancy Classification
96 in by 42 in <i>Contemporary</i> 96 in by 42 in <i>Colonial</i> 72 in by 42 in <i>Graspable</i> 72 in by 42 in <i>Light Architectural</i> 96 in by 42 in <i>Heavy Architectural</i> 72 in by 42 in <i>Light Classic</i>	Level	IBC - All Use Groups And IRC – One- and Two- Family Dwellings
72 in by 42 in <i>Contemporary</i> 72 in by 42 in <i>Colonial</i> 71 in by 42 in <i>Graspable</i> 68.5 in by 42 in <i>Light Architectural</i> 67 in by 42 in <i>Light Classic</i> 94 in by 42 in <i>Heavy Architectural</i> 92.5 in x 42 in <i>Contemporary</i>	Stair	
96 in by 36 in <i>Contemporary</i> 96 in by 36 in <i>Colonial</i> 72 in by 36 in <i>Graspable</i> 72 in by 36 in <i>Light Classic</i> 96 in by 42 in <i>Heavy Classic</i>	Level	IRC – One- and Two- Family Dwellings Only
72 in by 36 in <i>Contemporary</i> 72 in by 36 in <i>Colonial</i> 72 in by 36 in <i>Graspable</i> 68.5 in by 36 in <i>Light Classic</i> 94 in by 42 in <i>Heavy Classic</i>	Stair	

¹Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in the referenced Code Occupancy Classification. Guardrail lengths are actual railing lengths, i.e. clear space between supports for level rails and sloping length of rail between supports for stair rails.



TABLE 2 – Baluster Table

Baluster Style	Guardrail System											
	42 in Contemporary	36 in Contemporary	42 in Colonial	36 in Colonial	42 in Graspable	36 in Graspable	36 in Light Classic	42 in Light Classic	36 in Heavy Classic	42 in Heavy Classic	42 in Light Architectural	42 in Heavy Architectural
3/4 in Diameter Round (Classic) Aluminum Baluster (See Figure 34)	X	X	X	X	X	X	X		X		X	X
1-1/4 in Square, Hollow Ribbed, WPC Baluster (See Figure 30)	X	X	X	X	X	X	X		X		X	X
1-1/4 in Square, Classic Hollow, Co-Extruded WPC Baluster (See Figure 29)	X	X	X	X	X	X	X	X	X	X	X	X
5/16 in Thick by 4 in Wide Tempered Glass (Frontier) Baluster (See Figure 40)		X		X		X	X		X		X	X
5/16 in Thick Tempered Glass (Contoured) Baluster (See Figure 41)		X		X		X						
3/4 in Square (Estate) Aluminum Baluster (See Figure 26)		X		X		X	X		X		X	X
Traditional Aluminum Baluster (See Figure 25)											X	X
Baroque Aluminum Baluster (See Figure 23)											X	X
Arc Aluminum Baluster (See Figure 24)											X	X

**TABLE 3 - Fastening Schedule for *Contemporary, Colonial, and Graspable* Guard Systems**

Connection ¹	Fastener
Inner Rail to Top and Bottom Rail (Level)*	Four #10-12 x 1-1/2 in pan-head stainless steel screws equally spaced along the length of the rail
Level Rail Bracket to Post*	Two #10-12 x 2 in stainless steel screws
Level Rail Bracket to Rail*	Four #8-14 x 1 in stainless steel screws
All Non-Glass Baluster Connectors (Level / Stair) to Rail	Per connector, one #8-9 x 1-1/2 in stainless steel screw
Glass Baluster Connector to Rail (Level)	Per connector, two #8-9 x 1-1/2 in stainless steel screws
Inner Rail to Top and Bottom Rail (Stair)*	Three #10-12 x 1-1/2 in pan-head, stainless steel screws equally spaced along the length of the rail
Stair Rail Bracket to Post*	Two #10-12 x 2 in stainless steel screws
Stair Rail Bracket to Rail*	Four #8-14 x 1 in stainless steel screws
Two-Piece Glass Baluster Connection for Stair Rails (Level Connector and Stair Adaptor) to Rail	Three total fasteners: Two #8-9 x 1-1/2 in stainless steel screws – one screw penetrates rail and each of the two pieces of the connection; the other screw penetrates rail and stair adaptor One #8-8 x 4 in stainless steel screw – penetrates rail and each of the two pieces of the connection
Support Block Connector	One #8-9 x 1-1/2 in stainless steel screw

* 1/8 in diameter drill bit is used to pre-drill

¹ Rail connections use stainless steel brackets. See Figures 7 and 8.

TABLE 4 - Fastening Schedule for *Classic* Guard Systems

Connection ¹	Fastener
Top / Bottom Rail Bracket to Post (Level)	Four #8-15 x 2" (0.113 in minor diameter) pan-head, stainless steel screws
Top Rail Bracket to Rail (Level) ¹	Four #10-16 x 3/4" (0.130 in minor diameter) pan-head, stainless steel screws
Bottom Rail Bracket to Rail (Level & Stair)	Two #10-16 x 3/4" (0.130 in minor diameter) pan-head, stainless steel screws
Top / Bottom Rail Bracket to Post (Stair)	Four #8-15 x 2" (0.113 in minor diameter) trim-head, stainless steel screws
Top Rail Bracket to Rail (Stair)	Two #10-18 x 3/4" (0.111 in minor diameter) pan-head, self-starting, stainless steel screws
Baluster to Top / Bottom Rail and Foot Block to Bottom Rail	Baluster connector secured to rail with one #8-18 x 1-1/4" (0.113 in minor diameter) square-drive, trim-head, self-starting stainless steel

¹Rail connections use molded plastic brackets. See Figures 12-17.

TABLE 5 - Fastening Schedule for *Architectural Guard Systems*

Connection ¹	Fastener
Top / Bottom Rail Bracket to Post (Level)	Six #8-15 x 2" (0.113 in minor diameter) pan-head, stainless steel screws
Top / Bottom Rail Bracket to Rail (Level)	Four #10-16 x 3/4" (0.130 in minor diameter) pan-head, stainless steel screws
Top / Bottom Rail Bracket to Post (Stair)	Four #8-15 x 2" (0.113 in minor diameter) trim-head, stainless steel screws
Top Rail Bracket to Rail (Stair)	Four #10-18 x 3/4" (0.111 in minor diameter) pancake-head, self-starting, stainless steel screws
Baluster to Top / Bottom Rail and Foot Block to Bottom Rail	Baluster connector secured to rail with one #8-18 x 1-1/4" (0.113 in minor diameter) square-drive, trim-head, self-starting stainless steel
Aluminum Balusters to Top / Bottom Rail	Two #8 x 1.5" long stainless steel screws with a color match head
Connection of Two-Piece Upper and Lower Rails	One #8-15 x 2" (0.113 in minor diameter) square-drive, pan-head, stainless steel screw located 2 ft from each end

¹ Rail connections use molded plastic brackets. See Figures 20-22.

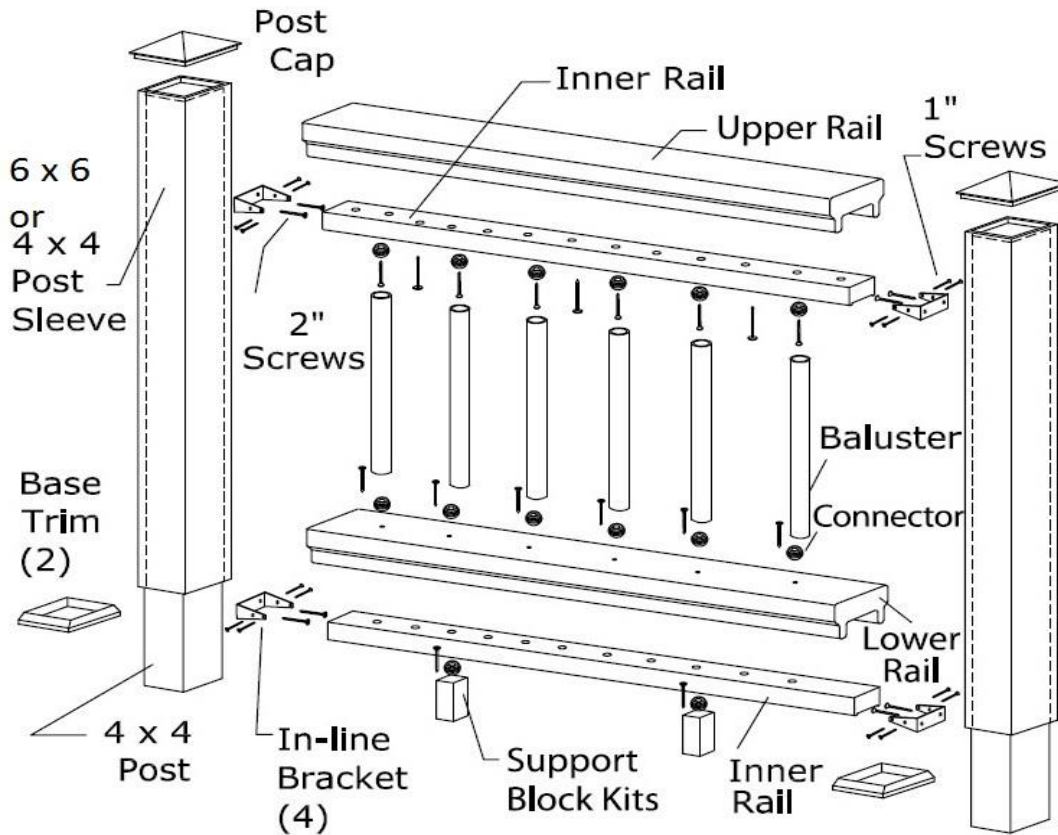


FIGURE 1 – CXT Railing Assembly (6 ft Length Shown) for Contemporary, Colonial and Graspable Systems

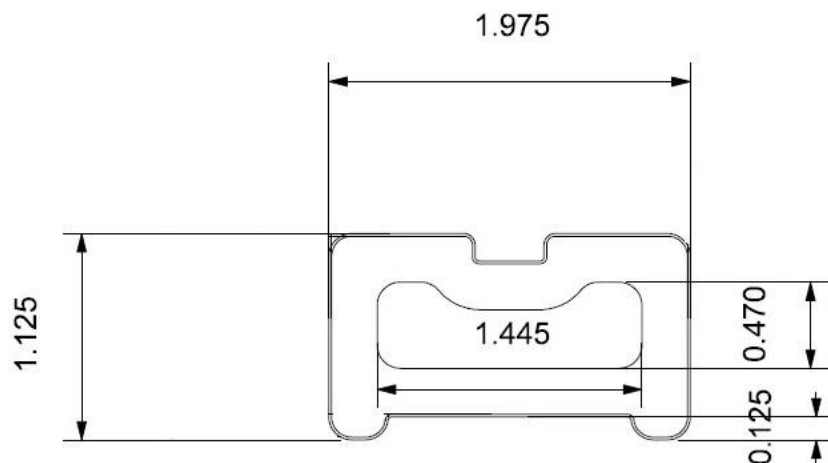


FIGURE 2 – CXT Inner Rail Profile for Contemporary, Colonial, and Graspable Systems Only

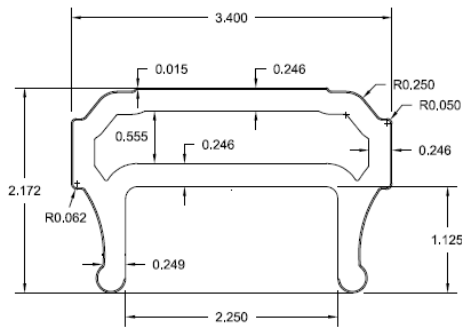


FIGURE 3 – Contemporary Top Rail Profile

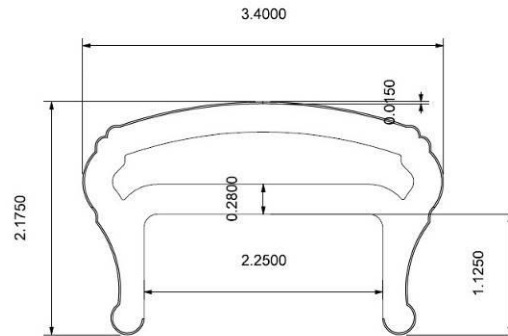


FIGURE 4 – Colonial Top Rail Profile

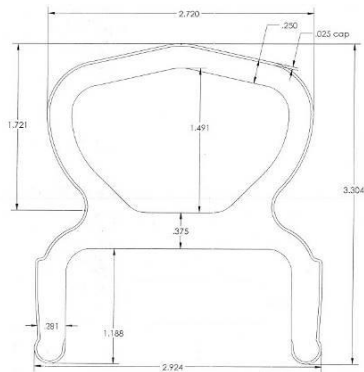


FIGURE 5 – Graspable Top Rail Profile

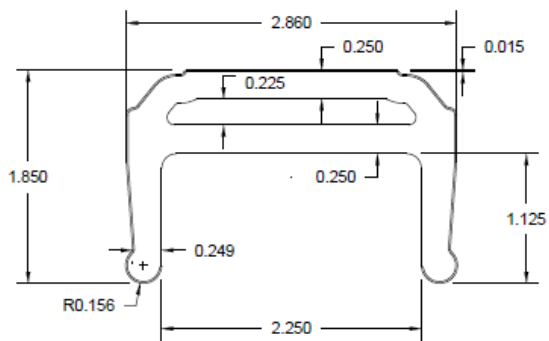


FIGURE 6 – Contemporary, Colonial and Graspable Bottom Rail Profile

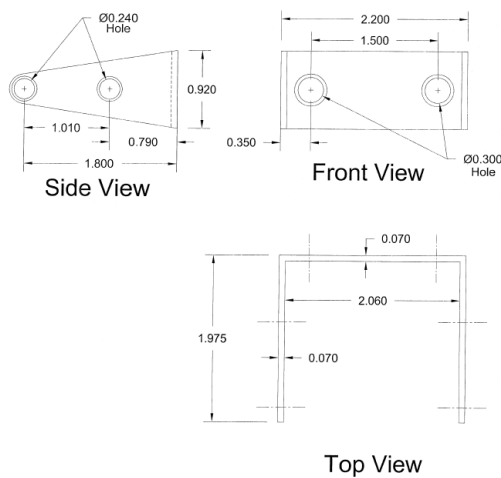


FIGURE 7 – Metal "U" Bracket – Level

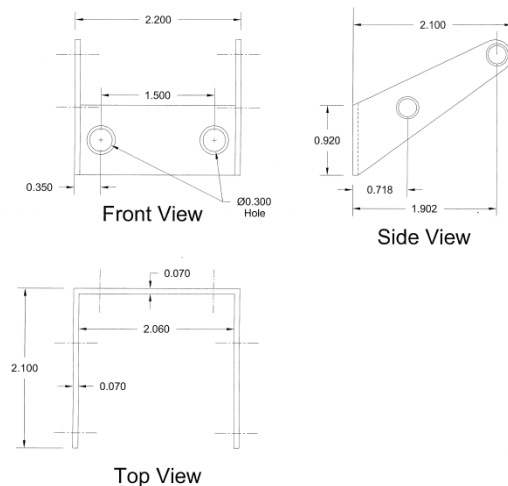


FIGURE 8 – Metal "U" Bracket – Stair

Contemporary, Colonial and Graspable Rail Brackets

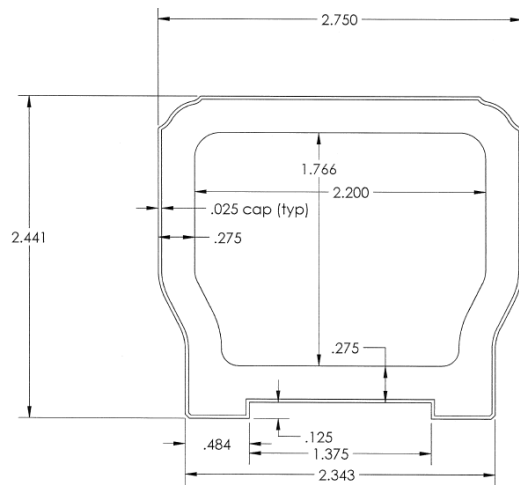


FIGURE 9 – Classic 6' Light Top Rail Profile

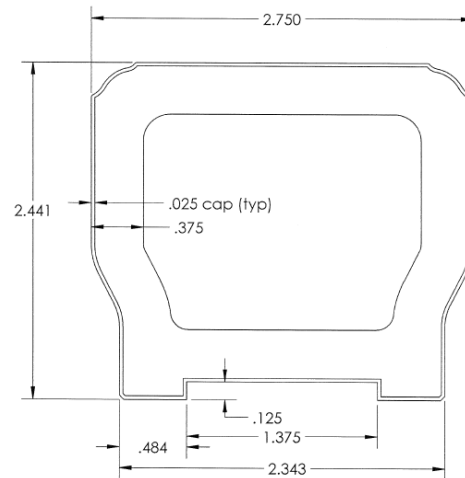


FIGURE 10 – Classic 8' Heavy Top Rail Profile

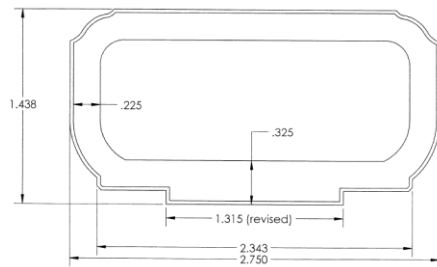


FIGURE 11 - Classic Bottom Rail

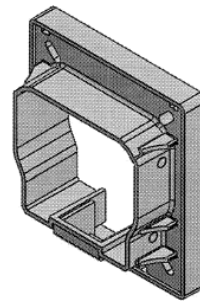


FIGURE 12 - Classic Level Top Rail Bracket

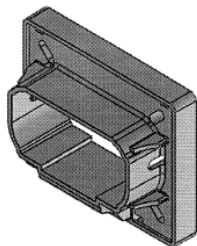


FIGURE 13 - Classic Level Bottom Rail Bracket

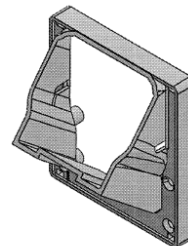
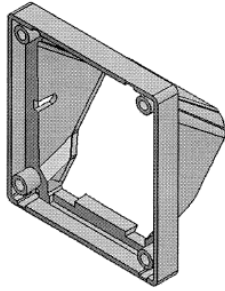
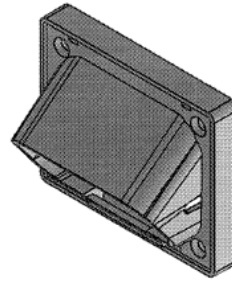
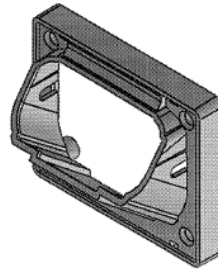
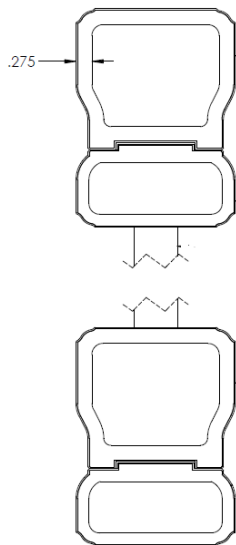
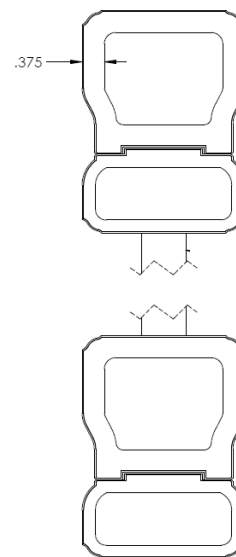


FIGURE 14 - Classic Lower Top Stair Rail Bracket

FIGURE 15 - *Classic* Upper Top Stair Rail BracketFIGURE 16 - *Classic* Upper Bottom Stair Rail BracketFIGURE 17 - *Classic* Lower Bottom Stair Rail BracketFIGURE 18 – *Architectural* Light GuardrailFIGURE 19 – *Architectural* Heavy Guardrail

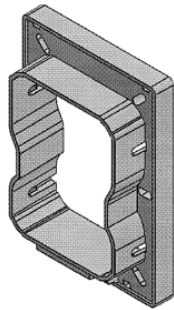


FIGURE 20 – Architectural Level Top and Bottom Rail Bracket

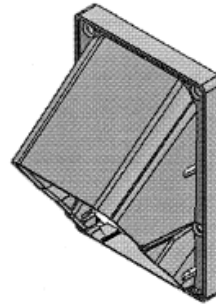


FIGURE 21 – Architectural Upper Top Stair Rail Bracket

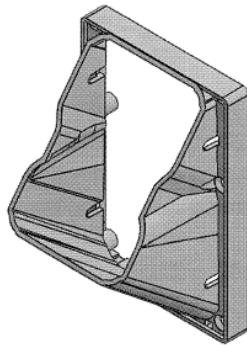


FIGURE 22 – Architectural Lower Bottom Stair Rail Bracket

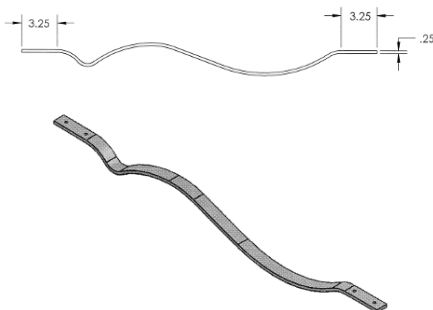


FIGURE 23 – Baroque Baluster

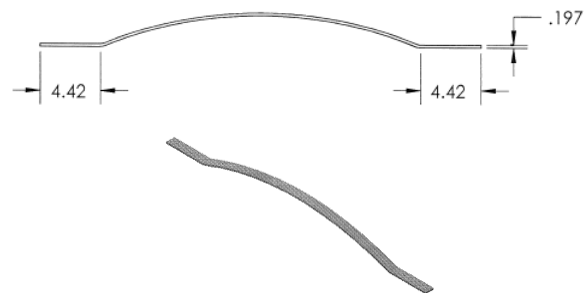


FIGURE 24 – Arc Baluster



FIGURE 25 – Traditional Aluminum Baluster

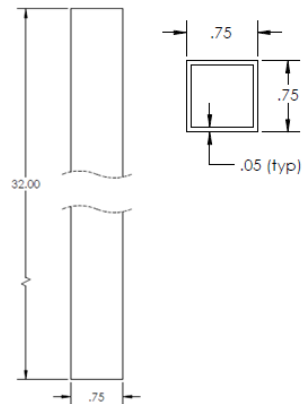


FIGURE 26 – Square (Estate) Baluster

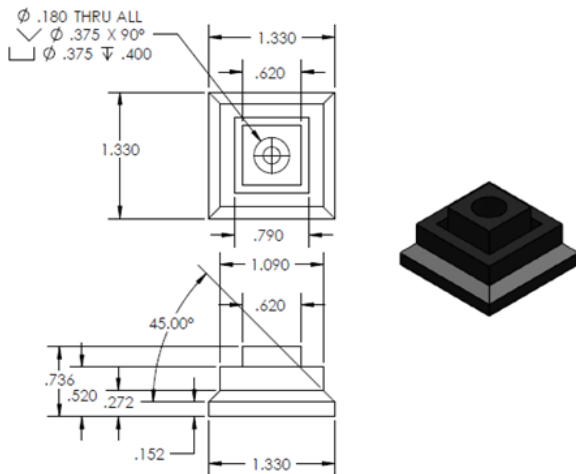


FIGURE 27 – Square Baluster (Estate) Connector (Level)

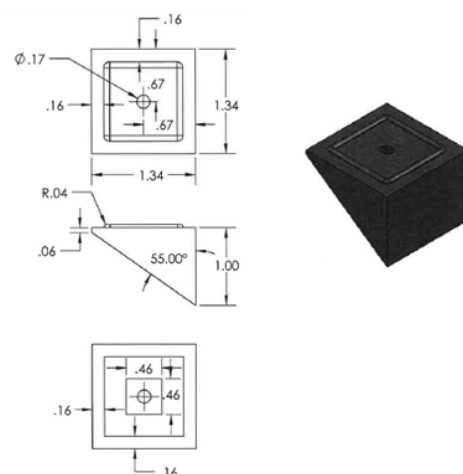


FIGURE 28 – Square Baluster (Estate) Connector Adaptor (Stair)

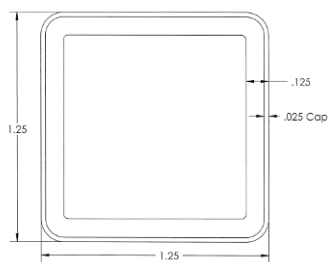


FIGURE 29 – Hollow Classic WPC Co-Extruded Baluster

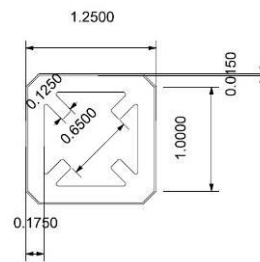


FIGURE 30 – Hollow Ribbed Co-Extruded WPC Baluster

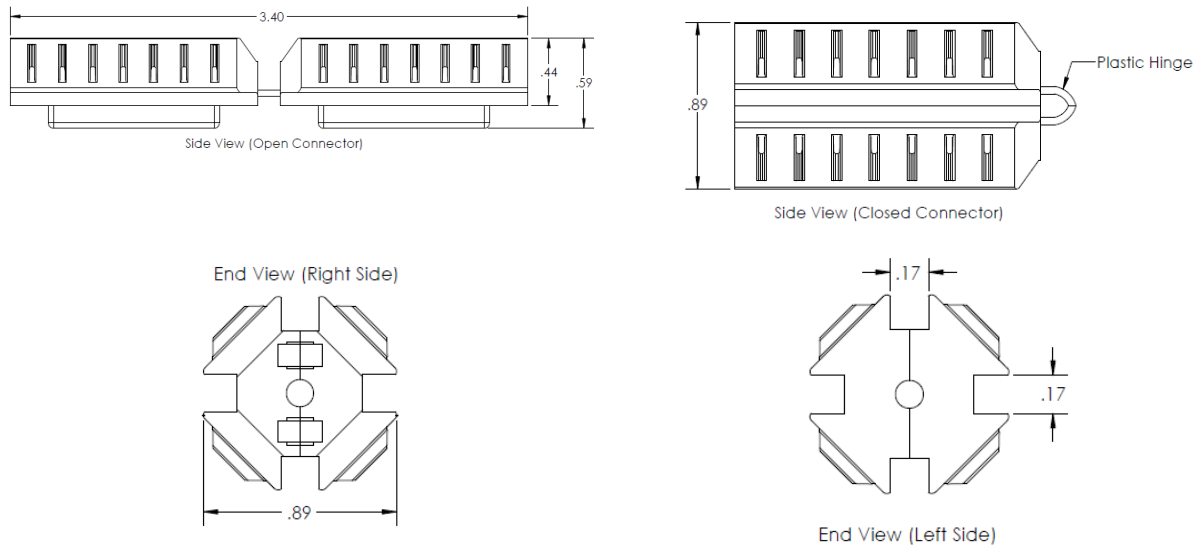


Figure 31 – Alternate CXT Connector

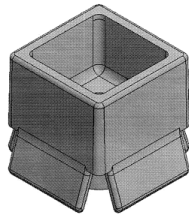


FIGURE 32 – Hollow WPC Baluster Connector

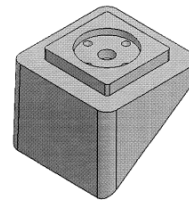


FIGURE 33 – Hollow WPC Baluster Connector Stair Adaptor

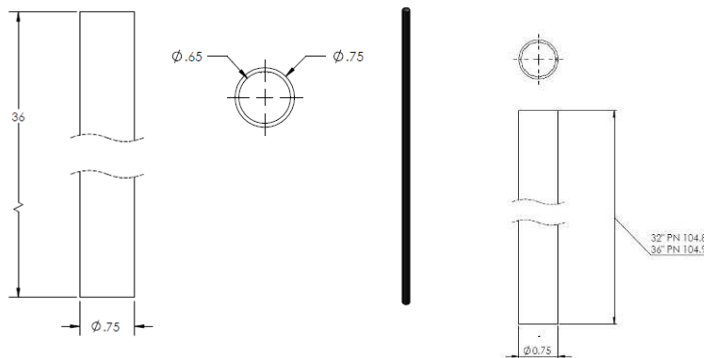


FIGURE 34 – Round and Splined *Classic* Balusters

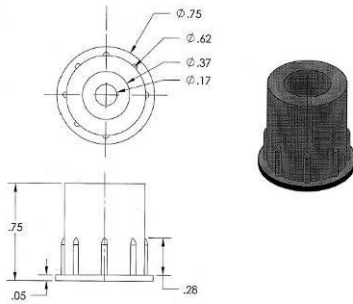


FIGURE 35 – Round (*Classic*) Baluster Connector

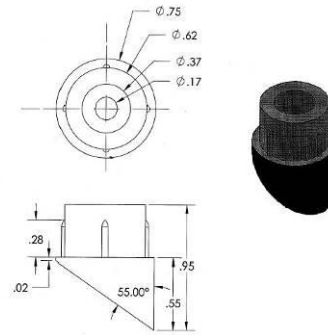


FIGURE 36 – Round (*Classic*) Baluster Connector (Stair)

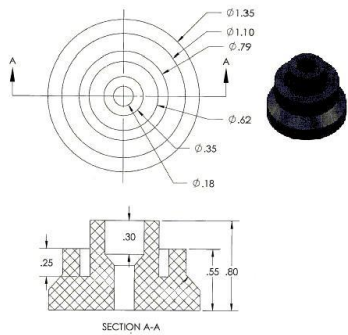


FIGURE 37 – Round (*Designer*) Baluster Connector

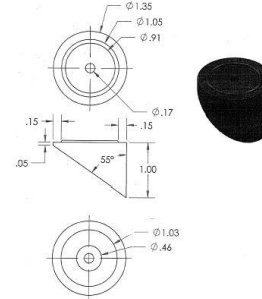


FIGURE 38 – Round (*Designer*) Baluster Connector Adaptor (Stair)

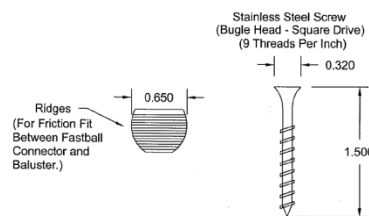


FIGURE 39 – *FastBall™* Baluster Connector

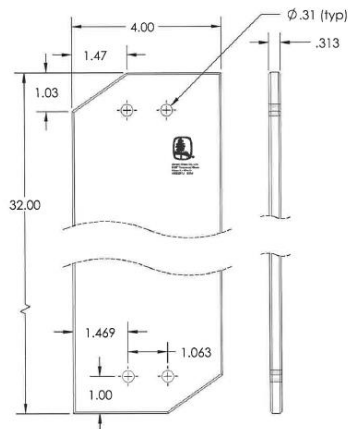


FIGURE 40 – Glass Baluster (Frontier)

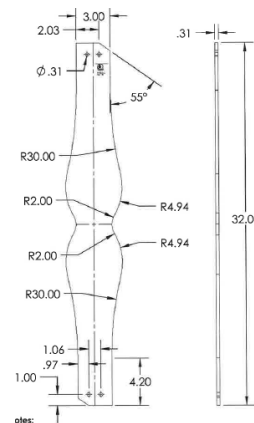


FIGURE 41 – Glass Baluster (Contoured)

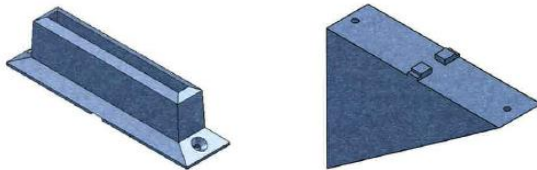


FIGURE 42 – Glass Baluster Connector, Level and Stair Adaptor (Frontier)

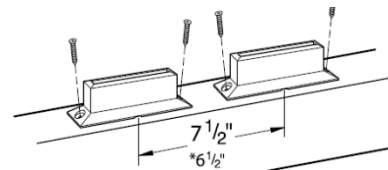


FIGURE 43 – Assembly of Glass Baluster Connections used in Level Railings

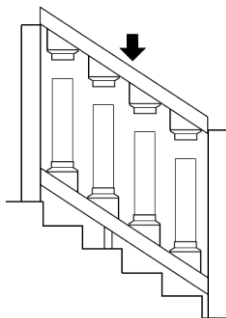


FIGURE 44 – Assembly of Stair Railing System with Glass Balusters

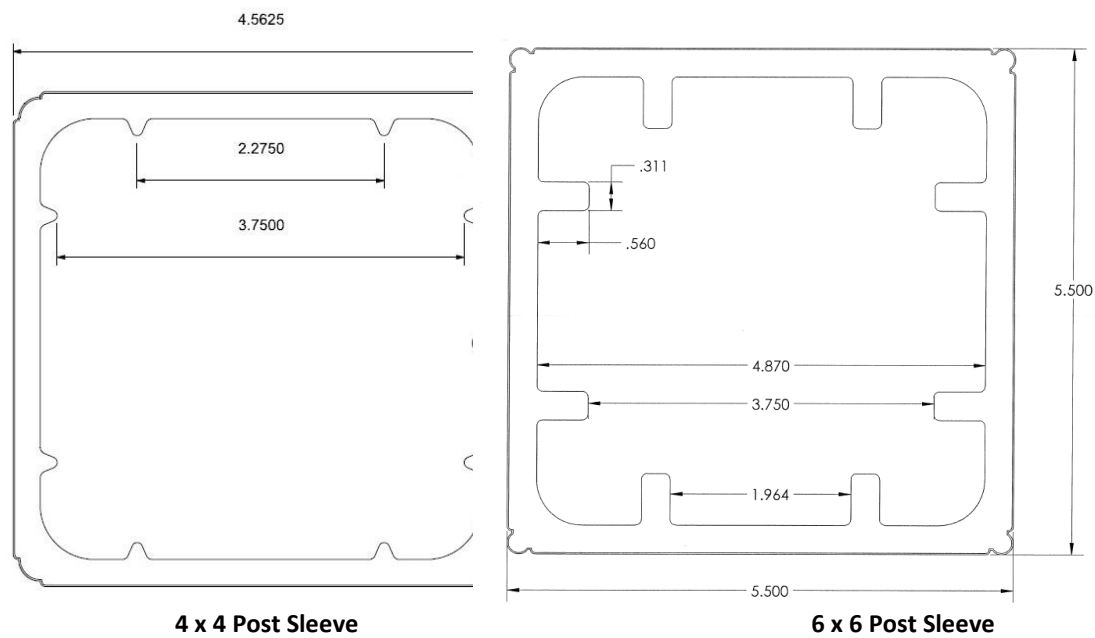


FIGURE 45 – Post Sleeves