

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

#### SCOPE OF WORK

ASTM D7147 UPLIFT AND SHEAR LOAD TESTING ON THE *DELTATRACK* MOUNT WITH FOUR, #14 BY 2-1/4 IN OR TWO, #14 BY 3 IN WOOD SCREWS - DECK AND RAFTER MOUNT

#### **REPORT NUMBER**

S1174.02-119-18 R1

#### **TEST DATES**

12/16/24 - 12/23/24

 ISSUE DATE
 REVISED DATE

 01/21/25
 02/05/25

**RECORD RETENTION END DATE** 12/23/34

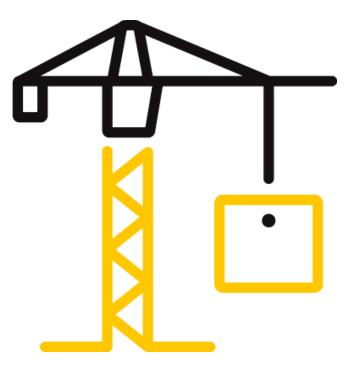
MIAMI-DADE COUNTY NOTIFICATION NO. ATI24092

LABORATORY CERTIFICATION NO. 22-0428.14

#### PAGES

26

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

Report No.: S1174.02-119-18 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 *DeltaTrack* mount with four, #14 by 2-1/4 in or two, #14 by 3 in wood screws - 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. SchrumREVIEWED BY:V. Thomas Mickley, Jr., P.E.TITLE:Project ManagerTITLE:Senior Staff EngineerSIGNATURE:SIGNATURE:DATE:02/05/25

COMPLETED BY: TITLE:	Tanya A. Dolby, P.E. Engineering Manager
SIGNATURE:	
DATE:	02/05/25
AJS:vtm/tad/aas	

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#### SECTION 2

#### SUMMARY OF TEST RESULTS

#### DeltaTrack Mount with Four, #14 by 2-1/4 in Wood Screws - Deck Mount

UPLIFT RESISTANCE <sup>1</sup>	Average Load at 1/8 in Displacement - 103 lbf
	Average Ultimate Load - 747 lbf
SHEAR PARALLEL TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 845 lbf
	Average Ultimate Load - 1907 lbf
SHEAR PERPENDICULAR TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 805 lbf
	Average Ultimate Load - 1718 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.

#### DeltaTrack Mount with Two, #14 by 3 in Wood Screws - Rafter Mount

UPLIFT RESISTANCE <sup>1</sup>	Average Load at 1/8 in Displacement - 246 lbf
	Average Ultimate Load - 986 lbf
SHEAR PARALLEL TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 1935 lbf
	Average Ultimate Load - 6292 lbf
SHEAR PERPENDICULAR TO THE TRACK <sup>1, 2</sup>	Average Load at 1/8 in Displacement - 1718 lbf
	Average Ultimate Load - 3167 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 *DeltaTrack* mount as an assembly. The shear load testing reported herein evaluated the connection of the *DeltaTrack* mount to the mock roof and did not evaluate the *DeltaTrack* mount with an attached panel.



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

Report No.: S1174.02-119-18 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.

#### **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.

#### Deck 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 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 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 *DeltaTrack* 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 four, #14-10 by 2-1/4 in, stainless steel, hex-washer head, Type A point wood screws with sealing washer.

#### Rafter Mount Condition:

Each track piece was fastened to the mock roof with two, #14-10 by 3 in, stainless steel, hex- head, Type A point wood screws with sealing washer. All fasteners were 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.: S1174.02-119-18 R1 Date: 01/21/25 Rev

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 *DeltaTrack* section. Load was applied, at the base of the *DeltaTrack*, to a bearing block 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<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.



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Report No.: S1174.02-119-18 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.

#### DeltaTrack with Four, #14 by 2-1/4 in Wood Screws - Deck Mount

Test Date: 12/16/24			
BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lb	s)	
0.020	34	17	16
0.040	54	34	35
0.060	55	46	62
0.080	55	59	92
0.100	49	75	122
0.120	49	94	153
0.140	50	112	185
0.160	50	131	217
0.180	49	149	251
0.200	49	167	284
Ultimate Load:	774	734	732

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE
1	774	+3.7%	49	
2	734	-1.7%	99	Wood screws withdrew from mock roof
3	732	-2.0%	161	
Average:	747	Average:	103	
	Stand	ard Deviation:	56	
	Coefficien	t of Variation:	54%	

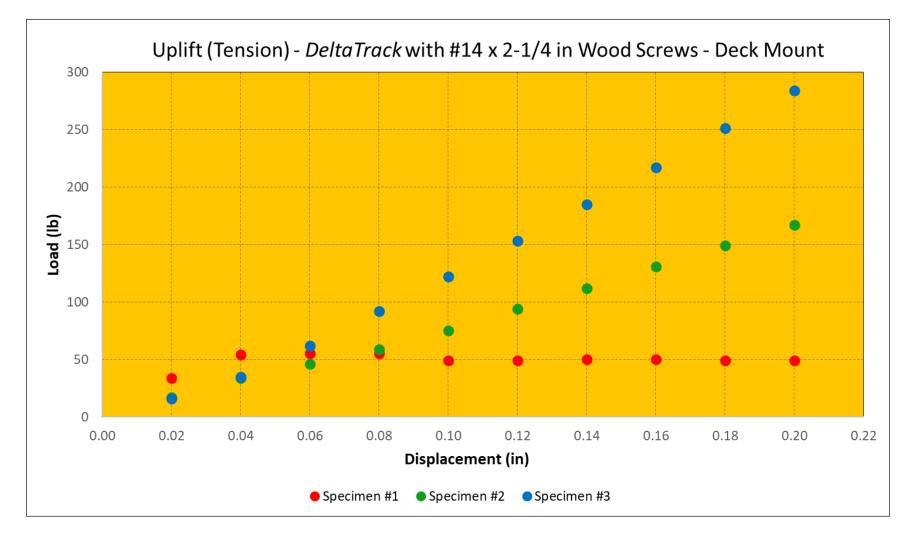


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#### **TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK**

Report No.: S1174.02-119-18 R1

Date: 01/21/25





TEST REPORT FOR SNR SOLAR LLC. DBA SNAPNRACK

Report No.: S1174.02-119-18 R1 Date: 01/21/25 Revised Date: 02/05/25

#### DeltaTrack with Two, #14 by 3 in Wood Screws - Rafter Mount Test Date: 12/16/24

Test Date: 12/16/24				
BASE DISPLACEMENT	SPECIME	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3	
ROOF (in)	LOAD (lb	s)		
0.020	21	37	39	
0.040	42	89	89	
0.060	69	139	137	
0.080	104	181	188	
0.100	142	205	242	
0.120	182	226	298	
0.140	223	249	360	
0.160	266	270	423	
0.180	309	291	486	
0.200	353	313	548	
Ultimate Load:	797	827	1333	

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE
1	797	-19.2%	192	Manda and the second
2	827	-16.1%	232	Wood screws withdrew from mock roof
3	1333	+35.2%	314	
Average:	986	Average:	246	
	Stand	ard Deviation:	62	
	Coefficien	t of Variation:	25%	

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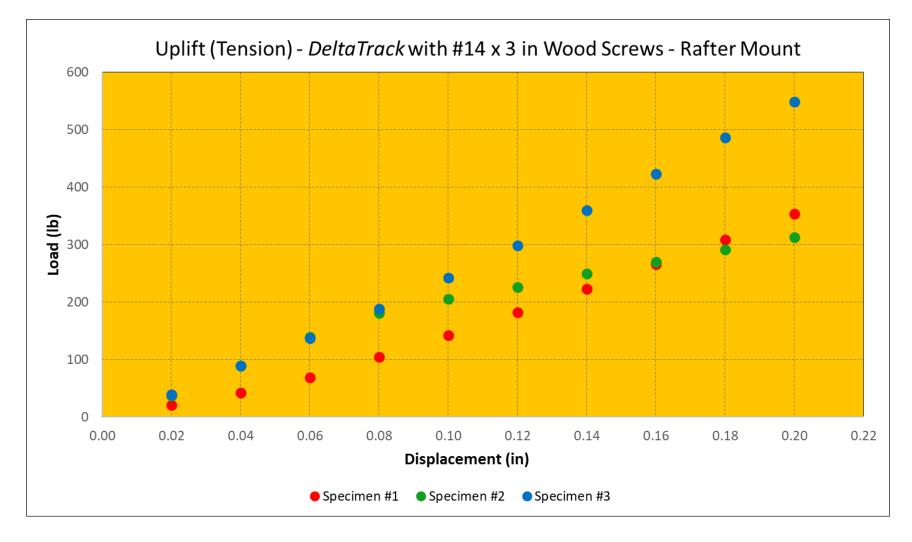


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Report No.: S1174.02-119-18 R1

Date: 01/21/25





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Report No.: S1174.02-119-18 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.

#### *DeltaTrack* with Four, #14 by 2-1/4 in Wood Screws - 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 (lb	s)	
0.020	87	133	141
0.040	184	256	316
0.060	321	379	490
0.080	445	488	640
0.100	576	621	793
0.120	709	744	973
0.140	851	867	1147
0.160	1001	990	1316
0.180	1138	1102	1458
0.200	1274	1199	1564
Ultimate Load:	2002	1577	2142

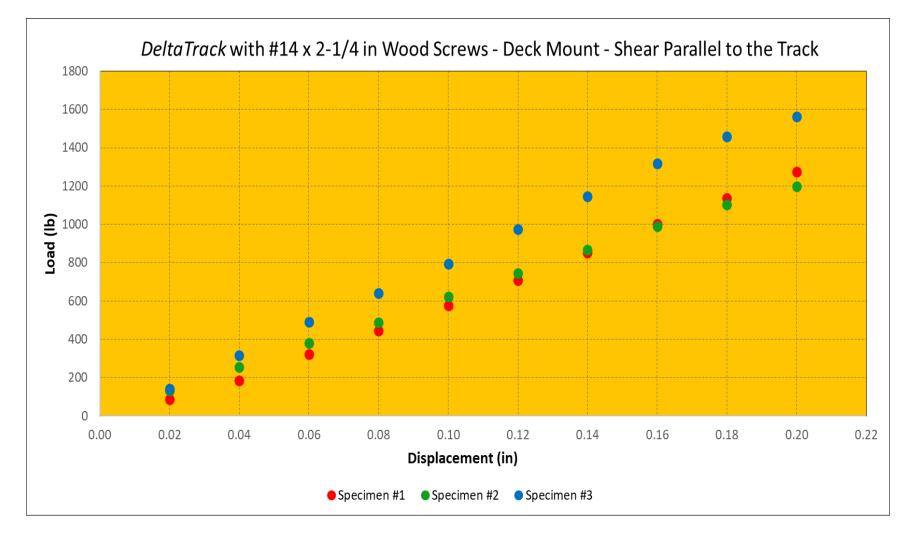
SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (Ib)	MODE OF FAILURE
1	2002	+5.0%	745	
2	1577	-17.3%	775	Wood screws bent and pulled through mock roof
3	2142	+12.3%	1017	
Average:	1907	Average:	845	
	Standa	ard Deviation:	149	
	Coefficien	t of Variation:	18%	



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Report No.: S1174.02-119-18 R1 Date: 01/21/25





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Report No.: S1174.02-119-18 R1 Date: 01/21/25 Revised Date: 02/05/25

### *DeltaTrack* with Four, #14 by 2-1/4 in Wood Screws - 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	129	137	132
0.040	329	225	185
0.060	521	333	260
0.080	705	462	353
0.100	888	575	433
0.120	1071	695	538
0.140	1259	817	668
0.160	1445	930	790
0.180	1619	1035	903
0.200	1770	1131	1023
Ultimate Load:	2128	1468	1557

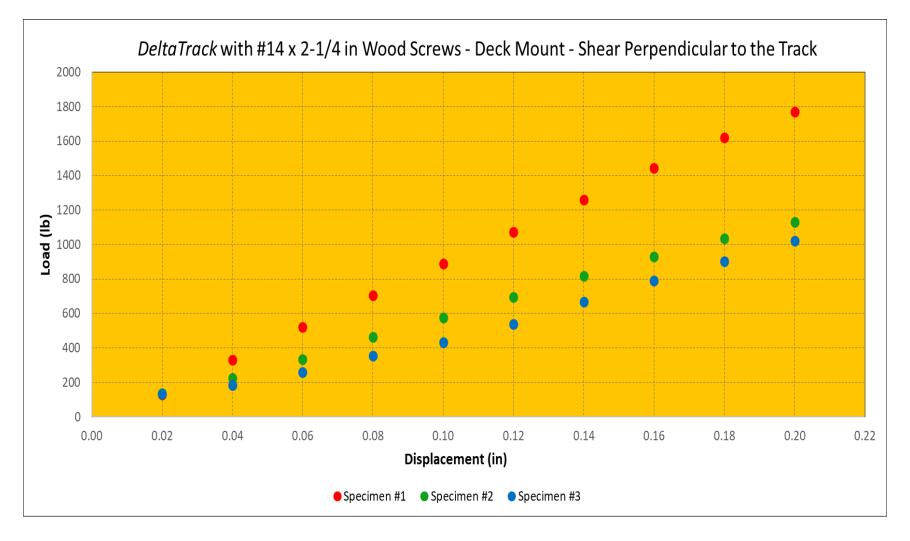
SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE
1	2128	+23.9%	1118	
2	1468	-14.6%	726	Wood screws bent and pulled through mock roof
3	1557	-9.4%	571	
Average:	1718	Average:	805	
	Standa	ard Deviation:	282	
	Coefficien	t of Variation:	35%	



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Report No.: S1174.02-119-18 R1 Date: 01/21/25





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

Report No.: S1174.02-119-18 R1 Date: 01/21/25 Revised Date: 02/05/25

#### *DeltaTrack* with Two, #14 by 3 in Wood Screws - Rafter Mount (Shear Parallel to the Track) Test Date: 12/23/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lbs)		
0.020	245	381	495
0.040	493	655	753
0.060	900	944	1067
0.080	1283	1208	1405
0.100	1571	1468	1807
0.120	1796	1675	2164
0.140	1974	1859	2480
0.160	2106	2001	2721
0.180	2249	2157	2930
0.200	2384	2302	3077
Ultimate Load:	6500	5876	6500

SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE	
1	6500	+3.3%	1841		
2	5876	-6.6%	1721	Wood screws bent and pulled through mock roof	
3	6500	+3.3%	2243		
Average:	6292	Average:	1935		
Standard Deviation:		273			
Coefficient of Variation:		14%			



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Date: 01/21/25





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Report No.: S1174.02-119-18 R1 Date: 01/21/25 Revised Date: 02/05/25

#### *DeltaTrack* with Two, #14 by 3 in Wood Screws - Rafter Mount (Shear Perpendicular to the Track) Test Date: 12/23/24

BASE DISPLACEMENT	SPECIMEN NO.		
RELATIVE TO MOCK	1	2	3
ROOF (in)	LOAD (lbs)		
0.020	378	327	381
0.040	700	531	718
0.060	1072	684	1048
0.080	1390	836	1468
0.100	1644	968	1826
0.120	1846	1077	2107
0.140	2040	1157	2328
0.160	2224	1205	2473
0.180	2396	1277	2609
0.200	2528	1346	2720
Ultimate Load:	3878	2557	3067

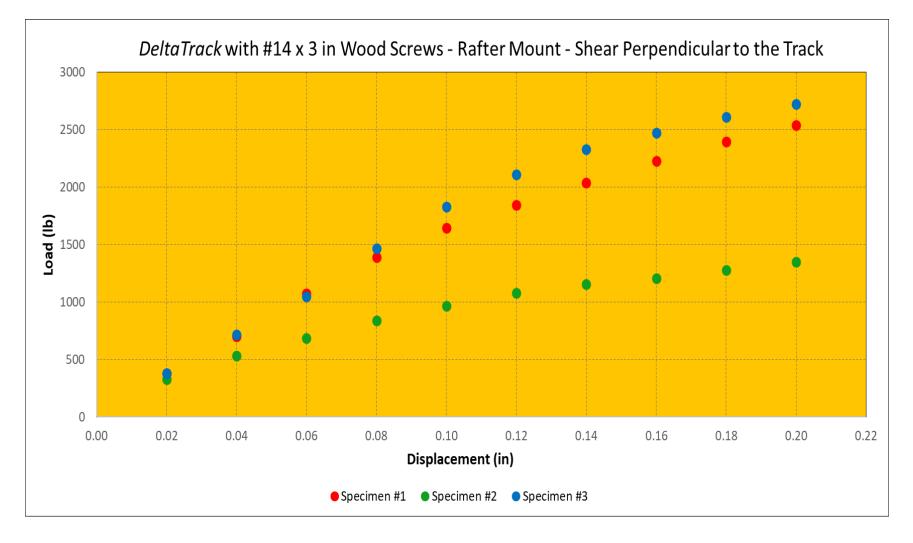
SPECIMEN NO.	ULTIMATE LOAD (lbf)	DEVIATION FROM AVERAGE	LOAD @ 1/8 in DISPLACEMENT (lb)	MODE OF FAILURE	
1	3878	+22.5%	1895		
2	2557	-19.3%	1097	Wood screws bent and pulled through mock roof	
3	3067	-3.2%	2162		
Average:	3167	Average:	1718		
Standard Deviation:		554			
Coefficient of Variation:		32%			



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Report No.: S1174.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### SECTION 10 PHOTOGRAPHS



Photo No. 1 Uplift Testing

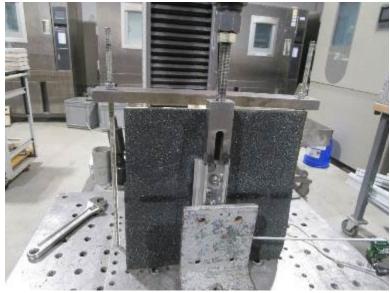


Photo No. 2 Shear Parallel to the Track



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Report No.: S1174.02-119-18 R1 Date: 01/21/25

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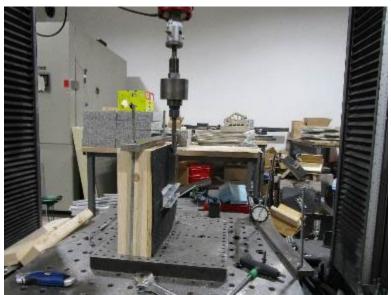
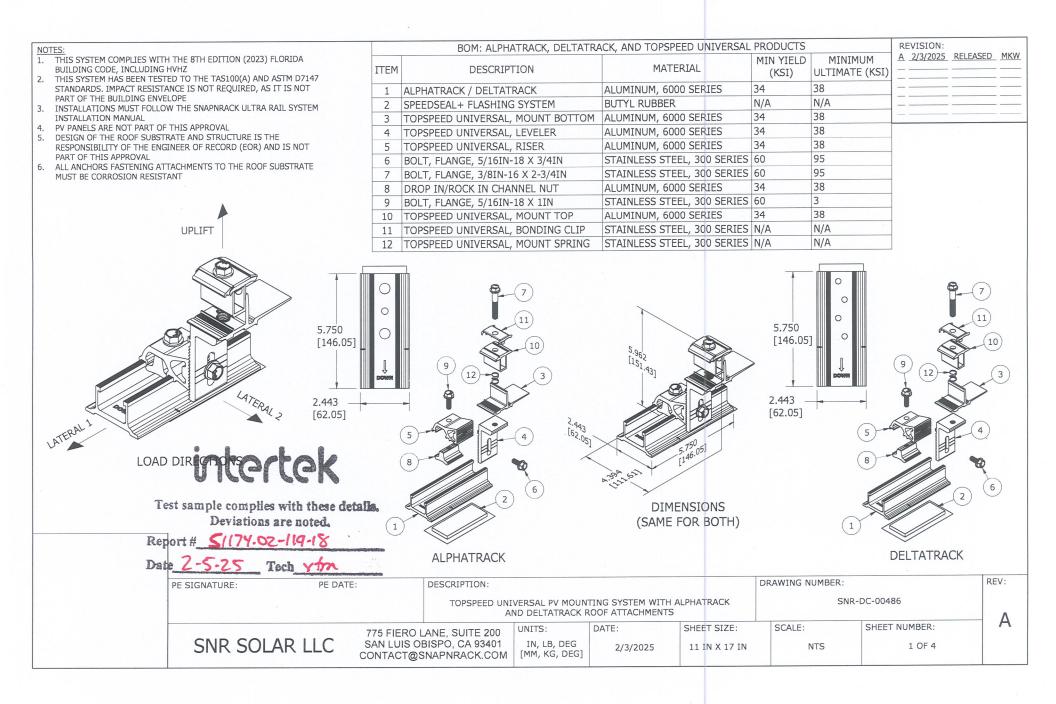


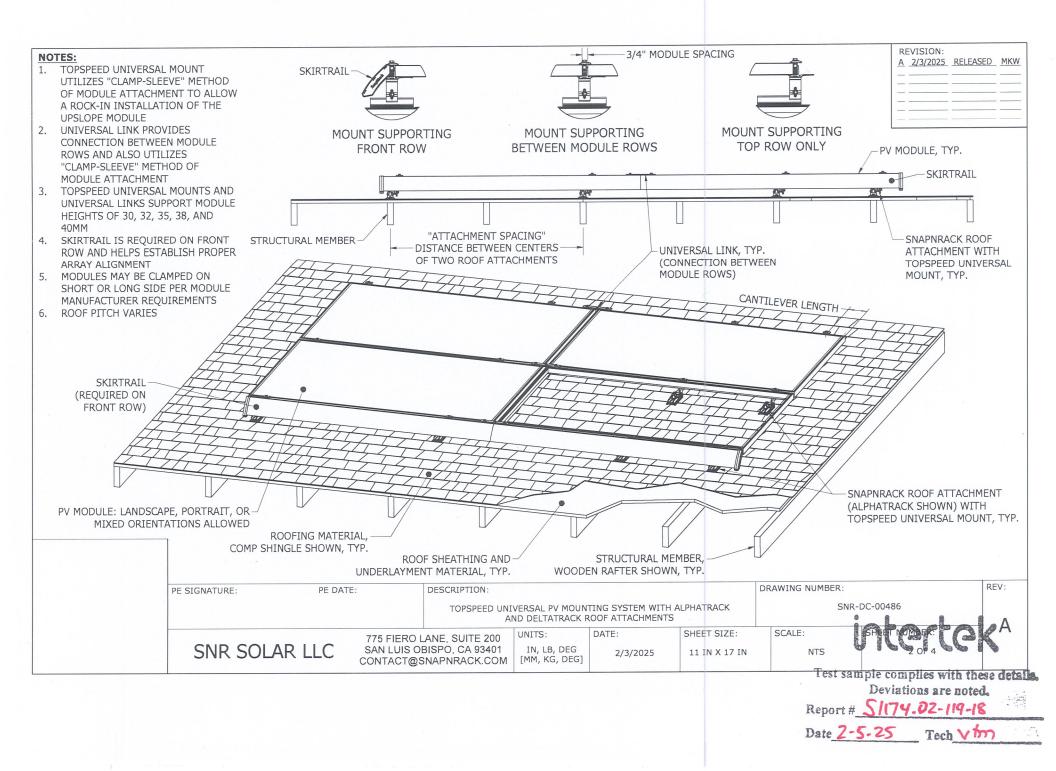
Photo No. 3 Shear Perpendicular to the Track

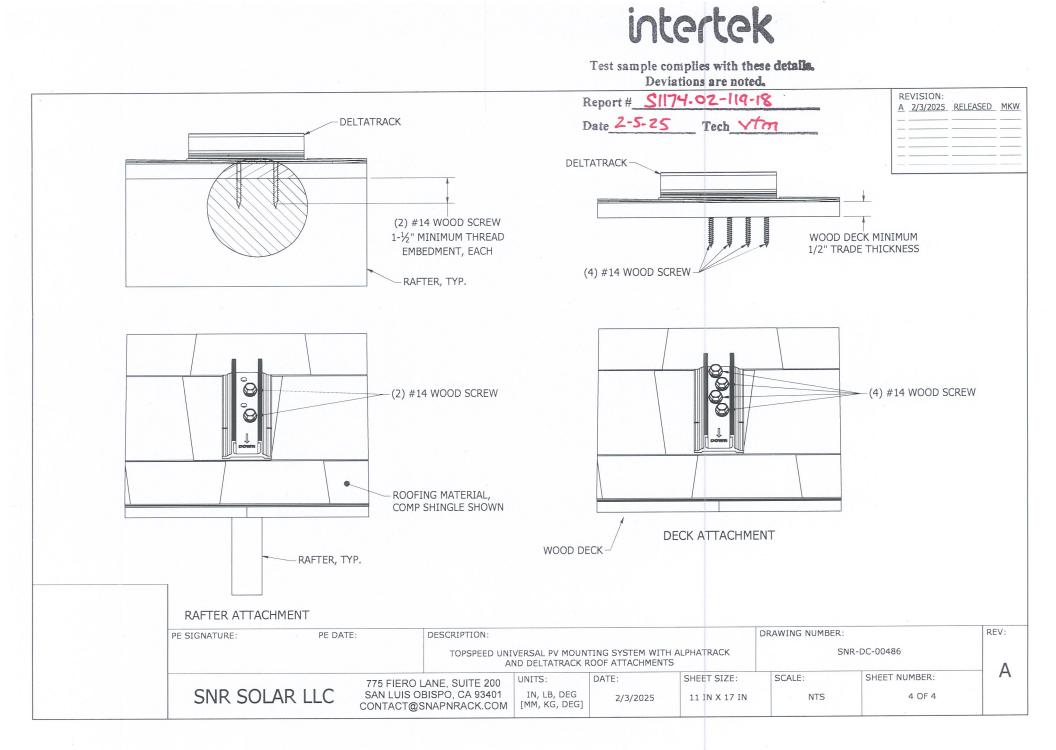
#### **SECTION 11**

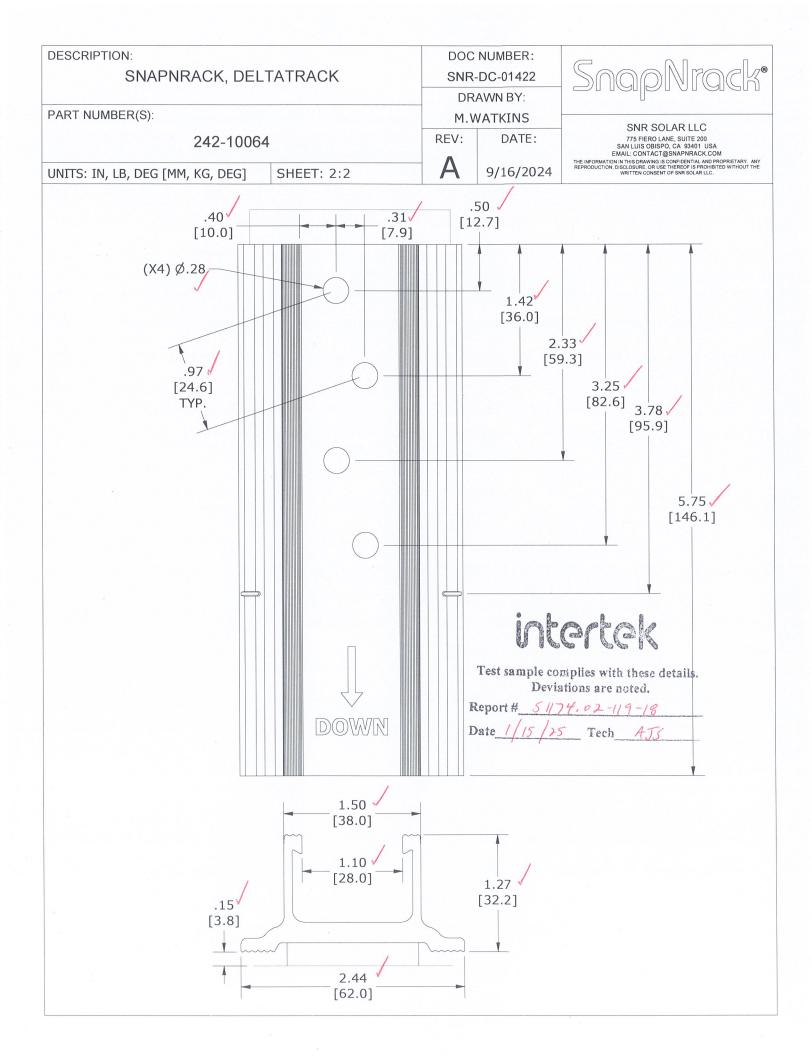
DRAWINGS

The "As-Built" drawings for the *DeltaTrack* 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.













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Report No.: S1174.02-119-18 R1 Date: 01/21/25

Revised Date: 02/05/25

#### **SECTION 12**

**REVISION LOG** 

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