APPLIED MATERIALS & ENGINEERING, INC.
980 41st Street
Oakland, CA 94608
Tel: (510) 420-8190
FAX: (510) 420-8186
e-mail: info@appmateng.com

July 5, 2011

Revised Fig.2 on Page 9 on 12/13/2011
Report Revised on 01/11/2012 for Editorial Changes Only
Project Number 111316C

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

Subject: Quick Mount QBase with 6.5" Post as Used in Low Slope Mount (QMLSH-7) & Universal Tile Mount (QMUTM) Load Testing

Dear Mr. Wentworth:

As requested, Applied Materials & Engineering, Inc. (AME) has completed load-testing the QMLSH-7 hardware. The purpose of our testing was to evaluate the tensile and shear load capacity of the QMLSH-7 hardware attached to a commercially available 2"x4" Douglas Fir rafter.

SAMPLE DESCRIPTION

Nine (9) mockup samples were delivered to our laboratory on June 17, 2011. Mockup configuration consisted of three 16" long rafters at 7"o.c., screwed to 1/2" Structural 1 plywood. The 7" (finished height) Quick Mount Standoff (QMSO) hardware is attached through the plywood into the rafter with two 5/16"x3" lag bolts torqued to 15ft-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 QMLSH-7 hardware in Douglas Fir was determined to be 3031 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 0.436 and 20.9%, respectively. Detailed results are provided in Table I. Test setup is illustrated in Figure 1 of Appendix B.

2. Shear Strength Parallel to Rafter

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 parallel 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 QMLSH-7 hardware in Douglas Fir was determined to be 803 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 0.438 and 13.8%, respectively. Detailed results are provided in Table II. Typical test setup is illustrated in Figure 2 of Appendix B.

3. Shear Strength Perpendicular to Rafter

Three samples were tested for shear strength on June 30, 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, perpendicular to rafter, of the QMLSH-7 hardware in Douglas Fir was determined to be 583 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 0.451 and 16.5%, respectively. Detailed results are provided in Table III. Typical 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:

REGISTERED PROFESSIONAL ENGINEER
ARMEN TAJIRIAN
No. 35535
Exp. 9/30/13
CIVIL
STATE OF CALIFORNIA

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

TABLE I

LOW SLOPE MOUNT QMLSH-7

TENSILE LOAD TEST RESULTS

PROJECT NUMBER 111316C

SAMPLE ID	ULTIMATE TENSILE LOAD (LBF)	RAFTER MOISTURE CONTENT (%)	RAFTER SPECIFIC GRAVITY	FAILURE MODE
7PULL-1	2807	20.7	0.402	Lag bolt pull-out
7PULL -2	3283	22.0	0.476	Lag bolt pull-out
7PULL -3	3003	20.0	0.430	Lag bolt pull-out
AVERAGE	**3031**	**20.9**	**0.436**	**..**

TABLE II

LOW SLOPE MOUNT QMLSH-7

SHEAR LOAD PARALLEL TO RAFTER TEST RESULTS

PROJECT NUMBER 111316C

SAMPLE ID	ULTIMATE SHEAR LOAD PARALLEL TO RAFTER (LBF)	RAFTER MOISTURE CONTENT (%)	RAFTER SPECIFIC GRAVITY	FAILURE MODE
7PARA-1	863	14.2	0.436	Lag bolt pull-out
7PARA-2	877	13.2	0.444	Lag bolt pull-out
7PARA-3	670	14.1	0.434	Lag bolt pull-out
AVERAGE	**803**	**13.8**	**0.438**	**..**

TABLE III

LOW SLOPE MOUNT QMLSH-7

SHEAR LOAD PERPENDICULAR TO RAFTER TEST RESULTS

PROJECT NUMBER 111316C

SAMPLE ID	ULTIMATE SHEAR LOAD PERPENDICULAR TO RAFTER (LBF)	RAFTER MOISTURE CONTENT (%)	RAFTER SPECIFIC GRAVITY	FAILURE MODE
7PERP-1	609	14.1	0.434	Buckled plywood
7PERP-2	639	16.2	0.432	Buckled plywood
7PERP-3	500	19.1	0.488	Lag bolt pull-out
AVERAGE	**583**	**16.5**	**0.451**	**..**

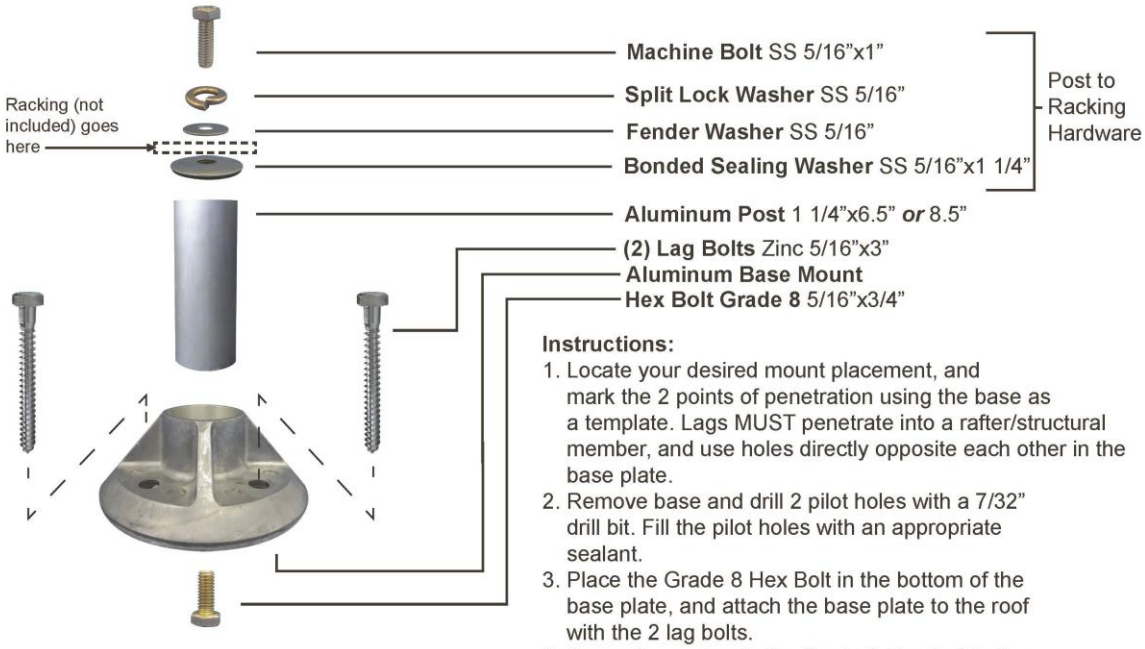
APPENDIX A

Quick Mount PV®

Your *Solution* in Mounting Products

Solar • H_2O • Conduit • HVAC • Custom

Low Slope Mount Specifications



Instructions:

1. Locate your desired mount placement, and mark the 2 points of penetration using the base as a template. Lags MUST penetrate into a rafter/structural member, and use holes directly opposite each other in the base plate.
2. Remove base and drill 2 pilot holes with a 7/32" drill bit. Fill the pilot holes with an appropriate sealant.
3. Place the Grade 8 Hex Bolt in the bottom of the base plate, and attach the base plate to the roof with the 2 lag bolts.
4. Screw the post onto the Grade 8 Hex bolt in the base plate. attach the post-to-racking hardware to the top of the post for ease of location.
5. You are now ready to flash the mounts and attach racking to them.

IMPORTANT-PLEASE READ:

This product DOES NOT include flashing, and therefore is not waterproof by itself. As the installer, it is your responsibility to make sure all roof penetrations are flashed properly!

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

Lag Bolt Specifications

	Specific Gravity	2/ea 5/16" shaft per 2.5" thread depth	5/16" shaft per 1" thread depth
Douglas Fir, Larch	.50	1330	266
Douglas Fir, South	.46	1175	235
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	1175	235
Hem, Fir	.43	1060	212
Hem, Fir. (North)	.46	1175	235
Southern Pine	.55	1535	307
Spruce, Pine, Fir	.42	1025	205
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	..50	1330	266

Sources: Uniform Building Code; American Wood Council

Notes: 1) Thread must be embedded in a rafter or other structural roof member.
2) Pull-out values incorporate a 1.6 safety factor recommended by the American Wood Council.
3) See IBC for required edge distances.

936 Detroit Ave Suite D, Concord, CA. 94518
Phone: (925) 687-6686 Fax: (925) 687-6689
Email: info@quickmountpv.com www.quickmountpv.com

APPENDIX B

LOW SLOPE MOUNT QMLSH-7

LOAD TEST SETUP

PROJECT NUMBER 111316C

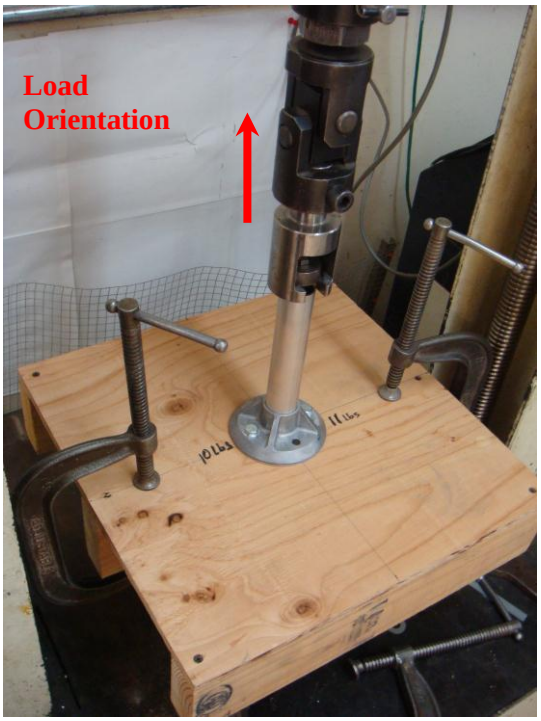


Figure 1. Tensile Test

Figure 2. Shear Test