

# SNR SOLAR LLC. DBA SNAPNRACK MIAMI-DADE TEST REPORT

## **SCOPE OF WORK**

ASTM D7147 UPLIFT AND SHEAR LOAD TESTING ON THE *ALPHATRACK* 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

## **REPORT NUMBER**

S1175.02-119-18 R1

## TEST DATES

12/09/24 - 12/20/24

 ISSUE DATE
 REVISED DATE

 01/21/25
 02/05/25

**RECORD RETENTION END DATE** 12/20/34

MIAMI-DADE COUNTY NOTIFICATION NO. ATI24093

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#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### **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 *AlphaTrack* mount with two, 1/2 in by 2-1/2 in *DeckAnchors* or one, 5/16 in lag screw - deck and rafter mount. Results obtained are tested values and were secured by using the designated test method. 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:

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TITLE:	Project Manager	TITLE:	Senior Staff Engineer
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#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### **SECTION 2**

#### SUMMARY OF TEST RESULTS

#### AlphaTrack Mount with Two, 1/2 in by 2-1/2 in DeckAnchors - Deck Mount

UPLIFT RESISTANCE <sup>1</sup>	Average Load at 1/8 in Displacement - 110 lbf		
	Average Ultimate Load - 611 lbf		
SHEAR PARALLEL TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 847 lbf		
	Average Ultimate Load - 1439 lbf		
SHEAR PERPENDICULAR TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 687 lbf		
	Average Ultimate Load - 1170 lbf		

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

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

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

UPLIFT RESISTANCE <sup>1</sup>	Average Load at 1/8 in Displacement - 88 lbf	
	Average Ultimate Load - 1234 lbf	
SHEAR PARALLEL TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 907 lbf	
	Average Ultimate Load - 3079 lbf	
SHEAR PERPENDICULAR TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 795 lbf	
	Average Ultimate Load - 1935 lbf	

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

<sup>2</sup> 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

Uplift testing reported herein evaluated the *AlphaTrack* mount as an assembly. The shear load testing reported herein evaluated the connection of the *AlphaTrack* mount to the mock roof and did not evaluate the *AlphaTrack* mount with an attached panel.



#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### 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.

See photographs of test specimens in Section 10.

#### **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<sup>®</sup> 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



#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### SECTION 7

#### **TEST SPECIMEN DESCRIPTION**

The *AlphaTrack* mount is an aluminum extrusion measuring 2-7/16 in wide by 5-3/4 in long by 1-1/4 in tall and has a 1-1/2 in wide by 4 in long black butyl seal adhered to the bottom. For uplift testing only, each track piece had an accompanying 4-1/4 in wide by 6 in tall by 1-1/2 in deep aluminum adjustable *RL Universal Mount* (also known as *TopSpeed Universal Mount*) connector, which is used to connect the solar panel to the track.

#### 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, hexhead, 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.



#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### 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 Mount Top at the top edge of the *RL Universal Mount* (also known as *TopSpeed Universal Mount*) connector (attached to the track) 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. A steel angle was placed at the edge of the track section, for the parallel load direction only, in order to keep the track section in the plane of load during the test. Load was applied to the specimen parallel to and perpendicular to the length of the *AlphaTrack* section. Load was applied, at the base of the *AlphaTrack*, to a bearing block through a load cell attached to the testing machine crosshead. Test speed was 0.10 in/min. Displacement was taken either a 2-inch travel Instron<sup>®</sup> 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.



#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### **SECTION 9**

**TEST RESULTS** 

#### **Uplift Resistance Testing**

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

# *AlphaTrack* with Two, 1/2 in by 2-1/2 in *DeckAnchors* - Deck Mount Test Date: 12/16/24

BASE DISPLACEMENT	SPECIMEN NO.			
RELATIVE TO MOCK	1	2	3	
ROOF (in)	LOAD (lb	LOAD (lbs)		
0.020	16	31	13	
0.040	28	55	23	
0.060	41	76	34	
0.080	54	99	49	
0.100	68	123	64	
0.120	86	147	80	
0.140	106	171	98	
0.160	127	196	117	
0.180	148	221	135	
0.200	170	245	154	
Ultimate Load:	608	584	640	

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE	
1	608	-0.4%	91		
2	584	-4.4%	153	DeckAnchor screws withdrew	
3	640	+4.8%	85	nom mock roor	
Average:	611	Average:	110		
Standard Deviation:		38			
Coefficient of Variation:		35%			



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#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1175.02-119-18 R1 Date: 01/21/25





#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### AlphaTrack with One, 5/16 in by 4-1/2 in Lag Screw - Rafter Mount Test Date: 12/09/24

BASE DISPLACEMENT	SPECIMEN NO.			
RELATIVE TO MOCK	1	2	3	
ROOF (in)	LOAD (lb	LOAD (lbs)		
0.020	6	12	13	
0.040	5	32	24	
0.060	5	53	44	
0.080	5	73	71	
0.100	5	96	95	
0.120	5	122	119	
0.140	22	149	142	
0.160	51	171	174	
0.180	82	198	206	
0.200	112	225	229	
Ultimate Load:	1364	932	1407	

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE	
1	1364	+10.5%	9	the second state of the second state	
2	932	-24.5%	129	Lag screw withdrew from moci	
3	1407	+14.0%	125		
Average:	1234	Average:	88		
	Standa	ard Deviation:	68		
	Coefficien	t of Variation:	77%		



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#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1175.02-119-18 R1 Date: 01/21/25





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#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### Shear Load Testing

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

#### *AlphaTrack* with Two, 1/2 in by 2-1/2 in *DeckAnchors* - Deck Mount (Shear Parallel to the Track) Test Date: 12/20/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lbs)		
0.020	75	123	176
0.040	144	207	360
0.060	211	300	580
0.080	296	477	752
0.100	419	655	911
0.120	554	821	1074
0.140	670	955	1193
0.160	771	1081	1306
0.180	883	1204	1408
0.200	1042	1297	1358
Ultimate Load:	1370	1497	1449

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE	
1	1370	-4.8%	583		
2	1497	+4.1%	855	DeckAnchor screws bent and pulled through mack roof	
3	1449	+0.7%	1104		
Average:	1439	Average:	847		
Standard Deviation:		260			
	Coefficien	t of Variation:	31%		



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#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1175.02-119-18 R1 Date: 01/21/25





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Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

*AlphaTrack* with Two, 1/2 in by 2-1/2 in *DeckAnchors* - Deck Mount (Shear Perpendicular to the Track)

Test Date: 12/20/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lb	s)	
0.020	160	166	191
0.040	217	298	273
0.060	336	397	357
0.080	449	498	439
0.100	570	595	522
0.120	702	680	603
0.140	822	771	694
0.160	938	858	770
0.180	1038	914	838
0.200	1132		901
Ultimate Load:	1324	943	1243

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE	
1	1324	+13.2%	732		
2	943	-19.4%	703	DeckAnchor screws bent and pulled through mock roof	
3	1243	+6.2%	626	pulled through mock root	
Average:	1170	Average:	687		
Standard Deviation:			55		
Coefficient of Variation:			8%		



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Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

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

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lbs)		
0.020	300	270	30
0.040	465	407	276
0.060	974	507	509
0.080	1048	582	628
0.100	1112	647	703
0.120	1167	709	800
0.140	1211	780	870
0.160	1275	857	933
0.180	1338	921	996
0.200	1404	982	1056
Ultimate Load:	3037	3018	3182

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE	
1	3037	-1.4%	1178		
2	3018	-2.0%	727	Lag screws bent and pulled	
3	3182	+3.3%	818		
Average:	3079	Average:	907		
Standard Deviation:			239		
Coefficient of Variation:			26%		



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Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

*AlphaTrack* with One, 5/16 in by 4-1/2 in Lag Screw - Rafter Mount (Shear Perpendicular to the Track)

Test Date: 12/19/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lbs)		
0.020	90	396	94
0.040	231	575	211
0.060	432	679	361
0.080	564	749	509
0.100	660	815	671
0.120	732	864	747
0.140	801	917	796
0.160	844	967	830
0.180	874	1015	855
0.200	909	1057	886
Ultimate Load:	1686	2651	1468

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE
1	1686	-12.9%	749	
2	2651	+37.0%	877	Lag screws bent and pulled
3	1468	-24.1%	759	
Average:	1935	Average:	795	
Standard Deviation:			71	
Coefficient of Variation:			9%	



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#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1175.02-119-18 R1 Date: 01/21/25





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Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### SECTION 10 PHOTOGRAPHS



Photo No. 1 Uplift (Tension) Testing



Photo No. 2 Shear Perpendicular to the Track



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#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25



Photo No. 3 Shear Parallel to the Track

#### SECTION 11 DRAWINGS

The "As-Built" drawings for the *AlphaTrack* mount with *DeckAnchors* and 5/16 in lag screws, 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.





# intertek









#### TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1175.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

### **SECTION 12**

**REVISION LOG** 

REVISION #	DATE	PAGES	REVISION
0	01/21/25	N/A	Original Report Issue
1	02/05/25	21-25	Updated Drawing Package