Code Compliance Research Report
CCRR-0221

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DIVISION: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES
Section: 06 63 00 – Plastic Railings

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REPORT SUBJECT:
Performance Railing Systems

1.0 SCOPE OF EVALUATION

This research report addresses compliance with the following Codes:

- 2012 International Building Code (IBC)
- 2012 International Residential Code (IRC)

The products described in this report have been evaluated for the following properties:

- Structural Performance
- Surface Burning
- Material Properties

2.0 USES

2.1. Gossen Corporation's *Performance Railing* systems are guards and guardrails under the definitions of the referenced codes. They are intended for use at or near the open sides of elevated walking areas of buildings and walkways as required by the referenced codes.

2.2. Guard systems are provided as level guards for level walking areas such as decks, balconies, porches, and sloped guards for open sides of stairways. Level guards are provided with rail lengths up to 96" and stair guards with rail lengths up to 70-1/2" with a maximum installed height of 42". See Table 1.

3.0 DESCRIPTION

3.1. Materials and Processes - *Performance Railing* systems are co-extruded (capped) cellular polyvinyl chloride (PVC) with a polyvinylidene fluoride (PVDF) capstock produced in the following colors: London Gray, Tuscan Cherry, Moroccan Cheddar, and Spanish Walnut.

3.2. The *Performance Railing* contoured PVC top rail profile has overall dimensions of 3.50" wide by 2.25" high. The 6005-T5 aluminum top sub rail profile has overall dimensions of 1.56" wide by 1.13" high. The inverted U-shape PVC bottom rail profile is 2.38" wide by 2.50" high. The solid PVC pickets are 1.25" square. See Figures 1 through 6.

3.3. Extruded 6063-T5 aluminum stiffeners provide reinforcement for the top and bottom rails. The stiffeners are 24" long and are centered lengthwise in the rails. The U-shaped top rail stiffener is 1.00" wide by 0.63" high, and the flat bottom rail stiffener is 1.25" wide with a 0.06" thickness. See Figures 7 and 8.

3.4. The 5.25" by 5.25" wood-plastic composite (WPC) post sleeves are installed over 4x4 conventional wood posts, Conventional wood support posts are not within the scope of this evaluation.

4.0 PERFORMANCE CHARACTERISTICS

4.1. The *Performance Railing* systems described in this report have demonstrated the capacity to resist the design loadings specified in Chapter 16 of the IBC, and Section R301 of IRC, when tested in accordance with ICC-ES AC174.

4.2. Materials used for the *Performance Railing* systems have a flame spread index less than 200 when tested in accordance with ASTM E 84.

4.3. Materials are deemed equivalent to preservative treated or naturally durable wood for resistance to weathering effects, attack from termites, and fungus decay.

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

5.0 INSTALLATION

Installation shall be in accordance with the manufacturer's installation instructions and this report. Where differences occur between this report and the manufacturer's installation instructions, this report shall govern.

5.1. Railing assemblies consist of top and bottom PVC rails with aluminum reinforcements. Balusters are attached to the aluminum top sub rail and PVC bottom rail with stainless steel screws. The U-shaped aluminum top rail stiffener is placed over the center of the aluminum top sub rail, and the PVC top rail is secured to the top sub rail with stainless steel screws. The aluminum bottom rail stiffener is secured to the PVC bottom rail with a stainless steel screw.

5.2. Railings are secured to WPC sleeved 4x4 wood posts with powder coated stainless steel brackets and stainless steel screws. The wood in the supporting structure including support posts and blocking shall have specific gravity of 0.50 or greater (Southern Yellow Pine or better). Rail attachment shall be in accordance with Table 2. See Figures 9 through 11.

5.2.1. Wood-Plastic Composite (WPC) post sleeves installed over wood support posts require a 2.25" wide by 0.75" thick by 6" long preservative treated wood block between the inside of the post sleeve and the support post at the top rail connection. See Figure 11.

5.2.2. All wood in the supporting structure required for anchorage of rail brackets including posts and blocking shall be preservative treated or naturally durable wood.

6.0 SUPPORTING EVIDENCE

6.1. Manufacturer's drawings and installation instructions.

6.2. Reports of testing demonstrating compliance with the performance requirements of ICC-ES AC174, *Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails), approved January 2012*.

6.3. Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ASTM D 7032-08.

6.4. A quality control manual in accordance with ICC-ES AC10, Acceptance Criteria for Quality Documentation, dated June 2014.

7.0 CONDITIONS OF USE

The *Performance Railing* guard assemblies identified in this report are deemed to comply with the intent of the provisions of the referenced building codes subject to the following conditions.

7.1. Guards recognized in this report are limited to exterior use in on and two family dwellings where wood is permitted in accordance with Section 1406.3 of the IBC and in One- and Two-Family Dwellings regulated by the IRC.

7.2. Conventional wood supports for guards, including 4x4 posts and framing, 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. Where required by the building official, engineering calculations and details shall be provided.

7.3. Compatibility of the supporting construction materials with all fasteners and other hardware components are subject to approval by the code official.

7.4. Only those types of fasteners and fastening methods described in this report have been evaluated for the installation of the *Performance Railing* systems; other methods of attachment are outside the scope of this report.

7.5. All products are manufactured in Milwaukee, Wisconsin by Gossen Corporation, in accordance with the manufacturer's approved quality control system with inspections by Architectural Testing (IAS AA-676).

8.0 IDENTIFICATION

The guard assemblies produced by Gossen Corporation described in this Research Report are identified by a marking bearing the report holder's name (Gossen Corporation), the Intertek Mark, the Code Compliance Research Report number (CCRR-0221) and the following statement: "See CCRR-0221 at https://whdirectory.intertek.com for uses and performance levels." The label shall also include the phrase "For Use in One- and Two-Family Dwellings Only".

CODE COMPLIANCE
Intertek
CCRR-0221

9.0 CODE COMPLIANCE RESEARCH REPORT USE

9.1. 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.

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

9.3. Reference to the Intertek website address at https://whdirectory.intertek.com is recommended to ascertain the current version and status of this report.

Table 1 - *Performance Railing* Guardrail Systems and Code Occupancy Classification

Guardrail System Dimension (1)	Guardrail Type	Baluster	Code Occupancy Classification
96” by 42”	Level / In-Line Application	1-1/4” Square, Cellular PVC Picket	The use of this product shall be limited to exterior use as a guard system for balconies and porches for one- and two-family dwellings of Type V-B (IBC) construction and structures constructed in accordance with the IRC.
70-1/2” by 42”	Stair		

(1) Guardrails are qualified up to and including the listed maximum guardrail system dimensions for use in the reference 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 - Fastener Schedule

Connection	Fastener
Top Rail Bracket to Post (Level)	Two #10-12 x 2-1/4" (0.115” minor diameter) pan-head, square drive, stainless steel screws
Top Rail Bracket to Post (Stair)	Two #10-12 x 3" (0.130” minor diameter) pan-head, square drive, stainless steel screws
Bottom Rail Bracket to Post	One 1/4"-10 x 2" (0.176” minor diameter) pan head, square drive, stainless steel screw
Top Rail Bracket to Sub-Rail	Two #10-16 x 1/2" (0.135” minor diameter) pan-head, square drive, stainless steel screws
Bottom Rail Bracket to Rail	One #10-16 x 1/2" (0.135” minor diameter) pan-head, square drive, stainless steel screw
Bottom Rail Bracket to Rail to Baluster	One #10-8 x 1-1/2" (0.110” minor diameter) trim-head, square drive, stainless steel screw
Baluster to Bottom Rail / Sub-Rail	Two #10-8 x 1-1/2" (0.110” minor diameter) trim-head, square drive, stainless steel screws (one screw located at each end of baluster)
Sub-Rail to Top Rail (Level)	Two #10-8 x 1-1/2" (0.110” minor diameter) trim-head, square drive, stainless steel screws (one screw located approximately 11 in from each end of rail)
Sub-Rail to Top Rail (Stair)	Three #10-8 x 1-1/2" (0.110” minor diameter) trim-head, square drive, stainless steel screws (one screw located approximately 11 in from each end of rail and at mid-span of rail)
Bottom Rail Stiffener to Rail	One #10-16 x 1/2" (0.135” minor diameter) pan-head, square drive, stainless steel screw

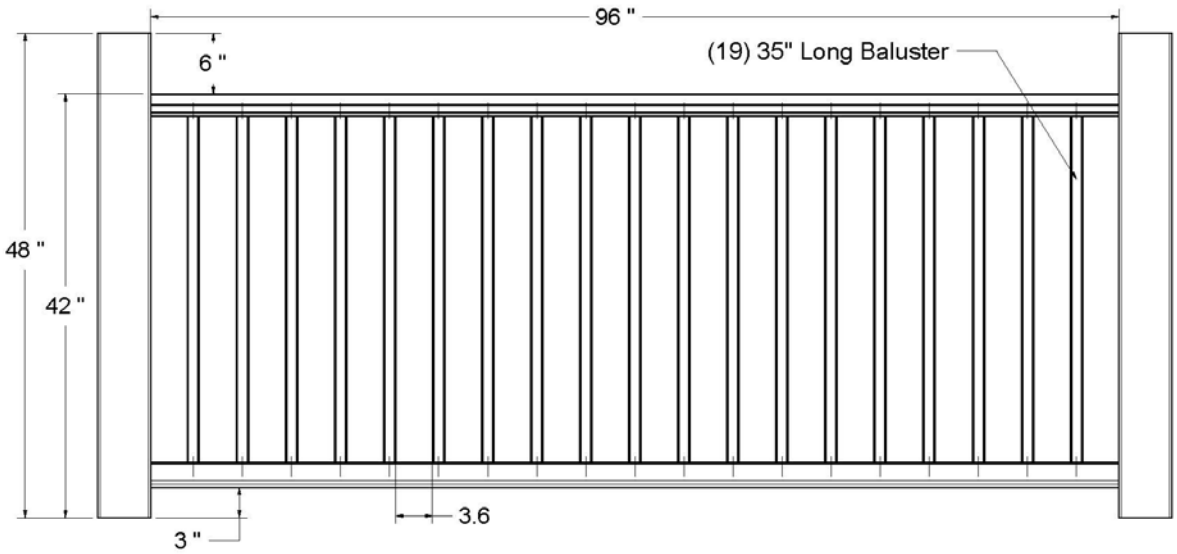

Figure 1 - *Performance Railing* - Level Assembly

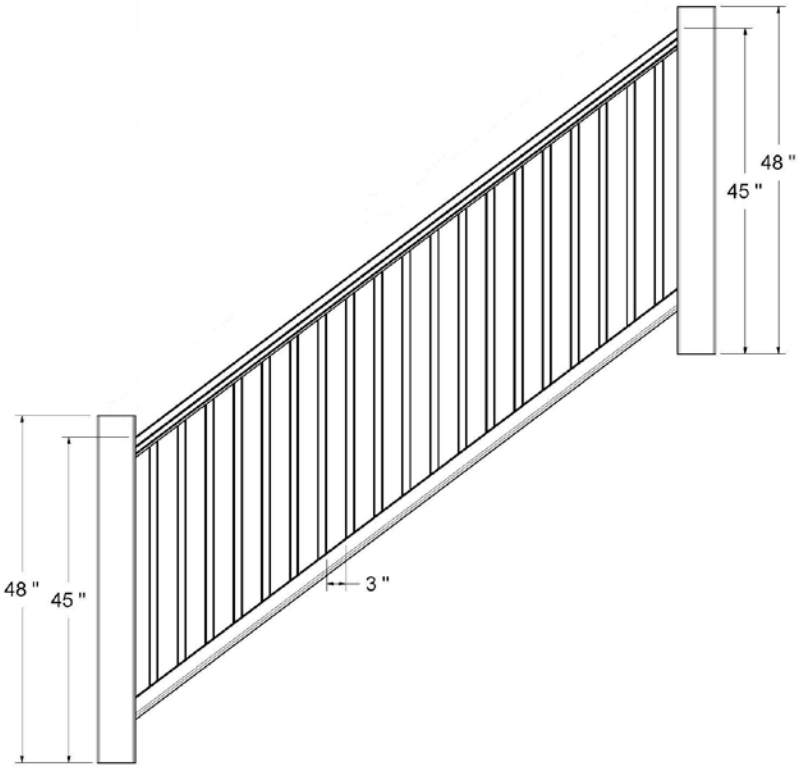

Figure 2 - *Performance Railing* - Stair Assembly

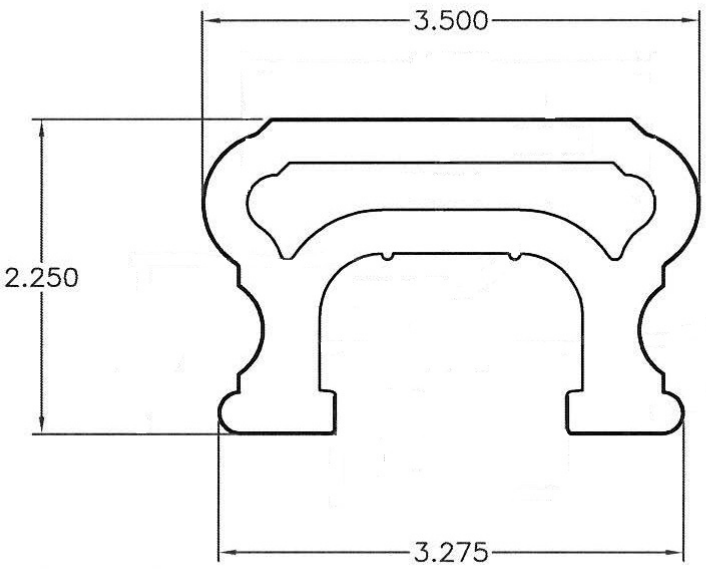

Figure 3 - Cellular PVC Contoured Top Rail Profile

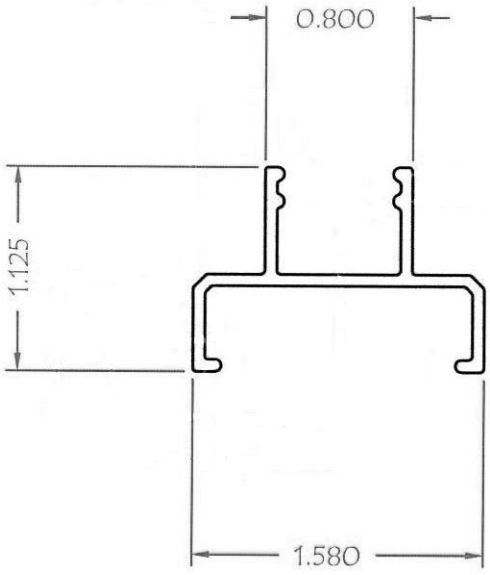

Figure 4 - Aluminum Top Sub Rail Profile

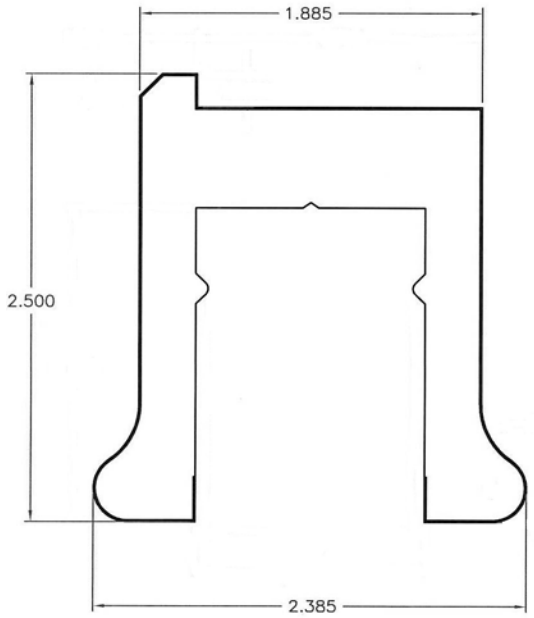

Figure 5 - Cellular PVC Bottom Rail Profile

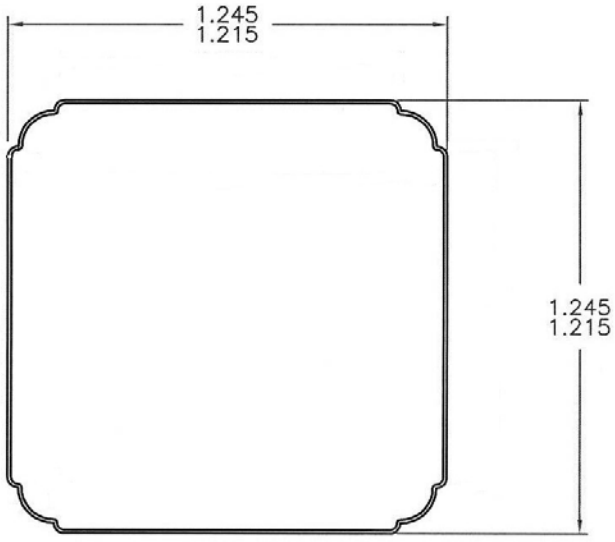

Figure 6 - Cellular PVC Picket Profile

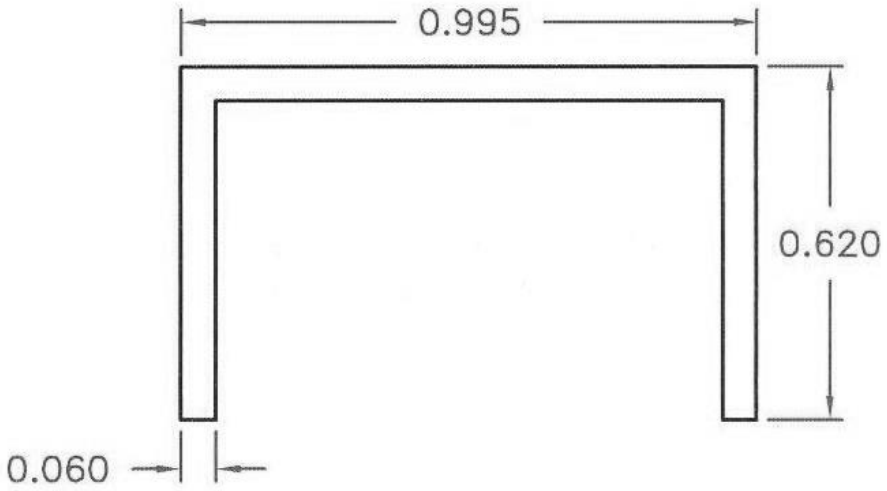

Figure 7 - Aluminum 'U'-shaped Top Rail Stiffener Profile

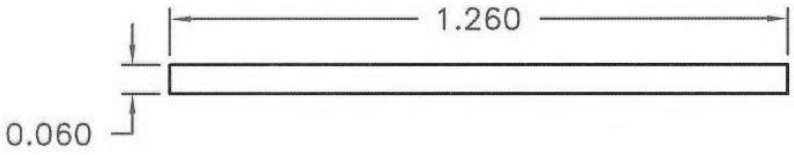

Figure 8 - Aluminum Flat Bottom Rail Stiffener Profile

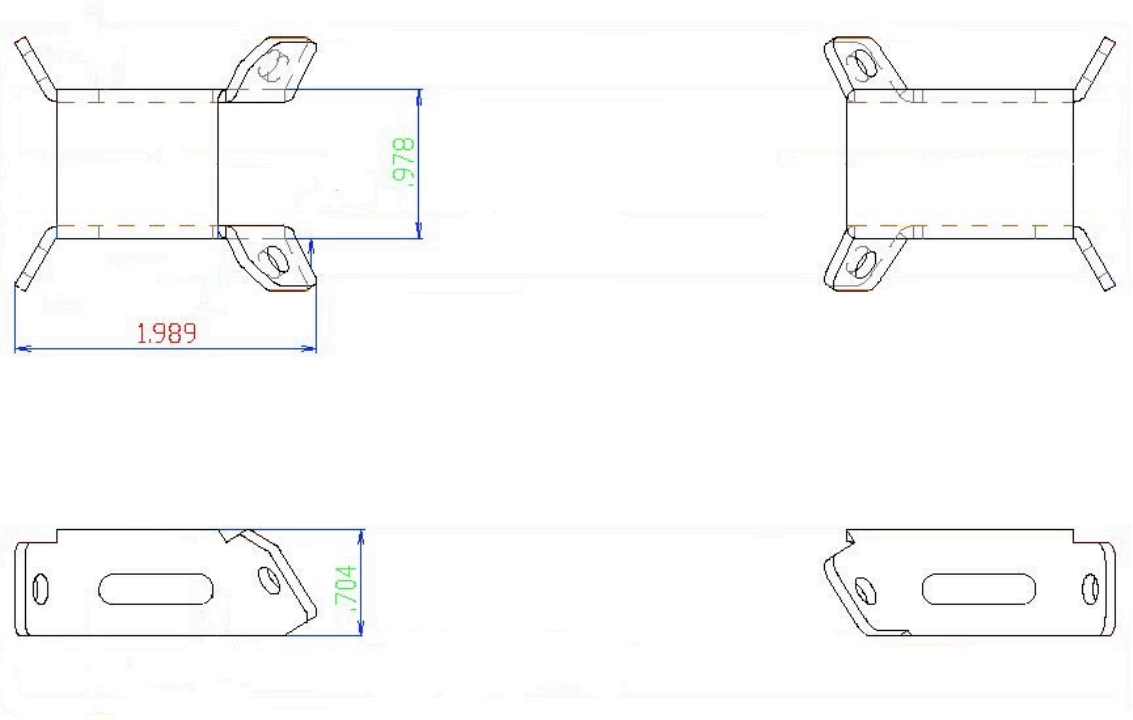

Figure 9 - Top Rail Bracket Profile

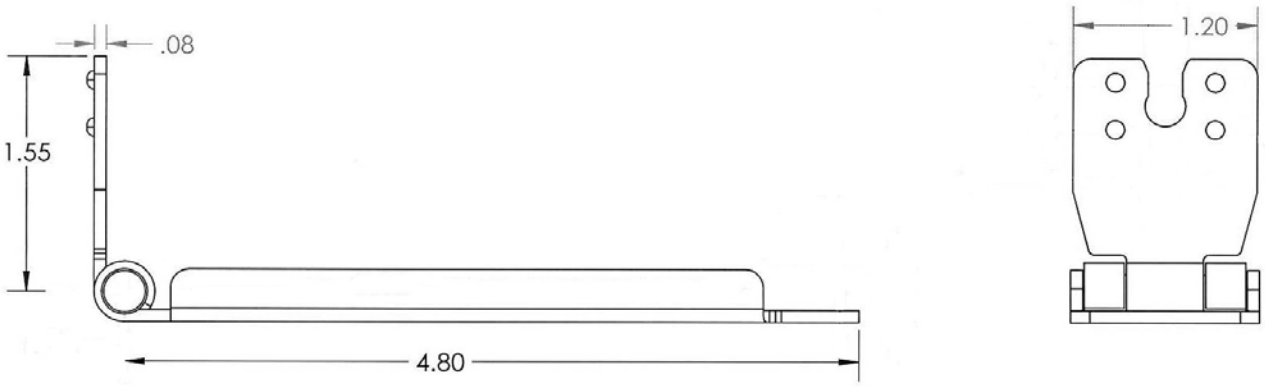

Figure 10 - Bottom Rail Bracket Profile

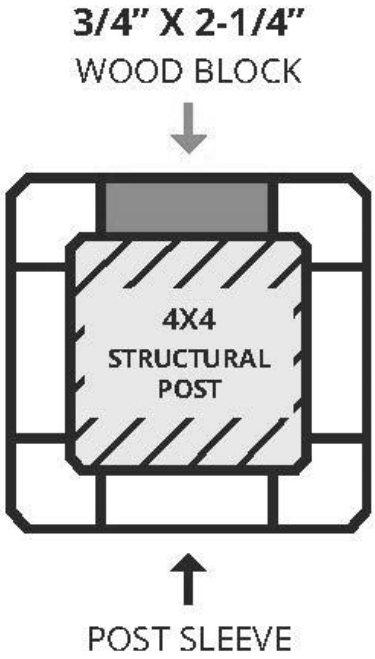

Figure 11 - WPC Post Sleeve with Blocking At Top Rail Connection