GREGORY MILNER
4292 NORTHWEST 54TH STREET COCONUT CREEK, FLORIDA 33073,
UNITED STATES
26.2963407, -80.1811857
SCOPE OF WORK: INSTALLATION OF SOLAR PANELS AND ASSOCIATED ELECTRICAL EQUIPMENT.

PROJECT INFORMATION
DISTRICTS
COUNTY: BROWARD COUNTY
JURISDICTION: COCONUT CREEK

DESIGN SPECS
WIND EXPOSURE: C
RISK CATEGORY: II
WIND SPEED (MPH): 170

GOVERNING CODES
SNOW LOAD (PSF): 0
BUILDING: FBC 2020/ASCE 7-16
ELECTRICAL: NEC 2017

SYSTEM
SIZE (KWDC): 9.6
# PANELS: 24
PANEL: REC400NP3
INVERTER(S): IQ7+
VOLTAGE (V): 240

SHEET INDEX
COVER
LAYOUT
LOCATIONS PLAN
ATTACHMENT PLAN
ATTACHMENT DETAIL
ELECTRICAL DIAGRAM
LABELS
DATASHEETS

01 VICINITY

02 AERIAL

PREPARED BY:

GREGORY MILNER
4292 NORTHWEST 54TH STREET COCONUT CREEK, FLORIDA 33073,
UNITED STATES

PARAMETERS:

DATE: 10.10.23
BY: RG
VER: 0
DESCRIPTION: INITIAL DESIGN

PAPER: ARCHIB
SCALE: NTS

PROJECT ID: 10102023-4292
ROOF TYPE 1
MATERIAL: TILES
ATTACHMENT: (74) SUNMODE-TOPTILE
RAL: (2011) R02RIDGE-XR100
MAX DEADLOAD: 23 lbs
MAX DSTR DEADLOAD: 2.98 psf
MAX AND NON LOAD: -361 lbf
MIN SAFETY FACTOR: 2.48

RELEVANT DMS
LENGTH HORIZ: 51'
ROOF HEIGHT(S), h/EXPOSED DIST, d1: 15'/7.5'
ZONE WIDTH, a: 5.1'

ARRAYS
MODULES: (24) REC400NP3
ARRAY AREA: 510 SQFT

02 SYSTEM SUMMARY

GENERAL
1.1 EXISTING VENTS, SKYLIGHTS OR EXHAUST OUTLETS SHALL NOT BE COVERED BY THE SOLAR PV SYSTEM.
1.2 MODULES SHALL NOT OVERHANG ANY RIDGE, HIP OR ROOF EDGE.
1.3 CONTRACTOR SHALL NOTIFY ENGINEER/DESIGNER OF ANY CHANGES.
1.4 PANELS SHALL BE A MINIMUM OF 18IN AWAY FROM ROOF EDGE.

AN ANALYSIS OF THE ROOF CONSTRUCTION AT THE REFERENCED PROPERTY WAS DONE AND IT HAS BEEN DETERMINED THAT THE STRUCTURE IS ADEQUATE TO SUPPORT THE ADDITIONAL SOLAR PV LOAD.

BASED ON OUR REVIEW, THE EXISTING MEMBERS COMPLY WITH FBC 2020/ASCE 7-16 SPAN RATINGS WITH SUFFICIENT CAPACITY TO SUPPORT THE NEW LOADS IMPOSED BY THE PROPOSED SOLAR ARRAY.

THE SPECIFICATIONS SHOWN IN THIS CONSTRUCTION PLAN WERE DESIGNED PER FBC 2020/ASCE 7-16 FOR A WIND SPEED OF 170 MPH, EXPOSURE CATEGORY C FOR RISK CATEGORY II BUILDING WITH 0 PSF SNOW LOAD.

03 NOTES

04 CERTIFICATION

INV - INVERTER/COMBINER
PM - POWER METER
ACD - AC DISCONNECT
MP - MAIN PANEL/DISC

INV - 1
ACD - 2
MP - 2r, 2n
M - 3, 3r, 3e

GREGORY MILNER
4292 NORTHWEST 54TH STREET COCONUT CREEK, FLORIDA 33073, UNITED STATES

R. S. GITTENS
1646 W SNOW AVE 196 TAMPA, FL 33606 CA: 33343

RYAN S. GITTENS
PE90605
LOCATIONS PLAN

GREGORY MILNER
4292 NORTHWEST 54TH STREET COCONUT CREEK, FLORIDA 33073, UNITED STATES

CONTRACTOR:

PROJECT ID: 10102023-4292

SOLAR DESIGN LAB

SL1

PANEL ID SIDE DIM (ft)
A00 T 2.98
A00 B 0.85
A00 L 4.39
A03 T 3.14
A03 B 4.1
A03 L 3.18
A10 T 4.47
A10 R 3.93
A10 L 2.11
B21 T 5.14
B21 R 4.23
B20 T 5.21
B20 L 1.49
B31 T 5.53
B31 R 6.35
B31 L 3.78
B40 T 3.28
B40 B 3.79
B40 L 5.97
C50 T 0.47
C50 B 1.75
C50 L 2.97
C55 T 0.47
C55 R 4.41
C60 T 3.04
C60 B 4.06
C70 T 0.66
C70 B 0.66
C80 T 6.59
C80 B 0.27
C80 L 0.97

DATE: 10.10.23
VER: 0
DESCRIPTION: INITIAL DESIGN

PAPER: ARCHIB
SCALE: NTS

PROJECT ID: 10102023-4292
ARRA Y
MODULE: (5) REC400NP3
TOT AL AREA: 106.23 SQFT

HARDWARE
RAIL: 40' IRONRIDGE-XR100
ATT ACHMENT: (14) SUNMODO-TOPTILE
ANCHORAGE: DECK
FRAMING
SIZE: MIN. 2X4
SP ACING: 24" OC

ROOF
MEAN HEIGHT: 15'
MA TERIAL: TILE
SHAPE: HIP

GEOGRAPHY
EXPOSURE CA T: C
WIND SPEED: 170 MPH
SNOW LOAD: 0 LBS

LOAD CALCS PER ASCE 7-16 & SEAOC PV2-2017

DIST DEADLOAD, Fdd: $Fdd = \frac{Fdr}{area/panel*#panels/row} (psf)$

DEADLOAD PER ANCHOR, Fda: $Fda = Fdr/(#anchors/row) (lbs)$

LOAD PER ANCHOR, Fa = 0.6*Fda + Fua (lbf)

SAFETY FACTOR, SF = Ftest/Fa

VELOCITY PRESSURE $qh = 0.00256*Kz*Kzt*Kd*Ke*V^2 = 53$ (lb/sqft)
Where $Kz = 0.85$, $Kzt = 1$, $Kd = 0.85$, $Ke = 1$, $V = 170$

EXT PRESSURE COEFFICIENT , $GCp$: $GCp$ varies per roof & zone, 30.3-2A-I to 30.3.7: $A_{eff} = 5.3125 \text{ sqft (0.25 panel)}$

EXPOSURE FACTOR, $YE$: $YE = 1.5$ for uplift loads on panels that are exposed and within a distance 1.5Lp from the end of a row at an exposed edge of the array; $YE = 1.0$ elsewhere for uplift loads and for all downward loads, as illustrated in Fig. 29.4-7. A panel is defined as exposed if $d1$ to the roof edge > 0.5h and one of the following applies: 1. $d1$ to the adjacent array > max (4h2, 4 ft) or 2. $d2$ to the next adjacent panel > max (4h2, 4 ft (1.2m).

PRESSURE EQUALIZATION FACTOR, $Ya$: $Ya$ is given as 0.7 per SEAOC 5.3.5 with $h2 = 6"$ & panel gap = 0.37"

LOADS:
Panel = 48lbs
Anchors = 1.2lbs
Rail = 0.72lbs/ft
Misc = 1.6lbs/panel

DEADLOAD PER ROW, Fdr:
$Fdr = (\frac{lbs/panel*#panels/row}{lbs/ft-rail*ft-rail/row})*2 + (\frac{lbs/anchor*#anchors/row}{lbs/anchor*#anchors/row})*2 + (\frac{misc-lbs/panel*#panels/row}{misc-lbs/panel*#panels/row})*(lbf)$

POINT LOAD, Fda:
$Fda = 23.01 \text{ lbs}$

LOAD PER ANCHOR, Fa = 0.6*Fda + Fua (lbf)

UPLIFT ON ONE PANEL, $Fup = P*A$ (lbf)
Per ASCE 2.4, 26.10.2 & 29.4.4
$P = \frac{pasd}{0.6} = \frac{0.6*qh*(GCp)*(Ye)*(Ya)}{0.6}$, $A = \text{load area}$

UPLIFT PER ROW, $Fur = \sum(Fup(0):Fup(n))$ (lbf)
Where $Fup(0):Fup(n) = loads$ from first to last panel in row

UPLIFT PER ANCHOR, $Fua = Fur/(#ANCHORS/ROW)$ (lbf)

ZONES
f0: 1' (Flat)
f1: 1 (Flat)
f2: 2 (Flat)
f3: 3 (Flat)
g1: 1 (Gable)
g2e: 2e (Gable)
g2n: 2n (Gable)
g2r: 2r (Gable)
g3r: 3r (Gable)
g3e: 3e (Gable)
h1: 1 (Hip)
h2r: 2r (Hip)
h2e: 2e (Hip)
h3: 3 (Hip)

ROW: 0 (4 MODS)
NOM SP AN: 36"
MAX SP AN: 39"
MAX CANTILEVER: 26"
UPLIFT/ROW, Fur: -3652 lbf
#ANCHORS: 10
LOAD/ANCHOR, Fa: -351 lbf
TEST LOAD/ANCHOR: -870 lbf
SF: 2.48
DIST LOAD, Fdd: 2.71 psf

ROW: 1 (1 MODS)
NOM SP AN: 66"
MAX SP AN: 66"
MAX CANTILEVER: 26"
UPLIFT/ROW, Fur: -913 lbf
#ANCHORS: 4
LOAD/ANCHOR, Fa: -219 lbf
TEST LOAD/ANCHOR: -870 lbf
SF: 3.98
DIST LOAD, Fdd: 2.98 psf

PARAMETERS

SP1

DESIGNATED USE OF THE DRAWING IS PERMITTED WITHOUT FURTHER PERMISSION FROM CONTRACTOR FOR INSTRUCTION OF U.S. COPYRIGHT LAW AND MAY BE REPRODUCED FOR PROJECT USE ONLY.
GENERAL
1.1 DESIGNED PER FBC 2020/ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.
1.2 CONTRACTOR IS RESPONSIBLE FOR INSTALLING PV MODULES, RACKING & RACKING SUPPORTS IN ACCORDANCE WITH THE MANUFACTURER INSTALLATION INSTRUCTIONS NOT SHOWN IN THIS PLAN.
1.3 WITHDRAWAL VALUES GIVEN PER NDS 2015 BASED ON SG OF 0.5 OR MANUFACTURER SUPPLIED 3RD PARTY UPLIFT TESTING REPORTS WITH APPLICABLE SAFETY FACTORS.
1.4 ALL PENETRATIONS SHALL BE FLASHED OR SEALED IN A MANNER THAT PREVENTS MOISTURE FROM ENTERING THE WALL AND ROOF USING ASTM C920 COMPLIANT SEALANT IN PILOT HOLES AND AROUND FASTENERS.
1.5 THE SUPPORTING ROOF STRUCTURE SHALL BE CONVENTIONAL WOOD FRAMED CONSTRUCTION WITH PRE-ENGINEERED TRUSSES OR ROOF FRAMING MEMBERS AT A SPACING OF 24 IN MAXIMUM ON CENTER.
1.6 EXISTING STRUCTURE IS ASSUMED TO BE IN COMPLIANCE WITH APPLICABLE BUILDING CODES AT THE TIME OF CONSTRUCTION.
1.7 CONTRACTOR SHALL NOTIFY ENGINEER OF ANY CONDITION CHANGES.

ANCHORAGE DETAIL

ANKOR DETAIL

MODULE DETAILS

CONTRACTOR:

ECQUIP ENGINEERING
1646 W SNOW AVE 196
TAMPA, FL 33606
CA: 33343
RYAN S GITTENS PE90655

DATE BY VER DESCRIPTION
10.10.23 RY O INITIAL DESIGN

PAPER: ARCHIV

SCALE: NTS
GENERAL
1.1 CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH FBC 2020/ASCE 7-16 AND NEC 2017 REQUIREMENTS AND EQUIPMENT INSTALLATION INSTRUCTIONS NOT SHOWN IN THIS PLAN.

1.2 DIRECT CURRENT PV SOURCE AND OUTPUT CONDUCTORS INSIDE A BUILDING SHALL BE CONTAINED IN METAL RACEWAYS, 690.31(G).

1.3 ALL EQUIPMENT SHALL BE LISTED PER NEC 690.4(B).

1.4 PV SOURCE CONDUCTORS ARE SIZED TO BE EXPOSED TO DIRECT SUNLIGHT GREATER THAN 10% OF THEIR LENGTH WHEN INSTALLED IN RACEWAYS ½" OR GREATER ABOVE ROOF. ADJUSTMENTS ARE BASED ON MAX CURRENT OF 16A. 35C AMBIENT TEMP NEC 310.15(B)(2)(A) AND 310.15(B)(3)(C).

1.5 ALL EQUIPMENT SHALL BE RATED FOR INSTALL LOCATION. ROOF & OUTDOOR JUNCTION BOXES SHALL BE OUTDOOR RATED

SYSTEM
2.1 THE ELECTRICAL SYSTEM IS NON-ISOLATED AND UNGROUNDED. NEITHER THE NEGATIVE NOR POSITIVE CONDUCTOR IS GROUNDED AND HAS A COMMON AC AND DC EQUIPMENT GROUNDING TERMINAL THEREFORE NO DC GEC IS REQUIRED.

2.2 ENPHASE SERIES MICROINVERTERS REQUIRE NO GROUND OR GROUNDED CONDUCTOR BECAUSE THE DC CIRCUIT IS ISOLATED AND INSULATED FROM GROUND.

2.3 THE INVERTER IS EQUIPPED WITH A RAPID SHUTDOWN FEATURE WHICH CONFORMS TO NEC 690.12.

2.4 INTERCONNECTION SHALL BE MADE BY LINE-SIDE-TAP PER ARTICLE 705.12(A) USING INSULATED, PIERCING CONNECTORS UL LISTED FOR THIS PURPOSE.

2.5 NO MORE THAN 4 BRANCHES (OR 8 CONDUCTORS) SHALL BE RUN IN A SINGLE CONDUIT USING #10 WIRE. USE MULTIPLE CONDUTS/JBOX AS REQUIRED TO SATISFY THIS LIMIT.

GROUNDING
3.1 ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690.

3.2 Framed PV modules shall be bonded together using lugs or rack integrated grounding clamps.

3.3 GROUNDING ELECTRICAL INSTALLATION SHALL BE COMPLY WITH 250.64, 250.53 & 250.62 & BE OF THE TYPES & SIZE LISTED IN 250.52

3.4 INTERSYSTEM BONDING DEVICE REQUIRED AT SERVICE WHEN COMMUNICATION DEVICES ARE PRESENT PER 250.94.

3.5 GROUNDING ELECTRODE INSTALLATION SHALL COMPLY WITH 250.64, 250.53 & 250.62 & BE OF THE TYPES & SIZE LISTED IN 250.52

3.6 GROUNDING ELECTRODE CONDUCTOR SHALL BE SIZE 250.66 & T250.66 (FIELD VERIFY)

3.7 METAL WATER PIPES SHALL BE GROUNDED PER 250.104(A)

MODULAR RATINGS

INVERTER RATINGS

SYSTEM

EQUIPMENT SCHEDULE
WARNING
ELECTRICAL SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

NEC 690.13(B)
LOCATION(S): 3, 4

PHOTOVOLTAIC DISCONNECT

NEC 690.13(B)
LOCATION(S): 3, 4

WARNING: PHOTOVOLTAIC POWER SOURCE

CAUTION
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM A PHOTOVOLTAIC SYSTEM WITH DISCONNECTS CO-LOCATED WITH UTILITY DISCONNECT

NFP 1 11.12.2.1.4
LOCATION(S): 4, 5

WARNING: DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

NEC 705.12(B)(3)
LOCATION(S): 5

MAXIMUM VOLTAGE 240 V
MAXIMUM CIRCUIT CURRENT 29.04 A

NEC 690.54
LOCATION(S): 5

SYSTEM SERVICED BY:

NFP 1 11.12.2.1.5, NEC 690.56(B), 705.10
LOCATION(S): 5

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

NFP 1 11.12.2.1.6, NEC 690.56(C)(3)
LOCATION(S): 4

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

NFP 1 11.12.2.1.1.1.1, NEC 690.56(C)(1)
LOCATION(S): 5

GENERAL
1.1 LABEL MATERIALS SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT, NEC 110.21(B)(3).
1.2 EXACT MATERIALS USED ARE SUBJECT TO THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
1.3 LABELS SHALL BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
1.4 LABELS WILL BE REFLECTIVE AND MEET THE REQUIREMENTS OF NFP 1-11.12.2.1.1.2

01 LABELS

02 NOTES

GREGORY MILNER

CONTRACTOR:

4292 NORTHWEST 54TH STREET COCONUT CREEK, FLORIDA 33073, UNITED STATES

RAN S GITTENS

PAPER: ARCHIB

SCALE: NTS

P R O J E C T I D: 1 0 1 0 2 0 0 3 - 4 2 9 2

P A P E R: ARCHIB

S C A L E: N T S

D A T E: 1 1 3 0 - 4 2 9 2

O R I G I N A L D E S I G N

E C Q U I P E N G I N E E R I N G

1 6 4 6 W S N O W A V E 1 9 6
T A M P A, F L 3 3 6 0 6
C A: 3 3 3 4 3
IronRidge Inc.
28357 Industrial Boulevard
Hayward, CA 94545

To whom it may concern,

Special approval for the installation of REC N-Peak 3 Black series solar panels using Iron Ridge UFO clamp on Flush, Tilt, and Ground Mount System

REC herewith grants approval for REC N-Peak 3 Black series solar panels to be installed using Iron Ridge UFO clamp on Flush, Tilt, and Ground Mount System according to the specifications in the table below and in Appendix A and B:

- The rails are parallel to short side of the panel and clamped on the long side of the frame between 350 and 500 mm from the corner.
- The UFO (Universal Fastening Object) clamp torque value is no less than 80 in-lb (~9Nm).
- The panels are not subjected to test loads more than +/- 5400 Pa.

<table>
<thead>
<tr>
<th>Module</th>
<th>Mounting Configuration</th>
<th>Maximum Allowed Test Load</th>
<th>Design Load (Safety factor of 1.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REC N-Peak 3 Black series</td>
<td>Clamps mounted on the long side of the frame as represented in Appendix B</td>
<td>+/- 5400 Pa</td>
<td>+/- 3600 Pa</td>
</tr>
</tbody>
</table>

The terms and conditions as stated in the REC Limited Product Warranty Certificate and REC Installation Manual that are not addressed in this approval remain valid.

Best regards,
REC Solar Pte. Ltd.

Kay Iwaee Wee
Chief Operating Officer
# Enphase IQ 7 and IQ 7+ Microinverters

<table>
<thead>
<tr>
<th>INPUT DATA (DC)</th>
<th>IQ7-60-2-US</th>
<th>IQ7PLUS-72-2-US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commonly used module pairings</td>
<td>235 W - 260 W</td>
<td>235 W - 240 W</td>
</tr>
<tr>
<td>Module compatibility</td>
<td>60 cell/120 half-cell PV modules only</td>
<td>60 cell/120 half-cell and 72 cell/144 half-cell PV modules</td>
</tr>
<tr>
<td>Maximum input DC voltage</td>
<td>48 V</td>
<td>69 V</td>
</tr>
<tr>
<td>Peak power tracking voltage</td>
<td>27 V - 37 V</td>
<td>27 V - 45 V</td>
</tr>
<tr>
<td>Operating range</td>
<td>16 V - 60 V</td>
<td>16 V - 60 V</td>
</tr>
<tr>
<td>Min/Max start voltage</td>
<td>22 V / 48 V</td>
<td>22 V / 60 V</td>
</tr>
<tr>
<td>Max DC short circuit current (module inc.)</td>
<td>15 A</td>
<td>15 A</td>
</tr>
<tr>
<td>Overvoltage class DC port</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>DC port backfeed current</td>
<td>0 A</td>
<td>0 A</td>
</tr>
<tr>
<td>PV array configuration</td>
<td>1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OUTPUT DATA (AC)</th>
<th>IQ7 Microinverter</th>
<th>IQ7+ Microinverter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak output power</td>
<td>250 VA</td>
<td>250 VA</td>
</tr>
<tr>
<td>Nominal (AC) voltage/phase</td>
<td>240 V</td>
<td>240 V</td>
</tr>
<tr>
<td>Maximum continuous output power</td>
<td>299 V</td>
<td>299 V</td>
</tr>
<tr>
<td>Nominal frequency</td>
<td>60 Hz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Extended frequency range</td>
<td>47.68 Hz</td>
<td>47.68 Hz</td>
</tr>
<tr>
<td>AC short circuit fault current over 3 cycles</td>
<td>5.8 Arms</td>
<td>5.8 Arms</td>
</tr>
<tr>
<td>Maximum units per 3 (A or 0-1) branch circuit</td>
<td>16 (240 VAC)</td>
<td>13 (240 VAC)</td>
</tr>
<tr>
<td>Overvoltage class AC port</td>
<td>III</td>
<td>III</td>
</tr>
<tr>
<td>AC port backfeed current</td>
<td>18 mA</td>
<td>18 mA</td>
</tr>
<tr>
<td>Power factor setting</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Power factor (adjustable)</td>
<td>0.85 leading - 0.85 lagging</td>
<td>0.85 leading - 0.85 lagging</td>
</tr>
<tr>
<td>Efficiency</td>
<td>97.6%</td>
<td>97.6%</td>
</tr>
<tr>
<td>DC to AC efficiency</td>
<td>97.0%</td>
<td>97.0%</td>
</tr>
</tbody>
</table>

**MECHANICAL DATA**

- Ambient temperature range: -40°C to 60°C
- Relative humidity range: 4% to 100% (condensing)
- Connector type: MC4 (or Amphenol H4 UTX with additional O-DC-5 adapter)
- Dimensions (max/minimum): 210 mm x 175 mm x 30.2 mm (without bracket)
- Weight: 1.08 kg (2.3 lbs)
- Cooling: Natural convection
- Approval for wet locations: Yes
- Pollution degree: PD3
- Enclosure: Class I, II, III, IV, IEC 60529 IP67 R21, IEC 60529 IP66 R21
- Environmental category / UV exposure rating: NEMA Type 5 / outdoor

**FEATURES**

- Communication: Power Line Communication (PLC)
- Monitoring: Enphase Manager by MySolarLight monitoring options
- Disconnecting means: The AC and DC disconnects are required by UL, for use as the load-break disconnect required by NEC Article 490.

**Compliance**

- UL 61724 Standard for PV Systems
- CSA C22.2 No. 1101-00
- IEC 61724 Standard for PV Systems
- UL 61724 Standard for PV Systems
- CSA C22.2 No. 1101-00

**To learn more about Enphase offerings, visit enphase.com**
WE CRACKED THE CODE

TopTile™ Mount

SunModo’s innovative TopTile™ Mount is the world’s first PV mounting system that is mounted entirely above the tiles. The mounting system spares an installer the need to deconstruct the tile roof. The system also allows installation on the ridges of curved tiles for superior water leak protection. The TopTile Mounts are easy to install which significantly reduces installation time.

The TopTile™ Mount Advantage

✓ No more lifting roof tiles, broken tiles or finding rafters.
✓ Mounting stanchion can be mounted on a tile ridge independent of rafter position.
✓ Hand bendable flashing and EPDM Rubber Boot for easy fit and superior leak protection.
✓ High-Speed Hurricane Zone Approved - Passed TAS 100 (a) Wind-Driven Rain Test

Key Features of TopTile™ Mount System

The TopTile™ Mount System features three mounting options that secure panels 4-7 inches above the tile surface, using stanchions with waterproof seals and sealable flashing. Installers can choose either SunModo’s patented deck mounting system when anchoring into deck or a rafter mounting system. The system can also be mounted to a flat concrete surface. Available Stanchion heights are 5’ and 7”; 6” and 8” can be achieved with 1” spacer.

Rafter Mounting System:
(K10206-005/007)
These Stanchion Mounts can be used for direct rafter installation. Flat tiles allow lateral flexibility to locate the rafter.

Wood Deck Mounting System:
(K10207-165/107)
These Tripod Mounts are used for curved tiles or flat tiles to mount directly into roof decking without removing tiles.

Concrete Deck Mounting System:
(K10290-005/007)
These Stanchion Mounts can be mounted directly to a flat concrete surface with a customer supplied expansion anchor.

Technical Data

<table>
<thead>
<tr>
<th>Application</th>
<th>Tile Roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>High grade aluminum, 304 stainless steel hardware</td>
</tr>
<tr>
<td>Finish</td>
<td>Clear anodized</td>
</tr>
<tr>
<td>Flashing Size</td>
<td>9.00 x 12.50 x 0.03 inch</td>
</tr>
<tr>
<td>Stanchion Height</td>
<td>5’ and 7”; 6” and 8” height can be achieved with 1” spacer</td>
</tr>
<tr>
<td>Roof Attachment</td>
<td>Rafter (wood), decking (wood and concrete)</td>
</tr>
<tr>
<td>Structural Integrity</td>
<td>IBC and IRC compliant</td>
</tr>
<tr>
<td>Warranty</td>
<td>20 years</td>
</tr>
</tbody>
</table>

SunModo, Corp. Vancouver, WA., USA • www.sunmodo.com • 360.844.0048 • info@sunmodo.com
Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of rippling panels from a root, and snowdrifts weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.

Force-Stabilizing Curve

Steps both generate both vertical and lateral forces on mounting rails, which can cause them to buckle. XR Rails, on the other hand, are specially designed to increase strength in both directions while reducing the footprint. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlatFoot and other pitched roof attachments.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Avoiding prevents surface and structural corrosion, while also providing a more attractive appearance.

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

**XR10**
- 6" spanning capability
- Heavy load capability
- Clear anodized finish
- Internal options available

**XR100**
- 6" spanning capability
- Heavy load capability
- Clear anodized finish
- Internal options available

**XR1000**
- 12" spanning capability
- Extreme load capacity
- Clear anodized finish
- Internal options available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

<table>
<thead>
<tr>
<th>Load (PSF)</th>
<th>Rail Span (MPH)</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
<th>8'</th>
<th>10'</th>
<th>12'</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>XR10</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-20</td>
<td>XR100</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>XR1000</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>XR1000</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-70</td>
<td>XR1000</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-90</td>
<td>XR1000</td>
<td>100</td>
<td>120</td>
<td>140</td>
<td>160</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

**Stopper Sleeve**
- The Stopper Sleeve snaps onto the UFO, converting it into a bolted-end clamp.

**Universal Fastening Object (UFO)**
- The UFO sacraly bonds solar modules to XR Rails. It comes prealigned (unmatched), and can fit a wide range of module heights.

**BOSS™ Splice**
- Bonded Structural Splice connects rails with bimetallic bonding both. No tools or hardware needed.

**Grounding Lug**
- A single Grounding Lug clamp on one side of a PV module to the grounding conductor.

**Bonded Attachments**
- The bonding lug also fits and bonds line joint to the rail. It is installed with the same socket as the rest of the system.

**System Diagram**

- Approved: Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field-installed equipment ground conductors (EGG). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

**UL Certification**

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc. UL 2703 is the standard for evaluating solar mounting systems. It requires these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

**Cross-System Compatibility**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Flush Mount</th>
<th>Tilt Mount</th>
<th>Ground Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>XR Rails</td>
<td>✓</td>
<td>✓</td>
<td>XRx1000 Only</td>
</tr>
<tr>
<td>UFO/Stoppers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>BOSS™ Splice</td>
<td>✓</td>
<td>✓</td>
<td>N/A</td>
</tr>
<tr>
<td>Grounding Lugs</td>
<td>1 per Row</td>
<td>1 per Row</td>
<td>1 per Array</td>
</tr>
<tr>
<td>Microinverters</td>
<td>Enphase - M250-72, M350-60, M275-60, C250-72</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Solax - X1200, X2200, X3200, X640</td>
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</tr>
<tr>
<td>Power Optimizers</td>
<td>SolarEdge - P300, P320, P400, P405, P700, P730</td>
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</tr>
<tr>
<td>Fire Rating</td>
<td>Class A</td>
<td>Class A</td>
<td>N/A</td>
</tr>
<tr>
<td>Modules</td>
<td>Tested or Evaluated with over 400 Framed Modules</td>
<td>Refer to installation manuals for a detailed list</td>
<td></td>
</tr>
</tbody>
</table>

Go to IronRidge.com/UFO

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