

TEST REPORT

Rendered to:

FORTRESS IRON RAILING & FENCE SYSTEMS

For:

32" Mega Series Plain Baluster

Report No.: D4810.01-119-19

Report Date: 02/14/14

Test Record Retention Date: 01/21/18

TEST REPORT

D4810.01-119-19
February 14, 2014

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TEST REPORT

Rendered to:

FORTRESS IRON RAILING & FENCE SYSTEMS
P.O. Box 831268
Richardson, Texas 75083

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1.0 General Information

1.1 Product

32" *Mega Series* Plain Baluster

1.2 Project Description

Architectural Testing was contracted by Fortress Iron Railing & Fence Systems to perform structural testing on their 32" *Mega Series* plain baluster. The purpose of the testing is code compliance evaluation in accordance with the following codes:

2012 *International Building Code*[®], International Code Council

2012 *International Residential Code*[®], International Code Council

Structural tests were performed according to Chapter 17 (Structural Tests and Special Inspections) of IBC 2012.

1.3 Limitations

All tests performed were to evaluate structural performance of the in-fill, pre-galvanized steel balusters, attached to 2x4 preservative-treated SYP railings. Testing is limited to in-fill testing only and to test loads equal to 2.5 times the design load.

1.4 Qualifications

Architectural Testing in York, Pennsylvania has demonstrated compliance with ANS/ISO/IEC Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. Architectural Testing is accredited to perform all testing reported herein.

1.0 General Information (Continued)

1.5 Product Description

Fortress Iron Railing & Fence Systems provided the baluster test specimens and hardware with the following details:

Mega Series Square Baluster: 3/4 in square by 32 in long, pre-galvanized, powder coated steel square baluster with 0.05 in wall

Mega EZ Mount Baluster Connectors: 5.5mm x 50mm stainless steel, flat-head, star drive screws with nylon EZ Mount (two per baluster)

Top and Bottom Rails: Preservative-treated SYP 2x4's

Architectural Testing provided the preservative treated SYP 2x4's for the top and bottom rails mounted to pressure treated 4x4 wood posts. See drawings in Appendix A and photographs in Appendix B for additional details.

1.6 Witnessing

There were no witnesses from Fortress Iron Railing & Fence Systems present for testing conducted and reported herein.

1.7 Conditions of Testing

Unless otherwise indicated, all testing reported herein was conducted in a laboratory set to maintain temperature in the range of 68 ± 4 °F and humidity in the range of 50 ± 5 % RH. All test specimen materials were stored in the laboratory environment for no less than 40 hours prior to testing.

2.0 Structural Performance Testing of Assembled Railing Systems

Re: ICC-ES™ AC174, Section 5.1

2.1 Test Equipment

The guardrail was tested in a self-contained structural frame designed to accommodate anchorage of the guardrail assembly and application of the required test loads. The specimens were loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables, nylon straps, and load distribution beams were used to impose test loads on the specimens. Applied load was measured using an electronic load cell located in-line with the loading system. Electronic linear motion transducers were used to measure deflections.

2.2 Test Setup

The 96 in wide by 42 in high guardrail assembly for the *Mega Series* plain baluster system was installed and tested as a single railing section by directly securing the wood 4x4 posts into a rigid steel test fixture, which rigidly restrained the posts from deflecting. Transducers mounted to an independent reference frame were located to record movement of reference points on the guardrail system components (ends and mid-point) to determine net component deflections. See photographs in Appendix B for individual test setups.

2.3 Test Procedure

Each test specimen was inspected prior to testing to verify size and general condition of the materials, assembly, and installation. No potentially compromising defects were observed prior to testing. An initial load, not exceeding 50% of design load, was applied and transducers were zeroed. Load was then applied at a steady uniform rate until reaching 2.0 times design load in no less than 10 seconds. After reaching 2.0 times design load, the load was released. After allowing a minimum period of one minute for stabilization, load was reapplied to the initial load level used at the start of the loading procedure, and deflections were recorded and used to analyze recovery. Load was then increased at a steady uniform rate until reaching 2.5 times design load or until failure occurred. The testing time was continually recorded from the application of initial test load until the ultimate test load was reached.

2.0 Structural Performance Testing of Assembled Railing Systems (Continued)

2.4 Test Results

The following tests were performed on the guardrail assemblies for the design load requirements of the codes referenced. Deflection and permanent set were component deflections relative to their end-points; they were not overall system displacements. All loads and displacement measurements were horizontal, unless noted otherwise.

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target).

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure.

8 ft by 42 in 2x4 Wood Guardrail System Using 32" Mega Series Plain Baluster

Test No. 1 - 01/21/14						
Design Load: 50 lb / 1 Square Ft at Center of In-Fill (on Three Balusters)						
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)			
			End	Mid	End	Net ¹
Initial Load	25	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	107	01:13	0.52	0.58	0.42	0.11
Initial Load	27	03:07	0.03	0.02	0.067	-0.03
100% Recovery from 2.0 x Design Load						
2.5x Design Load	140	03:12	Achieved Load without Failure			

¹ Net displacement was the infill displacement relative to its top and bottom

Test No. 1 - 01/21/14						
Design Load: 50 lb / 1 Square Ft at Bottom of In-Fill (on Three Balusters)						
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)			
			End	Mid	End	Net ¹
Initial Load	28	00:00	0.00	0.00	0.00	0.00
2.0x Design Load	111	01:11	0.08	0.63	0.06	0.56
Initial Load	28	02:49	0.01	0.01	0.00	0.00
100% Recovery from 2.0 x Design Load						
2.5x Design Load	149	02:55	Achieved Load without Failure			

¹ Net displacement was the bottom rail displacement relative to its ends

2.5 Summary and Conclusions

Using performance criteria of 75% deflection recovery from 2.0 times design load and withstanding an ultimate load of 2.5 times design load, the test results substantiate compliance with the design load requirements of the referenced building codes for the 96 in wide by 42 in high railing assembly containing the *Mega Series* plain balusters reported herein.

3.0 Closing Statement

Architectural Testing will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Architectural Testing, Inc. for the entire test record retention period.

Results obtained are tested values and were secured using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.:

Joshua I. Scott
Technician II
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JIS:jis/tah/jas

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A - Drawings (2)
- Appendix B - Photographs (1)

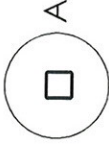
Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	02/14/14	N/A	Original report issue

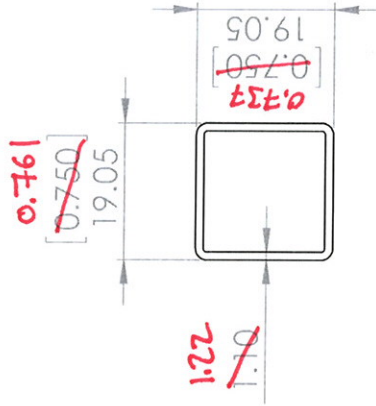
APPENDIX A

Drawings

[32.000]
812.80



SCALE 1:5



DETAIL A
SCALE 1:1



Test sample complies with these details.
Deviations are noted.

Report # D4810.01-119-19

Date 2/7/14 Tech JIS



COMMENTS:

PROPRIETARY AND CONFIDENTIAL
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FILE NAME: RB MEGA SQ 32

TITLE: RB MEGA SQ 32

DRAWN BY: KEVIN BURT

SIZE DWG. NO. REV

A

SCALE: NOTED DATE: 1/20/14

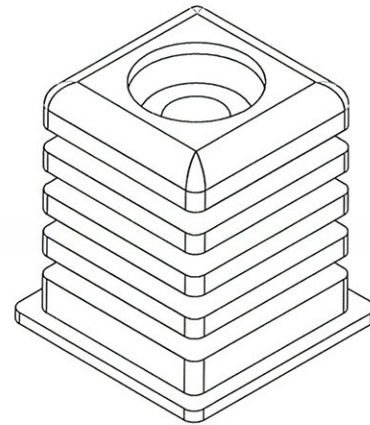
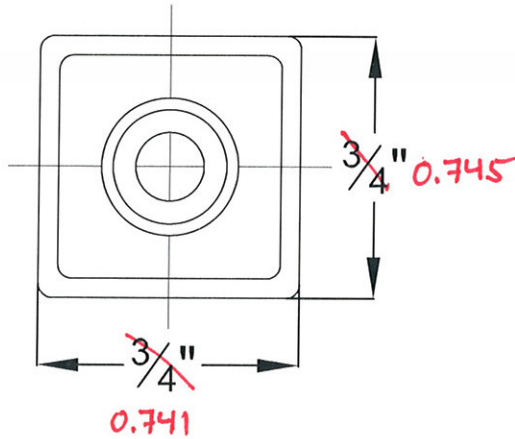
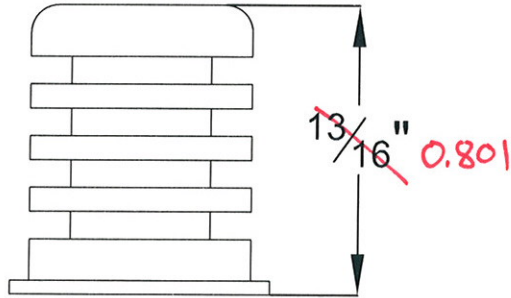
NOTES:
 MATERIAL IS NYLON 66
 SCREW IS A STAINLESS STEEL 5.5MM X 50mm WOOD SCREW



Test sample complies with these details.
 Deviations are noted.

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Fortress Railing
 PO Box# 831268
 Richardson, TX 75081

Style: RALING BALUSTER	Description: RB-MEGA EZ MOUNT LEVEL	
PART SIZES: 3/4" x 3/4" x 1 3/16"	Rev #: 1	Rev Date: 1/17/14
FOR VINTAGE BALUSTER: 3/4" x 3/4"	Scale: Do Not Scale	
Class: Residential	Drawn By: B B	Date: 1/21/13

APPENDIX B

Photographs



Photo No. 1
Infill Loading at Center of Three Balusters

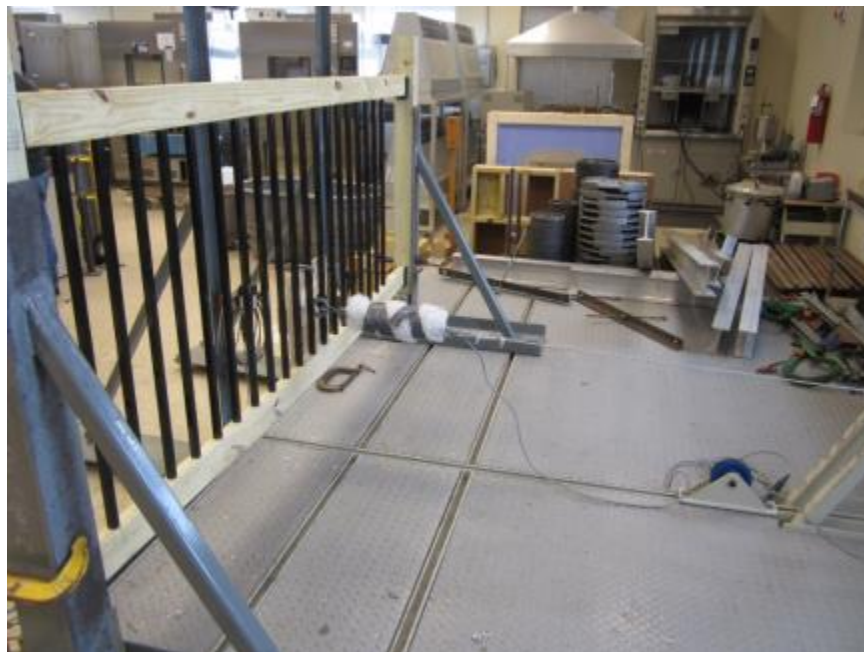


Photo No. 2
Bottom Infill Loading at Center of Three Balusters