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DIVISION: 06—WOOD AND PLASTICS
Section: 06500—Structural Plastics
Section: 06610—Plastic Railings and Guards

REPORT HOLDER:

EPOCH COMPOSITE PRODUCTS, INC.
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EVALUATION SUBJECT:

**EPOCH EVERGRAIN WOOD-THERMOPLASTIC
COMPOSITE DECK BOARDS AND GUARDRAIL SYSTEMS**

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2003 *International Building Code*® (IBC)
- 2003 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)

Properties evaluated:

- Structural properties
- Surface-burning characteristics
- Durability

2.0 USES

The EPOCH Evergrain Decking described in this report is recognized for exterior use for balconies, porches, decks, stair treads and other walking surfaces of combustible construction. The EPOCH Evergrain guardrail systems described in this report are recognized for exterior use for balconies, porches and decks, of Group R Occupancy buildings of Type V-B (IBC) and Type V-N (UBC) construction and structures constructed in accordance with the IRC.

3.0 DESCRIPTION

3.1 General:

EPOCH Evergrain Decking, Traditional Railing system components and the 2x4 Traditional Railing system components are manufactured by a compression molding process in accordance with the approved quality control manual. The Designer Railing system is manufactured by an extrusion process in accordance with the approved quality control manual. The EPOCH Evergrain Decking and guardrail systems consist of wood fibers, polyethylene, fillers and

colorants as described in the manufacturer's quality control manual.

3.2 Deck Board:

3.2.1 General: EPOCH Evergrain decking is manufactured in solid sections having the nominal sizes of 1-by-6 [actually 0.94 inch by 5.50 inches (23.9 by 140 mm)], 2-by-4 [actually 1.44 by 3.50 inches (37 by 89 mm)], and 2-by-6 [actually 1.44 by 5.50 inches (37 by 140 mm)]. The average installed weights of 1-by-6 and 2-by-6 EPOCH Evergrain decking are 5.3 psf and 8.2 psf (0.25 and 0.39 kN/m²), respectively.

3.2.2 Durability: When subjected to weathering, insect attack, and other decaying elements, material used to manufacture the EPOCH Evergrain decking is equivalent to preservative-treated or naturally durable lumber when used in locations described in Section 2.0 of this report. EPOCH Evergrain decking has been evaluated for a temperature range from -20°F (-29°C) to 130°F (54.4°C).

3.2.3 Surface-burning Characteristics: When tested in accordance with ASTM E 84, EPOCH Evergrain decking has a flame-spread index of no greater than 200.

3.3 Guardrail System:

3.3.1 Traditional Railing: The EPOCH Evergrain Traditional Railing system is manufactured to a height of 42 inches (1067 mm) and a rail length of 68 inches (1727 mm). The top cap rail is a combination of a nominally 2-by-6-inch [actually 1 inch by 5½ inches (25 by 140 mm)] solid cap rail and a nominally 2-by-4-inch [actually 1.44 by 3.50 inches (37 by 89 mm)] top side rail. The bottom side rail is a nominally 2-by-4-inch [actually 1.44 by 3.50 inches (37 by 89 mm)] solid board. The balusters are nominally 2-by-2-inch [actually 1.5 by 1.5 inches (37 by 37 mm)] solid components. See Figure 2 for typical component cross sections.

3.3.2 2x4 Traditional Railing: The EPOCH Evergrain 2x4 Traditional Railing System is manufactured to a height of 42 inches (1067 mm) and a rail length of 68 inches (1727 mm). The assembly is similar to the Traditional Railing system with the exception that the top rail terminates at a newel post (supplied by others). See Figure 2 for typical component cross sections.

3.3.3 Designer Railing: The EPOCH Evergrain Designer Railing system is manufactured to a height of 42 inches (1067 mm) and a rail length of 68 inches (1727 mm). The main component of the top and bottom rail is approximately 2½ inches by 2½ inches (64 by 64 mm). The bottom of the top rail component is provided with an approximately 1½-inch-wide (38 mm) channel into which the 1¼-by-1½-inch (32 by 38 mm) oval solid baluster is fitted. The top of the bottom rail component provides a 0.30-inch-high (7.6 mm) lip that supports the baluster. The top rail is provided with a finish component that slides onto the main rail component. See Figure 3 for typical component cross sections.

3.3.4 Durability: When subjected to weathering, insect attack, and other decaying elements, material used to manufacture EPOCH Evergrain is equivalent to preservative-treated or naturally durable lumber when used in locations described in Section 2.0 of this report. The EPOCH Evergrain Guardrail System has been evaluated for a temperature range from -20°F (-29°C) to 130°F (54.4°C).

3.3.5 Surface-burning Characteristics: When tested in accordance with ASTM E 84, EPOCH Evergrain has a flame-spread index of no greater than 200.

4.0 DESIGN AND INSTALLATION

4.1 General:

Installation of EPOCH Evergrain decking and guardrail systems shall comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions shall be available at the jobsite at all times during installation. When the manufacturer's published installation instructions differ from this report, this report shall govern.

4.2 Deck Boards:

4.2.1 Allowable Stresses: Table 1 lists allowable stress values for the EPOCH Evergrain decking recognized in this report. These values shall not be adjusted by any of the adjustment factors permitted for wood framing referred to in the applicable code, with the exception that increases for load duration, C_D , are permitted.

4.2.2 Allowable Spans: Table 2 lists allowable spans, continuous over two or more supports, for EPOCH Evergrain decking used as planking (flatwise bending). As an alternative, other allowable spans or other uses, such as stair treads, of EPOCH Evergrain decking can be permitted, provided the user/designer submits structural calculations regarding the specific application to the local code official for approval, establishing Evergrain's ability to resist the code-prescribed loads based on the allowable stresses in Table 1.

4.2.3 Spacing: The end-to-end gap of the deck boards shall be $\frac{1}{16}$ inch (1.6 mm) for every 20°F (11.1°C) of difference between the installation temperature and the hottest anticipated temperature. A minimum $\frac{1}{8}$ -inch (3.2 mm) gap shall be provided between boards.

4.2.4 Decking Fasteners: Allowable lateral design values for nails, wood screws, and bolts used as fasteners for the EPOCH Evergrain deck boards shall be based on an equivalent specific gravity $SG = 0.50$. Allowable stress or duration of load increases, indicated in the applicable code, are not permitted when fastener capacities are designed.

Fasteners used with EPOCH Evergrain shall comply with the following:

- Nails shall have a diameter less than or equal to that of a 16d common nail [0.162-inch (4 mm) diameter].
- Wood screws shall have a diameter less than or equal to that of a No. 12 screw [0.216-inch (5.5 mm) diameter].
- Bolts shall have a diameter less than or equal to $\frac{1}{2}$ inch (12.7 mm).

Minimum fastener edge and end distances shall be 1 inch (25.4 mm) and $\frac{1}{2}$ inch (12.7 mm), respectively. Minimum spacing of fasteners shall be 1 inch (25.4 mm). Minimum fastener penetration shall be $1\frac{1}{2}$ inches (38 mm) into the supporting construction.

4.3 Guardrail System:

4.3.1 General: The Epoch Evergrain Traditional Railing and 2x4 Traditional Railing and the Designer Railing systems provide three optional installation methods for attachment to

the supporting construction. Two of the methods address the installation of the system on the outside of the rim joist of the deck. The third method addresses the installation of the systems on the inside of the rim joist. See Figure 5 for illustrations of these alternate installations. When installing fasteners for all guardrail components, pilot holes shall be drilled as described in the manufacturer's published installation instructions. Screws shall be either stainless steel or galvanized and shall be spaced a minimum of 1 inch (25.4 mm) from the ends of the components. Each of the guardrail systems shall provide intermediate support at a maximum of 25 inches (635 mm) on center as described in the manufacturer's published installation instructions.

4.3.2 Traditional Railing: The top cap rail of the EPOCH Evergrain Traditional Railing system is attached to the top side rail utilizing one No. 8 by $2\frac{1}{2}$ -inch (64 mm) screw at a maximum of 16 inches (406 mm) on center. The top rail is designed to be a continuous rail that is attached to the supporting construction (post supplied by others) with two No. 8 by $3\frac{1}{2}$ -inch (89 mm) screws. The top rail is fastened to the adjoining post or supporting construction utilizing an L-clip supplied by the manufacturer and fastened with three No. 8 by 1-inch (89 mm) screws into the top rail and two No. 8 by $2\frac{1}{2}$ -inch (64 mm) screws into the post or supporting construction. The bottom side rail is attached to each post with two No. 8 by $2\frac{1}{2}$ -inch (64 mm) screws. The balusters are attached to the top and bottom at a maximum of 5 inches (127 mm) on center with two No. 8 by $2\frac{1}{2}$ -inch (64 mm) screws into the top and bottom side rails. One alternate installation method involves the extension of the balusters providing intermediate support down below the deck surface, with these being attached directly to the rim joist/supporting construction with two No. 8 by $2\frac{1}{2}$ -inch (64 mm) screws in each baluster. A second alternate method involves the installation of the balusters without utilizing a bottom side rail. In this method, the balusters are continuous down to the rim joist/supporting construction and are attached with two No. 8 by $2\frac{1}{2}$ -inch (64 mm) screws in each baluster. See Figure 4 for typical Traditional Railing and alternative assemblies.

4.3.3 2x4 Traditional Railing: The EPOCH Evergrain 2x4 Traditional Railing system is assembled in the same way as the basic assembly for the Traditional Railing system, with the following exception: Since the top rail is not continuous, a baluster is installed directly abutting the supporting construction or post. The balusters are attached to the supporting construction/posts utilizing four No. 8 by $3\frac{1}{2}$ -inch (64 mm) screws spaced as shown in the manufacturer's published installation instructions. The top cap rail, top side rail and bottom side rail are fastened to this baluster in the same manner as the remainder of the balusters. See Figure 5 for typical EPOCH Evergrain 2x4 Traditional Railing assembly.

4.3.4 Designer Railing: The balusters are attached to the top and bottom rails at a maximum of 5 inches (127 mm) on center with one No. 8 by $2\frac{1}{2}$ -inch (64 mm) screw installed through the top and bottom rail into the end of each baluster. The top and bottom rails are fastened to the adjoining post or supporting construction utilizing an L-clip supplied by the manufacturer and three No. 8 by 1-inch (89 mm) screws installed into the top rail and two No. 8 by $2\frac{1}{2}$ -inch (64 mm) screws installed into the post or supporting construction. See Figure 6 for typical EPOCH Evergrain Designer Railing assembly.

5.0 CONDITIONS OF USE

The EPOCH Evergrain deck boards and guardrails described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The EPOCH Evergrain decking described in this report shall be limited to exterior use for balconies, porches, decks, walking surfaces and stair treads of combustible construction.
- 5.2 The EPOCH Evergrain guardrail systems described in this report shall be limited to exterior use for balconies, porches and decks of Group R Occupancy buildings of Type V-B (IBC) and Type V-N (UBC) construction and structures constructed in accordance with the IRC.
- 5.3 Installation shall comply with this report, the manufacturer's published installation instructions and the applicable code. Only those fasteners and fastener configurations described in this report have been evaluated for the installation of the EPOCH Evergrain decking and guardrail systems. When the manufacturer's published installation instructions differ from this report, this report shall govern.
- 5.4 The use of the EPOCH Evergrain decking as a component of a fire-resistance-rated assembly is outside the scope of this report.
- 5.5 The compatibility of the fasteners, metal components and other metal hardware with the supporting construction, including chemically treated wood, is outside the scope of this report.
- 5.6 The EPOCH Evergrain Traditional Railing System, the 2x4 Traditional Railing system and the Designer Railing system have not been evaluated with posts installed in the system. The determination of the ability of the supporting construction to resist the code-specified loads is outside the scope of this report.
- 5.7 When a guardrail is supported on one or both ends by the supporting construction, the maximum distance shall be measured from center-of-post to edge-of-structure or from edge-of-structure to edge-of-structure.
- 5.8 Adjustment factors outlined in the AF&PA *National Design Specification* and applicable codes shall not apply to the allowable capacity and maximum spans for EPOCH Evergrain.
- 5.9 Deck boards and deck boards used as stair treads shall be installed in a minimum of a two-span condition.
- 5.10 EPOCH Evergrain decking and guardrail systems shall be fastened directly to supporting construction. Where

required by the code official, engineering calculations and construction documents consistent with this report shall be submitted for approval. The calculations shall verify that the supporting construction complies with the applicable building code requirements and is adequate to resist the loads imparted upon it from the products and systems discussed in this report. The documents shall contain details of the attachment to the supporting structure consistent with the requirements of this report. The documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

- 5.10 EPOCH Evergrain decking and components of the EPOCH Evergrain Traditional Railing and the 2x4 Traditional Railing systems are produced by Epoch Composite Products, Inc., at the Lamar North Plant and the Lamar South Plant, Missouri, under a quality control program with inspections by PFS Corporation (AA-652).
- 5.12 The components of the EPOCH Evergrain Designer Railing system are produced by Epoch Composite Products, Inc., in Lamar, Missouri, and Chilhowie, Virginia, under a quality control program with inspections by PFS Corporation (AA-652).

6.0 EVIDENCE SUBMITTED

- 6.1 Data establishing compliance of the EPOCH Evergrain decking with the ICC-ES Acceptance Criteria for Thermoplastic Composite Lumber Products (AC109), dated July 2004 (editorially revised November 2004).
- 6.2 Data establishing compliance of the EPOCH Evergrain guardrail systems with the ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails) (AC174), dated April 2002 (editorially revised July 1, 2004).

7.0 IDENTIFICATION

The EPOCH Evergrain decking and guardrail systems described in this report shall be identified on each individual piece or on the packaging by a stamp bearing the manufacturer's name (EPOCH Composite Products, Inc.), the product type, the name of the inspection agency (PFS Corporation) and the evaluation report number (ESR-1625).

TABLE 1—ALLOWABLE DESIGN STRESS VALUES FOR EPOCH EVERGRAIN DECKING HAVING A MAXIMUM 2-INCH THICKNESS

PROPERTY	ALLOWABLE DESIGN VALUE (psi)
Flexural stress (F_b)	245
Modulus of elasticity (MOE)	53,000
Tensile stress—parallel to longitudinal direction (F_t)	295
Compressive stress—parallel to longitudinal direction (F_c)	860
Compressive stress—perpendicular to longitudinal direction ($F_{c\perp}$)	400
Shear stress (F_v)	225

For **SI**: 1 psi = 6.9 kPa.

TABLE 2—EPOCH EVERGRAIN DECKING SPAN CHART^{1,2}

MEMBER SIZE	ALLOWABLE MEMBER SPAN BETWEEN SUPPORTS WHEN SUPPORTING 100 psf UNIFORM LIVE LOADING ^{3,4} (inches)
1-by-6	16
2-by-6	20

For **SI**: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m².

¹Tabulated span values are for members used as planking (flatwise bending). The values are permitted to be used in lieu of application-specific calculations.

²Members shall be supported by a minimum of three joists and must be fastened at each joist.

³Tabulated spans are based on a deflection limit of L/180.

TABLE 3—MAXIMUM GUARDRAIL SPAN^{2,3}

PRODUCT NAME	APPLICABLE BUILDING CODE ⁴			MAXIMUM SPAN (ft-in) ¹
	IBC	IRC	UBC	
EPOCH Evergrain Traditional Railing	Yes	Yes	Yes	5' - 8"
EPOCH Evergrain 2x4 Traditional Railing	Yes	Yes	Yes	5' - 8"
EPOCH Evergrain Designer Railing	Yes	Yes	Yes	5' - 8"

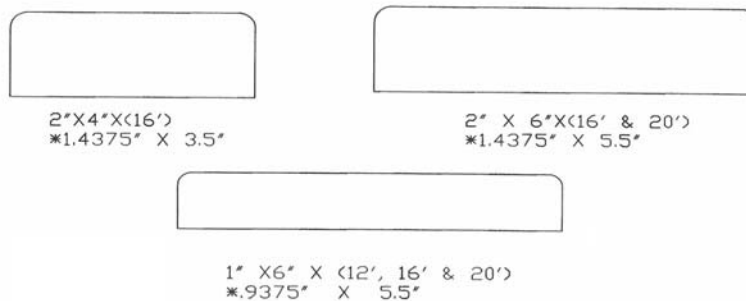
For **SI**: 1 inch = 25.4 mm, 1 ft = 305 mm.

¹Maximum span shall be measured from edge-of-supporting-construction to edge-of-supporting-construction.

²Maximum allowable span has been adjusted for durability. No further increases are permitted.

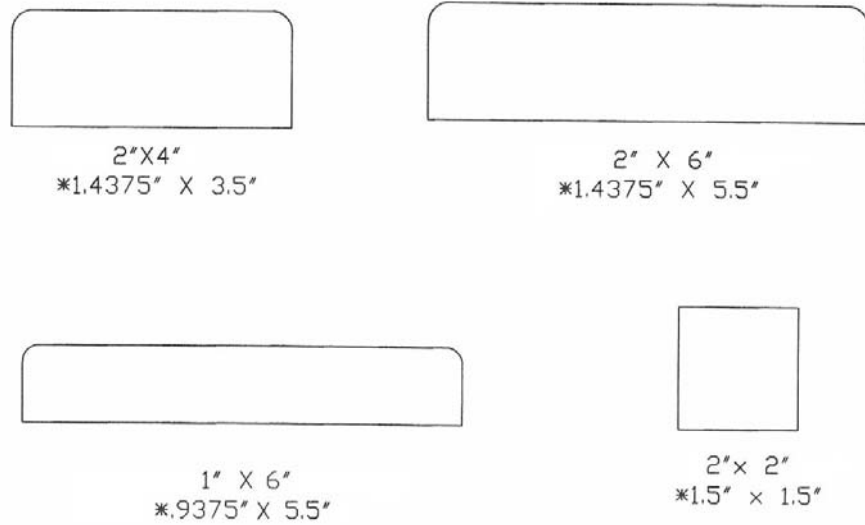
³Evaluation of this guardrail does not include the post, post sleeve or post base attachment. The ability of the supporting construction to resist the reactionary loads shall be established as required by the code official.

⁴Indicates compliance with the respective building codes.



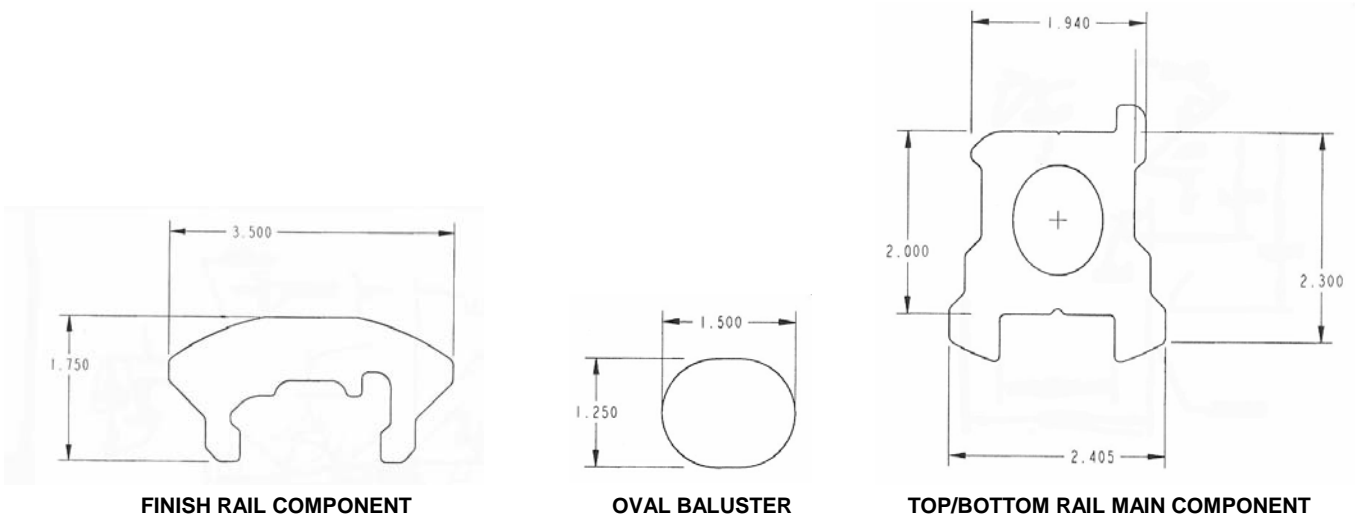
For **SI**: 1 inch = 25.4 mm.

FIGURE 1—EPOCH EVERGRAIN DECKING CROSS SECTIONS



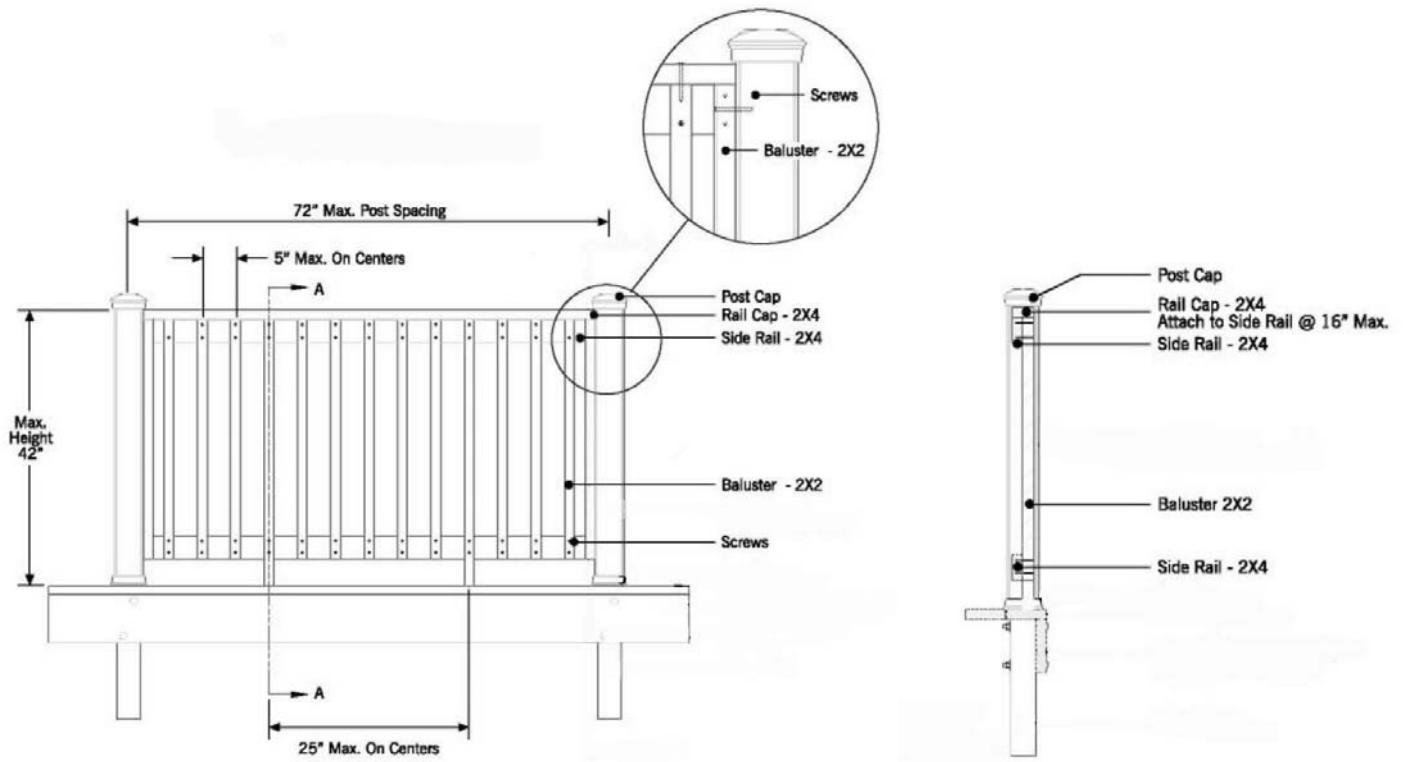
For SI: 1 inch = 25.4 mm.

FIGURE 2—EPOCH EVERGRAIN TRADITIONAL RAILING AND 2x4 TRADITIONAL RAILING COMPONENT CROSS SECTIONS



For SI: 1 inch = 25.4 mm.

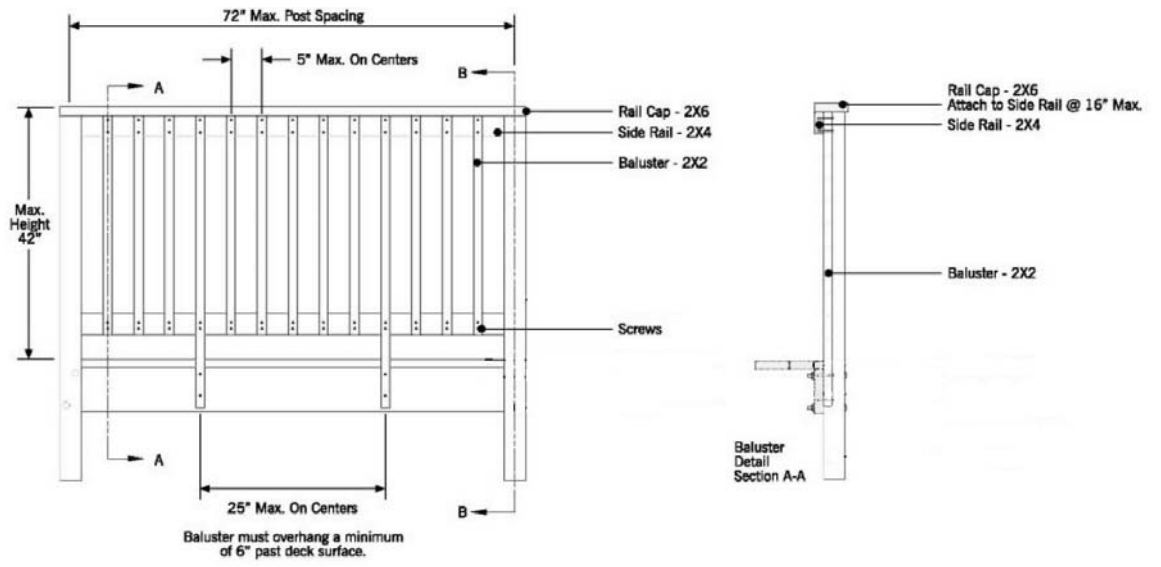
FIGURE 3—EPOCH EVERGRAIN DESIGNER RAILING COMPONENT CROSS SECTIONS



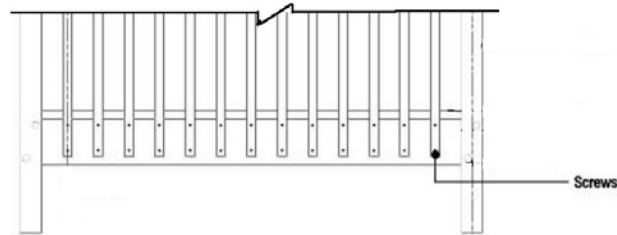
For SI: 1 inch = 25.4 mm.

FIGURE 4— EPOCH EVERGRAIN 2x4 TRADITIONAL GUARDRAIL ASSEMBLY

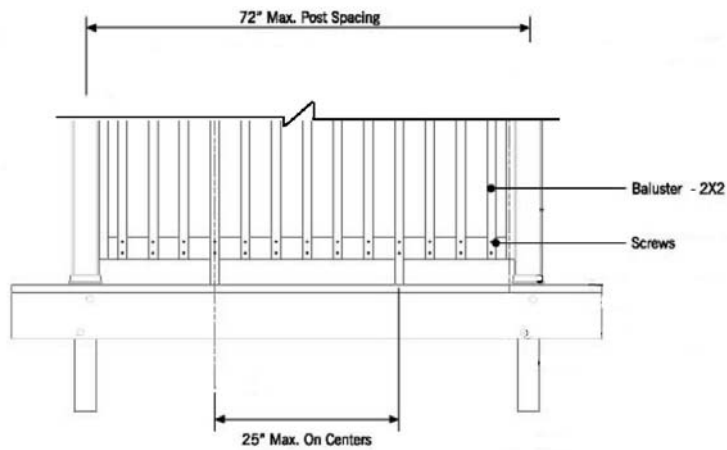
**OUTSIDE RIM JOIST
(INTERMEDIATE
BALUSTERS
TO RIM JOIST)**



**OUTSIDE RIM JOIST
(ALL BALUSTERS TO
RIM JOIST)**

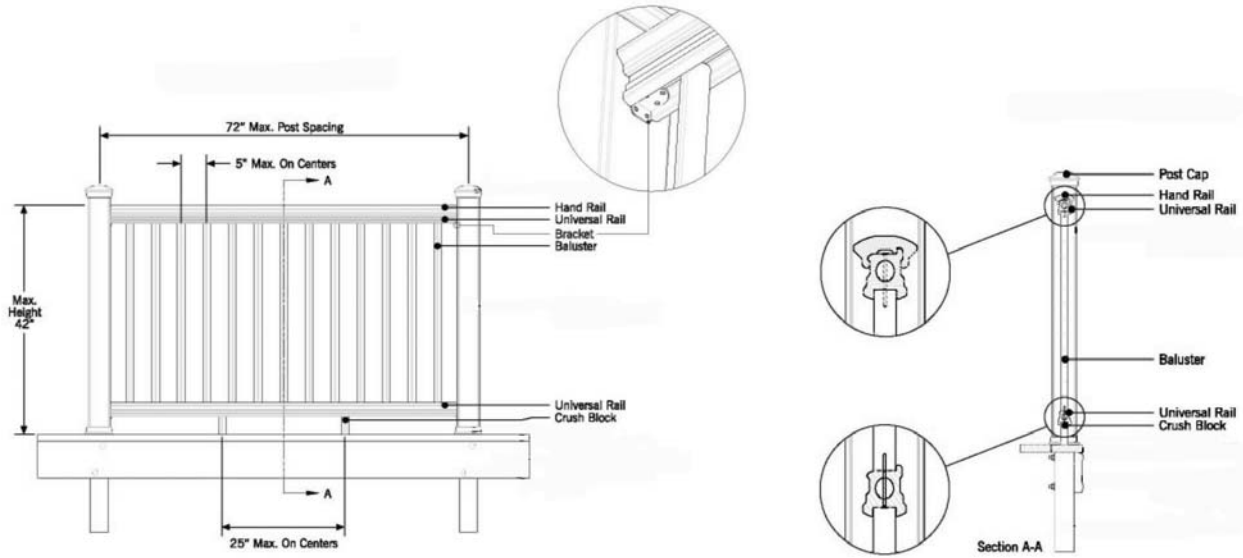


**INSIDE RIM JOIST
(BALUSTER TO SIDE
RAIL)**



For SI: 1 inch = 25.4 mm.

FIGURE 5—EPOCH EVERGRAIN TRADITIONAL AND ALTERNATIVE BOTTOM RAIL ASSEMBLIES



For SI: 1 inch = 25.4 mm.

FIGURE 6— EPOCH EVERGRAIN DESIGNER GUARDRAIL ASSEMBLY