APPLIED MATERIALS & ENGINEERING, INC.
980 41st Street
Oakland, CA 94608
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October 29th, 2014

Mr. Bryan Espiritu
QUICKMOUNT PV
2700 Mitchell Dr., Bldg. 2
Walnut Creek, CA 94598

Project Number 114490C

Subject: Allowable Loads for QMSE-Lag

Dear Mr. Espiritu:

As requested, below please find allowable loads for the subject product:

Analysis of Allowable Tension and Shear Loads

From AME's report *(Laboratory Load Testing of the QMSE-Lag)* dated October 6, 2014, the allowable tension and shear loads in accordance with AC13, Section 3.2.11.1.2 (which requires a factor of safety of 3), were determined to be as follows:

Douglas Fir Lumber:	Tension (uplift):	732 lbf
	Shear (lateral- Parallel to Rafter):	526 lbf

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

Respectfully Submitted,

APPLIED MATERIALS & ENGINEERING, INC.

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

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Mr. Bryan Espiritu
QUICKMOUNT PV
2700 Mitchell Dr., Bldg. 2
Walnut Creek, CA 94598

Project Number 114490C

Subject: Laboratory Load Testing of the QMSE-Lag

Dear Mr. Espiritu:

As requested, Applied Materials & Engineering, Inc. (AME) has completed load-testing the QMSE-Lag. The purpose of our testing was to evaluate the tensile (uplift) and lateral (Parallel to rafter) load capacity of the QMSE-Lag attached to a 2"x4" Douglas Fir Rafter using one 5/16"Ø x 5.5" 304ss lag bolts.

SAMPLE DESCRIPTION

Samples were assembled in our laboratory between August 11th and September 9th, 2014. Mockup configuration consisted of three 16" long rafters at 4.5"o.c., screwed to 1/2" Structural I plywood. The QMSE-Lag is attached through the plywood into a rafter using one 5/16"ø x 5.5" 304ss lag bolt. QMSE-Lag configuration is provided in Appendix A.

TEST PROCEDURES & RESULTS

1. Tensile (Uplift) Load Test

A total of six tests were conducted for tensile load capacity on September 9th, 2014 using a United Universal testing machine. Samples were rigidly attached to the testing machine and an uplift load was applied to the mount. 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 tensile load of the QMSE-Lag attached to a 2"x4" Douglas Fir rafter using one 5/16"Ø x 5.5" 304 lag bolt was determined to be 2197 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 rafters was tested in accordance with ASTM D2395, Method A (oven-dry). The average specific gravity and moisture content was determined to be 0.426 and 17.0%, respectively.

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October 29th, 2014

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2. Shear (Lateral) Load Test Parallel to Rafter

Six samples were tested for shear strength parallel to rafter on August 11th, 2014 using a United Universal testing machine. Samples were rigidly attached to the testing machine and a shear load was applied to the QMSE-Lag System parallel to the rafter. The samples were loaded at a constant rate of axial deformation of 0.09 in./min. without shock until failure occurred. Based on the above testing, the average ultimate load, of the QMSE-Lag System attached to a 2"x4" Douglas Fir rafter using one 5/16"Ø x 5.5" lag bolts was determined to be 1578 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 rafters was tested in accordance with ASTM D2395, Method A (oven-dry). The average specific gravity and moisture content was determined to be 0.389 and 16.0 %, respectively.

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

Respectfully Submitted,

APPLIED MATERIALS & ENGINEERING, INC.

Darrius Shuemake
Laboratory Technician

Reviewed By:

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

REGISTERED PROFESSIONAL ENGINEER
ARMEN TAJIRIAN
No. 35535
Exp. 9/30/15
CIVIL
STATE OF CALIFORNIA

TABLE I

TENSILE (UPLIFT) LOAD TEST RESULTS

QMSE-LAG

PROJECT NUMBER 114490C

SAMPLE ID	MAXIMUM TENSILE LOAD (lbf)	DISPLACEMENT AT MAXIMUM LOAD (in.)	FAILURE MODE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
T-1	2255	0.9	Lag Pullout	0.354	17.3
T-2	2100	2.1	Lag Pullout	0.495	10.6
T-3	2255	1.6	Lag Pullout	0.416	22.4
T-4	2133	1.7	Lag Pullout	0.422	16.7
T-5	2136	1.0	Lag Pullout	0.444	16.6
T-6	2300	1.6	Lag Pullout	0.427	18.6
AVERAGE	**2197**	**1.5**	..	**0.426**	**17.0**

TABLE II

SHEAR (LATERAL) LOAD TEST PARALLEL TO RAFTER TEST RESULTS

QMSE-LAG

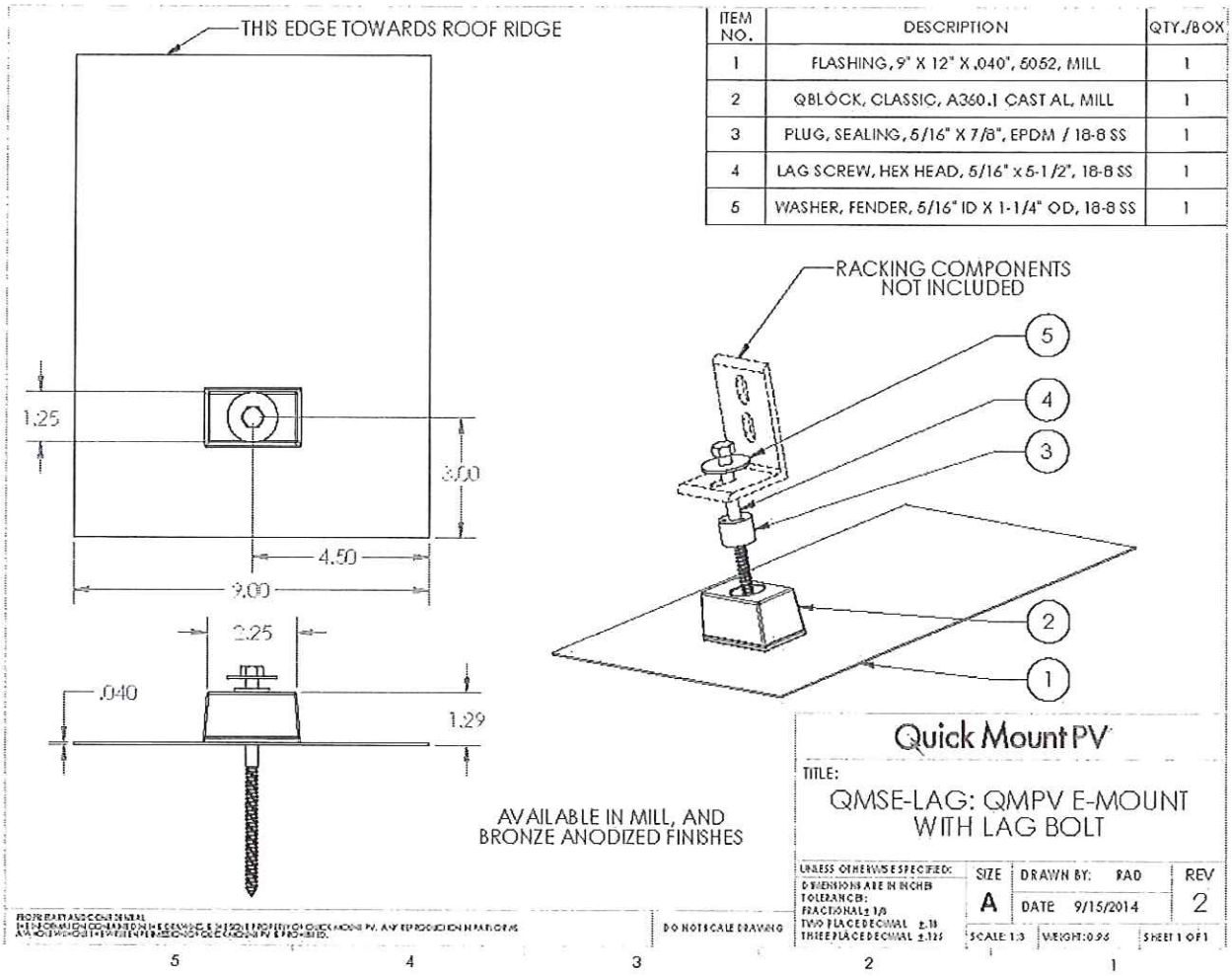
PROJECT NUMBER 114490C

SAMPLE ID	MAXIMUM LATERAL LOAD (lbf)	DISPLACEMENT AT MAXIMUM LOAD (in.)	FAILURE MODE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
L-1	1719	1.3	Lag Pullout	0.379	13.5
L-2	1788	1.3	Lag Pullout	0.359	14.4
L-3	1321	1.4	Lag Pullout	0.423	19.1
L-4	1498	1.7	Lag Pullout	0.387	15.7
L-5	1601	1.3	Lag Pullout	0.390	16.4
L-6	1541	1.2	Lag Pullout	0.400	17.0
AVERAGE	**1578**	**1.4**	**..**	**0.389**	**16.0**

APPENDIX A

QMSE-LAG CONFIGURATION

PROJECT NUMBER 114490C



ITEM NO.	DESCRIPTION	QTY./BOX
1	FLASHING, 9" X 12" X .040", 5052, MILL	1
2	QBLOCK, CLASSIC, A360.1 CAST AL, MILL	1
3	PLUG, SEALING, 5/16" X 7/8", EPDM / 18-8 SS	1
4	LAG SCREW, HEX HEAD, 5/16" x 5-1/2", 18-8 SS	1
5	WASHER, FENDER, 5/16" ID X 1-1/4" OD, 18-8 SS	1

APPENDIX B

FIGURE 1

QMSE-LAG

TENSILE (UPLIFT) LOAD TEST SETUP

PROJECT NUMBER 114490C

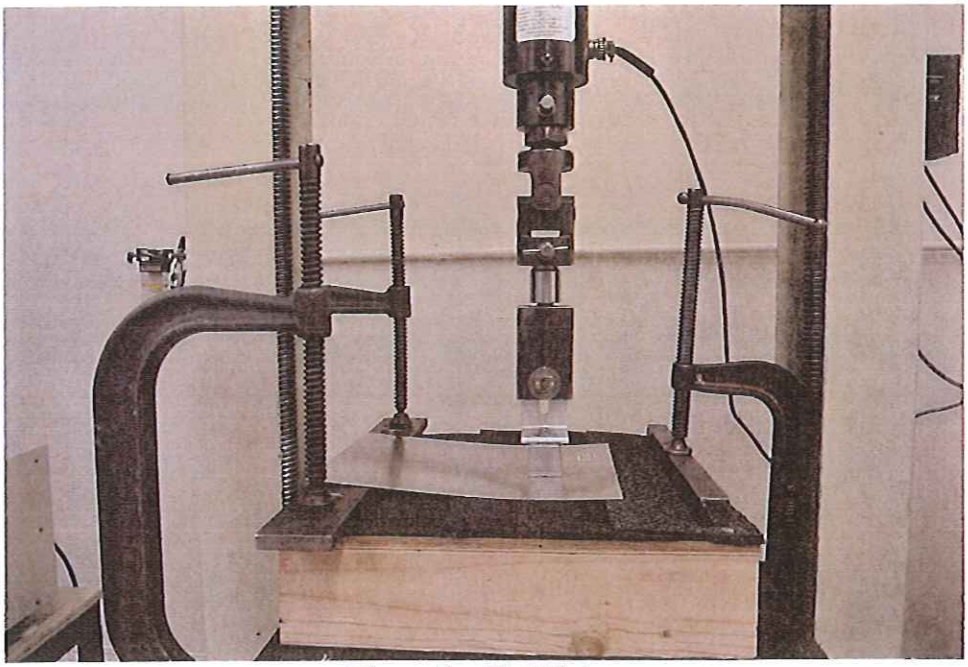


Figure 1a. Test Setup

Figure 1b. Typical Failure Mode

FIGURE 2

QMSE-LAG

SHEAR (LATERAL) LOAD TEST PARALLEL TO RAFTER

PROJECT NUMBER 114490C

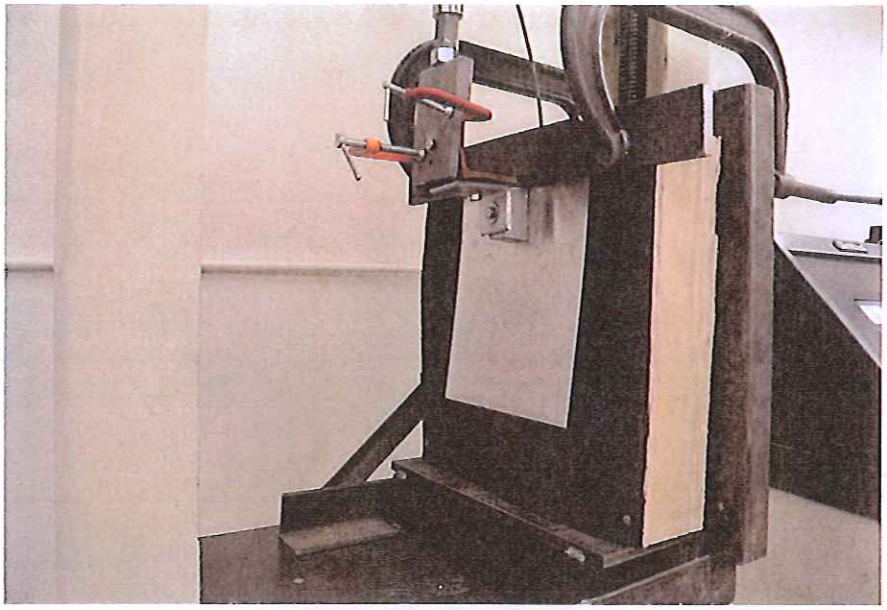


Figure 2a. Test Setup

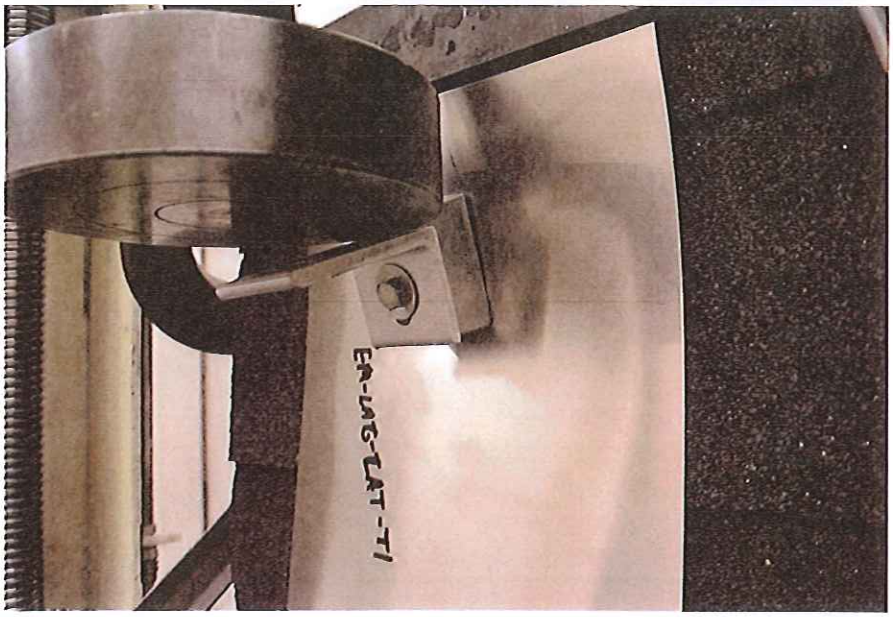


Figure 2b. Typical Failure Mode