

TEST REPORT

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EVALUATION CENTER

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RENDERED TO

Marwood Ltd.
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PRODUCT EVALUATED

6 ft. Pressure-Treated SPF Guard with Aluminum Balusters
3 ft. Pressure-Treated SPF Stair Guard with Aluminum Balusters

EVALUATION PROPERTY

2015 NBC / 2012 OBC Loads on Guards

Report of Load on Guards Testing on 6 ft Pressure-Treated SPF Guard and 3 ft Pressure-Treated SPF Stair Guard with Aluminum Balusters for compliance with the applicable requirements of the following criteria: *National Building Code of Canada (NBC) 2015, and Ontario Building Code (OBC) 2012.*

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2 Introduction

Intertek has conducted load testing for Marwood Ltd. On a 6 ft. Pressure-Treated SPF guard and 3 ft stair guard, each with aluminum balusters and plastic hanger brackets. The top and bottom of the rails with balusters in between were assembled onto SPF posts with plastic hanger brackets. Evaluation of the post including post anchoring to the substrate is excluded from the scope of this test report.

The test loads applied were as set forth in the 2012 Ontario Building Code and National Building Code of Canada 2015, Section 9.8.8.2 sentence 1 in conjunction with Table 9.8.8.2 for guards within dwelling units and for exterior guards serving not more than 2 dwelling units. Factored loads of 2.24 or 2.5 were applied to the code loads.

This evaluation was completed on May 16, 2017.

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. Samples were not independently selected for testing. Samples were received on May 2, 2017.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

A production sample of the guardrail system was prepared for testing. The guardrail system components are summarized in Table 1 below.

Component	Material
Railing Screw	#8x1-3/4" flat head stainless steel screw
Hanger Screw	#8x1-3/4" flat head stainless steel screw
Hand Rail Nail	2-1/2" Finishing Nails
Plastic Rail Hanger	Plastic
Plastic Insert Plugs	Plastic
Plastic Infill Incline Plugs	Plastic
32"x3/4" Metal Balusters	Aluminum tube with Black paint
Top Hand Rail	3" x 1-1/4" Pressure-Treated SPF Lumber
Top and Bottom Rails	1-1/4" x 2-15/16" Pressure-Treated SPF Lumber
Posts	3-1/4" x 3-1/4" Pressured Treated SPF Lumber

Top and Bottom Rail:

The top and bottom rail consisted of an 1817 mm long by 35 mm wide by 74 mm high pressure-treated SPF rail. The handrail which was attached to the top rail measured 77 mm wide by 30 mm high. A notch measuring 35 mm by 9 mm was routed on the underside of the handrail which was fitted to the top rail. The hand rail was glued and fastened to the top rail with four 2-½" finishing nails.

The black plastic rail hanger was fastened to the ends of the top and bottom rail with two #8×1-¾" flat head screws and secured to the pressure-treated pine post with four #8×1-¾" flat head screws. The top and bottom rail were spaced 787 mm (31") apart.

Testing was conducted simulating the top of the upper rail as 1070 mm from the deck floor.

Posts:

The 3-¼" × 3-¼" SPF posts were press-fit into steel sleeves and secured to the test rig. The post performance is outside the scope of this report.

Infill Aluminum Balusters:

The aluminum balusters were 32" in length and each were fitted with plastic insert plugs at the ends. The balusters were fitted into routed holes in the rails measuring 7/8" diameter and ¾" in depth. The balusters were spaced 114 mm on center resulting in a spacing of 98 mm between each baluster.

Stair Guard:

The stair guard construction was identical to the 6 ft. Pressure Treated SPF guard with the exception of the plastic plugs on the infill aluminum balusters that accommodated the 24° incline.

4 Testing and Evaluation Methods

4.1. SPECIMEN PREPARATION

The guard samples were assembled by the client and shipped to the Intertek laboratory in Mississauga, Ontario. The posts were inserted into steel sleeves and secured to a steel base for testing.

4.2. CONDITIONING

The samples were tested in the laboratory under ambient conditions. No specific conditioning parameters were required before testing.

4.3. TEST PROCEDURES

The 6ft pressure-treated SPF guard with Aluminum Balusters was symmetrical, and it is the professional opinion of Intertek that the loads applied from one side would achieve results that are equal to loads applied to the other side.

The basic test loads applied were as set forth in the 2012 Ontario Building Code and National Building Code of Canada 2015, Section 9.8.8.2 sentence 1 in conjunction with Table 9.8.8.2 for guards within dwelling units and for exterior guards serving not more than 2 dwelling units. Factored loads of 2.24 or 2.5 were applied to the load specifications.

4.3.1. Horizontal Concentrated Load at Top Rail at Midspan

2.5 Factored Load (2012 OBC/2015 NBCC)

A concentrated horizontal load of 2.5 kN (delivered with a 100 mm by 100 mm platen) was applied to mid span of the top rail by means of a calibrated load cell and hydraulic ram system and held for 1 minute. After release of the load, the system was evaluated for failure; evidence of disengagement of any component and visible cracks in any component.

4.3.2. Horizontal Concentrated Load at Top Rail at End Connector

2.24 Factored Load (2012 OBC/2015 NBCC)

A concentrated horizontal load of 2.24 kN (delivered with a 100 mm by 100 mm platen) was applied to top rail adjacent the post by means of a calibrated load cell and hydraulic ram system and held for 1 minute. After release of the load, the system was evaluated for failure; evidence of disengagement of any component and visible cracks in any component.

4.3.3. Horizontal Concentrated Load on Infill Elements (Aluminum Balusters)

2.5 Factored Load (2012 OBC/2015 NBCC)

A concentrated horizontal load of 1.25 kN (delivered with a 300 mm by 300 mm platen) was applied to the midspan of the infill of the guardrail and stair guard system by means of a calibrated load cell and hydraulic ram system and held for 1 minute. After release of the load, the systems were evaluated for failure; evidence of disengagement of any component and visible cracks in any component.

4.3.4. Horizontal Concentrated Load on Post

The post anchorage was not evaluated in this test report.

4.3.5. Vertical Uniform Load on Top Rail

2.5 Factored Load (2012 OBC/2015 NBCC)

Quarter-point loading (deemed by Intertek to be equivalent to uniform loading) was applied to the top rail in a vertical direction by means of a loading fixture and a calibrated load cell and hydraulic ram system. A test load of 3.75 kN/m was held for 1 minute. After release of the load, the system was evaluated for failure; evidence of disengagement of any component and visible cracks in any component. The applied load was based on a top rail length of 1817 mm.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The sample test results are shown in Table 2 below. A full set of test data is included in Appendix A.

Table 2. Test Results of 6ft Pressure-Treated Pine Rail with Aluminum Balusters		
Test Description	Test Load	Test Result
Horizontal Concentrated Load at Top Rail at Mid span (factored Load of 2.95)	2.5 kN	After release of the load, the system was evaluated for failure; There was no evidence of disengagement of any component and visible cracks in any component
Horizontal Concentrated Load at Top Rail at End Connector (factored Load of 2.24)	2.24 kN	
Horizontal Concentrated Load on Infill Elements (Aluminum Balusters) (factored Load of 2.5)	1.25 kN	
Vertical Uniform Load on Top Rail (factored Load of 2.95)	3.75 kN/m	

6 Conclusion

The Marwood Ltd. 6 ft. pressure-treated SPF guard and 3 ft. pressure treated SPF stair guard with aluminum balusters and plastic hanger brackets sample identified in this test report has complied with the load requirements, as specified in 2012 Ontario Building Code and National Building Code of Canada 2015, Section 9.8.8.2 sentence 1 in conjunction with Table 9.8.8.2 for guards within dwelling units and for exterior guards serving not more than 2 dwelling units. In addition, the guard withstood factored loads as given in Table 2 of this report.

The connection of the railing system to the structure was not evaluated.

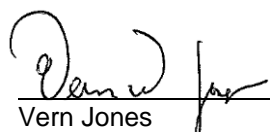
The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA LTD.

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7 Appendix A: Test Data (1 Page)



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Test: NBCC & OBC Loads on Guards(2 Dwelling Units)
 Test Date: 16-May-17
 Job No.: G102953278
 Client: Marwood Ltd.
 Sample: Pressure Treated SPF Railing with Aluminum Balusters
 Post Spacing: 72 in 1817 mm
 Height of Guard: 42.25 in 1070 mm
 Spacing on Infill: 3.85 in 98 mm

Standard: Ontario building Code 2012/National Building Code 2015
 Procedure: Standard Code for exterior guards serving not more than 2 dwelling units

Factor of safety: 2.5x Wood Rail
 2.5x for Connectors
 2.24x for Fasteners

Test	Design Load (Inward/Outward) kN	Factored Load	Test Load (kN)	Pass/Fail
Individual Elements	0.5	2.5x	1.25	Pass
Vertical Uniform Load per Meter	1.5	2.5x	3.75	Pass
Midspan Horizontal Concentrated Load	1	2.5x	2.5x	Pass
Adjacent to Post Horizontal Concentrated Load	1	2.24x	2.24	Pass

Equipment	Load Cell with Display	Asset # 280-01-0774 Cal Date: November 22, 2017
	Tape Measure	Asset # 273-01-1210 Cal Date: June 20, 2017

8 Revision Page

Revision No.	Date	Changes	Author	Reviewer
0	May 31, 2017	First issue	Daniel Dubeckyj	Vern Jones

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