

RESIDENTIAL RENEWABLE ENERGY CONSTRUCTION DOCUMENTS

PV BATTERY PLAN SET

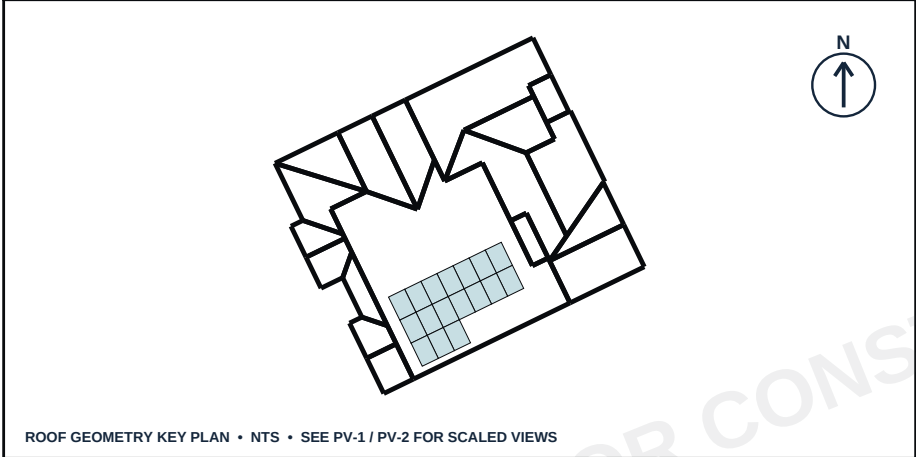
7.820 kW DC • 11.500 kW AC • 13.5 kWh ESS

CASEY SAMPLE RESIDENCE • 1800 BENCHMARK COURT, PASO ROBLES, CA 93446

PROJECT DATA

OWNER	Casey Sample
SITE ADDRESS	1800 Benchmark Court, Paso Robles, CA 93446
APN	BM-025-000-000
AUTHORITY (AHJ)	City of Paso Robles
SERVING UTILITY	Pacific Gas and Electric
OCCUPANCY / USE	R-3 SINGLE FAMILY
STORIES	1
CONSTRUCTION	EXISTING LIGHT-FRAME DWELLING
DESIGNER	Benchmark Preparer / C-10 SAMPLE-000000
DOCUMENT CLASS	PRELIMINARY DESIGN ASSISTANCE

ROOF GEOMETRY KEY PLAN — NOT A PARCEL MAP



ROOF GEOMETRY KEY PLAN • NTS • SEE PV-1 / PV-2 FOR SCALED VIEWS

DRAWING INDEX

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S-1	EQUIPMENT DATA SHEETS

SCOPE OF WORK + CODE BASIS

- INSTALL 17 × REC REC460AA PURE-RX-DC (460 W) — 7.82 kW DC
- Tesla Powerwall 3 (1707000-xx-y) — 11.5 kW AC, 48 A
- 1 × Tesla 1707000-xx-y ENERGY STORAGE (13.5 kWh)
- TESLA BACKUP SWITCH (1624171-XX-Y)
- RAPID SHUTDOWN: 9 × MID-CIRCUIT INTERRUPTERS
- EATON DG222URB 60 A NF AC DISCONNECT
- MAIN SERVICE PANEL UPGRADE: NO

APPLICABLE CODES

- 2025 CALIFORNIA RESIDENTIAL CODE
- 2025 CALIFORNIA BUILDING CODE
- 2025 CALIFORNIA ELECTRICAL CODE (NEC 2023)
- 2025 CALIFORNIA MECHANICAL CODE
- 2025 CALIFORNIA PLUMBING CODE
- 2025 CALIFORNIA ENERGY CODE
- 2025 CALIFORNIA FIRE CODE
- 2025 CALGREEN

SYSTEM DESIGN SUMMARY

PV ARRAY	17 MODULES / 7.820 kW STC
MODULE	REC REC460AA PURE-RX-DC / 460 W
INVERTER	Tesla Powerwall 3 (1707000-xx-y) / 11.500 kW
STRINGING	S1:6 / S2:6 / S3:5
ESS	1 × Tesla 1707000-xx-y / 13.5 kWh
SERVICE	120/240V 1-phase / 200 A MAIN / 225 A BUS
INTERCONNECTION	LOAD SIDE / 60 A
ROOF / PITCH	TILE / 4:12 (18°)
FRAMING	2X4 @ 24" O.C.
RACKING	SnapNrack Ultra Rail + 242-02729 tile hooks
DESIGN LOAD	2.23 PSF / 33.33 LB MAX POINT

DESIGN CRITERIA + DRAWING BASIS

GEOMETRY SOURCE	G2 / NATIVE VECTOR PLAN PLUS CURRENT SITE SURVEY
SOURCE DATE	2026-09-02
CURRENT CONDITIONS	CONFIRMED
ROOF PLAN AREA	3604.75 SQ FT (DECLARED)
ARRAY AREA	380.52 SQ FT
ARRAY AZIMUTH	153° TRUE
FIRE PATHWAY	36" MIN
RIDGE SETBACK	18" MIN
SHEET SIZE	ANSI B / 11 × 17 LANDSCAPE
DIMENSION BASIS	MODEL-SPACE MEASUREMENTS
STATUS	PRELIMINARY / FIELD VERIFY

RELEASE CONTROL — AUTOMATED CHECKS DO NOT REPLACE AHJ / ENGINEER REVIEW

GATE B GEOMETRY EVIDENCE — PASS

Geometry evidence chain complete.

GATE C ELECTRICAL COMPLIANCE — PASS

All electrical checks pass with recorded limits.

GATE E JURISDICTION READINESS — PASS

Fail-closed: City of Paso Robles, the serving utility, the fire authority, and the responsible design professional retain approval authority.

YOUR LOGO HERE

YOUR COMPANY NAME

CONTRACTOR / DESIGNER OF RECORD

PROJECT

BENCHMARK RESIDENCE PV + ESS

SITE ADDRESS

1800 BENCHMARK COURT, PASO ROBLES, CA 93446

ASSESSOR PARCEL NUMBER

BM-025-000-000

SYSTEM

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AUTHORITY HAVING JURISDICTION

CITY OF PASO ROBLES

SERVING UTILITY

PACIFIC GAS AND ELECTRIC

PREPARED BY

BENCHMARK PREPARER / C-10 SAMPLE-000000

CODE BASIS

2025 CALIFORNIA CODES (EFFECTIVE JANUARY 1, 2026)

REVISION HISTORY

DRAFT

PRELIMINARY DESIGN

09/03/26

DOC BENCHMARK-PA

DOCUMENT STATUS

PREPARED — NOT REVIEWED

NOT FOR CONSTRUCTION

SHEET TITLE

COVER SHEET AND PROJECT DATA

GOPLANSETS

T-1

1 / 10

GENERAL NOTES, INSTALLATION REQUIREMENTS & CODE REFERENCES

BASIS: 2025 CALIFORNIA CODES (EFFECTIVE JANUARY 1, 2026) • BRACKETED REFERENCES ARE DESIGN AIDS; VERIFY LOCAL AMENDMENTS AT SUBMITTAL

GENERAL
1. All work shall comply with the 2025 California Building Standards Code (Titles 24), the 2025 California Electrical Code (based on NEC 2023), the 2025 California Fire Code, and all locally adopted amendments in force on the permit application date. [CBSC 2025; H&S 18938.5] 2. This plan set describes the proposed scope only. Existing conditions shown are from recorded evidence; the contractor shall verify all field conditions before ordering material or starting work. 3. Any deviation from these drawings shall be reported to the plan preparer and the authority having jurisdiction before proceeding. 4. All equipment shall be listed and labeled by a recognized testing laboratory and installed per the manufacturer installation instructions. [CEC 110.3(B)] 5. Working space about electrical equipment shall be maintained: 30 in wide, 36 in deep, 78 in high minimum for equipment up to 150 V to ground. [CEC 110.26] 6. Equipment shall be suitable for the environment in which it is installed; outdoor enclosures shall be rated NEMA 3R or better. [CEC 110.28]
ELECTRICAL
7. PV system DC circuit maximum voltage shall be calculated using the manufacturer temperature coefficient of Voc and the ASHRAE extreme annual mean minimum design dry-bulb temperature for the site. [CEC 690.7(A)(1)] 8. PV system DC circuits on or in one- and two-family dwellings shall not exceed 600 V. [CEC 690.7(A)] 9. Maximum PV source circuit current shall be 125 percent of the module rated short-circuit current. [CEC 690.8(A)(1)] 10. Conductor ampacity shall be not less than 125 percent of the maximum continuous current before conditions-of-use adjustment, and not less than the maximum current after adjustment and correction factors. [CEC 690.8(B); 310.14] 11. Inverter output circuit overcurrent protection shall be rated not less than 125 percent of the inverter maximum continuous output current. [CEC 690.9(B); 705.30] 12. Load-side source connections shall comply with the busbar provisions; where the 120 percent allowance is used, the source breaker shall be located at the opposite end of the busbar from the primary supply and the busbar shall be marked accordingly. [CEC 705.12(B)(2)] 13. All terminals shall be torqued to manufacturer specifications; terminals are rated 75°C unless listed otherwise. [CEC 110.14] 14. DC PV wiring inside buildings shall be in metallic raceway or metal-clad cable per the wiring-methods requirements for PV systems. [CEC 690.31(C)] 15. Exposed single-conductor PV wire shall be listed PV wire, secured every 24 in, protected from abrasion, and kept off the roof surface. [CEC 690.31(A); 338/690.31] 16. Conductors of different systems in the same raceway or enclosure shall comply with the separation and grouping requirements. [CEC 300.3(C); 690.31(B)]
DRAWING COORDINATION
1. DIMENSIONS GOVERN. DO NOT SCALE A PRINT OR SCREEN CAPTURE. 2. COORDINATE PV-1 EQUIPMENT KEYS WITH E-1 COMPONENTS AND E-3 ELEVATION KEYS. 3. COORDINATE PV-2 ATTACHMENTS WITH PV-3 DETAILS AND THE PINNED RACKING SUBMITTAL. 4. REPORT CONFLICTS BETWEEN MODEL VALUES, FIELD CONDITIONS, AND MANUFACTURER DOCUMENTS. 5. A REVISION TO EQUIPMENT, STRINGING, SERVICE, OR MODULE LAYOUT REQUIRES REGENERATION. 6. PROTECT EXISTING ROOF DRAINAGE, FLASHINGS, VENTS, AND REQUIRED ACCESS.

ELECTRICAL
17. A permanent plaque or directory denoting all electric power sources on or in the premises shall be installed at the service equipment. [CEC 705.10] 18. Interactive inverters shall be listed to UL 1741 and configured for the serving utility required grid profile. [CEC 705.6]
GROUNDING
19. Equipment grounding conductors shall be sized per Table 250.122 and routed with the circuit conductors. [CEC 690.45; 250.122] 20. Module frames and racking shall be bonded using listed bonding hardware; the array equipment grounding path shall be continuous. [CEC 690.43] 21. The PV system shall be connected to the existing grounding electrode system; new auxiliary electrodes, where installed, shall be bonded to the existing system. [CEC 690.47(A)] 22. Ground-fault protection shall be provided by the listed inverter; ground-fault indication shall be located where readily observed. [CEC 690.41(B)]
RAPID SHUTDOWN
23. The PV system shall include rapid shutdown meeting the controlled-limits requirements: conductors within the array boundary limited to 80 V or less within 30 seconds of initiation, and conductors outside the boundary limited to 30 V within 30 seconds. [CEC 690.12(B)] 24. The rapid-shutdown initiation device shall be located at a readily accessible location outside the building and shall simultaneously initiate shutdown for all PV systems on the structure. [CEC 690.12(C)] 25. Rapid-shutdown labeling shall be provided per the label schedule on sheet E-2, including the required rapid-shutdown switch label and the applicable roof-plan placard. [CEC 690.12(D)]
LABELING
26. All PV system disconnecting means shall be marked to indicate whether the line and load terminals may be energized in the open position. [CEC 690.13(B)] 27. DC circuit labels showing maximum voltage and maximum circuit current shall be provided at DC disconnecting means. [CEC 690.7(D); 690.53] 28. The interactive system point of interconnection shall be marked with the rated AC output current and nominal operating voltage. [CEC 690.54] 29. DC PV circuits routed inside a building shall be marked "PHOTOVOLTAIC POWER SOURCE" every 10 ft, within 1 ft of turns and penetrations, and above and below penetrations. [CEC 690.31(D)(2)] 30. All labels shall be permanently affixed, suitable for the environment, and shall comply with the reflective/contrast requirements of the authority having jurisdiction. [CEC 110.21(B)]
FIRE ACCESS
31. Roof access pathways and ridge setbacks shall be provided as shown on the roof plan per the California Residential Code solar provisions and the California Fire Code. [CRC R329; CFC 1204/1205] 32. Access pathways shall be located over structurally capable bearing walls where required and shall remain free of obstructions. [CRC R329]
FIELD VERIFICATION
1. VERIFY ROOF GEOMETRY WITH CONTROL DIMENSIONS BEFORE MATERIAL RELEASE. 2. VERIFY ROOF COVERING, NUMBER OF LAYERS, DECK, RAFTER SIZE, SPACING, AND BEARING DIRECTION. 3. VERIFY SERVICE VOLTAGE, MAIN RATING, BUS RATING, BREAKER POSITION, AND AVAILABLE SPACES. 4. VERIFY EQUIPMENT WALL OPENINGS, GAS / WATER CLEARANCES, WORKING SPACE, AND IMPACT EXPOSURE. 5. VERIFY ALL EQUIPMENT MODEL NUMBERS AGAINST PROCUREMENT RECORDS. 6. PHOTOGRAPH CONCEALED ATTACHMENTS AND LABELS BEFORE FINAL COVER-UP WHEN REQUIRED.

FIRE ACCESS
33. Where panels are installed on dwellings, at least the code-required clear setback shall be maintained at ridges per the adopted fire-access provisions and any local amendment. [CRC R329; local amendments]
STRUCTURAL
34. Attachments shall be installed into structural framing members with the fastener type, embedment, and spacing shown in the attachment schedule on sheet PV-3; pull-out capacity shall not be exceeded. 35. Roof penetrations shall be flashed and sealed per the racking manufacturer instructions and roofing-material requirements to maintain the roof assembly rating. 36. The combined dead load of modules and racking shall not exceed the value stated on PV-3; where existing framing is found deteriorated, altered, or overspanned, work shall stop pending evaluation. 37. Modules shall not overhang ridges, hips, rakes, or eaves, and shall maintain the module-to-roof clearance range stated in the racking listing.
ESS
38. Energy storage systems shall be listed to UL 9540 and installed per the manufacturer instructions and the residential ESS location and protection provisions. [CRC R330; CEC 706] 39. ESS units installed on exterior walls shall maintain the required separation from doors, windows, and other openings per the adopted residential code. [CRC R330] 40. Where subject to vehicle damage, ESS equipment shall be protected by approved barriers. [CEC 110.27; CRC R330] 41. An ESS disconnecting means shall be provided and marked per the storage-system requirements. [CEC 706.15]
UTILITY
42. Interconnection to the serving utility requires utility review and permission to operate; final utility requirements govern metering and disconnect provisions. 43. A utility-accessible AC disconnect shall be provided where required by the serving utility interconnection handbook.
WORKMANSHIP
44. All outdoor raceway shall be rated for wet locations; fittings shall be listed raintight where exposed. [CEC 300.6] 45. Conduit shall be supported per its article requirements and routed to minimize exposure; rooftop raceway ambient-temperature adjustment applies where routed above the roof. [CEC 310.15(B)] 46. Penetrations of fire-resistance-rated assemblies shall be firestopped with listed systems. [CBC 714]
SUBMITTAL & RELEASE CONTROL
1. CONFIRM AHJ, UTILITY, PARCEL, AND ADDRESS BEFORE SUBMITTAL. 2. USE ONLY CURRENT, RELEASED JURISDICTION AND UTILITY RULE PROFILES. 3. ATTACH HASH-PINNED MANUFACTURER DOCUMENTS FOR EVERY EXACT INSTALLED MODEL. 4. RESOLVE EVERY BLOCKING GATE; A DRAWING-COMPLETENESS PASS IS NOT PERMIT READINESS. 5. RENDER AND REVIEW EVERY PDF PAGE AT PRINT SCALE FOR CLIPPING AND LEGIBILITY. 6. RECORD QUALIFIED REVIEWER, DATE, REVISION, AND DISPOSITION BEFORE WATERMARK REMOVAL.

YOUR LOGO HERE

YOUR COMPANY NAME

CONTRACTOR / DESIGNER OF RECORD

PROJECT

BENCHMARK RESIDENCE PV + ESS

SITE ADDRESS

1800 BENCHMARK COURT, PASO ROBLES, CA 93446

ASSESSOR PARCEL NUMBER

BM-025-000-000

SYSTEM

7.820 KW DC / 11.500 KW AC / 13.5 KWH ESS

AUTHORITY HAVING JURISDICTION

CITY OF PASO ROBLES

SERVING UTILITY

PACIFIC GAS AND ELECTRIC

PREPARED BY

BENCHMARK PREPARER / C-10 SAMPLE-000000

CODE BASIS

2025 CALIFORNIA CODES (EFFECTIVE JANUARY 1, 2026)

REVISION HISTORY

DRAFT	PRELIMINARY DESIGN	09/03/26
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DOC BENCHMARK-PA

DOCUMENT STATUS

PREPARED — NOT REVIEWED

NOT FOR CONSTRUCTION

SHEET TITLE

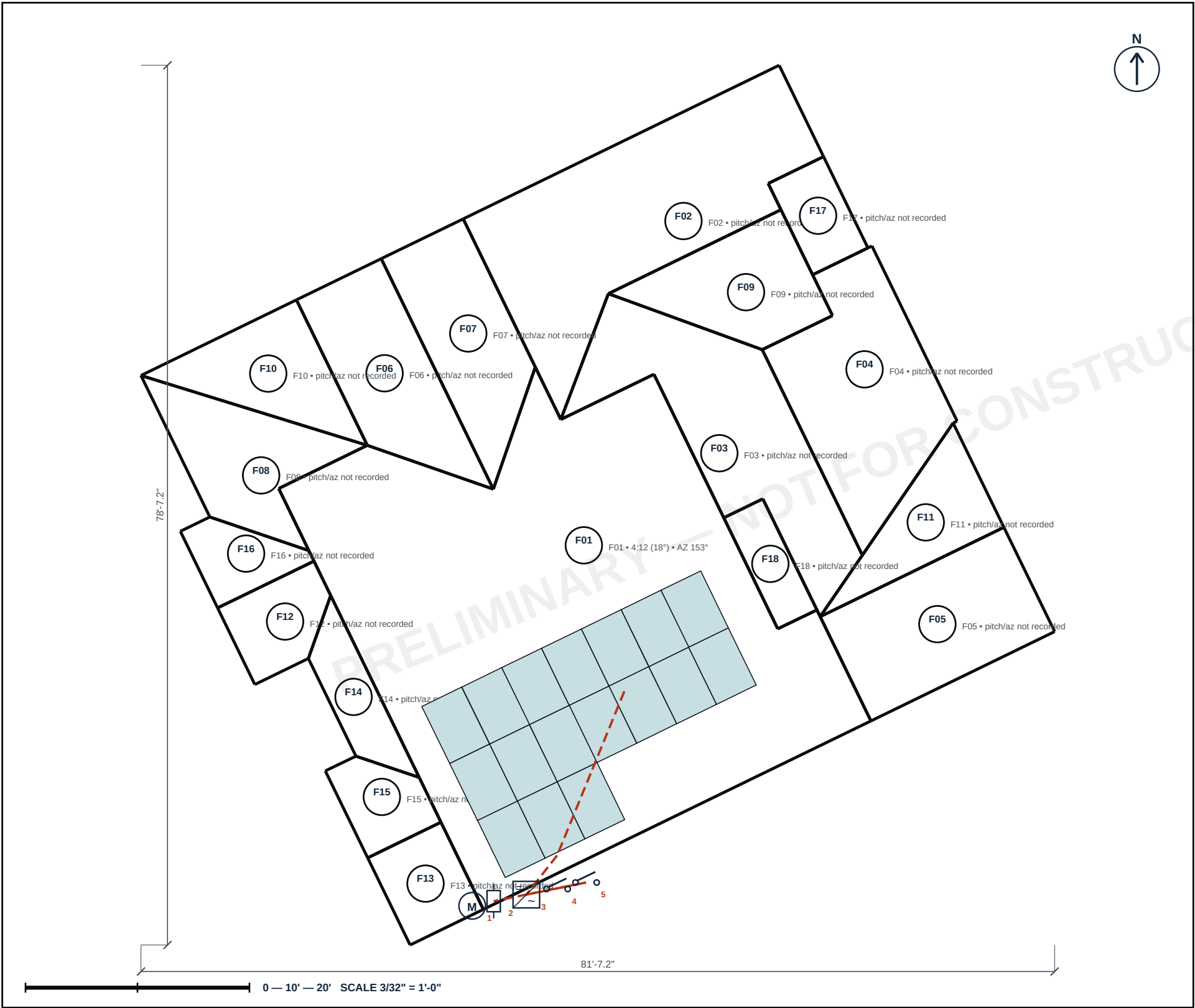
GENERAL NOTES

T-2

GOPLANSETS

2 / 10

SITE / ROOF / EQUIPMENT PLAN



LEGEND

—	ROOF EDGE / FACET BOUNDARY
[]	PV MODULE
- - -	CONDUIT / ROUTING PATH
<> n	EQUIPMENT (SEE SCHEDULE)
DIA	ATTACHMENT (SEE PV-2/PV-3)

EQUIPMENT SCHEDULE

1	EXISTING UTILITY METER / BACKUP SWITCH
2	EXISTING 225 A BUS / 200 A MAIN
3	TESLA POWERWALL 3
4	RAPID SHUTDOWN INITIATOR
5	60 A VISIBLE-OPEN AC DISCONNECT

FIRE ACCESS + AREA

ARRAY 380.52 SQ FT / ROOF 3604.75 SQ FT = 10.56%
ACCESS PATHWAYS >= 36" CLEAR; RIDGE SETBACK 18" (CRC R329 / CFC)

GEOMETRY SOURCE + ACCURACY

CLASS G2 — NATIVE VECTOR PLAN PLUS CURRENT SITE SURVEY
SOURCE: Hash-pinned native-vector roof extraction cross-checked against the 59-image current site survey (2026-09-02)
ARTIFACT SHA-256 184992acf6becb40?
Dimensions verified to ±1 in per the control-dimension residual ledger (RMSE 0.05 in, max 0.07 in, 4 controls, 2 independent).

COORDINATION NOTES

- THIS VIEW SHOWS RECORDED ROOF GEOMETRY; PROPERTY LINES ARE OMITTED UNLESS CONTROLLED SURVEY DATA IS PRESENT.
- FIELD-VERIFY SERVICE EQUIPMENT, DISCONNECTS, OPENINGS, ROOF OBSTRUCTIONS, AND CONDUIT ROUTING BEFORE INSTALLATION.
- MODULE / ATTACHMENT LAYOUT: SEE PV-2. MOUNTING DETAILS: SEE PV-3. ELECTRICAL PATH: SEE E-1.

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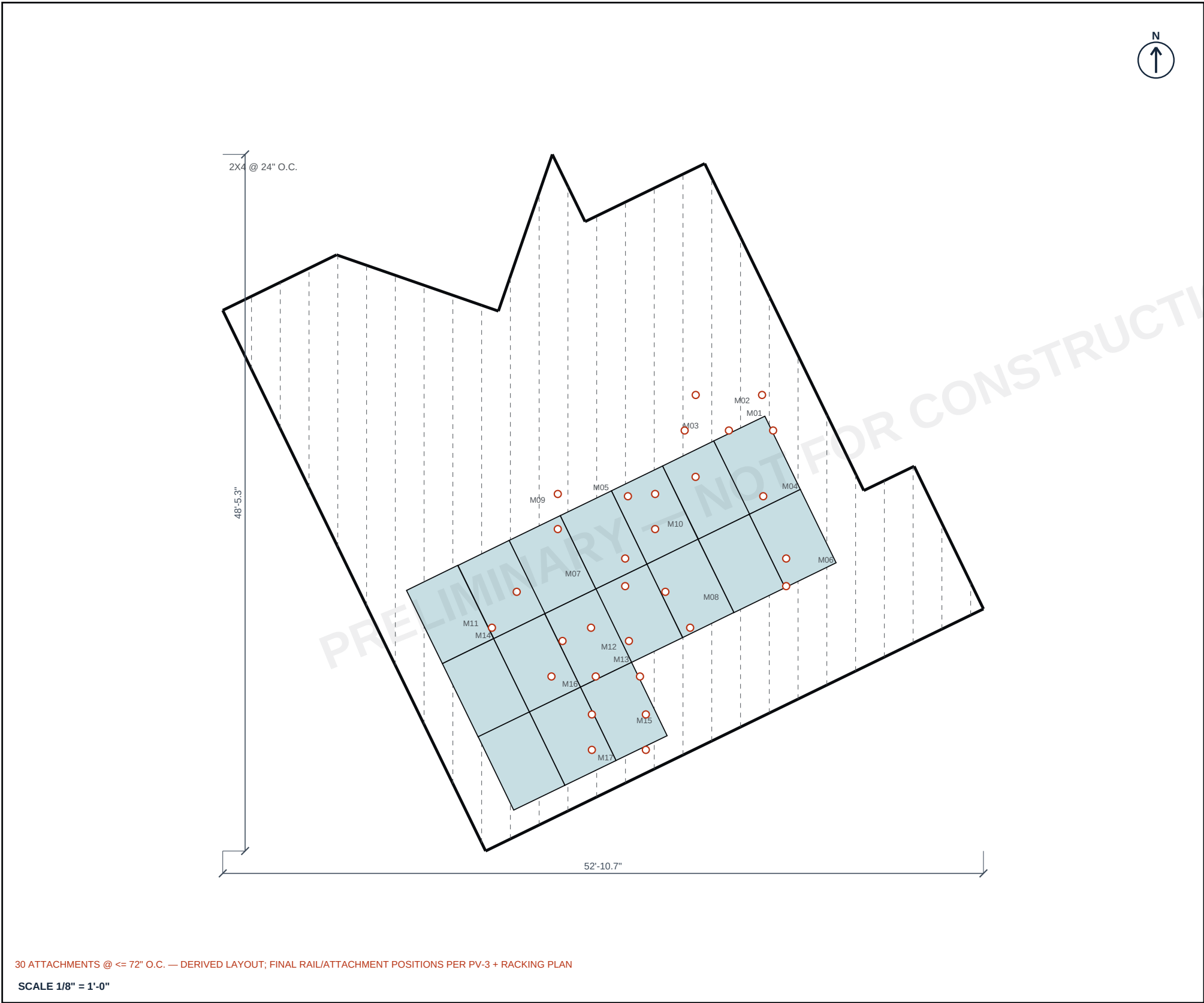
SITE PLAN

PV-1

GOPLANSETS

3 / 10

ROOF / MODULE / RAFTER / ATTACHMENT LAYOUT



1 ROOF / MODULE / ATTACHMENT PLAN

ARRAY SUMMARY

MODULES	17 PLACED
MODULE	REC REC460AA PURE-RX-DC
AZIMUTH	153° TRUE
PITCH	4:12 (18°)
ROOF MAT.	TILE
FRAMING	2x4 @ 24" O.C.
MOUNTING	SnapNrack Ultra Rail + 242-02729 tile hooks
ATTACHMENTS	30

GRAPHIC LEGEND

SOLID HEAVY	ROOF / ARRAY BOUNDARY
DASHED FINE	RAFTER CENTERLINE
OPEN CIRCLE	ROOF ATTACHMENT
BLUE FIELD	PV MODULE

MOUNTING PLAN NOTES

- MODULE COORDINATES AND ROOF PERIMETERS ARE MODEL-DERIVED; DO NOT SCALE THE PDF.
- RAFTER LINES ARE CLIPPED TO EACH ROOF FACET. FIELD-VERIFY FRAMING DIRECTION, SIZE, SPACING, AND CONDITION.
- ATTACHMENT SPACING SHALL NOT EXCEED 72" O.C.; LOCATE FASTENERS AT STRUCTURAL FRAMING.
- MAINTAIN 36" ACCESS PATHWAYS AND 18" RIDGE SETBACK WHERE SHOWN / REQUIRED.
- FLASH AND SEAL ALL PENETRATIONS. SEE PV-3 FOR FASTENER, FLASHING, RAIL, AND CLAMP DETAILS.
- FIELD CONFLICTS REQUIRE DESIGN REVIEW BEFORE RELOCATING MODULES OR ATTACHMENTS.

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DOCUMENT STATUS

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SHEET TITLE

ROOF PLAN AND ARRAY LAYOUT

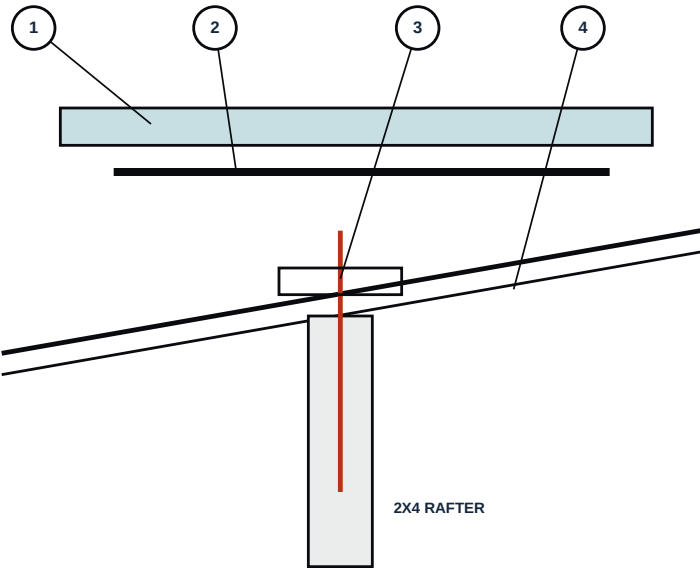
PV-2

GOPLANSETS

4 / 10

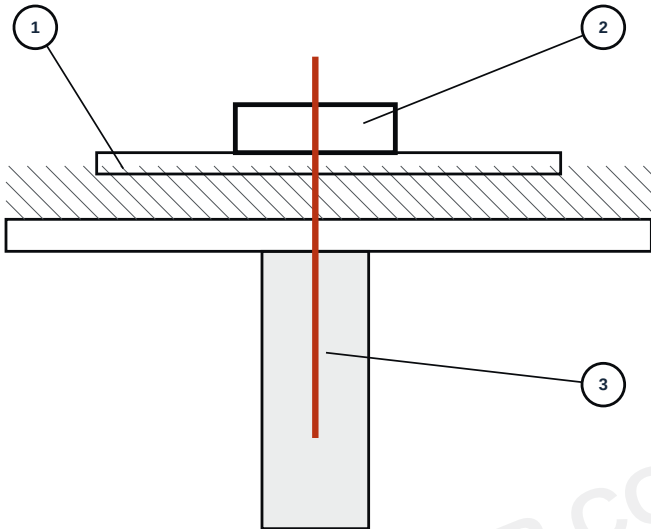
MOUNTING SECTIONS, ATTACHMENT DETAILS & PROJECT SCHEDULE

D1 TRANSVERSE ROOF ATTACHMENT SECTION • NTS

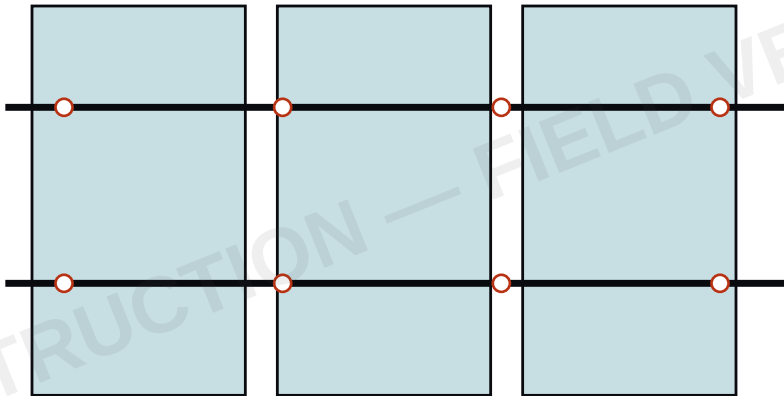


D2 FLASHING / FASTENER INTERFACE • NTS

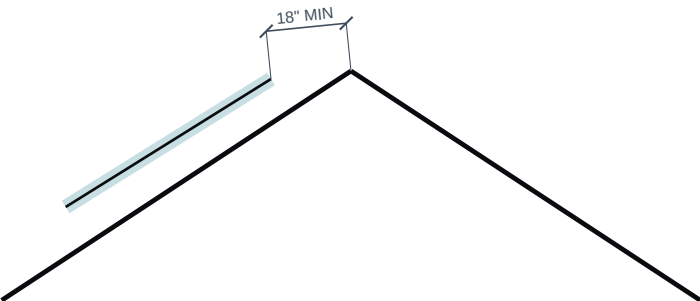
SNAPNRACK ULTRA RAIL + 242-02729 TILE HOOKS



D3 RAIL, CLAMP & ATTACHMENT PLAN • NTS



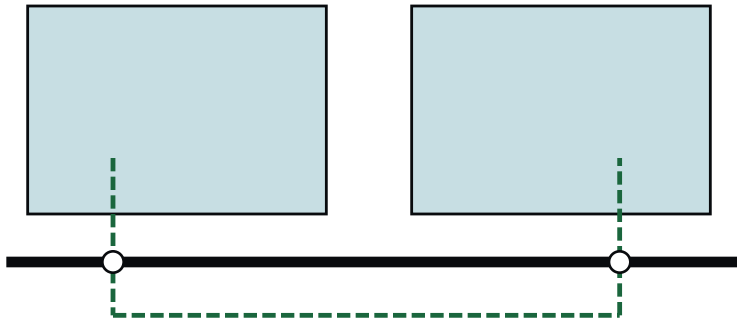
D4 ROOF EDGE / RIDGE / ARRAY PROFILE • NTS



ARRAY PROFILE — ROOF SLOPE / RIDGE COORDINATION

ROOF MATERIAL	TILE
ROOF PITCH	4:12 (18°)
RIDGE SETBACK	18" MIN
FIRE PATHWAY	36" MIN
ARRAY HEIGHT	6" MAX

D5 BONDING & WIRE MANAGEMENT • NTS



- BOND MODULE FRAMES AND RACKING WITH LISTED DEVICES PER CEC 690.43.
- ROUTE PV WIRE IN LISTED CLIPS; SUPPORT, PROTECT FROM ABRASION, AND KEEP OFF ROOF.
- BOND AC/DC RACEWAYS AND METAL ENCLOSURES; EGC SIZING IS SHOWN ON E-1.1.
- PROVIDE JUMPERS ACROSS RAIL SPLICES WHEN REQUIRED BY THE RACKING LISTING.
- EQUIPMENT-SPECIFIC HARDWARE SHALL MATCH THE HASH-PINNED SUBMITTAL DOCUMENT.

PROJECT ATTACHMENT + LOADING SCHEDULE

ITEM	VALUE	BASIS
MOUNTING SYSTEM	SnapNrack Ultra Rail + 242-02729 tile hooks	PROJECT EQUIP...
ROOF COVERING	TILE	FIELD EVIDENCE
FRAMING	2x4 @ 24" O.C.	FIELD EVIDENCE
ATTACHMENT COUNT	30	DERIVED/DECLA...
MAX ATTACHMENT SPACING	72" O.C.	RACKING LISTING
COMBINED DEAD LOAD	2.23 PSF — WITHIN 4 PSF PRESCRIPTIVE ENVELOPE	CALCULATED
MAX POINT LOAD	33.33 LB PER ATTACHMENT	CALCULATED
ARRAY HEIGHT	<= 6" ABOVE ROOF	RACKING LISTING

1	PV MODULE
2	RAIL + CLAMP ASSEMBLY
3	ROOF ATTACHMENT / STRUCTURAL FASTENER
4	ROOF COVERING, FLASHING, AND DECK

DO NOT INSTALL FROM THIS DETAIL UNTIL THE EXACT RACKING DOCUMENT IS PINNED.

FIELD-VERIFY ROOF ASSEMBLY, RAFTER LOCATION, EDGE DISTANCE, FASTENER TORQUE, AND ALLOWABLE SPANS AGAINST MANUFACTURER TABLES BEFORE CONSTRUCTION.

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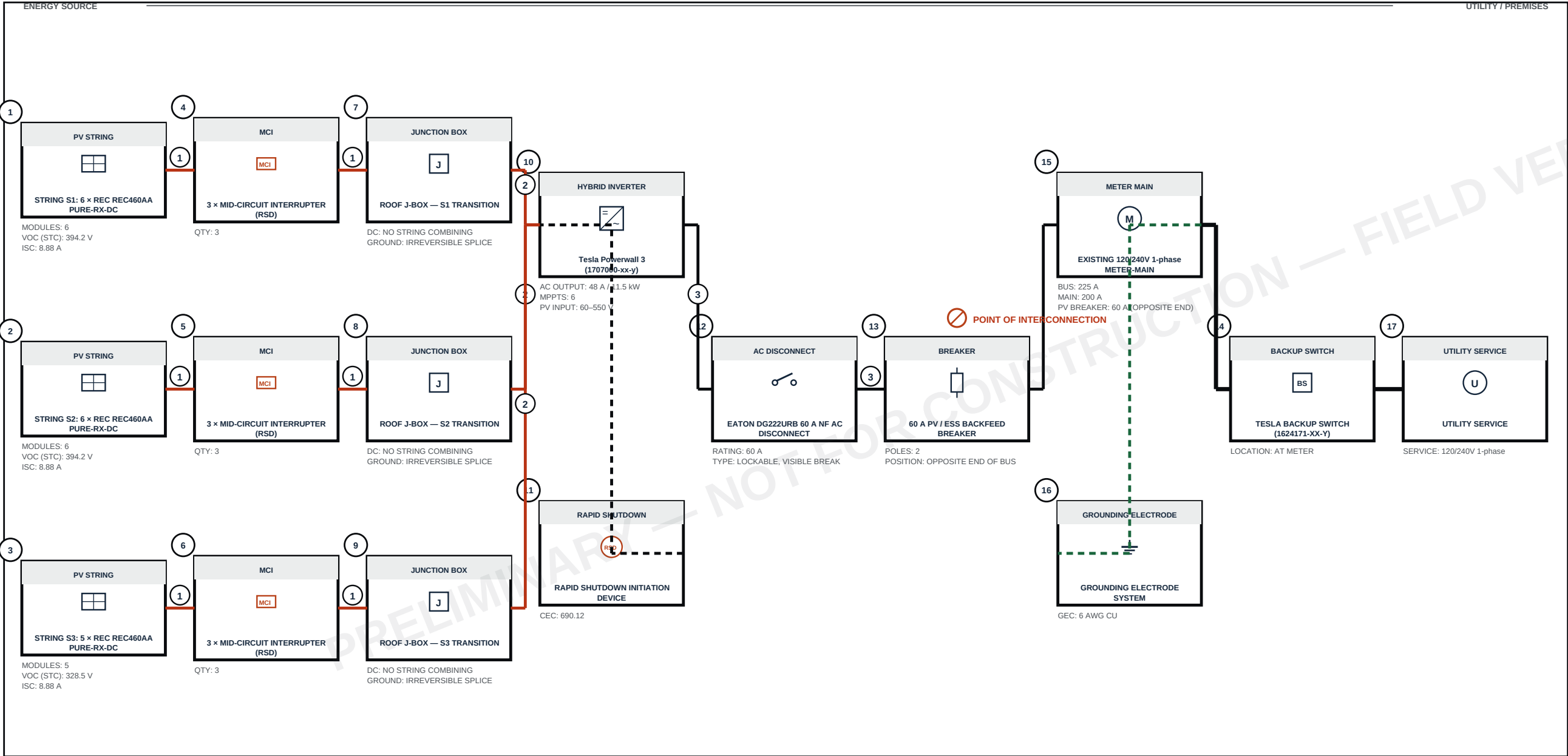
DOC BENCHMARK-PA

DOCUMENT STATUS
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SHEET TITLE
ATTACHMENT DETAILS

PV-3

ELECTRICAL SINGLE-LINE DIAGRAM & INTERCONNECTION



CONDUCTOR TAGS, GROUNDING & KEYED EQUIPMENT

GROUNDING: Equipment grounding conductors sized per CEC 250.122; array EGC 10 AWG Cu with irreversible splice at roof junction box.

(1) 2 × 10 AWG PV WIRE — FREE AIR

(2) 2 × 10 AWG THWN-2 IN 3/4" EMT + 10 AWG EGC

(3) 3 × 6 AWG THWN-2 IN 3/4" EMT + 10 AWG EGC

1	STR-S1	STRING S1: 6 × REC REC460AA P...
2	STR-S2	STRING S2: 6 × REC REC460AA P...
3	STR-S3	STRING S3: 5 × REC REC460AA P...
4	MCI-S1	3 × MID-CIRCUIT INTERRUPTER (...)
5	MCI-S2	3 × MID-CIRCUIT INTERRUPTER (...)
6	MCI-S3	3 × MID-CIRCUIT INTERRUPTER (...)
7	JB-S1	ROOF J-BOX — S1 TRANSITION
8	JB-S2	ROOF J-BOX — S2 TRANSITION
9	JB-S3	ROOF J-BOX — S3 TRANSITION
10	INV-1	Tesla Powerwall 3 (1707000-xx-y)
11	RSD-1	RAPID SHUTDOWN INITIATION DEVICE
12	ACD-1	EATON DG222URB 60 A NF AC DIS...

LOAD-SIDE INTERCONNECTION — CEC 705.12(B)(2)

(225 A × 1.2) - 200 A = 70 A headroom; PV breaker 60 A

LIMIT: PV BREAKER ≤ 70 A — PASS

SOURCE BREAKER AT OPPOSITE END OF BUSBAR + WARNING LABEL (SEE E-2)

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BENCHMARK PREPARER / C-10 SAMPLE-000000

CODE BASIS
2025 CALIFORNIA CODES (EFFECTIVE JANUARY 1, 2026)

REVISION HISTORY

DRAFT	PRELIMINARY DESIGN	09/03/26
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DOC BENCHMARK-PA

DOCUMENT STATUS

PREPARED — NOT REVIEWED

NOT FOR CONSTRUCTION

SHEET TITLE
SINGLE-LINE DIAGRAM

E-1

GOPLANSETS

6 / 10

ELECTRICAL CALCULATIONS, SCHEDULES & COMPLIANCE LEDGER

PV MODULE RATINGS

MODULE	REC REC460AA PURE-RX-DC
PMAX (STC)	460 W
VOC / VMP	65.7 V / 54.9 V
ISC / IMP	8.88 A / 8.38 A
BETA VOC	-0.24 %/°C
MAX SERIES FUSE	25 A
MAX SYSTEM VOLTAGE	1000 V
PARAMETER SOURCE	REC Alpha Pure-RX datasheet (DS_Alpha_Pure-RX_UL DC), ele...

INVERTER RATINGS

INVERTER	Tesla Powerwall 3 (1707000-xx-y)
PV INPUT RANGE	60–550 V
MPPT WINDOW	60–480 V
WITHSTAND	600 V
MPPT CHANNELS	6 (15 A IMP / 19 A ISC EACH)
CONTINUOUS OUTPUT	48 A / 11.5 kW
MAX OCPD	60 A
PARAMETER SOURCE	Tesla Powerwall 3 Datasheet (energylibrary.tesla.com), PV...

DESIGN CONDITIONS

EXTREME LOW	-6 °C
COLD VOC FACTOR	1 + 0.0024 × (25 - -6) = 1.0744
TEMP SOURCE	ASHRAE extreme annual mean minimum, Paso Robles area st...
SYSTEM DC / AC	7.82 kW / 11.5 kW
DWELLING DC LIMIT	600 V (CEC 690.7(A))

STRING SCHEDULE (COLD FACTOR 1.0744 @ -6 °C)

STRING	MOD	MPPT	VOC STC	VOC COLD	WORST LIMIT	MARGIN	RESULT
S1	6	1	394.2 V	423.53 V	inverter max PV input 550 V	22.99%	PASS
S2	6	2	394.2 V	423.53 V	inverter max PV input 550 V	22.99%	PASS
S3	5	3	328.5 V	352.94 V	inverter max PV input 550 V	35.83%	PASS

CONDUCTOR + RACEWAY SCHEDULE

TAG	CIRCUIT	CONDUCTORS	RACEWAY	EGC
1	DC STRING	2 × 10 AWG PV WIRE Cu	FREE AIR	—
2	DC HOMERUN	2 × 10 AWG THWN-2 Cu	3/4" EMT	10 AWG
3	INVERTER OUTPUT	3 × 6 AWG THWN-2 Cu	3/4" EMT	10 AWG

OCPD + INTERCONNECTION CALCULATIONS

CHECK	CALCULATION	RESULT
ELEC_INVERTER_OCPD	48 A × 1.25 = 60 A <= 60 A breaker	PASS
ELEC_CONDUCTOR_AMPACITY	48 A × 1.25 = 60 A <= 65 A ampacity	PASS
ELEC_120_RULE	(225 A × 1.2) - 200 A = 70 A headroom; PV breaker 60 A	PASS

FAILED LIMITS: NONE — ALL EVALUATED CHECKS PASS

ELECTRICAL COMPLIANCE LEDGER — EVERY EVALUATED LIMIT

#	CHECK	SUBJECT	CALCULATION / OBSERVATION	CODE REFERENCE	RESULT
1	ELEC_STRING_COUNT	SYSTEM	6 + 6 + 5 = 17 modules; declared 17	Drawing coordination (CEC 690.4)	PASS
2	ELEC_STRING_VOC_STC	S1	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer design limit	PASS
3	ELEC_STRING_VOC_STC	S1	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer withstand rating	PASS
4	ELEC_STRING_VOC_STC	S1	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 690.7(A) — one/two-family dwelling 600 V max	PASS
5	ELEC_STRING_VOC_STC	S1	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 110.3(B); module datasheet	PASS
6	ELEC_STRING_VOC_COLD	S1	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer design limit	PASS
7	ELEC_STRING_VOC_COLD	S1	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer withstand rating	PASS
8	ELEC_STRING_VOC_COLD	S1	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 690.7(A) — one/two-family dwelling 600 V max	PASS
9	ELEC_STRING_VOC_COLD	S1	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 110.3(B); module datasheet	PASS
10	ELEC_STRING_VMP_MIN	S1	54.9 V × 6 = 329.4 V	CEC 110.3(B); manufacturer MPPT window	PASS
11	ELEC_STRING_VMP_MAX	S1	54.9 V × 6 = 329.4 V	CEC 110.3(B); manufacturer MPPT operating window	PASS
12	ELEC_STRING_VOC_STC	S2	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer design limit	PASS
13	ELEC_STRING_VOC_STC	S2	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer withstand rating	PASS
14	ELEC_STRING_VOC_STC	S2	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 690.7(A) — one/two-family dwelling 600 V max	PASS
15	ELEC_STRING_VOC_STC	S2	65.7 V × 6 = 394.2 V	CEC 690.7(A)(1); CEC 110.3(B); module datasheet	PASS
16	ELEC_STRING_VOC_COLD	S2	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer design limit	PASS
17	ELEC_STRING_VOC_COLD	S2	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 110.3(B); manufacturer withstand rating	PASS
18	ELEC_STRING_VOC_COLD	S2	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 690.7(A) — one/two-family dwelling 600 V max	PASS
19	ELEC_STRING_VOC_COLD	S2	65.7 V × (1 + 0.0024 × 31) × 6 = 423.53 V	CEC 690.7(A)(1); CEC 110.3(B); module datasheet	PASS

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YOUR COMPANY NAME

CONTRACTOR / DESIGNER OF RECORD

PROJECT

BENCHMARK RESIDENCE PV + ESS

SITE ADDRESS

1800 BENCHMARK COURT, PASO ROBLES, CA 93446

ASSESSOR PARCEL NUMBER

BM-025-000-000

SYSTEM

7.820 KW DC / 11.500 KW AC / 13.5 KWH ESS

AUTHORITY HAVING JURISDICTION

CITY OF PASO ROBLES

SERVING UTILITY

PACIFIC GAS AND ELECTRIC

PREPARED BY

BENCHMARK PREPARER / C-10 SAMPLE-000000

CODE BASIS

2025 CALIFORNIA CODES (EFFECTIVE JANUARY 1, 2026)

REVISION HISTORY

DRAFT

PRELIMINARY DESIGN

09/03/26

DOC BENCHMARK-PA

DOCUMENT STATUS

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SHEET TITLE

ELECTRICAL CALCULATIONS AND SCHEDULES

E-1.1

GOPLANSSETS

7 / 10

PRINT-READY LABELS & PLACARDS — ARTWORK / LOCATION / CODE BASIS

RAPID SHUTDOWN SWITCH

FOR SOLAR PV SYSTEM

INSTALL AT: At the rapid-shutdown initiation device
CODE: CEC 690.12(D)(2) • ID: LBL-RSD

INTERACTIVE PV SYSTEM

POINT OF INTERCONNECTION
RATED AC OUTPUT CURRENT: 48.00 A
NOMINAL OPERATING AC VOLTAGE: 240.0 V

INSTALL AT: At the point of interconnection disconnecting means
CODE: CEC 690.54 • ID: LBL-POI-AC

WARNING

ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES
MAY BE ENERGIZED IN THE OPEN POSITION

INSTALL AT: At each disconnecting means whose terminals may remain energized when open
CODE: CEC 690.13(B); 705.20 • ID: LBL-LINE-LOAD

CAUTION: MULTIPLE SOURCES OF POWER

PREMISES SUPPLIED BY UTILITY, PV, AND ESS.
SEE DIRECTORY MAP FOR DISCONNECT LOCATIONS.

INSTALL AT: At the service equipment, with a site map of all source disconnects
CODE: CEC 705.10 • ID: LBL-DIRECTORY

ENERGY STORAGE SYSTEM

DISCONNECTING MEANS
DISCONNECT ALL SOURCES BEFORE SERVICING

INSTALL AT: At the ESS disconnecting means
CODE: CEC 706.15(C) • ID: LBL-ESS-DISCO

SOLAR PV SYSTEM EQUIPPED

WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH TO THE
"OFF" POSITION TO SHUT DOWN PV SYSTEM
AND REDUCE SHOCK HAZARD IN THE ARRAY

INSTALL AT: At the service equipment with the roof-plan placard
CODE: CEC 690.12(D)(1) • ID: LBL-RSD-TYPE

PHOTOVOLTAIC DC DISCONNECT

MAXIMUM DC VOLTAGE: 423.53 V
MAXIMUM CIRCUIT CURRENT: 11.10 A

INSTALL AT: At each DC disconnecting means
CODE: CEC 690.7(D); 690.53 • ID: LBL-DC-MAX

WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES.
TOTAL RATING OF ALL OVERCURRENT DEVICES
EXCLUDING MAIN SUPPLY EXCEEDS AMPACITY OF BUSBAR (225 A).
DO NOT RELOCATE THE 60 A SOURCE BREAKER FROM THE OPPOSITE END.

INSTALL AT: At the panelboard/meter-main containing the source breaker
CODE: CEC 705.12(B)(2) • ID: LBL-BUS-120

WARNING: PHOTOVOLTAIC POWER SOURCE

INSTALL AT: On DC raceway every 10 ft, within 1 ft of turns/penetrations, and both sides of penetrations
CODE: CEC 690.31(D)(2) • ID: LBL-PV-WIRING

CAUTION: THIS PROPERTY CONTAINS A STANDBY

ENERGY STORAGE SYSTEM. PORTIONS OF THE
PREMISES MAY REMAIN ENERGIZED DURING A
UTILITY OUTAGE.

INSTALL AT: At the service equipment and the backed-up loads panel
CODE: CEC 706; 702.7 • ID: LBL-ESS-TRIPPOWER

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PROJECT
BENCHMARK RESIDENCE PV + ESS

SITE ADDRESS
1800 BENCHMARK COURT, PASO ROBLES, CA
93446

ASSESSOR PARCEL NUMBER
BM-025-000-000

SYSTEM
7.820 KW DC / 11.500 KW AC / 13.5 KWH ESS

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SHEET TITLE
LABELS AND PLACARDS

E-2

GOPLANSETS

8 / 10

EQUIPMENT WALL ELEVATION, CLEARANCES & MOUNTING SCHEDULE

ELEVATION DESIGN BASIS

MOUNTING HEIGHTS AND NOMINAL ENCLOSURE SIZES ARE PROJECT MODEL VALUES.
VERIFY EXACT MANUFACTURER DIMENSIONS, SERVICE CONFIGURATION, AND WALL CONDITIONS.
ALL DIMENSIONS ARE TO FINISHED GRADE / FINISHED OPENING UNLESS NOTED.
OPERATING MODE: SOLAR PLUS STORAGE EXPORT

CLEARANCE CRITERIA

CEC 110.26: 30" W × 36" D × 78" H WORKING SPACE; KEEP CLEAR.
ESS: MAINTAIN PROJECT / MANUFACTURER / CRC R330 OPENING AND EQUIPMENT SEPARATION.
PROVIDE PHYSICAL PROTECTION WHERE SUBJECT TO VEHICLE IMPACT.
MAX EXPORT: 11.5 KW • CHARGING: GRID AND PV

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BENCHMARK RESIDENCE PV + ESS

SITE ADDRESS
1800 BENCHMARK COURT, PASO ROBLES, CA
93446

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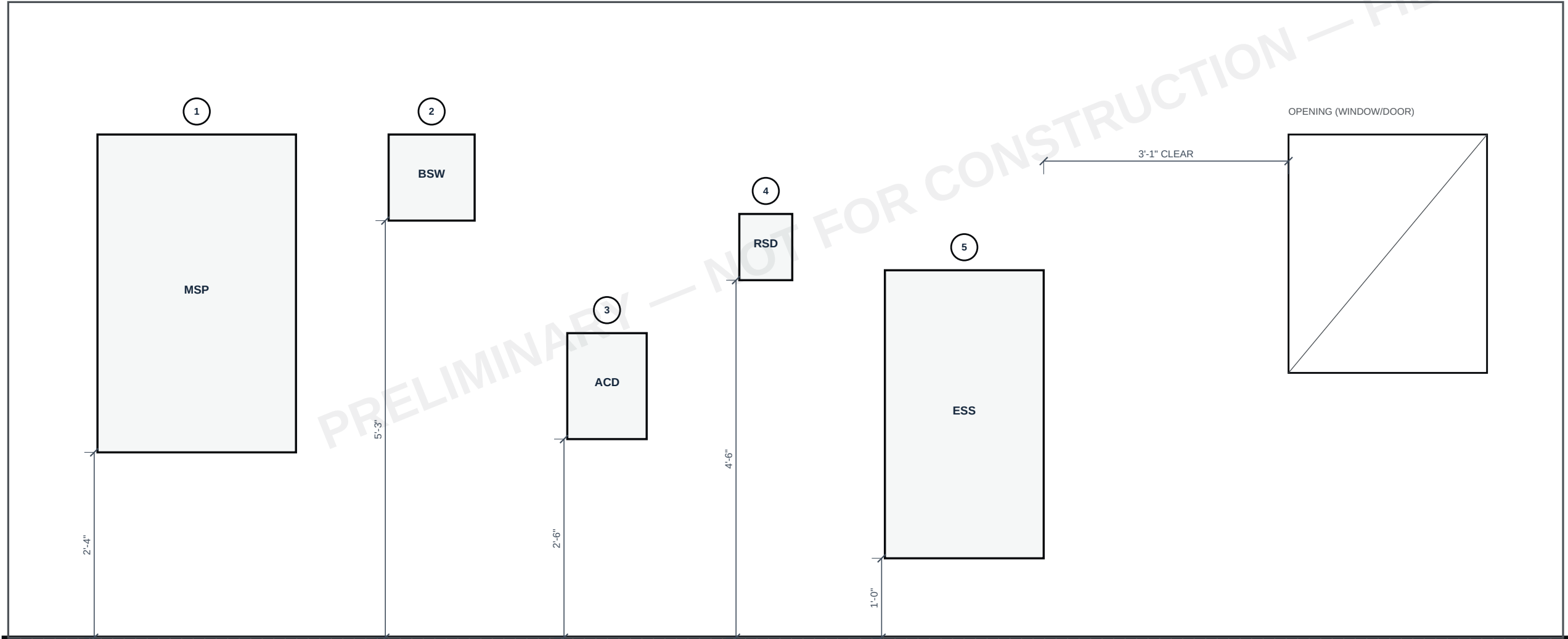
SHEET TITLE
ENERGY STORAGE EQUIPMENT
ELEVATION

E-3

GOPLANSETS

9 / 10

EQUIPMENT WALL — SEE PV-1 FOR PLAN LOCATION



ELEVATION EQUIPMENT SCHEDULE

#	ID	EQUIPMENT	MOUNTING	NOTE
1	MSP	METER-MAIN 225 A BUS / 200 A MAIN	2'-4" AFG	EXISTING
2	BSW	TESLA BACKUP SWITCH (1624171-XX-Y)	5'-3" AFG	AT METER SOCKET
3	ACD	EATON DG222URB 60 A NF AC DISCONNECT	2'-6" AFG	LOCKABLE, VISIBLE BREAK
4	RSD	RAPID SHUTDOWN INITIATION	4'-6" AFG	READILY ACCESSIBLE
5	ESS	TESLA 1707000-XX-Y (1 ×)	1'-0" AFG	MOUNT PER MFR; NOMINAL DIMS — VERIFY

EQUIPMENT, BILL OF MATERIALS & SOURCE-DOCUMENT CONTROL

BILL OF MATERIALS — DESIGN QUANTITIES

ITEM	DESCRIPTION	MODEL / PART NO.	QTY
1	PV MODULE — REC REC460AA PURE-RX-DC (460 W)	REC460AA PURE-RX-DC	17
2	INVERTER — Tesla Powerwall 3 (1707000-xx-y)	1707000-xx-y	1
3	ENERGY STORAGE — Tesla 1707000-xx-y (13.5 kWh)	1707000-xx-y	1
4	AC DISCONNECT — EATON DG222URB 60 A NF AC DISCONNECT (60 A)	EATON DG222URB 60 A NF AC DISCONNECT	1
5	ROOF ATTACHMENT — SnapNrack Ultra Rail + 242-02729 tile hooks	SnapNrack Ultra Rail + 242-02729 tile hooks	30
6	SNAPNRACK ULTRA RAIL, DOMESTIC	232-10097	10
7	SNAPNRACK RAIL SPLICE	242-01213	4
8	SNAPNRACK MID CLAMP	242-02071	28
9	SNAPNRACK END CLAMP	242-02073	12
10	SNAPNRACK ADJUSTABLE TILE HOOK	242-02729	30

SOURCE-DOCUMENT INDEX — STORED ARTIFACT STATUS

DOC	TITLE	OFFICIAL SOURCE	STATUS
DOC-MODULE	REC Alpha Pure-RX REC460AA manufacturer datasheet	https://www.recgroup.com/sites/default/files/2026-03/DS_Alpha_	PINNED
DOC-INVERTER	Tesla Powerwall 3 manufacturer datasheet	https://energylibrary.tesla.com/docs/Public/EnergyStorage/Powe	PINNED
DOC-BATTERY	Tesla Powerwall 3 ESS ratings (same official datasheet)	https://energylibrary.tesla.com/docs/Public/EnergyStorage/Powe	PINNED
DOC-RACKING-...	SnapNrack mount capacity summary — adjustable tile hook 24	https://res.cloudinary.com/summitpoint/image/upload/v178363038	PINNED
DOC-RACKING-...	SnapNrack Ultra Rail Adjustable Tile Hook 242-02729 datash	https://res.cloudinary.com/summitpoint/image/upload/v174284011	PINNED

DOCUMENT DEFICIENCY REGISTER — RELEASE BLOCKERS

DOC	DOCUMENT TYPE	STATUS	REQUIRED ACTION
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SOURCE INTEGRITY & APPENDIX ELIGIBILITY

DOC	ARTIFACT SHA-256	APPENDIX DISPOSITION
DOC-MODULE	4f4f121194d8508d	ELIGIBLE FOR APPENDIX
DOC-INVERTER	ecbff54253ac022f	ELIGIBLE FOR APPENDIX
DOC-BATTERY	ecbff54253ac022f	ELIGIBLE FOR APPENDIX
DOC-RACKING-CAP...	175ec83ce94ecbc6	ELIGIBLE FOR APPENDIX
DOC-RACKING-DAT...	3e5bc2a39b9d94fb	ELIGIBLE FOR APPENDIX

DOCUMENT RELEASE CHECKLIST

EXACT MODEL MATCH	RECORDED
OFFICIAL SOURCE URL	RECORDED
LOCAL ARTIFACT	COMPLETE
SHA-256	COMPLETE
VISUAL PAGE QA	REQUIRED
APPENDIX IMPOSITION	ELIGIBLE

CONTROLLED DOCUMENT WORKFLOW

1. RESOLVE THE EXACT INSTALLED MANUFACTURER AND MODEL FROM PROJECT INPUTS.
2. RETRIEVE THE OFFICIAL CURRENT MANUFACTURER PDF; DO NOT TRUST A SEARCH SNIPPET.
3. STORE THE ORIGINAL BYTES, SOURCE URL, RETRIEVAL DATE, AND SHA-256.
4. VERIFY MODEL NUMBER, RATINGS, DIMENSIONS, LISTINGS, AND APPLICABLE REVISION.
5. RENDER EVERY PAGE AND INSPECT FOR CLIPPING, ROTATION, LEGIBILITY, AND DUPLICATES.
6. IMPOSE APPROVED PAGES BEHIND DRAWING SHEETS WITH CONTINUOUS SHEET NUMBERING.
7. INVALIDATE RELEASE IF EQUIPMENT CHANGES OR AN ARTIFACT HASH CHANGES.

EQUIPMENT MATCH REGISTER

MODULE DATASHEET	PINNED
INVERTER DATASHEET	PINNED
BATTERY DATASHEET	PINNED
RACKING DOCUMENT	PINNED
RACKING DOCUMENT	PINNED

EXPORT POLICY

MANUFACTURER PAGES ARE IMPOSED ONLY FROM STORED, HASH-PINNED ARTIFACTS. NO LIVE FETCHING AT EXPORT; APPENDIX INPUTS MUST ALREADY BE PINNED. A URL ALONE DOES NOT COUNT AS AN ATTACHED SPECIFICATION. MISSING OR BLOCKED DOCUMENTS MUST REMAIN VISIBLE TO THE REVIEWER.

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BENCHMARK RESIDENCE PV + ESS

SITE ADDRESS

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EQUIPMENT DATA SHEETS

S-1

GOPLANSETS

10 / 10



REC

SOLAR'S MOST TRUSTED



REC ALPHA[®] PURE-RX

DATASHEET



PURE STRENGTH

55 MM HAIL RESISTANT

+7000 PA / -4000 PA
WITH 4 POINT CLAMPING

+10000 PA / -6000 PA
WITH 6 POINT CLAMPING

450 - 470W HETEROJUNCTION TECHNOLOGY

22.6% MAX EFFICIENCY
>92% POWER IN YEAR 25
-0.24%/°C TEMPERATURE
COEFFICIENT OF P_{MAX}



ELIGIBLE

ASSEMBLED WITH FOREIGN AND DOMESTIC COMPONENTS. THESE MODULES ARE COMPATIBLE WITH AYLIC INDICATING DOMESTIC CONTENT ADDER ELIGIBILITY.

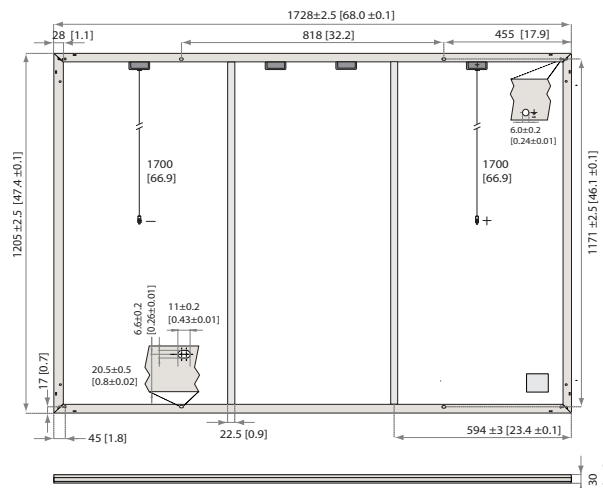
REC ALPHA® PURE-RX DATASHEET



Measurements in [inches] and mm

GENERAL DATA

Cell Type	88 half-cut bifacial REC heterojunction cells, with gapless technology
Glass	0.13 in solar glass with anti-reflective surface treatment in accordance with EN12150
Backsheet	Highly resistant polymer (Black)
Frame	Anodized aluminum (Black)
Junction Box	4-part, 4 bypass diodes, IP68 rated, in accordance with IEC 62790:2020
Connectors	Stäubli MC4 PV-KBT4/KST4 (12 AWG) in accordance with IEC 62852:2014, IP68 only when connected
Cable	12 AWG solar cable, 59.1 in (1.50 m) + 59.1 in (1.50 m) in accordance with EN50618:2014
Dimensions	68.0 x 47.4 x 1.2 in (22.4 ft²) / 1728 x 1205 x 30 mm (2.08 m²)
Weight	50.0 lb / 22.7 kg
Origin	Made in Singapore



ELECTRICAL DATA

PRODUCT CODE*: RECXXXAA PURE-RX-DC

Power Output - P _{MAX} (W _p)	450	460	470
Watt Class Sorting - (W)	0/+10	0/+10	0/+10
Nominal Power Voltage - V _{MPP} (V)	54.3	54.9	55.4
Nominal Power Current - I _{MPP} (A)	8.29	8.38	8.49
Open Circuit Voltage - V _{OC} (V)	65.6	65.7	65.7
Short Circuit Current - I _{SC} (A)	8.81	8.88	8.95
Power Density (W/ft²)	21.6	22.1	22.6
Panel Efficiency (%)	21.6	22.1	22.6

Power Output - P _{MAX} (W _p)	342	350	358
Nominal Power Voltage - V _{MPP} (V)	51.2	51.7	52.2
Nominal Power Current - I _{MPP} (A)	6.70	6.77	6.86
Open Circuit Voltage - V _{OC} (V)	61.8	61.9	61.9
Short Circuit Current - I _{SC} (A)	7.12	7.18	7.23

Values at standard test conditions (STC: air mass AM1.5, irradiance 1000 W/m², temperature 25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM1.5, irradiance 800 W/m², temperature 20°C, windspeed 1 m/s). * Where xxx indicates the nominal power class (P_{MAX}) at STC above.

TEMPERATURE COEFFICIENT*

P _{MAX} -0.24%/°C	V _{OC} -0.24%/°C	I _{SC} 0.04%/°C	*The temperature coefficients stated are linear values
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MODULE RATINGS

Module Operating Temperature [T98] [§]	176°F (80°C)
Min Environmental Temperature	-40°F (-40°C)
Nominal Module Operating Temperature	44 ± 2°C
Max Hail Rating [¶]	55 mm @ 33.9 m/s
System Voltage	1000 V
Max Series Fuse Rating	25 A
Max Reverse Current	25 A

§ 98th percentile operating temperature cKiva PVEL HSS test result

MAXIMUM TEST LOAD*

Front (4-Point)*	+7000 Pa (146 lbs/ft²)
Rear (4-Point)*	-4000 Pa (84 lbs/ft²)
Front (6-Point)**	+10000 Pa (209 lbs/ft²)
Rear (6-Point)**	-6000 Pa (125 lbs/ft²)

Design load = Test load / 1.5 (safety factor)

*IEC61730/UL61730 certified. Refer to installation manual.

**Internal testing. Refer to installation manual.

Available from:



Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.

CERTIFICATIONS

ISO 14001; ISO 9001; IEC 45001; IEC 62941
IEC 61215:2021; IEC 61730:2023; UL 61730
IEC 61730 Fire Class C
ISO 11925-2 Ignitability (EN 13501-1 Class E)
EN 13501-5 Roof Fire Performance (B _{ROOF} T2)
IEC 62716 Ammonia Resistance
IEC 61701 Salt Mist (SM6)
IEC 61215:2021 Hailstone (35 mm)
UL 61730 Fire Type 2
IEC TS 63126 Level 1



WARRANTY

	Standard	REC ProTrust	
Installed by an REC	No	Yes	Yes
Certified Professional			
System Size	All	<25 kW	25-500 kW
Product Warranty (yrs)	20	25	25
Power Warranty (yrs)	25	25	25
Labor Warranty (yrs)	0	25	10
Power in Year 1	98%	98%	98%
Annual Degradation	0.25%	0.25%	0.25%
Power in Year 25	92%	92%	92%

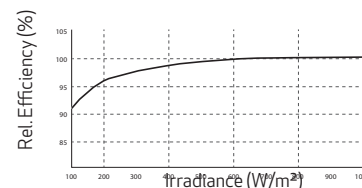
REC ProTrust Warranty applies only for i) REC panels installed by an REC Certified Solar Professional, and ii) panels have been registered by the installer with REC. Subject to System Size and further conditions. See www.recgroup.com for details.

DELIVERY INFORMATION

Panels per Pallet	33
Panels per 40 ft GP/high cube container	594 (18 Pallets)
Panels per 53 ft truck	792 (24 Pallets)

LOW LIGHT BEHAVIOR

Typical low irradiance performance of module at STC:



REC Solar PTE. LTD.
20 Tuas South Ave. 14
Singapore 637312
post@recgroup.com
www.recgroup.com



Specifications subject to change without notice.

UL EN 6.2026 V7 REF: PM-DS-12-06/08.04.08.01

Powerwall 3

Power Everything

Powerwall 3 is a fully integrated solar and battery system, designed to accelerate the transition to sustainable energy. Customers can receive whole home backup, cost savings, and energy independence by producing and consuming their own energy while participating in grid services. Once installed, customers can manage their system using the Tesla App to customize system behavior to meet their energy goals.

Powerwall 3 achieves this by supporting up to 20 kW DC of solar and providing up to 11.5 kW AC of continuous power per unit. It has the ability to start heavy loads rated up to 185 LRA, meaning a single unit can support the power needs of most homes. Powerwall 3 Expansions make it easier and more affordable to scale up customers' systems to meet their current or future needs. Powerwall 3 is designed for fast and efficient installations, modular system expansion, and simple connection to any electrical service.



Powerwall 3 Technical Specifications

System Technical Specifications

Model Number	1707000-xx-y			
Nominal Grid Voltage (Input & Output)	120/240 VAC			
Grid Type	Split phase			
Frequency	60 Hz			
Nominal Battery Energy	13.5 kWh AC ¹			
Nominal Output Power (AC)	5.8 kW	7.6 kW	10 kW	11.5 kW
Maximum Apparent Power	5,800 VA	7,600 VA	10,000 VA	11,500 VA
Maximum Continuous Current	24 A	31.7 A	41.7 A	48 A
Overcurrent Protection Device ²	30 A	40 A	60 A	60 A
Configurable Maximum Continuous Discharge Power Off-Grid (PV Only, -20°C to 25°C)	15.4 kW ³			
Maximum Continuous Charge Current / Power (Powerwall 3 only)	20.8 A AC / 5 kW			
Maximum Continuous Charge Current / Power (Powerwall 3 with up to (3) Expansion units)	33.3 A AC / 8 kW			
Output Power Factor Rating	0 – 1 (Grid Code configurable)			
Maximum Output Fault Current (1 s)	160 A			
Maximum Short-Circuit Current Rating	10 kA			
Load Start Capability	185 LRA			
Solar to Battery to Home/Grid Efficiency	89% ^{1,4}			
Solar to Home/Grid Efficiency	97.5% ⁵			
Power Scalability	Up to 4 Powerwall 3 units supported			
Energy Scalability	Up to 3 Expansion units (for a maximum total of 7 units)			
Supported Islanding Devices	Gateway 3, Backup Switch, Backup Gateway 2			
Connectivity	Wi-Fi (2.4 and 5 GHz), Ethernet, Cellular (LTE/4G ⁶)			
Hardware Interface	Dry contact relay, Rapid Shutdown (RSD) certified switch and 2-pin connector, RS-485 for meters			
AC Metering	Revenue Grade (+/- 0.5%, ANSI C12.20)			
Protections	Integrated arc fault circuit interrupter (AFCI), Isolation Monitor Interrupter (IMI), PV Rapid Shutdown (RSD) using Tesla Mid-Circuit Interrupters			
Customer Interface	Tesla Mobile App			
Warranty	10 years			

¹Values provided for 25°C (77°F), at beginning of life. 3.3 kW charge/discharge power.

²See [Powerwall 3 Installation Manual](#) for fuse requirements if using fuse for overcurrent protection.

³15.4kW off-grid maximum continuous discharge power is only available if on-grid rating is 11.5 kW. If enabled, Powerwall 3 must be installed with an 80 A breaker and appropriately sized conductors.

⁴Typical solar shifting use case.

⁵Tested using CEC weighted efficiency methodology.

⁶The customer is expected to provide internet connectivity for Powerwall 3; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

Powerwall 3 Technical Specifications

Solar Technical Specifications

Maximum Solar STC Input	20 kW
Withstand Voltage	600 V DC
PV DC Input Voltage Range	60 — 550 V DC
PV DC MPPT Voltage Range	60 — 480 V DC
MPPTs	6
Maximum Current per MPPT (I_{MP})	15 A ^{7,8}
Maximum Short Circuit Current per MPPT (I_{SC})	19 A ⁸

⁷ Only applicable to Powerwall 3 units with 15 A I_{MP} on the product label. Otherwise, Powerwall 3 has an I_{MP} of 13 A.

⁸ When PV strings are combined on the roof and the DC input current exceeds the MPPT rating, a jumper can be used to combine two MPPTs into a single input to intake DC current up to 30 A I_{MP} / 38 A I_{SC} (or 26 A I_{MP} / 30 A I_{SC} if Powerwall 3 is labeled with 13 A I_{MP} / 15 A I_{SC}).

Environmental Specifications

Operating Temperature	−20°C to 50°C (−4°F to 122°F) ⁹
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	−20°C to 30°C (−4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP55 (Wiring Compartment)
Pollution Rating	PD3
Operating Noise @ 1 m	< 50 db(A) typical < 62 db(A) maximum

⁹ Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information

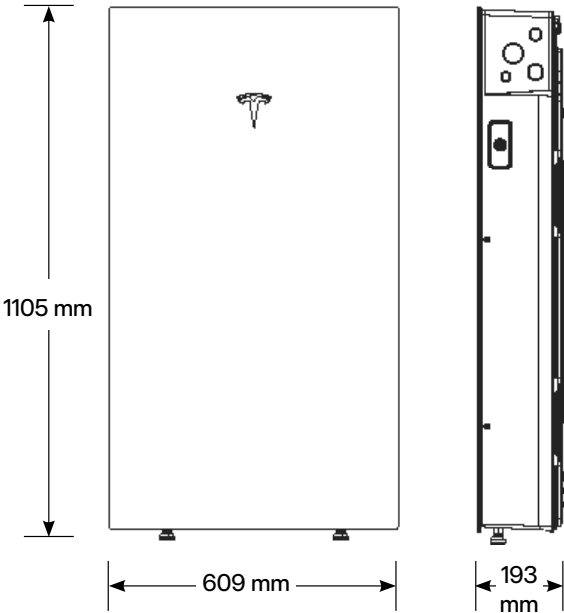
Certifications	UL 1741, UL 9540, UL 9540A, UL 3741, UL 1741 PCS, UL 1741 SA, UL 1741 SB, UL 1741 Multimode, UL 1973, UL 1699B, UL 1998, CSA C22.2 No. 0.8, CSA C22.2 No. 107.1, CSA C22.2 No. 330, CSA 22.3 No. 9, IEEE 1547, IEEE 1547A, IEEE 1547.1, CA Rule No.21
Grid Connection	United States and Canada
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)
Fire Testing	Meets the unit level performance criteria of UL 9540A

Powerwall 3 Technical Specifications

Mechanical Specifications

Dimensions	1105 x 609 x 193 mm (43.5 x 24 x 7.6 in) ¹⁰
Total Weight of Installed Unit	132 kg (291.2 lb)
Weight of Powerwall 3	124 kg (272.5 lb)
Weight of Glass Front Cover	6.5 kg (14.5 lb)
Weight of Wall Bracket	1.9 kg (4.2 lb)
Mounting Options	Floor or wall mount

¹⁰ These dimensions include the glass front cover being installed on Powerwall 3.



Powerwall 3 Expansion Technical Specifications

Battery Technical Specifications

Model Number	1807000-xx-y
Nominal Battery Energy	13.5 kWh
Voltage Range	52 – 92 V DC ¹¹

¹¹ Powerwall 3 Expansion units are connected in parallel and are not field serviceable.

Environmental Specifications

Operating Temperature	–20°C to 50°C (–4°F to 122°F) ¹²
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	–20°C to 30°C (–4°F to 86°F), up to 95% RH, non-condensing, State of Energy (SOE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	NEMA 3R
Ingress Rating	IP67
Pollution Rating	PD3

¹² Performance may be de-rated at operating temperatures above 40°C (104°F).

Compliance Information

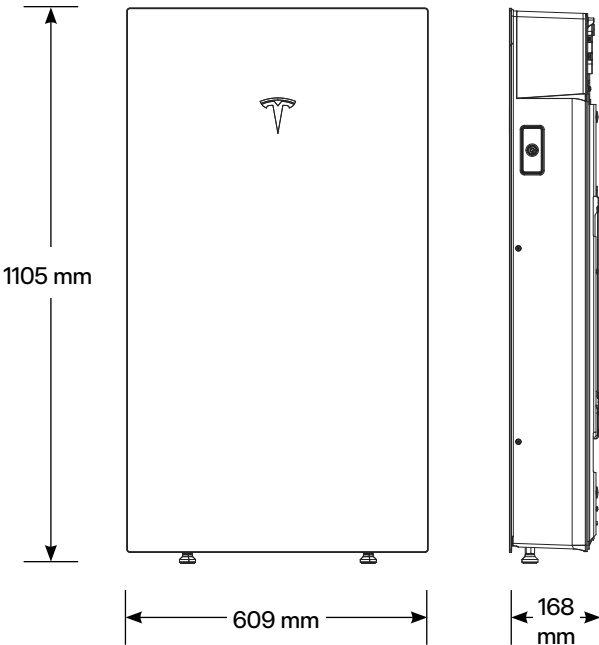
Certifications	UL 1973, UL 9540 Meets the unit level performance criteria of UL 9540A
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Mechanical Specifications

Dimensions	1105 x 609 x 168 mm (43.5 x 24 x 6.6 in) ¹³
Total Weight of Wall-Mounted Expansion Unit	118.5 kg (261.2 lb)
Weight of Expansion Unit	110 kg (242.5 lb)
Weight of Glass Front Cover	6.5 kg (14.5 lb)
Weight of Wall Bracket	1.9 kg (4.2 lb)
Weight of Expansion Accessories	0.7 kg (1.5 lb)
Mounting Options	Floor or wall mount
Stacking Capability (Floor Mount Only)	Up to (3) Expansion units behind a Powerwall 3
Compatibility with Other Systems	Only compatible with Powerwall 3
Connection to Powerwall 3 or Expansions	Powerwall 3 Expansion harness ¹⁴

¹³ These dimensions include the glass front cover being installed on Powerwall 3 Expansion.

¹⁴ The Powerwall 3 Expansion harness is a listed component of the UL 9540 certification.



Solar Shutdown Device Technical Specifications

The Solar Shutdown Device is a Mid-Circuit Interrupter (MCI) and is integral to the rapid shutdown (RSD) function required for rooftop PV systems in accordance with Article 690 of the NEC. When paired with Powerwall 3, solar array shutdown is initiated by an External System Shutdown Switch or the On/Off Enable switch located on Powerwall 3. Systems not subject to rapid shutdown requirements must still install one or more MCIs for functional purposes; see the Powerwall 3 installation manual for details.

Electrical Specifications	Model	MCI-1	MCI-2	MCI-2 High Current
	Nominal Input DC Current Rating (I _{MP})	13 A	13 A	15 A
	Maximum Input Short Circuit Current (I _{SC})	19 A	17 A	19 A
	Maximum System Voltage	600 V DC	1000 V DC ¹⁵	1000 V DC ¹⁵
	Maximum Disconnect Voltage ¹⁶	600 V DC	165 V DC	165 V DC
¹⁵ Maximum System Voltage is limited by Powerwall to 600 V DC.				
¹⁶ Maximum Disconnect Voltage is the maximum voltage allowed across each MCI in the open position (Rapid Shutdown Initiated). An individual MCI-2 has a voltage rating of 165V but in combination (connected in the same string) their voltage ratings are additive.				
RSD Module Performance	Maximum Number of Devices per String	5		
	Control	Power Line Excitation		
	Passive State	Normally Open		
	Maximum Power Consumption	7 W		
	Warranty	25 years		
Environmental Specifications	Operating Temperature	-40°C to 50°C (-40°F to 122°F)	-45°C to 70°C (-49°F to 158°F)	
	Storage Temperature	-30°C to 70°C (-22°F to 158°F)	-30°C to 70°C (-22°F to 158°F)	
	Enclosure Rating	NEMA 4X / IP65		
Mechanical Specifications	Electrical Connections	MC4 Connector		
	Housing	Plastic		
	Dimensions	125 x 150 x 22 mm (5 x 6 x 1 in)	173 x 45 x 22 mm (6.8 x 1.8 x 1 in)	
	Weight	350 g (0.77 lb)	120 g (0.26 lb)	
	Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw	Wire Clip	
Compliance Information	Certifications	UL 1741 PVRSE, UL 3741, PVRSA (Photovoltaic Rapid Shutdown Array)		
	RSD Initiation Method	External System Shutdown Switch or Powerwall 3 Enable Switch		

UL 3741 PV Hazard Control (and PVRSA) Compatibility

See [UL 3741 Application Addendum](#)

Gateway 3

Tesla Gateway 3 controls connection to the grid in a Powerwall system, automatically detecting outages and providing seamless transition to backup power. It provides energy monitoring that is used by Powerwall for solar self-consumption, time-based control, and backup operation.

Performance Specifications

Model Number	1841000-x1-y	AC Meter	+/- 0.5%
Nominal Grid Voltage	120/240 V AC	Communication	CAN
Grid Configuration	Split phase	User Interface	Tesla App
Grid Frequency	60 Hz	Backup Transition	Automatic disconnect for seamless backup
Continuous Current Rating	200 A	Overcurrent Protection Device	100–200 A Service entrance rated Eaton CSR, BWH, or BW, or Square D QOM breakers
Maximum Supply Short Circuit Current	22 kA with Square D or Eaton main breaker 25 kA with Eaton main breaker ¹⁷	Internal Panelboard	200 A 8-space/16 circuit breakers Eaton BR, Siemens QP, or Square D HOM breakers rated to 10–125A
IEC Protective Class	Class I	Warranty	10 years
Overvoltage Category	Category IV		

¹⁷ Only Eaton CSR or BWH main breakers are 25 kA rated.

Environmental Specifications

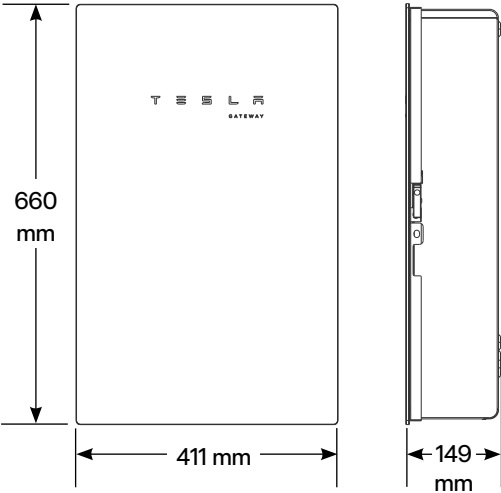
Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 107.1, CSA 22.2 29
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

Dimensions	660 x 411 x 149 mm (26 x 16 x 6 in)
Weight	16.3 kg (36 lb)
Mounting options	Wall mount



Backup Switch

The Tesla Backup Switch controls connection to the grid in a Powerwall system, and can be easily installed behind the utility meter or in a standalone meter panel downstream of the utility meter.

The Backup Switch automatically detects grid outages, providing a seamless transition to backup power. It communicates directly with Powerwall, allowing home energy usage monitoring from any mobile device with the Tesla app.

Performance Specifications

Model Number	1624171-xx-y
Continuous Load Rating	200 A, 120/240 V split phase
Maximum Supply Short Circuit Current	22 kA with breaker ¹⁸
Communication	CAN
AC Meter	+/- 0.5%
Expected Service Life	21 years
Warranty	10 years

¹⁸ Breaker maximum supply short circuit current rating must be equal to or greater than the available fault current.

Environmental Specifications

Operating Temperature	−40°C to 50°C (−40°F to 122°F)
Storage Temperature	−40°C to 85°C (−40°F to 185°F)
Enclosure Rating	NEMA 3R
Pollution Rating	PD3

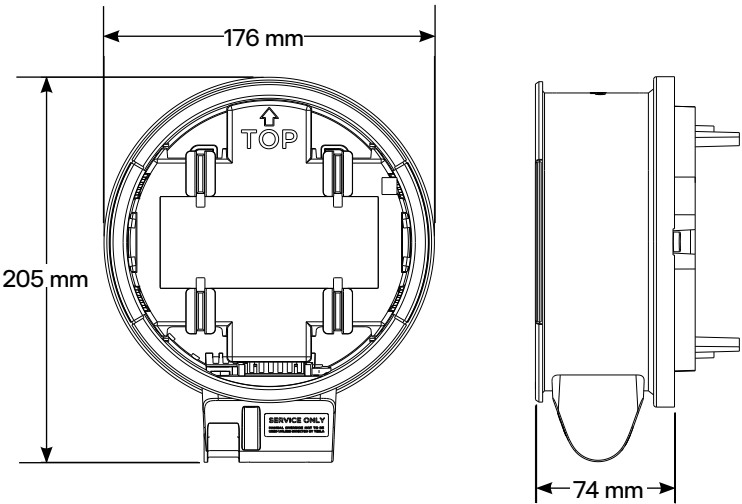
Compliance Information

Safety Standards	USA: UL 414, UL 414 SB, UL 2735, UL 916, CA Prop 65
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

Dimensions	176 x 205 x 74 mm (6.9 x 8.1 x 2.9 in)
Weight	2.8 lb
Meter and Socket Compatibility	ANSI Type 2S, ringless or ring type
External Service Interface	Contactor manual override ¹⁹ Reset button
Conduit Compatibility	1/2-inch NPT

¹⁹ Manually overrides the contactor position during a service event.



Backup Gateway 2

Backup Gateway 2 controls connection to the grid when paired with Powerwall 3, automatically detecting outages and providing seamless transition to backup power. Backup Gateway 2 also provides energy metering for solar self-consumption, time-based control, and backup operation.

In this system configuration, Powerwall 3 acts as the Site Controller, with the Backup Gateway 2 Site Controller disabled.

Performance Specifications

Model Number	1232100-xx-y	Internal Primary AC Meter	+/- 0.2%
AC Voltage (Nominal)	120/240 V	Internal Auxiliary AC Meter	+/- 2%
Feed-in Type	Split phase	Backup Transition	Automatic disconnect for seamless backup
Grid Frequency	60 Hz	Modularity	Supports up to 10 AC-coupled Powerwalls
Current Rating	200 A	Optional Internal Panelboard	200 A 6-space / 12 circuit breakers Siemens QP or Square D HOM breakers rated 10 - 80A or Eaton BR breakers rated 10 - 125A
Maximum Supply Short Circuit Current	10 kA ²⁰	Warranty	10 years
Overcurrent Protection Device	100 - 200 A, Service entrance rated		
Overvoltage Category	Category IV		

²⁰ When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.

Environmental Specifications

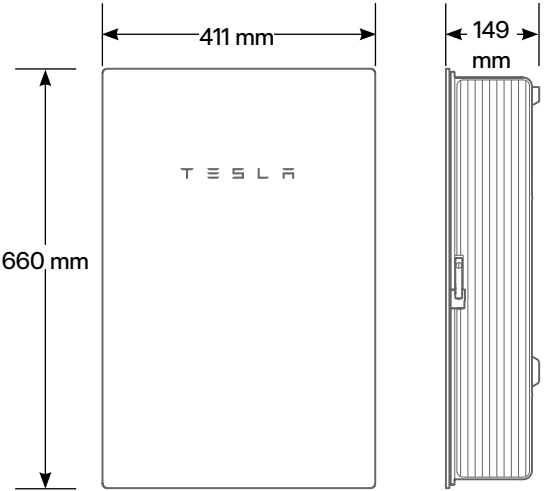
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Compliance Information

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS, CSA 22.2 0.19, CSA 22.2 205
Emissions	FCC Part 15, Class B, ICES 003

Mechanical Specifications

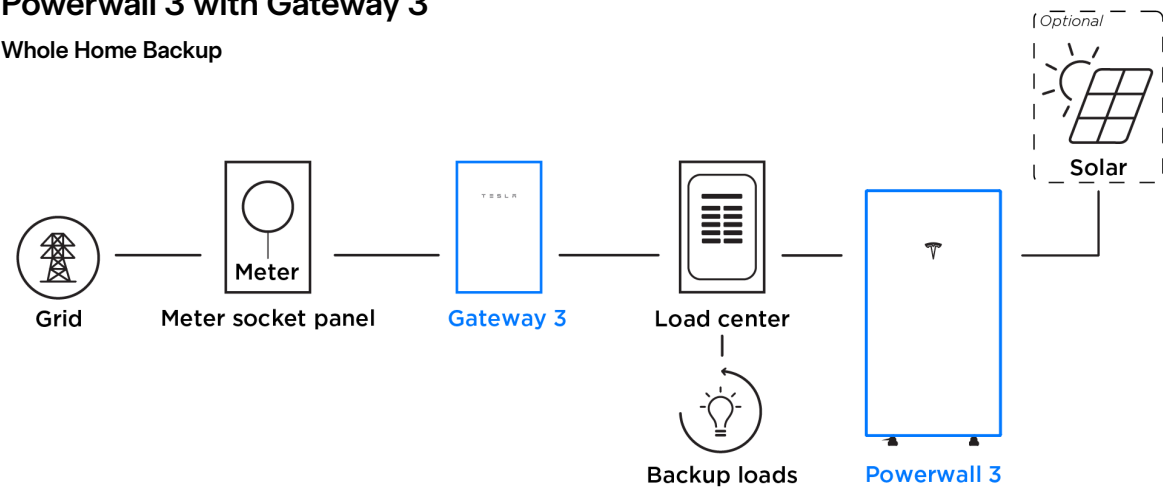
Dimensions	660 x 411 x 149 mm (26 x 16 x 6 in)
Weight	20.4 kg (45 lb)
Mounting options	Wall mount



Powerwall 3 Example System Configurations

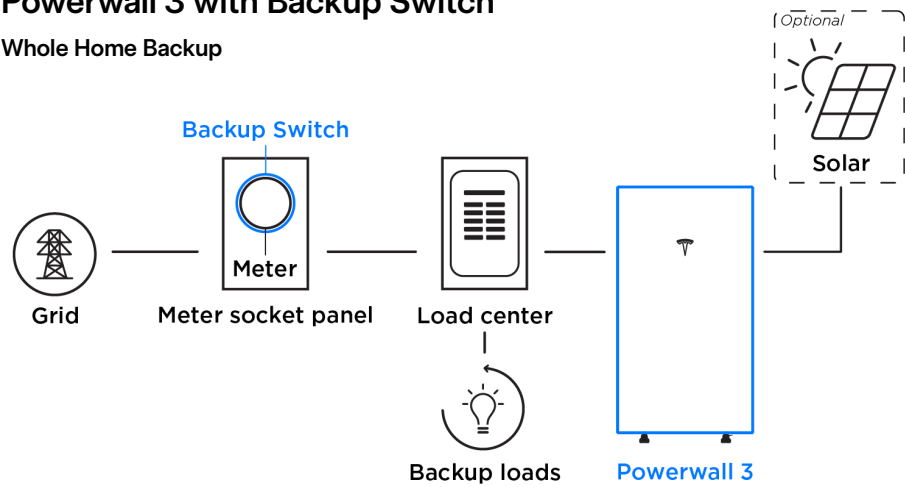
Powerwall 3 with Gateway 3

Whole Home Backup



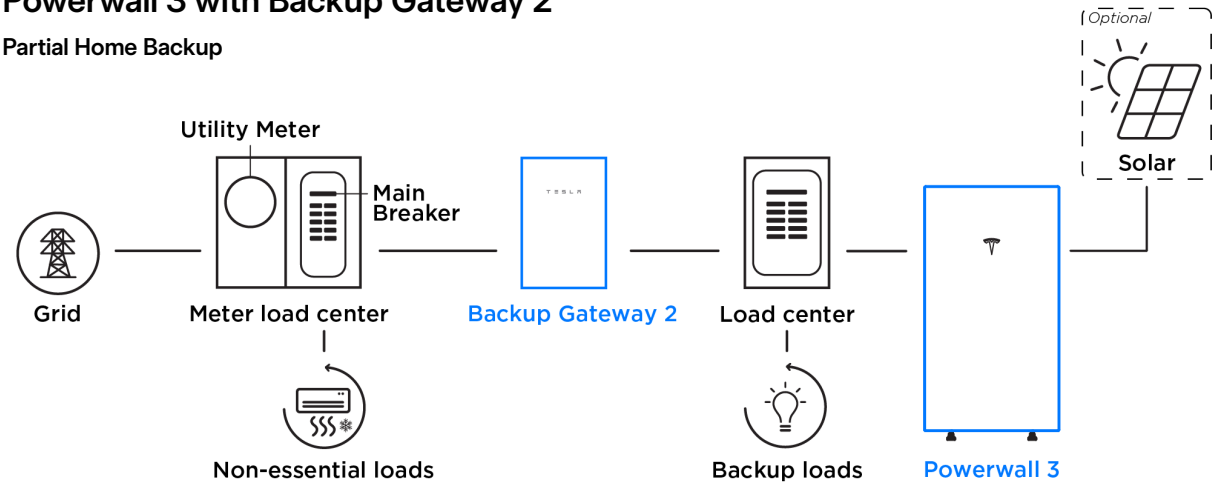
Powerwall 3 with Backup Switch

Whole Home Backup



Powerwall 3 with Backup Gateway 2

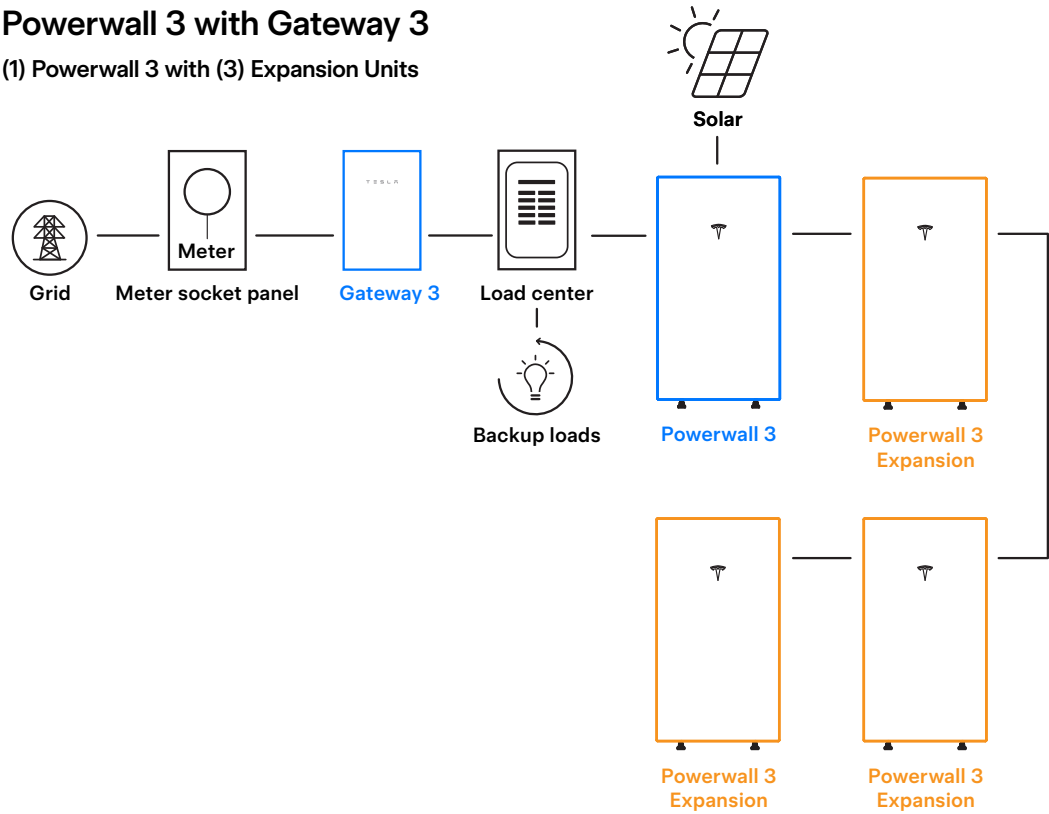
Partial Home Backup



Powerwall 3 Example System Configurations

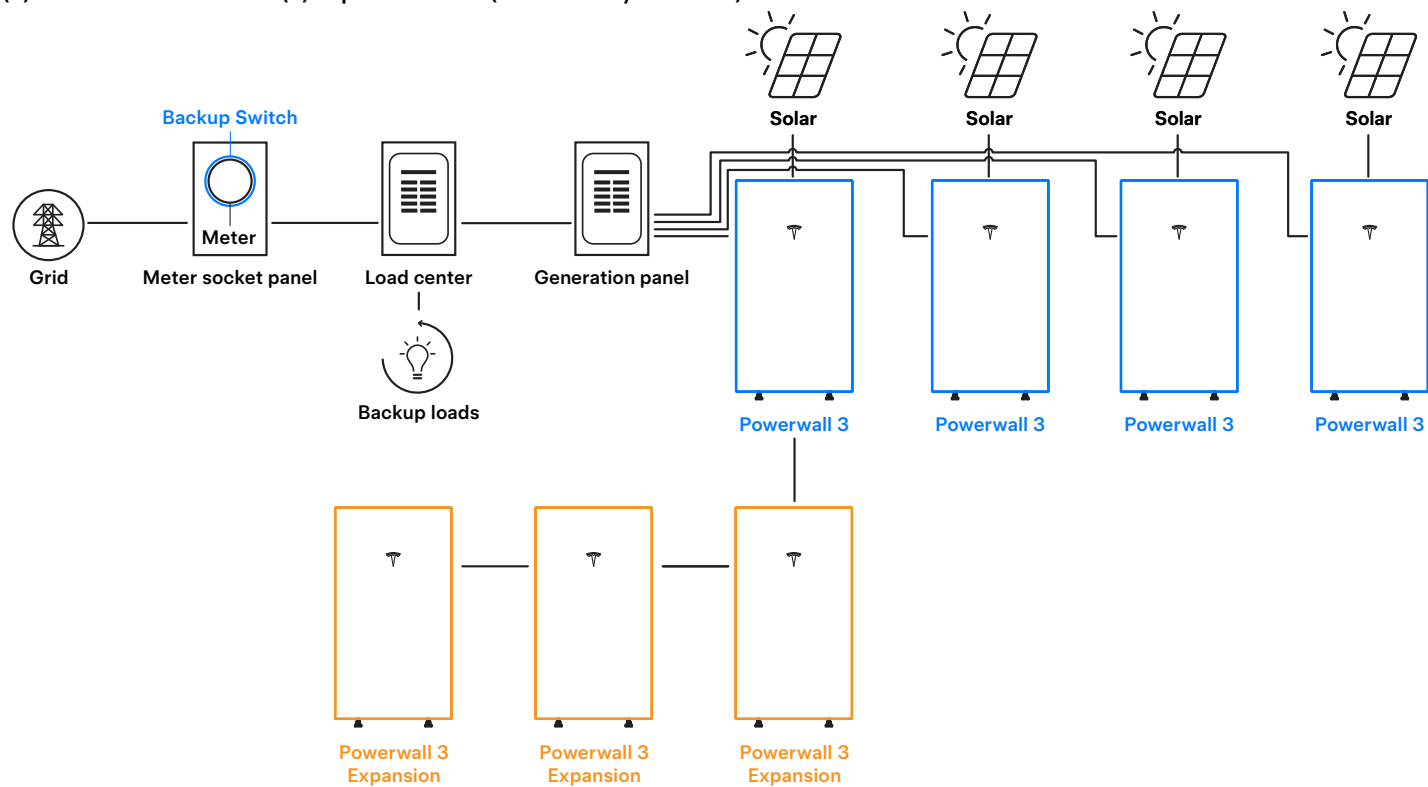
Powerwall 3 with Gateway 3

(1) Powerwall 3 with (3) Expansion Units



Powerwall 3 with Backup Switch

(4) Powerwall 3 Units with (3) Expansion Units (Maximum System Size)





April 15, 2026

SnapNrack
775 Fiero Lane, Ste. 200
San Luis Obispo, CA 93401
TEL: (877) 732-2860

Attn.: SnapNrack - Engineering Department
PZSE Reference Number 2024-04731
Re: Master Report #'s 2017-03227.11, 2018-11940.03 & 2022-02141

PZSE, Inc. – Structural Engineers determined the allowable capacity for various SnapNrack roof attachments. This analysis is based on requirements set forth in the ASCE 7-16, ASCE 7-22, the 2018, 2021 & 2024 International Building Code(s), and the 2018, 2021 & 2024 International Residential Code(s). This letter shall serve as a summary letter showing the design capacity per attachment to be used with the an associated racking system. Please refer to the System Master Certification Report(s) for limitations of the racking system(s) certification and code criteria.

SnapNack Attachments:

The following published tables showing design reactions are considered maximum allowable(s). Fasteners shall be embedded into competent material. Refer to the tables for fastening material and minimum embedment requirements. For deck attachments, install fasteners with min. ¼” protrusion through the deck to ensure adequate thread engagement. Where fastener diameter is not shown, use fastener specified by manufacture with min. (6) diameter embedment. For standing seam roof clamps, clamps shall be torqued to mnfr. Specification.

Design Responsibility:

This report does not explicitly consider the effects on the existing building structural or architectural components. This requires additional knowledge of the building and is outside the scope of the certification of this racking system.

If you have any questions, do not hesitate to call.

Prepared by:
PZSE, Inc. – Structural Engineers
Roseville, CA

Racking System: UltraRail - Flush Mount			Minimum Embedment (in)	Design Reactions			
Mount	Fastener	Fastening Material		Uplift (lb)	Downforce (lb)	Side (lb)	Lateral (lb)
UltraFoot, Rafter	(1) 5/16" lag screw	Framing	2.1/2"	1325	2500	444	735
UltraFoot, Deck	(4) #14 wood screws	1/2" sheathing/plank/T&G	Full	285	350	180	245
UltraFoot, Deck	(4) #14 wood screws	3/8" sheathing/plank/T&G	Full	260	335	100	100
UltraFoot, Deck	(2) #14 wood screws	Framing	1.1/4"	584	674	271	271
UltraFoot, Anchor	(2) DeckAnchors	1/2" sheathing/plank/T&G	Full	500	350	430	430
UltraFoot, Anchor	(2) DeckAnchors	3/8" sheathing/plank/T&G	Full	375	350	200	200
UltraFoot, Anchor	(1) 5/16" lag screw	Framing	2.1/2"	1325	2500	444	735
SpeedSeal Foot	(1) 5/16" lag screw	Framing	2.1/2"	829	1333	443.8	443.8
SpeedSeal DeckFoot	(2) #14 wood screws	Framing	1.1/4"	584	674	271	271
SpeedSeal DeckFoot	(4) #14 wood screws	1/2" sheathing/plank/T&G	Full	448	335	275.7	275.7
SpeedSeal DeckFoot	(4) #14 wood screws	3/8" sheathing/plank/T&G	Full	260	335	100	100
Umbrella L-Foot	(1) 5/16" lag screw	Framing	2"	829	1333	356.7	356.7
Tile Hook WS	(2) 5/16" lag screws	Framing	2.1/2"	1200	500	356.7	356.7
Tile Hook WS	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	225	350	100	100
Tile Hook WS	(8) #14 wood screws	1/2" sheathing/plank/T&G	Full	300	350	100	100
Tile Hook WS	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	195	350	100	100
Tile Hook WS	(8) #14 wood screws	3/8" sheathing/plank/T&G	Full	262	335	120	120
Tile Roof Hook F	(2) 5/16" lag screws	Framing	2.1/2"	829.2	500	615.8	615.8
Adjustable Tile Hook	(2) 5/16" lag screws	Framing	2.1/2"	1200	500	615.8	615.8
Adjustable Tile Hook	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	225	350	100	100
Adjustable Tile Hook	(8) #14 wood screws	1/2" sheathing/plank/T&G	Full	300	350	100	100
Adjustable Tile Hook	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	195	350	100	100
Adjustable Tile Hook	(8) #14 wood screws	3/8" sheathing/plank/T&G	Full	262	350	100	100
OmniBase with 8-1/2 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	305	266.3
OmniBase with 8-1/2 in Standoff	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	670	350	250	250
OmniBase with 8-1/2 in Standoff	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	390	335	120	120
OmniBase with 10 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	259	226
OmniBase with 10 in Standoff + Omnishield	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	670	350	250	200
OmniBase with 10 in Standoff + Omnishield	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	390	350	250	200
OmniBase with 14 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	185	162
OmniBase with 14 in Standoff + Omnishield	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	670	350	185	162
OmniBase with 14 in Standoff + Omnishield	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	390	350	185	162
OmniBase with 23 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	113	98
OmniBase with 23 in Standoff + Omnishield	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	670	350	113	98
OmniBase with 23 in Standoff + Omnishield	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	390	350	113	98
AnchorFoot	(2) DeckAnchors	1/2" sheathing/plank/T&G	Full	500	350	430	430
AnchorFoot	(2) DeckAnchors	3/8" sheathing/plank/T&G	Full	375	350	200	200
AnchorFoot	(4) #14 wood screws	1/2" sheathing/plank/T&G	Full	500	350	275	275
AnchorFoot	(4) #14 wood screws	3/8" sheathing/plank/T&G	Full	260	350	100	100
AnchorFoot	(1) 5/16" lag screw	Framing	2.1/2"	802	1333	287	287
AnchorFoot	(2) #14 wood screws	Framing	1.1/4"	584	674	271	271
All Purpose L-Foot (90 Deg)	(1) 5/16" lag screw	Framing	2.1/2"	444.7	1468.7	259.3	336
Hanger Bolt Clamp	(1) 3/8" bolt	Framing	2.1/2"	397.3	460.9	500	500

Racking System: UltraRail - Flush Mount			Minimum Embedment (in)	Design Reactions			
Mount	Fastener	Fastening Material		Uplift (lb)	Downforce (lb)	Side (lb)	Lateral (lb)
S-5! N-mini w/ SnapNrack hardware	-	Taylor Metals Easy Lock Standing Seam 22ga (.030") Steel	-	485	500	409	204.5
S-5! N-mini w/ SnapNrack hardware	-	New Tech FF 100 22ga (.030") Steel	-	485	500	409	204.5
S-5! N-mini w/ SnapNrack hardware	-	Dimond Roofing Eurotray Lite 22ga (.030") Steel	-	496	500	225	225
S-5! N-mini w/ SnapNrack hardware	-	Metal Panel Systems NS-100 22ga (.030") Steel	-	485	500	409.1	204.5
S-5! N-mini w/ SnapNrack hardware	-	The Bryer Company TBC-Proseam 24ga (.024") Steel	-	766.5	500	337	168.5
S-5! N-mini w/ SnapNrack hardware	-	AB Martin AB Seam 124ga (.024") Steel	-	533.5	500	337	168.5
S-5! N-mini w/ SnapNrack hardware	-	McElroy Meridian 24ga (.024") Steel	-	533	500	464.5	232.25
S-5! N-mini w/ SnapNrack hardware	-	Englert A1101 24ga (.024") Steel	-	372	500	337	168.5
S-5! N-mini w/ SnapNrack hardware	-	Lysaght ENSEAM® 25mm 24ga (.024") Steel	-	595.5	500	400	133.3
S-5! N-mini w/ SnapNrack hardware	-	Sheet Metal Supply NS-124ga (.024") Steel	-	595.5	500	400	133.3
S-5! N-mini w/ SnapNrack hardware	-	Taylor Metals Easy Lock Standing Seam 24ga (.024") Steel	-	370	500	400	133.3
S-5! N-mini w/ SnapNrack hardware	-	New Tech FF 100 24ga (.024") Steel	-	370	500	370	185
S-5! N-mini w/ SnapNrack hardware	-	Westform Metals PROLOK 24ga (.024") Steel	-	481	500	253.5	126.75
S-5! N-mini w/ SnapNrack hardware	-	The Bryer Company TBC-Proseam 26ga (.018") Steel	-	380	500	225	112.5
S-5! N-mini w/ SnapNrack hardware	-	McElroy Meridian 26ga (.018") Steel	-	262.5	500	342	171
S-5! N-mini w/ SnapNrack hardware	-	ABC SL16 26ga (.018") Steel	-	367	500	225	112.5
S-5! N-mini w/ SnapNrack hardware	-	Westman Steel Snap-Lok 26ga (.018") Steel	-	200.7	500	225	112.5
S-5! N-mini w/ SnapNrack hardware	-	Agway NS25 26ga (.018") Steel	-	273.45	500	225	112.5
S-5! N-mini w/ SnapNrack hardware	-	Metal Sales Image II 26ga (.018") Steel	-	269.45	500	225	112.5
S-5! N-mini w/ SnapNrack hardware	-	Taylor Metals Easy Lock Standing Seam 26ga (.018") Steel	-	262	500	225	112.5
S-5! N-mini w/ SnapNrack hardware	-	New Tech FF 100 26ga (.018") Steel	-	262	500	229.5	114.75

Racking System: UltraRail - Flush Mount			Minimum Embedment (in)	Design Reactions			
Mount	Fastener	Fastening Material		Uplift (lb)	Downforce (lb)	Side (lb)	Lateral (lb)
S-5! N-mini w/ SnapNrack hardware	-	Metal Panel Systems NS-100 26ga (.018") Steel	-	262	500	225	225
S-5! N-mini w/ SnapNrack hardware	-	Westform Metals PROLOK 26ga (.018") Steel	-	264	500	233.5	116.75
S-5! N-mini w/ SnapNrack hardware	-	Englert A1101 18ga (.040") Aluminum	-	267	500	225	225
S-5! N-mini w/ SnapNrack hardware	-	Generic Generic 26ga (.018") Steel	-	225	500	225	113
S-5! N-mini w/ SnapNrack hardware	-	Generic Generic 20ga (.032") Aluminum	-	400	500	400	200
S-5! Protea Bracket w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	29ga (.014") Steel	Full	327	500	248	124
S-5! Protea Bracket w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	26ga (.018") Steel	Full	501.6	500	279.5	139.75
S-5! Protea Bracket w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	24ga (.024") Steel	Full	560	500	333.5	166.76
S-5! CorruBracket w/ SnapNrack hardware	(4) 1/4" Wood Screws	Framing	1.1/2"	795.6	500	616.76	308.38
S-5! CorruBracket w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	16ga (.060") Steel	Full	695.2	500	544.3	272.15
S-5! CorruBracket w/ SnapNrack hardware	(4) 1/4" Wood Screws	1/2" sheathing/plank/T&G	Full	306.9	500	338.3	169.16
S-5! CorruBracket w/ SnapNrack hardware	(4) 1/4" Wood Screws	3/8" sheathing/plank/T&G	Full	260	350	100	100
S-5! CorruBracket 100T w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	27ga (.017") Steel	Full	375	500	644.3	322.15
S-5! CorruBracket 100T w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	24ga (.024") Steel	Full	455.5	500	628.7	314.37
S-5! CorruBracket 100T w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	26ga (.018") Steel	Full	388	500	465.26	232.63
S-5! CorruBracket 100T w/ SnapNrack hardware	(4) 1/4" Self-Piercing Metal Screws	20ga (.032") Aluminum	Full	337	500	398.8	199.4
S-5! SolarFoot w/ SnapNrack hardware	(4) Fasteners	5/8" sheathing/plank/T&G	Full	446.4	500	392.8	196.4
S-5! SolarFoot w/ SnapNrack hardware	(4) Fasteners	17ga (.055") Galv Steel	Full	624	500	913.6	304.5
S-5! SolarFoot w/ SnapNrack hardware	(2) Fasteners	17ga (.055") Galv Steel	Full	507.2	500	722	240.67
S-5! SolarFoot w/ SnapNrack hardware	(2) Fasteners	Framing	1.1/2"	491.6	500	270.8	135.4
S-5! SolarFoot w/ SnapNrack hardware	(4) Fasteners	Framing	1.1/2"	621.6	500	662.4	331.2
S-5! SolarFoot w/ SnapNrack hardware	(4) Fasteners	1/2" sheathing/plank/T&G	Full	194.5	500	392.8	196.4
S-5! SolarFoot w/ SnapNrack hardware	(4) Fasteners	3/8" sheathing/plank/T&G	Full	260	350	100	100
S-5! VersaBracket 47 w/ SnapNrack hardware	(3) Fasteners	Framing	(6) Diameters	754.4	500	662.4	331.2
S-5! VersaBracket 47 w/ SnapNrack hardware	(2) Fasteners	Framing	(6) Diameters	526.8	500	394	197
S-5! VersaBracket 47 w/ SnapNrack hardware	(2) Fasteners	16ga (.060") Steel	Full	354.8	500	512.8	256.4
S-5! VersaBracket 47 w/ SnapNrack hardware	(3) Fasteners	1/2" sheathing/plank/T&G	Full	193.4	500	230.4	115.2
S-5! VersaBracket 47 w/ SnapNrack hardware	(3) Fasteners	3/8" sheathing/plank/T&G	Full	170	350	100	100
Metal Roof Base with L-Foot	(1) 1/4" Tek Screw	16ga (.060") Steel	Full	445	1458	445	445
Metal Roof Base with 7 in Standoff	(1) 1/4" Tek Screw	16ga (.060") Steel	Full	416	788	286	286
Metal Roof Base with L-Foot	(1) 5/16" lag screw	Framing	2.1/2"	445	1458	445	445
Metal Roof Base with 7 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	416	788	286	286
Wide Base Seam Clamp with L-Foot	-	26ga (.018") Steel	-	598	461	275	275

Racking System: UltraRail - Tilt Systems			Minimum Embedment (in)	Design Reactions			
Mount	Fastener	Fastening Material		Uplift (lb)	Downforce (lb)	Side (lb)	Lateral (lb)
Simple Tilt (5 Deg)	(1) 5/16" lag screw	Framing	2.1/2"	598	462	265	166
Simple Tilt (10 Deg)	(1) 5/16" lag screw	Framing	2.1/2"	598	462	265	166
OmniBase with 8-1/2 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	500	789	265	265
OmniBase with 8-1/2 in Standoff	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	500	350	100	100
OmniBase with 8-1/2 in Standoff	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	393	350	100	100
OmniBase with 10 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	259	226
OmniBase with 10 in Standoff + Omnishield	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	500	350	175	150
OmniBase with 10 in Standoff + Omnishield	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	393	350	100	100
OmniBase with 14 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	185	161.7
OmniBase with 14 in Standoff + Omnishield	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	500	350	124	106.5
OmniBase with 14 in Standoff + Omnishield	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	393	350	100	100
OmniBase with 23 in Standoff	(1) 5/16" lag screw	Framing	2.1/2"	655	1333	112.7	98
OmniBase with 23 in Standoff + Omnishield	(6) #14 wood screws	1/2" sheathing/plank/T&G	Full	500	350	75	64.5
OmniBase with 23 in Standoff + Omnishield	(6) #14 wood screws	3/8" sheathing/plank/T&G	Full	393	350	75	64.5

Note: All standoffs on this sheet refer to rear-leg height; front leg height is variable

Racking System: TopSpeed			Minimum	Design Reactions			
Mount	Fastener	Fastening Material	Embedment (in)	Uplift (lb)	Downforce (lb)	Side (lb)	Lateral (lb)
TopSpeed Original	(4) #14 wood screws	1/2" sheathing/plank/T&G	Full	448	335	320	320
TopSpeed Original	(4) #14 wood screws	3/8" sheathing/plank/T&G	Full	260	335	100	100
TopSpeed Universal - AlphaTrack	(1) 5/16" lag screw	Framing	2.1/2"	1325	2500	444	735
TopSpeed Universal - AlphaTrack	(2) DeckAnchors	1/2" sheathing/plank/T&G	Full	220	350	240	100
TopSpeed Universal - AlphaTrack	(2) DeckAnchors	3/8" sheathing/plank/T&G	Full	165	350	200	100
TopSpeed Universal - DeltaTrack	(2) #14 wood screws	Framing	1.1/4"	584	674	271	271
TopSpeed Universal - DeltaTrack	(4) #14 wood screws	1/2" sheathing/plank/T&G	Full	220	335	240	100
TopSpeed Universal - DeltaTrack	(4) #14 wood screws	3/8" sheathing/plank/T&G	Full	127	335	100	100
TopSpeed Universal - SpeedSeal Track	(1) 5/16" lag screw	Framing	2.1/2"	1325	2500	444	735
TopSpeed Universal - SpeedSeal DeckTrack	(1) 5/16" lag screw	Framing	2.1/2"	1325	2500	444	735
TopSpeed Universal - FlashTrack	(1) 5/16" lag screw	Framing	2.1/2"	1325	2500	444	735

Adjustable Tile Hook



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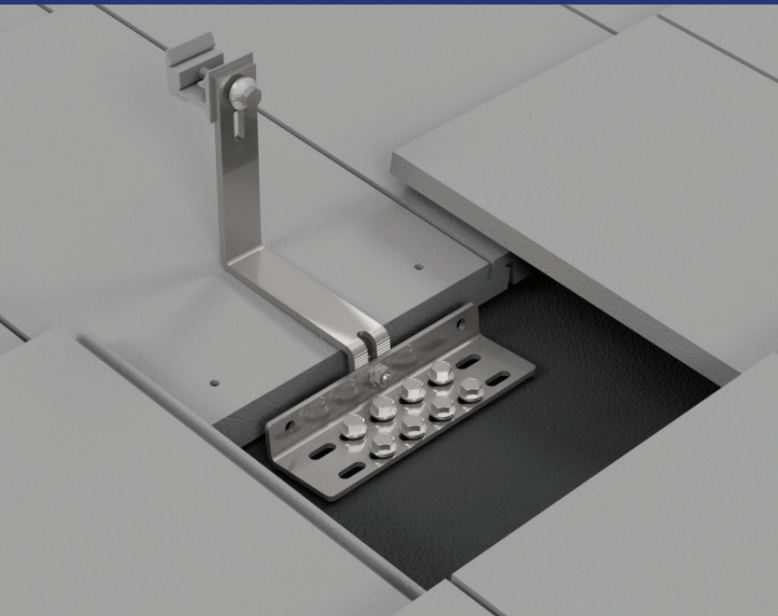
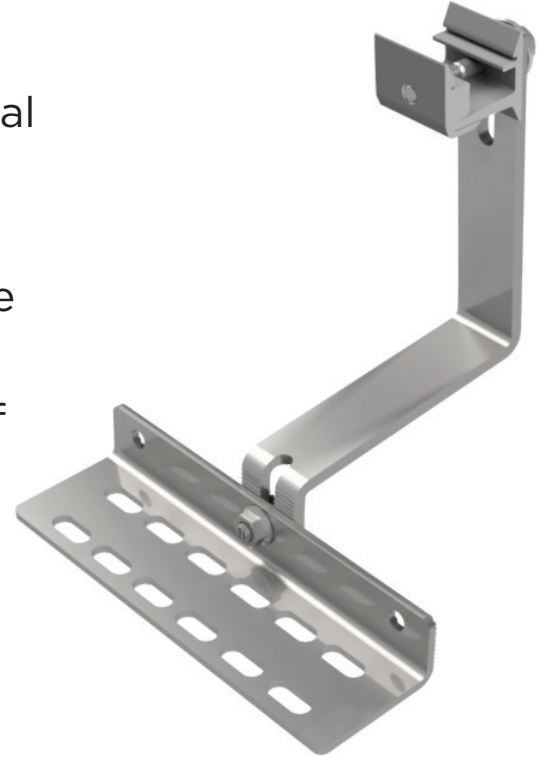
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Designed with maximum adjustability to accommodate for installation on Flat, S or W shaped tile roofs. These roof hooks are a strong low-profile attachment that can easily adjust to various tile heights, while reducing damage to tiles. The Tile Roof Hook can also be mounted directly to the roof deck with the use of wood screws.

- Slotted attachments provide maximum vertical adjustments for array leveling & compatibility with all tile profiles
- Three hook installation locations with multiple lag screw holes, guarantees locating a rafter while installing the hook through the valley of the tile
- Strong & rigid design reduces roof attachment quantities
- 1 hook for all tile roof profiles



- Capable of mounting directly to the roof deck with the use of 6 to 8 Wood Screws
- Ships preassembled with Ultra Rail Mount for snap-in rail connection
- Available with the **Tile Replacement Flashing** to further simplify tile installations

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