



PFS TECO Research Report 0115

Date of Acceptance: January 1, 2018

Expiration Date: January 1, 2019

Revision Date: February 19, 2018

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TYPE OF ACCEPTANCE: Product Material – Wood and Plastics
CSI Specification Division 065000 (Structural Plastic) and 066300 (Plastic Railing)

MANUFACTURER IDENTIFICATION:

| | |
|--|--|
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RESEARCH REPORT SUBJECT: Guardrail Systems for Exterior Applications
Installation on construction complying with International Residential Code (IRC)
Dwellings or complying with International Building Code (IBC) and IBC
Exceptions in Section 1015.3 of the International Building Code.

DESCRIPTION OF BUILDING COMPONENTS:

Barrette Outdoor Living guardrail system is identified by the name – **Endurance®** (Guardrail System). The guardrail system is for use in areas as referenced in the Applicable Code Sections of this report. The guardrail system provides a protective barrier for walking areas, balconies, porches and ramps. The guardrail system is manufactured by the co-extrusion process, assembled with molded components and is produced in the color White, Earth and Sahara.

1. **Guardrail – Endurance®**
 - (a) The **Endurance®** guardrail system consists of top rail, bottom rail, balusters and aluminum reinforcing inserts. The top rail, bottom rail and balusters are manufactured with PVC material by the co-extrusion process except for the PVC molded brackets and aluminum baluster.
 - (b) The **Endurance®** guardrail system has a top rail that comes in a “T” rail profile. The top rail profile is “T” in shape, hollow in the center, has rounded edges, is pre-routed for balusters and has cap stock on the rail. The top rail aluminum reinforcing insert has a “T” shape profile and is made of extruded 6105-T5 aluminum alloy material. See Table 1 in this report for drawings and dimensions of top rail and insert.
 - (c) The **Endurance®** guardrail system has a bottom rail that is rectangular in shape, hollow in the center, has rounded edges and is pre-routed for balusters. The bottom rail aluminum reinforcing insert has a “h” shape profile and is made of extruded 6063-T6 aluminum alloy material. See Table 1 in this report for drawings and dimensions of bottom rail and insert.
 - (d) The **Endurance®** guardrail system has three baluster designs as follows: square, turned and round. The square and turned balusters are manufactured with PVC material. The square baluster has rounded edges and is hollow in the center. The turned baluster is square on both ends with rounded edges, turned in the middle, is hollow in the center and is produced in two lengths. The round baluster is circular in shape, is hollow in the center and is an extruded aluminum alloy 6063-T5 material. See Table 1 in this report for baluster drawings and dimensions.
 - (e) The **Endurance®** guardrail system post sleeve is square in shape. The post sleeve is manufactured with PVC material. The square post sleeve has rounded edges and is hollow in the center. See Table 1 in this report for post sleeve drawing and dimensions.
 - (f) The **Endurance®** guardrail system connections for the top and bottom rail to the supports are PVC molded brackets and adapters. The brackets and adapters shall be secured to the posts with steel screws (stainless, corrosion plated, or galvanized) suitable for use in preservative treated wood. See Table 1 and 3 of this report for a drawing of the bracket and number of fasteners required.
 - (g) See Table 2 in this report for the **Endurance®** guardrail system height and length limits.
 - (h) See manufacturer’s published installation instructions identified as 34115980 dated 03-17 for additional guardrail system installation details. The stair rail system described in the instructions have not been evaluated and are not part of this Research Report.

APPLICABLE CODES:

- 2015 *International Building Code*® (IBC)
- 2012 *International Building Code*® (IBC)
- 2009 *International Building Code*® (IBC)
- 2006 *International Building Code*® (IBC)
- 2015 *International Residential Code*® (IRC)
- 2012 *International Residential Code*® (IRC)
- 2009 *International Residential Code*® (IRC)
- 2006 *International Residential Code*® (IRC)
- 2013 *California Green Building Standards Code (CalGreen) Title 24, Part 11*
- 2015 *(ICC/ASHRAE) 700-2015 National Green Building Standard*™

APPLICABLE CHARACTERISTICS REVIEWED:

1. **Structural Performance:**
 - (a) The **Endurance**® guardrail system has been reviewed for maximum spans as indicated in Table 2. Table 2 in this report also indicates the limitations of use evaluated for each design.
2. **Temperature:**
 - (a) The **Endurance**® guardrail system has been reviewed for evaluated temperature range of -20° degrees F (-29° degrees C) to 125° degrees F (52° degrees C).
3. **Flame Spread Index:**
 - (a) The **Endurance**® guardrail system flame spread rating was less than 200 for PVC material when tested in accordance with ASTM E84 “Standard Test Method for Surface Burning Characteristics of Building Materials.”
4. **Decay Resistance:**
 - (a) The material used in the **Endurance**® guardrail system in this report does not contain any wood and has been deemed comparable to naturally resistant wood or to preservative treated wood for resistance to fungal decay.
5. **Termite Resistance:**
 - (a) The material used in the **Endurance**® guardrail system in this report does not contain any wood and has been deemed equivalent to naturally resistant wood or to preservative treated wood for resistance to termite attack.
6. **UV Testing:**
 - (a) The UV testing was conducted, and an appropriate adjustment factor was applied in accordance with ASTM D 7032-10 “Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)”.
7. **Fastening:**
 - (a) The **Endurance**® guardrail system top and bottom rails must be fastened to posts with PVC molded brackets using steel (stainless, corrosion plated or galvanized) screws. See Table 3 in this report and manufacturers installation instructions, noted as 1(h) above.
 - (b) The fasteners and brackets are supplied by the manufacturer and must be used in the installation of the Barrette Outdoor Living guardrail system. Use of other brackets and fasteners is not covered under this report.
8. **Posts:**
 - (a) Wood posts and other wood framing members supporting the posts are not covered under this report and fall outside of this report. Wood posts and other wood must be designed to meet the load requirement in the applicable building code and the wood members must have a minimum specific gravity of 0.50 (southern yellow pine or better) and a minimum thickness to allow full penetration of bracket mounting screws. Other wood posts or wood members not meeting these requirements are not covered under this report.
9. **2013 California Green Building Standards Code (CalGreen), Title 24, Part 11:**
 - (a) The **Endurance**® guardrail system conforms to the requirements for reduced maintenance according to Section A5.406.1.2 of the code.

10. **2015 (ICC/ASHRAE 700-2015) National Green Building Standard™:**
- (a) The **Endurance®** guardrail system conforms to the requirements for termite-resistant materials Sections 602.1.6 and 11.602.1.6 of the standard.
 - (b) The **Endurance®** guardrail system conforms to the requirements for site-applied finishing materials Section 12.1(A).601.7 of the standard.

APPLICABLE USES:

The Barrette Outdoor Living **Endurance®** guardrail system guardrail system evaluated in this report are for installations on construction complying with IRC or IBC. See Table 2 for guardrail system limitations.

LIMITATIONS OF ACCEPTANCE:

The Barrette Outdoor Living **Endurance®** guardrail system described in this report comply with those codes listed in the Applicable Codes section above and are subject to the following conditions:

- 1. The Barrette Outdoor Living **Endurance®** guardrail system guardrail system is limited to exterior construction complying with the IRC and the IBC. The guardrail systems provide a protective barrier for walking areas, balconies, porches and ramps.
- 2. Installation of the guardrail system must comply with this report; the manufacturer's published installation instructions identified as 34115980 dated 03-17 and the applicable code. When the guardrail installation instructions differ from this report, this report governs.
- 3. The fasteners described in this report have been evaluated for the installation of the Barrette Outdoor Living **Endurance®** guardrail system only. Structural wood posts and framing support members for posts must be designed to satisfy load requirements (live and dead) indicated in the applicable building code. Material necessary for anchorage of the guardrail system(s) and compatibility of the fasteners to the treated wood supporting construction has not been evaluated.
- 4. The Barrette Outdoor Living **Endurance®** guardrail system indicated in the report must be fastened to the supporting construction as indicated in the manufacturer's published installation instructions and as outlined in this report. When guardrail fastening instructions differ from this report, this report governs.
- 5. When required, the guardrail system in this report must be designed by a professional and submitted to the authority having jurisdiction for final acceptance.
- 6. The use of a corner rail connection with out a post is outside the scope of this report.
- 7. The Barrette Outdoor Living **Endurance®** guardrail system has not been evaluated as a member of a fire-resistance-rated assembly.
- 8. Barrette Outdoor Living has Third Party inspection program provided by PFS Corporation (AA-652).

DOCUMENTATION SUBMITTED:

Submitted data was provided in accordance with PFS TECO 1601 (Quality Control Manual, Specifications, Manufacturer's published installation instructions, Test data and Descriptive information) and the product has been evaluated in accordance with "Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (AC174)."

PRODUCT IDENTIFICATION:

The Barrette Outdoor Living guardrail assembly system must be identified with a label on each component or the packaging. The information required is as follows: Barrette Outdoor Living, product identification - (**Endurance®**), compliance to ASTM D7032 including the maximum guardrail span and loading, the Research Report number (RR – 0115), and the PFS Certification Mark. Guardrails that are 36" high require a label indicating, "Guardrail installation in residential (1 & 2 Family units only)". Guardrails without this information are not covered under this report.

Table 1: Schematics of Endurance® Guardrail System Components

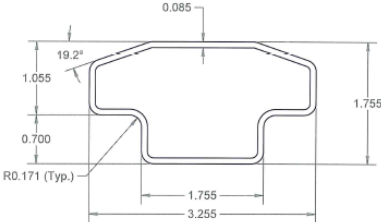
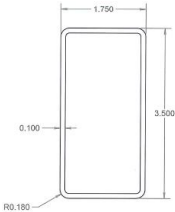
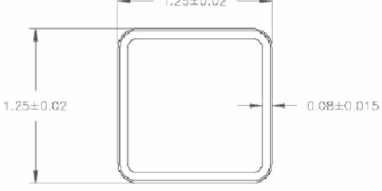
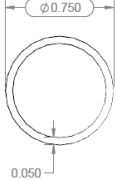
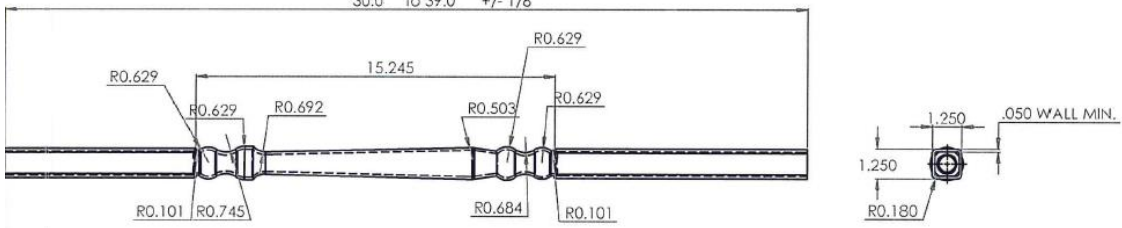
| Description | Profile |
|-------------|--|
| Top Rail |  |
| Bottom Rail |  |
| Balusters | <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Square Baluster</p> </div> <div style="text-align: center;">  <p>Round Aluminum Baluster</p> </div> </div> <div style="text-align: center; margin-top: 20px;">  <p>Turned Baluster</p> </div> |

Table 1 Continued

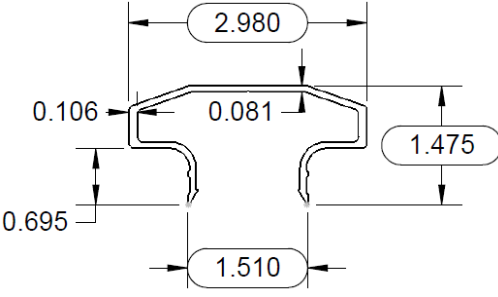
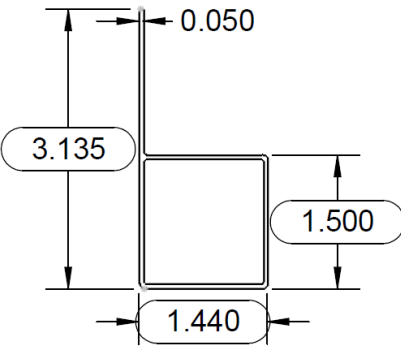
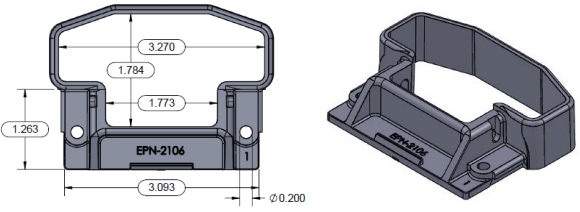
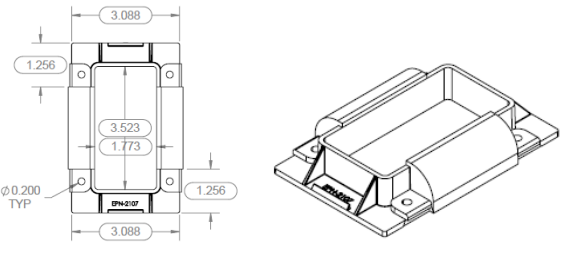
| | |
|--|--|
| <p>Top Rail Insert</p> |  |
| <p>Bottom Rail Insert</p> |  |
| <p>Level Top Rail Bracket</p> |  |
| <p>Level Bottom Rail Bracket</p> |  |

Table 2: Span Table for Endurance® Guardrail Assembly

| Guardrail Type | Top Rail Insert | Bottom Rail Insert | Baluster | Max Guardrail Span |
|--|------------------------|---------------------------|--------------------------------------|---------------------------|
| Maximum Guardrail Height 36 in. for IRC Residential One- and Two-Family Residential Dwellings | | | | |
| Level | T-Channel | P-Channel | Square, Turned, Aluminum Round | 8-ft |
| Maximum Guardrail Height 42 in. for IBC | | | | |
| Level | T-Channel | P-Channel | Square, Turned, Aluminum Round | 8-ft |

for SI conversion: 1 in = 25.4 mm, 1 psi = 47.9 Pa, 1 lbf = 0.0044 kN

Refer to Table 3 for fastening schedule

Maximum span is clear length between posts measured parallel to top/bottom rail

Table 3: Fastening Schedule for Endurance® Guardrail Assembly

| Location | Connection | Fasteners |
|-------------------|-------------------|---|
| Level Top Rail | Bracket to Post | Two #10 x 2" stainless steel wood screw ¹ |
| | Bracket to Rail | Two #10 x 1" self drilling stainless screw |
| Level Bottom Rail | Bracket to Post | Four #10 x 2" stainless steel wood screw ¹ |

¹ Pre drill with 5/32" drill bit.