



Availability Test Report

Demo Site

This report documents a contractual availability test: it measures the share of eligible time (irradiance above the agreed threshold while the plant was exporting) during which each inverter was operating, and compares the result against the guaranteed availability.

PASS — 99.6%

Guarantee 99.0%

Site: Demo Site · 42 Demo Street, Demo City, 94515, US

PV system: Rooftop System

Test window (nominal): 2024-10-18 00:00 → 2024-10-23 00:00 (5 consecutive days)

Timezone: America/Hermosillo (UTC-07:00 standard time)

Test run: Availability test demo

Prepared by: Demo User

Generated: 2026-08-05 09:47 UTC



1 • Summary

1 data-quality finding (0 blockers, 1 warning) applies to this result — the Quality Checks section carries the recommended actions.

• Warning:

No inverter has a state column mapped — every eligible interval was classified by power > 0.1 kW alone

The plant passed at 99.6% against a 99.0% guarantee, consuming 35 of 92 permitted inverter-minutes. Charged downtime traces to 2 documented events: a fault on inv1_1149_power_ac_inv from 2024-10-18 11:24 to 2024-10-18 11:42 (18 inverter-minutes); a data override on inv3_1151_power_ac_inv from 2024-10-19 13:05 to 2024-10-19 13:11 (6 inverter-minutes). A further 11 charged inverter-minutes have no documented event-log entry (see the reconciliation in the event log section).

Verdict	PASS (margin +0.6 pp)
System availability	99.6%
Guaranteed availability	99.0%
Inverters under test	3
Test window	2024-10-18 00:00 → 2024-10-23 00:00 (5 consecutive days)
Eligible inverter-minutes	9297 (3099 min × 3 inverters)
Charged inverter-minutes	35
Downtime budget	35 of 92 permitted inverter-minutes consumed

$$\begin{aligned} \text{availability} &= 1 - \sum \text{charged}_i / (\text{eligible minutes} \times n) \\ &= 1 - 35 / (3099 \times 3) = 1 - 35 / 9297 = 99.624\% \rightarrow \text{rounded to } 99.6\% \end{aligned}$$

$$\begin{aligned} \text{permitted downtime} &= \text{floor}((100\% - 99.0\%) \times \text{eligible inverter-minutes}) \\ &= \text{floor}(1.0\% \times 9297) = 92 \text{ inverter-minutes} \\ &\approx 30 \text{ minutes of simultaneous full-plant outage } (92 \div 3) \end{aligned}$$

Pass/fail is decided on the value rounded to 1 decimal place (99.6%), not on the unrounded value shown in the calculation above; the margin shown next to the verdict is likewise computed from the rounded value.

Key terms used in this report

Eligible

An interval where POA irradiance is above the agreed threshold AND the meter is exporting — only these minutes count at all. Totals are inverter-minutes: eligible wall-clock time × number of inverters.

Ineligible

An interval that never enters the calculation: POA at or below the threshold, export at or below the deadband, or a missing sample from a configured POA sensor or the export meter. These are plant-level inputs — missing inverter telemetry does not make an interval ineligible (see Missing-charged).

Excluded

An interval removed from the test by a grid-outage event — charged to neither party. The window is extended by the excluded daylight minutes (POA above the agreed threshold), replacing the test time the outage took away.

Charged

Eligible inverter-minutes counted against the guarantee (inverter down, unmapped state code, or missing telemetry).

Downtime budget

The charged inverter-minutes the plant can absorb while still meeting the guarantee: $\text{floor}((100\% - \text{guarantee}) \times \text{eligible inverter-minutes})$. It is derived from the guarantee as an illustration — the contractual criterion is the availability percentage itself, not a minute budget.

Excused

Eligible downtime waived by an excusal event — it is never charged, so it counts toward availability just as Operational time does (it is reported in its own column, not added to Operational).

Missing-charged

Eligible minutes charged to an inverter because both its state and its power sample were missing — under the missing-data policy, an inverter that cannot prove it was running is treated as down.

Operational

An eligible interval where the inverter was running (by state classification, power inference, or a data override).

The crucial asymmetry: **excluded** minutes leave the denominator (the test window grows to replace them); **excused** minutes stay in the denominator and simply are not charged.

2 · Test Configuration & Input Data

POA sensors (eligibility)	wss_950_poa Eligibility irradiance is the mean of all listed sensors; an interval is dropped as "missing input" if any sensor sample is absent (all-present rule).
POA threshold	50.0 W/m² Intervals at or below this irradiance are ineligible — the test clock only runs above it. Provenance: selected as a reasonable default value
Export meter	pvmtr_856_power_pv (export recorded as positive, deadband 5.0 kW) The plant counts as exporting when the sign-adjusted meter power exceeds the deadband; intervals at or below it are ineligible.
Operational power threshold (fallback)	0.1 kW Used only when an inverter has no state column or the state sample is missing: output above this per-inverter power counts as operating.
Test window	2024-10-18 00:00 → 2024-10-23 00:00 (5 consecutive days) Site standard time — America/Hermosillo (UTC-07:00 standard time); local clocks match site standard time year-round (no daylight-saving time).
Agreed cadence ceiling	60 s Maximum data cadence the parties agreed the analysis may run at. This test ran at 60 s (within the ceiling).

Charging policy	Actual downtime Downtime is charged for its actual measured duration; no fixed response-window penalty is added.
Missing-data policy	When both the state and the power sample of an inverter are missing during eligible time, those minutes are charged to that inverter ("missing = unavailable"). A charge from missing data can still be corrected: if separate evidence (SCADA logs, service records) proves the inverter was in fact running, the affected time can be reclassified with a documented data-override event (see the event log).
Rounding	Rounded half-up to 1 decimal place Pass/fail compares the rounded value against the guarantee. "Half-up" names only the tie-break: values round to the nearest step as usual, up or down, and a value exactly halfway between two steps rounds up.

Inverters under test (3)

Inverter	Power column (kW AC)	State column
inv1_1149_power_ac_inv	inv1_1149_power_ac_inv	not mapped — power inference used
inv2_1150_power_ac_inv	inv2_1150_power_ac_inv	not mapped — power inference used
inv3_1151_power_ac_inv	inv3_1151_power_ac_inv	not mapped — power inference used

Input files

File	Data start	Data end	Cadence	Columns	Uploaded
site_data_18-24_oct_1min_for_availability_test.csv	2024-10-18 00:00	2024-10-24 18:59	1min	5	2026-07-31 12:43

The test reads only the columns named in the configuration above. Data outside the test window is excluded by design and does not enter the calculation. Timestamps label the *start* of each recorded interval in site standard time (daylight-saving shifts are removed when a file is ingested); each row covers the cadence step that begins at its timestamp, so at a 1-minute cadence a file whose last row is stamped 23:59 carries data through 00:00. This site's timezone does not observe daylight-saving time: local clocks match the timestamps in this report year-round, and no adjustment is needed when comparing them against SCADA exports, shift logs, or utility correspondence.

3 · Eligibility & Exclusions

This section accounts for every minute of the test window: how much of the window the uploaded data covers, and how the window narrows down to the eligible time the guarantee is measured on.

Window & data coverage

Window start	2024-10-18 00:00
Window end	2024-10-23 00:00
Data coverage	100.0% (through 2024-10-22 23:59)

Eligibility funnel

Step	Minutes	Inverter-minutes (× 3)	Share of window
Test window (effective)	7200	21600	100.0%
– Excluded for grid outages	0	0	0.0%
– POA or meter sample missing	0	0	0.0%

Step	Minutes	Inverter-minutes (× 3)	Share of window
– POA at or below threshold (50 W/m²)	4101	12303	57.0%
– Export at or below deadband	0	0	0.0%
= Eligible	3099	9297	43.0%

Every minute of the effective window falls in exactly one bucket, so the steps sum to the window total. Buckets are evaluated in the order listed — each minute lands in the first bucket that applies (a night-time minute inside a grid outage counts as excluded, not as below threshold). Minutes with a missing POA or export-meter sample cannot prove the eligibility precondition, so they are left out of the test entirely — they enter neither the availability figure nor the downtime budget, which favours neither party. The quality checks flag runs where this share is material.

Daily eligibility & availability

Day	Window min	Excluded (grid)	Missing input	Below threshold	Not exporting	Eligible (per inverter)	Charged inverter-minutes	Availability
2024-10-18	1440	0	0	817	0	623	19	99.0%
2024-10-19	1440	0	0	820	0	620	6	99.7%
2024-10-20	1440	0	0	820	0	620	0	100.0%
2024-10-21	1440	0	0	820	0	620	10	99.5%
2024-10-22	1440	0	0	824	0	616	0	100.0%
Total	7200	0	0	4101	0	3099	35	99.6%

Daily availability figures are informational only — the guarantee applies to the test window as a whole, not to individual days.

4 · Event Log

Kind	Inverter	Starts	Ends	Charged min	Excused min	Details
Fault	inv1_1149_power_ac_inv	2024-10-18 11:24	2024-10-18 11:42	18	0	inverter 1 down for about 20mins
Data override	inv3_1151_power_ac_inv	2024-10-19 13:05	2024-10-19 13:11	6	0	Override → Unavailable (proven down): Data suggests the inverter produced, but an external measurement shows the inverter was actually down.

Data-override events (highlighted) force intervals to a known state where other evidence proves the telemetry wrong — the mandatory note documents that evidence.

Reconciliation to the Summary

Charged — documented by events	24
Charged — no documented event-log entry	11
Total charged inverter-minutes (as in the Summary)	35
For reference — downtime that was never charged and therefore does not add into the total above:	
Excused by events (not charged)	0

Excluded by grid outages (daylight minutes)	0
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The first two rows split the Summary's charged total by whether the event log explains it: downtime covered by a documented event, and downtime detected in the telemetry alone with no event recorded for it. The two rows always add up to the Summary's total, so no charged time can sit outside this table unaccounted for.

5 · Per-Inverter Results

Inverter	Eligible min	Operational	Charged	Excused	Missing-charged	Availability	% of budget
inv1_1149_power_ac_inv	3099	3080	19	0	0	99.4%	20.7%
inv3_1151_power_ac_inv	3099	3083	16	0	10	99.5%	17.4%
inv2_1150_power_ac_inv	3099	3099	0	0	0	100.0%	0.0%
Total (3 inverters)	9297	9262	35	0	10	99.6%	38.0%

Rows are sorted by charged minutes (worst first). Eligibility is plant-wide, so every inverter shows the same eligible minutes by construction. "Missing-charged" is the subset of Charged caused by absent state and power samples under the missing-data policy. "% of budget" is the inverter's share of the 92 permitted inverter-minutes. Per-inverter availability is informational only — the guarantee applies to the plant total, not to individual inverters.

6 · Quality Checks

Automated data-quality checks ran against this test's inputs and provenance: 0 blockers, 1 warning, 0 info findings; 10 checks passed, 4 not applicable.

Findings & recommended actions

Check	Severity	Finding	Recommended action
Classification fell back to power inference	warning	No inverter has a state column mapped — every eligible interval was classified by power > 0.1 kW alone	Map state columns for the inverters if the data source provides them, or document that the power-threshold basis is the agreed classification method.

All checks

Check	Severity	Status	Result
Data resolution within agreed cadence	blocker	Passed	Analysis cadence of 60 s is within the agreed 60 s ceiling
Test window fully covered by data	blocker	Passed	Measured data covers the full effective test window
Window contains eligible time	blocker	Passed	The test window contains 9,297 eligible inverter-minutes
All observed state codes classified	blocker	Not applicable	No inverter has a state column configured
Classification fell back to power inference	warning	Finding	No inverter has a state column mapped — every eligible interval was classified by power > 0.1 kW alone
POA threshold provenance documented	warning	Passed	The POA eligibility threshold carries a provenance note
Eligibility inputs present	warning	Passed	0.0% of window intervals lack POA/meter samples — within the 1% bound

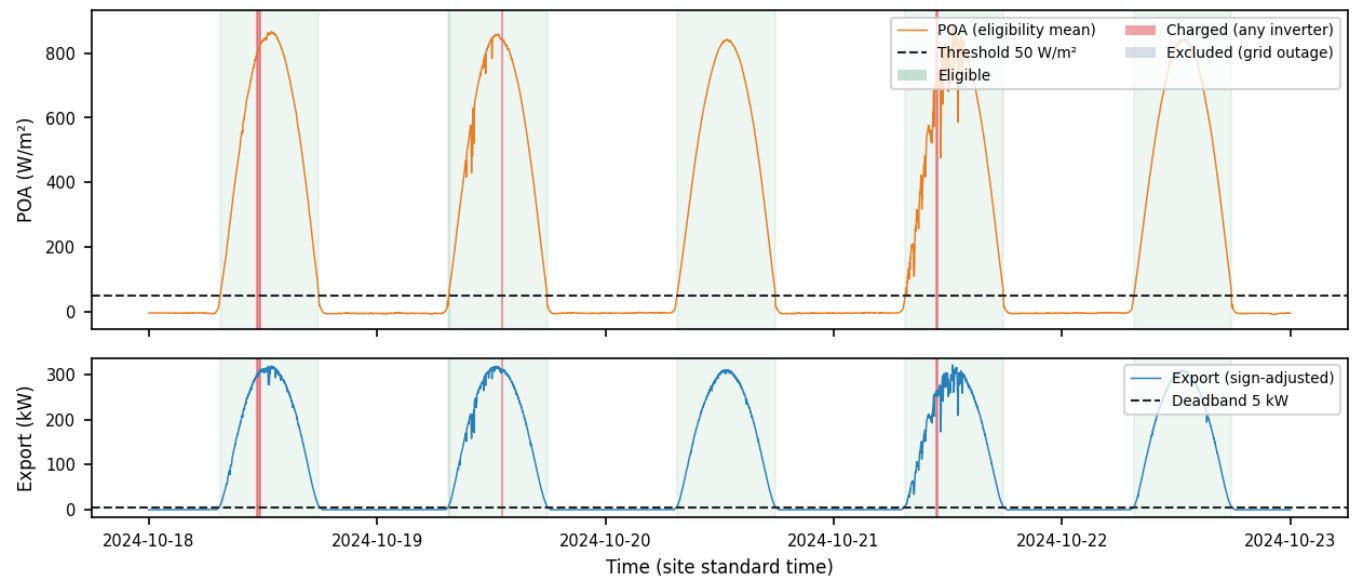


Check	Severity	Status	Result
Missing-data charges within bounds	warning	Passed	0.1% of eligible inverter-minutes were charged from missing data — within the 2% bound
Meter export sign convention plausible	warning	Passed	Export is positive for 3099 of 3099 high-POA intervals (100.0%)
POA sensors agree on daylight magnitude	warning	Not applicable	Only one POA sensor is configured — nothing to compare
Charged downtime documented in event log	warning	Passed	11 of 35 charged inverter-minutes lack a documented event — below the materiality threshold of 15 inverter-minutes
Fault events corroborated by telemetry	warning	Passed	No fault event contradicts the telemetry (1 event checked)
Events inside covered data range	info	Passed	All events fall inside the covered data range
Meter corroborates grid outages	warning	Not applicable	No grid-outage events recorded
State and power telemetry agree	info	Not applicable	No inverter has a state column configured

A check marked not applicable did not evaluate this run — the Result column states why, typically an input this test was not configured with. Not-applicable checks count neither as passed nor as findings.

7 · Charts

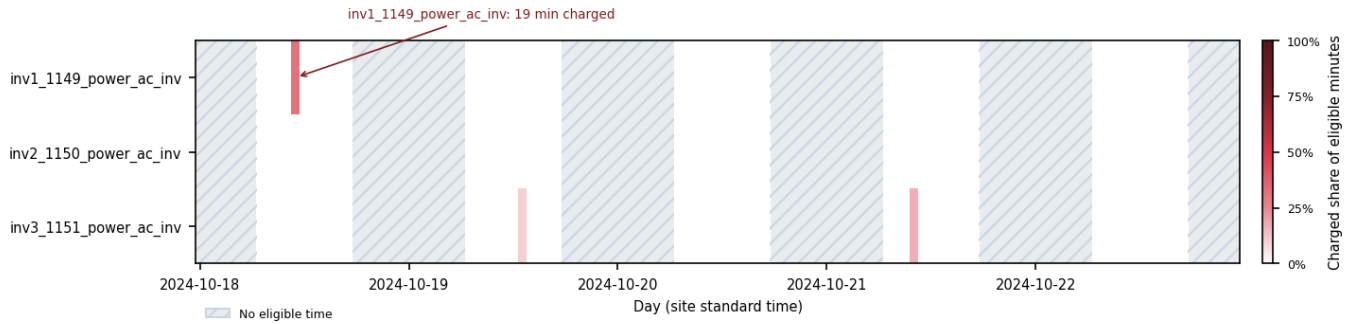
Eligibility timeline (minute resolution)



How to read this: the test clock runs only where POA (top) is above the threshold and export (bottom) is above the deadband — those minutes are shaded green. Red spans are charged downtime on at least one inverter; grey spans are grid-outage exclusions.

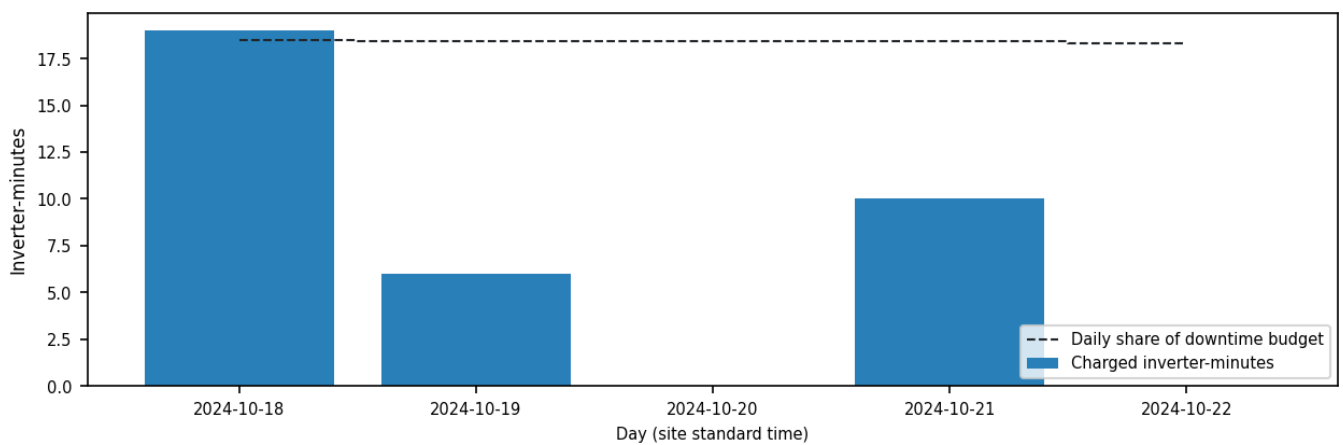


Inverter × time charged-share matrix (hour resolution)



How to read this: each cell is one inverter over one hour. White = nothing charged, deeper red = a larger charged share of the cell's eligible minutes; hatched grey = no eligible time in that cell (night, below threshold, not exporting, or excluded). The callout marks the most-charged cell.

Charged downtime per day vs daily budget share



How to read this: bars are charged inverter-minutes per day; the dashed line is each day's proportional share of the 92-inverter-minute window budget. The guarantee itself applies to the window as a whole, not to individual days.

8 • Method

Method in brief: every interval of the test window is classified per inverter. An interval is eligible when the mean POA of the configured sensors exceeds the agreed threshold while the meter exports above the deadband. During eligible time each inverter is classified from its state column (per the state classification table in the Test Configuration section), falling back to power inference where no state is available; eligible intervals where the inverter was not operating and not excused are charged. Grid-outage events remove intervals from the denominator and extend the window; excusal events waive charges; data-override events correct proven-wrong telemetry. Availability is $1 - \text{charged} / (\text{eligible} \times n)$, rounded per the rounding rule in the Test Configuration and compared against the guarantee.