

TEST REPORT

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EVALUATION CENTER

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PRODUCT EVALUATED
Rail Connectors
EVALUATION PROPERTY
Load Capacity

Report of Load Testing of Polycarbonate Rail Connectors used in Connecting 2x4 Wood Rails of Guards to Posts.

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted load testing for Titan Building Products on a Polycarbonate Rail Connectors used in the construction of guards. The connectors were identified by the Titan as "Shadowrail Connector", part #TIS R24. The base applied loads were as given in the International Building Code (2015) Para. 1607.8.1.1 for one-family and two-family dwellings. Factored loads were also applied in addition to the base loads. 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. Three preassembled test samples each consisting of 2 posts 8 ft. on centre, wood top and bottom rails with $\frac{3}{4}$ " aluminum infill balusters. Post to rail attachment was achieved using the subject Polycarbonate Rail Connectors. The samples were received at the Evaluation Center on June 22, 2016.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

Each test sample consisted of two 4x4 wood (cedar) posts 8 ft. on centre, 2x4 top and bottom rails with $\frac{3}{4}$ " aluminum infill balusters. The top rail consisted of two 2x4's one on edge and one flatwise fastened to the one on edge with seven evenly spaced 3" FH screws. The bottom rail was a single 2x4 on edge. Post to rail attachment was achieved using subject Polycarbonate Rail Connectors that consisted of interlocking mating halves with half fastened to the post and the other half fastened to the rail. Fasteners were #10 x 2" flat head wood screws with two screws in each half. The infill of the guard consisted of round aluminum balusters $\frac{3}{4}$ " in diameter spaced 4" on centre and fitting onto plastic spigots each fastened to the top and bottom rails with a single #8 x 1-1/2" flat head wood screw.

4 Testing and Evaluation Methods

4.1. SPECIMEN PREPARATION

Each guard assembly in turn was installed vertically in our guard testing frame and loads applied horizontally.

4.2. CONDITIONING

No specific conditioning required. Samples were tested under ambient lab conditions.

4.3. PROCEDURE

4.3.1 Horizontal Concentrated Load at Top Rail at Midspan

Basic Load (2015 IBC)

The initial position of the top rail at mid span was measured. A concentrated horizontal load of 200 lbs (delivered with a 4"x by 4" platen) was applied to mid span of the top rail by means of a calibrated load cell/single ram/pump system and held for 1 minute, whereupon the position of the top rail was measured. The load was then released and the residual position of the top rail was measured.

2.5 Factored Load

A test load of 500 lbs (factored load of 2.5) 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. After release of the 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 at Top Rail End Connection

Basic Load (2015 IBC)

The initial position of the top rail (relative to the post) at the end connection was measured. A concentrated horizontal load of 200 lbs (delivered with a 4"x by 4" platen) was applied to the top rail adjacent to the post by means of a calibrated load cell/single ram/pump system and held for 1 minute, whereupon the position of the top rail was measured. The load was then released and the residual position of the top rail was measured.

2.5 Factored Load

A test load of 500 lbs (factored load of 2.5) was applied to the top rail adjacent to the post and the rail movement (relative to the post) was measured at full load and after removal of the test load. After release of the load, the system was evaluated for residual deflection, failure, evidence of disengagement of any component and visible cracks in any component.

The above loading procedure was repeated on the two additional guard assemblies submitted.

5 Testing and Evaluation Results

5.1. Horizontal Concentrated Load at Top Rail at Midspan

Table 1. - Horizontal Concentrated Load at Top Rail at Midspan					
Load		Specimen Number	Net Deflection (mm)	Residual Deflection (mm)	Test Result
Basic	200 lbf	1	14.5	0	After release of the load there was no evidence of disengagement or visible cracks in any component of the guard system
		2	12.5	1.5	
		3	14.0	0.5	
Factored 2.5 X	500 lbf	1	21.0	2	No other evidence of disengagement or visible cracks was observed in any component of the guard system
		2	27.5	2.5	
		3	32.5	1.5	

Based on the appropriate resistance factor applied, the guard system satisfied the requirements specified in the International Building Code (2015) Para. 1607.8.1.1 for one-family and two-family dwellings.

5.2. Horizontal Concentrated Load at Top Rail End Connector

Table 1. - Horizontal Concentrated Load at Top Rail End Connector Adjacent to Post					
Load		Specimen Number	Net Deflection (mm)	Residual Deflection (mm)	Test Result
Basic	200 lbf	1	0.06	0.05	After release of the load there was no evidence of disengagement or visible cracks in any component of the guard system
		2	0.31	0.10	
		3	0.78	0.20	
Factored 2.5 X	500 lbf	1	0.27	0.24	No other evidence of disengagement or visible cracks was observed in any component of the guard system
		2	0.50	0.40	
		3	1.07	0.42	

Based on the appropriate resistance factor applied, the guard system satisfied the requirements specified in the International Building Code (2015) Para. 1607.8.1.1 for one-family and two-family dwellings.

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. has conducted testing for Titan Building Products on Polycarbonate Rail Connectors used in the construction of guards. The 8 foot guard having the top and bottom 2x4 rails connected to the 4x4 posts using the subject Polycarbonate Rail Connectors withstood the horizontally applied base loads as given in the International Building Code (2015) Para. 1607.8.1.1 for one-family and two-family dwellings. In addition the Polycarbonate Rail Connectors withstood the factored loads (base load x 2.5).

INTERTEK TESTING SERVICES NA LTD.



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7 Appendix A: Photograph



Photo 1 Guard with Polycarbonate Rail Connectors Undergoing Loading at Midspan

8 Revision Page

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

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