



July 5, 2011

Mr. Stewart Wentworth
QUICK MOUNT PV
936 Detroit Avenue, Suite D
Concord, CA 94518-2539

Project Number 111317C

Subject: Flat Tile Mount Hardware Load Testing

Dear Mr. Wentworth:

As requested, Applied Materials & Engineering, Inc. (AME) has completed load-testing the Flat Tile Mount hardware. The purpose of our testing was to evaluate the tensile and shear load capacity of the Flat Tile Mount hardware attached to a commercially available 2"x6" Douglas Fir rafter.

SAMPLE DESCRIPTION

Six (6) mockup samples were delivered to our laboratory on June 17, 2011. Mockup configuration consisted of one 12" long rafter, screwed to 1/2" Structural 1 plywood. The Flat Tile Mount hardware is attached through the plywood into the rafter with four 1/4"x1-1/2" lag bolts torqued to 7ft-lbs. Product hardware drawings are provided in Appendix A.

TEST PROCEDURES & RESULTS

1. Tensile Strength

Three samples were tested for tensile strength on June 29, 2011 using a United Universal testing machine. Samples were rigidly attached to the testing machine and a tensile load was applied to the 5/16"x1" machine bolt connected to the aluminum post. The samples were loaded in tension at a constant rate of axial deformation of 0.05 in./min. without shock until failure occurred. Based on the above testing, the average ultimate tensile load of the Flat Tile Mount hardware in Douglas Fir was determined to be 1090 lbf.

The specific gravity and moisture content of the rafter was tested in accordance with ASTM D2395, Method A (oven-dry). The average specific gravity and moisture content was determined to be 0.429 and 18.9%, respectively. Detailed results are provided in Table I. Test setup is illustrated in Figure 1 of Appendix B.

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2. Shear Strength

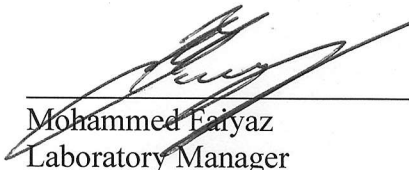
Three samples were tested for shear strength on June 29, 2011 using a United Universal testing machine. Samples were rigidly attached to the testing machine and a shear load was applied to the 5/16"x1" machine bolt connected to the aluminum standoff. The samples were loaded perpendicular to rafter at a constant rate of axial deformation of 0.01 in./min. without shock until failure occurred. Based on the above testing, the average ultimate shear load, parallel to rafter, of the Flat Tile Mount hardware in Douglas Fir was determined to be 602 lbf.

The specific gravity and moisture content of the rafter was tested in accordance with ASTM D2395, Method A (oven-dry). The average specific gravity and moisture content was determined to be 0.411 and 18.0%, respectively. Detailed results are provided in Table II. Test setup is illustrated in Figure 2 of Appendix B.

If you have any questions regarding the above, please do not hesitate to call the undersigned.

Respectfully Submitted,

APPLIED MATERIALS & ENGINEERING, INC.


Mohammed Faiyaz
Laboratory Manager

Reviewed By:

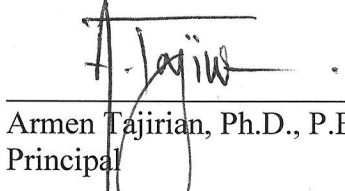

Armen Tajirian, Ph.D., P.E.
Principal



TABLE I
FLAT TILE MOUNT
TENSILE LOAD TEST RESULTS
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SAMPLE ID	ULTIMATE TENSILE LOAD (LBF)	RAFTER MOISTURE CONTENT (%)	RAFTER SPECIFIC GRAVITY	FAILURE MODE
PULL-1	1047	20.7	0.456	Lag bolt pull-out
PULL -2	1338	16.0	0.402	Lag bolt pull-out
PULL -3	885	20.1	0.429	Lag bolt pull-out
AVERAGE	1090	18.9	0.429	..

¹ Upper bolt.

TABLE II
FLAT TILE MOUNT
SHEAR LOAD TEST RESULTS
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SAMPLE ID	ULTIMATE SHEAR LOAD PARALLEL TO RAFTER (LBF)	RAFTER MOISTURE CONTENT (%)	RAFTER SPECIFIC GRAVITY	FAILURE MODE
SHEAR-1	696	15.9	0.396	5/16"x3/4" bent bolt
SHEAR-2	629	17.4	0.434	5/16"x3/4" bent bolt
SHEAR-3	482	20.5	0.403	5/16"x3/4" bent bolt
AVERAGE	602	18.0	0.411	..

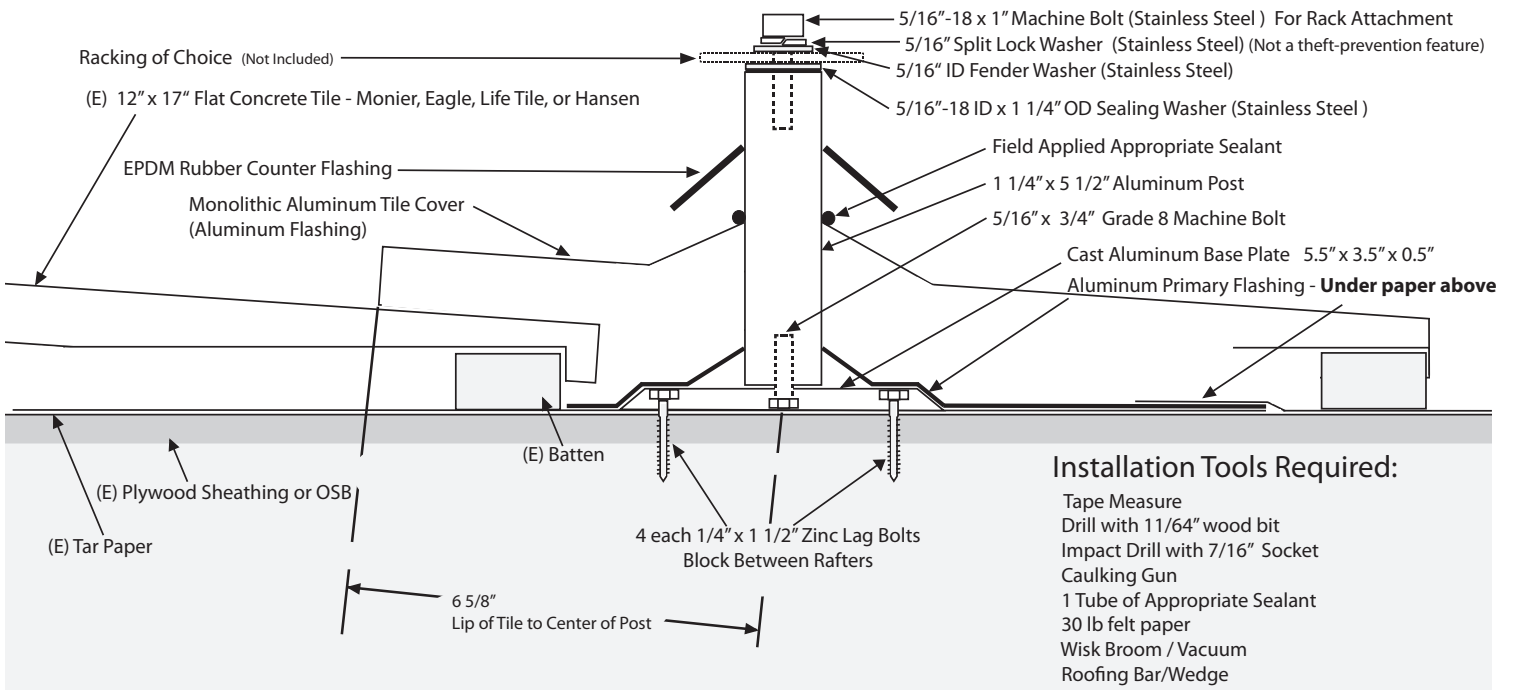
APPENDIX A

Quick Mount PV[®]

Your *Solution* in Mounting Products
Solar • H₂O • Conduit • HVAC • Custom

Flat Tile Mount Specifications -A-

All Patents Pending



Lag pull-out (withdrawal) capacities (lbs) in typical lumber:

Lag Bolt Specifications

	Specific Gravity	4/ea 1/4" shaft per 1" thread depth	1/4" shaft per 1" thread depth
Douglas Fir, Larch	.50	900	225
Douglas Fir, South	.46	828	207
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	828	207
Hem, Fir	.43	716	179
Hem, Fir, (North)	.46	828	207
Southern Pine	.55	1040	260
Spruce, Pine, Fir	.42	692	173
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	.50	900	225

Sources: Uniform Building Code; American Wood Council

Notes: 1) Thread must be embedded in a rafter or other structural roof member.

2) See UBC for required edge distances.

**Note: To maintain waterproofing of substrate it is important to make sure the Aluminum Primary Flashing is properly placed over the Q Base, and under the course of paper above. If the paper above does not reach due to layout, place an additional piece of roofing paper over the Primary Flashing and under the next course of paper above. (See instructions on page 4)



APPENDIX B

FLAT TILE MOUNT

LOAD TEST SETUP

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Figure 1. Tensile Test



Figure 2. Shear Test