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EVALUATION CENTER

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RENDERED TO

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PRODUCT EVALUATED
Shadow Rail™ Connector

EVALUATION PROPERTY
Loads on Guards

Report of Testing Shadow Rail™ Connector for horizontal loads on guards as given in The National Building Canada (2015) and the Ontario Building Code (2012) Section 9.8.8.2.(1).

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for Titan Building Products, on Shadow Rail^{Te} Connector used in guards, to evaluate load capacity for a 6 foot guardrail. Concentrated loads were applied in a horizontal direction and were as given in Table 9.8.8.2 of The National Building Canada (2015) and the Ontario Building Code (2012) for guards within dwelling units and exterior guards serving not more than 2 dwelling units. In addition to the code concentrated loads factored loads were also applied. The fastening of the guard to the substrate is beyond the scope of this report. This evaluation began July 7, 2016 and was completed July 21, 2016.

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. Samples were not independently selected for testing. The samples were received at the Evaluation Center on June 22, 2016.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

Titan Building Products submitted three pre-assembled guardrail test samples each consisting of two (2) 4 x 4 cedar wood posts 1.83m (6 feet) on center, 2 x 4 cedar wood top and bottom rails, and 19mm ($\frac{3}{4}$ ") diameter round aluminum infill balusters spaced at 100mm (4 inches) on center. Post to rail attachment was achieved using the Shadow RailTM Connector which were reported to be made with a polycarbonate thermoplastic material. The Shadow RailTM Connector part number was identified by the Titan as TIS R24. The Shadow RailTM Connector installation information is appended to this report.

The Shadow RailTM Connector consisted of interlocking mating halves with one half fastened to the post and the other half fastened to the rail end. Each Shadow RailTM Connector was secured to the post and rail using two (2) #10 x 2 inch flat head wood screws. The guard infill balusters were secured with plastic spigots each fastened to the top and bottom rails with a single #8 x 1-1/2" flat head wood screw. The guard assembly was installed vertically with the top rail 1067 mm (42 inches) above the simulated deck surface.

4 Testing and Evaluation Methods

4.1. SPECIMEN PREPARATION

The guardrail assemblies were received fully assembled. Each guard assembly in turn was installed vertically in a guard testing frame. Concentrated loads were applied horizontally.

4.2. CONDITIONING

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

4.3. PROCEDURE

4.3.1 Horizontal Concentrated Load Applied to Top Rail at Midspan

The initial position of the top rail at mid span relative to a stationary reference was measured. A concentrated horizontal load of 1kN (224 lbf) was applied to mid-span of the top rail using a 100 mm (4") square platen. The load cell/single ram/pump system held the loads for 1 minute. The horizontal displacement of the top rail was measured. The load was then released and the residual displacement of the top rail was measured.

A test load of 2.25kN (504 lbf) was applied to mid span of the top rail and the rail movement was measured at full load and after removal of the test load. The system was evaluated for residual deflection, failure, evidence of disengagement of any component and visible cracks in any component.

4.3.2 Horizontal Concentrated Load Applied to Top Rail Adjacent to Post

The initial position of the top rail adjacent to post relative to a stationary reference was measured. A concentrated horizontal load of 1kN (224 lbf) was applied to the top rail adjacent to the post using a 4" square platen. The load cell/single ram/pump system held the loads for 1 minute. The horizontal displacement of the top rail was measured. The load was then released and the residual displacement of the top rail was measured.

A test load of 2.25kN (504 lbf) was applied to the top rail adjacent to the post and the rail movement was measured at full load and after removal of the test load. The system was evaluated for residual deflection, failure, evidence of disengagement of any component and visible cracks in any component.

4.3.3 Horizontal Concentrated Load Applied to Balusters

The initial position of the balusters at mid height and mid span of the guard was measured. A concentrated horizontal load of 0.5kN (112 lbf) was applied over three balusters using a 300 mm (12") square platen. The load cell/single ram/pump system held the load for 1 minute. The horizontal displacement of the balusters was measured. The load was then released and the residual displacement of the balusters measured.

A test load of 1.33kN (299 lbf) was applied over three balusters using a 300 mm (12") square platen. The load cell/single ram/pump system held the load for 1 minute and the baluster movement was measured at full load and after removal of the test load. The system was evaluated for residual deflection, failure, evidence of disengagement of any component and visible cracks in any component.

5 Testing and Evaluation Results

Horizontal Concentrated Load Applied to Top Rail at Midspan

Load	Net Deflection (mm)	Residual Deflection (mm)	Observations
1kN (224 lbf)	24.5	0	After release of the load there was no evidence of disengagement or visible cracks in any component of the guard system
2.25kN (504 lbf)	56	1	No other evidence of disengagement or visible cracks was observed in any component of the guard system

5.1. Horizontal Concentrated Load Applied to Top Rail Adjacent to Post +

Load	Net Deflection (mm)	Residual Deflection (mm)	Observations
1kN (224 lbf)	0.75	0.25	After release of the load there was no evidence of disengagement or visible cracks in any component of the guard system
2.25kN (504 lbf)	1.5	1	No other evidence of disengagement or visible cracks was observed in any component of the guard system

+ Note- Deflection measured relative to post

5.2. Horizontal Concentrated Load Applied to Balusters

Load	Net Deflection (mm)	Residual Deflection (mm)	Observations
0.5kN (112lbf)	20	1	After release of the load there was no evidence of disengagement or visible cracks in any component of the guard system
1.33kN (299lbf)	56	3	No other evidence of disengagement or visible cracks was observed in any component of the guard system

5.3 Test Equipment

Description	Inventory Number
Powerfist 24" stroke hydraulic ram	--
Electric Hydraulic Pump	--
2.5 k Load Cell	280-01- 0713A Cal Due March 7, 2017
Read Out	280-01- 0713B Cal Due March 7, 2017
Tape Measure	280-01-1223 Cal Due Jan 28, 2017

6 Conclusion

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for Titan Building Products, on Shadow Rail™ Connector, to evaluate load capacity when used as a component of a 6 foot guard system. The Shadow Rail™ Connector withstood the horizontally concentrated load on guards as given in Table 9.8.8.2 of The National Building Canada (2015) and the Ontario Building Code (2012) for guards within dwelling units and exterior guards serving not more than 2 dwelling units. Results are reported in Section 5.0 of this report.

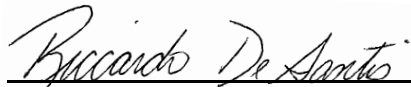
The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA LTD.



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Appendix A - Photograph



Photo 1 Top Rail Loaded at Midspan

6 Revision Page

Revision No.	Date	Changes	Author	Reviewer
0	September 28, 2016	First issue	Vern Jones	Riccardo DeSantis

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