

# MARWOOD LTD TEST REPORT

## SCOPE OF WORK

TESTING OF MARWOOD LTD. PRESSURE-TREATED-PINE "STAIR RAIL" WITH ALUMINUM BALUSTERS, TO ASSESS RESISTANCE TO LOADS ON GUARDS AS PRESCRIBED IN THE 2015 NATIONAL BUILDING CODE OF CANADA (NBC) AND 2012 ONTARIO BUILDING CODE (OBC).

## REPORT NUMBER

104696156TOR-008

## TEST DATE(S)

10/21/21

## ISSUE DATE

10/28/21

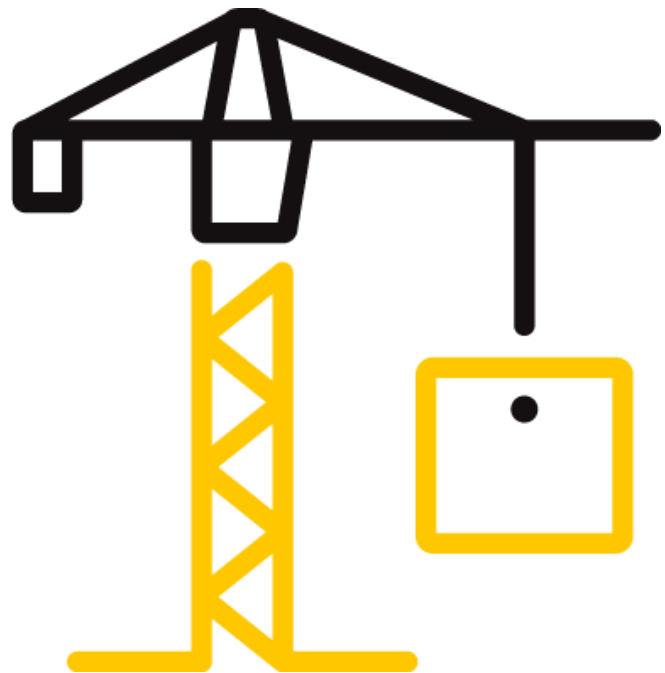
## PAGES

9

## DOCUMENT CONTROL NUMBER

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## TEST REPORT FOR MARWOOD LTD

Report No.: 104696156TOR-008

Date: 10/28/21

### REPORT ISSUED TO MARWOOD LTD.

3307 Route 101  
Tracyville NB E5L 1N7  
Canada

### SECTION 1 SCOPE

Intertek Testing Services NA, Inc. dba Intertek Building & Construction (B&C) was contracted by Marwood Ltd, 3307 Route 101, Tracyville NB E5L 1N7, Canada to perform testing in accordance with Table 9.8.8.2 of the 2015 National Building Code of Canada (NBC) and 2012 Ontario Building Code (OBC)., on their pressure-treated-pine "Stair Rail". The scope of the testing was to assess the ability of the guard system to resist the Specified Loads for guards within dwelling units and exterior guards serving not more than two dwelling units. The posts were not tested and as such, the post and post-base attachment methods are beyond the scope of this project. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek Testing Services NA test facility in Mississauga, ON.



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### SECTION 2 SUMMARY OF TEST RESULTS

The Marwood Ltd. pressure-treated-pine "Stair Rail" with Aluminum balusters as identified and evaluated in this report, has demonstrated resistance to the specified and factored loads as specified in the codes stated in the scope of this report.

For INTERTEK B&C:

<b>COMPLETED BY:</b>	Tyrone Williams	<b>REVIEWED BY:</b>	Igor Radovic, P.Eng.
<b>TITLE:</b>	Technical Analyst	<b>TITLE:</b>	Lab Manager
<b>SIGNATURE:</b>		<b>SIGNATURE:</b>	
<b>DATE:</b>	10/28/21	<b>DATE:</b>	10/28/21

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### SECTION 3

#### TEST METHOD(S)

The specimens were evaluated in accordance with the following:

- 2015 National Building Code of Canada (NBC), Table 9.8.8.2, item 1
- 2012 Ontario Building Code (OBC), Table 9.8.8.2, item 1

### SECTION 4

#### MATERIAL SOURCE/INSTALLATION

Test samples were provided by the client. The results outlined in this report apply to the sample as received.

The test samples were received by the test facility on 10/18/21.

### SECTION 5

#### EQUIPMENT

EQUIPMENT CALIBRATION		
INSTRUMENT/EQUIPMENT	ASSET #	CALIBRATION DUE DATE
2K Load Cell with Digital Indicator	280-01-0773	Nov-5-2021
Stopwatch	273-01-0311	July-15-2022
Digital Caliper	280-01-1228	July-27-2022
Digimatic indicator	280-01-0747	Sept-30-2022
Digital angle gauge	273-01-1200	July-16-2022
Tape Measure	278-01-0730	Nov-6-2021
Powerfist 24" stroke Hydraulic Ram	N/A	N/A
Electric Hydraulic Pump	N/A	N/A

### SECTION 6

#### LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Mandeep Singh	Intertek

Note: The above observers witnessed part or the entire test program

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**SECTION 7****TEST PROCEDURE**

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

**Infill Load Test**

Test Loads were applied over a 300 mm x 300 mm square platen normal to the infill at the geometric centre of the infill (over three Aluminium balusters). Specified and factored loads were applied and held for one (1) minute, whereupon deflection of the infill at the point of maximum deflection was recorded. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

**Uniform Load Test**

The top rail was subjected to vertical quarter point loads applied by means of a load distributing bar. Specified and factored loads were applied and held for one (1) minute, whereupon deflection of the top rail at mid-span was recorded. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

**Concentrated Load Test**

Concentrated test loads were applied separately and sequentially at the following two critical locations: horizontally on the top rail at mid-span between posts and on the top rail adjacent to a post. Specified and factored loads were applied over a 100 mm x 100 mm square platen and held for one (1) minute, whereupon deflection was recorded at the point of application of the load. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

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### SECTION 8

#### TEST CALCULATIONS

The applicable factored loads were based on the specified loads in Table 9.8.8.2 of the 2015 National Building Code of Canada (NBC) and 2012 Ontario Building Code (OBC) increased by the following safety factors as applicable, derived from **CSA O86**, "Engineering Design in Wood"

- Specified loads multiplied by  $1.5/\phi/KT$ , where  $\phi=0.6$  resistance for wood screw connection and  $KT=0.85$  Treatment factor, the resulting safety factor was **2.94**
- Specified loads multiplied by  $1.5/\phi/KT$ , where  $\phi=0.9$  resistance factor for wood failure perpendicular to grain and  $KT=0.85$  Treatment factor, the resulting safety factor was **1.96**

### SECTION 9

#### TEST SPECIMEN DESCRIPTION

**Top and Bottom Rail:** The milled top and bottom rail were 1725 mm long by 32 mm wide by 79 mm high pressure treated SPF rail installed at a 26° angle. The milled handrail which was attached to the top rail measured 75 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 handrail 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 using two #8×1-1/2" flat head screws with 17.8 mm dia. x 1.6 mm thick washer. The rail hanger was secured to the pressure-treated pine post with four #9×1-1/2" flat head screws. The post had a 35 x 75 x 4 mm notch which allowed the rail hanger to be mounted flush. The top and bottom rails were spaced 784 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 viced fixed 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 813 mm long and each were fitted with plastic insert plugs at the ends. The balusters were fitted into routed holes in the rails measuring 21 mm dia. and 21 mm in depth. The balusters were spaced 115 mm on center resulting in a spacing of 95 mm between each baluster.

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**SECTION 10**  
**TEST RESULTS**

Direction of Load	Test	Specified loads	Deflection at Specified load (mm)	Required Safety Factor	Factored Load Applied	Pass/Fail	
Symmetrical Guard Tested in One Direction	Horizontal load applied on elements within the Guard over a width of 300 mm x height of 300 mm	0.5kN	23.5	2.50	1.25kN	Pass	
	Evenly Distributed Vertical Load <b>Applied</b> at the Top of the Guard (mid Span)/ <b>Quarter Point Equivalent load</b>	1.5kN/m	6.0	1.96	2.94kN/m	Pass	
	Horizontal load applied at the minimum required height of the guard	Top Rail Mid-Span Concentrated load	1.0kN	39.8	2.94	3.30kN	Pass
	Adjacent to Post Concentrated load	1.0kN	15.9	2.94	3.22kN	Pass	

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### SECTION 11

#### CONCLUSION

Intertek Testing Services NA Ltd. (Intertek) has conducted Loads on Guards testing on Marwood Ltd. pressure-treated-pine "Stair Rail" with Aluminum balusters. The scope of the testing was to assess the ability of the guard system to resist the Specified Loads for guards within dwelling units and exterior guards serving not more than two dwelling units as prescribed in Table 9.8.8.2 of the 2015 National Building Code of Canada (NBC) and 2012 Ontario Building Code (OBC).

The posts were not tested and as such, the post and post-base attachment methods are beyond the scope of this report.

The Marwood Ltd. pressure-treated-pine "Stair Rail" with Aluminum balusters identified and evaluated in this report has achieved the results presented in Section 10 of this report.

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### SECTION 12

### PHOTOGRAPHS



**Photo No. 1**  
Milled Bottom rail



**Photo No. 2**  
Milled Top rail and Handrail





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**SECTION 13**

**REVISION LOG**

REVISION #	DATE	SECTION	REVISION
0	10/28/21	N/A	Original Report Issue