

TEST REPORT

Intertek ETL SEMKO

REPORT NUMBER: 3116527COQ-005C
ORIGINAL ISSUE DATE: March 31, 2007

EVALUATION CENTER

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

RENDERED TO

B.W. CREATIVE WOOD INDUSTRIES LTD.
23282 RIVER ROAD
MAPLE RIDGE, BC V2W 1B6

PRODUCT EVALUATED: Tuscany Guard Rail Systems
EVALUATION PROPERTY: Load Requirements

Report of Tuscany Guard Rail Systems for compliance with the applicable requirements of the following criterion:

- **2006 International Building Code**
 - **Section 1013 Guards**
 - **Section 1607.7.1 Handrails and Guards**
 - **Section 1714.3.1 Test Procedure**
- **2006 International Residential Code**
 - **Section R312 Guards**

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted a test program for B.W. Creative Wood Industries Ltd. on guard rail systems. The evaluation was carried out to determine whether the railing systems would resist the loads specified in the following Building Codes:

- 2006 International Building Code
 - Section 1013 Guards
 - Section 1607.7.1 Handrails and Guards
 - Section 1714.3.1 Test Procedure
- 2006 International Residential Code
 - Section R312 Guards

This evaluation was conducted in the month of March 2007.

3 Test Samples

3.1. SAMPLE SELECTION

Intertek representative, Kal Kooner, sampled the specimen guard rail system components on March 1, 2007. The specimens were manufactured at B.W. Creative Wood Industries Ltd., 23282 River Road, Maple Ridge, British Columbia, V2W 1B6. The specimens were selected in accordance with recognized independent sampling procedures and were received at the Evaluation Center on March 16, 2007.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The different railing systems were identified as follows (and detailed drawings are located in Appendix B):

The Tuscan Pine and Tuscan Cedar railing systems were assembled as follows: Nylon 6 connector brackets (black) were mechanically fastened to treated SPF handrails using two No. 8 x 1-3/4 in. stainless steel screws. The SPF bottom rail was attached to the 82.5 mm square treated pine (or cedar) post using the same connector bracket and screws. Four additional No. 8 x 1-3/4 in. stainless steel screws were used to connect the brackets to posts at four points. Both the top and bottom rails are pre-drilled to accept picket angle adapters. Powder coated aluminum pickets are then placed onto the bottom rail and the top rail is pressed down onto the assembly then fastened to the posts with the same four No. 8 x 1-3/4 in. stainless steel screws. A 3 in. treated SPF cap rail was then mechanically connected to the top rail at 300 mm spacing using 3 in. finishing nails.

Post:	3-1/4 in. (82.5 mm) treated pine post
Rails:	42 in. (1067 mm) high, treated SPF
Picket Insert:	11/16 in. (17.46 mm) x 1.5 mm thick 6063-T5 aluminum extruded tube
Rail Connections:	Black Nylon 6 connector

An additional Tuscany Pine guard rail system was also constructed identical to the first system with the exception of four No. 10 x 3 in. stainless steel screws on 45° replacing the Nylon 6 connector bracket and associated screws.

Note: Post to sub-structure fastener evaluation is beyond the scope of this report. Steel plates with two 3/8 in. Grade 5 bolts on each post were used to install the specimen for testing.

4 Testing and Evaluation Methods

The test specimens were loaded at a rate to achieve the specified loads between 10 seconds and 5 minutes. The test loads with the 2.5 times safety factor specified in Section 1714.3.1 were held for one minute before the load was released. As per the 2006 International Building Code, the following tests were conducted:

4.1. GENERAL (Clause 1607.7)

One complete railing system, consisting of two posts, was tested at maximum spacing and in the worst-case scenario.

4.2. HEIGHT (Clause 1013.2)

The railing systems formed a protective barrier not less than 42 in. (1067mm) high, measured vertically above the leading edge of the tread, adjacent walking surface or adjacent seat board.

4.3. OPENING LIMITATIONS (Clause 1013.3)

A maximum opening of 3.89 in. (98.8 mm) between balusters and a kick opening of 3.82 in. (97.1) prevented a sphere 4 in. in diameter to pass up to a height of 42 in.

4.4. IN-FILL LOAD TEST (Clause 1607.7.1.2)

A load consisting of 125 lbs. was applied over 1 sq. ft. (0.0929 m²) normal to the in-fill in a worst-case scenario.

4.5. UNIFORM LOAD TEST (Clause 1607.7.1)

For one- and two-family dwellings, the uniform load test is not required as per Exception 1 of the 2006 International Building Code, Section 1607.7.1.

4.6. CONCENTRATED LOAD TEST (Clause 1607.7.1.1)

Two separate tests were conducted where the proof load of 500 lbf was applied horizontally to the top-rail at mid-span and directly adjacent to the post to evaluate the connection capacity.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

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

Table 1. Test Results				
System Description	System Height (inches)	Maximum Post to Post Center Spacing (inches)	Test	Compliance
8 ft. Tuscany Cedar Guard Rail with Nylon 6 fasteners	42	98-3/4	In-fill load	Complied
			Uniform Load	Not Evaluated*
			Concentrated Load Mid-span	Complied
			Concentrated Load Adjacent to Post	Complied
8 ft. Tuscany Pine Guard Rail with Nylon 6 fasteners	42	98-3/4	In-fill load	Complied
			Uniform Load	Not Evaluated*
			Concentrated Load Mid-span	Complied
			Concentrated Load Adjacent to Post	Complied
8 ft. Tuscany Pine Guard Rail with 45° screws	42	98-3/4	In-fill load	Complied
			Uniform Load	Not Evaluated*
			Concentrated Load Mid-span	Complied
			Concentrated Load Adjacent to Post	Complied

* Uniform Load Test was not performed for a one- and two-family dwelling as specified in Exception 1 of the 2006 International Building Code, Section 1607.7.1.

Note: Compliance with the 2006 International Building Code, Section 1013, also meets the requirements of the 2006 International Residential Code, Section R301.5 and R312.

6 Conclusion

The B.W. Creative Wood Industries Ltd. Tuscany Pine and Tuscany Cedar railing systems identified in this test report have complied with the following requirements as presented in Section 5 of this test report:

- 2006 International Building Code
 - Section 1013 Guards
 - Section 1607.7.1 Handrails and Guards
 - Section 1714.3.1 Test Procedure
- 2006 International Residential Code
 - Section R312 Guards

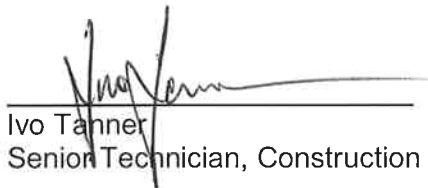
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Engineer, Construction Products

Reviewed by:



Ivo Tanner
Senior Technician, Construction Products

CC/ahvs

APPENDIX A: Test Data (3 pages)

Test: IBC Handrails and Guards
Date: 30-Mar-07 **Project:** 3116527 **Eng/Tech:** Riccardo DeSantis
Client: B W Creative Wood **Kevin Penner**
Product: 8 ft Tuscany Cedar with Nylon 6 screwed top rail connection
Post Spacing: 8 4/16 ft 2.51 m
Height of Guard: 42 in 1067 mm
Opening in Guard: 4 in 102 mm
Method: International Building Code 2006
 1607.7.1. Handrails and Guards
 1714.3.1 Test Procedure
Safety Factor: 2.5
Equipment: Revere 2000lbf load cell with direct read-out cal due August 2007

Test	Design Load (Inward/Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Pass/Fail
Horizontal In-fill Load	50	125	-	-	125	Pass
Horizontal Uniform Load (per ft)	50	125	1063	516	1031	Not Evaluated*
Midspan Horizontal Concentrated Load	200	500	-	-	500	Pass
Top of Post Horizontal Concentrated Load	200	500	-	-	500	Pass

Test	Design Load (Inward/Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent 3-Point Load (kN)	Required Proof Load (kN)	Pass/Fail
Horizontal In-fill Load	0.22	0.56	-	-	0.56	Pass
Horizontal Uniform Load (per m)	0.73	1.82	1.44	2.29	4.59	Not Evaluated*
Midspan Horizontal Concentrated Load	0.89	2.22	-	-	2.22	Pass
Horizontal Concentrated Load	0.89	2.22	-	-	2.22	Pass

* Uniform Load Test was not evaluated for one- and two-family dwellings, as per Exception 1 of Section 1607.7.1 of the 2006 IBC

Test: IBC Handrails and Guards
Date: 30-Mar-07 **Project:** 3116527 **Eng/Tech:** Riccardo DeSantis
Client: B W Creative Wood **Kevin Penner**
Product: 8 ft Tuscany Pine with Nylon 6 screwed top rail connection
Post Spacing: 8 4/16 ft 2.51 m
Height of Guard: 42 in 1067 mm
Opening in Guard: 4 in 102 mm
Method: International Building Code 2006
 1607.7.1. Handrails and Guards
 1714.3.1 Test Procedure
Safety Factor: 2.5
Equipment: Revere 2000lbf load cell with direct read-out cal due August 2007

Test	Design Load (Inward/Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Pass/Fail
Horizontal In-fill Load	50	125	-	-	125	Pass
Horizontal Uniform Load (per ft)	50	125	1063	516	1031	Not Evaluated*
Midspan Horizontal Concentrated Load	200	500	-	-	500	Pass
Top of Post Horizontal Concentrated Load	200	500	-	-	500	Pass

Test	Design Load (Inward/Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent 3-Point Load (kN)	Required Proof Load (kN)	Pass/Fail
Horizontal In-fill Load	0.22	0.56	-	-	0.56	Pass
Horizontal Uniform Load (per m)	0.73	1.82	1.44	2.29	4.59	Not Evaluated*
Midspan Horizontal Concentrated Load	0.89	2.22	-	-	2.22	Pass
Horizontal Concentrated Load	0.89	2.22	-	-	2.22	Pass

* Uniform Load Test was not evaluated for one- and two-family dwellings, as per Exception 1 of Section 1607.7.1 of the 2006 IBC



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Test: IBC Handrails and Guards
Date: 21-Mar-07 **Project:** 3116527 **Eng/Tech:** Riccardo DeSantis
Client: B W Creative Wood **Kevin Penner**
Product: 8 ft Tuscany Pine with 45 degree screwed top rail connection
Post Spacing: 8 4/16 ft 2.51 m
Height of Guard: 42 in 1067 mm
Opening in Guard: 4 in 102 mm
Method: International Building Code 2006
 1607.7.1. Handrails and Guards
 1714.3.1 Test Procedure
Safety Factor: 2.5
Equipment: Revere 2000lbf load cell with direct read-out cal due August 2007

Test	Design Load (Inward/Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Pass/Fail
Horizontal In-fill Load	50	125	-	-	125	Pass
Horizontal Uniform Load (per ft)	50	125	1063	516	1031	Not Evaluated*
Midspan Horizontal Concentrated Load	200	500	-	-	500	Pass
Top of Post Horizontal Concentrated Load	200	500	-	-	500	Pass

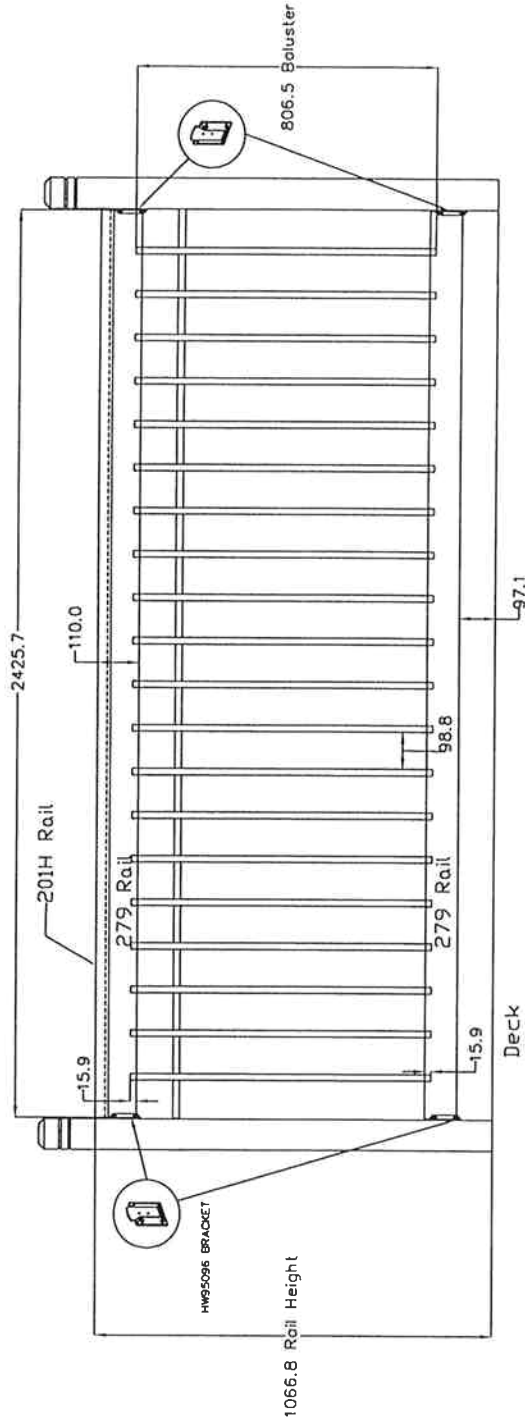
Test	Design Load (Inward/Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent 3-Point Load (kN)	Required Proof Load (kN)	Pass/Fail
Horizontal In-fill Load	0.22	0.56	-	-	0.56	Pass
Horizontal Uniform Load (per m)	0.73	1.82	1.44	2.29	4.59	Not Evaluated*
Midspan Horizontal Concentrated Load	0.89	2.22	-	-	2.22	Pass
Horizontal Concentrated Load	0.89	2.22	-	-	2.22	Pass

* Uniform Load Test was not evaluated for one- and two-family dwellings, as per Exception 1 of Section 1607.7.1 of the 2006 IBC

APPENDIX B: Drawings (5 pages)



32" TUSCANY BALUSTERS



Dimensions have been rounded to nearest 1/8"

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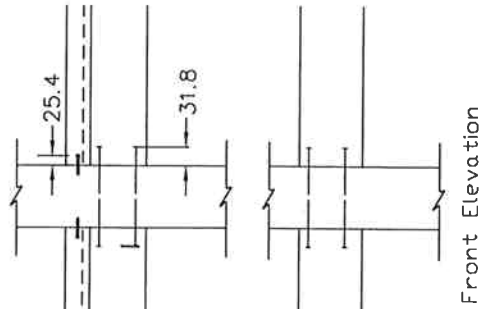
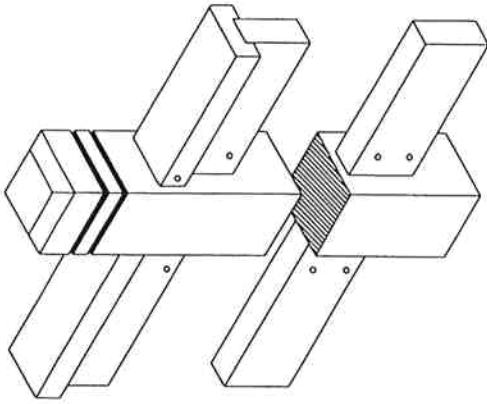
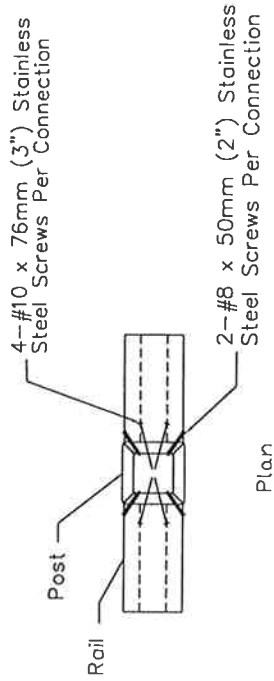
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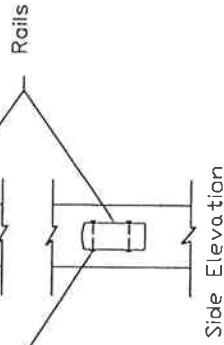
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Detail 1-1 Exterior Connection: Rail Fastened To Post



2-#8 x 50mm (2") Stainless Steel Screws Per Connection

4-#10 x 76mm (3") Stainless Steel Screws Per Connection



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MAY 28 2007

PROJECT #: 3116527

APPROVED BY:

Detail 1-1

Exterior Connection: Cap Rail Glued to Top Rail, Screwed To Post-50mm Screws.
Top/Bottom Rail Skew Screwed To Post-76mm Screws

- 1) Nails and screws shall not cause splitting of wood elements.
- 2) Fasteners shall be resistant to corrosion.
- 3) Glue Exterior Type II.

DIMENSIONS IN MM

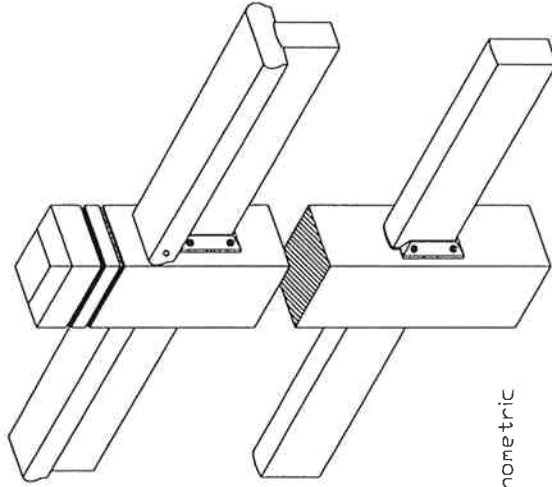
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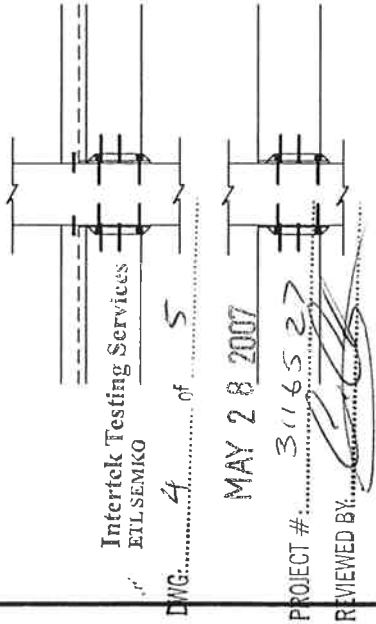
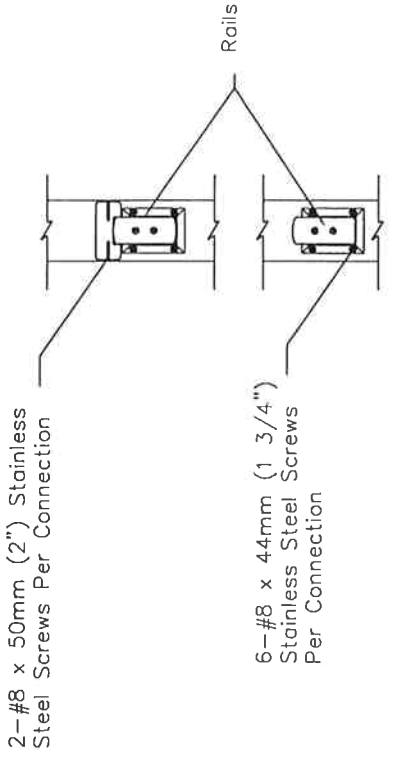
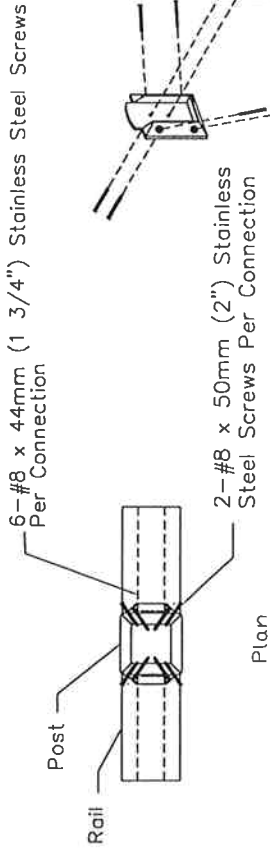
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Detail 1-3 Exterior Connection: Rail Fastened To Post With Hanger Bracket



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REVISION: MARCH 29, 2007
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CAD FILE: INSTALLATION INSTRUCTIONS

Detail 1-3
Exterior Connection: Cap Rail Glued to Top Rail, Screwed To Post-50mm Screws.
Top/Bottom Rail Skew Screwed To Post-44mm Screws

- 1) Nails and screws shall not cause splitting of wood elements.
- 2) Fasteners shall be resistant to corrosion.
- 3) Glue Exterior Type II.