



TEST REPORT

Rendered to:

COLOR GUARD, INC.

For:

2 in Steel Post Mount System

Report No.: D0399.01-119-19

Report Date: 03/24/16

Test Record Retention Date: 08/12/17



TEST REPORT

D0399.01-119-19
March 24, 2016

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TEST REPORT

Rendered to:

COLOR GUARD, INC.
320 Range Line Road
Sheboygan Falls, Wisconsin 53085

Report No.: D0399.01-119-19

Test Date: 08/12/13

Report Date: 03/24/16

Test Record Retention Date: 08/12/17

1.0 General Information

1.1 Product

2 in Steel Post Mount System

1.2 Project Description

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted by Color Guard, Inc. to perform structural testing on their 2 in steel post mount system. The purpose of the testing is performance evaluation of the post mount assembly in accordance with Section 5.1 of the following criteria:

ICC-ES™ AC174 (approved January, 2012), *Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)*

ICC-ES™ AC174-12 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 post mount assembly. The test specimen evaluated included the post mount assembly including post sleeve and spacers.

Testing is limited to satisfying the IRC - One- and Two-Family Dwellings requirements of ICC-ES™ AC174 regarding single-family houses, two-family houses (duplexes) and buildings consisting of three or more townhouse units.

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 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). Intertek-ATI is accredited to perform all testing reported herein.

1.5 Product Description

The two inch post mount is comprised of a steel tube and base plate with PVC spacers and a PVC post sleeve. 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 used for testing reported herein were provided to Intertek-ATI by Color Guard, Inc. and were not independently sampled or selected by an independent inspection agency.

1.7 Witnessing

There were no witnesses from Color Guard, Inc. present for testing 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 ± 4 °F and humidity in the range of $50 \pm 5\%$ RH. All test specimen materials were stored in the laboratory environment for no less than 40 hours prior to testing.

2.0 Referenced Standard

ASTM D7032-08, *Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)*

3.0 Structural Performance Testing

Re: ICC-ES™ AC174, Section 5.1

3.1 General

Post mount 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.

3.2 Post Mount Assembly Description

The 2 in post mount system consisted of a round steel tube welded to a base plate. PVC spacers were placed over the steel tube to support a 6 in post sleeve. The post mount system was attached to a rigid steel channel. 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.

3.3 Component Descriptions

The scope of testing performed and reported herein was intended to evaluate the 2 in steel post mount system consisting of the following components (see Appendix A for drawings):

Post Sleeve: 6 in square (0.13 in wall), hollow, co-extruded PVC sleeve, installed over post mount and spacers

Spacers: - 4 in Spacer - Two 3-5/8 in high by 1-5/8 in wide (short leg) / 2 in wide (long leg) by 10 in long C-shaped PVC section with one 1/4 in thick angled fin on each short side and two 5/16 in thick angled fins on the long side
- 6 in Spacer - Two 5-11/16 in high by 2-1/2 in wide by 10 in long C-shaped PVC sections with one 9/16 in high by 1/4 in thick fin on each short side and two 11/16 in high by 1/4 in thick fins on the long side

Post Mount: 2.0 in outside diameter steel tube with 0.103 in wall welded to 3-1/2 in square by 1/4 in thick base plate with a 3/16 fillet weld all around – base plate contained four 7/16 in diameter holes (one at each corner) with center located 1/2 in from each edge and 2-1/2 in apart on-center and four 5/16 in diameter holes (one on each face) drilled and tapped with center located 7/16 in from edge and 1-3/16 in and 2-5/16 in from edge - post base was attached to a rigid steel test surface (simulated concrete) as described in Section 3.4 Fastening Schedule.

3.4 Fastening Schedule

Connection	Fastener
Spacer to Post Mount (Steel Tube)	One – 1/4"-14 x 2-1/2" (0.186 in minor diameter) Philips drive, trim head, self-drilling, zinc coated, carbon steel screw per side
Post Mount to Rigid Steel Test Surface (simulated concrete)	Four 3/8" Grade 8, hex head bolts with nut and washers

3.5 Test Setup

The 2 in steel post mount was installed and tested as a stand-alone post mount attached to a rigid steel test surface (simulated concrete condition). Transducers mounted to an independent reference frame were located to record movement of reference points on the post mount assembly to determine net component deflections. See photographs in Appendix B for test setups.

3.6 Test Procedure

Testing was performed in accordance with Section 5.1 of ICC-ES™ AC174. 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 each load tests. Each design load test was performed using the following procedure:

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

3.7 Test Results

Unless otherwise noted, all loads and displacement measurements were normal to the post (horizontal). The test load adjustment factor was 2.5 x design load for the load tests.

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

3.7 Test Results (Continued)

2 in Steel Post Mount Assembly (Simulated Concrete Condition) IRC – Residential Use Only / ICC-ES AC174

Test No. 1 - Test Date: 08/12/13 Design Load: 200 lb Concentrated Load on Top of a Stand-Alone Post (42" high) Filler Pieces Aligned with Joint Perpendicular to the Load			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	202	00:29	1.35
500 lb (2.5 x D.L.)	501	01:23	Result: Withstood load equal to or greater than 500 lb without failure
<u>Deflection Evaluation:</u> Maximum post deflection at 202 lb = 1.35 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 1.35" \therefore \text{ok}$			

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

Test No. 2 - Test Date: 08/12/13 Design Load: 200 lb Concentrated Load on Top of a Stand-Alone Post (42" high) Filler Pieces Aligned with Joint Parallel to the Load			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	204	00:19	1.14
500 lb (2.5 x D.L.)	501	01:19	Result: Withstood load equal to or greater than 500 lb without failure
<u>Deflection Evaluation:</u> Maximum post deflection at 204 lb = 1.14 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 1.14" \therefore \text{ok}$			

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

3.8 Test Results (Continued)

2 in Steel Post Mount Assembly (Simulated Concrete Condition) IRC – Residential Use Only / ICC-ES AC174 (Continued)

Test No. 3 - Test Date: 08/12/13 Design Load: 200 lb Concentrated Load on Top of a Stand-Alone Post (42" high) Filler Pieces Aligned with Joint Parallel to the Load			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	200	00:29	1.06
500 lb (2.5 x D.L.)	500	01:37	Result: Withstood load equal to or greater than 500 lb without failure
<u>Deflection Evaluation:</u> Maximum post deflection at 200 lb = 1.06 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 1.06" \therefore \text{ok}$			

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

Test No. 4 - Test Date: 08/12/13 Design Load: 200 lb Concentrated Load on Top of a Stand-Alone Post (42" high) Filler Pieces aligned with Joint Parallel to the Load			
Load Level	Test Load (lb)	E.T. (min:sec)	Displacement (inches)
200 lb (D.L.)	202	00:26	1.11"
500 lb (2.5 x D.L.)	500	01:31	Result: Withstood load equal to or greater than 500 lb without failure
<u>Deflection Evaluation:</u> Maximum post deflection at 200 lb = 1.11 in Limit per AC174 ¹ : $\frac{h}{12} = \frac{36}{12} = 3.0" > 1.11" \therefore \text{ok}$			

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

3.9 Summary and Conclusions

The post mount assembly reported herein met the minimum structural performance requirements of Section 5.1 of AC174 for One- and Two-Family Dwellings (IRC) as installed in a simulated concrete condition.

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

4.0 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:

Adam J. Schrum
Lead Technician

V. Thomas Mickley, Jr., P.E.
Program Manager

AJS:vtm/jas

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

Appendix A - Drawings (6)

Appendix B - Photographs (1)



Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	03/24/16	N/A	Original report issue

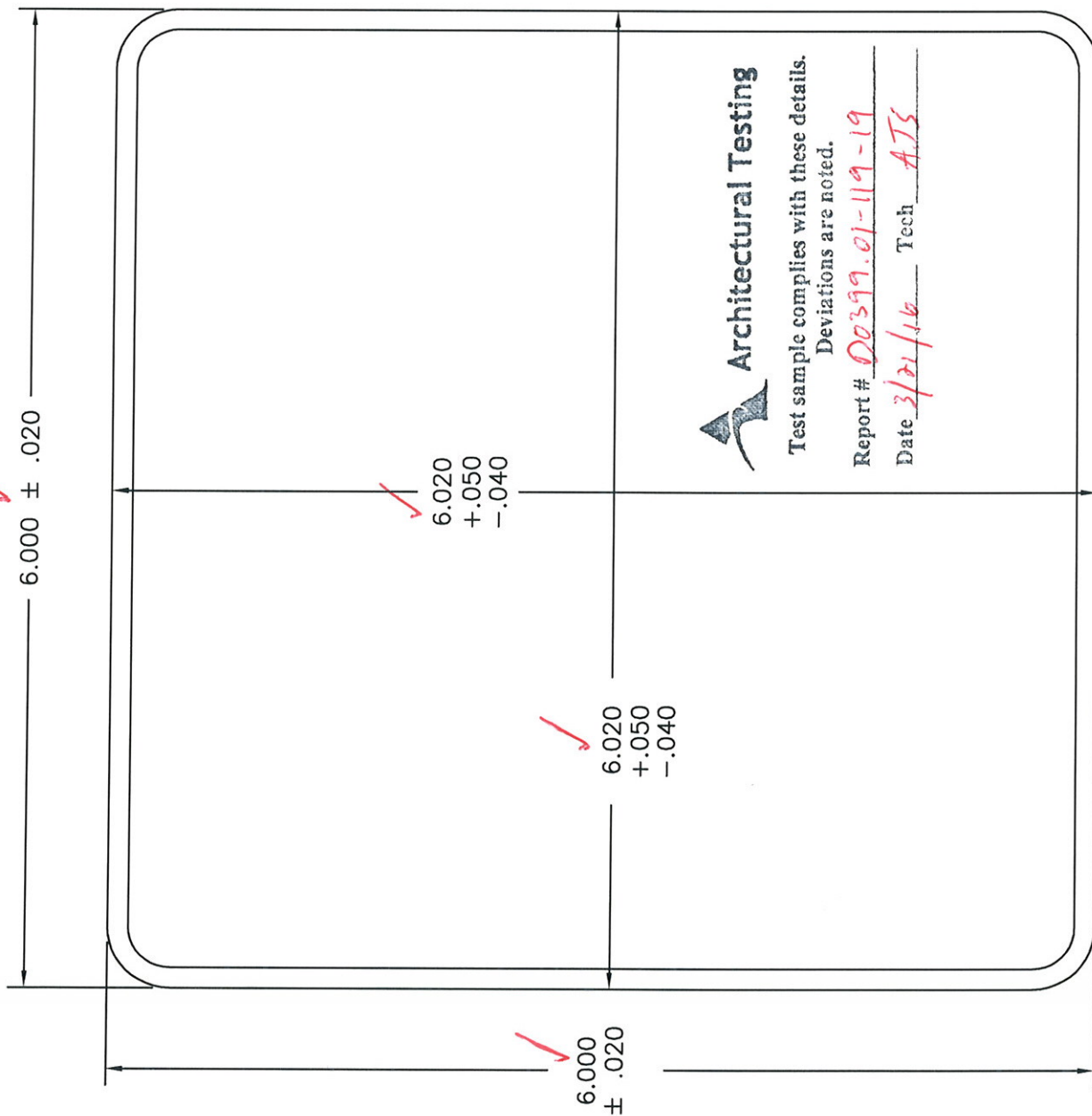


D0399.01-119-19

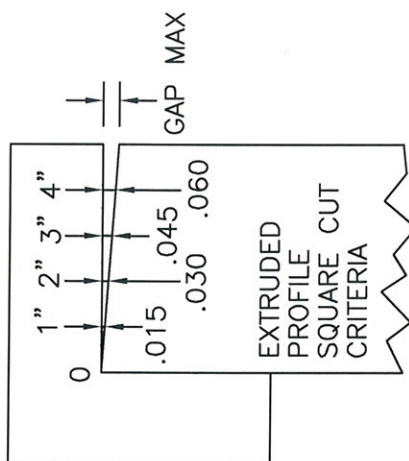
APPENDIX A

Drawings

REV	PART #	LENGTH
1	W66-44BP	44.625 ± .125/- .250
REL	W66-120BP	120.000 ± .500
1	T66-44BP	44.625 ± .125/- .250
REL	T66-120BP	120.000 ± .500
1	C66-44BP	44.625 ± .125/- .250
REL	C66-120BP	120.000 ± .500



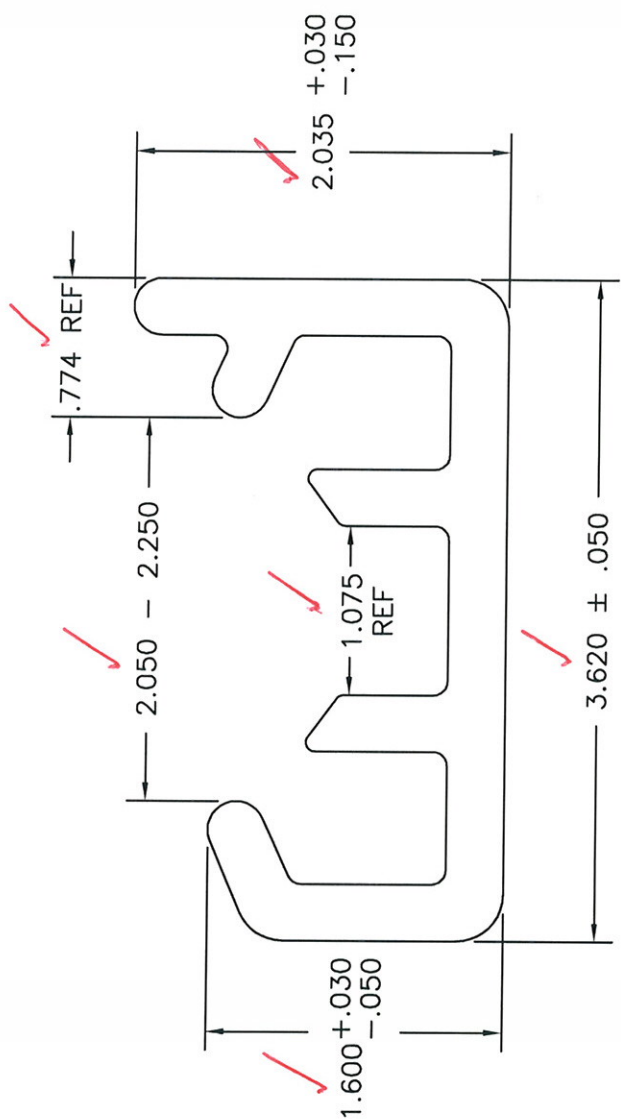
ADD .015 PER EACH ADDITIONAL
INCH OVER 4"



Poly Vinyl Co.

CUSTOM EXTRUSIONS
DRAWER 300 SHEBOYGAN FALLS, WI 53085
PH. (920) 467-4685 FAX. (920) 467-3271

WALL	.120 ± .015	LOG	.2
DR. BY	DH	REV.	
DATE	5/6/13	SCALE	FULL
DIE	3757	AREA-	FLEXIBLE
		RIGID	2.848



Test sample complies with these details.
Deviations are noted.

Report # D0399.01-119-19

Date 3/21/16 Tech ATJ

LENGTH-

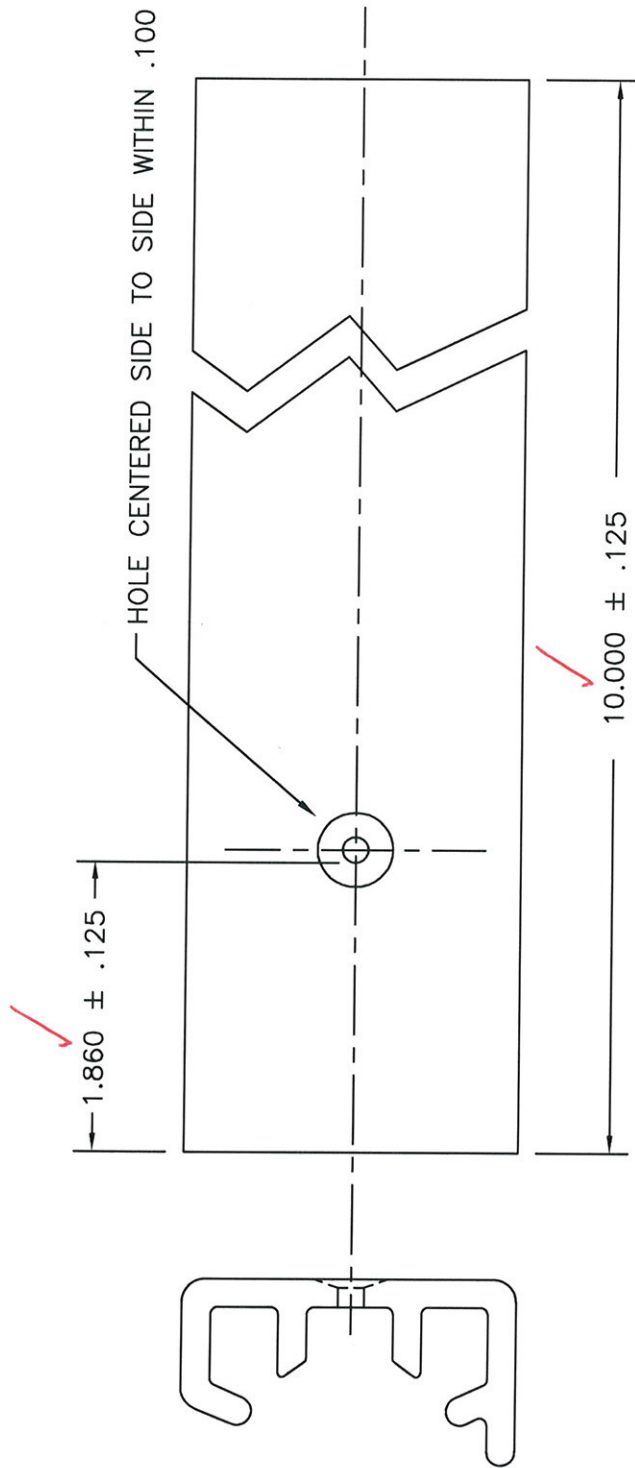
NOTES:

1 CF-0337

2

3

Poly Vinyl Co.			
CUSTOM EXTRUSIONS			
DRAWER 300 SHEBOYGAN FALLS, WI 53085			
PH. (920) 467-4685 FAX. (920) 467-3271			
WALL	AREA-	LOG .4	
FLEXIBLE	REV.	REL	
RIGID	DR. BY	DH	
	2.675		
TOLERANCES-	SCALE	FULL	
XX ±	DATE	9/4/12	
XXX ±	DIE	3781	
ANGLES			
PART NO.	10000784		



Test sample complies with these details.
Deviations are noted.

Report # 08399.01-119-19

Date 3/21/16 Tech AJS

LENGTH-

NOTES:

1 CF-0538

2 MAX 1/8" CROOKED CUT

3

Poly Vinyl Co.

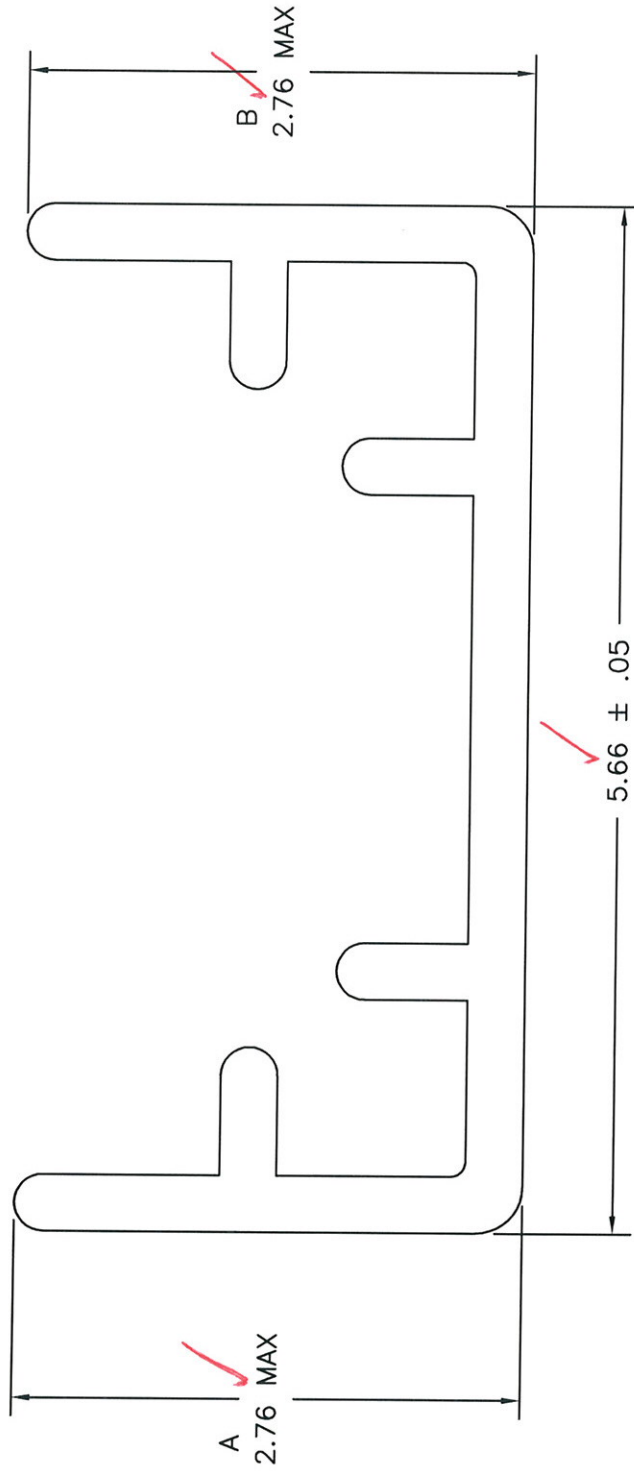
CUSTOM EXTRUSIONS

DRAWER 300 SHEBOYGAN FALLS, WI 53085

PH. (920) 467-4685 FAX. (920) 467-3271

WALL	LOG
AREA-	REV. REL
FLEXIBLE	DR. BY DH
RIGID	SCALE NA
TOLERANCES-	DATE 9/4/12
XX ±	DIE
XXX ±	3781
ANGLES	

PART NO. 10000784



Test sample complies with these details.
Deviations are noted.

Report # D0399.01-119-19

Date 3/21/16 Tech AJS

LENGTH- 10.000 ± .125

NOTES:

1 CF-0547

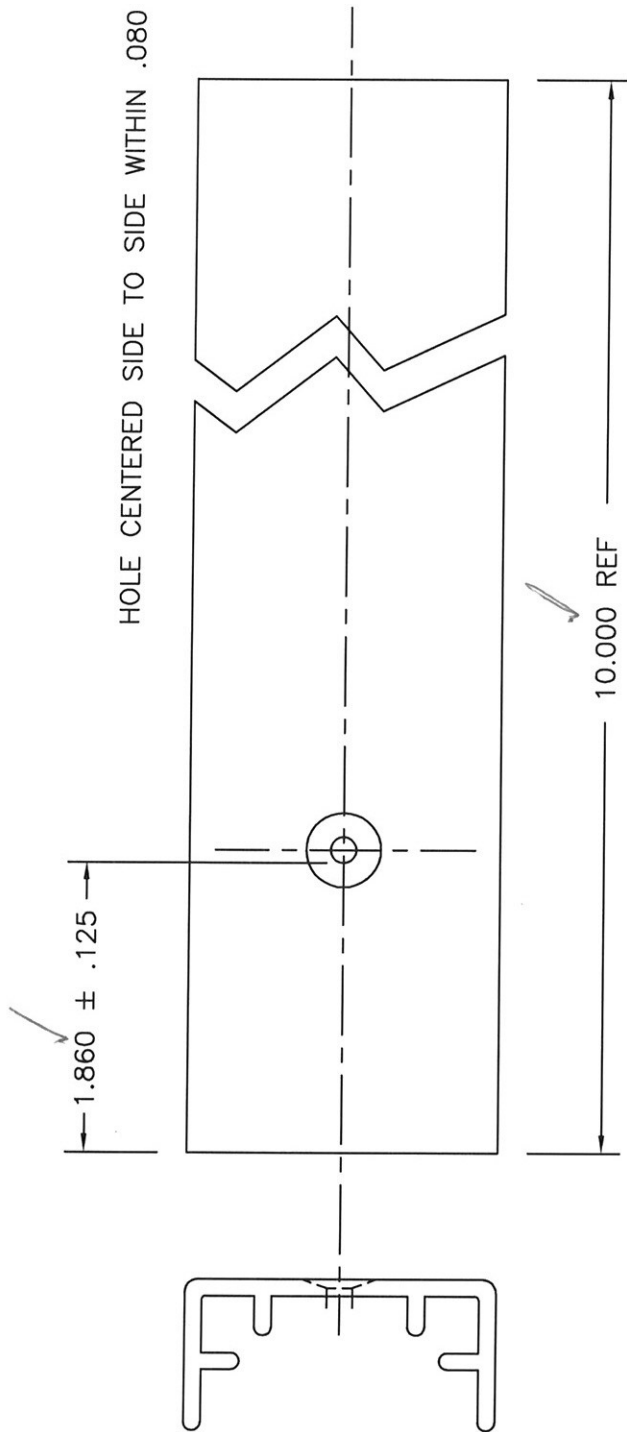
2

Poly Vinyl Co.

CUSTOM EXTRUSIONS
DRAWER 300 SHEBOYGAN FALLS, WI 53085
PH. (920) 467-4685 FAX. (920) 467-3271

WALL	AREA-	LOG
FLEXIBLE	REV.	REL
RIGID	DR. BY	DH
4.052	SCALE	FULL
TOLERANCES-	DATE	6/13/13
XX ±	XXX ±	DIE
ANGLES		3811

PART NO. 10000797



Test sample complies with these details.
Deviations are noted.

Report # 00399.01-119-19

Date 3/21/16 Tech ATS

LENGTH-

NOTES:

1 CF-0538

2

3

Poly Vinyl Co.

CUSTOM EXTRUSIONS
DRAWER 300 SHEBOYGAN FALLS, WI 53085
PH. (920) 467-4685 FAX. (920) 467-3271

WALL	LOG
AREA-	REV.
FLEXIBLE	DR. BY
RIGID	DH
TOLERANCES-	SCALE FULL
XX ±	DATE 8/6/13
XXX ±	DIE
ANGLES	

PART NO. 10000798



D0399.01-119-19

APPENDIX B

Photographs



Photo No. 1
Post Mount Assembly during Load

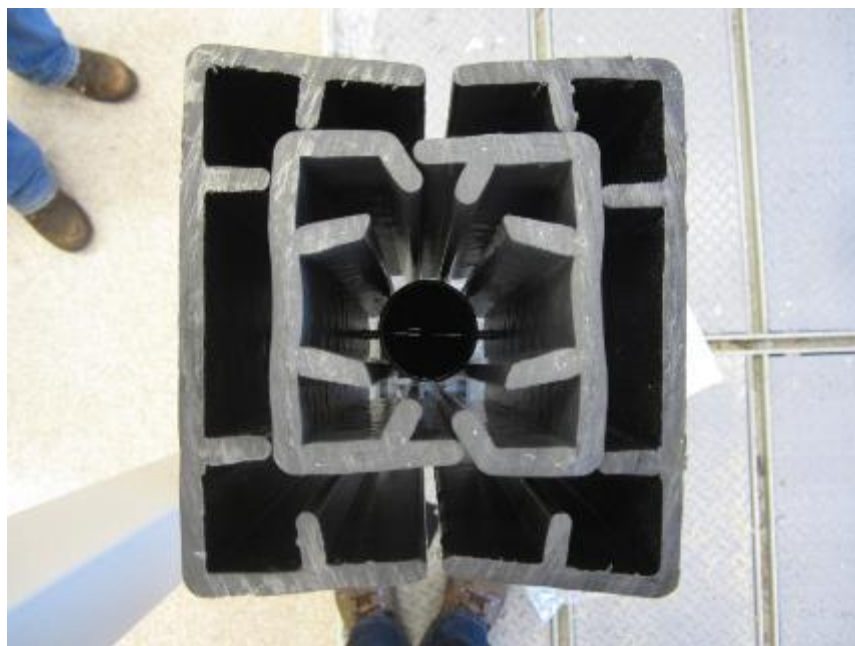


Photo No. 2
Filler Piece Orientation (Joints Perpendicular to Load)