

# TEST REPORT

**Intertek**

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## **EVALUATION CENTER**

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

## **RENDERED TO**

CENDEK RAILINGS LTD.  
9685 AGUR STREET  
SUMMERLAND, BC V0H 1Z2  
CANADA

**PRODUCT EVALUATED:**  
6.25 ft. Aluminum 5mm Glass Railing System

**EVALUATION PROPERTY:**  
Load Requirements

**Report of 6.25 ft. Aluminum 5mm Glass Railing System for compliance with the requirements of the following criteria:**

- **2010 National Building Code of Canada**
  - **Section 4.1.5.14, Loads on Guards**
  - **Section 9.8.8.2 Loads on Guards**
- **2012 British Columbia Building Code**
  - **Section 4.1.5.14, Loads on Guards**
  - **Section 9.8.8.2 Loads on Guards**
- **2012 Ontario Building Code**
  - **Section 4.1.5.14, Loads on Guards**
  - **Section 9.8.8.2 Loads on Guards**

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# 1 Table of Contents

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1	Table Of Contents .....	2
2	Introduction .....	3
3	Test Samples .....	3
	3.1. Sample Selection.....	3
	3.2. Sample And Assembly Description .....	3
4	Testing And Evaluation Methods .....	4
	4.1 2010 NBC / 2012 BCBC / 2012 OBC: Section 4.1.5.14 Loads On Guards .....	4
	4.2 2010 NBC / 2012 BCBC / 2012 OBC: Section 9.8.8.2 Loads On Guards .....	4
	4.3 2010 NBC / 2012 BCBC / 2012 OBC: Section 9.8.8.3 Height Of Guards.....	4
	4.4 2010 NBC / 2012 BCBC / 2012 OBC: Section 9.8.8.5 Openings In Guards.....	5
	4.5 2010 NBC / 2012 BCBC / 2012 OBC: Section 9.8.8.6 <i>Design Of Guards To Not Facilitate Climbing / Guards Designed Not To Facilitate Climbing</i> .....	5
	4.6 In-Fill Load Test.....	5
	4.7 Uniform Load Test.....	5
	4.8 Concentrated Load Test.....	5
	4.9 Height Of Guards .....	5
	4.10 Openings In Guards.....	6
	4.11 Design To Prevent Climbing .....	6
5	Testing And Evaluation Results.....	7
	5.1. Results And Observations .....	7
6	Conclusion .....	8
	Appendix A Test Data .....	3 Pages
	Appendix B Drawings.....	5 Pages

## 2 Introduction

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Intertek Testing Services NA Ltd. (Intertek) has conducted a test program for an Aluminum Glass Railing System submitted by Cendek Railings Ltd. The evaluation was carried out to determine whether the railings would meet the requirements of the following:

- 2010 National Building Code of Canada (NBC)
  - Section 4.1.5.14, *Loads On Guards*
  - 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 British Columbia Building Code (BCBC)
  - Section 4.1.5.14, *Loads On Guards*
  - Section 9.8.8.2 *Loads on Guards*
  - Section 9.8.8.3, *Height of Guards*
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  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
- 2012 Ontario Building Code (OBC)
  - Section 4.1.5.14, *Loads On Guards*
  - 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*

This evaluation was conducted in the months of January to February 2016.

## 3 Test Samples

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### 3.1. SAMPLE SELECTION

The client submitted one (1) aluminum railing system to the Evaluation Center on January 11, 2016 (Coquitlam ID# VAN1601111234-001). Samples were not independently selected for testing.

### 3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The sample was identified as the following:

Table 1. Railing Configuration					
Railing	Post	Post Spacing	Mounting Plate	Rails	Panel Insert
Aluminum Glass Panel – Deck Mount	2-1/2" x 2-1/2"	75"	4" x 4" x 1/4"	42" high	5mm Tempered Glass

For detailed drawings of the test sample and components, refer to Appendix B.

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

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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 specimens were 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. For each test, deflection measurements were taken at the point of load application. As per Section 4.1.5.14 and Section 9.8.8.2 of the 2010 NBC, 2012 BCBC, and 2012 OBC, the following tests were conducted:

### 4.1 2010 NBC / 2012 BCBC / 2012 OBC: SECTION 4.1.5.14 LOADS ON GUARDS

- 1) The minimum specified horizontal load applied inward or outward at the minimum required height of every guard shall be 0.75 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 100 mm x 100 mm located at any point in the element or elements so as to produce the most critical effect.
- 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: A safety factor of 1.67-2.5 was applied to the above loads.

### 4.2 2010 NBC / 2012 BCBC / 2012 OBC: SECTION 9.8.8.2 LOADS ON GUARDS

- 1) The minimum specified horizontal load applied inward or outward at the minimum required height of every 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: A safety factor of 1.67-2.5 was applied to the above loads.

### 4.3 2010 NBC / 2012 BCBC / 2012 OBC: SECTION 9.8.8.3 HEIGHT OF GUARDS

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

#### **4.4 2010 NBC / 2012 BCBC / 2012 OBC: 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.

#### **4.5 2010 NBC / 2012 BCBC / 2012 OBC: SECTION 9.8.8.6 DESIGN OF GUARDS TO NOT FACILITATE CLIMBING / GUARDS DESIGNED NOT TO 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 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 1-in-2 slope on the offset.

#### **4.6 IN-FILL LOAD TEST**

A load of 1.25 kN (281 lbs) was applied using a 100 mm x 100 mm square block on the center of the railing system normal to the in-fill. 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 UNIFORM LOAD TEST**

A uniform load of 2.5 kN/m (171 plf) was applied vertically to the top of the guardrail system. A uniform load of 1.25 kN/m (86 plf) was applied horizontally to the top of the guardrail system. 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.

#### **4.8 CONCENTRATED LOAD TEST**

The top of the guardrail system was subjected to three separate tests where a concentrated load of:

- 1.67 kN (375 lbs) was applied horizontally at the midspan of the top of the guard,
- 2.24 kN (503 lbs) was applied horizontally at the top of the guard adjacent to the post connection to verify the connection capacity, and
- 1.67 kN (375 lbs) was applied horizontally at the top of post.

#### **4.9 HEIGHT OF GUARDS**

All railings formed a protective barrier not less than 1070 mm (42 in.) high.

#### **4.10 OPENINGS IN GUARDS**

All railings had openings that prevented a sphere 4 in. (100 mm) in diameter to pass.

#### **4.11 DESIGN TO PREVENT CLIMBING**

No member, attachment or opening located between 140 mm and 900 mm above the floor or walking surface protected by the guards facilitated climbing.

## 5 Testing and Evaluation Results

### 5.1. RESULTS AND OBSERVATIONS

The product test results are shown in Table 2. A copy of the test data is located in Appendix A.

Table 2. Test Results				
Section	Property	Result	Requirement	Pass/Fail
9.8.8.2	In-fill Load	281 lbs	281 lbs	Pass
	Vertical Uniform Load	171 plf	171 plf	Pass
	Horizontal Uniform Load	86 plf	86 plf	Pass
	Mid-span Concentrated Load	375 lbs	375lbs	Pass
	Adjacent to Post Connection Concentrated Load	503 lbs	503 lbs	Pass
	Top of Post Concentrated Load	375 lbs	375 lbs	Pass
9.8.8.3	Height of Guards	1070 mm	≥ 1070 mm	Pass
9.8.8.5	Openings in Guards	60 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 that facilitate climbing	No elements from the vertical between 140 mm and 900 mm that facilitate climbing	Pass


## 6 Conclusion


The Cendek Railings Ltd. Aluminum Glass Railing System identified in this test report has been evaluated per the requirements of the following:

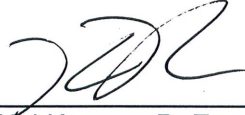
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  - Section 9.8.8.3, *Height of Guards*
  - Section 9.8.8.5, *Openings in Guards*
  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
- 2012 British Columbia Building Code (BCBC)
  - Section 4.1.5.14, *Loads On Guards*
  - Section 9.8.8.2 *Loads on Guards*
  - Section 9.8.8.3, *Height of Guards*
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  - Section 9.8.8.6, *Design of Guards to Not Facilitate Climbing*
- 2012 Ontario Building Code (OBC)
  - Section 4.1.5.14, *Loads On Guards*
  - 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*

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

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