



## Code Compliance Research Report

CCRR-0107

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### 1.0 Subject

Enduris Extrusions Railing Systems:

*Enrail™* series 100, 200 & 300

### 2.0 Research Scope

2.1. Building codes:

2006 & 2009 International Building Code (IBC)

2006 & 2009 International Residential Code (IRC)

2.2. Properties:

Structural performance

Durability

Surface Burning

### 3.0 Description

3.1. General – *Enrail™* Railing Systems are guards under the definitions of the referenced codes intended for use on elevated walking areas in buildings and walkways as required by the codes.

3.1.1. Guards are provided in lengths up to 10 feet (120-inches) and a maximum installed height of 42-inch. See Table 1.

3.2. Materials and Processes - Railings are an assemblage of extruded and molded components utilizing Poly Vinyl Chloride (PVC) material and aluminum reinforcements. Vinyl components are produced in white and tan colors. All systems consist of the following components:

3.2.1. The top and bottom rails are extruded PVC profiles of various styles.

3.2.2. Balusters are extruded PVC profiles in various dimensions (See Table 2).

3.2.3. An extruded aluminum insert provides reinforcement for the top and bottom rails. (See Table 1)

3.2.4. Top and bottom rails are connected to posts with molded brackets that are secured to the supports with stainless steel screws.

3.3. Supports - Railing systems can be attached to conventional wood supports or a structural PVC post installed with an aluminum post-mount tower.

3.3.1. A PVC post sleeve that is non-structural can be provided as a cladding over conventional 4x4 wood posts.

3.3.2. Structural 4"x4" PVC posts are supported by an UltiMount™ ProSpec post mount system as permitted by Table 4.

3.3.3. Railing systems include a bottom rail intermediate support block located beneath the rail (See Figure 2). Railing lengths up to 8-ft have a single intermediate support located at mid-span. Railing lengths exceeding 8-ft have two intermediate supports spaced equally within the overall rail length.

For installations in One- And Two-Family Dwellings (IRC), intermediate support blocks are optional for rails up to 8 feet in length when the aluminum rail insert is utilized in the bottom rail.

### 4.0 Performance Characteristics

4.1. *Enrail™* railing systems have demonstrated the capacity to resist the design loadings specified in Chapter 16 of the IBC 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 materials used have a flame spread index of 35 when tested according to ASTM E 84. The referenced criteria, AC174, requires a flame spread index not exceeding 200.

## 5.0 Installation

5.1. 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. (See Table 1)

5.2. Railings attached to wood supports with molded brackets utilize stainless steel all purpose screws for anchorage. The wood in the supporting structure 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. Bracket attachment shall be in accordance with Table 3.

5.3. The UltiMount™ ProSpec post mount system may be mounted in a wood deck or anchored to concrete and/or steel with approved anchors. Installation in wood decks shall be in accordance with the manufacturer's installation instructions and Figure 3.

5.3.1. The UltiMount™ ProSpec post mount system anchors used in concrete or steel installation are not within the scope of this report and are subject to evaluation and approval by the building official. Anchors must satisfy the design load requirements specified in Chapter 16 of the building code and must meet the following minimum requirements.

5.3.2. A minimum of four anchor bolts must be used and located in the four pre-drilled holes in the post base plate.

5.3.3. The anchors must be stainless steel or other approved material compatible with aluminum.

5.3.4. The anchors must have a minimum diameter equal to 5/16".

5.3.5. Where required by the building official, engineering calculations and details shall be provided. The calculations shall verify that the anchorage complies with the building code for the type and condition of the supporting construction.

5.4. Compatibility of fasteners and other installation hardware with the supporting construction including treated wood is not within the scope of this report.

## 6.0 Supporting Evidence

6.1. Manufacturer's drawings and installation instructions.

6.2. Reports of testing and engineering analysis demonstrating compliance with the performance requirements of ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails), AC174 effective June 1, 2009.

6.3. Quality control manual in accordance with ICC-ES Acceptance Criteria for Quality Control Manuals, AC10.

## 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. Guardrails with install eights less than 42 inches are limited to use in One- and Two Family Dwellings (IRC) as indicated in Table 1.

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, post mount brackets, and other metallic components with the supporting structure, including chemically treated wood, is not within the scope of this report.

7.4. *Enrail*™ Railing Systems are manufactured in Jacksonville, Florida in accordance with the manufacturer's approved quality control system with inspections by Architectural Testing, Inc. (AA-676).

## 8.0 Identification

The railing assemblies produced by Enduris LLC and identified in this report shall be identified with labeling on the individual components or the packaging that includes the name and/or trademark of the manufacturer, the identifying mark of the independent inspection agency, Architectural Testing, Inc. (AA-676) and, the ATI Code Compliance Research Report Number (CCRR-0107).

**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 ATI.

9.3. Reference to the Architectural Testing internet web site address at [www.archtest.com](http://www.archtest.com) is recommended to ascertain the current version and status of this report.

**Table 1 –Railing System Descriptions and Code Recognition**

<b>Enrail™ Railing Systems</b>	<b>Railing System Components</b> (See Table 2 for available balusters)	<b>Maximum Size (Length x Height)<sup>1</sup></b>
100 Series	Top: 2"x3-1/2" Rail with Alum "H" channel Btm: 2"x3-1/2" Rail with Alum "H" channel <sup>2</sup> Top & Btm. Brackets: Eclipse Zinc or Eclipse PVC	8' x 42" / IBC & IRC 8' x 36" / IRC only
	Top: 2"x3-1/2" Rail with Alum "H" channel Btm: 2"x3-1/2" Rail with Alum "H" channel <sup>2</sup> Top & Btm. Brackets: Eclipse Zinc	10' x 42" or 10' x 36" / IRC One- and Two- Family Dwellings only
200 Series	Top: T-Rail with Alum "H" channel Btm: 2"x3-1/2" Rail with Alum "H" channel <sup>2</sup> Top & Btm. Brackets: Eclipse Zinc or Eclipse PVC	10' x 42" / IBC & IRC 10' x 36" / IRC only
300 Series	Top: Small Contour Rail with Contour Alum insert Btm: 2"x3-1/2" Rail with Alum "H" channel Top Brackets: Small Contour (Polycarbonate) Bracket  Btm. Brackets: Eclipse Zinc or Eclipse PVC or Enduris PVC Bracket (END1092)	8' x 42" / IBC & IRC 8' x 36" / IRC only

<sup>1</sup> Railing lengths are clear length between supports. Railing height is installed height from walking surface to top of top rail. Bottom rail clearance is 2-1/2"

<sup>2</sup> Aluminum "H" Channel is optional in bottom rail for railing lengths 8 feet and less.

When utilized, intermediate support blocks are not required for installations not exceeding 8 feet in One- And Two-Family Dwellings (IRC). See Paragraph 3.3.3

**Table 2 - Balusters**

Baluster Style
1-1/2" Straight Picket
1-3/8" Straight Picket <sup>1</sup>

<sup>1</sup> The 1-3/8" Picket is used in 36" rail heights only.

**Table 3 – Rail Bracket Fastening Schedule**

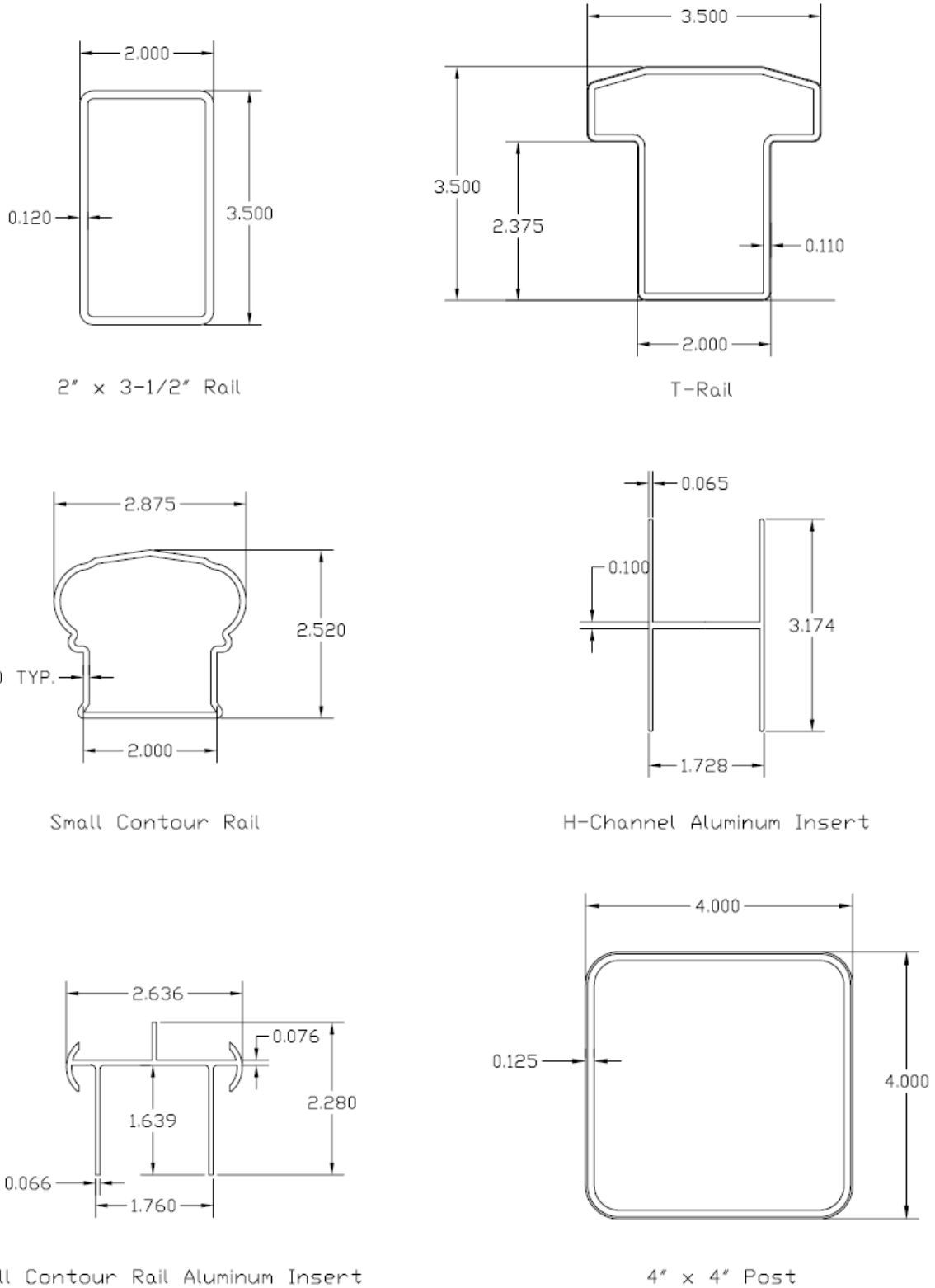
Rail – Bracket Combination	Bracket to Post	Rail to Bracket
Eclipse Zinc Bracket	(6) #12 x 2" Stainless Steel, Self-Starting Screws	(4) #10 x 1" Pan-Head Self-Tapping Screws
Eclipse PVC Bracket	(6) #12 x 2" Stainless Steel, Self-Starting Screws	(4) #10 x 1" Pan-Head Self-Tapping Screws
Small Contour Bracket (Two-Piece)	(4) #10 x 2" Stainless Steel Wood Screws	(2) #10 x 1" Stainless Steel, Self Tapping Screws
Enduris PVC Bracket (END1092)	(4) #10 x 3/4" Stainless Steel Wood Screws	(1) #10 x 3/4" Stainless Steel Wood Screw

**Table 4 – Post Mounts**

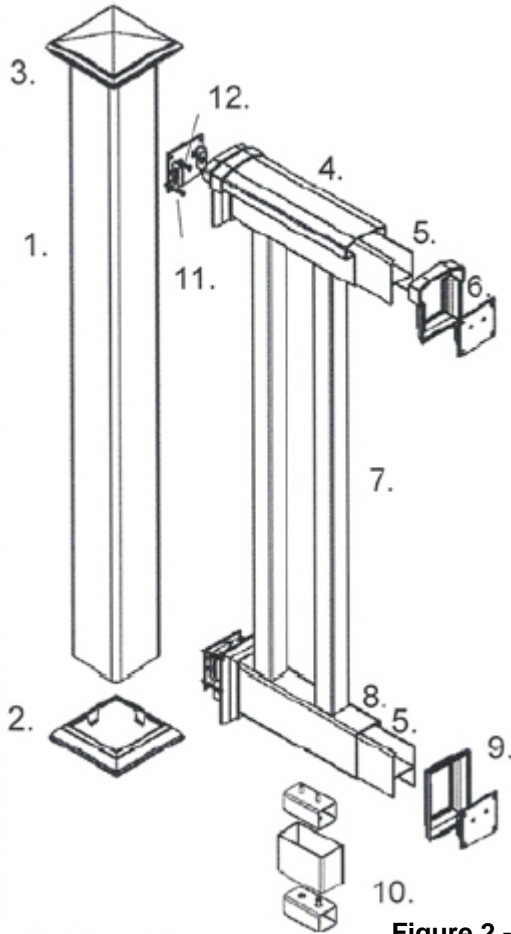
<i>Post Mounting System</i>	Code Recognition	
	Maximum Supported Railing Length and Height <sup>1</sup>	
	IBC <sup>2</sup>	IRC
UltiMount™ ProSpec	6-ft Length 42" Height	10-ft. Length 42" Height

<sup>1</sup> Railing lengths are clear length between supports. Railing height is installed height from walking surface to top of top rail.

<sup>2</sup> Code recognition for the IBC is limited to Residential use groups.

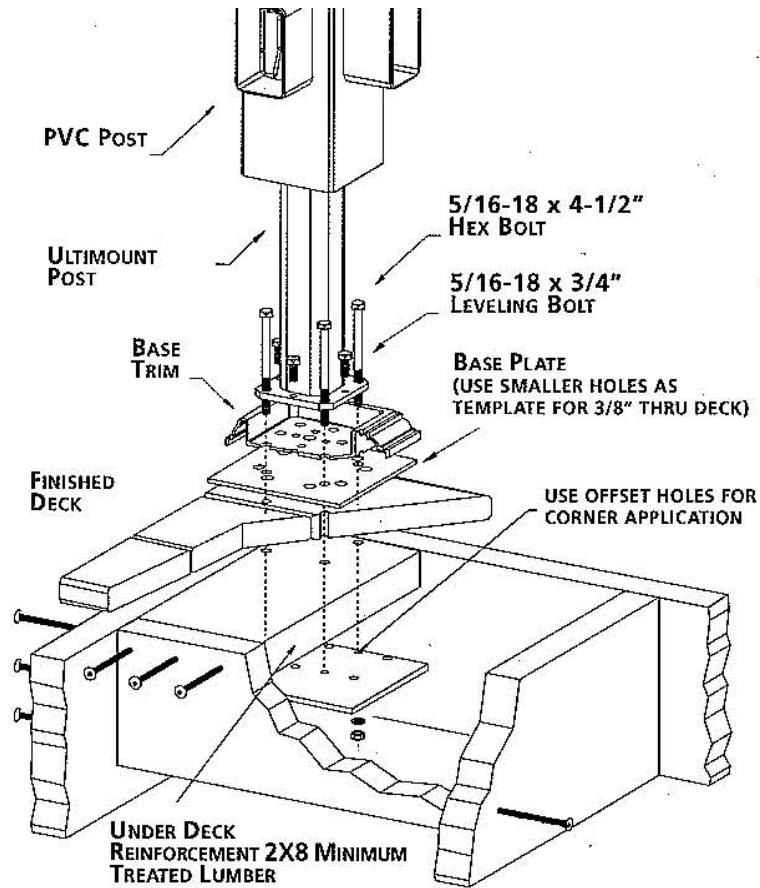


**Figure 1 - Rail and Post Profiles**



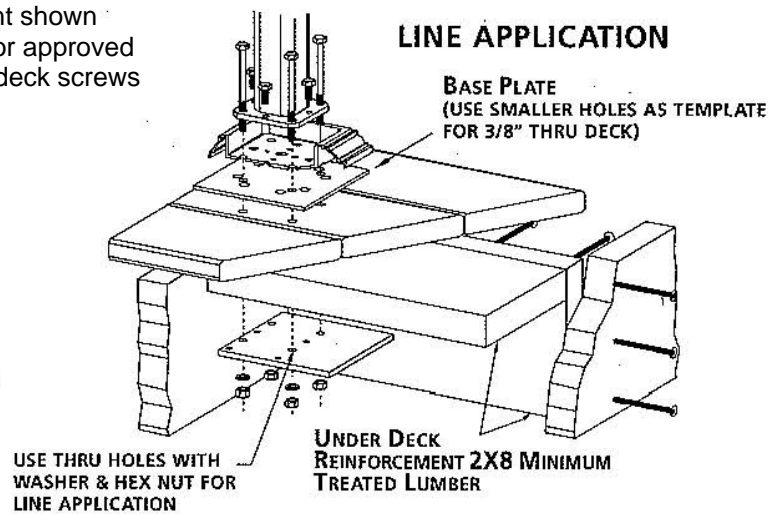
- 1. 4"x4" PVC Post
- 2. Base Trim
- 3. Cap Trim
- 4. PVC Top Rail (T-Rail Shown)
- 5. Aluminum Reinforcement Insert
- 6. Top Rail Bracket and Trim
- 7. PVC Balusters (Straight Pickets Shown)
- 8. PVC Bottom Rail
- 9. Bottom Rail Bracket and Trim
- 10. Intermediate Support Block
- 11. Bracket-To-Post Fasteners
- 12. Bracket-To-Rail Fasteners

**Figure 2 - Typical Rail Assembly**



**Note:**

Cross supports and reinforcement shown are 2x8 Southern Pine (treated) or approved equivalent fastened with #8 x 3" deck screws in the quantities shown.



**Figure 3 – UltiMount™ Installation on a Wood Deck**