Architectural Testing

TEST REPORT

Report No.: C8970.01-301-32

Rendered to:

ROOF-TECH, INC.
Novato, California

PRODUCT TYPE: Fitting Brackets for PV Module
SERIES/MODEL: U Set Solar
E Mount
E Rail

Title	Summary of Results
Water Penetration Resistance Test Pressure Composition Shingle Roof	6 inches of water column (31.2 psf)
Water Penetration Resistance Test Pressure Metal Roof	6 inches of water column (31.2 psf)
RT – [E] Mount Pull Out Force (in rafter with two mounting screws)	940 lbs
RT – [E] Mount Pull Out Force (in plywood with four mounting screws) pulling from the edge of bracket	975 lbs
RT – [E] Mount Pull Out Force (in plywood with four mounting screws) pulling from the center of the bracket.	1,375 lbs

Reference must be made to Report No. C8970.01-301-32, dated 07/02/13 for complete test specimen description and detailed test results.

1.0 Report Issued To: Roof-Tech, Inc.
92 Hamilton Drive, Suite A
Novato, California 94949

2.0 Test Laboratory: Architectural Testing, Inc.
2524 East Jensen Avenue
Fresno, California 93706
(559) 233-8705

3.0 Project Summary:

3.1 Product Type: Fitting Brackets for PV Module

3.2 Series/Model: U Set Solar

E Mount

E Rail

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). Test specimen description and results are reported herein.

3.4 Test Dates: 06/06/2013 through 06/07/2013

3.5 Test Location: Architectural Testing, Inc. test facility in Fresno, California.

3.6 Test Sample Source: The test specimen was provided by the client.

4.0 Test Method:

ASTM E 2140-01, *Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head. Modified for use with PV Module Brackets by using the test methodology but not conforming to the test specimen requirements of the test standard.*

5.0 Test Specimen Description:

5.1 Product Sizes:

	Width	Length
	inches	inches
U Set Solar	3	3-1/4
E Mount	3-1/4	4-3/4
E Rail	3-1/4	3-1/4

5.2 Roof Construction:

Two 3' x 8' roofs were assembled by the test lab. One was composed of composition shingles over 5/8" plywood with 2x4 Douglas fir rafters spaced lengthwise 24" on center. The other roof composed of 22 gauge metal profiled roof over 5/8" plywood with 2x4 Douglas fir rafters spaced lengthwise 24" on center.

6.0 Installation:

Each roof assembly used two of each type of bracket for the water infiltration test. The brackets were held in place with 5mm stainless steel hex head screws with a domed stainless steel washer and a 2.3 mm thick rubber washer. All brackets were embedded in a 3 mm thick butyl 'pad' which covered the entirety of the bracket bottom surface.

7.0 Test Results:

The temperature during testing was 80°F. The results are tabulated as follows:

Title of Test	Results	Allowed	Note
Water Penetration Composition Shingle Roof 6" deep per ASTM E 2140	Pass	No leakage	1,2
Water Penetration Metal Roof 6" deep per ASTM E 2140	Pass	No leakage	1,2

Note 1: The roof was monitored for 6 hours and was determined that any water leakage observed was from the perimeter of the test buck.

Note 2: See testing Photo No. 1.

Title of Test	Results	Allowed	Note
RT – [E] Mount Pull Out Force (in rafter with two mounting screws) pulling from the edge of bracket	Pass 940 lbs (2 specimens)	No bracket breakage or pullout of fasteners	3
RT – [E] Mount Pull Out Force (in plywood with four mounting screws) pulling from the edge of bracket	Pass 975 lbs (3 specimens)	No bracket breakage or pullout of fasteners	3
RT – [E] Mount Pull Out Force (in plywood with four mounting screws) pulling from the center of the bracket.	Pass 1,375 lbs (2 specimens)	No bracket breakage or pullout of fasteners	3

Note 3: See testing Photo No. 2

The service life of this report will expire on the stated Test Record Retention End Date, at which time such materials as drawings, data sheets, samples of test specimens, copies of this report, and any other pertinent project documentation, shall be discarded without notice.

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 specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, Inc.

Digitally Signed by: Dennis Janzen

Dennis Janzen
Technician

Digitally Signed by: Tyler Westerling

Tyler Westerling, P.E.
Senior Project Engineer

TW:ss

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Photographs (3)
Appendix-B: Drawings (3)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	07/01/13	N/A	Original report issue.
1	07/02/13	2	Added statement to the test standard line that the testing does not conform to the ASTM test method specimen requirements.
1	07/02/13	3	Added thickness of butyl.
1	07/02/13	Appendix A	Added photo of metal roof set up.

Appendix A

Photographs

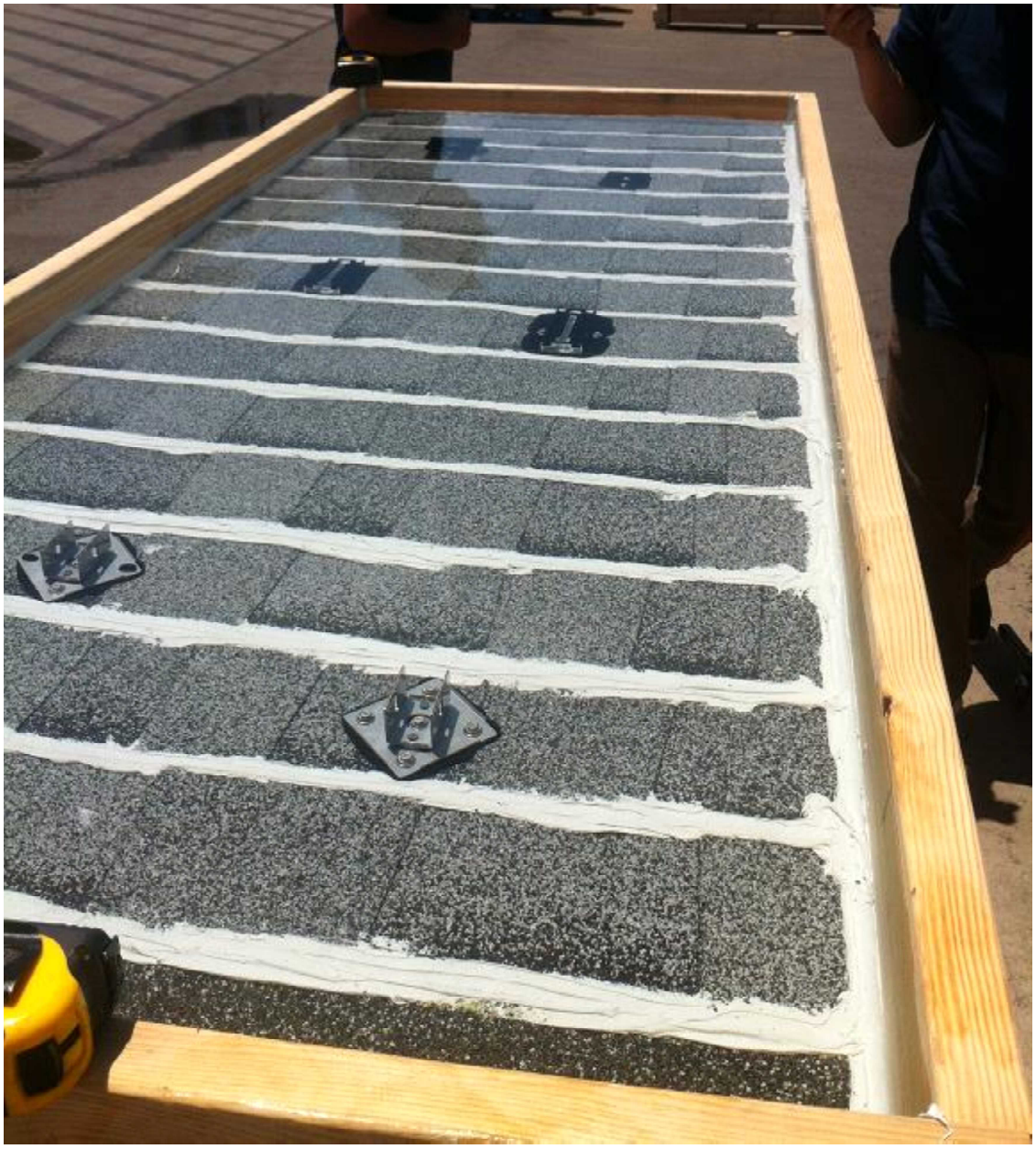

Photo No. 1
Roof surface under 6" of water

Photo No. 2
Metal Roof set up

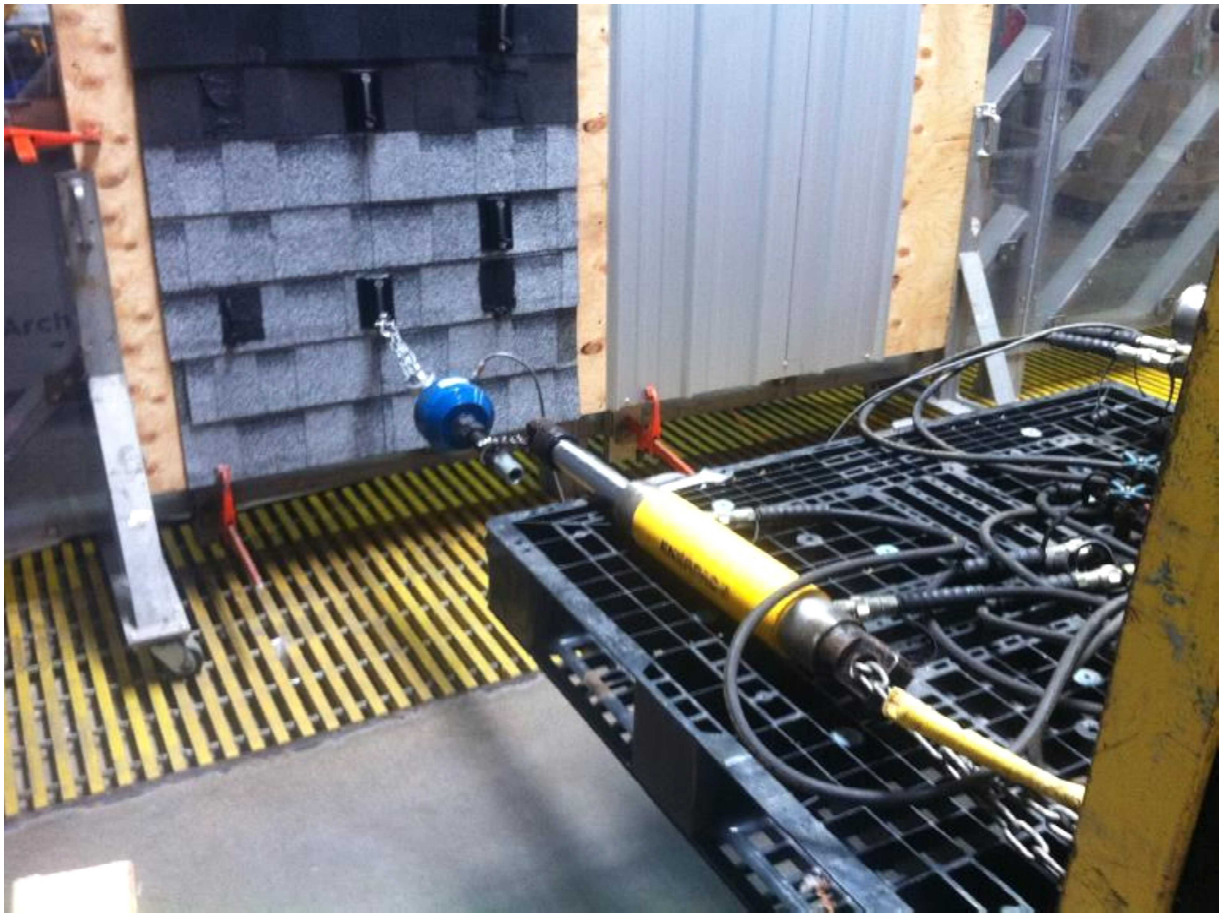

Photo No. 3
Pull Test