

Performance Test Report

Demo Site

Prepared by: Demo User
Prepared on: July 27, 2026
Site Address: 42 Demo Street, Demo City, 94515, US
Site Coordinates: 30.000000, -110.000000

1. Summary

This report presents the results of the capacity test for the **Demo Site** solar photovoltaic (PV) facility. The test compares measured AC power output under observed environmental conditions against modeled expected output to verify system performance, following the ASTM E2848-13 and ASTM E2939-13 standards for determining the electrical performance of photovoltaic systems.

As detailed in this report, the test score is **91.1%**, meaning the test **failed**, considering the tolerance of 3.0%. The following sections provide a comprehensive overview of the system configuration, input data, data processing steps, reporting conditions, regression analysis, and final conclusions that support this result.

Remarks: This is a dummy test report. You can add custom explanations about the Test Run or the tested System here (e.g. sensor observations, weather conditions,...).

PV System	Rooftop System
Test Run	Test Run 1
Test Period	2024-10-18 — 2024-10-24
Measured Capacity	286.9 kW
Target Capacity	315.1 kW
Capacity Ratio	91.1%
Tolerance	3.0%
Test Result	FAIL

New to capacity testing? Learn how the ASTM E2848 methodology works and what the results mean: [heliotest.com/resources](#)

2. System Configuration

2.1 PV Array Configuration

Array Name	Modules	STC Rating (W)	Total DC (kW)	Tilt (°)	Azimuth (°)	Bifacial
Main Array	1020	350	357.00	10.0	175.0	Yes
Total	1020		357.00			

2.3 Sensor Configuration

Sensor Name	Type	Data Tag
Front POA Sensor	POA Irradiance	wss_950_poa
Back POA Sensor	Rear POA Irradiance	wss_951_bpoa
Temp Sensor	Air Temperature	wst_949_air_temp
Wind Sensor	Wind Speed	wst_949_wind_speed

3. Input Data

3.1 Measured Data

Measured data was collected from **2024-10-18** to **2024-10-24** (7 days) at a **5min** resolution. Source file: *site_data_18-24_oct_5min.csv*.

Data Tag / Column	Role	Unit
pvmtr_856_power_pv	AC Power (Meter)	kW
wss_950_poa	POA Irradiance	W/m²
wss_951_bpoa	Rear POA Irradiance	W/m²
wst_949_air_temp	Air Temperature	°C
wst_949_wind_speed	Wind Speed	m/s

3.2 Modeled Data

Modeled data was provided from a **PVSYST** simulation (8760 hourly values). Source file: *pvsyst_VC4_HourlyRes.CSV*.

4. Data Processing & Filtering

Following the ASTM E2848/E2939 methodology, data was filtered to retain only intervals where the relationship between AC power and irradiance is not disturbed by effects such as shading, inverter clipping, or operating conditions far from nominal.

After filtering, **125** of **8760** modeled data points and **343** of **1956** measured data points were retained for analysis.

Note: ASTM E2848/E2939 requires a minimum of 750 minutes of valid data for a capacity test, corresponding to 50 data points at the standard's 15-minute cadence.

4.1 Filtering Parameters

The following parameters were used to filter data that did not meet the specified criteria, mainly to ensure a clean relationship between AC power and irradiance.

PARAMETER	VALUE
Minimum Irradiance	400 W/m²
Maximum Irradiance	1050 W/m²
Model Period	09/20/1990 to 11/21/1990
Shading Loss Threshold	1.5%
Reporting Condition Method	Percentile (ASTM E2939)
RC Tolerance Band (±)	20%
Analysis Cadence	Automatic (5 min)
Clipping Type	System
System Clipping Threshold	1000.0 kW

4.2 Filtering Steps

These two filtering tables summarize the steps taken to clean the data for both model and measured datasets. Each step shows the number of data points remaining after applying the filter and the number of points removed.



Model Data

Period: 09/20/1990 to 11/21/1990 (63 days)
Total Points: 8760
Retained: 125

#	FILTER	AFTER	REMOVED
1	Time Range	1489	-7271
2	PVSyst Filter	1475	-14
3	Shading Filter	1088	-387
4	Irradiance Range	155	-933
5	Remove Outliers	148	-7
6	Irradiance around Reporting Condition	125	-23

Measured Data

Period: 2024-10-18 to 2024-10-24 (7 days)
Total Points: 1956
Retained: 343

#	FILTER	AFTER	REMOVED
1	Shade-free Hours	427	-1529
2	Irradiance Range	427	0
3	Remove Missing Data	427	0
4	System-level Clipping	427	0
5	Remove Outliers	409	-18
6	Irradiance around Reporting Condition	343	-66



5. Reporting Conditions

Reporting conditions were determined from the **modeled** data following ASTM E2939-13. POA irradiance is the 60th percentile of filtered irradiance values; temperature is the arithmetic mean of the filtered data.

POA Irradiance (I_{RC})	813.0 W/m ²
Ambient Temperature (T_{RC})	19.8 °C
Wind Speed (WS_{RC})	2.7 m/s

6. Regression Analysis

Multilinear regression models were fit to both the modeled and measured datasets using the ASTM E2848-13 power equation:

$$P = E \times (a_1 + a_2 \times E + a_3 \times T + a_4 \times WS)$$

where E is POA irradiance (W/m²), T is ambient temperature (°C), and WS is wind speed (m/s).

6.1 Regression Coefficients			6.2 Statistical Significance (P-Values)		
TERM	MODEL	MEASURED	TERM	MODEL	MEASURED
a_1 — E (POA)	0.385506	0.294925	a_1 — E (POA)	0.0000	0.0000
a_2 — E ²	0.000031	0.000057	a_2 — E ²	0.0000	0.0000
a_3 — E × T	-0.001242	0.000449	a_3 — E × T	0.0000	0.0002
a_4 — E × WS	0.000464	0.000992	a_4 — E × WS	0.0108	0.0001
			Values > 0.05 (shown in red) indicate terms that may not be statistically significant.		



7. Capacity Test Results

7.1 Capacity Calculation

The capacity at reporting conditions is obtained by evaluating each regression model at the reporting condition values:

Target (Model) Capacity

$$P_{\text{model}} = I_{\text{RC}} \times (a_1 + a_2 \times I_{\text{RC}} + a_3 \times T_{\text{RC}} + a_4 \times WS_{\text{RC}}) = 315.1 \text{ kW}$$

Measured (Actual) Capacity

$$P_{\text{measured}} = I_{\text{RC}} \times (a_1 + a_2 \times I_{\text{RC}} + a_3 \times T_{\text{RC}} + a_4 \times WS_{\text{RC}}) = 286.9 \text{ kW}$$

7.2 Result

91.1%

Capacity Ratio = Measured / Target Power at Reporting Conditions

FAIL

7.3 Results Summary

PARAMETER	VALUE	UNIT
Test Period Start	2024-10-18	
Test Period End	2024-10-24	
Qualifying Data Points	343	
Measured Capacity	286.9	kW
Target Capacity	315.1	kW
Capacity Ratio	91.1	%
Tolerance Band	97.0 – 103.0	%
Capacity Test Result	FAIL	

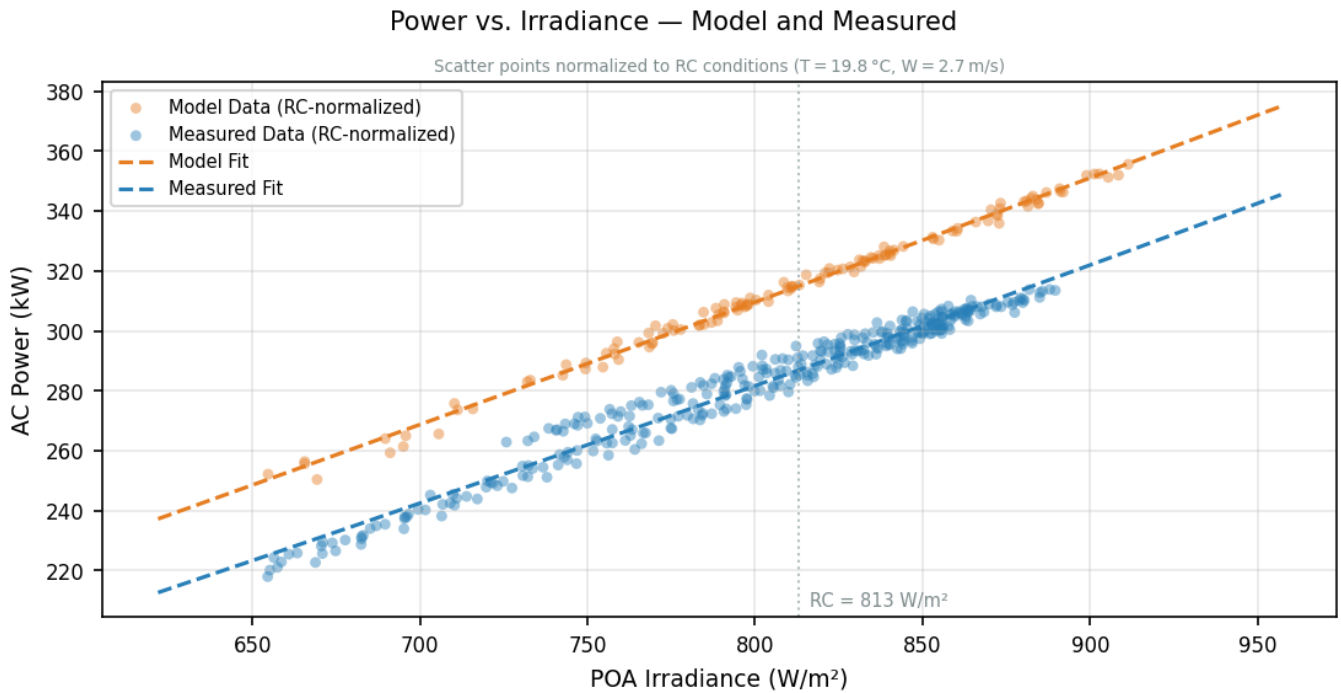
The upper bound of the tolerance band is informational: a capacity ratio above it does not fail the test, but may indicate measurement or model issues.



8. Charts

8.1 Power vs. Irradiance

Filtered model data (orange) and measured data (blue) are plotted against POA irradiance. Dashed lines show the fitted regression for each dataset.



8.2 Measured Data — Retained Points

Retained measured data points over the test period, colored by POA irradiance intensity.

