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Section: 06500—Structural Plastics
Section: 06610—Plastic Railings and Guards

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EVALUATION SUBJECT:

VINYL GUARDRAIL SYSTEMS

ADDITIONAL LISTEE:

LANSING BUILDING PRODUCTS
8501 SANFORD DRIVE
RICHMOND, VIRGINIA 23228

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)

Properties evaluated:

- Structural
- Durability
- Surface-burning characteristics

2.0 USES

The vinyl guardrail systems described in this report are limited to exterior use as guards for balconies, porches, decks and stairs. The products described in this report are used in exterior applications in (1) one-and-two family dwellings, or (2) any occupancy group in buildings of Type V-B (IBC) construction and other types of construction in applications where untreated wood is permitted by IBC Section 1406.3, and (3) dwellings constructed in accordance with the IRC. (See Table 1 for occupancy and other restrictions.)

3.0 DESCRIPTION

3.1 General:

The guardrail systems are made of coextruded hollow profile polyvinyl chloride (PVC) manufactured in white, tan and gray colors. The railing is manufactured by a coextrusion process in accordance with the approved quality control manual, to produce balusters and railing components. See Table 2 for guardrail dimensions by brand name.

3.2 Vinyl Guardrail Systems:

3.2.1 Quantum® Guardrail System: The top Quantum® rail is a 3-inch-wide-by-$1^3/_4$-inch-high-by-0.08-inch-thick-wall (76.2 by 44.5 by 2.0 mm) PVC coextruded hollow "T" profile. The Quantum® Guardrail System is available in up to 10-foot-long-by-42-inch-high (3 m by 1067 mm) sections. The top and bottom rails have aluminum inserts for reinforcement. The bottom rail is a 2-inch-wide-by-$2^1/_2$-inch-high-by-0.09-inch-thick-wall (50.8 by 63.5 by 2.3 mm) PVC coextruded hollow rectangular profile. The top and bottom Quantum® rails are attached to 4-inch-by-4-inch (102 mm by 102 mm), preservative-treated, vinyl sleeved wood posts, which are outside the scope of this report. The balusters are $1^3/_8$-inch (35 mm) square, coextruded, hollow PVC cross sections or $1^3/_8$-inch (35 mm), square-ended, thermo-formed, blow-molded, hollow PVC cross sections made from monoextruded lineals.

3.2.2 2-by-3.5 Guardrail System: The vinyl guardrails are manufactured as 2-inch- wide-by-3.5 inch-high-by-0.12-inch-thick (50.8 by 88.9 by 3 mm) PVC coextruded, rectangular profile, top and bottom rails. The vinyl guardrail system is available in sizes up to10 feet long by 42 inches high (3 m by 1067 mm). The rectangular top and bottom rails have aluminum inserts for reinforcement. The balusters are $1^3/_8$-inch (35 mm) square, coextruded, hollow PVC cross sections or $1^3/_8$-inch (35 mm), square-ended, thermo-formed, blow-molded, hollow PVC cross sections made from monoextruded lineals. Top and bottom rails are attached to 4-inch-by-4-inch (102 mm by 102 mm), preservative-treated, vinyl sleeved wood posts, which are outside the scope of this report.

3.3 Durability:

When subjected to weathering, insect attack, and other decaying elements, the materials used to manufacture the Quantum® and 2-by-3.5 guardrail systems are equivalent in durability to code-complying, preservative-treated or naturally durable lumber when used in locations described in Section 2.0. The Quantum® and 2-by-3.5 guardrail systems have been evaluated for structural performance when exposed to temperatures from -20°F (-29°C) to 125°F (52°C).

3.4 Surface-burning Characteristics:

When tested in accordance with ASTM E 84, the Quantum® and 2-by-3.5 guardrail systems have a flame spread index of less than 200.

4.0 DESIGN AND INSTALLATION

4.1 General:

Installation of the Quantum® and 2-by-3.5 guardrail systems must comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions must be available at the jobsite at all times during installation.

4.2 Structural:

The Quantum® and 2-by-3.5 guardrail systems are satisfactory to resist the loads specified in Section 1607.7.1 of the IBC and Table R301.5 of the IRC, when installed at a maximum 120-inch (3 m) clear span post spacing. When a railing is supported on one or both ends by the supporting construction, the maximum distance must be measured from the inside face of the post to edge-of-structure or edge-of-structure to edge-of-structure, respectively. See Table 1 (notes) for actual measurement of rail.

4.3 Installation:

4.3.1 Guardrail Systems for Any Occupancy Group:

4.3.1.1 Quantum® Guardrail System: The Quantum® is a maximum 8-foot-long (2.4 m) rail assembly in which the top and bottom rails must be attached to a post and rigid column or building wall with four zinc die-cast brackets secured with four No. 10 by $1^1/_2$-inch (38 mm), stainless steel wood screws. Each bracket is secured to the Quantum® top and bottom rails with two No.12 by $1^1/_2$-inch (38 mm), self-drilling hex-head screws.

Balusters are $1^3/_8$-inch (35 mm) square, coextruded, hollow PVC pickets or $1^3/_8$-inch (35 mm), square-ended, thermo-formed/blow-molded, hollow PVC spindles from monoextruded lineals. The balusters are installed into routed holes in top and bottom rails.

4.3.1.2 2-by-3.5 Guardrail System: The 2-by-3.5 is a maximum 10-foot-long (3 m) rail assembly in which the rectangular top and bottom rails must be attached to a post and rigid column or building wall with four zinc die-cast brackets secured with six No. 10 by $1^1/_2$-inch (38 mm) stainless wood screws. Each bracket holding a 2-inch-by-3.5-inch (50.8 by 88) top and bottom rail is secured to the top and bottom vinyl rectangular rails with four No. 12 by $1^1/_2$-inch (38 mm), stainless steel, self-drilling hex-head screws.

Balusters are $1^3/_8$-inch (35 mm) square, co-extruded, hollow PVC pickets or $1^3/_8$-inch (35 mm), square-ended, thermo-formed/blow-molded, hollow PVC spindles from monoextruded lineals. The balusters are installed into routed holes in top and bottom rails.

4.3.2 Guardrail Systems for One- and Two-family Dwellings (IBC or IRC):

The Quantum® is a maximum 10-foot-long (3 m) rail assembly in which the top and bottom rails must be attached to a post and rigid column or building wall with four zinc die-cast brackets secured with four No. 10 by $1^1/_2$-inch (38 mm), stainless steel wood screws. Each bracket is secured to the Quantum® top and bottom rails with two No.12 by $1^1/_2$-inch (38 mm), self-drilling hex-head screws.

Balusters are $1^3/_8$-inch (35 mm) square, coextruded, hollow PVC pickets or $1^3/_8$-inch (35 mm), square-ended, thermo-formed/blow-molded, hollow PVC spindles from monoextruded lineals. The balusters are installed into routed holes in top and bottom rails.

5.0 CONDITIONS OF USE

The Quantum® and 2-by-3.5 guardrail systems 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 use of these products must be limited to exterior use as guards for balconies, porches, decks and stairs in (1) one-and-two dwellings, or (2) any occupancy group in buildings of Type V-B (IBC) construction and other types of construction in applications where untreated wood is permitted by IBC Section 1406.3 (IBC), and (3) dwellings constructed in accordance with the IRC.

5.2 The 10-foot-long (3 m) Quantum® guardrail system has not been evaluated for use as a handrail or as a guard for stairs.

5.3 Installation complies 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 railing system. If there is a conflict between this report and the manufacturer's published installation instructions, this report governs.

5.4 The use of wood posts, with or without post sleeves, is outside the scope of this report.

5.5 The use of 9- or 10-foot-long-by-42-inch-high (2.75 m or 3 m by 1067 mm) Quantum® guardrail assemblies must be limited to one- and two-family dwellings.

5.6 The compatibility of the fasteners, metal post mount brackets and other metal hardware with the supporting construction, including chemically treated wood, is outside the scope of this report.

5.7 Adjustment factors outlined in the AF&PA *National Design Standard* and applicable codes do not apply to the allowable capacity and maximum spans for the railing system.

5.8 The Quantum® and 2-by-3.5 guardrail systems must be directly fastened to supporting construction. Where required by the code official, engineering calculations and construction documents consistent with this report must be submitted for approval. The calculations must 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 must contain details of the attachment to the supporting structure consistent with the requirements of this report. The documents must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.9 The Quantum® and 2-by-3.5 guardrail systems are produced in Macon, Mississippi, under a quality control program with inspections by RADCO (AA-650).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails) (AC174), dated February 2007(editorially revised April 2008).

7.0 IDENTIFICATION

Each railing section described in this report is identified on the packaging by a label or stamp bearing the manufacturer's name (Outdoor Technologies, Inc.) or the listee name (Lansing Building Products), the part number, the name of the inspection agency (RADCO) and the ICC-ES evaluation report number (ESR-2339). The label for the10-foot-long-by-42-inch-high (3 m by 1067 mm) Quantum® guardrail systems must also include the phrase "For Use in One- and Two-Family Dwellings Only."

TABLE 1—MAXIMUM GUARDRAIL SYSTEM SPANS[1]

PRODUCT NAME/COMPONENT	APPLICABLE BUILDING CODE[2]		MAXIMUM SPAN (ft-in)[3,4]
	IBC	IRC	
The 8-foot-long Quantum® vinyl guardrail system	Yes	Yes	8-0
The 10-foot-long Quantum® vinyl guardrail system	Yes[5]	Yes	10-0
The 2-inch-by-3.5-inch vinyl guardrail system	Yes	Yes	10-0

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

[1]The ability of the supporting construction to resist the reactionary loads must be confirmed by the code official.
[2]Indicates compliance with the respective building codes.
[3]Maximum span is measured inside-to-inside of the posts or from edge-of-building to inside-of-post or edge-of-building to edge-of-building where the rail is supported directly by the building.
[4]Maximum allowable span is adjusted for durability. No further increases are permitted.
[5]This rail assembly meets the one- and two-family dwelling requirements of Section 1607.7.1 of the IBC.

TABLE 2—DIMENSIONS OF GUARDRAIL SYSTEMS (inches)

RAILING SYSTEM MODEL NAME/BRAND NAME	OVERALL GUARDRAIL (height × length)[1]	TOP RAIL (width × height)	BOTTOM RAIL (width × height)	BALUSTERS (width × height)	BALUSTER SPACING[2]
Steinbeck & Stanton/Heritage Hillcrest & Parkcrest /VinylGard Huntington & Princeton /DuraVinyl Windjammer/Lansing Building Products Quantum T Rail/OTI	36 × 48, 36 × 60 36 × 72, 36 × 84 36 × 96, 36 × 108[3] 36 × 120[3] 42 × 48, 42 × 60 42 × 72, 42 × 84 42 × 96, 42 × 108[3] 42 × 120[3]	3 × 1.75 Low-profile “T”	2 × 2.5 rectangular rail	1.375 square 1.375 spindle	3.75
Wilson & Rutherford/Heritage Wakefield & Windham/VinylGard Layton & Leland/DuraVinyl Pinnacle/Lansing Building Products 2 × 3.5 Rail/OTI	36 × 48, 36 × 60 36 ×72, 36 × 84 36 × 96, 36 × 108 36 × 120 42 × 48, 42 × 60 42 × 72, 42 × 84 42 × 96, 42 × 108 42 × 120	2 × 3.5 rectangular rail	2 × 3.5 rectangular rail	1.375 square 1.375 spindle	3.75

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

[1]Height dimension is measured from the top of the horizontal top rail to the top of the floor surface. Length dimension is measured from the clear opening between two posts.
[2]Spacing dimension is maximum clearance between balusters.
[3]Limited to one- and two-family dwellings only.