

TEST REPORT



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EVALUATION CENTER

INTERTEK TESTING SERVICES NA LTD.
1500 BRIGANTINE DRIVE
COQUITLAM, BC V3K 7C1

RENDERED TO

CENTURY ALUMINUM RAILINGS
A DIVISION OF BEAVER HOME IMPROVEMENTS
9685 AGUR STREET
SUMMERLAND, BC V0H1Z2
CANADA

PRODUCT EVALUATED:
8 ft. Component Picket System

EVALUATION PROPERTY:
Load Requirements

Report of 8 ft. Component Picket System for compliance with the applicable requirements of the following criteria:

- **2010 National Building Code of Canada**
 - Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6
- **2012 Ontario Building Code**
 - Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6
- **2006 Alberta Building Code**
 - Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6
- **2012 British Columbia Building Code**
 - Section 9.8.8.2, 9.8.8.3, 9.8.8.5, and 9.8.8.6

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted a test program on a railing system submitted by Century Aluminum Railings – A Division of Beaver Home Improvements. The evaluation was carried out to determine whether their 8 ft. Component Picket System would resist the required loads for dwelling units and exterior guards serving not more than 2 dwelling units, as specified in the following Building Codes:

- 2010 National Building Code of Canada (NBC)
 - Section 9.8.8.2, *Loads On Guards*
 - Section 9.8.8.3, *Height of Guards*
 - Section 9.8.8.5, *Openings in Guards*
 - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
- 2012 Ontario Building Code (OBC)
 - Section 9.8.8.2, *Loads On Guards*
 - Section 9.8.8.3, *Height of Guards*
 - Section 9.8.8.5, *Openings in Guards*
 - Section 9.8.8.6, *Guards Designed Not to Facilitate Climbing*
- 2006 Alberta Building Code (ABC)
 - Section 9.8.8.2, *Loads On Guards*
 - Section 9.8.8.3, *Height of Guards*
 - Section 9.8.8.5, *Openings in Guards*
 - Section 9.8.8.6, *Design to Prevent Climbing*
- 2012 British Columbia Building Code (BCBC)
 - Section 9.8.8.2, *Loads On Guards*
 - Section 9.8.8.3, *Height of Guards*
 - Section 9.8.8.5, *Openings in Guards*
 - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*

This evaluation was conducted in the month of February 2015.

3 Test Samples

3.1. SAMPLE SELECTION

The client submitted various railing components to assemble one (1) 8 ft. guard rail system to the Evaluation Center on February 19, 2015 (Coquitlam ID# VAN1502191013-001). Components submitted were posts with caps, pickets, top and bottom rails, picket spacers, and fasteners.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The assembled railing system was identified as the following:

Table 1. Railing Details				
Railing	Posts and Base	Picket	Rails	Other
8 ft. Component Picket System	2-1/2" x 2-1/2" (6063-T54 aluminum) with 4" x 4" x 1/4" base (6005A-T6 aluminum)	5/8" x 5/8" 6063-T54 aluminum	Top and bottom rail 6063-T54 aluminum	2 support legs spaced equally under bottom rail; 6063-T54 aluminum

Note: The installation of the guardrail to the deck was not within the scope of this report, and is subject to evaluation and approval by the building official. Four 3/8 in. grade 5 bolts and washers on each post were used to install the specimen for testing.

4 Testing and Evaluation Methods

The evaluation was conducted in accordance with the testing procedures of ASTM E935-13e1, *Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings*. The test specimen was loaded at a rate to achieve the specified loads between 10 seconds and 5 minutes. The specified test loads were held for one minute before the load was released. As per Section 9.8.8.2 of the 2010 NBC, 2012 OBC, 2006 ABC, and 2012 BCBC, the following tests were conducted for use within dwelling units and exterior guards serving not more than 2 dwelling units:

4.1 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.2. LOADS ON GUARDS

- 1) The minimum specified horizontal load applied inward or outward at the top of every required guard shall be 0.5 kN/m or a concentrated load of 1.0 kN applied at any point
- 2) Individual elements within the *guard*, including solid panels and pickets, shall be designed for a concentrated load of 0.5 kN applied over an area of 300 mm x 300 mm located at any point in the element or elements so as to engage 3 balusters.
- 3) The minimum specified load applied vertically at the top of every required *guard* shall be 1.5 kN/m.
- 4) None of the loads specified above need be considered to act simultaneously.

Notes:

1. A safety factor of 1.67-2.24 was applied to the above loads.

4.2 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.3 HEIGHT OF GUARDS

- 1) All guards shall be not less than 1070 mm high.

4.3 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.5 OPENINGS IN GUARDS

- 1) Openings through any guard shall be of a size that will prevent the passage of a spherical object having a diameter of 100 mm unless it can be shown that the location and size of openings that exceed this limit do not present a hazard.

4.4 2010 NBC/2012 OBC/2006 ABC/2012 BCBC: SECTION 9.8.8.6 DESIGN OF GUARDS TO NOT FACILITATE CLIMBING

- 1) Guards except those in industrial occupancies and where it can be shown that the location and size of openings do not present a hazard, shall be designed so that no member, attachment or opening facilitates climbing.
- 2) Guards shall be deemed to comply with Sentence (1) where all elements protruding from the vertical and located within the area between 140 mm and 900 mm above the floor or walking surface protected by the guard conform to one of the following clauses:
 - a) they are located more than 450mm horizontally and 20 mm vertically, or
 - b) they provide not more than 15 mm horizontal offset,
 - c) they do not provide a toe-space more than 45mm horizontally and 20 mm vertically, or
 - d) they present more than a 2-in-1 slope on the offset.

4.5 IN-FILL LOAD TEST

A load of 0.83 kN (187 lbf) was applied using a 300 mm x 300 mm square block on the center of the railing system normal to the in-fill so as to engage 3 glass balusters. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and visible cracks in any component.

4.6 UNIFORM LOAD TEST

The top rail of the guardrail system was subjected to two separate tests where a maximum equivalent uniform load of 0.83 kN/m (57 plf) was applied horizontally and 2.50 kN/m (171 plf) was applied vertically. The loads were applied using quarter point loads. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and visible cracks in any component.

4.7 CONCENTRATED LOAD TEST

The top rail of the guardrail system was subjected to three separate tests where a concentrated load was applied at the following locations:

- 1.67 kN (375 lbs) horizontally at the centre of the guardrail,
- 2.24 kN (503 lbs) horizontally at the top rail adjacent to the post connection to verify the connection capacity, and
- 1.67 kN (375 lbs) horizontally at the top of the post.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The product test results are shown in Table 1 below and a copy of the test data is located in Appendix A.

Table 1. Test Results				
Section	Property	Result	Requirement	Pass/Fail
9.8.8.2	In-fill Load	187 lbs	187 lbs	Pass
	Vertical Uniform Load	171 lbs/ft	171 lbs/ft	Pass
	Horizontal Uniform Load	57 lbs/ft	57 lbs/ft	Pass
	Mid-span Concentrated Load	375 lbs	375 lbs	Pass
	Adjacent to Post Connection Concentrated Load	503 lbs	503 lbs	Pass
	Top of Post	375 lbs	375 lbs	Pass
	Top of Post Ultimate Failure	561 lbs	As Reported	As Reported
9.8.8.3	Height of Guards	1070 mm	≥ 1070 mm	Pass
9.8.8.5	Openings in Guards	Between pickets: 98 mm Under bottom rail: 64 mm	< 100 mm	Pass
9.8.8.6	Design to Not Facilitate Climbing	No elements protruding from the vertical between 140 mm and 900 mm	No elements from the vertical between 140 mm and 900 mm that facilitate climbing	Pass

6 Conclusion


The Century Aluminum Railings 8 ft. Component Picket System identified and evaluated in this test report has complied with the load requirements for guards within dwelling units and in exterior guards serving not more than 2 dwelling units, as specified in the following Building Codes:

- 2010 National Building Code of Canada (NBC)
 - Section 9.8.8.2, *Loads On Guards*
 - Section 9.8.8.3, *Height of Guards*
 - Section 9.8.8.5, *Openings in Guards*
 - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
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 - Section 9.8.8.5, *Openings in Guards*
 - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*


The product test results are presented in Section 5 of this report.

INTERTEK TESTING SERVICES NA LTD.


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