Intertek | Architectural Testing

TEST REPORT

Rendered to:

EASTERN WHOLESALE FENCE COMPANY, INC.

For:

8 ft by 42 in *Eastern Ornamental Railing*
Aluminum Guardrail System

Report No.: F5524.01-119-19
Report Date: 03/31/16
Test Record Retention Date: 02/26/20

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Intertek | Architectural Testing

TEST REPORT

F5524.01-119-19
March 31, 2016

TABLE OF CONTENTS

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Rendered to:

EASTERN WHOLESALE FENCE COMPANY, INC.
301 Scott Avenue
Calverton, New York 11933

Report No.:	F5524.01-119-19
Test Date:	02/26/16
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1.0 General Information

1.1 Product

8 ft by 42 in *Eastern Ornamental Railing* - Aluminum Guardrail System

1.2 Project Description

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted by Eastern Wholesale Fence Company, Inc. to perform structural testing on their 8 ft by 42 in *Eastern Ornamental Railing* aluminum guardrail system. The purpose of the testing is preliminary code compliance evaluation in accordance with the following criteria:

ICC-ES™ AC273 (March 1, 2008 - Editorial Revised January 2012), *Acceptance Criteria for Handrails and Guards*

ICC-ES™ AC273-08 was developed by the ICC Evaluation Service, Inc. (ICC-ES™) as acceptance criteria to evaluate compliance with the following building codes:

2012 *International Building Code*®, International Code Council

2012 International Residential Code®, International Code Council

1.3 Limitations

All tests performed were to evaluate structural performance of the railing assembly to carry and transfer imposed loads to the supports (posts). The test specimen evaluated included the pickets, rails, rail brackets, posts, and attachment to the supporting structure. Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

1.4 Qualifications

Intertek-ATI has demonstrated compliance with ISO/IEC International Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. (IAS).

1.5 Product Description

The 8 ft by 42 in *Eastern Ornamental Railing* aluminum guardrail system is comprised of aluminum rails, pickets, and posts produced by an extrusion process. Drawings are included in Appendix A to verify the overall dimensions and other pertinent information of the tested product, its components, and any constructed assemblies.

1.6 Product Sampling

All samples utilized for testing reported herein were provided to Intertek-ATI by Eastern Wholesale Fence Company, Inc. and were not independently sampled and selected.

1.7 Witnessing

Mr. Philip Bryan was present on 02/26/16 to witness structural performance testing of assembled railing systems conducted and reported herein.

1.8 Conditions of Testing

Unless otherwise indicated, all testing reported herein was conducted in a laboratory set to maintain temperature in the range of 68 ± 4ºF and humidity in the range of 50 ± 5% RH.

2.0 Referenced Standard

ASTM D1761-12, *Standard Test Methods for Mechanical Fasteners in Wood*

3.0 Assembly Fastener Testing

Re: ICC-ES™ AC273 - Section 4.2.7

3.1 General

The purpose of this testing was to simulate a 90 degree bracket loading condition, which addresses a situation when the guardrail system is to be installed with the top rails in a corner condition.

3.2 Test Specimens

Short sections of the top rail were attached in accordance with Eastern Wholesale Fence Company, Inc.'s installation instructions to short sections of posts. Specimens were assembled by an Intertek-ATI technician. Rail brackets were secured to the post and to the rail as described in Section 4.4 Fastening Schedule.

3.3 Test Setup

The testing machine was fitted with the post sections at the top and bottom to accommodate anchorage of the rail and brackets. The top post section was attached to the test machine's crosshead with a swivel mechanism, and the bottom post section was attached rigidly to the base of the test machine. Three specimens were tested in this manner with each of the three specimens including two connections for a total of six connections. See photograph in Appendix B for test setup.

3.4 Test Procedure

Testing was performed in accordance with ASTM D 1761 and by using a computer-monitored and -controlled SATEC Unidrive, Model MII 50 UD Universal Testing Machine. Tests were run at a crosshead speed of 0.05 in/min, and each specimen was tested in tension to its ultimate load capacity. Testing was conducted on 02/29/16.

3.5 Test Results

Sample No.	Ultimate Load (lb)	Deviation From Average	Mode of Failure
1	1736	+9.2%	Bracket to rail fastener shear failure
2	1512	-4.9%	
3	1522	-4.2%	
Average	**1590**		
Allowable Capacity [1]	**530**	**≥ 200 lb ∴ OK**	

[1] *Average ultimate load divided by a factor of safety of three (3.0)*

3.6 Summary and Conclusions

The maximum design load rating required for guardrail systems for use in IRC - One- and Two-Family Dwellings and for rail lengths up to and including 8 ft for use in IBC - All Use Groups is 200 lb. Therefore, fasteners / connectors reported herein meet the performance requirements of ICC-ES™ AC273 for use in corner conditions.

4.0 Structural Performance Testing of Assembled Railing Systems

Re: ICC-ES™ AC273 - Section 4.2.1

4.1 General

Railing assemblies were tested in a self-contained structural frame designed to accommodate anchorage of a rail assembly and application of the required test loads. The specimen was 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 specimen. Applied load was measured using an electronic load cell located in-line with the loading system. Deflections were measured to the nearest 0.01 in using electronic linear displacement transducers.

4.2 Railing Assembly Description

The *Eastern Ornamental Railing* aluminum guardrail systems consisted of aluminum top and bottom rails with spaced pickets between the rail members. The railing systems had an overall top rail length (inside of post to inside of post) of 93-1/8 in with an overall rail height (top of top rail to bottom of bottom rail) of 39-1/8 in. Top and bottom rails attached to aluminum post mounts via cast aluminum collar and socket brackets respectively. See Section 4.4 Fastening Schedule for connection details. A support block was located at the midspan of the bottom rail and was attached according to Section 4.4 Fastening Schedule. See drawings in Appendix A and photographs in Appendix B for additional details.

4.3 Series / Model

The test specimen components were supplied by Eastern Wholesale Fence Company, Inc. and were assembled by a representative of Intertek-ATI.

Top Rail: 2-1/8 in wide by 2-1/4 in high by 0.080 in wall 6061-T6 aluminum contoured (breadloaf profile) rail with internal 1-1/8 in wide by 7/8 in high by 0.035/0.090 in wall inverted U-shaped vinyl baluster retainer and 7/8 in wide by 7/32 in high by 0.050 in wall 6061-T6 aluminum baluster spacer

Bottom Rail: 1-1/4 in wide by 1-1/2 in high by 0.050 in wall 6061-T6 aluminum inverted U-shaped profile rail with internal 1-1/8 in wide by 7/8 in high by 0.035/0.090 in wall U-shaped vinyl baluster retainer

Brackets:
- Top Rail – 2-3/8 in wide by 2-1/8 in high by 1-1/2 in deep ADC-12 cast aluminum socket bracket
- Bottom Rail – 1-1/2 in wide by 2-3/8 in high by 1-1/2 in deep ADC-12 cast aluminum socket bracket

Pickets: 3/4 in square by 0.040 in wall 6061-T6 aluminum pickets

4.3 Series / Model (Continued)

Support Block: Three piece section consisting of a 7/8 in long section of picket secured to the bottom rail as described in Section 4.4 Fastening Schedule, a 1 in square by 0.050 in wall 6061-T6 aluminum section cut to length and an ADC-12 cast aluminum socket bracket secured to the deck surface as described in Section 4.4 Fastening Schedule.

Post:
- 2-1/2 in square by 0.110 in wall, 6061-T6 aluminum post with raceway channels at each interior corner attached to 4-1/4 in square by 1/2 in thick steel base plate with four 3/8 in by 2-3/4 in (17 TPI, 0.320 in minor diameter) hex head, carbon steel bolts; the base plate contained four 1/2 in diameter through holes (3-3/8 in on-center; 7/16 in edge of plate to center of hole), four 7/16 in diameter through holes with 13/16 in diameter by 1/4 in deep counter bores (2 in on-center; 1-1/8 in edge of plate to center of hole) and one 7/16 in diameter through hole directly in the middle - the base plate was attached to the surface of a rigid steel test surface (simulated concrete) as described in Section 5.4 Fastening Schedule for the post mount test only.
- 3 in square by 0.120 in wall, 6061-T6 aluminum post with raceway channels at each interior corner attached to 4-3/4 in square by 1/2 in thick steel base plate with four 3/8 in by 2-3/4 in (17 TPI, 0.320 in minor diameter) hex head, carbon steel bolts; the base plate contained four 1/2 in diameter through holes (3-7/8 in on-center; 7/16 in edge of plate to center of hole), four 7/16 in diameter through holes with 7/8 in diameter by 1/4 in deep counter bores (2-1/2 in on-center; 1-1/8 in edge of plate to center of hole) and one 7/16 in diameter through hole directly in the middle - the base plate was attached to the surface of a rigid steel test surface (simulated concrete) as described in Section 5.4 Fastening Schedule for the post mount test only.

See drawings in Appendix A and photographs in Appendix B for additional details.

4.4 Fastening Schedule

Connection	Fastener
Top Rail Bracket to Post	Three #10-12 by 1" (0.132 in minor diameter) pan-head, Philips drive, self-drilling, stainless steel screws
Bottom Rail Bracket to Post	Two #10-12 by 1" (0.132 in minor diameter) pan-head, Philips drive, self-drilling, stainless steel screws
Top Rail Bracket to Rail	Two #8-18 by 5/8" (0.110 in minor diameter) pan-head, Philips drive, self-drilling, stainless steel screws
Bottom Rail Bracket to Rail	Slip fit – no mechanical connections
Baluster to Top and Bottom Rail	Slip fit – no mechanical connections
Support Block Picket Section to Bottom Rail	One #8-18 by 1/2" (0.112 in minor diameter) pan-head, Philips drive, self-drilling, stainless steel screw
Support Block Bracket to Deck Surface	Two #10-12 by 1" (0.132 in minor diameter) pan-head, Philips drive, self-drilling, stainless steel screws
Post Mount to Substructure	Four 3/8 in Grade 8 hex-head bolts with washer

4.5 Test Setup

The railing assembly was installed and tested as a single railing section by directly securing the aluminum post to a rigid test frame (stanchions) (fully assembled guardrail testing) or by directly securing (surface-mounting; simulated concrete) the base of the post mounts to a rigid steel test frame (post mount testing). The railing was assembled by an Intertek-ATI technician. Transducers mounted to an independent reference frame were located to record movement of reference points on the railing system components (ends and mid-point) to determine net component deflections. See photographs in Appendix B for test setups.

4.6 Test Procedure

Testing and evaluation was performed in accordance with Section 4.2.1 of ICC-ES™ AC273. The 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. One specimen was used for all load tests which were performed in the order reported. Each design load test was performed using the following procedure:

1. Zeroed transducers and load cell at zero load;
2. Increased load to specified test load in no less than ten seconds; and
3. Held test load for no less than one minute.

4.7 Test Results

Unless otherwise noted, all loads and displacement measurements were normal to the rail (horizontal). The test results apply only to the railing assembly between supports and anchorage to the support.

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target). Where more than one value is reported, the test load was the range (min. - max.) that was held during the time indicated in the test.

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure. Where more than one value is reported, the time was the range (start-end) that the designated load level was reached and sustained.

4.7 Test Results (Continued)

93-1/8 in by 42 in *Eastern Ornamental Railing* Aluminum Guardrail
IBC – All Use Groups / ICC-ES™ AC273
Specimen No. 1 of 2

Test No. 1 - Test Date: 02/26/16 Design Load: 50 lb / 1 Square ft of In-Fill at Center of Two Pickets			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
125 lb (2.50 x D.L.)	126 - 130	00:29 - 01:31	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 02/26/16 Design Load: 50 lb / 1 Square ft of In-Fill at Bottom of Two Pickets			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
125 lb (2.50 x D.L.)	124 - 131 [1]	00:24 - 01:27	Sustained load equal to or greater than 125 lb for one full minute without failure

[1] *The test load fell below the target load level for a total of 1 second while maintaining load.*

Test No. 3 - Test Date: 02/26/16 Design Load: 50 plf x (93-1/8 in ÷ 12 in/ft) = 388 lb Uniform Load at 45° from Horizontal on Top Rail [1]			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
970 lb (2.50 x D.L.)	972 - 981	01:19 - 02:20	Sustained load equal to or greater than 970 lb for one full minute without failure

[1] *Uniform load was simulated with quarter point loading*

4.7 Test Results (Continued)

Specimen No. 1 of 2 (Continued)

Test No. 4 - Test Date: 02/26/16 Design Load: 200 lb Concentrated Load at Mid-Span of Top Rail						
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**			
			End	**Mid**	**End**	**Net [1]**
200 lb (D.L.)	201	00:35	0.03	1.13	0.03	1.10
500 lb (2.50 x D.L.)	503 - 512	01:01 - 02:04	**Result:** Withstood load equal to or greater than 500 lb for one full minute without failure			
Deflection Evaluation: Maximum rail deflection at 201 lb = 1.10 in on an 8 ft rail (93-1/8 in) Limits per AC273 [2]: $\left(\frac{h}{24}+\frac{l}{96}\right)=\left(\frac{36}{24}+\frac{93.125}{96}\right)=2.47" > 1.10" \therefore$ ok and $\frac{h}{12}=\frac{42}{12}=3.50" > 1.10" \therefore$ ok						

[1] *Each end displacement was measured at the center of the support. Net displacement was the rail displacement relative to the supports.*

[2] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements.*

Test No. 5 - Test Date: 02/26/16 Design Load: 200 lb Concentrated Load at Both Ends of Top Rail (Brackets)			
Load Level [1]	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
1000 lb (2.50 x D.L.) x 2	1000 - 1028	00:38 - 01:41	Each end withstood load equal to or greater than 500 lb for one full minute without failure.

[1] *Load was imposed on* both *ends of rail using a spreader beam; therefore, loads were doubled.*

4.7 Test Results (Continued)

Specimen No. 2 of 2

Test No. 1 - Test Date: 02/26/16 Design Load: 50 lb / 1 Square ft of In-Fill at Center of Two Pickets			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
125 lb (2.50 x D.L.)	127 - 133	00:26 - 01:27	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 2 - Test Date: 02/26/16 Design Load: 50 lb / 1 Square ft of In-Fill at Bottom of Two Pickets			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
125 lb (2.50 x D.L.)	128 - 139	00:22 - 01:25	Sustained load equal to or greater than 125 lb for one full minute without failure

Test No. 3 - Test Date: 02/26/16 Design Load: 50 plf x (93-1/8 in ÷ 12 in/ft) = 388 lb Uniform Load at 45° from Horizontal on Top Rail [1]			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
970 lb (2.50 x D.L.)	973 - 987	00:49 - 01:58	Sustained load equal to or greater than 970 lb for one full minute without failure

[1] *Uniform load was simulated with quarter point loading*

4.7 Test Results (Continued)

Specimen No. 2 of 2 (Continued)

Test No. 4 - Test Date: 02/26/16 Design Load: 200 lb Concentrated Load at Mid-Span of Top Rail						
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**			
			End	**Mid**	**End**	**Net [2]**
200 lb (D.L.)	200	00:31	0.02	1.12	0.03	1.10
500 lb (2.50 x D.L.)	502 - 508	00:56 - 01:59	**Result:** Withstood load equal to or greater than 500 lb for one full minute without failure			

Deflection Evaluation:

Maximum rail deflection at 200 lb = 1.10 in on an 8 ft rail (93-1/8 in)

Limits per AC273 [2]: $\left(\frac{h}{24}+\frac{l}{96}\right)=\left(\frac{36}{24}+\frac{93.125}{96}\right)=2.47" > 1.10" \therefore$ ok

and $\frac{h}{12}=\frac{42}{12}=3.50" > 1.10" \therefore$ ok

[1] *Each end displacement was measured at the center of the support. Net displacement was the rail displacement relative to the supports.*

[2] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements.*

Test No. 5 - Test Date: 02/26/16 Design Load: 200 lb Concentrated Load at Both Ends of Top Rail (Brackets)			
Load Level [1]	**Test Load (lb)**	**E.T. (min:sec)**	**Result**
1000 lb (2.50 x D.L.) x 2	1002 - 1031	00:48 - 01:51	Each end withstood load equal to or greater than 500 lb for one full minute without failure.

[1] *Load was imposed on* both *ends of rail using a spreader beam; therefore, loads were doubled.*

4.7 Test Results (Continued)

Stand-Alone Post Mount Testing
Simulated Concrete Application
2-1/2 in Post Mounts

Test No. 1 - Test Date: 03/04/16 **Design Load: 200 lb Concentrated Load at Top of Post Mount (42 in High)**			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**
200 lb (D.L.)	200	00:35	0.54
Ultimate Load:	822	01:08	**Result**: Failure of attachment bolt on underside of post mount (shear failure)
Deflection Evaluation: Maximum post deflection at 200 lb = 0.54 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3.00" > 0.54" \therefore$ ok			

[1] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements*

Test No. 2 - Test Date: 03/04/16 **Design Load: 200 lb Concentrated Load at Top of Post Mount (42 in High)**			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**
200 lb (D.L.)	202	00:26	0.57
Ultimate Load:	783	01:02	**Result**: Post snapped off above attachment fasteners
Deflection Evaluation: Maximum post deflection at 202 lb = 0.57 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3.00" > 0.57" \therefore$ ok			

[1] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements*

4.7 Test Results (Continued)

Stand-Alone Post Mount Testing
Simulated Concrete Application
3 in Post Mounts

Test No. 1 - Test Date: 03/04/16 **Design Load: 200 lb Concentrated Load at Top of Post Mount (42 in High)**			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**
200 lb (D.L.)	203	00:18	0.46
Ultimate Load:	1049	00:57	**Result:** Failure of attachment bolt on underside of post mount (shear failure)
Deflection Evaluation: Maximum post deflection at 203 lb = 0.46 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.46" \therefore ok$			

[1] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements*

Test No. 2 - Test Date: 03/04/16 **Design Load: 200 lb Concentrated Load at Top of Post Mount (42 in High)**			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**
200 lb (D.L.)	202	00:22	0.47
Ultimate Load:	542	00:40	**Result:** Failure of attachment bolt on underside of post mount (shear failure)
Deflection Evaluation: Maximum post deflection at 202 lb = 0.47 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.47" \therefore ok$			

[1] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements*

4.7 Test Results (Continued)

Stand-Alone Post Mount Testing
Simulated Concrete Application
3 in Post Mounts
(Continued)

Test No. 3 - Test Date: 03/08/16 Design Load: 200 lb Concentrated Load at Top of Post Mount (42 in High)			
Load Level	**Test Load (lb)**	**E.T. (min:sec)**	**Displacement (in)**
200 lb (D.L.)	203	00:18	0.48
Ultimate Load:	1067	01:10	**Result:** Failure of attachment bolt on underside of post mount (shear failure)
Deflection Evaluation: Maximum post deflection at 203 lb = 0.48 in Limits per AC273 [1]: $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.48" \therefore$ ok			

[1] *Deflection limit calculation based on worse case 36" railing height to satisfy One- and Two-Family Dwelling requirements*

4.8 Summary and Conclusions

Preliminary evaluation concludes that the railing assembly reported herein meets the structural performance requirements of Section 4.2.1 of ICC-ES™ AC273 for use in Commercial Applications (IBC). In order to qualify the guardrail as AC273 compliant additional testing would need to be conducted of product sampled by an independent inspection agency.

Anchorage of support posts to the supporting structure is not included in the scope of this testing and would need to be evaluated separately.

5.0 Closing Statement

Intertek-ATI 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 Intertek-ATI 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 Intertek-ATI.

For INTERTEK-ATI:

Digitally Signed by: Adam J. Schrum

Adam J. Schrum
Lead Technician

Digitally Signed by: Virgal Thomas Mickley, Jr.

V. Thomas Mickley, Jr., P.E.
Senior Project Engineer

AJS:vtm/jas

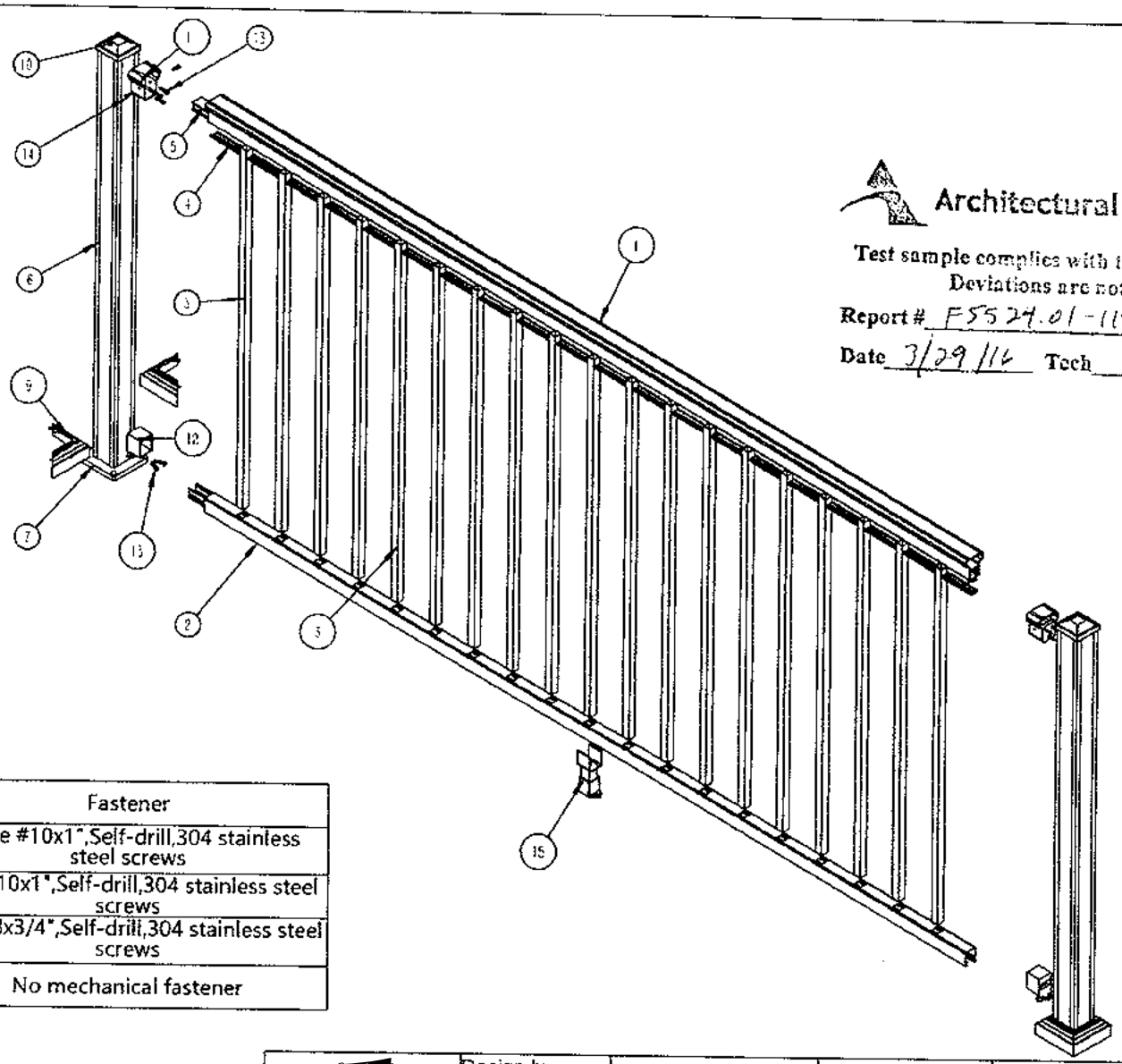
Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A - Drawings (15)
Appendix B - Photographs (4)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	03/31/16	N/A	Original report issue

APPENDIX A

Drawings



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5529.01-119-19

Date 3/29/19 Tech AJS

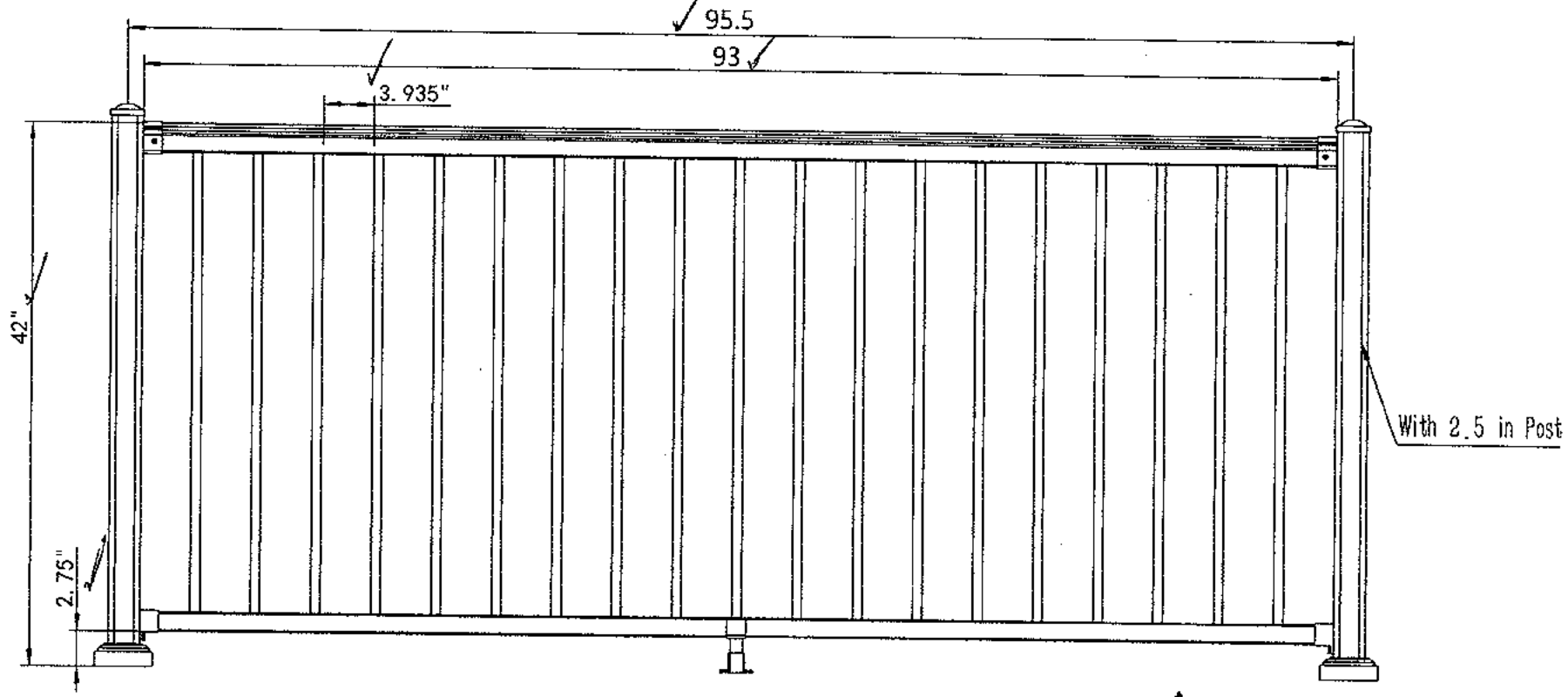
Connection	Fastener
Top Rail Bracket to Post	Three #10x1",Self-drill,304 stainless steel screws
Bottom Rail Bracket to Post	Two #10x1",Self-drill,304 stainless steel screws
Top Rail Bracket to Rail	Two #8x3/4",Self-drill,304 stainless steel screws
Bottom Rail Bracket to Rail	No mechanical fastener

Eastern Ornamental RAILING
EASTERNORNAMENTALRAILING.COM

Design by		Product name	Eastern-8'x42"Railing
Check by			
Approve by		Drawing NO	AR002
Complete date		Revision	A/0

Sheet 1 Of 13

42" X 96" Railing System W/ Square Balusters



Alum. Alloy #6061-T6	Standard Tolerance: 0.015 +/-

Architectural Testing

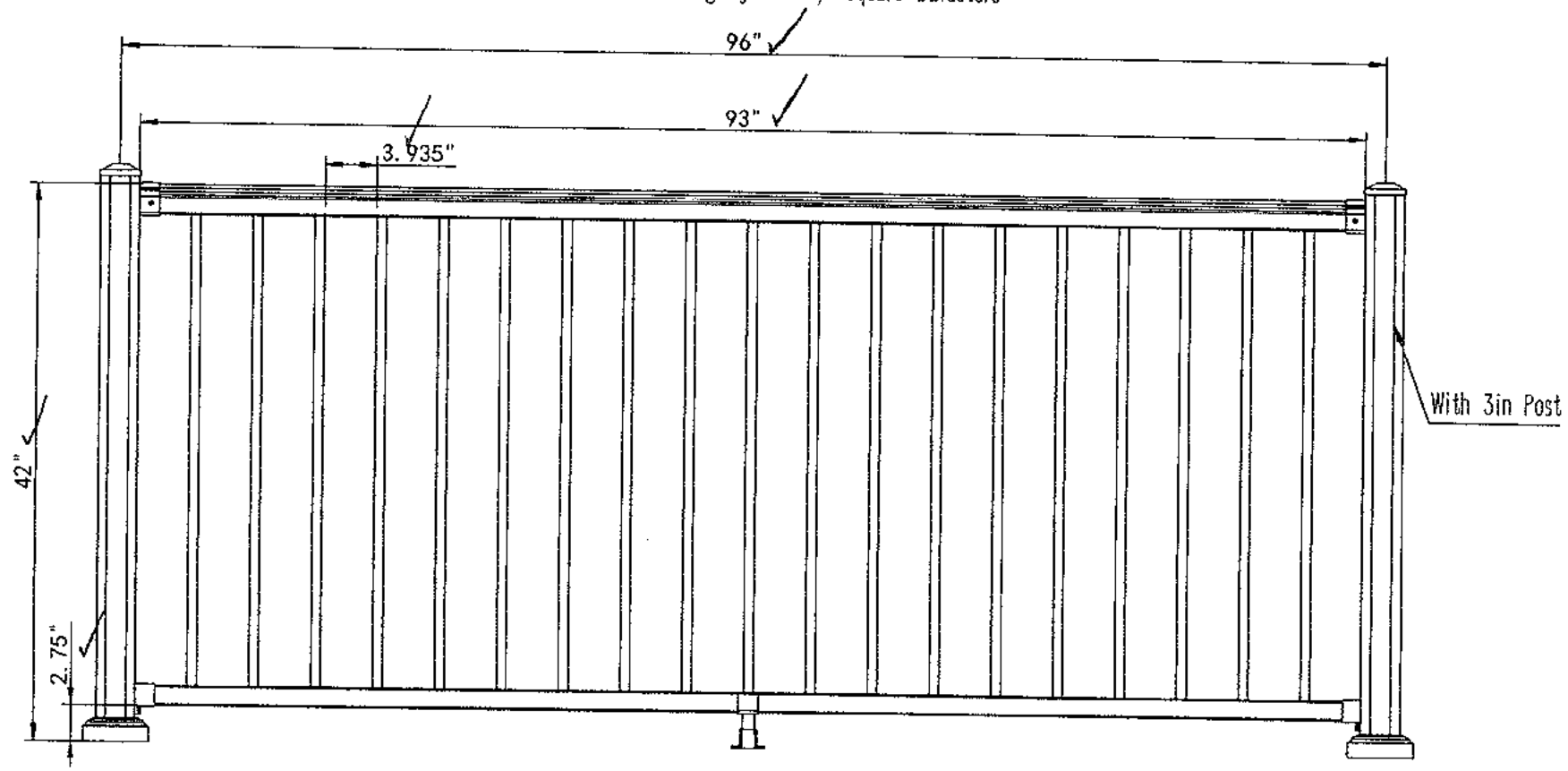
Test sample complies with these details.
Deviations are noted.

Report # E5524.01-119-19

Date 3/29/16 Tech AJS

Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AR022	
	Complete date		Revision	A/0	Sheet 2 Of 13

42" X 96" Railing System W/ Square Balusters



Alum. Alloy #6061-T6	Standard Tolerance: 0.015 +/-

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5524.01-119-19

Date 3/29/16 Tech AJS

Design by		Product name	Eastern-8'x42"Railing
Check by		Drawing NO	AR002
Approve by		Revision	A/0
Complete date		Sheet 2 Of 13	

Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # ES524.01-119-19

Date 2/29/16 Tech KJS

Parts List			
S.N.	Item	QTY	Material
1	top rail 2125	1	Aluminum 6061-T6
2	bottom rail 12515	1	Aluminum 6061-T6
3	3/4" picket	19	Aluminum 6061-T6
4	Spacer	20	Aluminum 6061-T6
5	vinyl insert	1	vinyl
6	2.5" post	2	Aluminum 6061-T6
7	base plate	2	#45 steel
8	0.4x2 3/4 Bolt (base plate to post)	8	carbon steel Level 8.8
9	2.5"Post trim	2	ADC-12
10	2.5" post cap	2	ADC-12
11	top bracket	2	ADC-12
12	bottom bracket	2	ADC-12
13	10# 1"Screw (all brackets to post)	10	SS304
14	8# 3/4"Screw (top bracket to rail)	4	SS304
15	bottom rail support	1	Aluminum 6061-T6

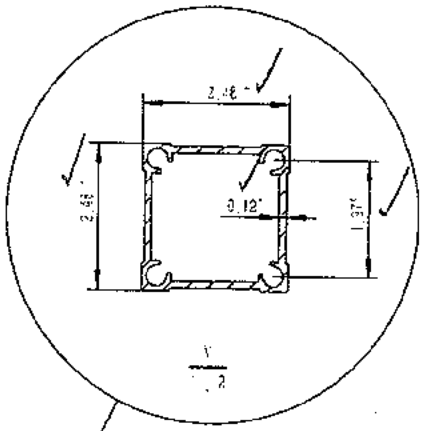
Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # ES524.01-119-19

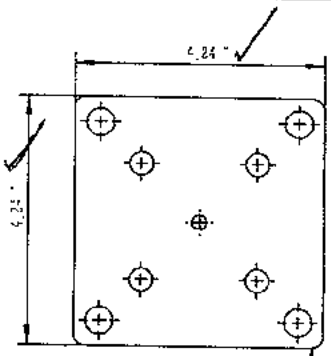
Date 3/29/16 Tech ATI

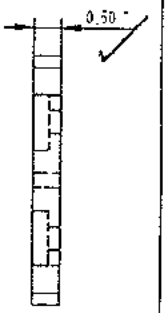
Parts List			
S.N.	Item	QTY	Material
1	top rail 2125	1	Aluminum 6061-T6
2	bottom rail 12515	1	Aluminum 6061-T6
3	3/4" picket	19	Aluminum 6061-T6
4	Spacer	20	Aluminum 6061-T6
5	vinyl insert	1	vinyl
6	3" post	2	Aluminum 6061-T6
7	base plate	2	#45 steel
8	0.4x2 3/4 Bolt (base plate to post)	8	carbon steel Level 8.8
9	3"Post trim	2	ADC-12
10	3" post cap	2	ADC-12
11	top bracket	2	ADC-12
12	bottom bracket	2	ADC-12
13	Screw (all brackets to post)	10	SS304
14	Screw (top bracket to rail)	4	SS304
15	bottom rail support	1	Aluminum 6061-T6



Base Plate

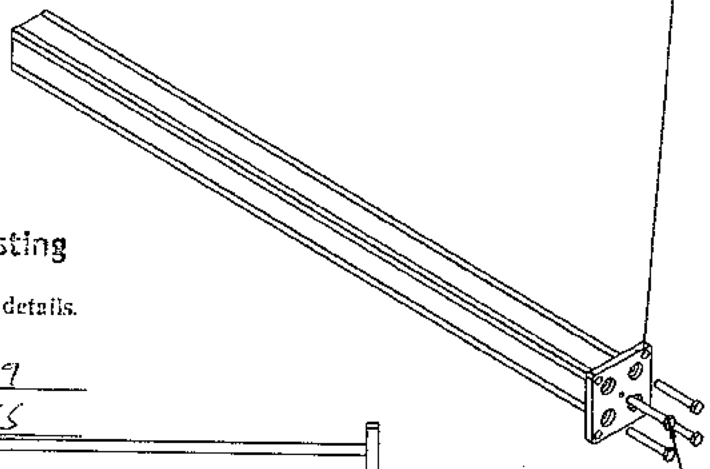
Steel #45
Standard Tolerance. 0.03 +/-
Wall Tolerance. 0.02 +/-





3.0in Newl Post

Alum. Alloy #6061-T6
Standard Tolerance. 0.015 +/-
Wall Tolerance. 0.01 +/-

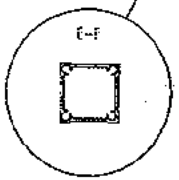


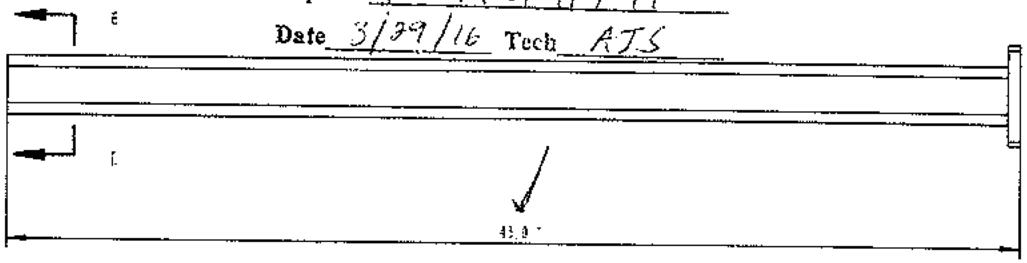
Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5574.01-119-19

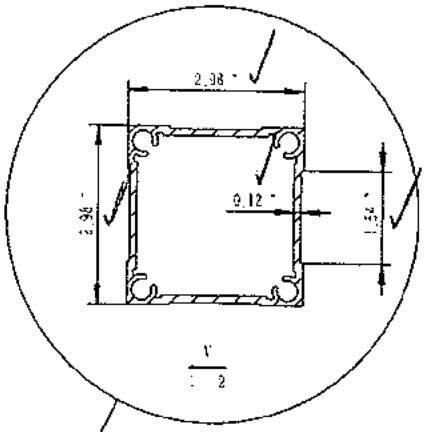
Date 3/29/16 Tech AJS





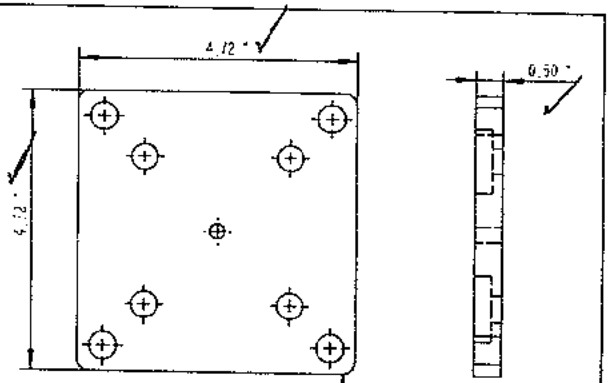
0.4x2 3/4" Bolt

Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AB002	
	Complete date		Revision	A/0	Sheet 3 Of 13



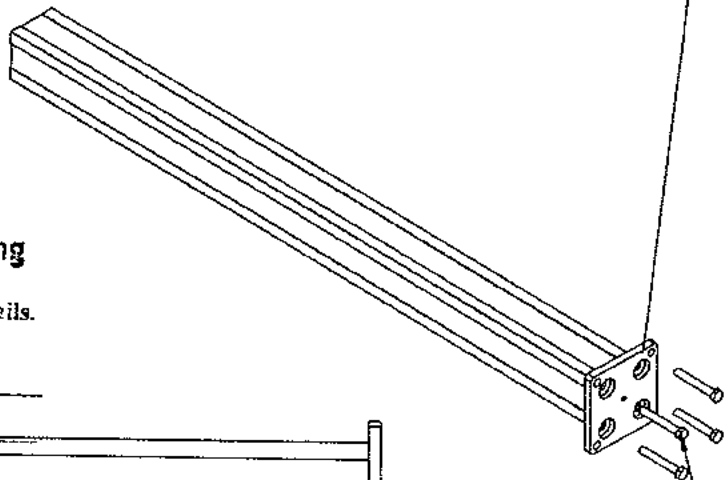
Base Plate

Steel #45
Standard Tolerance. 0.03 +/-
Wall Tolerance. 0.02 +/-



3.0in Newl Post

Alum. Alloy #6061-T6
Standard Tolerance. 0.015 +/-
Wall Tolerance. 0.01 +/-

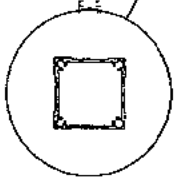


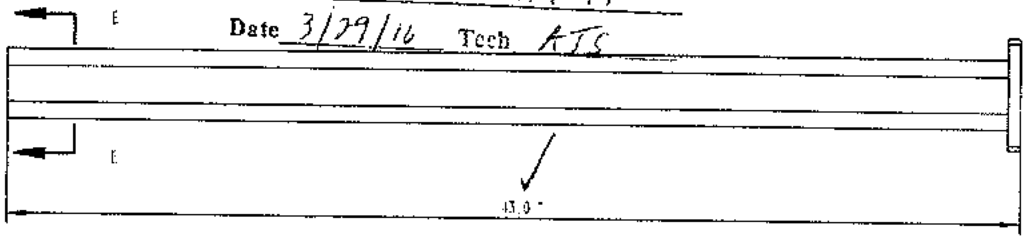
Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5524.01-119-19

Date 3/29/16 Tech RTS



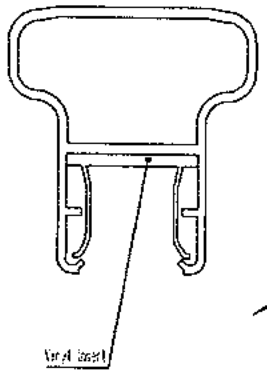


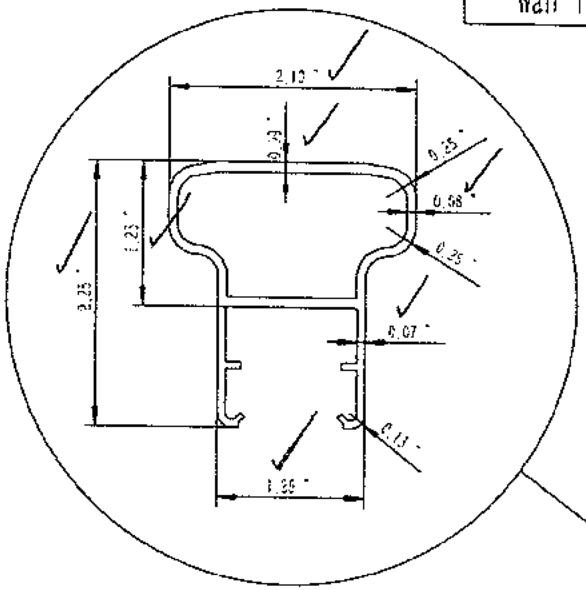
2.75" Hex Bolts

Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing
	Check by			
	Approve by		Drawing NO	AR302
	Complete date		Revision	A/0 Sheet 3 Of 13

Top Rail

Alum. Alloy #6061-T6
Standard Tolerance: 0.015 +/-
Wall Tolerance: 0.01 +/-



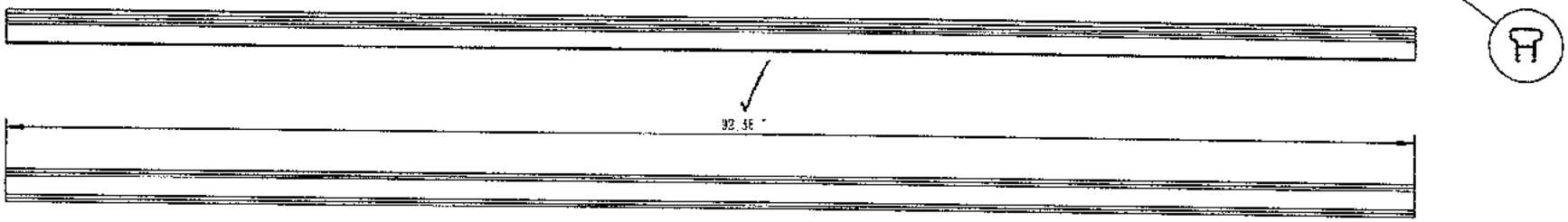


Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5529.01-119-19

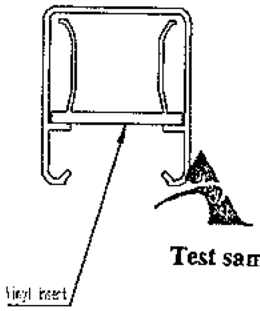
Date 3/29/16 **Tech** AJS

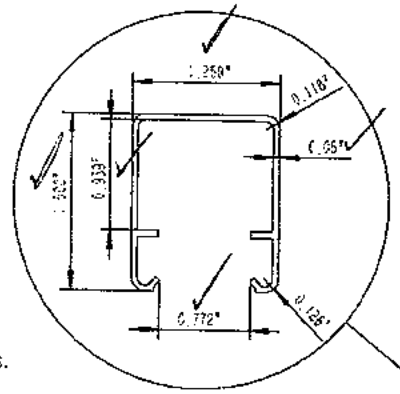


Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AR302	
	Complete date		Revision	A/0	Sheet 4 Of 13

Bottom Rail

Alum. Alloy #6061-T6
Standard Tolerance. 0.015 +/-
Wall Tolerance. 0.01 +/-



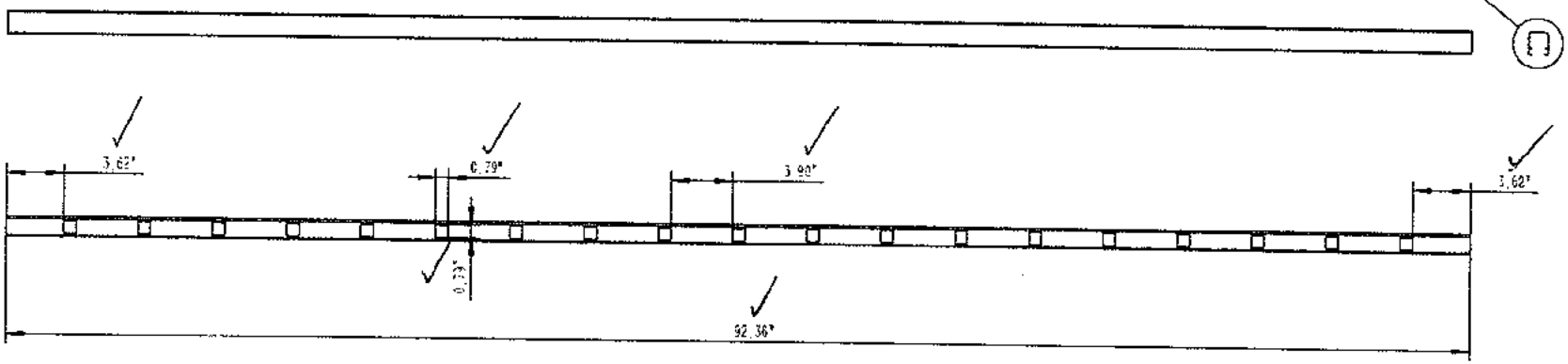


Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5524.01-119-19

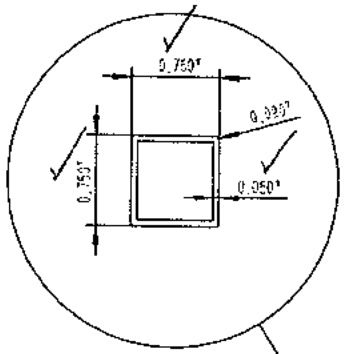
Date 3/29/16 **Tech** AJS

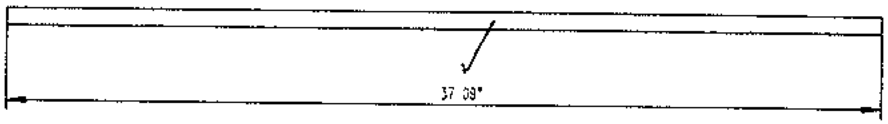


Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AR032	
	Complete date		Revision	A/0	Sheet 5 Of 13

Alum. Alloy #6061-T6
Standard Tolerance. 0.015 +/-
Wall Tolerance. 0.01 +/-

3/4" Picket





Architectural Testing

Test sample complies with these details.
Deviations are noted.

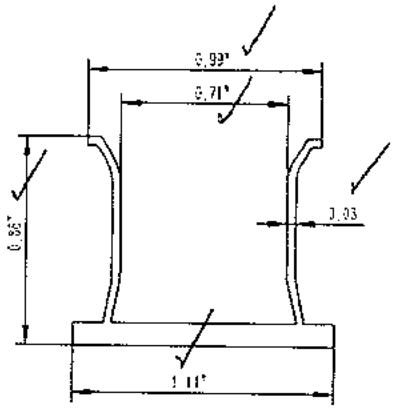
Report # ES574 01-119-19

Date 3/29/16 Tech AJS

Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name: Eastern-8'x42"Railing
	Check by		
	Approve by		Drawing NO: AR302
	Complete date		Revision: A/0 — Sheet 6 Of 13

Vinyl Insert

Material. Vinyl
Standard Tolerance. 0.03 +/-
Wall Tolerance. 0.02 +/-



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5524.01-119-19

Date 3/29/16 **Tech** AJS

Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AR909	
	Complete date		Revision	A/0	Sheet 7 Of 13

Spacer

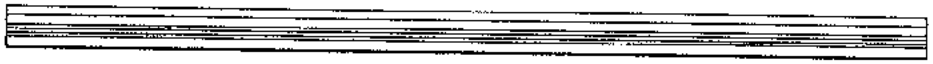
Alum. Alloy #6061-T6
Standard Tolerance. 0.015 +/-
Wall Tolerance. 0.01 +/-

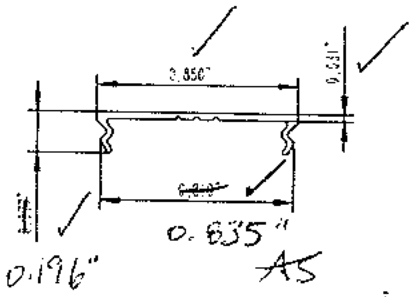
Architectural Testing

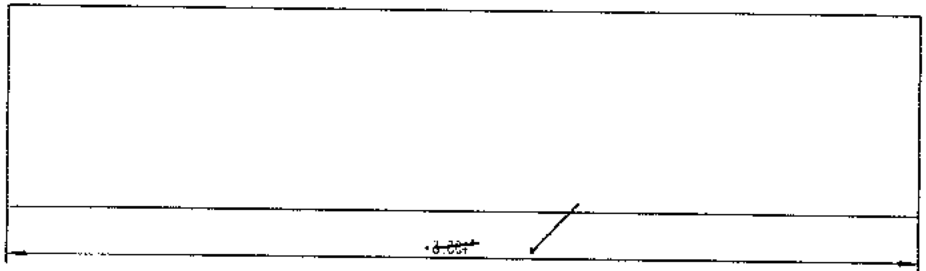
Test sample complies with these details.
Deviations are noted.

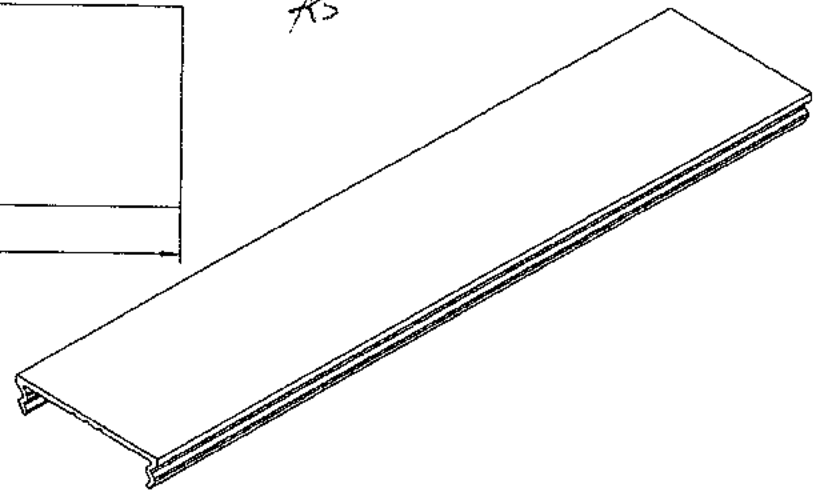
Report # F5524.01-119-19

Date 3/29/16 Tech ATS





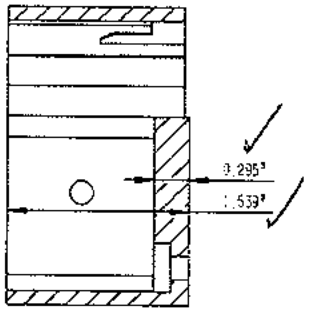


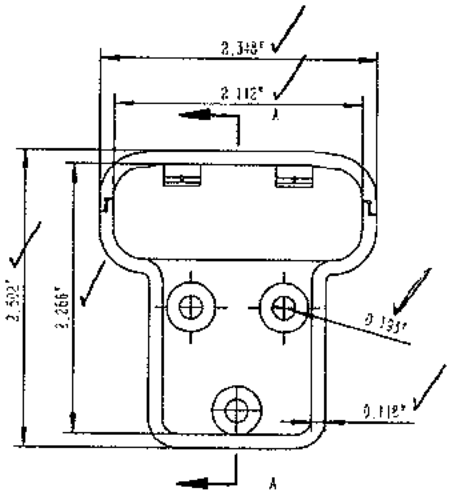


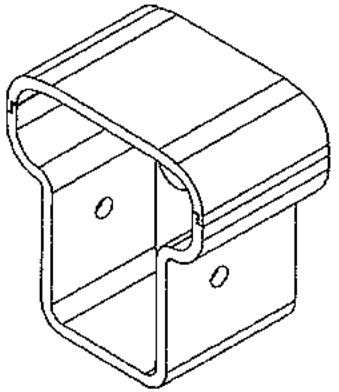
Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AR002	
	Complete date		Revision	A/0	Sheet 8 Of 13

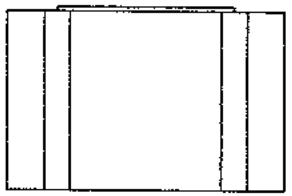
Top Rail Bracket

Alum. Alloy #ADC12









Architectural Testing

Test sample complies with these details.
Deviations are noted.

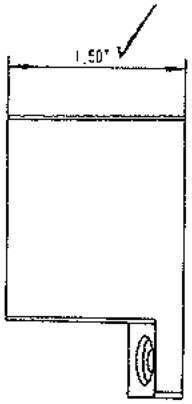
Report # E5524.01-119-109

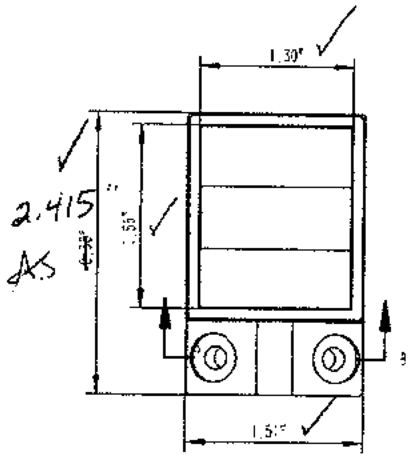
Date 3/29/16 Tech AJS

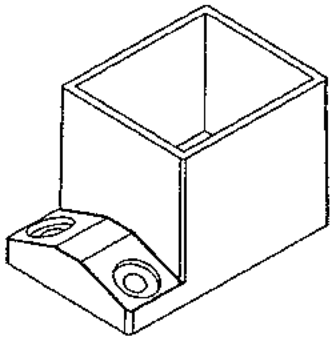
Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AR002	
	Complete date		Revision	A/0	Sheet 9 Of 13

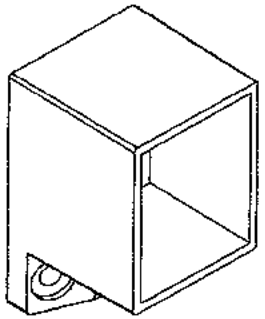
Alum. Alloy #ADC12

Bottom Rail Bracket







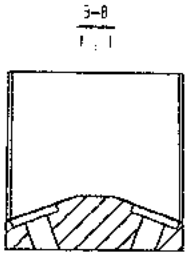


Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # E5524.01-119-19

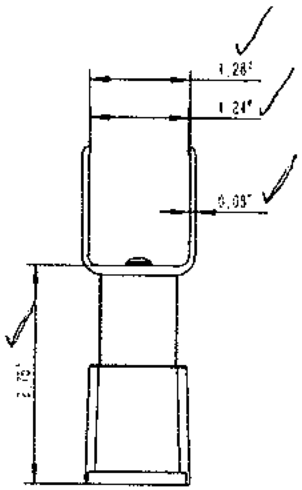
Date 3/29/16 Tech AJS

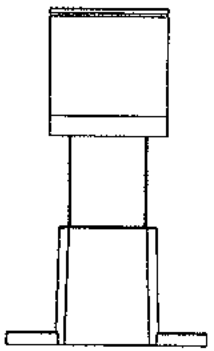


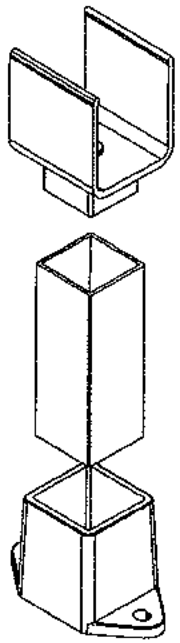
Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing	
	Check by				
	Approve by		Drawing NO	AB032	
	Complete date		Revision	A/0	Sheet 10 Of 13

Alum. Alloy #ADC12

Bottom Rail Support







Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report # F5524.01-119-19

Date 3/29/16 **Tech** AJS

Eastern Ornamental RAILING EASTERNORNAMENTALRAILING.COM	Design by		Product name	Eastern-8'x42"Railing
	Check by			
	Approve by		Drawing NO	A8012
	Complete date		Revision	A/C Sheet 11 Of 13

APPENDIX B

Photographs

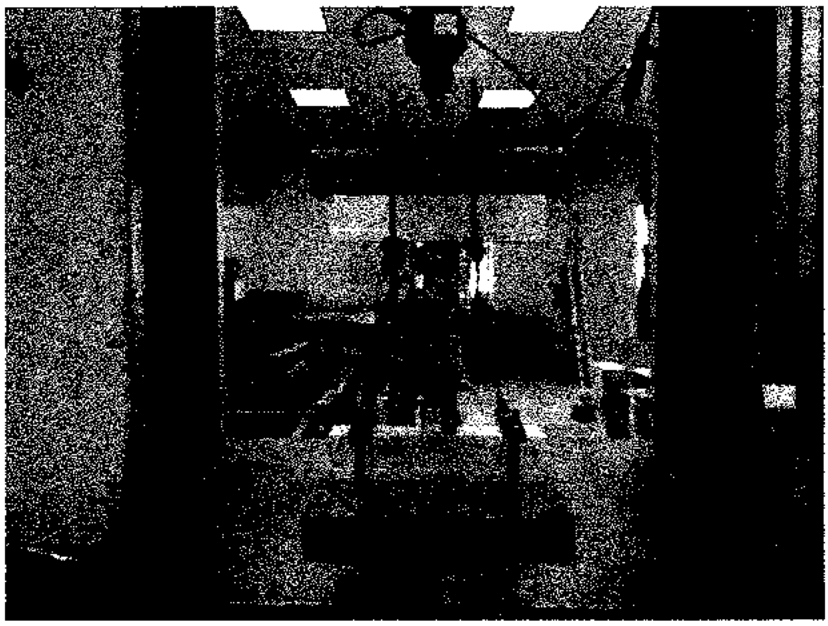


Photo No. 1
Assembly Fastener Test Setup

Photo No. 2
In-Fill Load Test at Center of Two Pickets

Photo No. 3
In-Fill Load Test at Bottom of Two Pickets

Photo No. 4
Concentrated Load Test at Mid-Span of Top Rail

Photo No. 5
Uniform Load Applied at 45 degrees

Photo No. 6
Concentrated Load at Ends of Top Rail (Brackets)

Photo No. 7
Stand-Alone Post Mount Testing