



EXTERIOR RESEARCH & DESIGN, LLC.
 80 Yesler Way, Suite 200
 Seattle, WA 98104
 PHONE: (206) 467-0054
 FAX: (206) 267-0272

EVALUATION REPORT

CertainTeed Corporation
750 East Swedesford Road
Valley Forge, PA 19482
(800) 233-8990

Evaluation Report C35420.02.14-1-R1
Date of Issuance: 02/17/2014
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1. SCOPE:

Evaluation of the "Kingston Guard Rail System" for conformance with the National Building Code of Canada (NBC) 2010 and the Ontario Building Code (OBC) 2012 loading requirements for guards within dwelling units serving no more than two dwelling units.

This Evaluation Report consists of pages 1 through 3.

2. STANDARDS:

<u>Standard</u>	<u>Year</u>	<u>Property</u>
NBC, Section 9.8.8.2	2010	Loading requirements
OBC, Section 9.8.8.2	2012	Loading requirements
ICC-ES AC174	2012	Loading procedure
ICC-ES AC273	2008	Loading requirements
ASTM D1761	2000	Fastener loading
ASTM D7032	2010	Performance ratings

3. REFERENCES:

<u>Entity</u>	<u>Examination</u>	<u>Reference</u>	<u>Date</u>
Architectural Testing, Inc.	Concentrated Load	59758.02-119-19	05/31/2006
Architectural Testing, Inc.	Uniform Load	D2183.01-119-19	12/19/2013

4. PRODUCT DESCRIPTION:

4.1 The Kingston Guard Rail System is comprised of PVC rails, balusters and post-sleeves produced by extrusion process and by a blow molding process (PVC spindles). Rails are reinforced with aluminum and attached to wood support posts using external aluminum brackets. The bottom rail of level configurations utilizes a support block located mid-span.

TABLE 1: RAILING DESCRIPTION	
Style:	Kingston Guard Rail System
Type:	Exterior use guard rail system for one and two family dwellings
Materials:	Extruded thermoplastic (PVC) with aluminum reinforcement
Rail Type:	1-9/16" x 3-3/16" wide contoured PVC rail
Rail Reinforcement:	U-rail; 6005-T5 aluminum alloy; 1.77" wide x 1.31" high x 0.12" thick
Rail Connection:	External aluminum brackets
Baluster Type:	1-1/2" square PVC picket or 1-1/2" square PVC spindle
Support (Foot) Block:	3-1/4" long x 1-3/4" wide x 2-7/16" deep x 0.106" thick PVC profile block located mid-span of bottom rail (for use with level systems)
Support:	Attached to full height posts or walls; posts nominal 4x4" PT Southern Yellow Pine

5. ANALYSIS:

- 5.1 Trinity|ERD evaluated the above-noted guardrail system for conformance with the loading requirements and load application locations as specified in the NBC 2010 / OBC 2012 codes.
- 5.2 The test loads were the code live loads (LL) x live load factor listed in Section 4.1.3.2.5 ($\Phi = 1.5$) x Factor of Safety (FOS = 1.5).

TABLE 2A: RESULTS, UNIFORM LOAD DISTRIBUTION							
Loading	LL		$\Phi \times LL$		Test Load		Results
	kN/m	plf	kN/m	plf	kN/m	plf	
Horizontal	0.5	34	0.75	51	1.13	77	Pass
Vertical (down)	1.5	103	2.25	154	3.38	231	Pass

TABLE 2B: RESULTS, CONCENTRATED LOAD							
Loading	LL		$\Phi \times LL$		Test Load		Results
	kN	lbf	kN	lbf	kN	lbf	
Midpoint / horizontal	1.0	225	1.50	337	2.25	506	Pass
End / horizontal	1.0	225	1.50	227	2.25	506	Pass
Spindles (balusters)	0.5	112	0.75	169	1.13	253	Pass

6. LIMITATIONS:

- 6.1 Analysis is limited to exterior use guard rail system for one and two family dwellings.
- 6.2 Anchorage of support posts to the supporting structure is not included in this Evaluation Report and would need to be evaluated separately.
- 6.3 This evaluation is limited to the following:
- 6.3.1 Level / In-Line and Level / 45° Assemblies: Maximum rail-length between adequate supports of 93-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 39-3/4-inch. This assembly translates to the 93 x 42 inch system.
- 6.3.2 Level / 22.5° Assembly: Maximum rail-length between adequate supports of 93-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 33-3/4-inch. This assembly translates to the 93 x 36 inch system.
- 6.3.3 Stair Assemblies: Maximum rail-length between adequate supports of 92-inch with maximum overall rail height (from top of top rail to bottom of bottom rail) of 34-inch. This assembly translates to the 9 x 36 inch system.

7. INSTALLATION:

- 7.1 In accordance with CertainTeed published installation instructions subject to the following fastening schedule limitations:

TABLE 3: MINIMUM FASTENING SCHEDULE	
Connection	Fastening
Top Rail Bracket to Post (bottom holes)	Two (2) #8-18 x 2" (0.120" minor diameter) pan head, self-drilling screws
Top Rail Bracket to Rail	Two (2) #8-18 x 1" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)
Bottom Rail Bracket to Post (top holes)	Two (2) #8-18 x 2" (0.120" minor diameter) pan head, self-drilling screws
Bottom Rail Bracket to Rail	Two (2) #8-18 x 1" (0.120" minor diameter) pan head, self-drilling screws (9/64" diameter pre-drill)
Foot Block to Bottom Rail (for level systems only)	Two (2) #8-18 x 3/4" (0.120" minor diameter) pan head, self-drilling screws

8. COMPLIANCE STATEMENT:

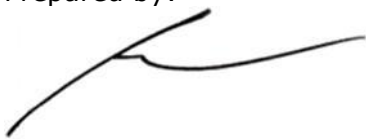
The **Kingston Guard Rail System**, as produced by CertainTeed Corporation, has demonstrated compliance with the sections of the National Building Code and Ontario Building Code noted in Section 2 through testing in accordance with the referenced Standards. Compliance is subject to the Limitations and Installation sections noted herein.

9. CERTIFICATION OF INDEPENDENCE:

Exterior Research & Design, LLC. d/b/a Trinity | ERD does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products it evaluates.

Exterior Research & Design, LLC. d/b/a Trinity | ERD is not owned, operated or controlled by any company manufacturing or distributing products it evaluates.

Prepared by:

A black ink signature of Robert Nieminen, consisting of a long, sweeping horizontal stroke with a small loop at the end.

Robert Nieminen, P.E.
Vice President

A blue ink signature of Colin Murphy, featuring a large, stylized loop at the beginning followed by a horizontal line and a small loop at the end.

Colin Murphy, RRC, FRCI, LEED AP
Principal