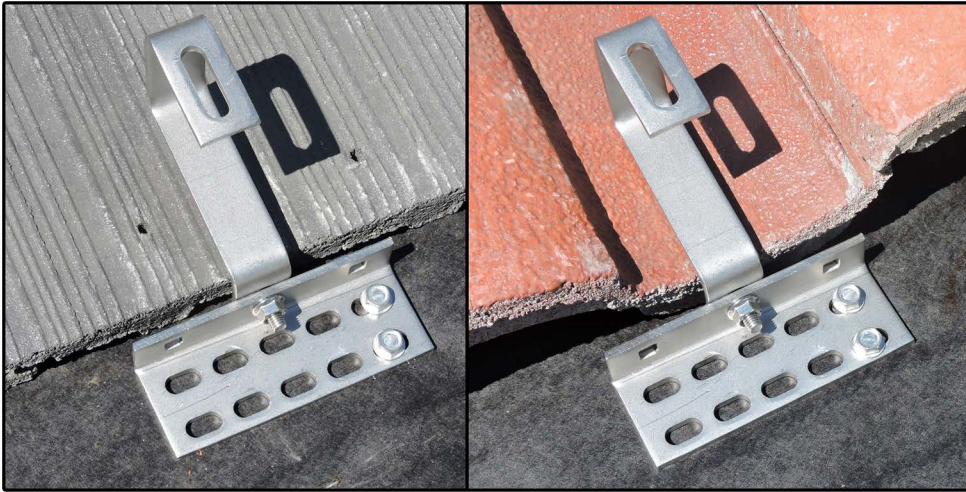


| Part # | Box Quantity         | Screw Size   |
|--------|----------------------|--------------|
| 17578  | 10 Hooks             | Not Included |
| 17579  | 1 Hook               | Not Included |
| 17616  | 10 Hooks & 20 Screws | 5/16" x 3"   |
| 17617  | 1 Hook & 2 Screws    | 5/16" x 3"   |
| 17600  | 10 Hooks & 20 Screws | #14 x 3"     |
| 17601  | 1 Hook & 2 Screws    | #14 x 3"     |

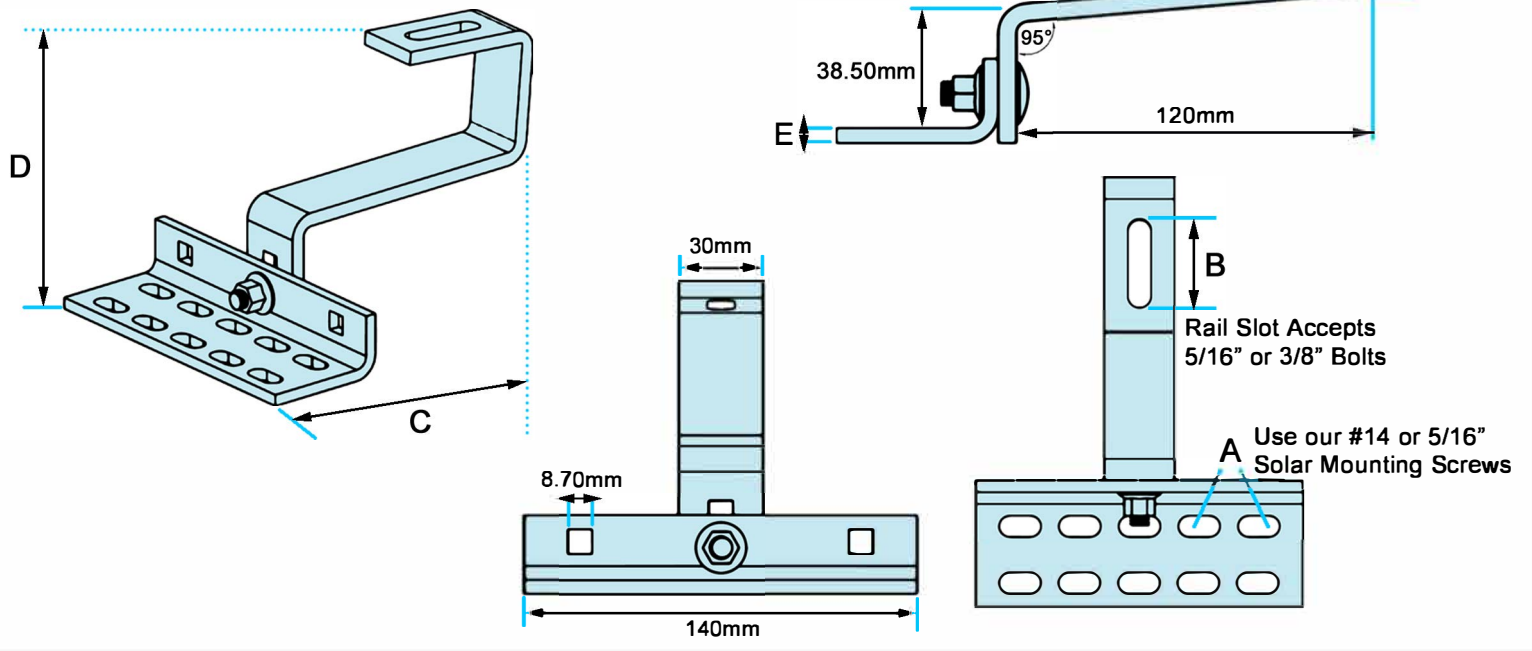


\*\*Old Part # STA18038



Rev1

| Letter | Description           | Size/Length  |
|--------|-----------------------|--------------|
| A      | Mounting Screw Slots  | 9mm x 18mm   |
| B      | Rail Slot Size        | 10mm x 38mm  |
| C      | Length of Roof Hook   | 179.54mm     |
| D      | Bottom End to Top End | 93mm - 102mm |
| E      | Thickness             | 6mm          |





January 23, 2014

To whom this may concern,

SolarRoofHook is committed to excellence. All of our parts were tested by a third party test facility for the following.

1. Uplift test
2. Downward load test
3. Water Proof - QuickBOLT only

AME Research facility had a current engineer license per the State of California in 2012 and 2013. Terrapin Testing had a current engineer license per the State of California in 2011.

The following is an excerpt from:

CALIFORNIA BOARD FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS  
g u i d e to Engineering & Land Surveying for City and County Officials  
Page 12, Line 27

***27. If the license has expired between the time the engineering documents were prepared and the time when the local agency's review is performed, do the documents need to be re-sealed by a licensee with a current license? (B&P Code §§ 6733, 6735, 6735.3, 6735.4)***

***As long as the license was current at the time the engineering documents were prepared, the documents do not need to be re-sealed prior to review by the local agency. However, any changes (updates or modifications) to the documents that are made following the review by the local agency would have to be prepared by a licensed engineer with a current license and those changes would have to be signed and sealed.***

We trust the information provided will alleviate any request for the test reports submitted to have a stamp from the current year.

Respectfully,

Rick Gentry

A handwritten signature in black ink, appearing to read 'Rick Gentry', is written over a light blue horizontal line.

V.P. of Sales & Marketing

5830 Las Positas Rd | Livermore, CA 94551  
Phone: (844)-671-6045 | Fax: (800)-689-7975  
www.solarroofhook.com



April 1<sup>st</sup>, 2015

Mr. Rick Gentry  
**QUICKSCREWS INTERNATIONAL**  
5830 Las Positas Road  
Livermore, CA 94551

Project Number 115169C

**Subject:**      STA18038 All Tile Adjustable 180° Roof Hook Laboratory Load Testing

Dear Mr. Gentry:

As requested, Applied Materials & Engineering, Inc. (AME) has completed load-testing the All Tile Adjustable 180° roof hook (see Appendix A, Figure 1). The purpose of our testing was to evaluate the compressive, and tensile (uplift) load capacity of the All Tile Adjustable 180° roof hook attached to a 2"x4" Douglas Fir Rafter using two #14x3" screws.

### **SAMPLE DESCRIPTION**

Mockup samples were assembled in our laboratory on March 26<sup>th</sup> & 27<sup>th</sup>, 2015. Mockup configuration consisted of three 16" long rafters at 4.5"o.c., screwed to 1/2" Structural I plywood. The All Tile Adjustable 180° roof hook is attached through the plywood into a rafter with two fasteners. The roof hook is positioned in the center of the base plate with the fasteners installed at the farthest end.

### **TEST PROCEDURES & RESULTS**

#### **1. Compressive Load Test**

A total of three tests were conducted for compressive load capacity on March 26<sup>th</sup>, 2015 using a United Universal testing machine. Samples were rigidly attached to the testing machine and a compressive load was applied to the hook. The samples were loaded in compression at a constant rate of axial deformation of 0.09 in. /min. without shock until the hook was bent and came in contact with the test board; displacement at maximum load was recorded. Based on the above testing, the average maximum compression load of the All Tile Adjustable 180° roof hook attached to a 2"x4" Douglas Fir rafter using two #14x 3" screws was determined to be 301 lbf. Detailed results are provided in Table I. Test setup and mode of failure are provided in Appendix B, Figure 1.

The specific gravity and moisture content of the rafter was tested in accordance with ASTM D2395, Method A (oven-dry). The specific gravity and moisture content were determined to be 0.375 and 13.9 %, respectively.

Mr. Rick Gentry  
**QUICKSCREWS INTERNATIONAL**  
5830 Las Positas Road  
Livermore, CA 94551

Project Number 115169C

## 2. Tensile (Uplift) Load Test

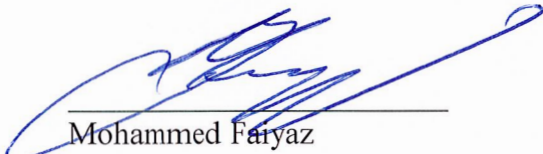
A total of three tests were conducted for compressive load capacity on March 27<sup>th</sup>, 2015 using a United Universal testing machine. Samples were rigidly attached to the testing machine and an uplift load was applied to the hook. The samples were loaded in tension at a constant rate of axial deformation of 0.09 in. /min. without shock until failure occurred; displacement at maximum load was recorded. Based on the above testing, the average maximum uplift load of the All Tile Adjustable 180° attached to a 2"x4" Douglas Fir rafter using two #14x3" screws was determined to be 2041 lbf. Detailed results are provided in Table II. Test setup and mode of failure are provided in Appendix B, Figure 2.

The specific gravity and moisture content of the rafter was tested in accordance with ASTM D2395, Method A (oven-dry). The specific gravity and moisture content were determined to be 0.388 and 15.6 %, respectively.

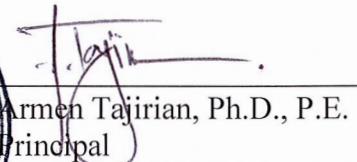
Respectfully Submitted,

**APPLIED MATERIALS & ENGINEERING, INC.**

**Reviewed By:**

  
Mohammed Fayaz  
Laboratory Manager



  
Armen Tajirian, Ph.D., P.E.  
Principal

**TABLE I**

**COMPRESSIVE LOAD TEST RESULTS**

**ALL TILE ADJUSTABLE 180° ROOF HOOK (PART # STA18038)**

**PROJECT NUMBER 115169C**

| <b>SAMPLE ID</b> | <b>MAXIMUM<br/>COMPRESSIVE<br/>LOAD (lbf)</b> | <b>DISPLACEMENT AT<br/>MAXIMUM LOAD<br/>(in.)</b> | <b>FAILURE<br/>MODE</b>   |
|------------------|---|---|---------------------------|
| C-1              | 308   | 2.0   | Hook contact<br>w/Plywood |
| C-2              | 291   | 2.4   | Hook contact<br>w/Plywood |
| C-3              | 304   | 2.1   | Hook contact<br>w/Plywood |
| <b>AVERAGE</b>   | <b>301</b>                                    | <b>2.2</b>  | <b>..</b>                 |

**TABLE II**

**TENSILE (UPLIFT) LOAD TEST RESULTS**

**ALL TILE ADJUSTABLE 180° ROOF HOOK (PART # STA18038)**

**PROJECT NUMBER 115169C**

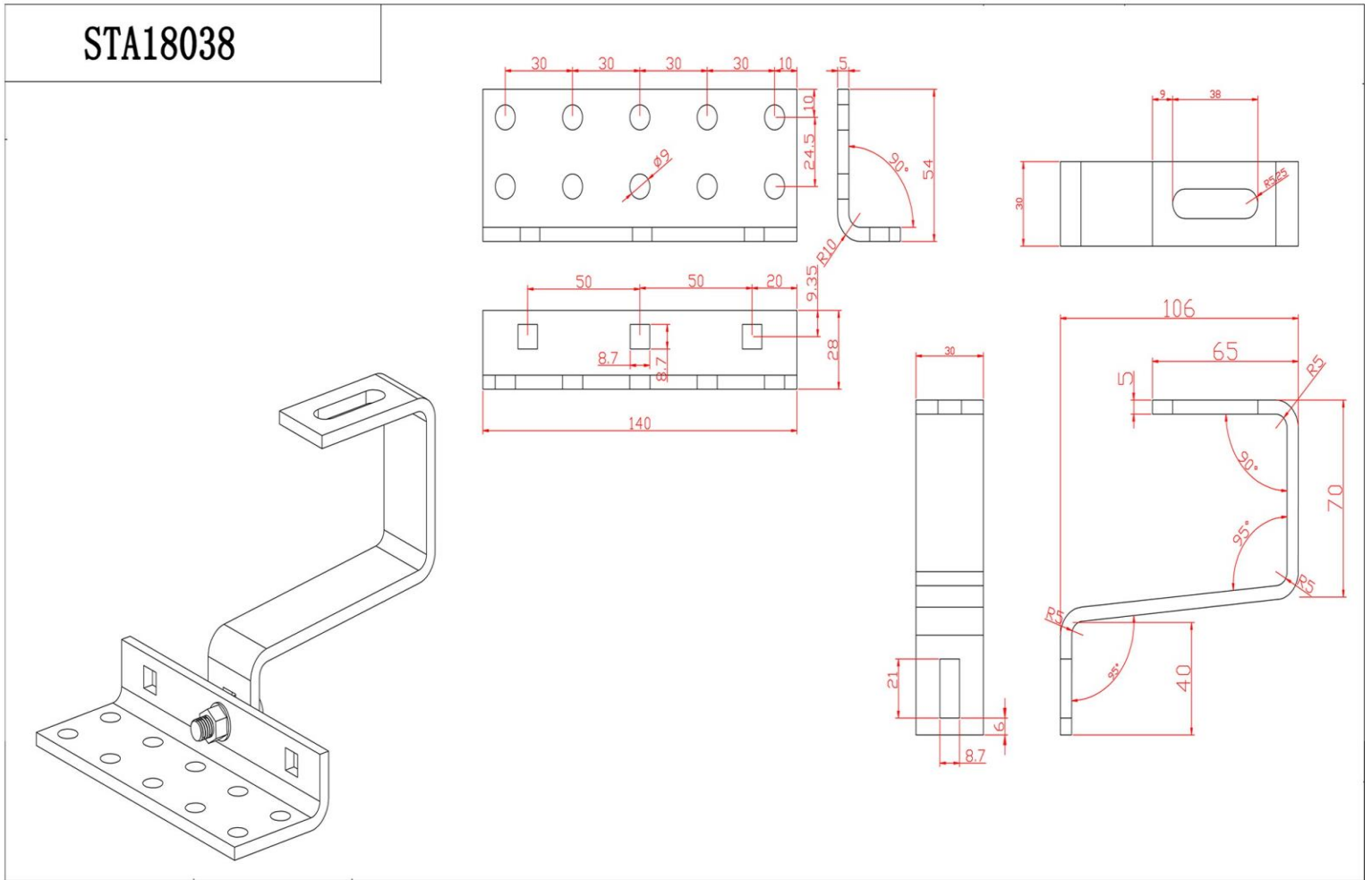
| <b>SAMPLE ID</b> | <b>MAXIMUM TENSILE LOAD (lbf)</b> | <b>DISPLACEMENT AT MAXIMUM LOAD (in.)</b> | <b>FAILURE MODE</b> |
|------------------|-----------------------------------|---|---------------------|
| T-1              | 2216                              | 7.2                                       | Fastener pullout    |
| T-2              | 1708                              | 6.5                                       | Fastener pullout    |
| T-3              | 2199                              | 7.2                                       | Fastener pullout    |
| <b>AVERAGE</b>   | <b>2041</b>                       | <b>6.9</b>                                | <b>..</b>           |

## **APPENDIX A**

**FIGURE 1**

**ALL TILE ADJUSTABLE 180° ROOF HOOK (PART # STA18038)**

**PROJECT NUMBER 115169C**





## **APPENDIX B**

**FIGURE 1**

**ALL TILE ADJUSTABLE 180° ROOF HOOK (PART # STA18038)**

**COMPRESSIVE LOAD TEST SETUP**

**PROJECT NUMBER 115169C**



Figure 1a. Test Setup



Figure 1b. Typical Failure Mode

**FIGURE 2**

**ALL TILE ADJUSTABLE 180° ROOF HOOK (PART # STA18038)**

**UPLIFT LOAD TEST SETUP**

**PROJECT NUMBER 115169C**

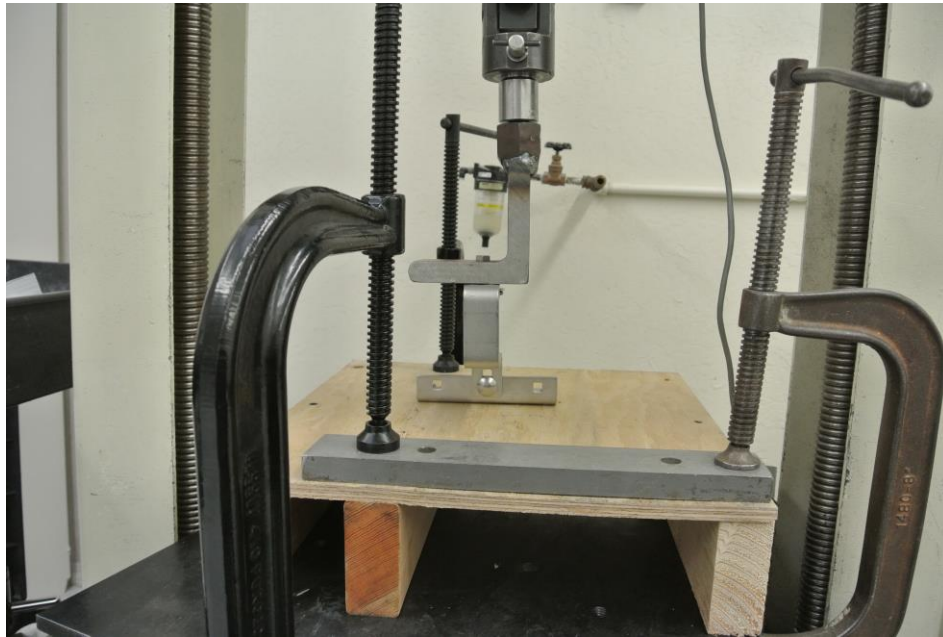


Figure 2a. Test Setup



Figure 2b. Typical Failure Mode