



TEST REPORT

Rendered to:

VINYLAST, INC.

For:

Atlas-Pro Quik-Mount Post Mount System

Report No.: F8818.01-119-19

Report Date: 01/19/17

Test Record Retention Date: 07/25/20



TEST REPORT

F8818.01-119-19
January 19, 2017

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TEST REPORT

Rendered to:

VINYLAST, INC.
1830 Swarthmore Avenue
Lakewood, New Jersey 08701

Report No.: F8818.01-119-19
Test Dates: 07/25/16
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1.0 General Information

1.1 Product

Atlas-Pro Quik-Mount Post Mount System

1.2 Project Description

Architectural Testing, Inc., an Intertek company (“Intertek-ATI”), was contracted by Vinylast, Inc. to perform structural performance testing on their *Atlas-Pro Quik-Mount* post mount for wood deck and concrete installation. This report is in conjunction with Intertek-ATI Report No. F9614.01-117-38 which includes product sampling information. The purpose of the testing is code compliance evaluation in accordance with the following criteria:

ICC-ES™ AC273 (March 1, 2008 - Editorial Revised March 2016), *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:

2015 *International Building Code*®, International Code Council

2015 *International Residential Code*®, International Code Council

1.3 Qualifications

Intertek-ATI in York, Pennsylvania 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).

1.4 Limitations

The test specimen evaluated included post, post spacers and post sleeve only and did not include an assembled guardrail attached to the post mount. Qualification of guardrail assemblies was outside the scope of this testing and would need to be evaluated separately.

Structural testing conducted and reported herein was limited to the design load times an adjustment factor of 2.5. Guardrail configurations with material adjustment factors in excess of 2.5 would need to be evaluated separately.

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

1.5 Product Description

The *Atlas-Pro Quik-Mount* post mount system is comprised of a steel tube and base plate with PVC spacers and sleeve. Drawings are included in Appendix A to verify the overall dimensions and other pertinent information of the tested product, their components, and any constructed assemblies.

1.6 Product Sampling

A representative of Intertek-ATI visited Trigo Enterprises Ltd. facility located in Dongsheng, Zhongshan of the Guangdong Province, China on 06/08/16 to select the components used for testing. All samples selected for testing were marked for identification and were the samples used for all tests reported herein. Reference Intertek-ATI Report No. F9614.01-117-38 for additional product sampling information. See photograph in Appendix B for typical sampling mark.

1.7 Witnessing

Steven J. Leary of Vinylast, Inc. was present on 07/25/16 to assemble and witness structural performance testing of the post mount system.

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 $68 \pm 4^{\circ}\text{F}$ and humidity in the range of $50 \pm 5\% \text{RH}$.

2.0 Structural Performance Testing of Post Mount Systems

Re: ICC-ES™ AC273 - Section 4.2.5

2.1 General

Post mount system was tested in a self-contained structural frame designed to accommodate anchorage of a post 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.

2.2 Post Mount Assembly Description

The *Atlas-Pro Quik-Mount* post mount system consisted of a square steel tube welded to a base plate. PVC post stabilizers were placed over the steel tube to support a 4 in post sleeve. Post mount system was attached to a steel channel (simulated concrete application) for IBC-All Use Groups or mock wood deck for IRC – One- and Two-Family Dwellings in accordance with manufacturer's installation instructions. 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.

2.3 Component Descriptions

The scope of testing performed and reported herein was intended to evaluate the *Atlas-Pro Quik-Mount* post mount system with the following component details:

Post Sleeves: 4 in square (0.10 in wall), hollow, PVC sleeve, installed over post mount

Post Mount: 1.60 in square steel tube with 0.14 in wall welded to 3.50 in square by 0.43 in thick steel base plate with a 5/16 in fillet weld all around - four 0.54 in diameter holes were located at each corner of the plate, with the center of the holes 0.51 in from each edge and 2.49 in apart. Four 5/16-18 threaded leveling holes were located at the midpoint between the mounting holes. One 1.36 in square hole was located in the center of the plate.

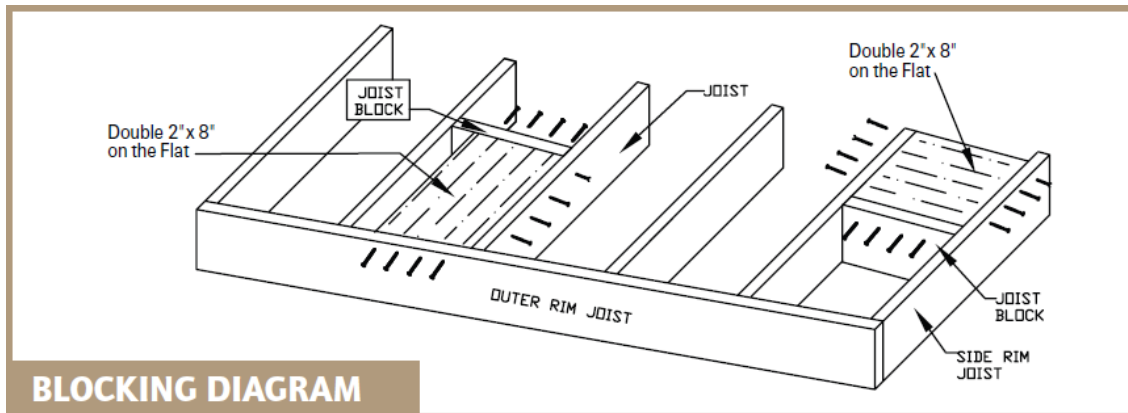
PVC Post Stabilizer: Top / Bottom Stabilizer: 3-5/8 in square by 6-3/4 in long with 0.24 in wall

2.3 Component Descriptions (Continued)

Post Mount Reinforcement Plates (used with mock wood decks only):

- Top (between post mount base plate and wood deck surface): 5 in square by 0.14 in thick steel plate with four 0.44 in diameter holes located at each corner of the plate, with the center of the holes 1.22 in from each edge and 2.57 in apart.
- Bottom (between the underside of the wood deck and the washers/nuts): 5 in square by 0.14 in thick steel plate with eight 0.44 in diameter holes. *See drawing in Appendix A for hole spacing.*

Mock Wood Deck: 2x8 preservative treated Southern Yellow Pine joist and 1x6 preservative treated Southern Yellow Pine decking with blocking as detailed in the figure below.



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

2.4 Fastening Schedule

Connection		Fastener
Post Mount to Substructure	Wood Deck	Four 3/8-16 by 6 in long Grade 5 hex-head bolts with two nuts and four washers
	Simulated Concrete	Four 3/8 in Grade 8 hex-head bolts with washers and two nuts
	Simulated Concrete – secured through bottom spacer	Four 1/2-13 by 12" long zinc plated threaded rod with one nut and one washer at the top of the bottom PVC spacer, one nut at the top of the post mount base plate, and two nuts and one washer on the bottom.
Top PVC Spacer to Post		#10-32 x 1" hex-washer head / Phillips drive zinc plated machine screw

2.5 Test Setup

The post mount assembly was installed and tested by directly securing (surface-mounting) the base of the post mounts to either a rigid steel test frame or a mock wood deck. The post mount was assembled by Steven J. Leary of Vinylast, Inc. Transducers mounted to an independent reference frame were located to record movement of reference points on the post mount to determine net component deflections. See photographs in Appendix B for test setups.

2.6 Test Procedure

Testing and evaluation was performed in accordance with Section 4.2.5 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. Each design load test was performed using the following procedure:

Mock Wood Buck Installation:

1. Zeroed transducers and load cell at zero load;
2. Increased load to 40 lbs (0.2 times design load) and zeroed transducers
3. Increased load to 200 lbs (design load) in no less than ten seconds.
4. Increased load to 400 lbs (2.0 times design load)
5. Load removed for a recovery period for no less than one minute
6. Increased load to 40 lbs (0.2 times design load), capture deflection
7. Increased load to 500 lbs (2.5 times design load)
8. Held test load for no less than one minute.

Simulated Concrete Installation(s):

1. Zeroed transducers and load cell at zero load;
2. Increased load to 200 lbs (design load) in no less than ten seconds
3. Increased load to ultimate failure.

2.7 Test Results

Unless otherwise noted, all loads and displacement measurements were normal to the post (horizontal). The test results apply only to the post mount assembly. The test load adjustment factor was maintained at 2.5 x design load.

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.

2.7 Test Results (Continued)

Test Series No. 1
Atlas-Pro Quik-Mount Post Mount on Wood Deck
Limited to Use in IRC - One- and Two-Family Dwellings / ICC-ES™ AC273

Test No. 1 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Post Displacement (in)
Initial Load	41	00:00	0.00
Design Load	205	00:12	0.85
2.0x Design Load	403	00:25	3.06
Initial Load	40	02:32	0.59
81% Recovery from 2.0 x Design Load			
2.5x Design Load	500 - 512	20:50 - 21:50	Achieved Load without Failure
Deflection Evaluation:			
Maximum post deflection at 205 lb = 0.85 in			
Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.00" > 0.85" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.85" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

Test No. 2 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Post Displacement (in)
Initial Load	42	00:00	0.00
Design Load	215	00:10	0.87
2.0x Design Load	405	00:23	3.36
Initial Load	45	01:47	0.79
76% Recovery from 2.0 x Design Load			
2.5x Design Load	499 - 511	02:15 - 03:23	Achieved Load without Failure ³
Deflection Evaluation:			
Maximum post deflection at 215 lb = 0.87 in			
Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.00" > 0.87" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.87" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

³ Test load dropped below the target load for 0.5 seconds during the 1 minute duration.

2.7 Test Results (Continued)

Test Series No. 1 (Continued)

Test No. 3 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Post Displacement (in)
Initial Load	41	00:00	0.00
Design Load	204	00:13	0.84
2.0x Design Load	403	00:27	3.63
Initial Load	45	02:15	0.93
74% Recovery from 2.0 x Design Load			
2.5x Design Load	499 - 510	03:07 - 04:16	Achieved Load without Failure ³
Deflection Evaluation:			
Maximum post deflection at 204 lb = 0.84 in			
Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.00" > 0.84" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.84" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

³ Test load dropped below the target load for 0.5 seconds during the 1 minute duration.

Test Series No. 1 Recovery Summary

Specimen Number	Recovery (%)
1	81
2	76
3	74
Average:	77

2.7 Test Results (Continued)

Test Series No. 2
Atlas-Pro Quik-Mount Post Mount on Simulated Concrete
IBC – All Use Groups / ICC-ES™ AC273

Test No. 1 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)
200 lb (D.L.)	211	00:21	0.84
Ultimate Load	914	01:22	Result: Post broke along the top of the weld.
<p><u>Deflection Evaluation:</u> Maximum post deflection at 211 lb = 0.84 in Limits per AC273 ²: $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.84" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.84" \therefore \text{ok}$</p>			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

Test No. 2 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)
200 lb (D.L.)	210	00:10	0.84
Ultimate Load	970	01:10	Result: Post broke along the top of the weld.
<p><u>Deflection Evaluation:</u> Maximum post deflection at 210 lb = 0.84 in Limits per AC273 ²: $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.84" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.84" \therefore \text{ok}$</p>			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

2.7 Test Results (Continued)

Test Series No. 2 (Continued)

Test No. 3 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone ¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)
200 lb (D.L.)	208	00:12	0.82
Ultimate Load	937	01:15	Result: Post broke along the top of the weld.
<u>Deflection Evaluation:</u> Maximum post deflection at 208 lb = 0.82in Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.82" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.82" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

Test Series No. 2 Test Summary

Sample No.	Ultimate Load (lb)	Deviation From Average
1	914	-2.8%
2	970	3.2%
3	937	-0.3%
Average:	940	
Allowable Span ¹: (center-to-center of posts)	7.5 ft	

¹ Average ultimate load divided by 125 plf (reference AC273 Section 4.2.5)

2.7 Test Results (Continued)

Test Series No. 3

Atlas-Pro Quik-Mount Post Mount on Simulated Concrete Bolted Through Bottom Spacer IBC – All Use Groups / ICC-ES™ AC273

Test No. 1 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone ¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)
200 lb (D.L.)	206	00:17	0.91
Ultimate Load	1345	02:01	Result: Test stopped due to equipment issue
<u>Deflection Evaluation:</u> Maximum post deflection at 206 lb = 0.91 in Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.91" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.91" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculated on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

Test No. 2 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone ¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)
200 lb (D.L.)	203	00:10	0.71
Ultimate Load	1250	01:21	Result: Post sleeve cracked.
<u>Deflection Evaluation:</u> Maximum post deflection at 203 lb = 0.71 in Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.71" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.71" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

2.7 Test Results (Continued)

Test Series No. 3 (Continued)

Test No. 3 - Test Date: 07/25/16			
Design Load: 200 lb Concentrated Load at Top of Stand-Alone ¹ Post Mount (42 in High)			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (in)
200 lb (D.L.)	220	00:12	0.79
Ultimate Load	1472	01:48	Result: Post yielded.
Deflection Evaluation:			
Maximum post deflection at 220 lb = 0.79in			
Limits per AC273 ² : $\frac{h}{12} = \frac{36}{12} = 3.0" > 0.79" \therefore \text{ok}$ and $\frac{h}{12} = \frac{42}{12} = 3.50" > 0.79" \therefore \text{ok}$			

¹ Post was conservatively tested without a railing attached.

² Deflection limit calculation based on 36" and 42" railing height for One- and Two-Family Dwelling requirements.

Test Series No. 3 Test Summary

Sample No.	Ultimate Load (lb)	Deviation From Average
1	1345	-0.8%
2	1250	-7.8%
3	1472	8.6%
Average:	1356	
Allowable Span ¹: (center-to-center of posts)	10.8 ft	

¹ Average ultimate load divided by 125 plf (reference AC273 Section 4.2.5)

2.8 Summary and Conclusions

The post mounts reported herein meet the structural performance requirements of Section 4.2.5 of ICC-ES™ AC273 for the attachment methods and code occupancy classifications listed in the table below:

Test Specimen	Attachment	Max Allowable Span (ft) ¹	Code Occupancy Classification
Atlas-Pro Quik-Mount 42 in Post Mount	Mock Wood Deck	N/A	IRC – (One- and Two-Family Dwellings)
	Simulated Concrete	7.5	IBC – (All Use Groups)
	Simulated Concrete – Bolted through bottom spacer	10.8	

¹ Max allowable span is measured from center of post to center of post.

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

3.0 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:

Steven A. Neff
Technician II

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

SAN:vtm/jas

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

Appendix A - Drawings (2)

Appendix B - Photographs (5)



Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	01/19/17	N/A	Original report issue



F8818.01-119-19

APPENDIX A

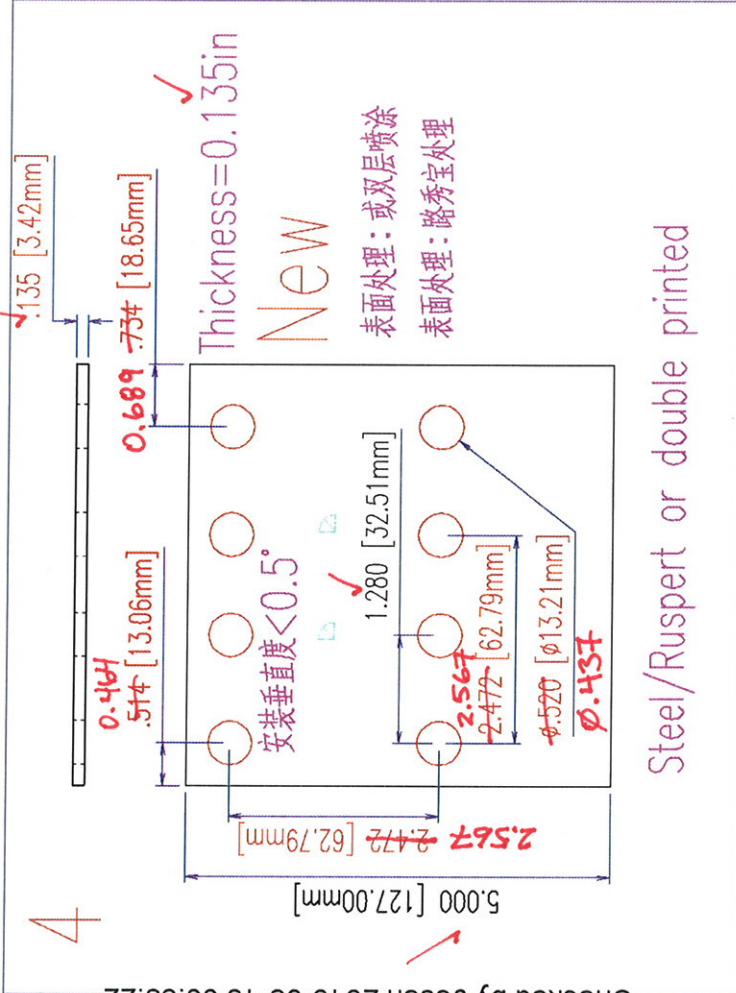
Drawings

Architectural Testing

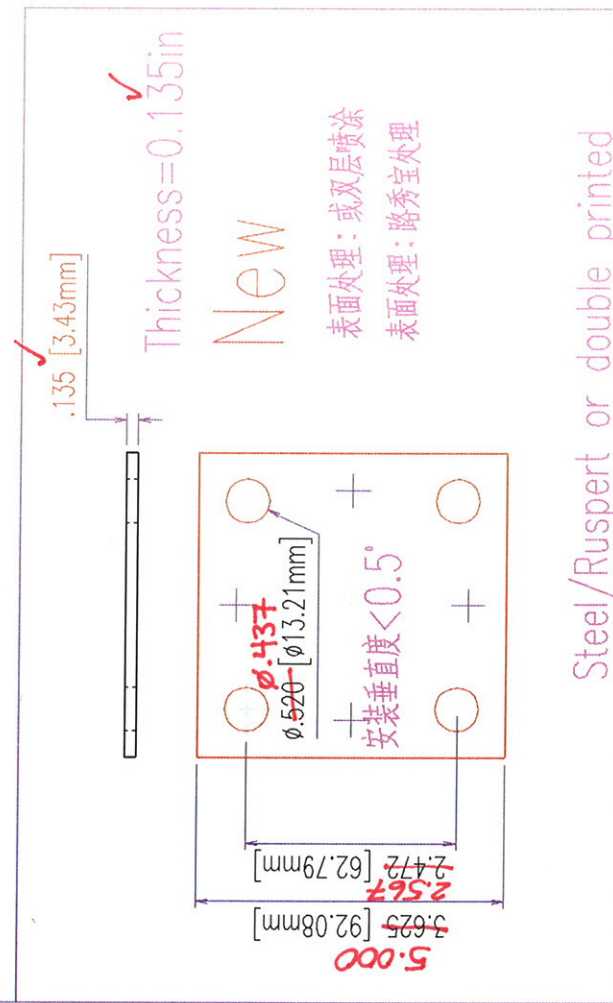
Test sample complies with these details.
Deviations are noted.

Report # F8818.01-119-19

Date 9/2/16 Tech SAN



Checked by Jesen 2016-08-18 00:55:22



Steel/Ruspert or double printed

Steel/Ruspert or double printed



F8818.01-119-19

APPENDIX B

Photographs



Photo No. 1
Typical Sampling Mark



Photo No. 2
Concentrated Load Test at Top of Post Mount
Mock Wood Deck



Photo No. 3
Concentrated Load Test at Top of Post Mount
Simulated Concrete



Photo No. 4
Concentrated Load Test at Top of Post Mount
Simulated Concrete Bolted Through Bottom Spacer

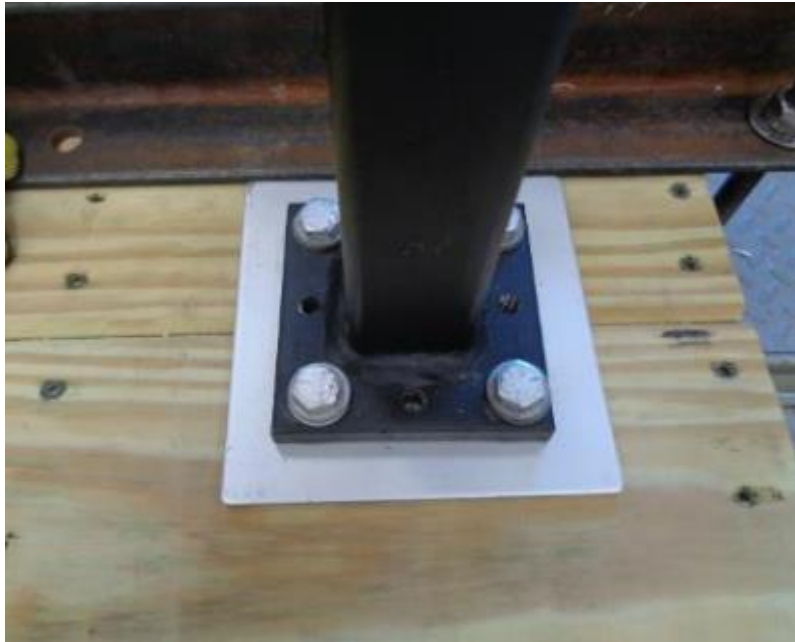


Photo No. 5
Post Mount Connection
Mock Wood Deck (Top Side)



Photo No. 6
Post Mount Connection
Mock Wood Deck (Bottom Side)



Photo No. 7
Post Mount Connection
Simulated Concrete (Top Side)



Photo No. 8
Post Mount Connection
Simulated Concrete (Bottom Side)

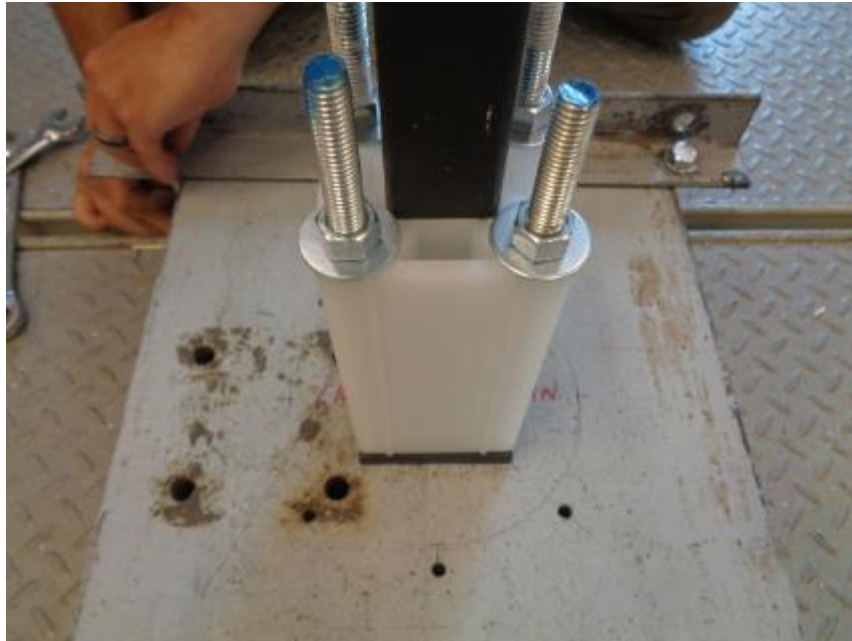


Photo No. 9
Post Mount Connection
Simulated Concrete Bolted Through Bottom Spacer (Top Side)
(Washers shown were replaced with smaller washers to allow post sleeve installation)



Photo No. 10
Post Mount Connection
Simulated Concrete Bolted Through Bottom Spacer (Bottom Side)