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# VISTA RAILING SYSTEMS INC.
# TEST REPORT

**SCOPE OF WORK**
REPORT OF 8 FT. PICKET SYSTEM "VISTA" RAILING TESTED IN ACCORDANCE WITH ASTM E935-21, *STANDARD TEST METHODS FOR PERFORMANCE OF PERMANENT METAL RAILING SYSTEMS AND RAILS FOR BUILDINGS*

**REPORT NUMBER**
105224861COQ-002

**TEST DATE**
11/09/22

**ISSUE DATE**
11/15/22

**PAGES**
30

**DOCUMENT CONTROL NUMBER**
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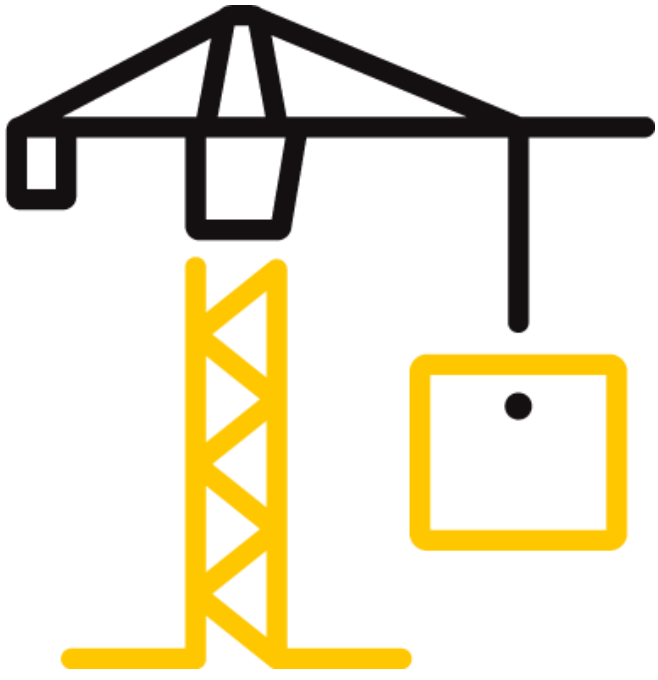

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# TEST REPORT FOR VISTA RAILING SYSTEMS INC.

Report No.: 104965171COQ-002A
Date: 11/15/22

## REPORT ISSUED TO

**VISTA RAILING SYSTEMS INC.**
23282 River Road
Maple Ridge, BC, V2W 1B6
Canada

## SECTION 1

**SCOPE**

Intertek Building & Construction (B&C) was contracted by Vista Railing Systems Inc., 23282 River Road, Maple Ridge, BC, V2W 1B6, Canada, to perform testing on an aluminum picket railing system in accordance with ASTM E935-21, *Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings*. The scope of the testing as requested by Vista Railing Systems Inc., was to assess the ability of the guard system to resist the load requirements of Section 9.8.8.2 of the 2020 NBC and 2012 OBC. Results obtained are tested values. Testing was conducted at the Intertek test facility in Coquitlam, BC, Canada on November 9, 2022.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called “Shared Risk approach,” of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

For INTERTEK B&C:

| | | | |
|---|---|---|---|
| **COMPLETED BY:** | Chris Chang, P.Eng. | **REVIEWED BY:** | Baldeep Sandhu |
| **TITLE:** | Sr. Tech – Building & Construction | **TITLE:** | Manager – Building & Construction |
| **SIGNATURE:** |  EGBC Permit No.: 1000953 | **SIGNATURE:** |  |
| **DATE:** | 11/15/22 | **DATE:** | 11/15/22 |

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Engineer's Disclaimer:

- Intertek Engineers do not assume professional responsibility of Engineer of Record.
- Compliance to Building Codes must be approved by the Engineer of Record or Authority Having Jurisdiction.
- Intertek Engineer's seal and signature is limited to the review of applicable code required loads, review of test setup, and witnessing of laboratory testing.
- Additional disclaimers are shown in Notes of Section 7 and Section 8

Engineers Approval Stamp


11/21/22

Kal Kooner, P.Eng.
EGBC Permit No.: 1000953
Director, Building & Construction
Intertek


11/21/2022

Dan Lungu, P.Eng.
EGBC Permit No.: 1000953
Engineer, Building & Construction
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**TEST REPORT FOR VISTA RAILING SYSTEMS INC.**
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## SECTION 2
## SUMMARY OF TEST RESULTS

| SYSTEM DESCRIPTION | SECTION | TEST | PASS/FAIL |
|---|---|---|---|
| 8 ft. Picket System "Vista" Railing | 9.8.8.2 | In-fill Load | Pass |
| | | Vertical Uniform Load Test | Pass |
| | | Horizontal Uniform Load Test | Pass |
| | | Horizontal – Mid-Span Concentrated Load | Pass |
| | | Horizontal – Adjacent to Post Concentrated Load | Pass |
| | | Horizontal – Top of Post Concentrated Load | Pass |

Refer to Appendix B for photos of testing.

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## SECTION 3
## TEST LOADS

The guard specimen was evaluated in accordance with the following:

> **ASTM E935-21**, *Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings*

The required test loads were based on the Specified Loads per the following Building Code articles with the Safety Factors applied as indicated in this report:

> **2020 National Building Code of Canada (NBC)**
> - Section 9.8.8.2 *Loads on Guards*
>
> **2012 Ontario Building Code (OBC)**
> - Section 9.8.8.2 *Loads on Guards*

## SECTION 4
## MATERIAL SOURCE

The client submitted the railing system to the Evaluation Center on November 4, 2022 (Coquitlam ID# VAN2211041404-001). The sample was received in good condition and was suitable for testing unless noted otherwise. The sample was not independently selected for testing.

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## SECTION 5
## EQUIPMENT

Calibration of test equipment was performed by Intertek B&C in accordance with ISO 17025 requirements.

| ASSET # | DESCRIPTION | MODEL | CAL DUE DATE |
|---|---|---|---|
| P60692 | Artech 5k lb S-Type Load Cell | 20210-5k | 11/23 |
| P60610 | T&D Temperature and Humidity Indicator | TR-72Ui | 08/15/23 |
| P60624 | Extech Stopwatch | 365515 | 12/09/22 |
| P60494 | Stanley Tape Measure | FatMax | 10/14/23 |
| 52650 | Mitutoyo 8 in. Digital Caliper | CD-8 | 06/08/23 |
| D7810 | Micro Mule | Intertek-York | 11/13/22 |
| P60673 | Tyco Electronics Linear Transducer | PT1MA-20-UP-420E-M6 | 07/28/23 |
| D7815 | Tyco Electronics Linear Transducer | PT1MA-20-UP-420E-M6 | 12/14/22 |

## SECTION 6
## LIST OF OFFICIAL OBSERVERS

| NAME | COMPANY |
|---|---|
| Frank Gadea-Lopez | Intertek B&C |
| Chris Chang | Intertek B&C |
| Kal Kooner | Intertek B&C |
| Dan Lungu | Intertek B&C |

The above observer(s) witnessed part of the test program.

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## SECTION 7
## TESTING PROCEDURE

The evaluation was conducted in accordance with the testing procedures of ASTM E935-21, *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. For each test, deflection measurements were taken at the point of load application. Testing was conducted with reference to the specified load requirements of the following:

### 2020 NBC / 2012 OBC: 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 when possible.

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.

Note 1: A safety factor of 1.67-2.5 was applied to the above loads, based on an assumed failure mode and tested material. The safety factor was calculated by dividing the live load factor of 1.5 by the material resistance factors below, as defined in the CAN/CSA S157, *Strength Design in Aluminum* standard.

- ø=0.90 resistance factor for bending failure mode, resulting safety factor = 1.67
- ø=0.75 resistance factor for ductile failure mode, resulting safety factor = 2.0
- ø=0.67 resistance factor for brittle failure mode, resulting safety factor = 2.24

### IN-FILL LOAD TEST

A test load was applied using a 300 mm x 300 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.

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**UNIFORM LOAD TEST**

Uniform test loads were applied vertically to the top of the guardrail system and horizontally to the top of the guardrail system. The test 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.

**CONCENTRATED LOAD TEST**

Concentrated test loads were applied horizontally at the midspan of the top of the guard, at the top rail adjacent to the post connection to verify the connection capacity, and at the top of post. After completion of the above load tests, the concentrated load at the top of post was loaded until failure.

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## SECTION 8
## TEST SPECIMEN DESCRIPTION

The sample was identified as the following:

**TABLE 1. RAILING CONFIGURATION**

| PART NAME | PART NUMBER | QTY | PART DIMENSIONS | | | | REPORTED MATERIAL |
|---|---|---|---|---|---|---|---|
| | | | LENGTH | WIDTH | HEIGHT | NOMINAL THICKNESS | |
| Post | V1093 | 2 | 2.00 in. | 2.00 in. | 39.7 in. | 0.11 in. | Aluminum |
| Baseplate | V5210 | 2 | 4.00 in. | 4.00 in. | 0.31 in. | - | Aluminum |
| Top Rail | PB7458Y | 1 | 96.0 in. | 2.30 in. | 2.50 in. | 0.07 in. | Aluminum |
| Bottom Rail | | 1 | 96.0 in. | 0.95 in. | 1.53 in. | 0.06 in. | Aluminum |
| Support Leg | N/A | 2 | 1.63 in. | 1.00 in. | 2.63 in. | 0.13 in. | Aluminum |
| Infill - Picket | V1000 | 21 | 0.63 in. | 0.63 in. | 37.4 in. | 0.04 in. | Aluminum |

Note 2: The railing had one (1) support leg positioned mid-span under the bottom rail and was set on a steel test frame. For a detailed drawing of the test sample and component, refer to Appendix B.

Note 3: The supporting structure attachment was outside the scope of this evaluation, and is subject to evaluation and approval by the Engineer of Record and the Authority Having Jurisdiction (AHJ). The assembly was attached to a rigid test support using steel plates with four (4) 3/8 in. Grade 5 bolts on each post.

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## SECTION 9
## TEST RESULTS

A full set of test results is included in Appendix A.

## SECTION 10
## CONCLUSION

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for Vista Railing Systems Inc. on the 8 ft. Picket System "Vista" Railing per ASTM E935-21, *Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.* The scope of the testing as requested by Vista Railing System Inc. was to assess the ability of the guard system to resist the loads as prescribed in the following building code articles:

**2020 National Building Code of Canada (NBC)**

- Section 9.8.8.2 *Loads on Guards*

**2012 Ontario Building Code (OBC)**

- Section 9.8.8.2 *Loads on Guards*

The Vista Railing Systems Inc. 8 ft. Picket System "Vista" Railing identified and evaluated in this report has met the load requirements using the safety factors as defined in Section 7, Note 1 of this report. Overall compliance with the Building Codes must be evaluated and approved by the Engineer of Record and Authority Having Jurisdiction.

The conclusions of this test may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

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## SECTION 11

## APPENDIX A – TEST DATA (2 PAGES)

| | | | |
|---|---|---|---|
| Company | Vista Railing System | Technician(s) | Chris Chang / Frank Gadea-Lopez |
| Project No. | G105224861 | Reviewer | Baldeep Sandhu |
| Models | 8 ft. Picket System "Vista" Railing (4.5 in. Picket Spacing) | Start/End Date | November 9, 2022 |
| Product Name | Same as above | Sample ID | VAN2211041404-001 |
| Standard | **2020 NBC/2012 OBC, Section 9.8.8.2** | | |

**Test Data Package**

**Table of Contents**

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| | | | | | | |
|---|---|---|---|---|---|---|
| Test: | **Loads on Guards - Section 9.8.8.2** | | | | Project: | G105224861 |
| Date: | 9-Nov-22 | | | | Eng/Tech: | Chris Chang / Frank Gadea-Lopez |
| Client: | Vista Railing Systems Inc. | | | | Reviewer: | Baldeep Sandhu |
| Product: | **8 ft. Picket System "Vista" Railing (4.5 in. Picket Spacing)** | | | | Location: | Coquitlam, BC, Canada |
| Post Spacing: | 8.17 | ft | 2.49 | m | | |
| Height of Guard: | 42.1 | in | 1070 | mm | | |
| Opening in Guard: | 3.88 | in | 98 | mm | (between pickets) | |
| | 2.50 | in | 64 | mm | (under bottom rail) | |

Method: ASTM E935-21, *Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings*
2020 National Building Code of Canada, Section 9.8.8.2 *Loads on Guards*
2012 Ontario Building Code, Section 9.8.8.2 *Loads on Guards*

Safety Factor: 1.67 (based on a resistance factor Ø = 0.9 for aluminum)
2.24 (based on a resistance factor Ø = 0.67 for connection)

Equipment: Artech 5000 lbf Load Cell (Intertek ID# P60692, cal due November 2023)
T&D TR-72Ui Temperature and Humidity Logger (Intertek ID# P60610, cal due August 15, 2023)
Stopwatch (Intertek ID# P60624, cal due December 9, 2022)
Stanley Tape Measure (Intertek ID# P60494, cal due October 14, 2023)
Mitutoyo Digital Caliper (Intertek ID# 52650, cal due June 8, 2023)
Micro Mule Measurement System (Intertek ID# D7810, cal due November 13, 2022)
Tyco Electronics Linear Transducer (Intertek ID# P60673, cal due July 28, 2023)
Tyco Electronics Linear Transducer (Intertek ID# D7815, cal due December 14, 2022)

Time/Temp/RH: 10:50AM / 22.1°C / 51.0%

| Direction | Test | Design Load (Inward/ Outward) (lbf) | Factored Load | Calculated Moment (lbf-ft) | Equivalent Quarter-Point Load (lbf) | Required Proof Load (lbf) | Deflections (in.) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|
| Outward | Individual Elements (over 11.8 in. x 11.8 in.) | 112 | 187 | - | - | 187 | 2.895 | **Pass** |
| | Vertical Uniform Load (per ft) | 103 | 171 | 1428 | 699 | 1399 | 0.550 | **Pass** |
| | Horizontal Uniform Load (per ft) | 34 | 57 | 476 | 233 | 466 | 3.397 | **Pass** |
| | Midspan Horizontal Concentrated Load | 225 | 375 | - | - | 375 | 3.131 | **Pass** |
| | Adjacent to Post Concentrated Load | 225 | 503 | - | - | 503 | 5.005 | **Pass** |
| | Top of Post Concentrated Load | 225 | 375 | - | - | 375 | 3.210 | **Pass** |
| | Top of Post Ultimate Load | Maximum load of 682.3 lbf reached | | | | | | |

| Direction | Test | Design Load (Inward/ Outward) (kN) | Factored Load | Calculated Moment (kNm) | Equivalent Quarter-Point Load (kN) | Required Proof Load (kN) | Deflections (mm) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|
| Outward | Individual Elements (over 300 mm in. x 300 mm) | 0.5 | 0.83 | - | - | 0.83 | 73.5 | **Pass** |
| | Vertical Uniform Load (per m) | 1.5 | 2.5 | 1.94 | 3.11 | 6.22 | 14.0 | **Pass** |
| | Horizontal Uniform Load (per m) | 0.5 | 0.83 | 0.65 | 1.04 | 2.07 | 86.3 | **Pass** |
| | Midspan Horizontal Concentrated Load | 1 | 1.67 | - | - | 1.67 | 79.5 | **Pass** |
| | Adjacent to Post Concentrated Load | 1 | 2.24 | - | - | 2.24 | 127.1 | **Pass** |
| | Top of Post Concentrated Load | 1 | 1.67 | - | - | 1.67 | 81.5 | **Pass** |
| | Top of Post Ultimate Load | Maximum load of 3.04 kN reached | | | | | | |

**ULTIMATE LOAD:** Maximum load of 682.3 lbf (3.04 kN) reached

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**APPENDIX B – PHOTOS (2 PAGES)**

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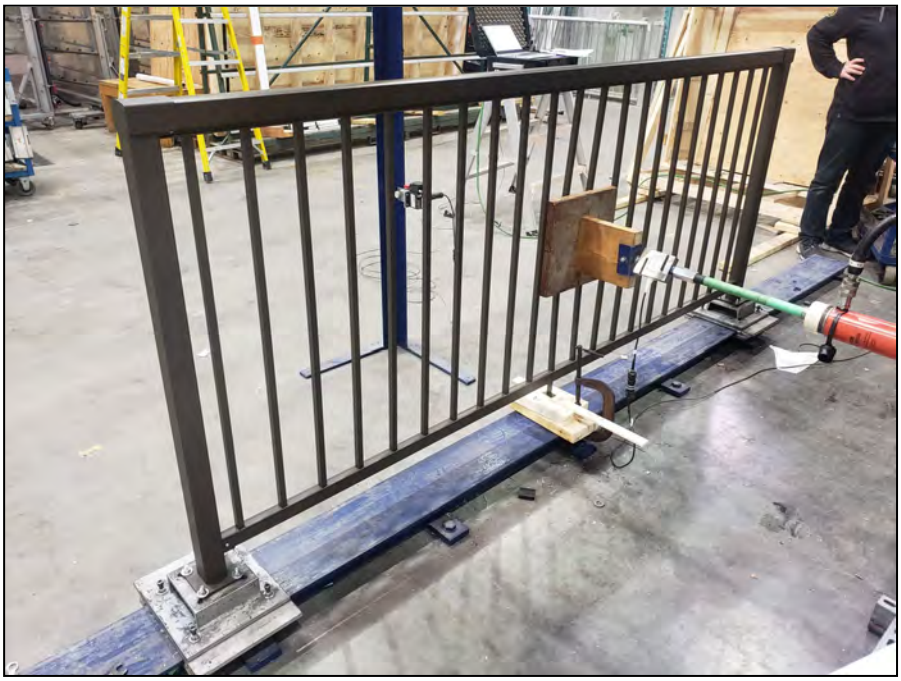

**Figure 1 – In-fill Load Test**

**Figure 2 – Vertical Uniform Load Test**

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**Figure 3 – Horizontal Uniform Load Test**

**Figure 4 – Mid-span Concentrated Load Test**