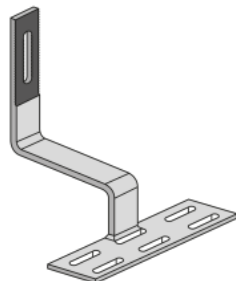
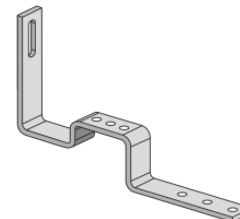


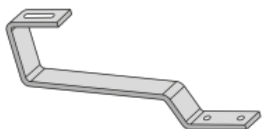
004AT1S
SOLARHOOK FLAT SIDE MT AT1



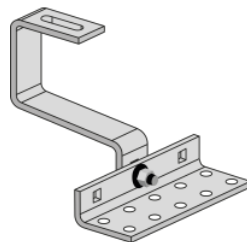
004CT1S
SOLARHOOK SPANISH SIDE MT CT1



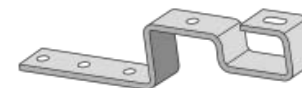
004ST1S
SOLARHOOK FLAT SIDE MT ST1



004AT2S
SOLARHOOK FLAT BOTTOM MT AT2



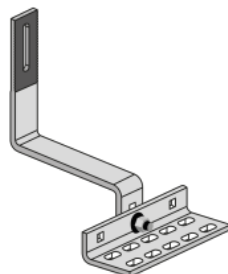
004CT4S
SOLARHOOK UNIV BOTTOM MT CT4



004ST2S
SOLARHOOK FLAT BOTTOM MT ST2

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004CT5S
SOLARHOOK UNIV SIDE MT CT5

ROOF HOOK CAPACITIES AND ENGINEERING

Refer to engineering report tables for tested ultimate loads. Refer to local AHJ to determine the correct code (ASCE 7-05 or 7-10), wind speed and snow load. It is the responsibility of the installer to ensure these mounting attachments are appropriate for the application. Please contact your 3rd party engineer for more information.

ENGINEERING GUIDE LIMITATIONS

- Flush roof installations only
- Roof slope must be 0-45 degrees (0/12 - 12/12 pitch)
- Installation must have at least 4 modules grouped together
- Module dimensions must be less than 42"x67"
- Surrounding ground area must not slope more than 10 degrees
- Location must fall into Exposure Category B or C
- Building height must be less than or equal to 30'-0"

Please refer to www.unirac.com in the Technical Support section for the Solarmount D&E guide which should be used in installations that do not comply with the limitations above.

FIGURE 1: Lag pull-out (withdrawal) capacities (lbs) in typical roof lumber (ASD)

	Specific Gravity	Lag Screw Specifications 5/16" shaft, per inch thread depth
Douglas Fir, Larch	0.50	266
Douglas Fir, South	0.46	235
Engelmann Spruce, Lodgepole Pine (MSR 1650f & higher)	0.46	235
Hem. Fir, Redwood (Close Grain)	0.43	212
Southern Pine	0.55	307
Spruce, Pine, Fir	0.42	205
Spruce, Pine, Fir (E of 2million PSI & higher grades of MSR & MEL)	0.50	266

SOURCES: AMERICAN WOOD COUNCIL, NDS 2005, TABLE 1

Use Figure 1 to select a lag bolt embedment depth to satisfy your Uplift Point Load Force (lbs), requirements. It is the installer's responsibility to verify that the substructure and attachment method is strong enough to support the maximum point loads calculated.

NOTES:

- (1) Thread must be embedded in the side grain of a rafter or other structural member integral with the building structure.
- (2) Lag bolts must be located in the middle third of the structural member.
- (3) This table does not include shear capacities. If necessary, contact a local engineer to specify lag bolt size with regard to shear forces.
- (4) Install lag bolts with head and washer flush to surface (no gap). Do not over torque.
- (5) Withdrawal design values for lag screw connections shall be multiplied by applicable adjustment factors if necessary. See table 10.3 in the American Wood Council NDS for Wood Construction



1 Remove tiles around installation area



2 Locate, identify, and mark the rafters.



3 Position hook, and using 3/16" bit, drill 2 pilot holes.



4 Clean debris and fill the holes with roofing sealant.



5 Reposition the hook and secure using included lag screws



6 Replace tiles and if necessary, notch with grinder to ensure proper fit.

Required tools:

- Drill, Impact driver
- 3/16" drill bit
- Sealant

Optional Tools:

- Rafter locator
- Chalk
- Grinder

Fixed or Universal Hooks



1

Remove tiles around installation area



2

Locate, identify, and mark the rafters.



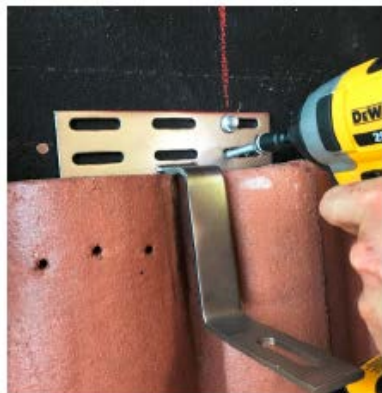
3

Position hook, and using 3/16" bit, drill 2 pilot holes.



4

Clean debris and fill the holes with roofing sealant.



5

Reposition the hook and secure using included lag screws



6

Replace tiles and if necessary, notch with grinder to ensure proper fit.

Required tools:

- Drill, Impact driver
- 3/16" drill bit
- Sealant

Optional Tools:

- Rafter locator
- Chalk
- Grinder

Fixed or Universal Hooks



1
Remove tiles around installation area



2
Locate, identify, and mark the rafters.



3
Position hook, adjust bolt position if needed. Using 3/16" bit, drill 2 pilot holes.



4
Clean debris and fill the holes with roofing sealant.



5
Reposition the hook and secure using included lag screws



6
Replace tiles and if necessary, notch with grinder to ensure proper fit.

Required tools:

- Drill, Impact driver
- 3/16" drill bit
- Sealant

Optional Tools:

- Rafter locator
- Chalk
- Grinder

MATERIALS REQUIRED:

- (Qty 1) 6 inch X 11 inch synthetic underlayment
- (Qty 2) 4 inch X 8 inch flexible flashing strip
- (Qty 2) 4 inch X 16 inch flexible flashing strip
- Stiff bristle brush
- Knife or scissors
- Roller (optional)

NOTES:

- Unirac recommends using an aluminum backed butyl flexible flashing tape.
- Refer flexible flashing manufacturer's instructions and technical data for surface compatibility, preparation, primer requirements, and environmental limitations.



CLEAN UNDERLAYMENT

Underlayment surface should be dry and free of dirt or other debris that would prevent adhesion of flexible flashing.



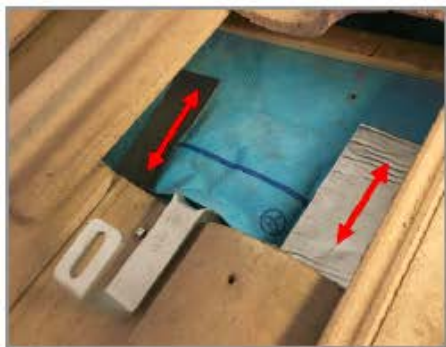
PREPARE SYNTHETIC FLASHING

Cut a piece of synthetic underlayment to a 6 inch X 11 inch rectangle.



PREPARE FLEXIBLE FLASHING STRIPS

Cut two 4 inch X 8 inch strips of flexible flashing. Apply strips along short edge of synthetic flashing with 50% of the flexible flashing strip exposed for attachment to the roof underlayment.



APPLY FLASHING TO ROOF UNDERLAYMENT

Place the synthetic flashing over the entire tile hook base. Press or roll the flexible flashing strips onto the roof underlayment ensuring full contact and removal of any bubbles or wrinkles.



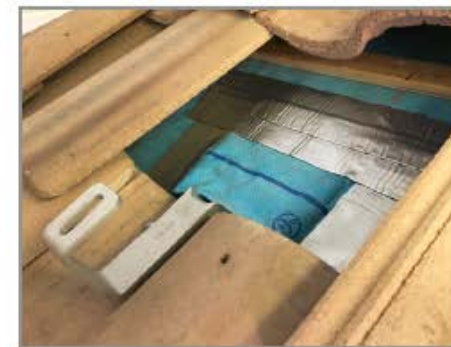
APPLY UP-SLOPE FLASHING STRIPS

Prepare Up-Slope Flexible Flashing Strips. Cut two 4 inch X 16 inch strips of flexible flashing. Apply first upslope strip horizontally over the edge of the synthetic flashing. 50% of the flashing strip should be on the roof underlayment.



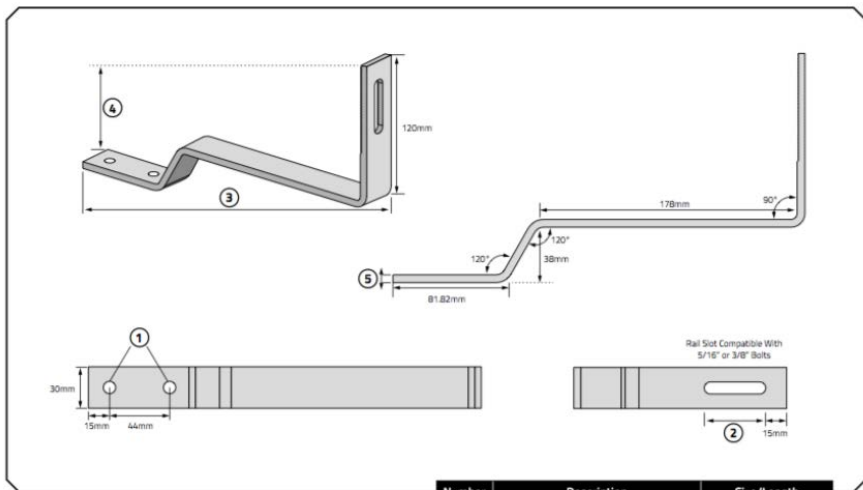
APPLY UP-SLOPE FLASHING STRIPS & COMPLETE INSTALLATION

Apply second up-slope strip horizontally over the edge of the first up-slope strip. The second strip should overlap the first, with 50% of the flashing strip on the roof underlayment. Press or roll the flexible flashing strips onto the roof underlayment ensuring full contact and removal of any bubbles or wrinkles.



004AT1S

SOLAROOK FLAT SIDE MT AT1



Number	Description	Size/Length
1	Mounting Screw Holes	9mm
2	Rail Slot Size	10mm x 46mm
3	Length of Roof Hook	286mm
4	Rail Height From Finished Roof	70mm - 108mm
5	Thickness	5mm

COMPRESSIVE ULTIMATE LOAD TEST RESULTS

SAMPLE ID	MAXIMUM COMPRESSIVE LOAD (lbf)	DISPLACEMENT AT MAXIMUM LOAD (in.)	FAILURE MODE
C-1	135	1.6	Hook contact w/Plywood
C-2	137	1.6	Hook contact w/Plywood
C-3	132	1.5	Hook contact w/Plywood
AVERAGE	135	1.6	..

Note: All failure mode consisted of ductile bending of hook.

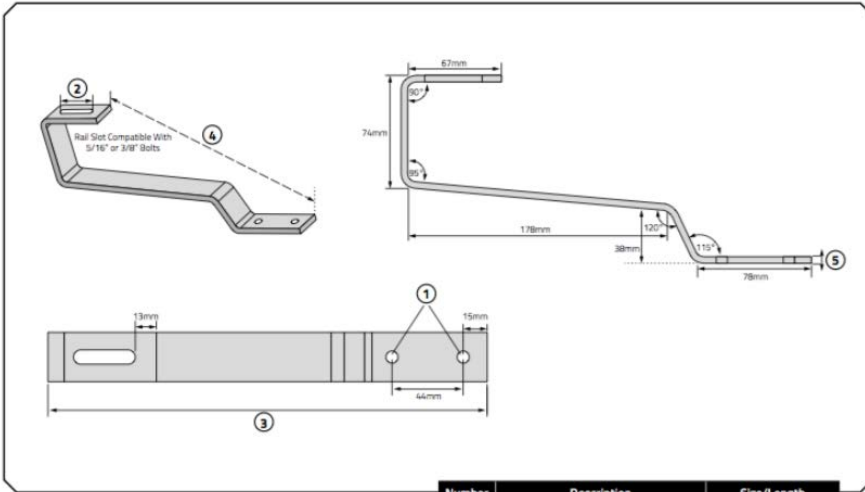
TENSILE (UPLIFT) ULTIMATE LOAD TEST RESULTS

SAMPLE ID	MAXIMUM TENSILE LOAD (lbf)	DISPLACEMENT AT MAXIMUM LOAD (in.)	FAILURE MODE
T-1	2087	6.1	Broken Fastener
T-2	1985	6.4	Broken Fastener
T-3	1522	6.6	Broken Fastener
AVERAGE	1865	6.3	..

Note: All failure mode consisted of ductile bending of hook.

004AT2S

SOLARHOOK FLAT BOTTOM MT AT2



Number	Description	Size/Length
1	Mounting Screw Holes	9mm
2	Rail Attachment Slot	10mm x 38mm
3	Length of Roof Hook	285mm
4	Bottom End to Top End	138mm
5	Thickness	5mm

COMPRESSIVE ULTIMATE LOAD TEST RESULTS

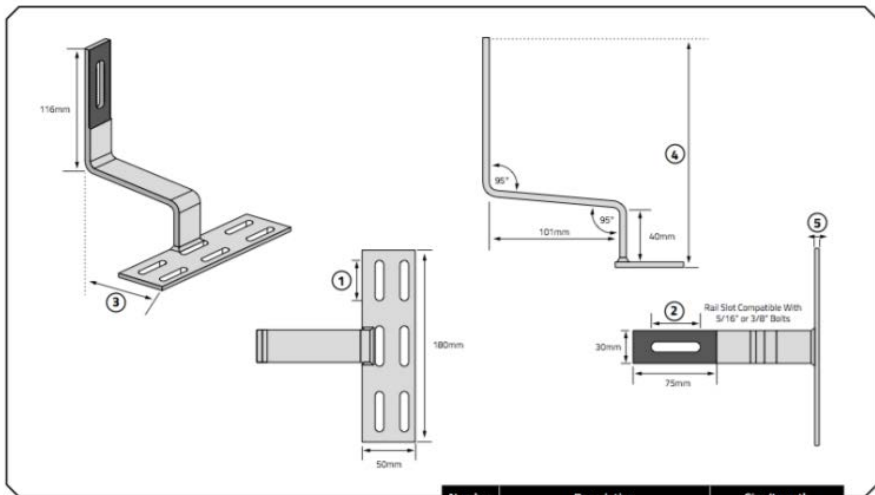
TEST NUMBER	MAXIMUM COMPRESSIVE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
388	152	2.0	Hook Contacted Plywood	0.415	10.8
389	141	2.0		0.381	9.6
390	154	2.2		0.360	9.7
AVERAGE	149	2.1	..	0.385	10.0

TENSILE (UPLIFT) ULTIMATE LOAD TEST RESULTS

TEST NUMBER	MAXIMUM TENSILE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
392	1951	8.3	Lag Screw Pull-out	0.371	10.9
393	1274	7.5		0.350	10.8
394	814	7.0		0.270	10.2
AVERAGE	1346	7.6	..	0.330	10.6

004CT1S

SOLARHOOK SPANISH SIDE MT CT1



Number	Description	Size/Length
1	Mounting Screw Slots	7.5mm x 37mm
2	Rail Slot Size	10mm x 46mm
3	Length of Roof Hook	151mm
4	Bottom End to Top End	165mm
5	Thickness	5mm

COMPRESSIVE ULTIMATE LOAD TEST RESULTS

SAMPLE ID	MAXIMUM COMPRESSIVE LOAD (lbf)	DISPLACEMENT AT MAXIMUM LOAD (in.)	FAILURE MODE
C-1	332	1.7	Hook contact w/Plywood
C-2	258	1.8	Hook contact w/Plywood
C-3	259	2.4	Hook contact w/Plywood
AVERAGE	283	2.0	..

Note: All failure mode consisted of ductile bending of hook.

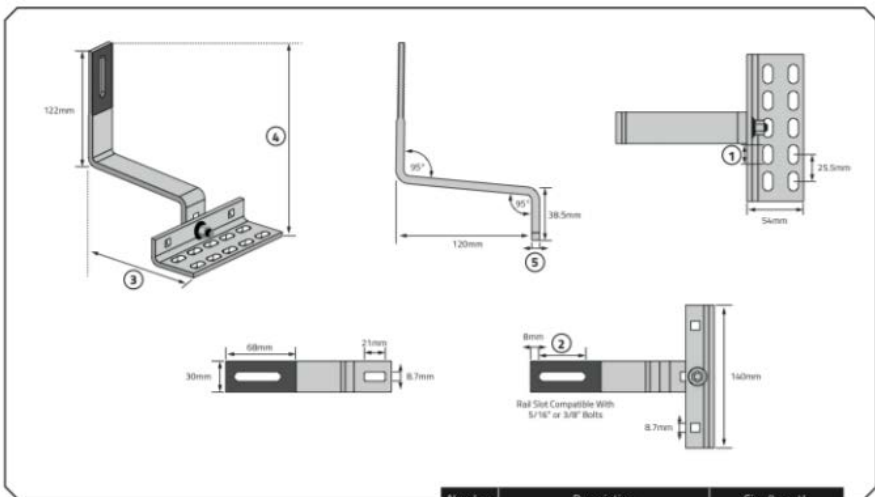
TENSILE (UPLIFT) ULTIMATE LOAD TEST RESULTS

SAMPLE ID	MAXIMUM TENSILE LOAD (lbf)	DISPLACEMENT AT MAXIMUM LOAD (in.)	FAILURE MODE
T-1	1349	3.5	Broken Fastener
T-2	1721	4.6	Broken Fastener
T-3	1805	4.5	Broken Fastener
AVERAGE	1625	4.2	..

Note: All failure mode consisted of ductile bending of hook.

004CT5S

SOLARHOOK UNIV SIDE MT CT5



Number	Description	Size/Length
1	Mounting Screw Slots	9mm x 18mm
2	Rail Slot Size	10mm x 46mm
3	Length of Roof Hook	179.5mm
4	Bottom End to Top End	165.3mm - 173.5mm
5	Thickness	5mm

COMPRESSIVE ULTIMATE LOAD TEST RESULTS

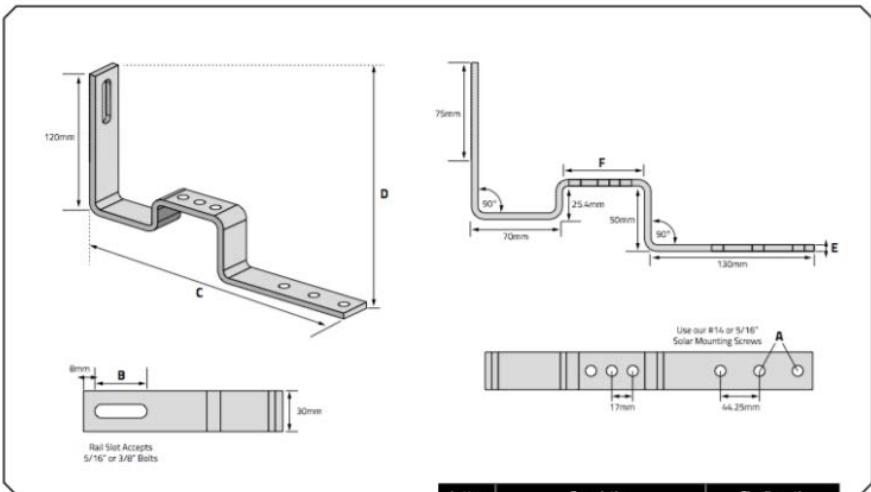
TEST NUMBER	MAXIMUM COMPRESSIVE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
382	403	1.8	Hook Contacted Plywood	0.402	12.6
383	396	1.8		0.358	14.4
384	403	2.1		0.367	14.0
AVERAGE	401	1.9	..	0.376	13.6

TENSILE (UPLIFT) ULTIMATE LOAD TEST RESULTS

TEST NUMBER	MAXIMUM TENSILE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
385	754	4.1	Lag Screw Pull-out	0.290	12.0
386	1269	4.4		0.296	12.5
387	1820	5.1		0.328	12.9
AVERAGE	1281	4.5	..	0.305	12.5

004ST1S

SOLARHOOK FLAT SIDE MT ST1



Letter	Description	Size/Length
A	Mounting Screw Holes	9mm
B	Rail Slot Size	10mm x 38mm
C	Length of Roof Hook	263mm
D	Bottom End to Top End	144.6mm
E	Thickness	5mm
F	Batten Bridge	63.5mm

COMPRESSIVE ULTIMATE LOAD TEST RESULTS

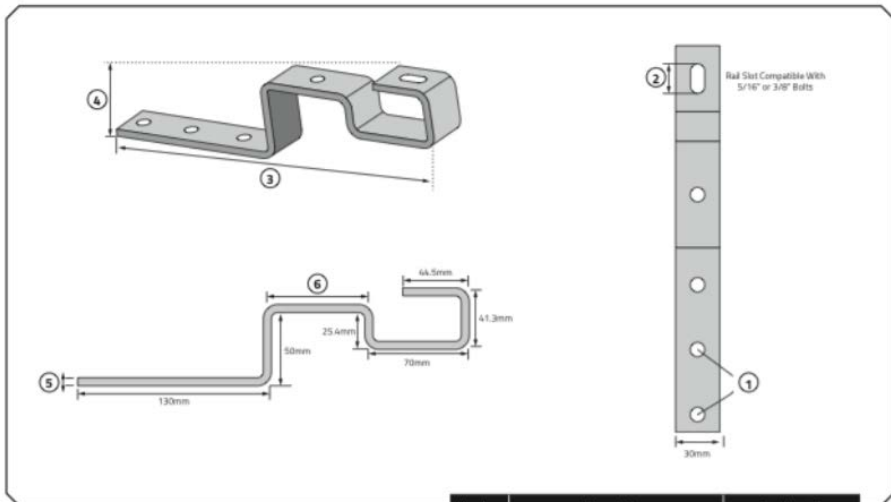
TEST NUMBER	MAXIMUM COMPRESSIVE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
432	206	1.2	Hook Contacted Plywood	0.415	9.6
433	192	1.1		0.355	13.3
434	197	1.1		0.338	10.1
AVERAGE	198	1.1	..	0.369	11.0

TENSILE (UPLIFT) ULTIMATE LOAD TEST RESULTS

TEST NUMBER	MAXIMUM TENSILE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
435	1034	5.9	Lag Screw Pull-out	0.338	12.3
436	1186	6.3		0.344	12.4
437	1319	6.9		0.391	12.6
AVERAGE	1180	6.4	..	0.358	12.4

004ST2S

SOLARHOOK FLAT SIDE MT ST1



Number	Description	Size/Length
1	Mounting Screw Holes	9mm
2	Rail Slot Size	10mm x 20mm
3	Length of Roof Hook	263mm
4	Bottom End to Top End	218.5mm
5	Thickness	5mm
6	Batten Bridge	63.5mm

COMPRESSIVE ULTIMATE LOAD TEST RESULTS

TEST NUMBER	MAXIMUM COMPRESSIVE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
445	224	1.0	Hook Contacted Plywood	0.367	14.0
446	211	1.0		0.420	11.5
448	245	1.0		0.424	12.5
AVERAGE	226	1.0	..	0.404	12.7

TENSILE (UPLIFT) ULTIMATE LOAD TEST RESULTS

TEST NUMBER	MAXIMUM TENSILE LOAD (lbs)	DISPLACEMENT AT MAXIMUM LOAD (in.)	MODE OF FAILURE	RAFTER SPECIFIC GRAVITY	RAFTER MOISTURE CONTENT (%)
440	1412	7.1	Lag Screw Pull-out	0.360	12.2
441	1013	7.3		0.281	12.0
442	1265	7.7		0.381	13.0
AVERAGE	1230	7.4	..	0.341	12.4