WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE
Scott E. Wyssling, PE
Coleman D. Larsen, SE, PE
Gregory T. Elvestad, PE

76 North Meadowbrook Drive
Alpine, UT 84004
office (201) 874-3483
swyssling@wysslingconsulting.com

June 22, 2023
Revised August 22, 2023

Scott Wyssling, PE

Digitally signed by Scott Wyssling, PE
DN: C=US, SN="Wyssling, PE", G=Scott, E=swyssling@wysslingconsulting.com, CN="Scott Wyssling, PE"
Reason: I am the author of this document
Location: your signing location here
Date: 2023.08.22 12:13:21-06'00'
Foxit PDF Editor Version: 11.1.0

Current Insight
2852 W. Amini Way
South Jordan, UT 84095

Re: Engineering Services
Owens Residence
4356 7th Avenue SW, Naples, FL
19.200 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing:	18” TJI 560 Joists at 16” on center.
Roof Material:	Brava Spanish Barrel Tile
Roof Slope:	27 degrees
Attic Access:	Accessible
Foundation:	Permanent

C. Loading Criteria Used

- **Dead Load**
  - Existing Roofing and framing = 13 psf
  - New Solar Panels and Racking = 3 psf
  - TOTAL = 16 PSF
- **ive Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 0 psf
- **Wind Load** based on ASCE 7-16
  - Ultimate Wind Speed = 158 mph (based on Risk Category II)
  - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2020 FBC 7th Edition, including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent IronRidge installation manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. The maximum allowable withdrawal force for a 5/16" lag screw is 229 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on two screws with a minimum penetration depth of 1-3/8", the allowable capacity per connection is greater than the design withdrawal force (demand). Considering the variable factors for the existing roof framing and installation tolerances, the connection using two 5/16" diameter lag screw with a minimum of 1-3/8" embedment will be adequate and will include a sufficient factor of safety.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 32" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2020 FBC 7th Edition, current industry standards, and is based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,

Scott E. Wyssling, PE
Florida License No. 81558
Florida COA # RY34912

SCOTT E WYSSLING
LICENSE
No. 81558
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912
Signed 8/22/2023

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

OWENS RESIDENCE

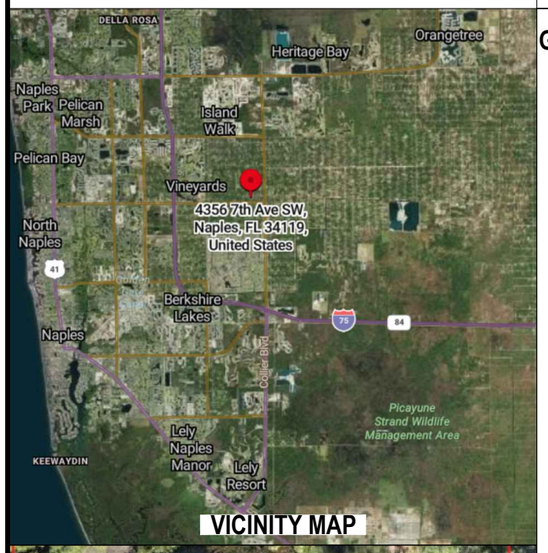
PHOTOVOLTAIC SYSTEM
4356 7TH AVENUE SW,
NAPLES, FL 34119

SYSTEM SIZE: 19.20 KW-DC | 18.00 KW-AC
MODULE: (48) HANWHA Q CELL Q.PEAK DUO ML-G10+400 [400W]
INVERTER: (2) SOL-ARK 12K-P [240V] INVERTER

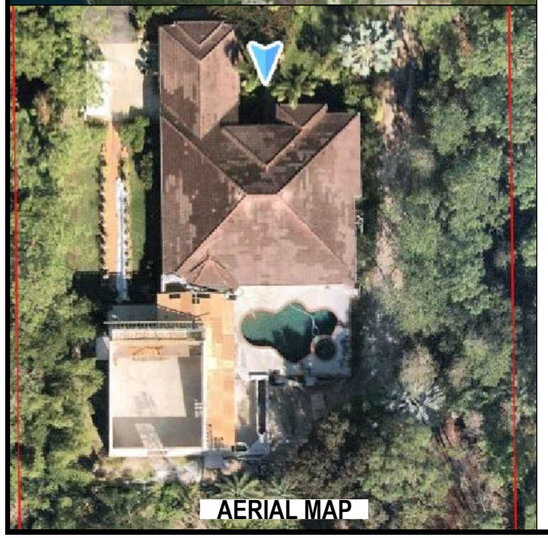
GOVERNING CODES

ALL MATERIALS, EQUIPMENT, INSTALLATION AND WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

- 2017 NATIONAL ELECTRIC CODE
- 2020 FLORIDA BUILDING CODE
- 2020 FLORIDA RESIDENTIAL CODE
- 2020 FLORIDA PLUMBING CODE
- 2020 FLORIDA FIRE CODE
- 2020 FLORIDA MECHANICAL CODE
- 780 CMR 51 MASSACHUSETTS RESIDENTIAL CODE 9TH EDITION
- IEEE STANDARD 929
- OSHA 29 CFR 1910.269
- WHERE APPLICABLE, RULES OF THE PUBLIC UTILITIES COMMISSION REGARDING SAFETY AND RELIABILITY
- THE AUTHORITY HAVING JURISDICTION
- MANUFACTURERS' LISTINGS AND INSTALLATION INSTRUCTIONS
- ANY OTHER LOCAL AMENDMENTS



VICINITY MAP



AERIAL MAP

GENERAL

1. ONCOR SHALL BE NOTIFIED BEFORE ACTIVATION OF PHOTOVOLTAIC SYSTEM.
2. 110.2 APPROVAL: ALL ELECTRICAL EQUIPMENT SHALL BE LABELED, LISTED, OR CERTIFIED BY A NATIONALLY RECOGNIZED TESTING LABORATORY ACCREDITED BY THE UNITED STATES OCCUPATIONAL SAFETY HEALTH ADMINISTRATION
3. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO INITIATING CONSTRUCTION.
4. CONTRACTOR SHALL REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
5. ALL EQUIPMENT AND ASSOCIATED CONNECTIONS, ETC, AND ALL ASSOCIATED WIRING AND INTERCONNECTIONS SHALL BE INSTALLED ONLY BY QUALIFIED PERSONNEL.
6. THE CONTRACTOR OR OWNER MUST PROVIDE ROOF ACCESS (LADDER TO ROOF) FOR ALL THE REQUIRED INSPECTIONS. LADDERS MUST BE OSHA APPROVED, MINIMUM TYPE I WITH A 250LB. RATING, IN GOOD CONDITION AND DESIGNED FOR ITS INTENDED USE.
7. CONTRACTOR SHALL VERIFY THAT THE ROOF STRUCTURE WILL WITHSTAND THE ADDITIONAL LOADS.
8. LAG SCREWS SHALL PENETRATE A MINIMUM 2" INTO SOLID SAWN STRUCTURAL MEMBERS AND SHALL NOT EXCEED MANUFACTURER RECOMMENDATIONS FOR FASTENERS INTO ENGINEERED STRUCTURAL MEMBERS.
9. AN ACCESS POINT SHALL BE PROVIDED THAT DOES NOT PLACE THE GROUND LADDER OVER OPENINGS SUCH AS WINDOWS OR DOORS ARE LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION AND IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES, OR SIGNS.
10. WHERE DC CONDUCTORS ARE RUN INSIDE BUILDING, THEY SHALL BE CONTAINED IN A METAL RACEWAY; THEY SHALL NOT BE INSTALLED WITHIN 10" OF THE ROOF DECKING OR SHEATHING EXCEPT WHERE COVERED BY THE PV MODULES AND EQUIPMENT.
11. ALL FIELD -INSTALLED JUNCTION, PULL AND OUTLET BOXES LOCATED BEHIND MODULES SHALL BE ACCESSIBLE DIRECTLY OR BY DISPLACEMENT OF A MODULE SECURED BY REMOVABLE FASTENERS.

ELECTRICAL

1. WIRING MATERIALS SHALL COMPLY WITH MAXIMUM CONTINUOUS CURRENT OUTPUT AT 25°C AND MAXIMUM VOLTAGE AT 600V; WIRE SHALL BE WET RATED AT 90°C.
2. EXPOSED PHOTOVOLTAIC SYSTEM CONDUCTORS ON THE ROOF WILL BE USE 2 OR PV-TYPE WIRE.
3. PHOTOVOLTAIC SYSTEM CONDUCTORS SHALL BE IDENTIFIED AND GROUPED. THE MEANS OF IDENTIFICATION SHALL BE PERMITTED BY SEPARATE COLOR-CODING, MARKING TAPE, TAGGING OR OTHER APPROVED MEANS.
4. ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE RAIN-TIGHT AND APPROVED FOR USE IN WET LOCATIONS.
5. ALL METALLIC RACEWAYS AND EQUIPMENT SHALL BE BONDED AND ELECTRICALLY CONTINUOUS.
6. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, CONTRACTOR SHALL SIZE THEM ACCORDING TO APPLICABLE CODES.
7. REMOVAL OF A ONCOR-INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BUILDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PV SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTOR.
8. FOR GROUNDED SYSTEMS, THE PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUITS SHALL BE PROVIDED WITH A GROUND-FAULT PROTECTION DEVICE OR SYSTEM THAT DETECTS A GROUND FAULT, INDICATES THAT FAULT HAS OCCURED AND AUTOMATICALLY DISCONNECTS ALL CONDUCTORS OR CAUSES THE INVERTER TO AUTOMATICALLY CEASE SUPPLYING POWER TO OUTPUT CIRCUITS.
9. FOR UNGROUNDED SYSTEMS, THE INVERTER IS EQUIPPED WITH GROUND FAULT PROTECTION AND A GFI FUSE PORT FOR GROUND FAULT INDICATION.
10. PV MODULE FRAMES SHALL BE BONDED TO RACKING RAIL OR BARE COPPER GEC/GEC PER THE MODULE MANUFACTURER'S LISTED INSTRUCTION SHEET.
11. PV MODULE RACKING RAIL SHALL BE BONDED TO BARE COPPER GEC VIA WEEB LUG, ILSCO GBL-4DBT LAY-IN LUG, OR EQUIVALENT LISTED LUG.
12. THE PHOTOVOLTAIC INVERTER WILL BE LISTED AS UL 1741 COMPLIANT.
13. RACKING AND BONDING SYSTEM TO BE UL2703 RATED.
14. ANY REQUIRED GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AS BUS BARS WITHIN LISTED EQUIPMENT.
15. WHEN BACKFED BREAKER IS THE METHOD OF ONCOR INTERCONNECTION, THE BREAKERS SHALL NOT READ "LINE AND LOAD".
16. WHEN APPLYING THE 120% RULE, THE SOLAR BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUS BAR FROM THE MAIN BREAKER.
17. THE WORKING CLEARANCE AROUND THE EXISTING ELECTRICAL EQUIPMENT AS WELL AS THE NEW ELECTRICAL EQUIPMENT WILL BE MAINTAINED.

SCOTT E WYSSLING LICENSE No. 81558 STATE OF FLORIDA PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912
Signed 8/22/2023

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

SHEET INDEX:

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

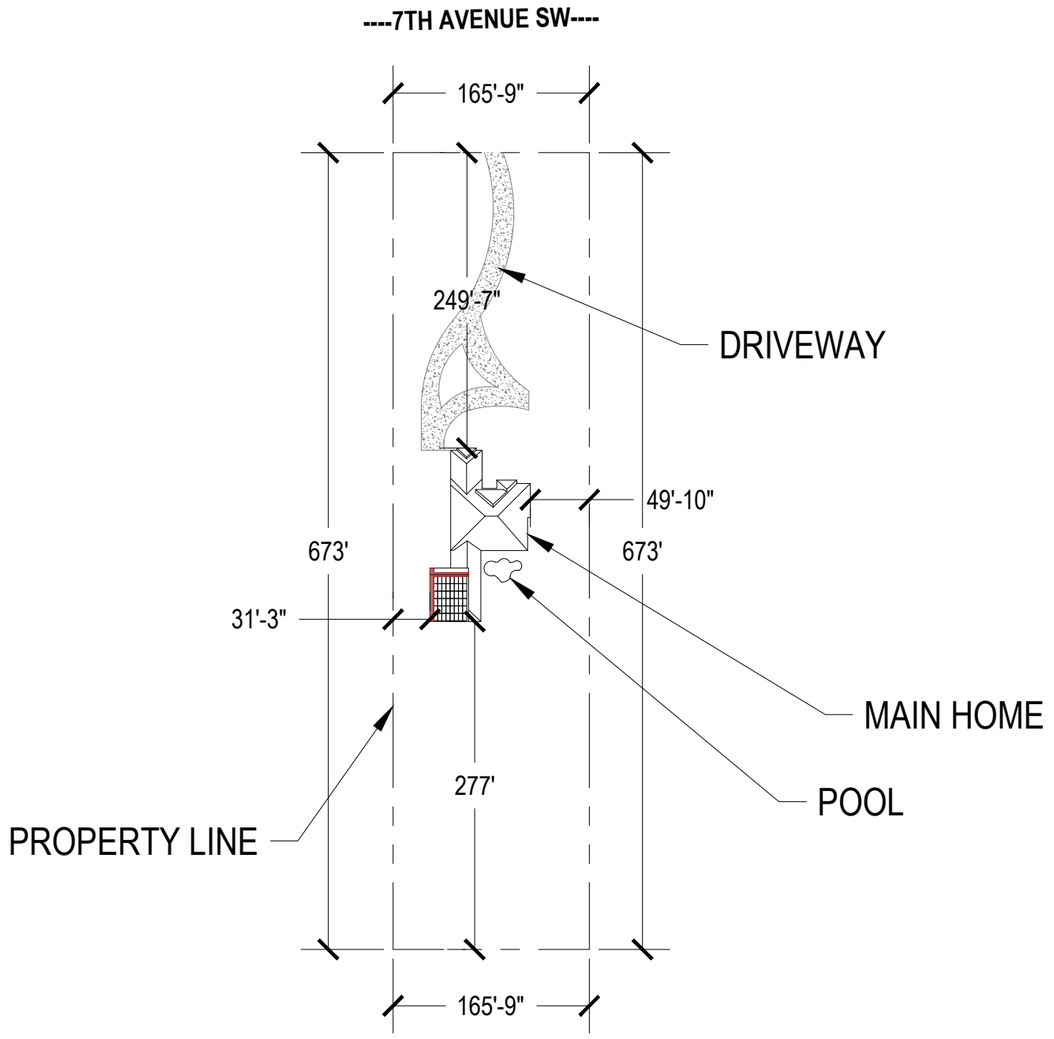
POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

COVER PAGE

DATE: 7/27/2023
DRAWN BY: US

REV #1:
REV #2:
REV #3:

PV-1



Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912
Signed 8/22/2023

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

N

LEGEND:

PROPERTY LINE: ——— – – ———

DRIVEWAY: – – – – – – – – – – – –

APN: 36614840002

SCALE: 1/128" = 1'-0"

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

PROPERTY PLAN

DATE: 7/27/2023
DRAWN BY: US

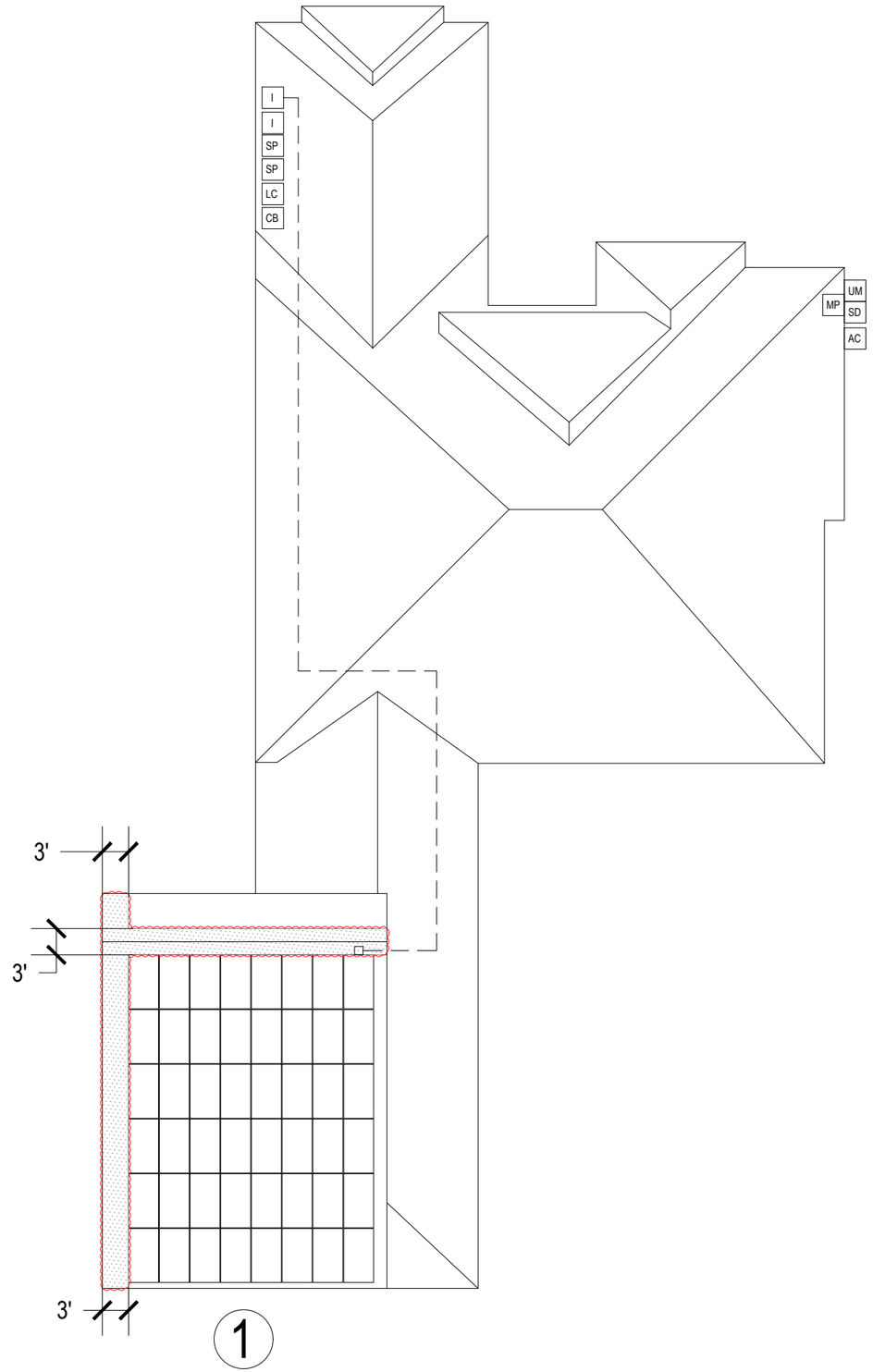
PV-2

ROOF DETAIL

ROOF TYPE: BRAVA SPANISH BARREL TILE

ROOF SECTION 1: 48 MODULES
AZIMUTH: 180°
PITCH: 27°

1



N

SYSTEM LEGEND

PHOTOVOLTAIC SYSTEM:
DC SYSTEM SIZE: 19.20 kW
AC SYSTEM SIZE: 18.00 kW

UM	MAIN SERVICE METER AND SERVICE POINT
MP	CRITICAL LODS SUBPANEL
AC	FUSED AC DISCONNECT
I	(2) SOL-ARK 12K-P [240V] INVERTER INVERTER INTEGRATED DC DISCONNECT
	(48) HANWHA Q CELL Q.PEAK DUO ML-G10+400 [400W] WITH (48) TIGO TS4-A-F RAPID SHUTDWON MOUNTED UNDER EACH MODULE.
B	(6) BATTERY RACK EG4 5.12KWH
	CONDUIT RUN CONDUIT TO BE RUN IN ATTIC IF POSSIBLE, OTHERWISE CONDUIT BLOCKS MIN. 1"/MAX 6" ABOVE ROOF SURFACE, CLOSE TO RIDGE LINES, AND UNDER EAVES; TO BE PAINTED TO MATCH EXTERIOR/EXISTING BACKGROUND COLOR OF ITS LOCATION; TO BE LABELED AT MAX 10' INTERVALS. CONDUIT RUNS ARE APPROXIMATE AND ARE TO BE DETERMINED IN THE BY THE INSTALLERS
SD	SERVICE DISCONNECT
	FIRE CODE SETBACK (18"MIN./ 36" MAX.)
CB	125 COMBINER BOX
SP	SUB PANEL

SCALE: 1/16" = 1'-0"

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

SITE PLAN

DATE: 7/27/2023
DRAWN BY: US

PV-3

SCOTT E WYSSLING LICENSE No. 81554 STATE OF FLORIDA PROFESSIONAL ENGINEER

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912

Signed 8/22/2023

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

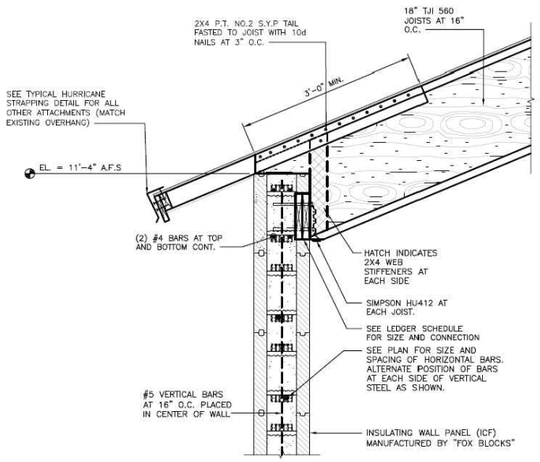
ROOF DETAIL

ROOF TYPE: BRAVA SPANISH BARREL TILE

ROOF SECTION 1: 48 MODULES
AZIMUTH: 180°
PITCH: 27°

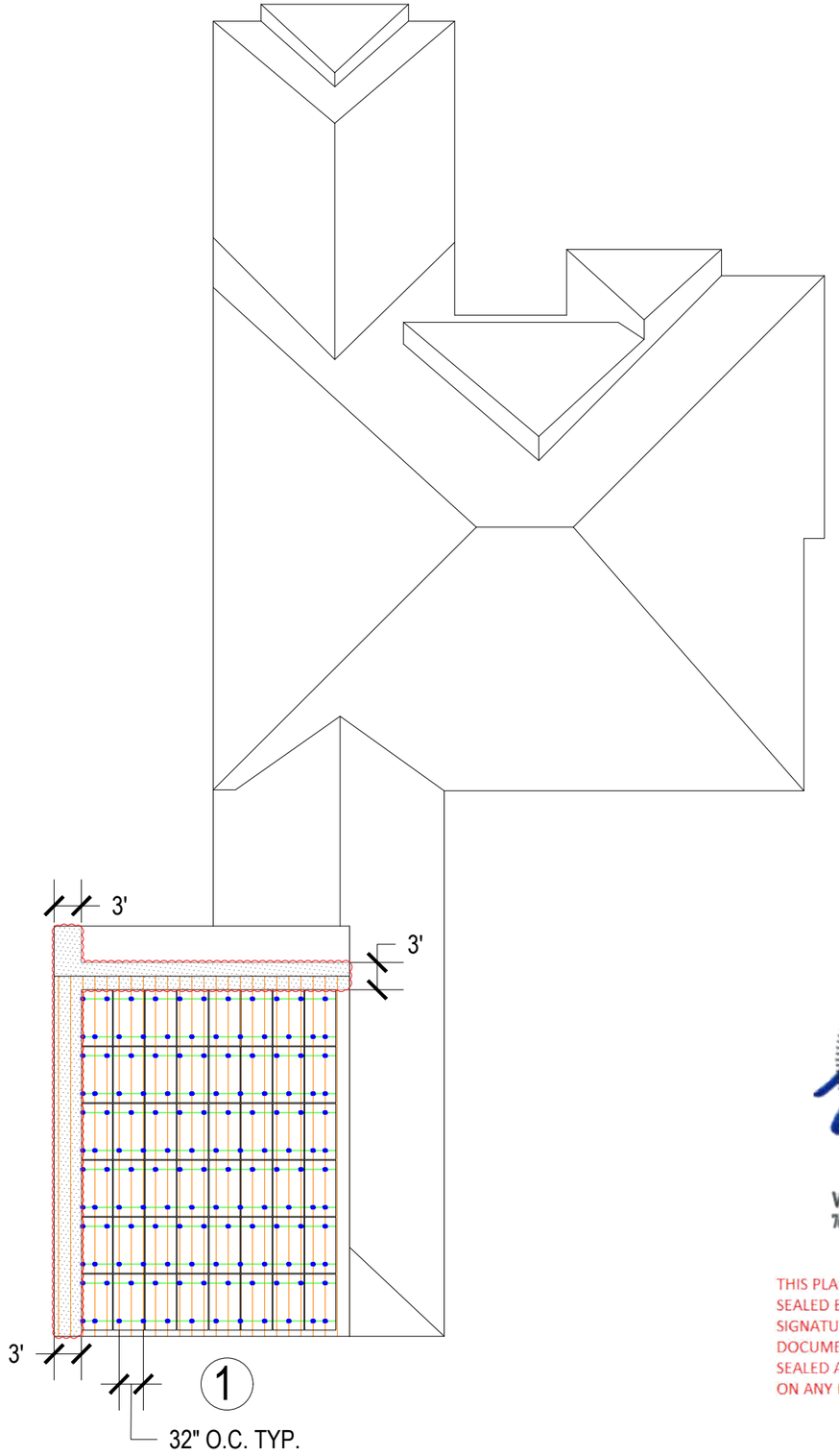
1

MODULE MECHANICAL SPECIFICATIONS(HOME)	
DESIGN WIND SPEED	158 MPH
DESIGN SNOW LOAD	3 PSF
# OF STORIES	1
ROOF PITCH	27°
TOTAL ARRAY AREA (SQ. FT)	1013.76
TOTAL ROOF AREA (SQ. FT)	2654
ARRAY SQ. FT / TOTAL ROOF SQ. FT	38.20%



NTS

ELEVATION DETAIL



SYSTEM LEGEND

- ROOF ATTACHMENT POINT
- ROOF FRAMING (RAFTERS/TRUSS)
- RACKING
- FIRE CODE SETBACK (18" MIN./ 36" MAX.)

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912

Signed 8/22/2023

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

SCALE: 3/16" = 1'-0"

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

ROOF PLAN

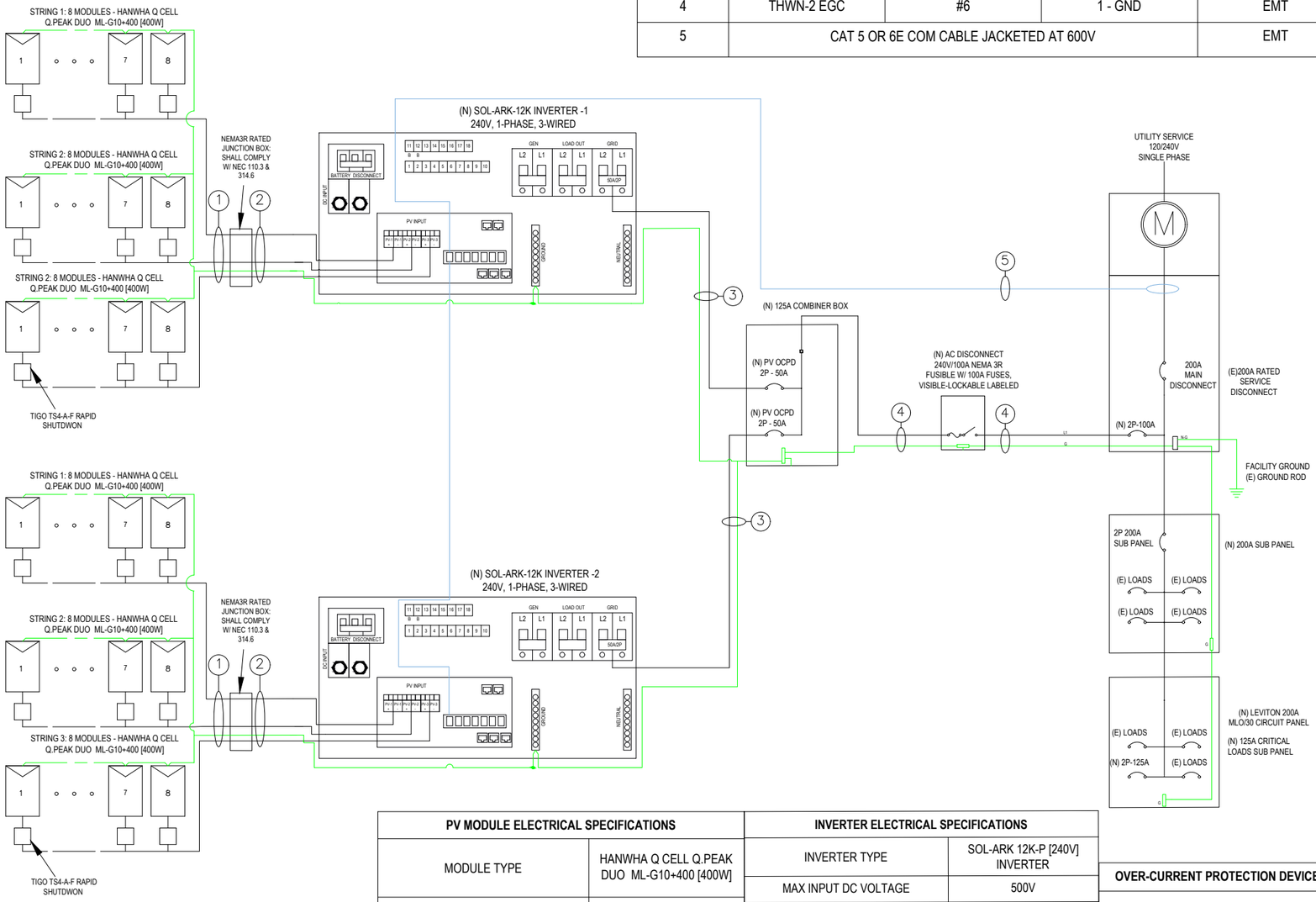
DATE: 7/27/2023
DRAWN BY: US

PV-3.1

NOTE: ALL DC CONNECTOR TO MODULES OR INVERTERS MUST BE OF MATCHING MANUFACTURING BRAND AND STYLE. DO NOT USE 'COMPATIBLE' CONNECTORS WHICH HAVE NOT BEEN UL TESTED FOR COMPATIBILITY. PERFORMANCE AND FIRE DAMAGE MAY RESULT FROM MISMATCHED CONNECTOR USAGE.

CONDUCTOR AND CONDUIT SCHEDULE

TAG	WIRE TYPE	WIRE SIZE	# OF CONDUCTORS	CONDUIT TYPE	MIN. CONDUIT SIZE
1	PV WIRE	#10	6 - L1 L2	FREE AIR	N/A
1	BARE COPPER	#8	1 - BARE	FREE AIR	N/A
2	THWN-2	#10	6 - L1 L2	EMT	3/4"
2	THWN-2 EGC	#10	1 - GND	EMT	3/4"
3	THWN-2	#8	3 - L1 L2 N	EMT	3/4"
3	THWN-2 EGC	#6	1 - GND	EMT	3/4"
4	THWN-2	#3	3 - L1 L2 N	EMT	1"
4	THWN-2 EGC	#6	1 - GND	EMT	1"
5	CAT 5 OR 6E COM CABLE JACKETED AT 600V			EMT	3/4"



PV MODULE ELECTRICAL SPECIFICATIONS	
MODULE TYPE	HANWHA Q CELL Q.PEAK DUO ML-G10+400 [400W]
POWER MAX (P_{MAX})	400W
OPEN CIRCUIT VOLTAGE (V_{OC})	45.30V
SHORT CIRCUIT CURRENT (I_{SC})	11.14A
MAX POWER-POINT VOLTAGE (V_{MP})	37.13V
MAX POWER-POINT CURRENT (I_{MP})	10.77A
SERIES FUSE RATING	20A

INVERTER ELECTRICAL SPECIFICATIONS	
INVERTER TYPE	SOL-ARK 12K-P [240V] INVERTER
MAX INPUT DC VOLTAGE	500V
MAX DC INPUT CURRENT PER MPPT	20A
STARTING VOLTAGE	125V
MAXIMUM OUTPUT POWER	9000W
NOMINAL AC OUTPUT VOLTAGE	240V
MAXIMUM CONT. OUTPUT CURRENT	37.5A
CEC EFFICIENCY	96.5%

OVER-CURRENT PROTECTION DEVICE (OCPD) CALCULATIONS	
GENERATION EQUIPMENT TYPE	SOL-ARK 12K-P [240V] INVERTER
# OF GENERATION EQUIPMENT	2
MAX CONTINUOUS OUTPUT CURRENT	37.5A
(# OF INVERTERS) X (MAX CONT. OUTPUT CURRENT) X 125% <= OCPD RATING	
(2 x 37.5A x 1.25)= 93.75A <= 100A, OK	

PHOTOVOLTAIC SYSTEM:
DC SYSTEM SIZE: 19.20 kW
AC SYSTEM SIZE: 18.00 kW
INVERTER: (2) SOL-ARK 12K-P [240V] INVERTER
MODULE: (48) HANWHA Q CELL Q.PEAK DUO ML-G10+400 [400W]

NOTES:
1. MODULES ARE BONDED TO RAIL USING UL 2703 RATED BONDING SYSTEM - INTEGRATED BONDING MID-CLAMPS + DIRECT-BURIAL LAY-IN-LUGS; SEE ATTACHED FOR SPECIFICATIONS IF APPLICABLE
2. PV DC SYSTEM IS UNGROUNDED
3. PV ARRAY WILL HAVE A GROUNDING ELECTRODE SYSTEM IN COMPLIANCE WITH NEC 250.58 AND 690.47(A)
4. BACKFED PV BREAKER WILL BE INSTALLED AT OPPOSITE END OF THE BUS BAR FROM THE MAIN BREAKER. A PERMANENT WARNING LABEL TO BE INSTALLED PER SYSTEM SIGNAGE, PAGE
5. BARE COPPER IS TRANSITIONED TO THWN-2 VIA IRREVERSIBLE CRIMP; WHEN PRESENT, THE GEC TO BE CONTINUOUS
6. INVERTER(S) TO BE COMPLIANT WITH UL 1741 SUPPLEMENT A
7. CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

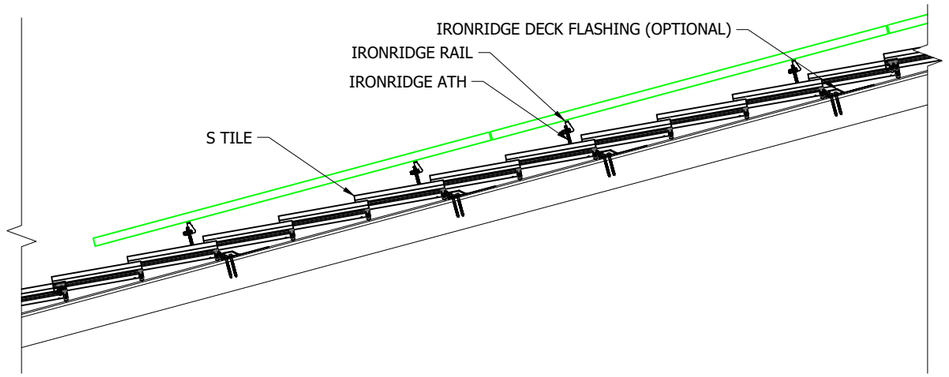
AHJ: COLLIER COUNTY

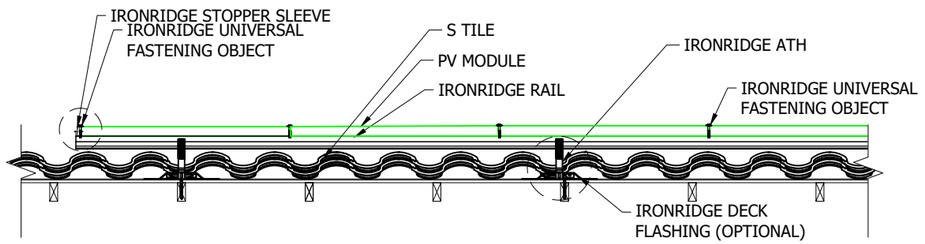
POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

1-LINE DIAGRAM & CALCULATIONS

DATE: 7/27/2023
DRAWN BY: US

PV-4



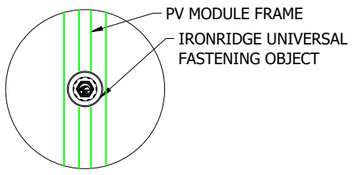


1 ATTACHMENT DETAILS (N.T.S.)

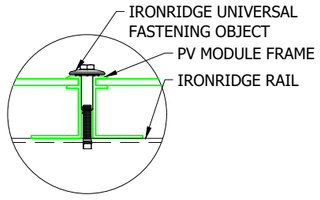
ATTACHMENT TYPE: IRONRIDGE ALL TILE HOOK
WITH IRONRIDGE XR-100 RAILS
ROOF TYPE: BRAVA SPANISH BARREL TILE ROOF, ROOF TILT: 27°

MODULE WEIGHT: 48.5 LBS
MODULE DIMENSIONS: 6.16' X 3.42'
MODULE WEIGHT/ SQ. FOOT: 2.29 LBS

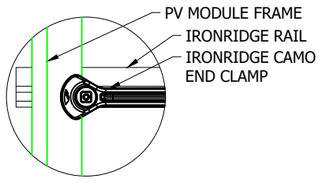
TOTAL NO. OF MODULES: 48
TOTAL MODULE WEIGHT: 2,328 LBS



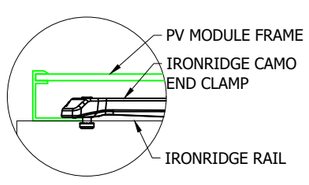
DETAIL, MID CLAMP PLAN



DETAIL, MID CLAMP FRONT



DETAIL, END CLAMP (CAMO) PLAN



DETAIL, END CLAMP (CAMO) FRONT

BILL OF MATERIAL		
EQUIPMENT	**MAKE**	**QUANTITY**
MODULE	HANWHA Q CELL Q.PEAK DUO ML-G10+400 [400W]	48
INVERTER	SOL-ARK 12K-P [240V] INVERTER	2
END CLAMPS	MODULE END CLAMP STANDARD	24
MID CLAMPS	MODULE MIDDLE CLAMP SET STANDARD(INTEGRATED GROUNDING)	84
MOUNTING POINTS	IRONRIDGE ALL TILE HOOK	139
MOUNTING RAILS	IRONRIDGE XR-100 RAILS	32
AC DISCONNECT	PV SYSTEM FUSED DISCONNECT 100A RATED WITH 100A FUSES	1
RAPID SHUTDOWN	TIGO TS4-A-F RAPID SHUTDOWN	48
COMBINER BOX	125A RATED COMBINER BOX	1

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
Florida License # RY34912

Signed 8/22/2023

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

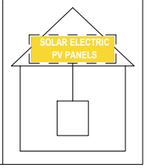
MOUNTING DETAILS AND BOM

DATE: 7/27/2023
DRAWN BY: US

PV-5

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWICH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY



LABEL 1
AT RAPID SHUTDOWN SYSTEM
[NEC 690.56(C)(1)(A)].

! WARNING !
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.
DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPLOSED TO SUNLIGHT

LABEL 2
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.15]

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

LABEL 3
AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT
[NEC 690.13 AND 690.15]

MAXIMUM VOLTAGE: -- V DC
MAXIMUM CIRCUIT CURRENT: -- A DC
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED): -- A DC

LABEL 4
AT EACH DC DISCONNECTING MEANS
[NEC 690.53]

PHOTOVOLTAIC AC DISCONNECT
OPERATING CURRENT: 75 A AC
OPERATING VOLTAGE: 240 V AC

LABEL 5
AT POINT OF INTERCONNECTION, MARKED AT DISCONNECTING MEANS
[NEC 690.54]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 6
AT RAPID SHUTDOWN DISCONNECT SWITCH
[NEC 690.56(C)(3)].

! WARNING !
DUAL POWER SOURCES.
SECOND SOURCE IS PV SYSTEM

LABEL 7

! CAUTION !
PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL 8

AT POINT OF INTERCONNECTION; LABEL, SUCH AS LABEL 7 OR LABEL 8 MUST IDENTIFY PHOTOVOLTAIC SYSTEM
[NEC 705.12(B)(4)]

BI-DIRECTIONAL METER

LABEL 9
AT UTILITY METER
[NEC 690.56(B)]

PHOTOVOLTAIC DC DISCONNECT

LABEL 10
AT EACH DC DISCONNECTING MEANS
[NEC 690.13(B)]

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL 11
AT RAPID SHUTDOWN SWITCH
[NEC 690.56(C)].
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 12
AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10 FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(G)]
LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE
[IFC 605.11.1.1]

VISIBLE LOCKABLE LABELED DISCONNECT

LABEL 13
AT EACH AC DISCONNECTING MEANS
[NEC 690.13(B)]

! WARNING !
POWER SOURCE OUTPUT CONNECTION - DO NOT RELOCATE THIS OVERCURRENT DEVISE

LABEL 14
AT POINT OF INTERCONNECTION
OVERCURRENT DEVICE
[NEC 705.12(B)(2)(3)(B)]

#03-359 LOCAL CODES

WARNING
THIS SERVICE METER IS ALSO SERVED BY A PHOTOVOLTAIC SYSTEM

ALL SIGNAGE MUST BE PERMANENTLY ATTACHED AND BE WEATHER RESISTANT/SUNLIGHT RESISTANT AND CANNOT BE HAND-WRITTEN PER CEC 110.21(B)

PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION
[CEC 690.56(B)]

WHERE THE PV SYSTEMS ARE REMOTELY LOCATED FROM EACH OTHER, A DIRECTORY IN ACCORDANCE WITH 705.10 SHALL BE PROVIDED AT EACH PV SYSTEM DISCONNECTING MEANS.
PV SYSTEM EQUIPMENT AND DISCONNECTING MEANS SHALL NOT BE INSTALLED IN BATHROOMS
[CEC 690.4(D),(E)]

LABELING NOTES

1.1 LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRICAL CODE,FIRE CODE 605.11, OSHA STANDARD 1910.145, ANSI Z535

1.2 MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.

1.3 LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.

1.4 LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.

1.5 ALERTING WORDS TO BE COLOR CODED. "DANGER" WILL HAVE RED BACKGROUND; "WARNING" WILL HAVE ORANGE BACKGROUND; "CAUTION" WILL HAVE YELLOW BACKGROUND. [ANSI Z535]

LABELS ARE NOT DRAWN TO SCALE

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

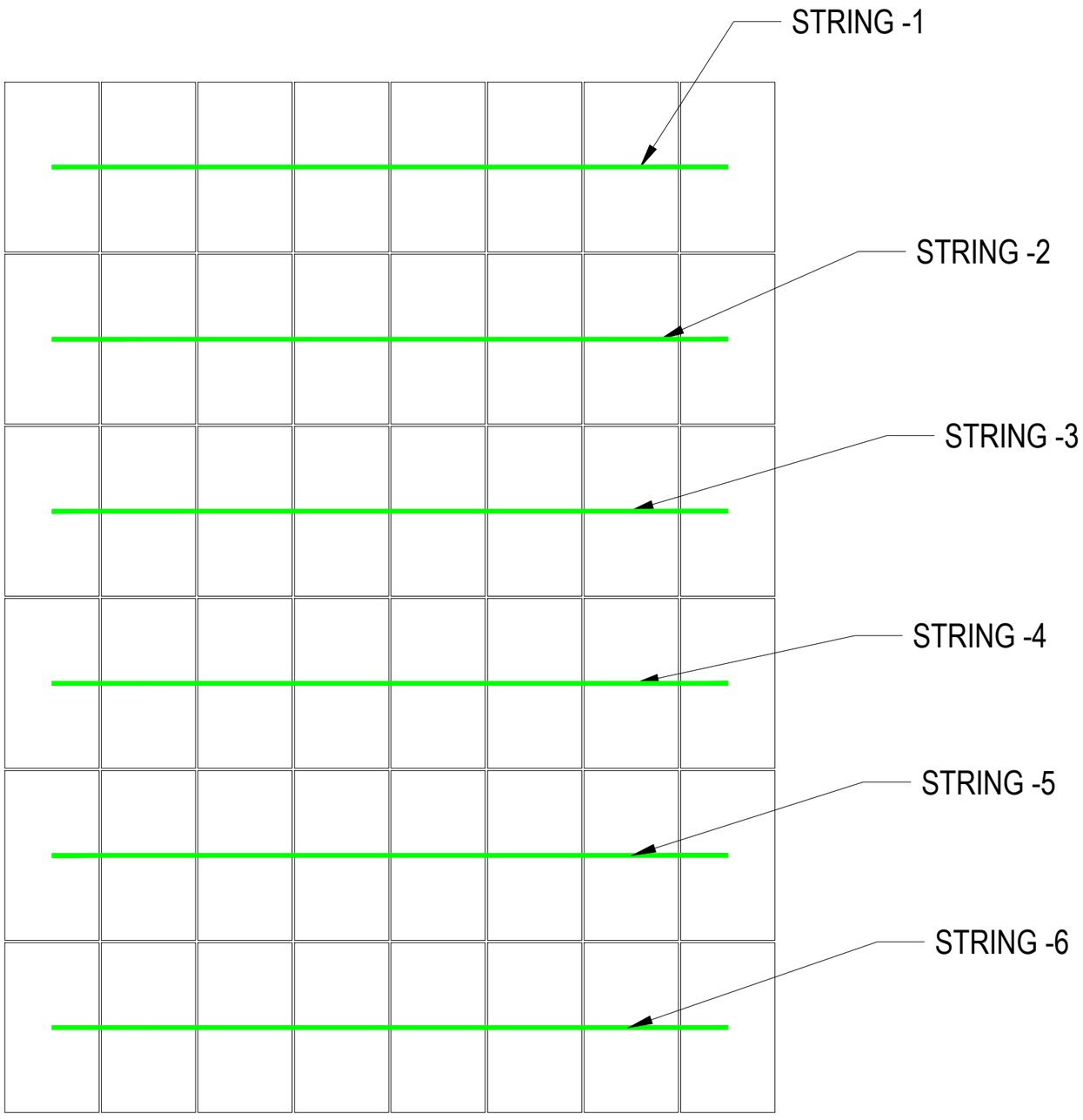
POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

ELECTRICAL LABELS

DATE: 7/27/2023
DRAWN BY: US

PV-6

STRING DETAIL
SOL-ARK STRINGS
STRING # 1: 8 MODULES
STRING # 2: 8 MODULES
STRING # 3: 8 MODULES
STRING # 4: 8 MODULES
STRING # 5: 8 MODULES
STRING # 6: 8 MODULES



FOR INSTALLER USE ONLY

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

STRING MAP

DATE: 7/27/2023
DRAWN BY: US

PV-7

powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-405

ENDURING HIGH PERFORMANCE

25 YR Warranty
Product & Performance

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING

High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty[2].

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (–1500 V, 96 h)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:

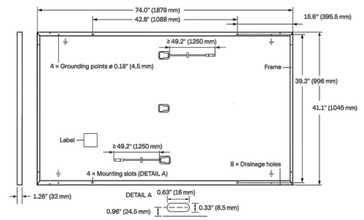
Rooftop arrays on residential buildings

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 49.2 in (1250 mm), (–) ≥ 49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

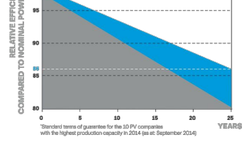


ELECTRICAL CHARACTERISTICS

POWER CLASS				385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)								
Minimum	Power at MPP[1]	P_{MPP}	[W]	385	390	395	400	405
	Short Circuit Current[1]	I_{SC}	[A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage[1]	V_{OC}	[V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I_{MPP}	[A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V_{MPP}	[V]	36.36	36.62	36.88	37.13	37.39
	Efficiency[1]	η	[%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP}	[W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I_{SC}	[A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V_{OC}	[V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I_{MPP}	[A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V_{MPP}	[V]	34.59	34.81	35.03	35.25	35.46

[1] Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25±2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

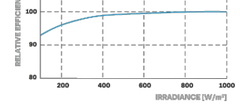
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

TEMPERATURE COEFFICIENTS							
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	–0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	–0.34	Nominal Module Operating Temperature	NMOT	[°F]	109±5.4 (43±3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1000 (IEC) / 1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull[3]	[lbs/ft²]	75 (3600 Pa) / 55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	–40 °F up to +185 °F (–40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]	[lbs/ft²]	113 (5400 Pa) / 84 (4000 Pa)		

[3] See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant, Quality Controlled PV - TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells), QCPV Certification ongoing.

C SP US Certified UL 61730 · CE · TÜVRheinland CERTIFIED www.tuv.com ID 1111220277

PACKAGING INFORMATION

Horizontal packaging	76.4 in 1940 mm	43.3 in 1100 mm	48.0 in 1220 mm	1656 lbs 751 kg	24 pallets	24 pallets	32 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | **TEL** +1 949 748 59 96 | **EMAIL** inquiry@us.q-cells.com | **WEB** www.q-cells.us

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

MODULE DATASHEET

DATE: 7/27/2023
DRAWN BY: US

PV-8.1

Sol-Ark 12K-P Spec Sheet

Solar	Input Power 12000W
Max Allowed PV Power	6500W + 6500W = 13000W
Max PV Power Delivered to Battery & AC Outputs	12000W
Max DC Voltage (Voc)	500V @ 18A, 450V @ 20A
MPPT Voltage Range	150-425V
Starting Voltage	125V
Number of MPPT	2
Max Solar Strings Per MPPT	2
Max DC Current per MPPT (Self Limiting)	20A
Max AC Coupled Input (Micro/String Inverters)	9600W

AC Output Power 9kW On-Grid & Off-Grid	
Connections	120/240/208V Split Phase
Continuous AC Power to Grid (On-Grid)	9000W 37.5A-L (240V)
Continuous AC Power to Load (Off-Grid)	9000W 37.5A-L (240V)
Surge AC Power 10sec Surge AC Power 100ms	16,000VA L-L (240V) 25,000VA L-L(240V)
Parallel Stacking	Yes
Frequency	60/50Hz
Continuous AC Power with Grid or Generator	15120W 63A L-L (240V)
CEC Efficiency	96.5% (Peak 97.5%)
Idle Consumption Typical—No Load	60W
Sell Back Power Modes	Limited to Household/Fully Grid-Tied
Design (DC to AC)	Transformerless DC
Response Time (Grid-Tied to Off-Grid)	4ms
Power Factor	+/- 0.9 - 1.0

Battery (optional)	Output Power 9000W
Type	Lead-Acid or Li-Ion
Nominal DC Input	48V
Capacity	50 — 9900Ah
Voltage Range	43.0 — 63.0V
Continuous Battery Charging Output	185A
Charging Curve	3-Stage w/ Equalization
Grid to Batt Charging Efficiency	96.0%
External Temperature Sensor	Included
Current Shunt for Accurate % SOC	Integrated
External Gen Start Based on Voltage or %SOC	Integrated
Communication to Lithium Battery	CanBus & RS485

General	
Dimensions (H x W x D)	30.0" x 18.3" x 10.0"
Weight	78 lbs
Enclosure	NEMA 3R
Ambient Temperature	-25-55°C, >45°C Derating
Installation Style	Wall-Mounted
Wi-Fi & LAN Communication	Included
Standard Warranty (verified by HALT Testing)	10 Years

Protections & Certifications	
Electronics Certified Safety by SGS Labs to NEC & UL Specs - NEC 690.4B & NEC 705.4/6	Yes
Grid Sell Back — UL1741-2010/2018, IEE-E1547a-2003/2014, FCC 15 Class B, UL1741SA,	Yes
PV DC Disconnect Switch — NEC 240.15	Integrated
Ground Fault Detection — NEC 690.5	Integrated
PV Rapid Shutdown Control — NEC 690.12	Integrated
PV Arc Fault Detection — NEC 690.11	Integrated
PV Input Lightning Protection	Integrated
PV String Input Reverse Polarity Protection	Integrated
AC Output Breakers - 63A	Integrated
250A Battery Breaker / Disconnect	Integrated
Surge Protection	DC Type II / AC Type II

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

INVERTER DATASHEET

DATE: 7/27/2023
DRAWN BY: US

PV-8.2

Tigo® Flex MLPE

TS4-A-F

PV Module Advanced Add-On

The TS4-A-F is the advanced add-on shutdown solution that brings smart module functionality to standard PV modules for higher reliability. Upgrade existing PV systems or add module-level shutdown to new installations.

The TS4-A-F shutdown feature requires installation with the Tigo RSS Transmitter or an inverter with built-in Tigo certified transmitter for activation.

Included Features

Manual or automatic module-level **shutdown**

Easy Installation

Snap to standard module frame or remove brackets for rack mounting

PLC Signaling

Control module-level shutdown with the Tigo RSS Transmitter

Automatic Shutdown

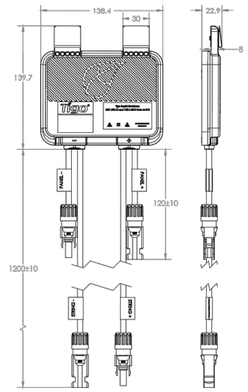
PV array enters shutdown mode in event of AC grid loss

02/28/20

TS4-A-F SPECIFICATIONS

Environmental	
Operating Temperature Range	-40°C to +85°C (-40°F to +185°F)
Outdoor Rating	IP68
Maximum Elevation	2000m
Mechanical	
Dimensions	138.4mm x 139.7mm x 22.9mm
Weight	490g
Electrical	
Voltage Range	16 - 90V
Maximum Current	15A
Maximum Power	500W
Output Cable Length	1.2m (standard)
Connectors	MC4 (standard)
Communication Type	PLC

Module-level shutdown activation of TS4-A-F requires RSS Transmitter.



ORDERING INFORMATION

Standard	
458-00252-32	1500V UL / 1000V TÜV, 1.2m cable, MC4
Options	
458-00257-12	1000V UL / TÜV, 1.2m cable, MC4 comparable
458-00261-32	1500V UL / TÜV, 1.2m cable, EVO2

For sales info:
sales@tigoenergy.com

For product info:
Visit tigoenergy.com/products

For technical info:
Visit support.tigoenergy.com

For additional info and product selection assistance, use Tigo's online design tool at tigoenergy.com/design

Tigo®

Tigo Energy, Inc. | www.tigoenergy.com | sales@tigoenergy.com

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

RAPIDSHTDOWN DATASHEET

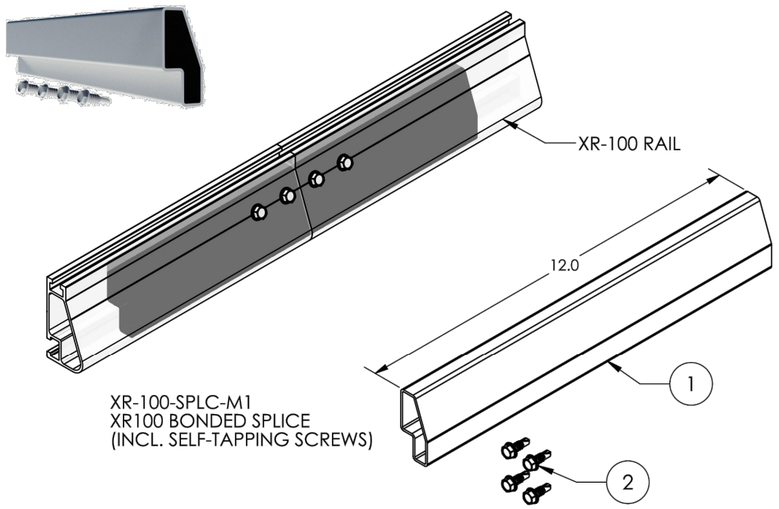
DATE: 7/27/2023
DRAWN BY: US

PV-8.3

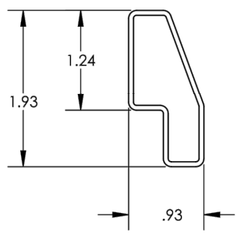
Cut Sheet

IRONRIDGE

XR100 Bonded Splice

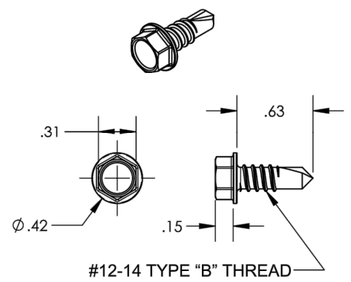


1) Splice, XR100, Mill 12" long



Property	Value
Material	6000 Series Aluminum
Finish	Mill

2) Screw, Self Drilling



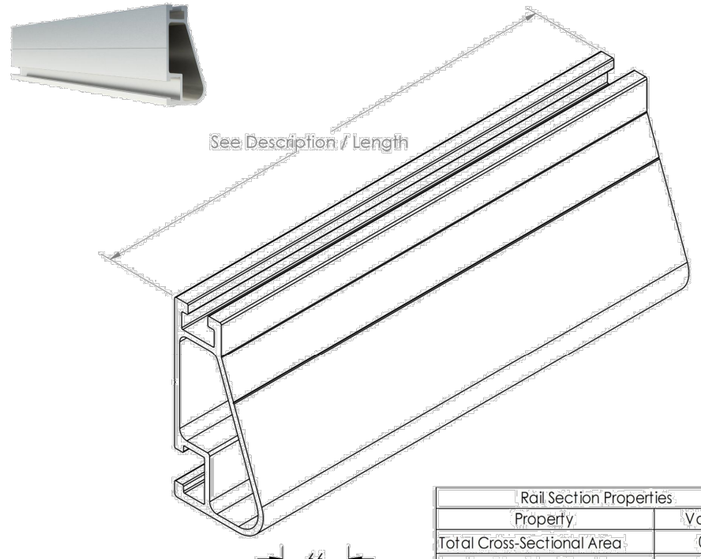
Property	Value
Material	300 Series Stainless Steel
Finish	Clear

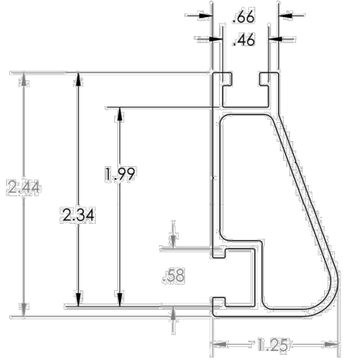
v1.0

Cut Sheet

IRONRIDGE

XR100 Rail





Rail Section Properties	
Property	Value
Total Cross-Sectional Area	0.582 in^2
Section Modulus (X-axis)	0.297 in^3
Moment of Inertia (X-axis)	0.390 in^4
Moment of Inertia (Y-axis)	0.085 in^4
Torsional Constant	0.214 in^3
Polar Moment of Inertia	0.126 in^4

APPROVED MATERIALS:
6005-T6, 6005A-T61, 6105-T5, 6N01-T6
(34,000 PSI YIELD STRENGTH MINIMUM)

Clear Part Number	Black Part Number	Description / Length	Material	Weight
XR-100-168A	XR-100-168B	XR100, Rail 168" (14 Feet)	6000-Series Aluminum	9.55 lbs.
XR-100-204A	XR-100-204B	XR100, Rail 204" (17 Feet)		11.60 lbs.

v1.10

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

RACKING DATASHEET

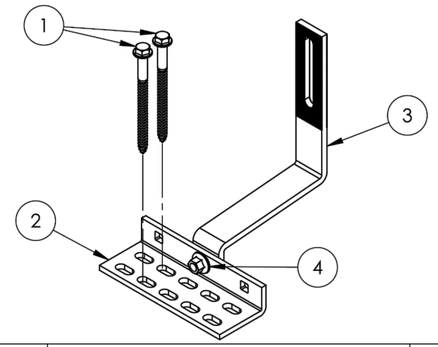
DATE: 7/27/2023
DRAWN BY: US

PV-8.4

Cut Sheet

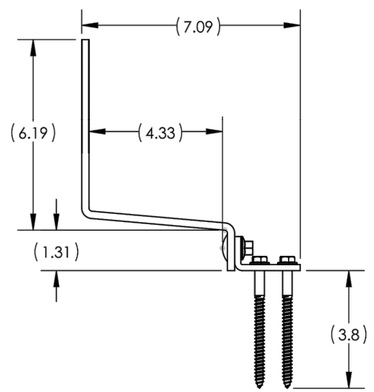
IRONRIDGE

All Tile Hook



ITEM NO.	DESCRIPTION	QTY IN KIT
1	BOLT, LAG 5/16 X 4"	2
2	ASSY, BASE, CLEAR	1
3	ASSY, ARM, CLEAR	1
4	BOLT, CARRIAGE 5/16 X 1"	1

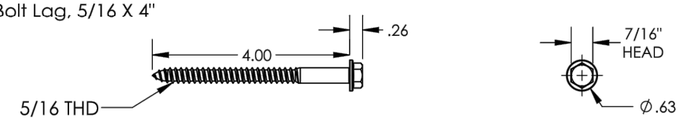
Part Number	Description
ATH-01-M1	All Tile Hook



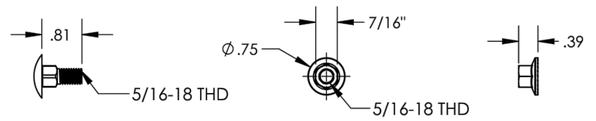
v1.0

Cut Sheet

1) Bolt Lag, 5/16 X 4"

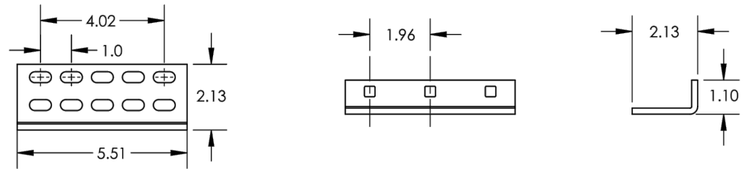


2) Bolt, Carriage 5/16 X 1"

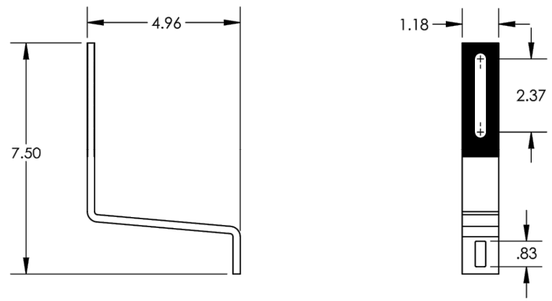


Items 1 & 2	Property	Value
	Material	300 Series Stainless Steel
	Finish	Clear

3) Base, Clear



4) Arm, Clear



Items 3 & 4	Property	Value
	Material	300 Series Stainless Steel
	Finish	Clear

v1.0

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

ROOF ATTACHMENT DATASHEET

DATE: 7/27/2023
DRAWN BY: US

PV-8.5

BRAVA

Brava Spanish Barrel Tile


Brava Spanish Barrel Tile Mocha Sand


Brava Spanish Barrel Tile French Clay


Brava Spanish Barrel Tile Mediterranean


Brava Spanish Terra Cotta

Beautifully authentic high-performance roofing.

The beautiful look of a Spanish barrel tile roof without the maintenance.

Truly realistic
Our proprietary process creates the most authentic-looking Spanish barrel tile on the market.

Superior performance
Brava is designed to withstand even the most severe weather, boasting the highest hail resistance rating in the industry.

Enhanced curb appeal
Curb appeal directly correlates with owner satisfaction and higher property value.

Maintenance free
Brava's proprietary formulation ensures extreme durability.

Color technology
Brava's proprietary multi-coloring process means you get the authentic appearance of a natural product, complete with variegated colors throughout the entire product.

Fully sustainable
Brava uses recycled material to create a roof that is fully recyclable.

Complete
Brava offers a complete line of accessory tiles.

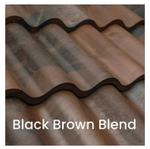
bravarooftile.com • (844) 290-4196 • info@bravarooftile.com

Unparalleled Performance

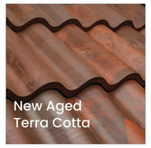

Aged Mission


Antigua


Arendale


Black Brown Blend


Mediterranean


New Aged Terra Cotta


Onyx


Terra Cotta


Terra Cotta Brown


Tuscan Clay

Description	Weight	Dimensions
Spanish Field Tile	2.9 lbs.	13" x 16"
Eave Starter	0.6 lbs.	11 3/4" x 3"
Ridge Closure	0.5 lbs.	11 3/4" x 2 1/2"
Hip Cap	3.5 lbs.	8 1/4" x 9" x 17 1/2"
Top Ridge	4.2 lbs.	10" x 10 3/8" x 17"
Bull Nose	3.9 lbs.	7 3/4" x 8 3/4" x 17 1/2"
Rake	3.0 lbs.	5 1/2" x 6 1/2" x 16"
Weight Per Square	261 lbs./sq.	

Aesthetics	Brava Spanish Barrel Tile	Clay / Concrete Spanish Tile
Authentic Look	✓	✓
Multi-Colored Variegated	✓	

Performance	Brava Spanish Barrel Tile	Clay / Concrete Spanish Tile
Fire Retardant: Class A or Class C	✓	✓
Wind Resistance: 188+ mph*	✓	✓
Impact Resistance: Class 4	✓	Varies by manufacturer
Freeze/Thaw Resistant	✓	✓
Maintenance Free	✓	Requires repair throughout life cycle
Colorfast	✓	Varies; concrete may develop efflorescence (powdery appearance)
Hail Warrantied	✓	Varies by manufacturer

Installation	Brava Spanish Barrel Tile	Clay / Concrete Spanish Tile
Lightweight	✓	
Estimated Waste Factor	Low	High; tiles with hairline cracks or broken during install will be discarded
Gun Nailed in Cold Weather	✓	

CLASS 4
Class 4 hail rating

CLASS A
Class A fire rating available

Made in USA

MIAMI-DADE COUNTY APPROVED

*Brava tiles are tested and approved to withstand wind speeds of up to 188 mph with nails and up to 211 mph with high wind / screw installation.

Tolerances +or- 1/2". All specifications subject to change without notice.

The printed colors shown may vary from actual colors. Before making a final selection, be sure to review actual material samples and roof installations. Please contact your salesperson for further assistance.

In order to achieve certain fire and wind ratings, special installation instructions may be required. Please reference Brava Roof Tile installation manuals at www.BravaRoofTile.com for more details.

bravarooftile.com • (844) 290-4196 • info@bravarooftile.com

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

BRAVA SPANISH BARREL TILE DATASHEET

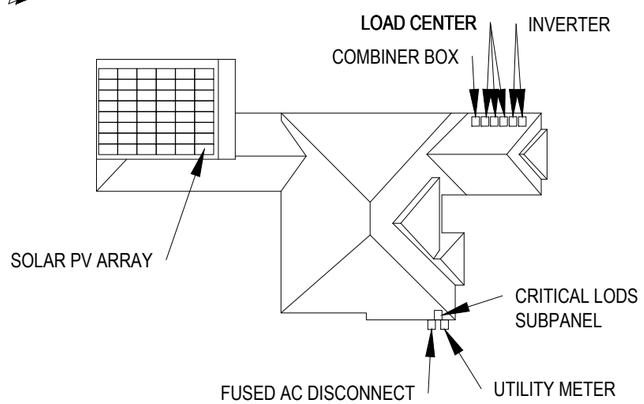
DATE: 7/27/2023
DRAWN BY: US

PV-8.6

⚠ CAUTION ⚠

POWER TO THIS BUILDING IS SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN

SERVICE 1 OF 1



4356 7TH AVENUE SW, NAPLES, FL 34119

OWENS, RICK
4356 7TH AVENUE SW,
NAPLES, FL 34119

AHJ: COLLIER COUNTY

POSITIVE ENERGY SOLAR LLC.
12713 MCGREGOR BLVD SUITE 2, FORT MYERS, FLORIDA 33919
TEL. NO.:- 2392001081

PLACARD

DATE: 7/27/2023
DRAWN BY: US

PV-9