



Code Compliance Research Report

CCRR-0167

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Superior Plastic Products, Inc.
260 Jalyn Drive
New Holland, Pennsylvania 17557

1.0 Subject

Vinyl Guardrail Systems:

1000 Series T-Rail

3000 Series Newport Rail

2.0 Research Scope

2.1 Building Codes:

2012 International Building Code (IBC)

2012 International Residential Code (IRC)

2.2 Properties:

Structural Performance

Durability

Surface Burning

3.0 Description

3.1 General – The Superior Plastic Products vinyl guardrail systems identified in Section 1.0 are guardrails (guards) under the definitions of the referenced codes and are intended for use on elevated walking areas of buildings and walkways as required by the referenced codes.

3.2 Guardrail Assemblies – Railing systems are provided as level guards for level walking areas such as decks, balconies, and porches. Guards are provided in lengths up to 120 inches between supports and overall installed height of 36 inches to 42 inches. See Figure 1, Table 1, and Table 2.

3.3 Materials and Processes - Railings are an assemblage of co-extruded and molded components utilizing Poly Vinyl Chloride (PVC) material, and aluminum reinforcements. The PVC components are produced in four colors: White, Tan, Clay, and Almond. The systems consist of the following components:

3.3.1 The *1000 Series T-Rail* top rail is a co-extruded PVC "T" profile with overall dimensions of 3.0 inches wide at the top and 1.75 inches wide at the bottom by 3.5 inches tall with a nominal 0.110 inch wall thickness. See Figure 2.

3.3.2 The *3000 Series Newport Rail* top rail is a co-extruded PVC contoured profile with overall dimensions of 3.0 inches wide at the top by 3.22 inches tall with a nominal 0.110 inch wall thickness. See Figure 3.

3.3.3 The *1000 Series T-Rail* and *3000 Series Newport Rail* bottom rail is a co-extruded PVC rectangular profile with overall dimensions of 1.75 inches wide by 3.5 inches tall with a nominal 0.110 inch wall thickness. See Figure 4.

3.3.4 Balusters are supplied in the eight styles identified in Table 3.

3.3.5 An extruded 6005-T5 aluminum "A"-shaped insert with an inner web thickness of 0.135 inch is used to provide reinforcement for the PVC top rails. See Figure 13.

3.3.6 An extruded 6005-T5 aluminum inverted "A"-shaped insert with an inner web thickness of 0.070 inch is used to provide reinforcement for the PVC bottom rails. See Figure 14.

3.3.7 Top and bottom rails are connected to posts using molded PVC brackets secured to the posts with stainless steel screws. See Figure 16 through Figure 18 and Table 4.

3.3.8 Railing systems are attached to conventional wood supports which are outside the scope of this report. A *Victorian* style 4 inch square with a nominal wall thickness of 0.115 inch co-extruded PVC post sleeve is used to sleeve a conventional 4x4 wood post. See Figure 15.

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.

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.

4.4 The PVC material used in the guardrail system has a flame spread index of 15 when tested according to ASTM E 84. The referenced criteria, ICC-ES AC174, requires that the material have a flame spread index not greater than 200 when tested according to ASTM E 84.

5.0 Installation

The guard system shall be installed 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 The baluster connections to the top and bottom rails are made by inserting the balusters into the routed openings in both rails.

5.2 The top and bottom rails are attached directly to structural supports utilizing molded PVC mounting brackets. See Figure 16 through Figure 18.

5.3 The top and bottom rails may be attached to conventional wood supports. The wood in the supporting structure, including conventional posts, shall have a specific gravity of 0.50 (southern yellow pine) or greater.

5.3.1 For attachment to wood supports, see Table 4 for fastening methods of the guardrail system components.

5.3.2 4x4 conventional wood posts may be covered by a 4 inch square non-structural PVC post sleeve with decorative caps and moldings.

6.0 Supporting Evidence

6.1 Drawings and installation instructions submitted by the manufacturer.

6.2 The 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), approved January 2012, and ASTM D 7032-07, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails). Within the scope of this report, ASTM D 7032-07 has been deemed equivalent to ASTM D 7032-08.

6.3 A quality control manual in accordance with ICC-ES AC10, Acceptance Criteria for Quality Documentation, approved June 2011.

7.0 Conditions of Use

The 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 and regulated by the IBC or IRC are limited to exterior use in all construction types 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 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 fasteners and other metallic components with the supporting structure, including chemically treated wood, is not within the scope of this report. Only those types of fasteners and fastening methods described in this report have been evaluated for the installation of the vinyl guardrail systems; other methods of attachment are outside the scope of this report.

7.4 The vinyl guardrail systems reported herein are manufactured by Superior Plastic Products, Inc. in New Holland, Pennsylvania. Manufacturing is in accordance with an approved quality control system and inspections by Architectural Testing (IAS AA-676).

8.0 Identification

The vinyl guardrail assemblies produced by Superior Plastic Products, Inc. identified in this report shall be identified with labeling on the individual components or the packaging that includes: the name and/or trademark of Superior Plastic Products, Inc.; the Architectural Testing Code Compliance Research Report mark and number (CCRR-0167); and the following statement: "See CCRR-0167 at www.ati-es.com for uses and performance levels." For 36" high guardrail systems, the label shall also include the phrase, "For Use in One- and Two-Family Dwellings Only."

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 Architectural Testing.

9.3 Reference to the Architectural Testing internet web site address at www.ati-es.com is recommended to ascertain the current version and status of this report.

**Table 1
Guardrail Systems for Use in IBC / All Use Group Classifications**

Type	Maximum Rail Dimensions (length by height) ¹	Baluster(s)
Level	96 inches by 42 inches	All baluster styles shown in Table 3, except for Aluminum

¹ Length is clear space between supports.

**Table 2
Guardrail Systems for Use in IRC / One- and Two-Family Dwellings ¹**

Type	Maximum Rail Dimensions (length by height) ²	Baluster(s)
Level	96 inches by 42 inches	All baluster styles shown in Table 3, except for Aluminum
Level	120 inches by 36 inches	All baluster styles shown in Table 3

¹ 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.

² Length is clear space between supports.

**Table 3
Baluster Styles**

Baluster Style	Description	Cross-Reference
Heritage	1.3-inch square-ended thermoformed PVC spindle with an 0.08 inch wall thickness measured at its ends	Figure 5
Kinzer		Figure 8
Madison		Figure 9
Oxford ¹		Figure 11
Model	1.3-inch square PVC baluster with an 0.08 inch wall thickness	Figure 10
Traditional	1.5 inches by 0.875 inch rectangular-ended thermoformed PVC spindle with an 0.08 inch wall thickness measured at its ends	Figure 6
Victorian	1.5 inches by 0.875 inch rectangular-ended PVC baluster with an 0.08 inch wall thickness	Figure 12
Aluminum	Round, painted 6063-T6 aluminum picket with a 0.75 inch outside diameter with 0.055 inch wall thickness	Figure 7

¹ Used in 36 inch high railing systems only.

**Table 4
Fastening Schedule**

System	Connection	Fastener	Qty.
<i>1000 Series T-Rail</i>	Top Rail Bracket to Post	#8 x 1 in self-starting pan-head stainless steel screws	6
	Top Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screws	2
	Bottom Rail Bracket to Post	#8 x 1 in self-starting pan-head stainless steel screws	6
	Bottom Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screw	1
<i>3000 Series Newport Rail</i>	Top Rail Bracket to Post	#14 x 1-1/2 in self-starting pan-head stainless steel screws	4
	Top Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screws	2
	Bottom Rail Bracket to Post	#8 x 1 in self-starting pan-head stainless steel screws	6
	Bottom Rail Bracket to Rail	#8 x 1 in self-starting pan-head stainless steel screw	1

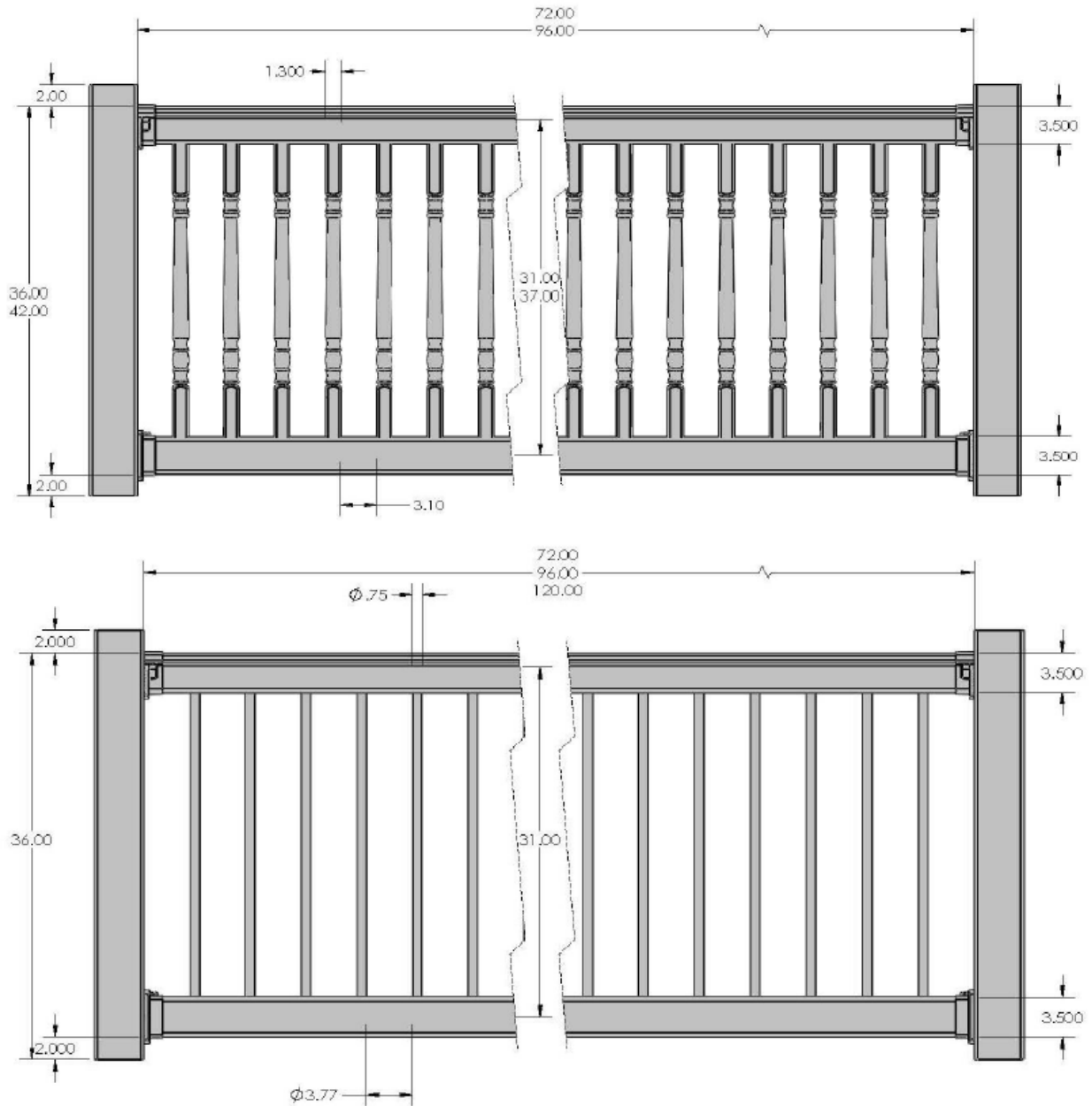


Figure 1
Vinyl Railing Systems

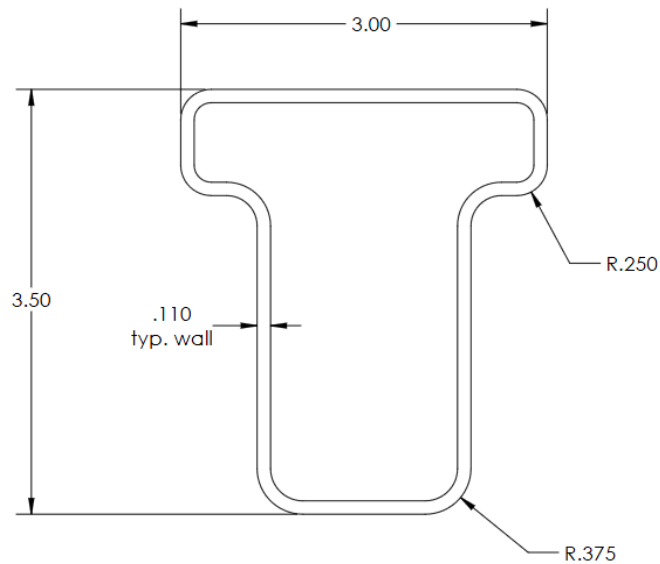


Figure 2
1000 Series T-Rail Top Rail

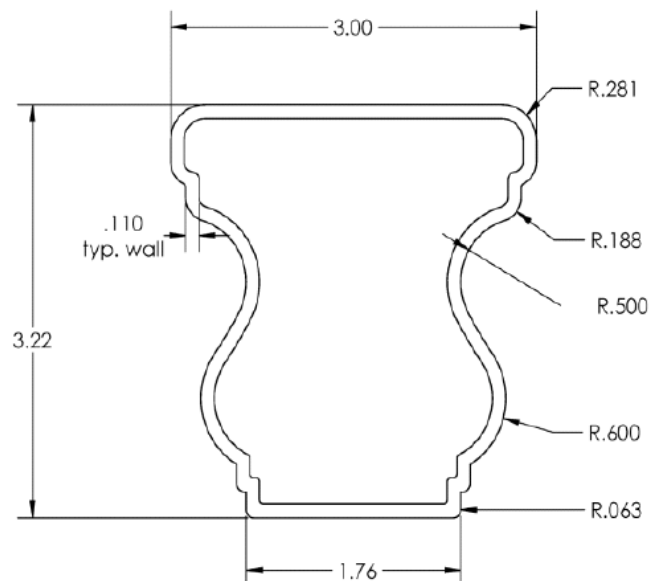


Figure 3
3000 Series Newport Rail Top Rail

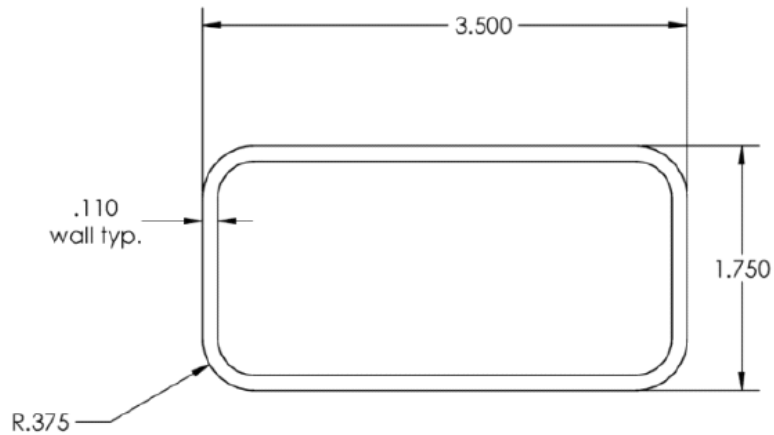


Figure 4
1000 Series and 3000 Series Bottom Rail

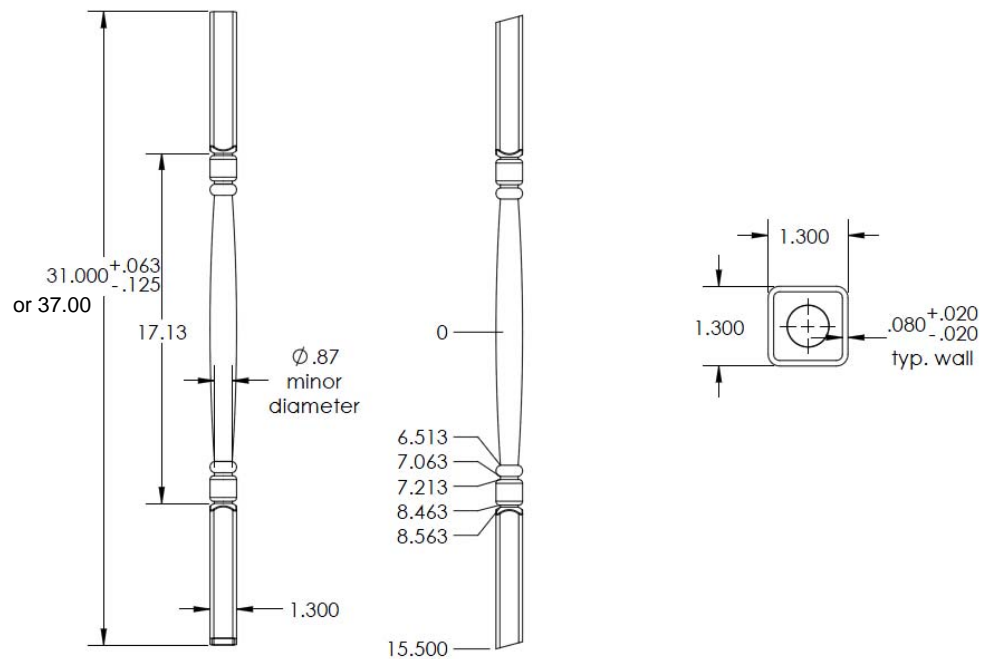


Figure 5
Heritage PVC Spindle

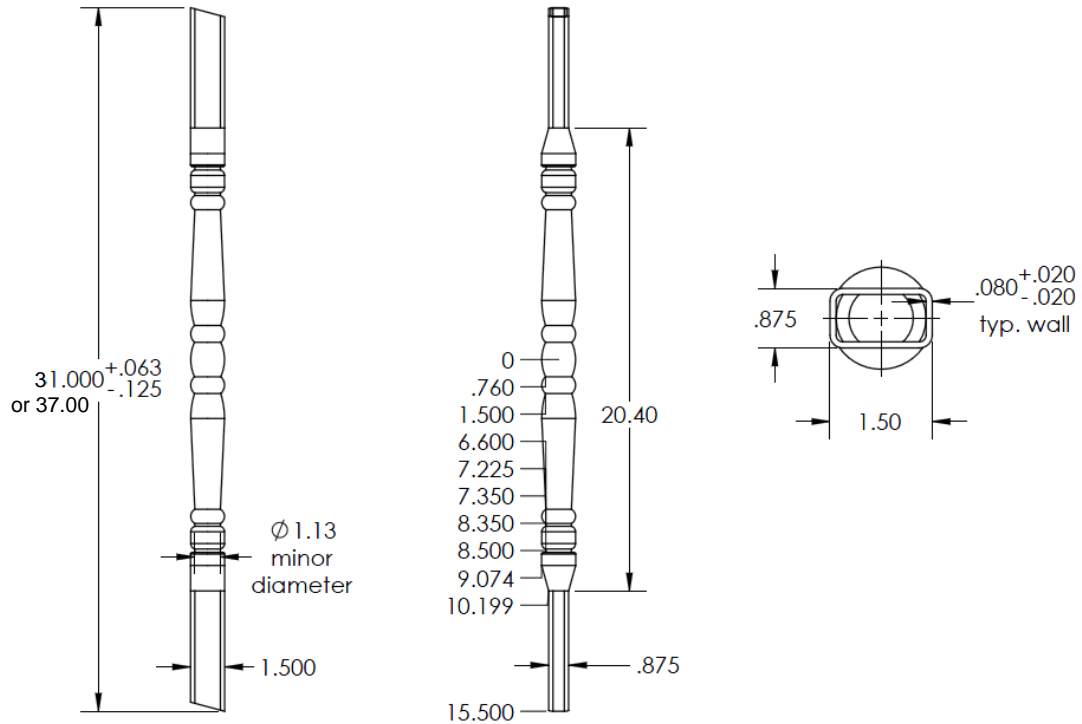


Figure 6
Traditional PVC Spindle

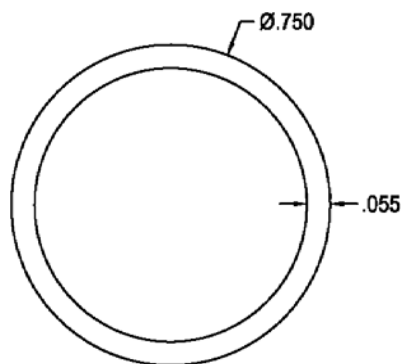


Figure 7
6063-T6 Aluminum Round Tube Picket

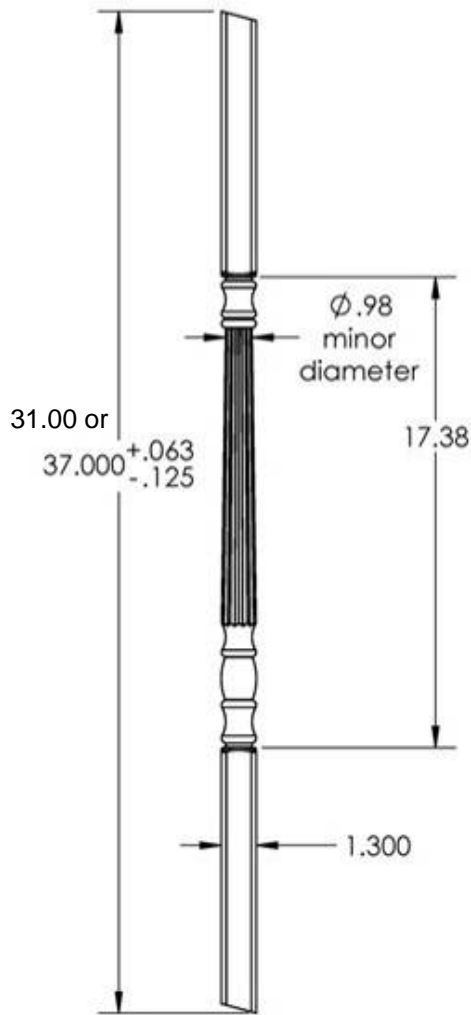


Figure 8
Kinzer PVC Spindle

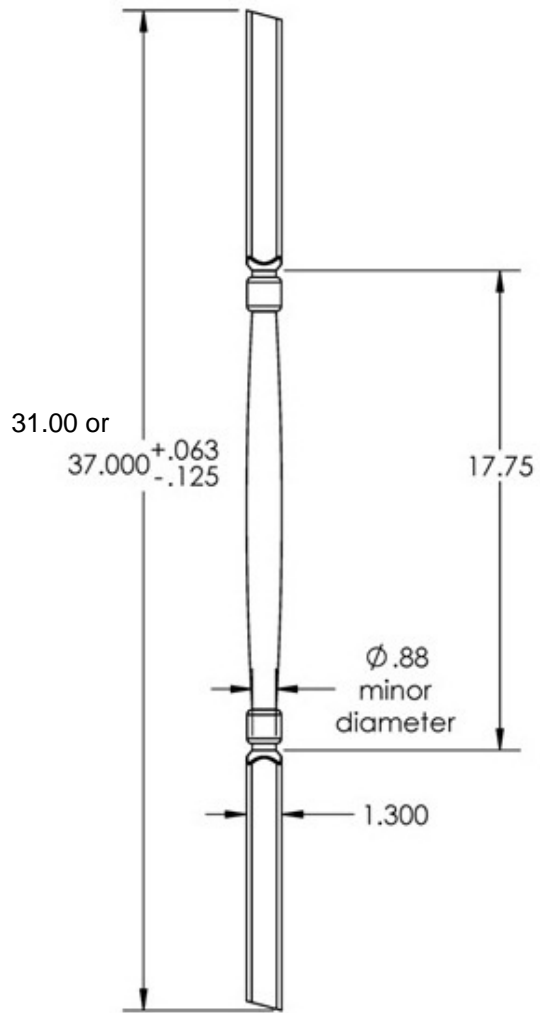


Figure 9
Madison PVC Spindle

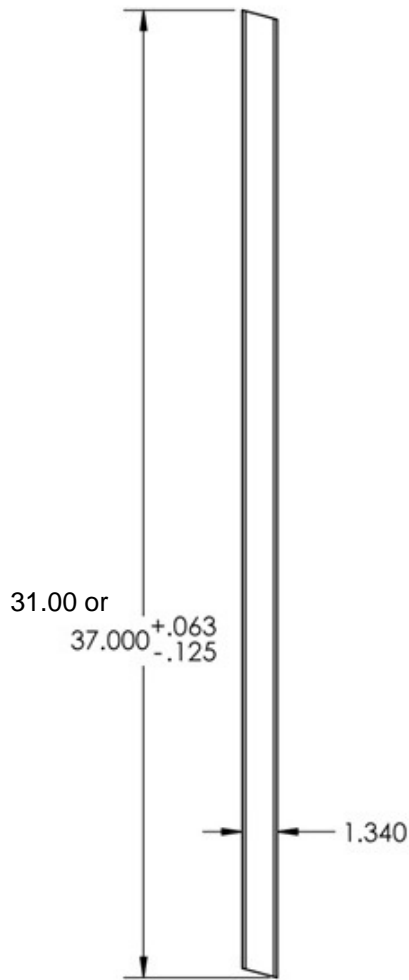


Figure 10
Model PVC Baluster

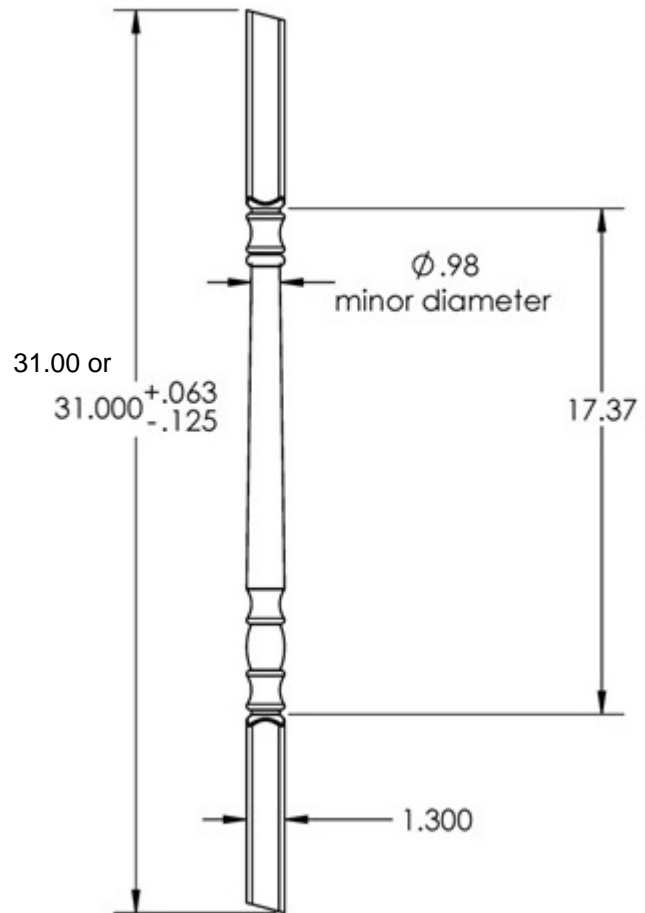


Figure 11
Oxford PVC Spindle

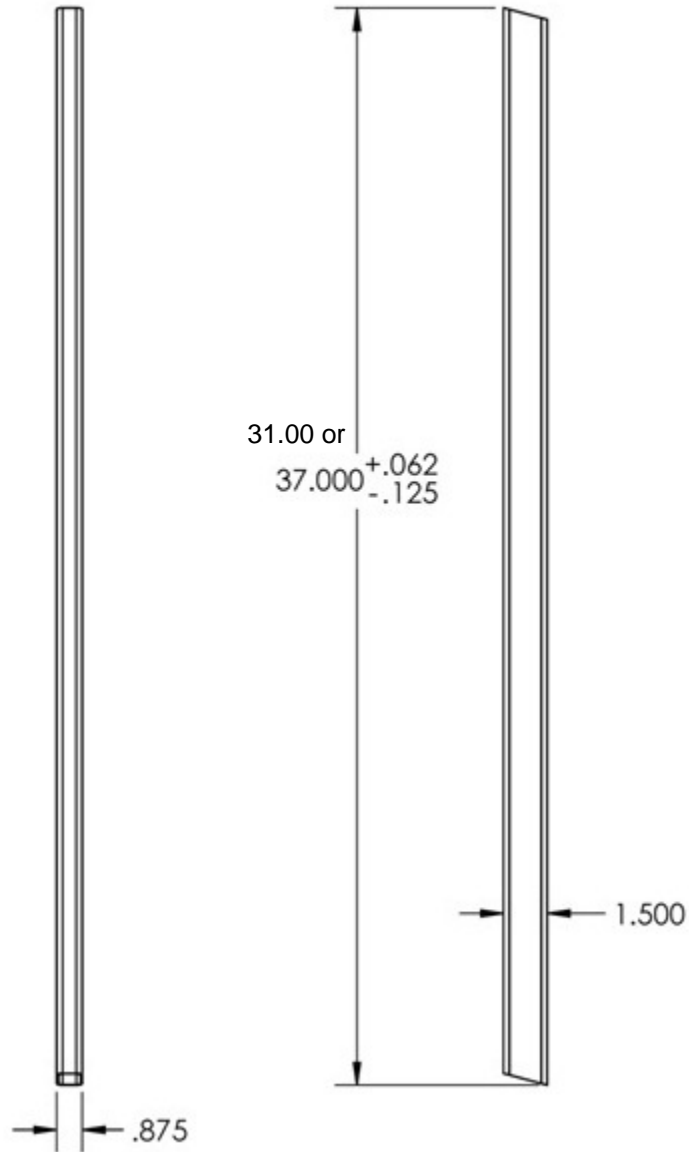


Figure 12
Victorian PVC Baluster

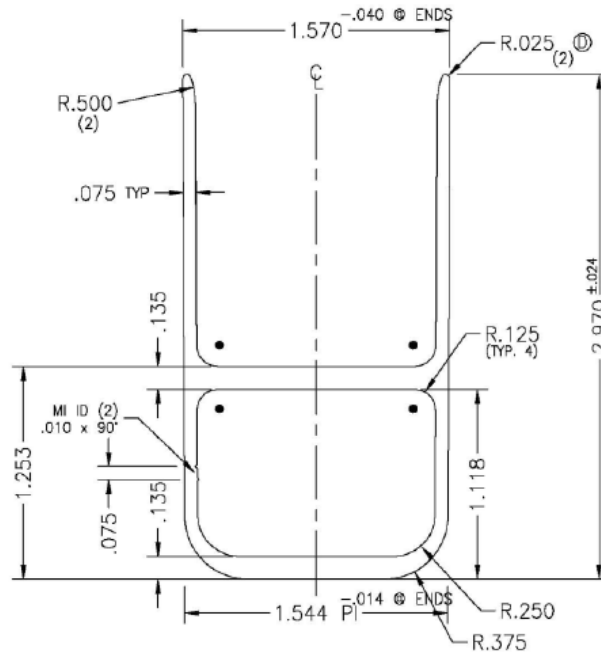


Figure 13
Top Rail Aluminum Insert

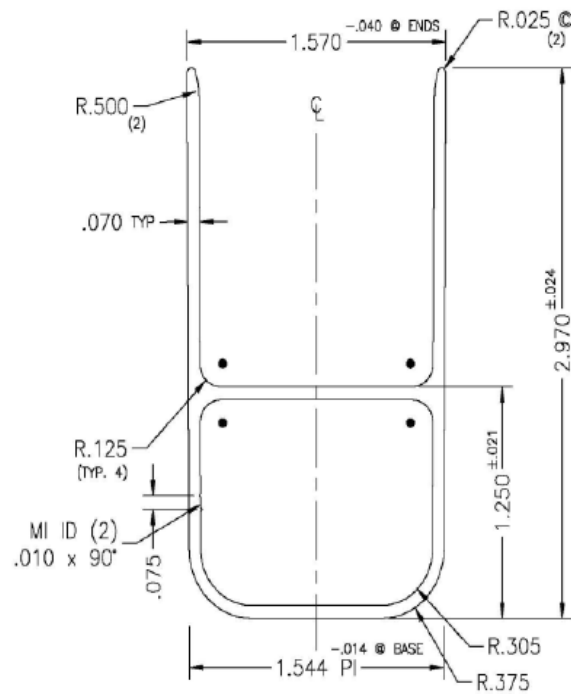


Figure 14
Bottom Rail Aluminum Insert

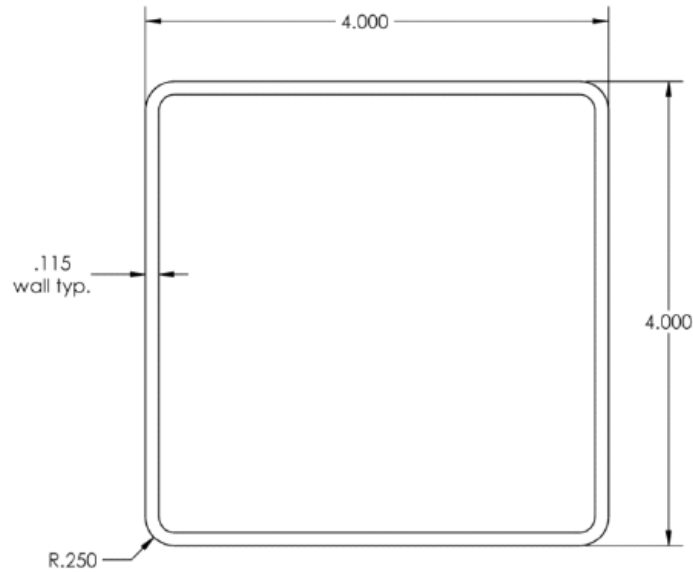


Figure 15
PVC Post Sleeve

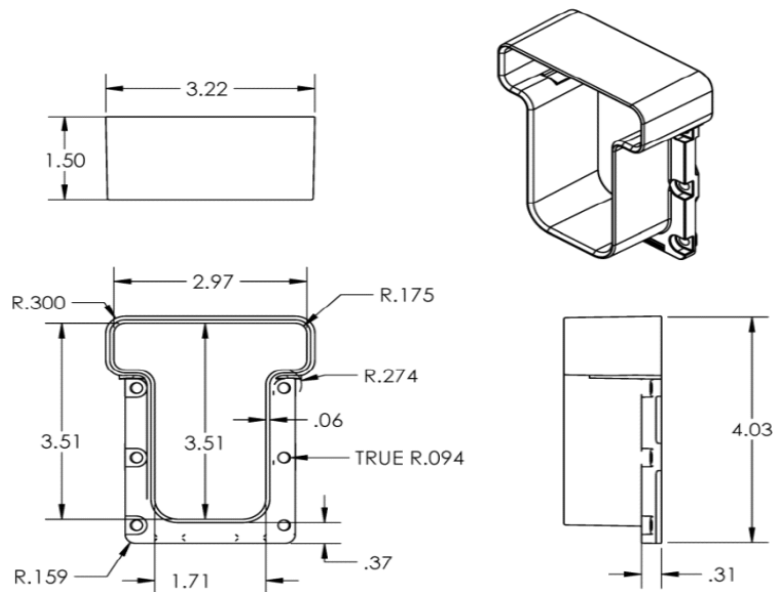


Figure 16
1000 Series T-Rail Top Rail Mounting Bracket

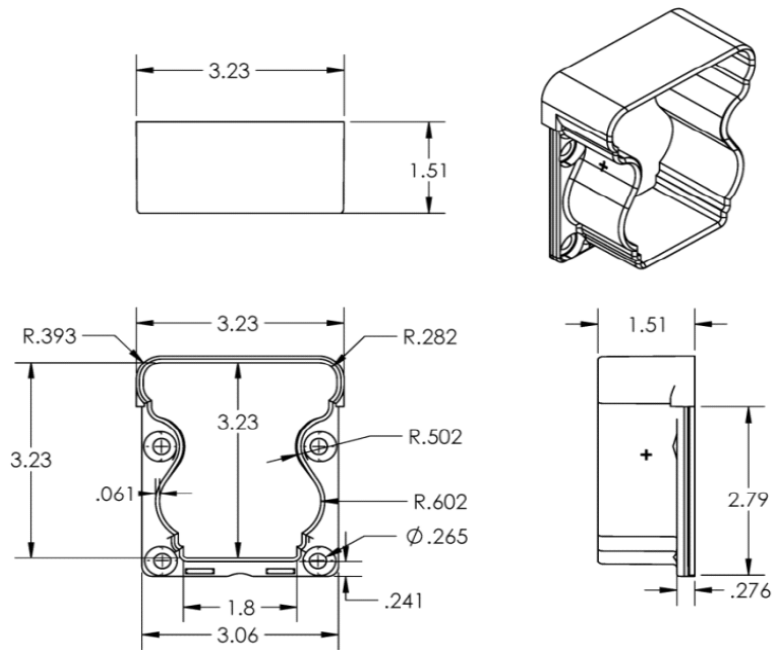


Figure 17
3000 Series Newport Rail Top Rail Mounting Bracket

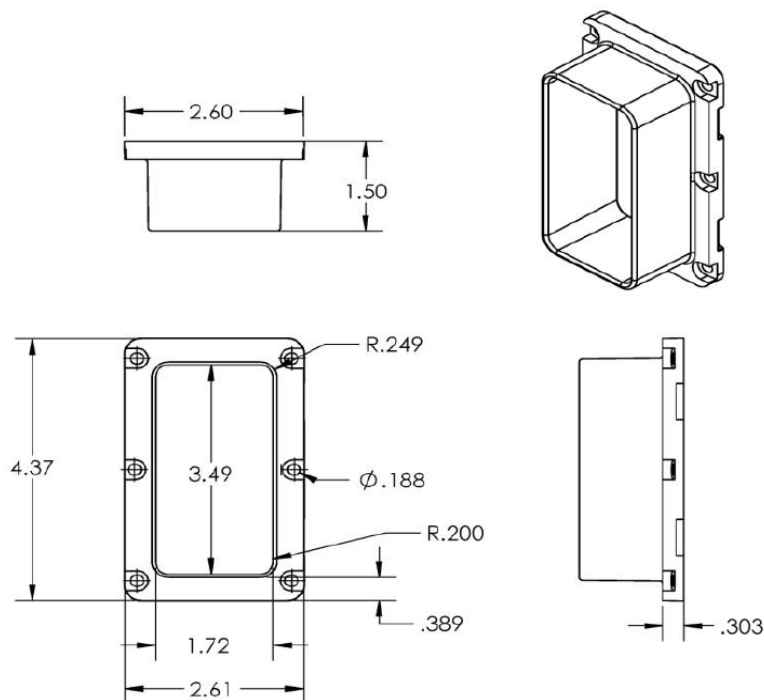


Figure 18
Bottom Rail Mounting Bracket