

SNR SOLAR LLC. DBA SNAPNRACK MIAMI-DADE TEST REPORT

SCOPE OF WORK

ASTM D7147 UPLIFT AND SHEAR LOAD TESTING ON THE *ULTRAFOOT, ANCHOR* MOUNT WITH TWO, 1/2 IN BY 2-1/2 IN *DECKANCHORS* OR ONE, 5/16 IN BY 4-1/2 IN LAG SCREWS - DECK AND RAFTER MOUNT

REPORT NUMBER

S1171.02-119-18 R1

TEST DATES

12/03/24 - 12/19/24

 ISSUE DATE
 REVISED DATE

 01/21/25
 02/04/25

RECORD RETENTION END DATE 12/19/34

MIAMI-DADE COUNTY NOTIFICATION NO. ATI24090

LABORATORY CERTIFICATION NO. 22-0428.14

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TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1171.02-119-18 R1 Date: 01/21/25 Revised Date: 02/04/25

REPORT ISSUED TO SNR SOLAR LLC. DBA SNAPNRACK

775 Fiero Lane, Suite 200 San Luis Obispo, CA 93401

SECTION 1

SCOPE

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by SNR Solar LLC. dba SnapNrack to perform uplift and shear load testing on their *UltraFoot, Anchor* mount with two, 1/2 in by 2-1/2 in *DeckAnchors* or one, 5/16 in by 4-1/2 in lag screw - deck and rafter mount. Results obtained are tested values and were secured by using the designated test methods. Testing was conducted at the Intertek test facility in York, Pennsylvania.

Intertek B&C in York, Pennsylvania has demonstrated compliance with ISO/IEC International Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. (IAS).

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends ten years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

For INTERTEK B&C:

COMPLETED BY:	Adam J. Schrum	REVIEWED BY:	V. Thomas Mickley, Jr., P.E.
TITLE:	Project Manager	TITLE:	Senior Staff Engineer
SIGNATURE:		SIGNATURE:	
DATE:	02/04/25	DATE:	02/04/25

COMPLETED BY:	Tanya A. Dolby, P.E.
TITLE:	Engineering Manager
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	02/04/25
DATE:	02/04/25

AJS:vtm/tad/aas

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SECTION 2

SUMMARY OF TEST RESULTS

UltraFoot, Anchor with Two, 1/2 in by 2-1/2 in *DeckAnchors* - Deck Mount

UPLIFT RESISTANCE ¹	Average Load at 1/8 in Displacement - 190 lbf
	Average Ultimate Load - 789 lbf
SHEAR PERPENDICULAR TO THE FLANGE ^{1, 2}	Average Load at 1/8 in Displacement - 298 lbf
	Average Ultimate Load - 1049 lbf
SHEAR PARALLEL TO THE FLANGE ^{1, 2}	Average Load at 1/8 in Displacement - 685 lbf
	Average Ultimate Load - 1482 lbf

¹ Test/Ultimate loads should not be used as design loads or safe working loads.

² Shear loads represent the capacity of the mount to roof connection only and not the shear capacity of the mount as an assembly.

UltraFoot, Anchor with One, 5/16 in by 4-1/2 in Lag Screw - Rafter Mount

UPLIFT RESISTANCE ¹	Average Load at 1/8 in Displacement - 155 lbf	
	Average Ultimate Load - 2371 lbf	
SHEAR PERPENDICULAR TO THE FLANGE ^{1, 2}	Average Load at 1/8 in Displacement - 565 lbf	
	Average Ultimate Load - 2446 lbf	
SHEAR PARALLEL TO THE FLANGE ^{1, 2}	Average Load at 1/8 in Displacement - 691 lbf	
	Average Ultimate Load - 2309 lbf	

¹ Test/Ultimate loads should not be used as design loads or safe working loads.

² Shear loads represent the capacity of the mount to roof connection only and not the shear capacity of the mount as an assembly.

SECTION 3

TEST METHOD

The specimens were evaluated in general accordance with the following:

ASTM D7147-11 (Reapproved 2018), Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers

The uplift and shear load testing reported herein evaluated the connection of the *UltraFoot, Anchor* mount to the mock roof and did not evaluate the *UltraFoot, Anchor* mount with an attached *Ultra Rail* mount or panel.



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SECTION 4

MATERIAL SOURCE

Test samples were provided by the client. Representative samples of the test specimens will be retained by Intertek B&C for a minimum of four years from the test completion date.

Deck Mount Condition:

Each tested specimen was installed on a mock roof consisting of one 12 in square piece of 15/32 in plywood sheathing, one piece of 30# felt underlayment, and one, three-tab shingle.

Rafter Mount Condition:

Each tested specimen was installed on a 12 in square by 6-1/4 in deep mock roof consisting of one 12 in long SPF 2x6 joist, one 12 in square piece of 15/32 in plywood sheathing, one piece of 30# felt underlayment, and one, three-tab shingle.

SECTION 5

EQUIPMENT

Testing was performed in an Instron Model 5989 Universal Testing Machine. Load and deflection were recorded manually using either the crosshead movement of the test machine, a 2-inch travel Instron[®] Model 3540-200T-ST deflectometer or a dial indicator accurate to 0.001 in.

SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Shawn E. Beamer	Intertek B&C
Adam J. Schrum	Intertek B&C



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SECTION 7

TEST SPECIMEN DESCRIPTION

The *UltraFoot, Anchor* mount is a 3-3/4 in long angle-shaped aluminum extrusion with a 2-1/4 in horizontal leg and a 3 in vertical leg (flange).

Deck Mount Condition:

Each track piece was fastened to the plywood (deck) of the mock roof with two, 1/2-5 by 2-1/2 in, die cast zinc, hex-washer head, Type 17 point *DeckAnchor* wood screws with sealing washer.

Rafter Mount Condition:

Each track piece was fastened to the mock roof with one, 5/16-9 by 4-1/2 in, stainless steel, hex- head, Type A point lag screw with sealing washer. The fastener was attached to the joist (rafter).

Drawings are included in Section 11 to verify the overall dimensions and other pertinent information of the tested product, its components, and any constructed assemblies.

SECTION 8

TEST PROCEDURE

The purpose of this testing was to determine the uplift and shear load capacity of the product in accordance with ASTM D7147.

Uplift Resistance Testing

The mock roof assemblies were rigidly mounted to the base of an Instron Model 5989 Universal Test Machine. Load was applied in tension to the 3 in leg of the aluminum angle bracket, through a load cell attached to the testing machine crosshead. Test speed was 0.05 in/min. Displacement was taken with the crosshead movement of the test machine, which was zeroed at zero load. Ultimate load was the maximum load the test assembly could carry.

Shear Load Testing

The mock roof assemblies were rigidly mounted to the base of an Instron Model 5989 Universal Test Machine. Load was applied to the base of the angle bracket in both a parallel and perpendicular orientation to the flange through a load cell attached to the testing machine crosshead. Test speed was 0.10 in/min. Displacement was taken with either a 2-inch travel Instron[®] Model 3540-200T-ST deflectometer or a dial indicator, accurate to 0.001 in, attached to the base of the test machine, which were zeroed at zero load. Ultimate load was the maximum load the test assembly could carry.

See photographs in Section 10 for typical test set-up.



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SECTION 9

TEST RESULTS

Uplift Resistance Testing

Test/Ultimate loads should not be used as design loads or safe working loads.

UltraFoot, Anchor with Two, 1/2 in by 2-1/2 in DeckAnchors - Deck Mount Test Date: 12/09/24

BASE DISPLACEMENT	SPECIMEN NO.			
RELATIVE TO MOCK	1	2	3	
ROOF (in)	LOAD (lb	s)		
0.020	23	28	42	
0.040	43	61	75	
0.060	65	93	107	
0.080	90	124	141	
0.100	116	156	176	
0.120	143	190	212	
0.140	170	224	250	
0.160	198	259	286	
0.180	228	294	324	
0.200	257	329	360	
Ultimate Load:	920	731	717	

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE	
1	920	+16.6%	150		
2	731	-7.4%	199	<i>DeckAnchor</i> screws withdrew	
3	717	-9.1%	222	Hom mock roor	
Average:	789	Average:	190		
	Standa	ard Deviation:	37		
	Coefficien	t of Variation:	19%		



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UltraFoot, Anchor with One, 5/16 in by 4-1/2 in Lag Screw - Rafter Mount Test Dates: 12/03/24 - 12/04/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (Ib	is)	
0.020	0	49	17
0.040	0	94	38
0.060	2	126	63
0.080	14	139	88
0.100	39	132	111
0.120	75	214	136
0.140	109	318	157
0.160	143	429	185
0.180	173	547	204
0.200	177	671	234
Ultimate Load:	2634	2082	2396

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE
1	2634	+11.1%	84	the second states for a second
2	2082	-12.2%	240	Lag screw withdrew from mock
3	2396	+1.1%	141	
Average:	2371	Average:	155	
	Standa	ard Deviation:	79	
	Coefficien	t of Variation:	51%	



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Shear Load Testing

Test/Ultimate loads should not be used as design loads or safe working loads.

UltraFoot, Anchor with Two, 1/2 in by 2-1/2 in *DeckAnchors* - Deck Mount (Shear Perpendicular to the Flange)

Test Dates: 12/17/24 - 12/18/24					
BASE DISPLACEMENT	SPECIMEN NO.				
RELATIVE TO MOCK	1	2	3		
ROOF (in)	LOAD (lbs)				
0.020	52	79	26		
0.040	93	136	37		
0.060	139	194	64		
0.080	190	258	106		
0.100	245	300	166		
0.120	302	351	206		
0.140	354	398	244		
0.160	405	445	285		
0.180	459	482	329		
0.200	513	522	381		
Ultimate Load:	1071	1097	978		

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE
1	1071	+2.1%	315	
2	1097	+4.6%	363	DeckAnchor screws bent and pulled through mock roof
3	978	-6.8%	216	
Average:	1049	Average:	298	
Standard Deviation:		75		
	Coefficien	t of Variation:	25%	



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UltraFoot, Anchor with Two, 1/2 in by 2-1/2 in *DeckAnchors* - Deck Mount (Shear Parallel to the Flange) Test Date: 12/18/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lb	is)	
0.020	125	234	112
0.040	197	381	191
0.060	280	541	307
0.080	351	667	423
0.100	418	775	531
0.120	493	867	631
0.140	571	956	718
0.160	646	1047	803
0.180	718	1151	885
0.200	789	1234	961
Ultimate Load:	1390	1442	1613

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE
1	1390	-6.2%	513	
2	1442	-2.7%	889	DeckAnchor screws bent and pulled through mock roof
3	1613	+8.9%	653	
Average:	1482	Average:	685	
Standard Deviation:		190		
Coefficient of Variation:			28%	



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UltraFoot, Anchor with One, 5/16 in by 4-1/2 in Lag Screw - Rafter Mount (Shear Perpendicular to the Flange)

Test Date: 12/17/24

BASE DISPLACEMENT	SPECIME	N NO.	
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lb	s)	
0.020	22	113	85
0.040	40	197	165
0.060	75	329	259
0.080	139	457	395
0.100	208	585	508
0.120	299	689	631
0.140	382	805	736
0.160	467	907	836
0.180	541	985	924
0.200	606	1061	997
Ultimate Load:	2346	2408	2583

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE
1	2346	-4.1%	320	
2	2408	-1.6%	718	Lag screw bent and pulled
3	2583	+5.6%	657	
Average:	2446	Average:	565	
Standard Deviation:		215		
Coefficient of Variation:			38%	



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UltraFoot, Anchor with One, 5/16 in by 4-1/2 in Lag Screw - Rafter Mount (Shear Parallel to the Flange) Test Date: 12/19/24

BASE DISPLACEMENT	SPECIME	N NO.	
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lb	is)	
0.020	29	14	28
0.040	277	63	39
0.060	493	347	58
0.080	627	503	260
0.100	713	588	478
0.120	771	647	609
0.140	810	705	694
0.160	834	720	752
0.180	860	760	782
0.200	887	773	811
Ultimate Load:	2468	2032	2428

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE
1	2468	+6.9%	781	
2	2032	-12.0%	662	Lag screw bent and pulled
3	2428	+5.2%	630	
Average:	2309	Average:	691	
Standard Deviation:		79		
Coefficient of Variation:			11%	



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SECTION 10 PHOTOGRAPHS



Photo No. 1 Uplift Testing



Photo No. 2 Shear Perpendicular to the Flange



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Photo No. 3 Shear Parallel to the Flange

SECTION 11 DRAWINGS

The "As-Built" drawings for the *UltraFoot, Anchor* mount, which follow, have been reviewed by Intertek B&C and are representative of the project reported herein. Project construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.







DESCRIPTION: SNAPNRACK, TDS, ULTRAFOOT ANCHOR		DOC SNR- DR	NUMBER: -DC-01438 AWN BY:	SnapNrack®
PART NUMBER(S):			FEKOETTER	
242	-10058	REV:	DATE:	SNR SOLAR LLC 775 FIERO LANE, SUITE 200
242		Λ		SAN LUIS OBISPO, CA 93401 USA EMAIL: CONTACT@SNAPNRACK.COM THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY
UNITS: IN, LB, DEG [MM, KG,	DEG] SHEET: 1:2	A	8/28/2024	REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SNR SOLAR LLC.
				ntertek
1 1 BOLT, WIDE F	1 1 BOLT, WIDE FLANGE, RECESSED, 5-16IN-18 X 1IN, S			mple complies with these details
2 1 SNAPNRACK, ULTRA RAIL MOUNT SPRING, SS				Deviations are noted.
3 1 SNAPNRACK, ULTRAFOOT BASE, ANCHOR, BLACK Report # 51171.02-			4 51171.02-119-18	
4 1 SNAPNRACK, UR FLIP CLAMP, THRU, SILVER Date 1/15/25 Tech A J			/15/25 Tech AJS	
5 1 SNAPNRACK, FLIP CLAMP, TAP, BLACK				
6 1 SNAPNRACK, BUTYL PAD, 2IN X 1.5IN X .25IN				
MATERIALS: 6000 SERIES ALUMINUM &			IES STAINLES	S STEEL
DESIGN LOAD (LBS): VARIES, REFER TO SNAPN		RACK ENG	INEERING	
ULTIMATE LOAD (LBS): VARIES, REFER TO SNAPN		RACK ENG	INEERING	
TORQUE SPECIFICATION: 16 FT-LBS FT-LBS				
CERTIFICATION:	UL 2703, FILE E359313			
WEIGHT (LBS):	0.550			

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SECTION 12

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	01/21/25	N/A	Original Report Issue
1	02/04/25	20-24	Updated Drawing Package