CITY OF BRUNSWICK, GEORGIA

APPLICATION FOR CERTIFICATE OF APPROPRIATENESS & MATERIAL CHANGES TO EXTERIOR FEATURES

Brunswick Historic Preservation Board

COA

1. Name of Applicant: Scott Nicholls Date: 12/9/21

You or your representative must be present at the meeting of the Board to answer questions that may arise. You will be notified of the time, date, and location of the meeting.

Mailing Address: 2931 Lewis Street Kennesaw GA Zip Code: 30156

Daytime Telephone: 404-384-4451

E-mail Address: Scott.Nicholls@CreativeSolarUSA.com

Relationship of Applicant to Property: ( ) Owner ( ) Architect (✓) Contractor
( ) Other (Specify)_____

2. Address and Legal Description of Property: 1326 Egmont Street Temple Beth Tefftloh

Year Built: 1890 Historic Designation: ( ) Historic (more than 50 years old and contributing)
Era: — ( ) Historic-obscured (50 years old but not contributing)
(✓) Non-historic (less than 50 years old, yet not detracting)
( ) Intrusions (any aged structure, which detracts)
( ) Vacant

3. Proposed Work:

( ) New Construction
( ) Demolition
( ) Relocation
( ) Excavation
( ) Fencing or landscaping
( ) New Signage
( ) Parking Lot, Driveway or Walkway
( ) Outbuilding or Accessory Structure
( ) Lighting Fixtures
(✓) Other
( ) Reconstruction or alteration of the size, shape or façade of an existing structure.
( ) A change in the location or extent of signage.

Please describe your proposed work as simply and accurately as possible. Be sure to indicate materials to be used, it is recommended you provide material samples. Accurate to-scale drawings and photographs required are to be attached. A location map is required to be attached to this application.

Propose to Install 22 REC 325w Solar Panels to the Southern facing Roof of the Accessory Building Directly South of the Temple proper.

IMPORTANT: This form must be completed before the Brunswick Historic Preservation Board can consider approval of any change affecting the appearance of any building, or property within the Historic District. This form, along with supporting documents, must be filed with the Historic Preservation Officer, 601 Gloucester Street at least 15 days prior to the regularly scheduled Board meeting. The Historic Preservation Board meets the first Monday of each month at 6:00 PM in at Old City Hall, 1229 Newcastle St. unless otherwise advertised.

CITY OF BRUNSWICK, GEORGIA C 2

APPLICATION FOR CERTIFICATE OF APPROPRIATENESS & MATERIAL CHANGES TO EXTERIOR FEATURES

Brunswick Historic Preservation Board

All applicable items from the attached checklist must be addressed. Incomplete applications will not be accepted or docketed for consideration by the Historic Preservation Board.

For additional help of information, contact the Historic Preservation Officer at (912) 267-5527

SIGNATURE OF APPLICANT: _____

Staff Comments: _____

_____

_____

_____

_____

CITY OF BRUNSWICK
CERTIFICATE OF APPROPRIATENESS
Brunswick Historic Preservation Board

A Certificate of Appropriateness is hereby issued to: _____

For the following actions: _____

_____

_____

at _____

provided the following conditions are met: _____

_____

_____

_____

SIGNATURE:

_____

Chairperson, Historic Preservation Board

DATE: _____

N

W — E

S

Proposed Area of Panel Placement

22 panels total making up 7.1 Kw

Property Located in the Old Town Historic Dist.

Open Lot owned by Glynn County Board of Education

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

Project Details

Name	Savannah	**Date**	12/09/2021
Location	Savannah, GA	**Total modules**	22
Module	REC Solar: REC325NP Black (30mm)	**Total watts**	7,150
Dimensions	65.94" x 39.25" x 1.18" (1675.0mm x 997.0mm x 30.0mm)	**Attachments**	40
ASCE	7-10	**Rails per row**	2

System Weight

Total system weight	1,038.9 lbs
Weight/attachment	26.0 lbs
Racking weight	165.7 lbs
Distributed weight	2.6 psf

Load Assumptions

Wind exposure	B
Wind speed	110 mph
Ground snow load	0 psf
Attachment spacing portrait	4.0'

Roof Information

Roof Material Family	Comp Shingle	**Roof material**	Comp Shingle
Building height	30 ft	**Roof attachment**	FlashVue
Roof slope	22 °	**Attachment hardware**	T Bolt
Risk category	II		

Span Details XR100 - Portrait

Zone	Max span	Max cantilever
1	11'	3'
2	9' 11"	3'
3	8'	3'

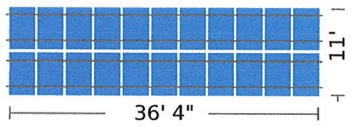
Reaction Forces XR100 - Portrait

Zone	Down (lbs)	Uplift (lbs)	Lateral (lbs)
1	138	89	13
2	138	186	13
3	138	295	13

Roof Section 1

Definition	Roof Section Weights	Roof Section (all segments)
22 modules	Total weight: 1,038.9 lbs	Provided rail: 168' [12 x 14']
East-West rail orientation	Weight/attachment: 26.0 lbs	Attachments: 40
Portrait module orientation	Total Area: 401.8 sq ft	Splices: 8
Graphical entry	Distributed weight: 2.6 psf	Clamps: 40

Diagram



Segments

Columns	Length	Cantilever	Cantilever Violations	Rail	Attachments	Splices	Clamps
11	36' 5"	3"	None	84' [6 x 14']	20	4	20
			Row segment totals (x 2) →	**168' [12 x 14']**	**40**	**8**	**40**

Creative Solar USA

Temple Beth Tefilloh
1326 Egmont St
Brunswick, GA 31520, USA
pgraitc@me.com

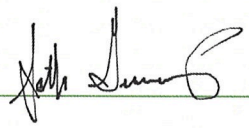
CUSTOMER SIGNATURE

I hereby agree to move forward with the solar project as described above and agree to the Terms and Conditions of the contract provided by the installer, Creative Solar, joined to this proposal.

Temple Beth Tefilloh

07/14/21

Date of Signature (MM/DD/YY)



Creative Solar

07/15/21

Date of Signature (MM/DD/YY)

YOUR REPRESENTATIVE

Seth Gunning
Email: seth.gunning@creativesolarusa.com
Phone: 4044349745

Temple Beth Tefilloh
1326 Egmont St
Brunswick, GA 31520, USA
pgraitc@me.com

PROJECT DETAILS

Additional information specific to your solar project:

Client name: Temple Beth Tefilloh

Address of project: 1326 Egmont St, Brunswick, GA 31520, USA

Solar Panels:

- Manufacturer: REC Solar
- Model: 325W N-Peak Black
- Watts: 325
- Count: 22

Flashing:

- Name: IronRidge Resources - FlashFoot2

Inverter:

- Name: SolarEdge - SE7600A-US
- Efficiency: 98.00%

Optimizer:

- Name: SolarEdge - P370

Rack:

- Name: IronRidge Resources - XR100

Pricing & Payment information:

Extra costs:

- Tile Roof Installation (Material and Labor): 7150 Watts x $0.30/Watt

Discounts:

- Georgia Interfaith Power and Light (GIPL) Revolving Loan Fund: 1 x -$15,000.00

Gross price of system

Cost after rebates and incentives:

Project specs:

- System Size: 7.15 kW

Creative Solar | 2931 Lewis Street, Suite 300, Kennesaw, GA 30144
Phone: 7704857438 | Email: Jessica.Worley@creativesolarusa.com
License Number: 2017029136

Initials

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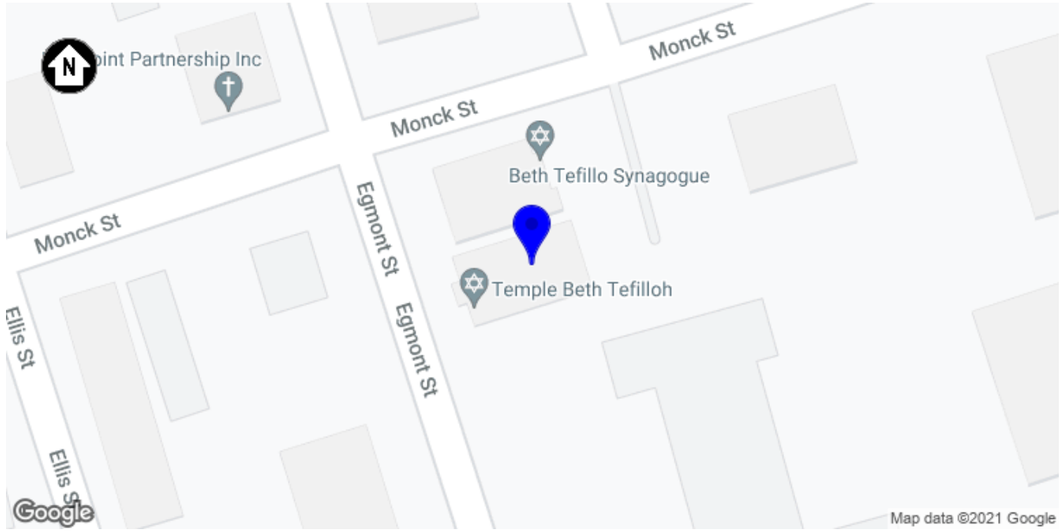
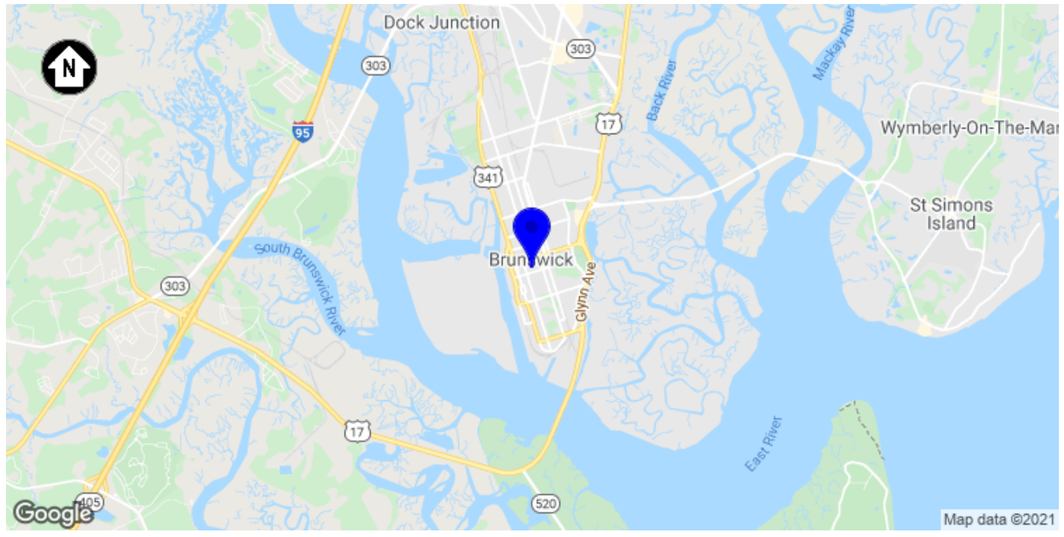
	MOUNTING SYSTEM DATASHEET
	MOUNTING SYSTEM ENGINEERING LETTER
	UL 2703 GROUND AND BONDING CERTIFICATION
	ANCHOR DATASHEET

PROJECT DETAILS	
PROPERTY OWNER	TEMPLE BETH TEFILLOH
PROPERTY ADDRESS	1326 EGMONT ST, BRUNSWICK, GA 31520 US
ZONING	RESIDENTIAL
USE AND OCCUPANCY CLASSIFICATION	BUSINESS GROUP (GROUP B)
AHJ	CITY OF BRUNSWICK
UTILITY COMPANY	GEORGIA POWER CO
METER SERIAL NUMBER	4773387
ELECTRICAL CODE	2020 NEC (NFPA 70)
FIRE CODE	2018 IFC
OTHER BUILDING CODES	2020 GA MIN. STANDARD BUILDING CODE 2020 GA MIN. ONE AND TWO FAMILY DWELLINGS CODE 2020 GA MIN. STANDARD PLUMBING CODE 2020 GA MIN. STANDARD BUILDING CODE

CONTRACTOR INFORMATION	
COMPANY	CREATIVE SOLAR USA
LICENSE NUMBER	EN211480
ADDRESS	PO BOX 1066, KENNESAW, GA 30156
PHONE NUMBER	(770) 485-7438
CONTRACTOR SIGNATURE	



1 PV-1 PLOT SCALE: NTS



2 PV-1 LOCALE SCALE: NTS

SCOPE OF WORK

THIS PROJECT INVOLVES THE INSTALLATION OF A GRID-INTERACTIVE PV SYSTEM. PV MODULES WILL BE MOUNTED USING A PREENGINEERED MOUNTING SYSTEM. THE MODULES WILL BE ELECTRICALLY CONNECTED WITH DC TO AC POWER INVERTERS AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

THIS DOCUMENT HAS BEEN PREPARED FOR THE PURPOSE OF DESCRIBING THE DESIGN OF A PROPOSED PV SYSTEM WITH ENOUGH DETAIL TO DEMONSTRATE COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS. THE DOCUMENT SHALL NOT BE RELIED UPON AS A SUBSTITUTE FOR FOLLOWING MANUFACTURER INSTALLATION INSTRUCTIONS. THE SYSTEM SHALL COMPLY WITH ALL MANUFACTURERS LISTING AND INSTALLATION INSTRUCTIONS, AS WELL AS ALL APPLICABLE CODES. NOTHING IN THIS DOCUMENT SHALL BE INTERPRETED IN A WAY THAT OVERRIDES THEM. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF ALL CONDITIONS, DIMENSIONS, AND DETAILS IN THIS DOCUMENT.

SYSTEM DETAILS	
DESCRIPTION	NEW GRID-INTERACTIVE PV SYSTEM WITH NO ENERGY STORAGE
DC RATING OF SYSTEM	7.15KW
AC RATING OF SYSTEM	7.60KW
AC OUTPUT CURRENT	32.0A
INVERTER(S)	1 X SOLAR EDGE SE7600H-US000BXX4
MODULE	REC SOLAR REC325NP BLACK
ARRAY WIRING	(2) STRINGS OF 11

INTERCONNECTION DETAILS	
POINT OF CONNECTION	NEW LOAD-SIDE AC CONNECTION PER NEC 705.12(B)(3)(2) AT MSP
UTILITY SERVICE	120/240V 1Φ
LOCATION	MAIN SERVICE PANEL W/400A BUSBAR 400A MCB

SITE DETAILS	
ASHRAE EXTREME LOW	-5°C (23°F)
ASHRAE 2% HIGH	33°C (91°F)
CLIMATE DATA SOURCE	BRUNSWICK/GLYNCO (KBQK)
WIND SPEED	140 MPH (ASCE7-10)
RISK CATEGORY	II
WIND EXPOSURE CATEGORY	C
GROUND SNOW LOAD	0 PSF

P-166013

Creative Solar

GRID-TIED SOLAR POWER SYSTEM

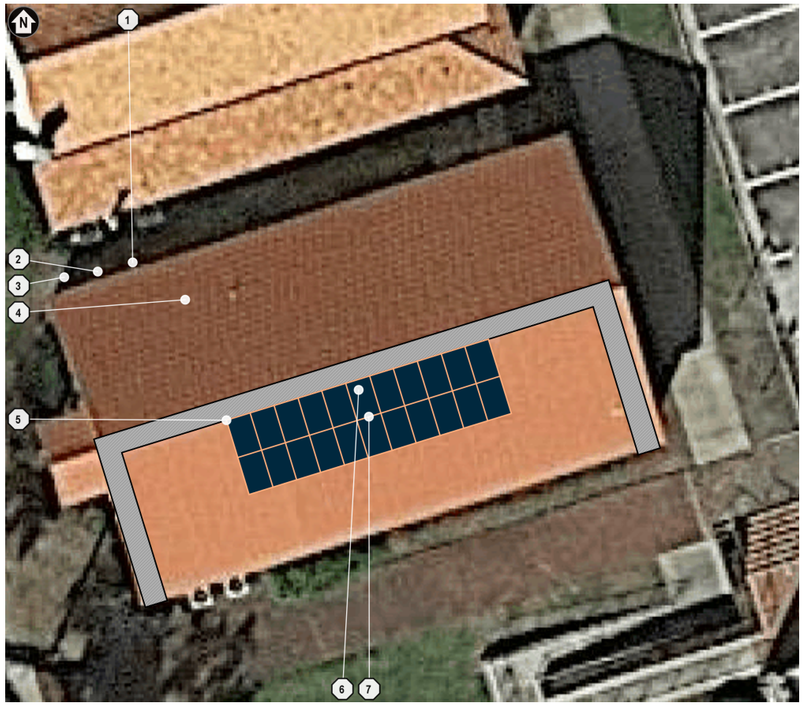
1326 EGMONT ST
BRUNSWICK, GA 31520

PROJECT SUMMARY

DOC ID: 166013-204546-1
DATE: 9/21/21
CREATOR: B.P.
REVIEWER:

REVISIONS

PV-1



1 PV-2 SITE PLAN
SCALE: 1" = 20'

GENERAL NOTES	
1	EQUIPMENT LIKELY TO BE WORKED UPON WHILE ENERGIZED SHALL BE INSTALLED IN LOCATIONS THAT SATISFY MINIMUM WORKING CLEARANCES PER NEC 110.26.
2	CONTRACTOR SHALL USE ONLY COMPONENTS LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY FOR THE INTENDED USE.
3	CONTRACTOR IS RESPONSIBLE FOR FURNISHING ALL EQUIPMENT, CABLES, ADDITIONAL CONDUITS, RACEWAYS, AND OTHER ACCESSORIES NECESSARY FOR A COMPLETE AND OPERATIONAL PV SYSTEM.
4	WHERE DC PV SOURCE OR DC PV OUTPUT CIRCUITS ARE RUN INSIDE THE BUILDING, THEY SHALL BE CONTAINED IN METAL RACEWAYS, TYPE MC METAL-CLAD CABLE, OR METAL ENCLOSURES FROM THE POINT OF PENETRATION INTO THE BUILDING TO THE FIRST READILY ACCESSIBLE DISCONNECTING MEANS, PER NEC 690.31(D).
5	ALL EMT CONDUIT FITTINGS SHALL BE LISTED AS WEATHERPROOF FITTINGS AND INSTALLED TO ENSURE A RAINTIGHT FIT, PER NEC 358.42.

1. (N) INVERTER, OUTDOOR
2. (N) VISIBLE, LOCKABLE, READILY-ACCESSIBLE AC DISCONNECT LOCATED WITHIN 10 FT OF UTILITY METER, OUTDOOR
3. (E) UTILITY METER, OUTDOOR
4. (E) MAIN SERVICE PANEL (MSP), OUTDOOR
5. (N) TRANSITION BOX, OUTDOOR , OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN EMT CONDUIT OVER ROOF NO CLOSER THAN 0.5" ABOVE ROOF SURFACE
6. (N) STRING COMBINER, OUTDOOR , OUTPUT CIRCUIT CONDUCTORS SHALL BE RUN IN EMT CONDUIT OVER ROOF NO CLOSER THAN 0.5" ABOVE ROOF SURFACE
7. (N) PROPOSED ROOF-MOUNTED PHOTOVOLTAIC ARRAY. 5:12 (23°) SLOPED ROOF, 22 PV MODULES (BLACK FRAME, BLACK BACKSHEET), 163° AZIMUTH

P-166013

Creative Solar

GRID-TIED SOLAR POWER SYSTEM

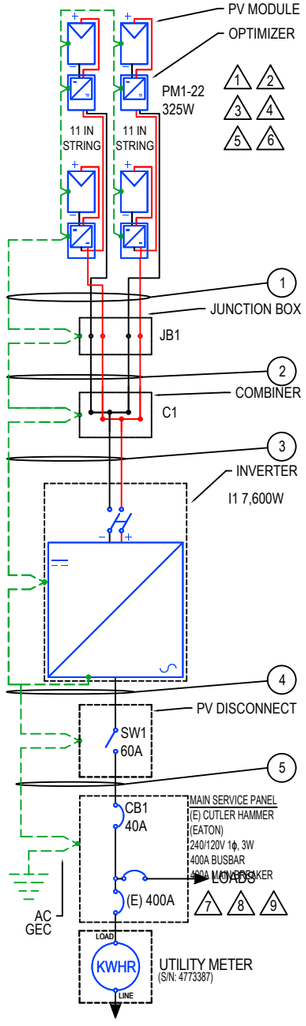
1326 EGMONT ST
BRUNSWICK, GA 31520

SITE PLAN

DOC ID: 166013-204546-1
DATE: 9/21/21
CREATOR: B.P.
REVIEWER:

REVISIONS

PV-2



MODULES

REF.	QTY.	MAKE AND MODEL	PMAX	PTC	ISC	IMP	VOC	VMP	TEMP. COEFF. OF VOC	FUSE RATING
PM1-22	22	REC SOLAR REC325NP BLACK	325W	304W	10.28A	9.46A	40.7V	34.4V	-0.11V/°C (-0.27%/°C)	25A

INVERTERS

REF.	QTY.	MAKE AND MODEL	AC VOLTAGE	GROUND	RATED POWER	MAX OUTPUT CURRENT	MAX INPUT CURRENT	MAX INPUT VOLTAGE	WEIGHTED EFFICIENCY
I1	1	SOLAR EDGE SE7600H-US	240V	NOT SOLIDLY GROUNDED	7,600W	32.0A	20.0A	480V	99.0%

OPTIMIZERS

REF.	QTY.	MODEL	RATED INPUT POWER	MAX OUTPUT CURRENT	MAX INPUT ISC	MAX DC VOLTAGE	WEIGHTED EFFICIENCY
PO1-22	22	SOLAR EDGE P340	340W	15A	11.0A	48V	98.8%

DISCONNECTS

REF.	QTY.	MAKE AND MODEL	RATED CURRENT	MAX RATED VOLTAGE
SW1	1	EATON DG222URB OR EQUIV.	60A	240VAC

OCPDS

REF.	QTY.	RATED CURRENT	MAX VOLTAGE
CB1	1	40A	240VAC

SYSTEM SUMMARY

	STRING 1	STRING 2
DC SOURCE CIRCUIT CURRENT	15A	15A
NUMBER OF OPTIMIZERS	11	11
NOMINAL STRING VOLTAGE	400V	400V
ARRAY OPERATING CURRENT	8.9A	8.9A
ARRAY STC POWER	7,150W	
ARRAY PTC POWER	6,679W	
MAX AC CURRENT	32A	
MAX AC POWER OUTPUT	7,600W	
DERATED AC POWER OUTPUT	6,533W	

NOTES

1. SOLAR EDGE SYSTEM MEETS REQUIREMENTS FOR PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM (PVRSS), AS PER NEC 690.12(B)(2).
2. MATING CONNECTORS SHALL COMPLY WITH NEC 690.33.
3. THE SPECIFIED OPTIMIZER CAN BE SUBSTITUTED WITH A P370, P505, P401, OR P485. THESE OPTIMIZERS HAVE AN INPUT VOLTAGE WINDOW WIDE ENOUGH TO ACCOMMODATE THE OUTPUT VOLTAGE RANGE OF THE MODULE AT THE DESIGN TEMPERATURES, HAVE A MAX INPUT CURRENT RATING THAT IS ABOVE THE MAX OUTPUT CURRENT OF THE MODULE, AND A MAX POWER INPUT THAT IS ABOVE THE RATED POWER OUTPUT OF THE MODULE.
4. DC PV CONDUCTORS ARE NOT SOLIDLY-GROUNDED. NO DC PV CONDUCTOR SHALL BE WHITE- OR GRAY-COLORED
5. ALL METAL ENCLOSURES, RACEWAYS, CABLES AND EXPOSED NONCURRENT-CARRYING METAL PARTS OF EQUIPMENT SHALL BE GROUNDED TO EARTH AS REQUIRED BY NEC 250.4(A) AND PART III OF ARTICLE 250 AND EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC 690.45. THE GROUNDING ELECTRODE SYSTEM SHALL ADHERE TO NEC 690.47(A) AND NEC 250.169. THE DC GROUNDING ELECTRODE SHALL BE SIZED ACCORDING TO NEC 250.166 AND INSTALLED IN COMPLIANCE WITH NEC 250.64.
6. MAX DC VOLTAGE OF ARRAY FIXED BY THE INVERTER AT 400V REGARDLESS OF TEMPERATURE. THE MAX DC VOLTAGE OF THE MODULE AT -5°C IS 44.0V (-5°C - 25°C) X -0.11V/C + 40.7V = 44.0V).
7. POINT-OF-CONNECTION IS ON LOAD SIDE OF SERVICE DISCONNECT, IN COMPLIANCE WITH NEC 705.12(B)(3)(2). OUTPUT IS BACKFED THROUGH BREAKER IN MAIN PANEL.
8. THE BREAKER SHALL BE LOCATED AT THE OPPOSITE END OF THE BUSBAR FROM THE MAIN BREAKER. THE BREAKER SHALL NOT BE MARKED FOR "LINE" AND "LOAD".
9. PV SYSTEM DISCONNECT SHALL BE A VISIBLE KNIFE-BLADE TYPE DISCONNECT THAT IS ACCESSIBLE AND LOCKABLE BY THE UTILITY IN ACCORDANCE WITH NEC 690.13(E). THE DISCONNECT SHALL BE LOCATED WITHIN 10 FT OF UTILITY METER AND INSTALLED IN COMPLIANCE WITH NEC 705.20 AND GROUPED AS REQUIRED BY NEC 230.72.

CONDUCTOR AND CONDUIT SCHEDULE W/ELECTRICAL CALCULATIONS

ID	TYPICAL	CONDUCTOR	CONDUIT / CABLE	CURRENT-CARRYING CONDUCTORS IN CONDUIT / CABLE	OCPD	EGC	TEMP. CORR. FACTOR	FILL FACTOR	CONT. CURRENT	MAX. CURRENT (125%)	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	AMP. @ TERM. TEMP. RATING
1	2	10 AWG PV WIRE, COPPER	FREE AIR	N/A	N/A	6 AWG BARE, COPPER	0.76 (55°C)	1.0	15A	18.75A	55A	41.8A	75°C	50A
2	1	8 AWG THWN-2, COPPER	0.75" DIA. EMT	4	N/A	10 AWG THWN-2, COPPER	0.96 (33°C)	0.8	15A	18.75A	55A	42.24A	90°C	55A
3	1	4 AWG THWN-2, COPPER	0.75" DIA. EMT	2	N/A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	30A	37.5A	95A	91.2A	90°C	95A
4	1	8 AWG THWN-2, COPPER	0.5" DIA. EMT	2	40A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	32A	40A	55A	52.8A	75°C	50A
5	1	8 AWG THWN-2, COPPER	0.5" DIA. EMT	2	40A	10 AWG THWN-2, COPPER	0.96 (33°C)	1.0	32A	40A	55A	52.8A	75°C	50A

GENERAL ELECTRICAL NOTES

1. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
2. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
3. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).

GROUNDING NOTES

1. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690
2. PV MODULES SHALL BE GROUNDED TO MOUNTING RAILS USING MODULE LUGS OR RACKING INTEGRATED GROUNDING CLAMPS AS ALLOWED BY LOCAL JURISDICTION. ALL OTHER EXPOSED METAL PARTS SHALL BE GROUNDED USING UL-LISTED LAY-IN LUGS.
3. INSTALLER SHALL CONFIRM THAT MOUNTING SYSTEM HAS BEEN EVALUATED FOR COMPLIANCE WITH UL 2703 "GROUNDING AND BONDING" WHEN USED WITH PROPOSED PV MODULE.
4. IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE A VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
5. AC SYSTEM GROUNDING ELECTRODE CONDUCTOR (GEC) SHALL BE A MINIMUM SIZE #8AWG WHEN INSULATED, #6AWG IF BARE WIRE.
6. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO NEC ARTICLE 690.45, AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE, AND #6AWG SHALL BE USED WHEN EXPOSED TO DAMAGE
7. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN, OR MARKED GREEN IF #4AWG OR LARGER

1 PV-3 SINGLE-LINE DIAGRAM
SCALE: NTS

P-166013

Creative Solar

GRID-TIED SOLAR POWER SYSTEM

1326 EGMONT ST
BRUNSWICK, GA 31520

SINGLE-LINE DIAGRAM

PROJECT ID: 166013
DATE: 09/21/21
CREATED BY: B.P.
CHECKED BY:

REVISIONS

PV-3

DC RACEWAYS

3

JB1 - TRANSITION BOX
(MODEL NOT SPECIFIED)

4

C1 - STRING COMBINER
(MODEL NOT SPECIFIED)

4

SW1 - DISCONNECT
(EATON DG222URB)

4 6 7

I1 - INVERTER
(SOLAR EDGE SE7600H-US000BXX4)

4 5

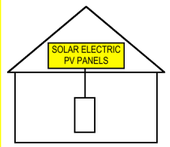
MSP - MAIN SERVICE PANEL
(CUTLER HAMMER (EATON))

1 2 6 7 8 9

1 SEE NOTE NO. 5 (MSP)

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.



NEC690.56(C)(1) AND IFC1204.5.1,1204.5.1

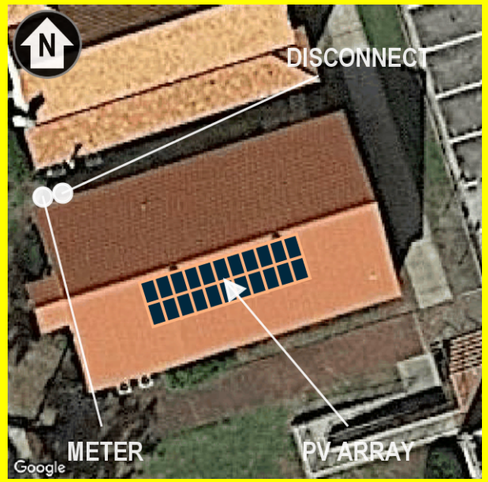
3 SEE NOTE NO. 6 (DC RACEWAYS)

WARNING
PHOTOVOLTAIC POWER SOURCE

NEC690.31(D)(2)

2 POINT-OF-INTERCONNECTION OR AT MAIN SERVICE DISCONNECT (MSP)

! CAUTION: MULTIPLE SOURCES OF POWER !
POWER TO THIS BUILDING IS ALSO FROM ROOF ARRAY WITH SAFETY DISCONNECTS AS SHOWN



INSTALLED BY CREATIVE SOLAR USA • 7704857438

NEC690.56(B),705.10

4 EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT (JB1, C1, SW1, I1)

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

NEC690.13(B)

5 DC DISCONNECT (I1)

DIRECT-CURRENT PV POWER SOURCE
MAXIMUM VOLTAGE: 400V
MAX CIRCUIT-CURRENT: 37.5A
DC-TO-DC CONVERTER RATED CURRENT: 15.0A

NEC690.53

6 AC DISCONNECT (SW1, CB1 IN MSP)

MAXIMUM AC OPERATING CURRENT: 32.0A
MAXIMUM AC OPERATING VOLTAGE: 240V

NEC690.54

7 AC SOLAR DISCONNECT (SW1, CB1 IN MSP)

PV SYSTEM DISCONNECT

NEC690.13(B)

8 ANY AC ELECTRICAL PANEL THAT IS FED BY BOTH THE UTILITY AND THE PHOTOVOLTAIC SYSTEM (MSP)

! CAUTION !
MULTIPLE SOURCES OF POWER

NEC705.10

9 SOLAR BREAKER (MSP)

! WARNING !
POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

NEC705.12(B)(3)(2)

LABELING NOTES

1	ALL PLAQUES AND SIGNAGE REQUIRED BY 2020 NEC AND 2018 IFC WILL BE INSTALLED AS REQUIRED.
2	LABELS, WARNING(S) AND MARKING SHALL COMPLY WITH ANSI Z535.4, WHICH REQUIRES THAT DANGER, WARNING, AND CAUTION SIGNS USED THE STANDARD HEADER COLORS, HEADER TEXT, AND SAFETY ALERT SYMBOL ON EACH LABEL. THE ANSI STANDARD REQUIRES A HEADING THAT IS AT LEAST 50% TALLER THAN THE BODY TEXT, IN ACCORDANCE WITH NEC 110.21(B).
3	A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS IF NOT IN THE SAME LOCATION IN ACCORDANCE WITH NEC 690.56(B).
4	THE DIAGRAM INDICATING THE LOCATIONS OF DISCONNECTS SHALL BE CORRECTLY ORIENTED WITH RESPECT TO THE DIAGRAM'S LOCATION, IN ACCORDANCE WITH NEC 705.10
5	LABEL(S) WITH MARKING, "TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY," SHALL BE LOCATED WITHIN 3 FT OF SERVICE DISCONNECTING MEANS THE TITLE SHALL UTILIZE CAPITALIZED LETTERS WITH A MINIMUM HEIGHT OF 3/8" IN BLACK ON A YELLOW BACKGROUND, AND REMAINING TEXT SHALL BE CAPITALIZED WITH A MINIMUM HEIGHT OF 3/16" IN BLACK ON WHITE BACKGROUND
6	LABEL(S) WITH MARKING, "WARNING PHOTOVOLTAIC POWER SOURCE," SHALL BE LOCATED AT EVERY 10 FEET OF EACH DC RACEWAY AND WITHIN ONE FOOT OF EVERY TURN OR BEND AND WITHIN ONE FOOT ABOVE AND BELOW ALL PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS AND BARRIERS. THE LABEL SHALL HAVE 3/8" TALL LETTERS AND BE REFLECTIVE WITH WHITE TEXT ON A RED BACKGROUND

P-166013

Creative Solar

GRID-TIED SOLAR POWER SYSTEM

1326 EGMONT ST
BRUNSWICK, GA 31520

SAFETY LABELS

DOC ID: 166013-204546-1
DATE: 9/21/21
CREATOR: B.P.
REVIEWER:

REVISIONS

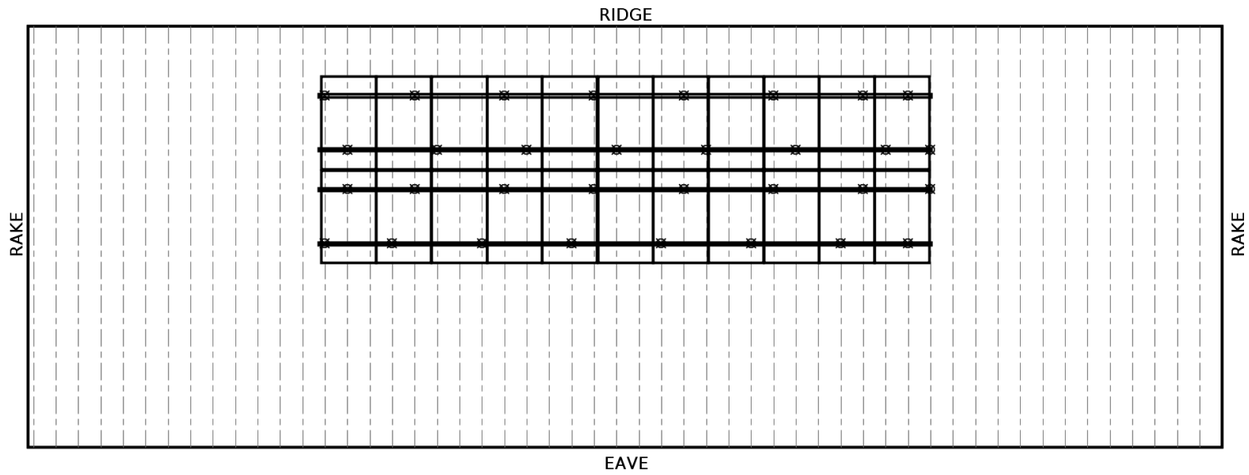
PV-4

ROOF PROPERTIES	
ROOF MATERIAL	COMPOSITION SHINGLE (1 LAYER)
SLOPE	5/12 (22.6°)
MEAN ROOF HEIGHT	24.5FT
DECK SHEATHING	15/32" OSB
CONSTRUCTION	RAFTERS (2X6'S), 16IN OC

MODULE MECHANICAL PROPERTIES	
MODEL	REC SOLAR REC325NP BLACK
DIMENSIONS (AREA)	65.9IN X 39.3IN X 1.2IN (18.0 SQ FT)
WEIGHT	39.7LB

MOUNTING SYSTEM PROPERTIES	
RAIL MODEL	IRONRIDGE XR100
ANCHOR MODEL	IRONRIDGE FM-FF2-001-B (FLASHED), 1.02IN AIR GAP
FASTENING METHOD	3.0 INCH EMBEDMENT INTO RAFTERS WITH (1) 5/16IN DIA. FASTENER
MAX. ALLOW. RAIL SPAN	64.0IN (ZONES 1 AND 2) 48.0IN (ZONE 3)
MAX. MOUNT SPACING	64.0IN (ZONES 1 AND 2) 48.0IN (ZONE 3)
MAX. ALLOW. CANTILEVER	25.6IN (ZONES 1 AND 2) 19.2IN (ZONE 3)
GROUNDING AND BONDING	TIN-PLATED, SOLID COPPER LAY-IN LUGS LISTED UNDER UL 2703

NOTES	
1	RAFTER LOCATIONS ARE APPROXIMATE. ACTUAL LOCATIONS MAY DIFFER AND CONTRACTOR MAY NEED TO ADJUST MOUNT LOCATIONS. IN NO CASE SHALL THE MOUNT SPACING EXCEED "MAX. MOUNT SPACING"



1 / PV-5 ATTACHMENT PLAN (ORTHOGONAL PROJECTION)
SCALE: 1/8" = 1'

P-166013

Creative Solar

GRID-TIED SOLAR POWER SYSTEM

1326 EGMONT ST
BRUNSWICK, GA 31520

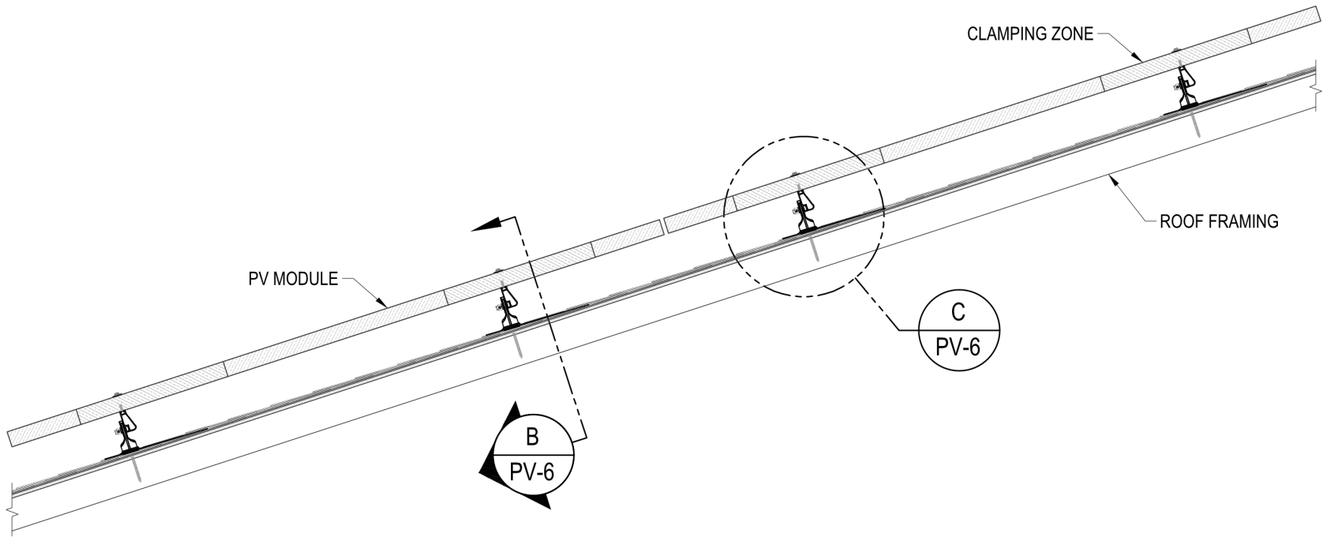
ATTACHMENT PLAN

DOC ID: 166013-204546-1
DATE: 9/21/21
CREATOR: B.P.
REVIEWER:

REVISIONS

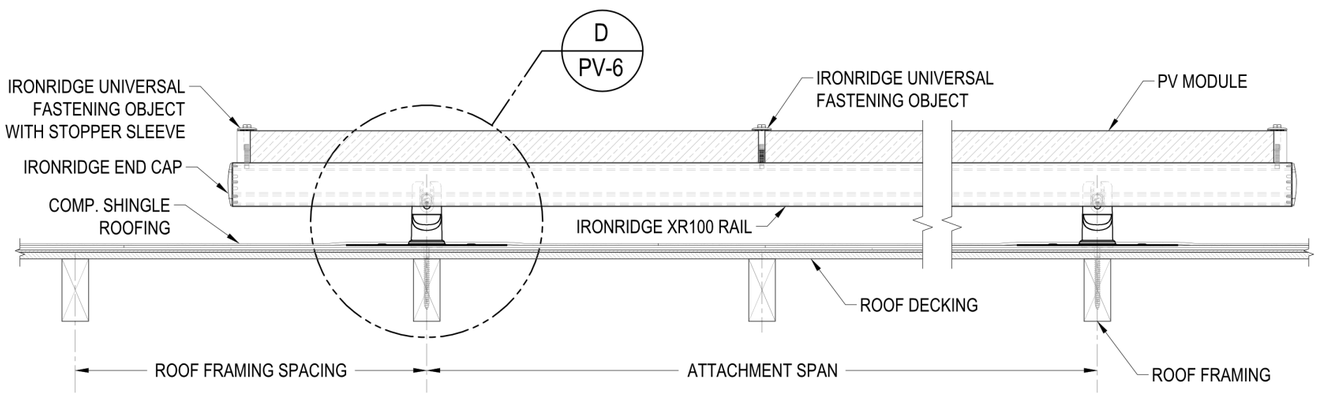
PV-5

MOUNTING SYSTEM NOTES	
1	FLASHING SHALL BE APPLIED IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.
2	IF THERE IS ANY CONFLICT BETWEEN WHAT IS DEPICTED HERE AND INSTRUCTIONS PROVIDED BY A MANUFACTURER, THE MANUFACTURER'S INSTRUCTIONS SHALL SUPERCEDE.



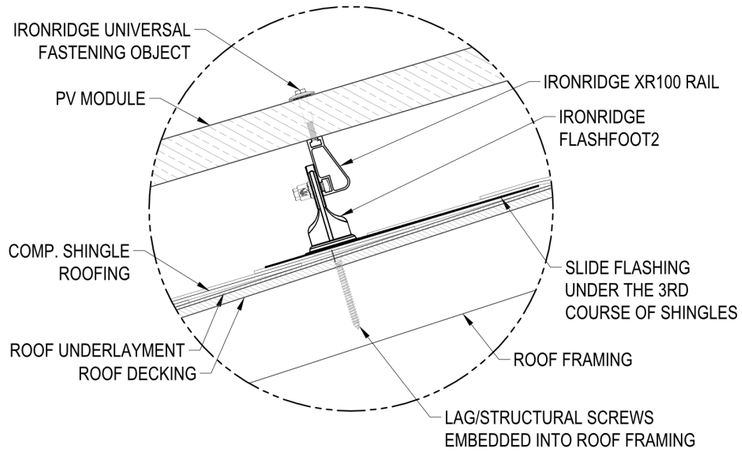
A PV-6 RACKING ELEVATION (TRANSVERSE VIEW)

SCALE: NTS



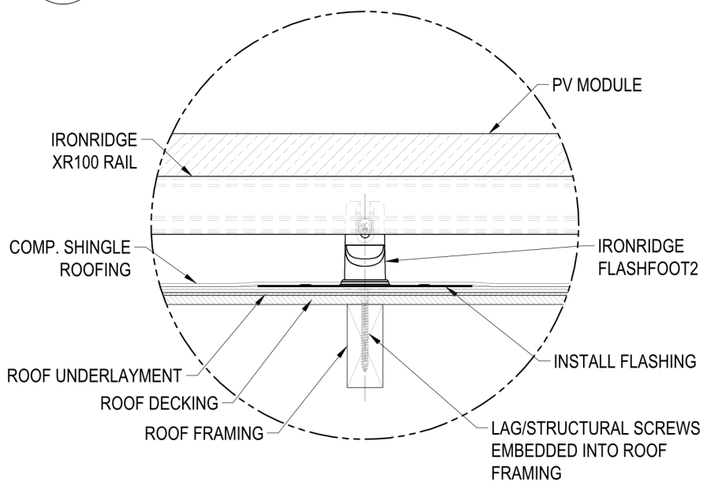
B PV-6 RACKING ELEVATION (LONGITUDINAL VIEW)

SCALE: NTS



C PV-6 ATTACHMENT DETAIL (TRANSVERSE VIEW)

SCALE: NTS



D PV-6 ATTACHMENT DETAIL (LONGITUDINAL VIEW)

SCALE: NTS

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Creative Solar

GRID-TIED SOLAR POWER SYSTEM

1326 EGMONT ST
BRUNSWICK, GA 31520

ATTACHMENT DETAILS

DOC ID: 166013-204546-1
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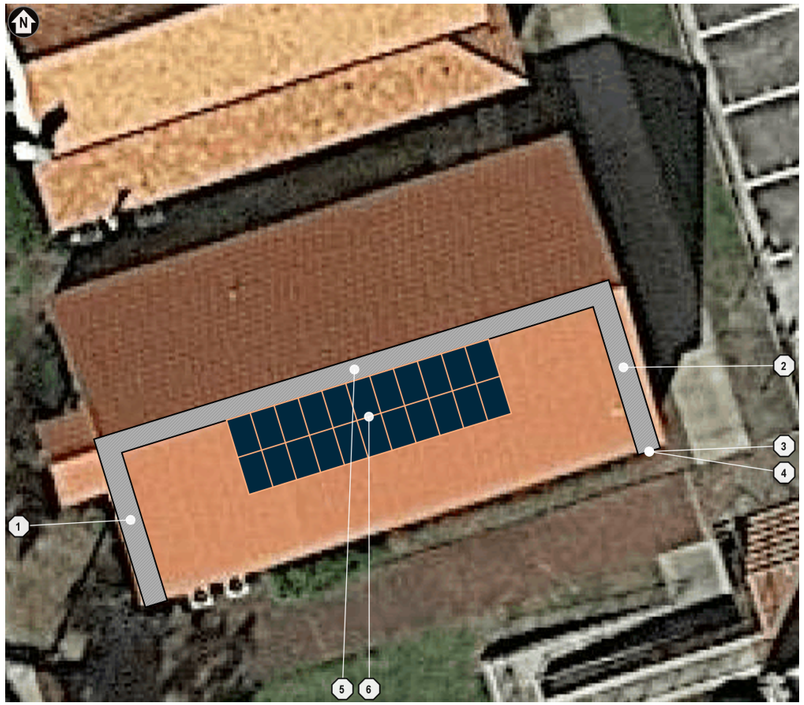
REVISIONS

PV-6



1 PV-7 FIRE SAFETY PLAN
SCALE: 1" = 20'

GENERAL NOTES	
1	AT LEAST TWO 36"-WIDE PATHWAYS ON SEPARATE ROOF PLANES, FROM LOWEST ROOF EDGE TO RIDGE, SHALL BE PROVIDED ON ALL BUILDINGS. THERE SHALL BE AT LEAST ONE PATHWAY ON THE STREET OR DRIVEWAY SIDE OF THE ROOF. FOR EACH ROOF PLANE WITH A PV ARRAY, AT LEAST ONE SUCH PATHWAY SHALL BE PROVIDED ON THE SAME ROOF PLANE, OR ON AN ADJACENT ROOF PLANE, OR STRADDLING THE SAME AND ADJACENT ROOF PLANES. (IFC 1204.2.1.1)
2	FOR PV ARRAYS OCCUPYING MORE THAN 1/3 OF THE PLAN VIEW TOTAL ROOF AREA, A MIN. 3'-WIDE SETBACK IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE. (IFC 1204.2.1.2)
3	PV MODULES SHALL NOT BE INSTALLED ON THE PORTION OF A ROOF THAT IS BELOW AN EMERGENCY ESCAPE AND RESCUE OPENING. A 36"-WIDE PATHWAY SHALL BE PROVIDED TO THE EMERGENCY ESCAPE AND RESCUE OPENING. (IFC 1204.2.2)

1. 3.0 FT. WIDE FIRE ACCESS PATHWAY, PER IFC 1204.2.1.1
2. 3.0 FT. WIDE FIRE ACCESS PATHWAY, PER IFC 1204.2.1.1
3. ROOF ACCESS POINT
4. ROOF ACCESS POINT
5. 3.0 FT. WIDE SMOKE-VENTILATION SETBACK, PER IFC 1204.2.1.2
6. PV MODULES INSTALLED ON ROOF WITH IRONRIDGE ROOF MOUNTING SYSTEM. THE MOUNTING SYSTEM IS UL 1703 CLASS A FIRE RATED ON A 5/12 SLOPED ROOF WHEN INSTALLED WITH TYPE 1 OR 2 MODULES. THE REC SOLAR REC325NP BLACK IS TYPE 2.
7. CABLES, WHEN RUN BETWEEN ARRAYS, SHALL BE ENCLOSED IN CONDUIT.

P-166013

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GRID-TIED SOLAR POWER SYSTEM

1326 EGMONT ST
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FIRE SAFETY PLAN

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PV-7

Conductor, Conduit, and OCPD Sizing Validation

1. Maximum System Voltage Test

1.1. Solar Edge inverter w/22 REC Solar REC325NP Black (325W)s

Array Properties

Array Type	Distributed MPPT System Inverter Array
System Description	Solar Edge inverter w/22 REC Solar REC325NP Black (325W)s
Module	REC325NP Black (325W)
Highest number of modules in series in a PV Source Circuit	1
Design Low Temp.	-5°C
Module Voc	40.7V
Temp. Coefficient Voc	-0.11V/C

NEC Code Validation Tests

1.	PV Source Circuit maximum Voc must not exceed 600V 44V < 600V = true	*PASS*
2.	DC-DC Converter Source Circuit voltage must not exceed 600V 400V < 600V = true	*PASS*

NEC Code Calculations

A. Maximum Voltage of PV Source Circuit 44V
see 690.7(A)

NEC 690.7(A) requires that if the PV module manufacturer provides a temperature coefficient of open-circuit voltage, it must be used to calculate the PV array's maximum system voltage. It includes an information note recommending the use of the ASHRAE 'Extreme Annual Mean Minimum Design Dry Bulb Temperature' as the design low temperature. Using these values, the module Voc (40.7V) will increase to 44V at the design low temperature (-5°C).

(-5°C - 25°C) X -0.11V/C + 40.7V = 44V
The module Voc at the design low temperature is 44V.

44V X 1 = 44V

B. Maximum Voltage of DC-DC Converter Source Circuit 400V
see 690.7(B)(2)

All PV circuits have a voltage that does not exceed 600V. This system's DC-DC Converter Source Circuits are fed by Solar Edge P340 dc-to-dc converter optimization devices. Each device is connected to a single REC325NP Black (325W) PV module. The voltage of this circuit is regulated by the inverter at a constant 400V.

2. Wire, Conduit, and OCPD Code Compliance Validation

2.1. #1: String of Optimizer(s): Optimizer to Transition Box

Circuit Section Properties

Conductor	10 AWG PV Wire, Copper
Equipment Ground Conductor (EGC)	6 AWG Bare, Copper
OCPD(s)	N/A
Raceway/Cable	Free Air
Lowest Terminal Temperature Rating	75°C
Maximum Wire Temperature	55°C
Power Source Description	DC-to-DC converter source circuit consisting of 11 Solar Edge P340 optimizers.
Power Source Current	15A
Voltage	400V

NEC Code Validation Tests

1.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 41.8A >= 15A = true	*PASS*
2.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 55A > 15A x 1.25 = true	*PASS*
3.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 35A >= 15A X 1.25 = true	*PASS*
4.	EGC must meet code requirements for minimum size (Table 250.122) 6 AWG >= 10 AWG = true	*PASS*
5.	EGC must meet code requirements for physical protection (250.120(C)) 6 AWG >= 6 AWG = true	*PASS*

NEC Code Calculations

A. Continuous Current 15A
see 690.8(A)(1)(d)

The continuous current of DC-to-DC converter source circuit is equal to the rated maximum output current of the optimizer.

Rated Max. Output Current of optimizer is 15A

B. Ampacity of Conductor 55A
see Table 310.15(B)(17)

Ampacity (30°C) for a copper conductor with 90°C insulation in free air is 55A.

C. Derated Ampacity of Conductor 41.8A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 55°C is 0.76.
The fill factor for conductors in free air is 1.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (55A) multiplied by the temperature factor (0.76) and by the fill factor (1).

55A X 0.76 X 1 = 41.8A

D. Max Current for Terminal Temp. Rating 35A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 75°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 75°C rating would be the amount referenced in the 75°C column in Table 310.15(B)(16), which is 35A.

E. Minimum Required EGC Size 10 AWG
see Table 250.122 and 690.45

The smallest EGC size allowed is 10 AWG for OCPD rating 25A according to Table 250.122.
According to 690.45, it is not necessary to increase the size of the PV array's EGC when conductors are oversized for voltage drop considerations.

2.2. #2: String of Optimizer(s): Transition Box to String Combiner

Circuit Section Properties

Conductor	8 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	N/A
Raceway/Cable	0.75" dia. EMT
Lowest Terminal Temperature Rating	90°C
Maximum Wire Temperature	33°C
Power Source Description	DC-to-DC converter source circuit consisting of 11 Solar Edge P340 optimizers.
Power Source Current	15A
Voltage	400V

NEC Code Calculations

A. Continuous Current 15A
see 690.8(A)(1)(d)

The continuous current of DC-to-DC converter source circuit is equal to the rated maximum output current of the optimizer.

Rated Max. Output Current of optimizer is 15A

B. Ampacity of Conductor 55A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 55A.

C. Derated Ampacity of Conductor 42.24A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 33°C is 0.96.
The fill factor for a conduit/cable that has 4 wires is 0.8.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (55A) multiplied by the temperature factor (0.96) and by the fill factor (0.8).

55A X 0.96 X 0.8 = 42.24A

D. Max Current for Terminal Temp. Rating 55A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 90°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 90°C rating would be the amount referenced in the 90°C column in Table 310.15(B)(16), which is 55A.

E. Minimum Required EGC Size 10 AWG
see Table 250.122 and 690.45

The smallest EGC size allowed is 10 AWG for OCPD rating 25A according to Table 250.122.
According to 690.45, it is not necessary to increase the size of the PV array's EGC when conductors are oversized for voltage drop considerations.

F. Minimum Recommended Conduit Size 0.75" dia.
see 300.17

The total area of all conductors is 0.1886in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.75.

Qty	Description	Size	Type	Area	Total Area
4	Conductor	8 AWG	THWN-2	0.0366in²	0.1464in²
2	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0422in²
6					0.1886in²

0.1886in² / 0.4 = 0.4715in² (Corresponding to a diameter of 0.75")

NEC Code Validation Tests

1.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 42.24A >= 15A = true	PASS
2.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 55A > 15A x 1.25 = true	PASS
3.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 55A >= 15A X 1.25 = true	PASS
4.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
5.	Conduit must meet code recommendation for minimum size (300.17) 0.75in. >= 0.75in. = true	PASS

2.3. #3: String Combiner Output: String Combiner to Inverter

Circuit Section Properties

Conductor	4 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	N/A
Raceway/Cable	0.75" dia. EMT
Lowest Terminal Temperature Rating	90°C
Maximum Wire Temperature	33°C
Power Source Description	Array of 2 strings, with 11, and 11 Solar Edge P340 power optimizers and REC Solar REC325NP Black PV modules
Power Source Current	30A
Voltage	34.4V

NEC Code Calculations

A. Continuous Current 30A
see 690.8(A)(1)(c)

The continuous current of the array is equal to the rated maximum output current of the optimizer multiplied by the number of paralleled strings.

15A X 2 = 30A

B. Ampacity of Conductor 95A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 95A.

C. Derated Ampacity of Conductor 91.2A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 33°C is 0.96.
The fill factor for a conduit/cable that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (95A) multiplied by the temperature factor (0.96) and by the fill factor (1).

95A X 0.96 X 1 = 91.2A

D. Max Current for Terminal Temp. Rating 95A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 90°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 90°C rating would be the amount referenced in the 90°C column in Table 310.15(B)(16), which is 95A.

E. Minimum Required EGC Size 10 AWG
see Table 250.122 and 690.45

The smallest EGC size allowed is 10 AWG for OCPD rating 38A according to Table 250.122.
According to 690.45, it is not necessary to increase the size of the PV array's EGC when conductors are oversized for voltage drop considerations.

F. Minimum Recommended Conduit Size 0.75" dia.
see 300.17

The total area of all conductors is 0.1859in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.75.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	4 AWG	THWN-2	0.0824in²	0.1648in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
3					0.1859in²

0.1859in² / 0.4 = 0.4648in² (Corresponding to a diameter of 0.75")

NEC Code Validation Tests

1.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 91.2A >= 30A = true	PASS
2.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 95A > 30A x 1.25 = true	PASS
3.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 95A >= 30A X 1.25 = true	PASS
4.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
5.	Conduit must meet code recommendation for minimum size (300.17) 0.75in. >= 0.75in. = true	PASS

2.4. #4: Inverter Output: Inverter to Utility Disconnect

Circuit Section Properties

Conductor	8 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	40A
Raceway/Cable	0.5" dia. EMT
Lowest Terminal Temperature Rating	75°C
Maximum Wire Temperature	33°C
Power Source Description	Solar Edge SE7600H-US000BXX4 7600W Inverter
Power Source Current	32A
Voltage	240V
Inverter Max OCPD rating	40A

NEC Code Calculations

A. Continuous Current 32A
see Article 100

Equipment maximum rated output current is 32A

B. Ampacity of Conductor 55A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 55A.

C. Derated Ampacity of Conductor 52.8A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 33°C is 0.96.
The fill factor for a conduit/cable that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (55A) multiplied by the temperature factor (0.96) and by the fill factor (1).

55A X 0.96 X 1 = 52.8A

D. Max Current for Terminal Temp. Rating 50A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 75°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 75°C rating would be the amount referenced in the 75°C column in Table 310.15(B)(16), which is 50A.

E. Minimum Allowed OCPD Rating 40A
see 240.4

NEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

32A X 1.25 = 40A

F. Minimum Required EGC Size 10 AWG
see Table 250.122

The smallest EGC size allowed is 10 AWG for OCPD rating 40A according to Table 250.122.

G. Minimum Recommended Conduit Size 0.5" dia.
see 300.17

The total area of all conductors is 0.1154in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.5.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	8 AWG	THWN-2	0.0366in²	0.0732in²
1	Neutral	10 AWG	THWN-2	0.0211in²	0.0211in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
4					0.1154in²

0.1154in² / 0.4 = 0.2885in² (Corresponding to a diameter of 0.5")

NEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 40A >= 32A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4) 52.8A >= 40A (OCPD Rating) = true	PASS
3.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 52.8A >= 32A = true	PASS
4.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 55A > 32A x 1.25 = true	PASS
5.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 50A >= 32A X 1.25 = true	PASS
6.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
7.	Conduit must meet code recommendation for minimum size (300.17) 0.5in. >= 0.5in. = true	PASS

2.5. #5: Utility Disconnect Output: Utility Disconnect to Main Service Panel

Circuit Section Properties

Conductor	8 AWG THWN-2, Copper
Equipment Ground Conductor (EGC)	10 AWG THWN-2, Copper
OCPD(s)	40A
Raceway/Cable	0.5" dia. EMT
Lowest Terminal Temperature Rating	75°C
Maximum Wire Temperature	33°C
Power Source Description	Solar Edge SE7600H-US000BXX4 7600W Inverter
Power Source Current	32A
Voltage	240V

NEC Code Calculations

A. Continuous Current 32A
see Article 100

Equipment maximum rated output current is 32A

B. Ampacity of Conductor 55A
see Table 310.15(B)(16)

Ampacity (30°C) for a copper conductor with 90°C insulation in conduit/cable is 55A.

C. Derated Ampacity of Conductor 52.8A
see Table 310.15(B)(3)(c), Table 310.15(B)(3)(a), and Article 100

The temperature factor for 90°C insulation at 33°C is 0.96.
The fill factor for a conduit/cable that has 2 wires is 1.
The ampacity derated for Conditions of Use is the product of the conductor ampacity (55A) multiplied by the temperature factor (0.96) and by the fill factor (1).

55A X 0.96 X 1 = 52.8A

D. Max Current for Terminal Temp. Rating 50A
see 110.14(C)

The lowest temperature rating for this conductor at any termination is 75°C.
Using the method specified in 110.14(C), the maximum current permitted to ensure that the device terminal temperature does not exceed its 75°C rating would be the amount referenced in the 75°C column in Table 310.15(B)(16), which is 50A.

E. Minimum Allowed OCPD Rating 40A
see 240.4

NEC 690.9(B) requires that the OCPD be rated for no less than 1.25 times the Continuous Current of the circuit.

32A X 1.25 = 40A

F. Minimum Required EGC Size 10 AWG
see Table 250.122

The smallest EGC size allowed is 10 AWG for OCPD rating 40A according to Table 250.122.

G. Minimum Recommended Conduit Size 0.5" dia.
see 300.17

The total area of all conductors is 0.1154in². With a maximum fill rate of 0.4, the recommended conduit diameter is 0.5.

Qty	Description	Size	Type	Area	Total Area
2	Conductor	8 AWG	THWN-2	0.0366in²	0.0732in²
1	Neutral	10 AWG	THWN-2	0.0211in²	0.0211in²
1	Equipment Ground	10 AWG	THWN-2	0.0211in²	0.0211in²
4					0.1154in²

0.1154in² / 0.4 = 0.2885in² (Corresponding to a diameter of 0.5")

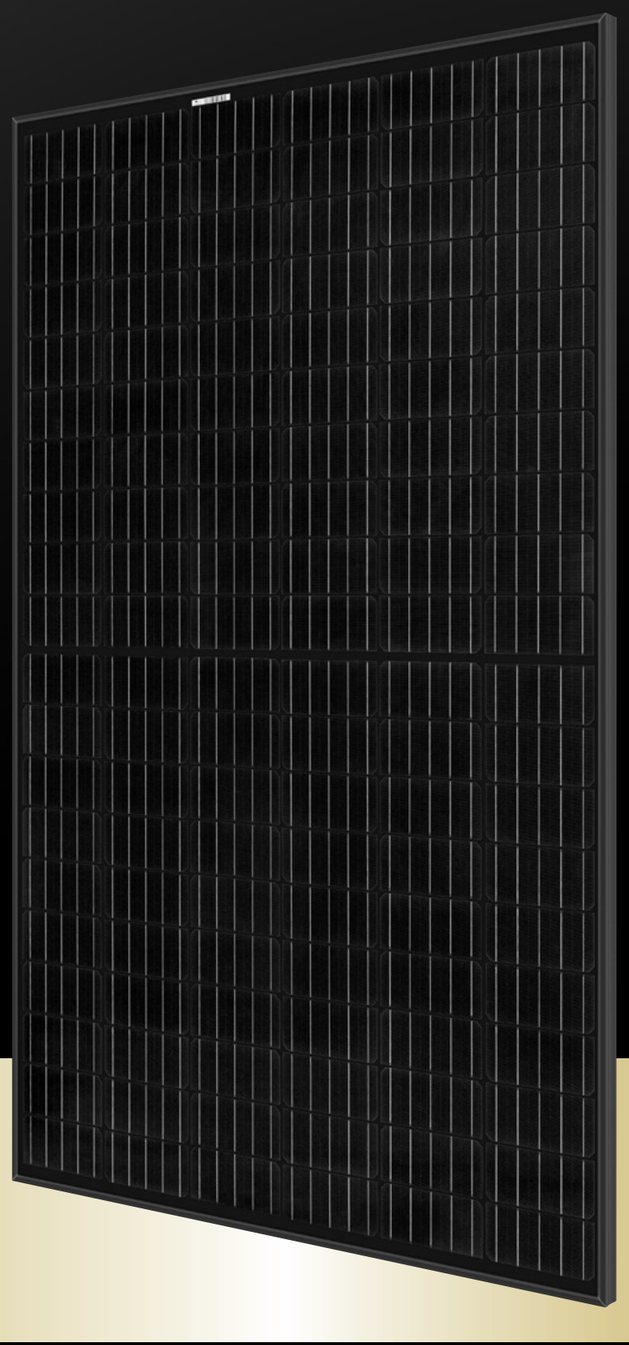
NEC Code Validation Tests

1.	OCPD rating must be at least 125% of Continuous Current (240.4) 40A >= 32A X 1.25 = true	PASS
2.	Derated ampacity must exceed OCPD rating, or rating of next smaller OCPD (240.4) 52.8A >= 40A (OCPD Rating) = true	PASS
3.	Derated Ampacity must be greater than or equal to the Continuous Current (Article 100) 52.8A >= 32A = true	PASS
4.	Conductor Ampacity must be at least 125% of Continuous Current (215.2(A)(1)) 55A > 32A x 1.25 = true	PASS
5.	Max current for terminal must be at least 125% of the Continuous Current. (110.14(C)) 50A >= 32A X 1.25 = true	PASS
6.	EGC must meet code requirements for minimum size (Table 250.122) 10 AWG >= 10 AWG = true	PASS
7.	Conduit must meet code recommendation for minimum size (300.17) 0.5in. >= 0.5in. = true	PASS

SOLAR'S MOST TRUSTED

REC N-PEAK BLACK SERIES

PREMIUM FULL BLACK MONO N-TYPE SOLAR PANELS



MONO N-TYPE: THE MOST EFFICIENT C-SI TECHNOLOGY

NO LIGHT INDUCED DEGRADATION

SUPER-STRONG FRAME UP TO 7000 PA SNOW LOAD

FLEXIBLE INSTALLATION OPTIONS

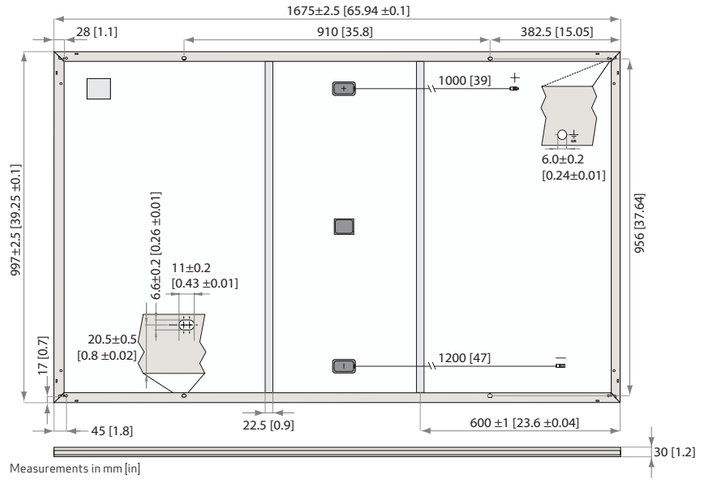
FEATURING REC'S PIONEERING TWIN DESIGN

HIGH POWER FOR 25 YEARS

325 WP POWER

PRODUCT REC 25 YEAR PROTRUST WARRANTY LABOR PERFORMANCE ELIGIBLE

REC N-PEAK BLACK SERIES



Measurements in mm [in]

ELECTRICAL DATA @ STC	Product code*: RECxxxNP Black				
Nominal Power - P_{MAX} (Wp)	305	310	315	320	325
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V_{MPP} (V)	33.3	33.6	33.9	34.2	34.4
Nominal Power Current - I_{MPP} (A)	9.17	9.24	9.31	9.37	9.46
Open Circuit Voltage - V_{OC} (V)	39.3	39.7	40.0	40.3	40.7
Short Circuit Current - I_{SC} (A)	10.06	10.12	10.17	10.22	10.28
Panel Efficiency (%)	18.3	18.6	18.9	19.2	19.5

Values at standard test conditions (STC: air mass AM 1.5, 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. * Where xxx indicates the nominal power class (P_{MAX}) at STC above. Bifaciality coefficent of up to P_{MAX} ~ 3%.

ELECTRICAL DATA @ NOCT	Product code*: RECxxxNP Black				
Nominal Power - P_{MAX} (Wp)	231	234	238	242	246
Nominal Power Voltage - V_{MPP} (V)	31.1	31.4	31.7	32.0	32.2
Nominal Power Current - I_{MPP} (A)	7.41	7.46	7.52	7.57	7.64
Open Circuit Voltage - V_{OC} (V)	36.7	37.1	37.4	37.7	38.0
Short Circuit Current - I_{SC} (A)	8.13	8.17	8.21	8.25	8.30

Nominal operating cell temperature (NOCT: air mass AM 1.5, irradiance 800 W/m², temperature 20°C, windspeed 1 m/s).
* Where xxx indicates the nominal power class (P_{MAX}) at STC above.

CERTIFICATIONS

UL 61730 (Fire Type 2), IEC 61215, IEC 61730,
MCS 005, IEC 62804, IEC 61701, IEC 62716, IEC 62782
ISO 9001: 2015, ISO 14001: 2004, OHSAS 18001: 2007

WARRANTY

	Standard	REC ProTrust	
Installed by an REC Certified Solar Professional	No	Yes	Yes
System Size	Any	≤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	0.5%	0.5%	0.5%
Power in Year 25	86%	86%	86%

See warranty documents for details. Some conditions apply.

GENERAL DATA

Cell type:	120 half-cut bifacial n-type mono c-Si cells 6 strings of 20 cells in series
Glass:	0.13" (3.2 mm) solar glass with anti-reflection surface treatment
Backsheet:	Highly resistant polymeric construction
Frame:	Anodized aluminum
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790
Cable:	12 AWG (4 mm²) PV wire, 39 + 47" (1 m + 1.2 m) in accordance with EN 50618
Connectors:	Stäubli MC4 PV-KBT4/KST4, 12 AWG(4 mm²) in accordance with IEC 62852 IP68 only when connected
Origin:	Made in Singapore

MECHANICAL DATA

Dimensions:	65.9 x 39.25 x 1.1" (1675 x 997 x 30 mm)
Area:	17.98 ft² (1.67 m²)
Weight:	39.7 lbs (18 kg)

MAXIMUM RATINGS

Operational temperature:	-40 ... +185°F (-40 ... +85°C)
Maximum system voltage:	1000 V
Maximum test load (front):	+ 7000 Pa (146 lbs/sq ft)*
Maximum test load (rear):	- 4000 Pa (83.5 lbs/sq ft)*
Max series fuse rating:	25 A
Max reverse current:	25 A

* See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

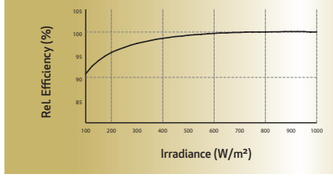
TEMPERATURE RATINGS *

Nominal Operating Cell Temperature:	44°C (±2°C)
Temperature coefficient of P_{MAX}:	-0.35 %/°C
Temperature coefficient of V_{OC}:	-0.27 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

*The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC.



Specifications subject to change without notice.

Ref: PM-DS-11-03-Rev- G 02.21

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.

www.recgroup.com

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

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Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT							
Rated Input DC Power[1]	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125[2]	83[2]	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11			10.1		14	Adc
Maximum DC Input Current	13.75			12.63		17.5	Adc
Maximum Efficiency	99.5						%
Weighted Efficiency	98.8					98.6	%
Overvoltage Category	II						
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)							
Maximum Output Current	15						Adc
Maximum Output Voltage	60				85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)							
Safety Output Voltage per Power Optimizer	1 ± 0.1						Vdc
STANDARD COMPLIANCE							
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3						
Safety	IEC62109-1 (class II safety), UL1741						
RoHS	Yes						
INSTALLATION SPECIFICATIONS							
Maximum Allowed System Voltage	1000						Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters						
Dimensions (W x L x H)	128 x 152 x 28 / 5 x 5.97 x 1.1			128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32	mm / in
Weight (including cables)	630 / 1.4			750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4[3]						
Output Wire Type / Connector	Double Insulated; MC4						
Output Wire Length	0.95 / 3.0		1.2 / 3.9				m / ft
Input Wire Length	0.16 / 0.52						m / ft
Operating Temperature Range	-40 - +85 / -40 - +185						°C / °F
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						%

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed
[2] NEC 2017 requires max input voltage be not more than 80V
[3] For other connector types please contact SolarEdge

PV System Design Using a SolarEdge Inverter[4][5]		Single Phase HD-Wave	Single phase	Three Phase 208V	Three Phase 480V	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8		10	18	
	P405 / P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[6]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000[7]	12750[8]	W
Parallel Strings of Different Lengths or Orientations		Yes				

[4] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
[5] It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string
[6] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
[7] For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W
[8] For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W

CE RoHS

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

solaredge.com

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Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
APPLICABLE TO INVERTERS WITH PART NUMBER	SEXXXXH-XXXXXBXX4							
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5[1]							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated

/ Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US / SE10000H-US / SE11400H-US

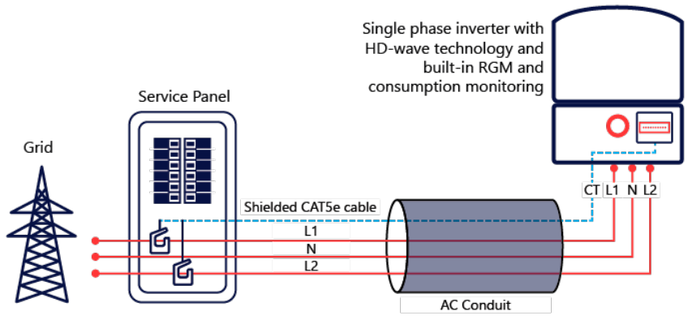
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Metering, ANSI C12.20	Optional[3]							
Consumption metering								
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	1" Maximum / 14-6 AWG					1" Maximum /14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1-2 strings / 14-6 AWG					1" Maximum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4		26.2 / 11.9	38.8 / 17.6		lb / kg
Noise	< 25					<50		dBA
Cooling	Natural Convection							
Operating Temperature Range	-40 to +140 / -40 to +60[4]							°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)							

[3] Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4 . For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

[4] Full power up to at least 50°C / 122°F; for power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills

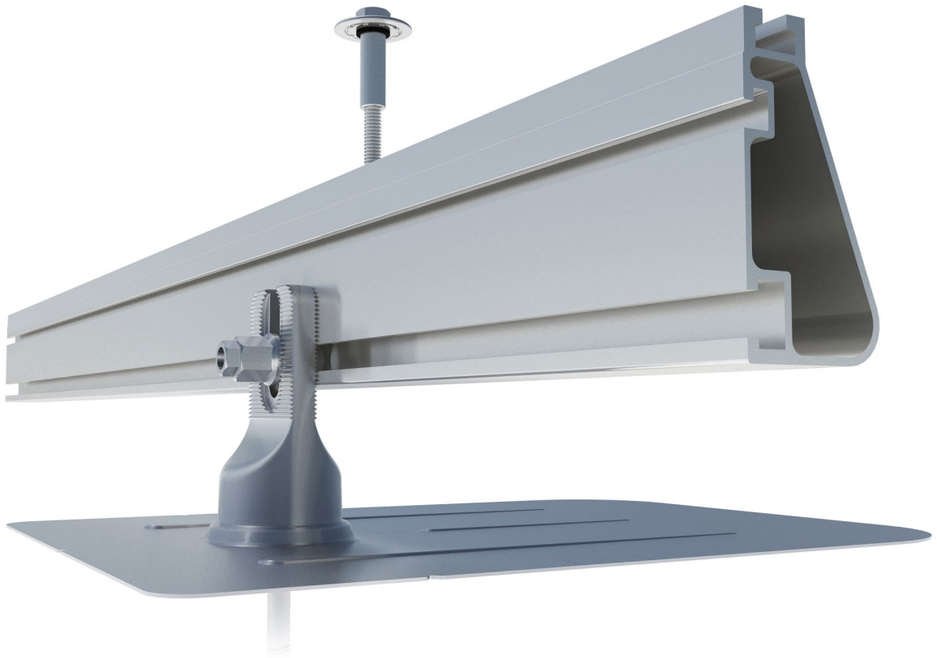


RoHS

Datasheet

IRONRIDGE

Flush Mount System



Built for solar's toughest roofs.

IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 25-year warranty.

Strength Tested
All components evaluated for superior structural performance.

PE Certified
Pre-stamped engineering letters available in most states.

Class A Fire Rating
Certified to maintain the fire resistance rating of the existing roof.

Design Assistant
Online software makes it simple to create, share, and price projects.

UL 2703 Listed System
Entire system and components meet newest effective UL 2703 standard.

25-Year Warranty
Products guaranteed to be free of impairing defects.

Datasheet

XR Rails

XR10 Rail

A low-profile mounting rail for regions with light snow.

- 6' spanning capability
- Moderate load capability
- Clear and black finish

XR100 Rail

The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear and black finish

XR1000 Rail

A heavyweight mounting rail for commercial projects.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices

All rails use internal splices for seamless connections.

- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

Clamps & Grounding

UFOs

Universal Fastening Objects bond modules to rails.

- Fully assembled & lubed
- Single, universal size
- Clear and black finish

Stopper Sleeves

Snap onto the UFO to turn into a bonded end clamp.

- Bonds modules to rails
- Sized to match modules
- Clear and black finish

CAMO

Bond modules to rails while staying completely hidden.

- Universal end-cam clamp
- Tool-less installation
- Fully assembled

Grounding Lugs

Connect arrays to equipment ground.

- Low profile
- Single tool installation
- Mounts in any direction

Attachments

FlashFoot2

Flash and mount XR Rails with superior waterproofing.

- Twist-on Cap eases install
- Wind-driven rain tested
- Mill and black finish

Conduit Mount

Flash and mount conduit, strut, or junction boxes.

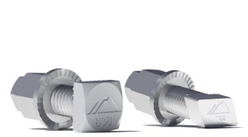
- Twist-on Cap eases install
- Wind-driven rain tested
- Secures ¾" or 1" conduit

Slotted L-Feet

Drop-in design for rapid rail attachment.

- Secure rail connections
- Slot for vertical adjusting
- Clear and black finish

Bonding Hardware



Bond and attach XR Rails to roof attachments.

- T & Square Bolt options
- Nut uses 7/16" socket
- Assembled and lubricated

Resources

Design Assistant
Go from rough layout to fully engineered system. For free.
Go to IronRidge.com/design

NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
Go to IronRidge.com/training

28375 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

Attn: Corey Geiger, COO, IronRidge Inc.
Date: May 18th, 2020

Re: Structural Certification and Span Tables for IronRidge Flush Mount System

This letter addresses the structural performance and code compliance of IronRidge's Flush Mount System. The contents of the letter shall be read in its entirety before being applied to any project design. The Flush Mount System is a proprietary rooftop mounting system used to support photovoltaic (PV) modules installed in portrait or landscape orientation and set parallel to the underlying roof surface. PV modules are supported by extruded aluminum XR Rails and secured to the rails with IronRidge mounting clamps. The XR Rails are side mounted to a selected roof attachment with 3/8" stainless steel bonding hardware and then attached directly to the roof structure or to a stanchion that is fastened to the underlying roof structure. Assembly details of a typical Flush Mount installation and its core components are shown in Exhibit EX-0015.

The IronRidge Flush Mount System is designed and certified to the structural requirements of the reference standards listed below, for the load conditions and configurations tabulated in the attached span tables.

- ASCE/SEI 7-10 Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)
- 2015 International Building Code (IBC-2015)
- 2014 & 2015 Georgia State Amendments to International Building Code (2012)
- 2015 Aluminum Design Manual (ADM-2015)

The tables included in this letter provide the maximum allowable spans of XR Rails in the Flush Mount System for the respective loads and configurations listed, covering wind exposure categories B, C, & D, roof zones 1, 2 & 3, and roof slopes from 8º to 45º. The span tables are applicable provided that the following conditions are met:

1. *Span* is the distance between two adjacent roof attachment points (measured at the center of the attachment fastener)

2. The underlying roof pitch, measured between roof surface and horizontal plane, is 45º or less.

3. The *mean roof height*, defined as the average of the roof eave height and the roof ridge height measured from grade, does not exceed 30 feet.

4. Module length shall not exceed the listed maximum dimension provided for the respective span table and module width shall not exceed 42".

5. All Flush Mount components shall be installed in a professional workmanlike manner per IronRidge's *Flush Mount installation manual* and other applicable standards for general roof construction practice.

28375 Industrial Blvd.
Hayward, CA 94545
1-800-227-9523
IronRidge.com

The span tables provided in this letter are certified based on the structural performance of IronRidge XR Rails only with no consideration of the structural adequacy of the chosen roof attachments, PV modules, or the underlying roof supporting members. It is the responsibility of the installer or system designer to verify the structural capacity and adequacy of the aforementioned system components in regards to the applied or resultant loads of any chosen array configuration.

Sincerely,

Gang Xuan, PE
Senior Structural Engineer

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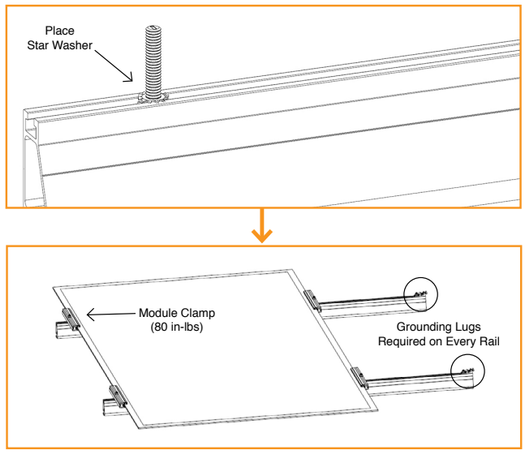
FRAMELESS MODULE KITS

Insert Frameless Kit T-bolt in top rail slot. Place star washer over T-bolt, allowing it to rest on top of rail. Secure module clamps with a hex nut and torque to **80 in-lbs**.



- **Tested or evaluated module clamps:**
  - **Sunforson silver or black SFS-UTMC-200(B) mid and SFS-UTEC-200(B) end clamps.**
  - **Sunpreme silver or black mid and end clamps with part numbers 7500105X where "X" is 1, 5, 6 or 7.**
  - **IronRidge silver or black mid and end clamps with part numbers FMLS-XC-001-Y where "X" is E or M and "Y" is B or blank.**
- **Follow module manufacturer's installation instructions to install the module clamps.**
- **Frameless modules require using a Grounding Lug on every rail.**
- **For Sunpreme Modules Only: If required to use slide prevention hardware, see Module Slide Prevention Addendum (Version 1.10).**

MODULE COMPATIBILITY

The Flush Mount System may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification.

MAKE	MODELS
Amerisolar	Amerisolar modules with 35, 40 and 50 mm frames AS-bYxxxZ Where "b" can be 5 or 6; "Y" can be M, P, M27, P27, M30, or P30; "xxx" is the module power rating; and "Z" can be blank, W or WB
Astronergy Solar	Astronergy modules with 30, 35, 40 and 45 mm frames aaSMbbyyC/zz-xxx Where “aa” can be CH or A; "bb" can be 60, 66, or 72; “yy” can be blank, 10 or 12; "C" can M, P, M(BL), M-HC, M(BL)-HC, P-HC, (DG), or (DGT); “zz” can be blank, HV, F-B, or F-BH ; and “xxx” is the module power rating Astronergy frameless modules CHSM6610P(DG)-xxx Where “xxx” is the module power rating
Auxin	Auxin modules with 40 mm frames AXN6y6zAxxx Where "y" can be M or P; "z" can be 08, 09, 10, 11, or 12; "A" can be F or T; and "xxx" is the module power rating
Axitec	Axitec Modules with 35 and 40 mm frames AC-xxxY/aaZZb Where "xxx" is the module power rating; "Y" can be M, P or MH; "aa" can be blank, 125- or 156-; "ZZ" can be 54, 60, 72, 120, or 144; "b" can be S or SB
Boviet	Boviet modules with 40mm frames BVM66aaYY-xxx Where "aa" can be 9, 10 or 12; "YY" is M or P; and "xxx" is the module power rating
BYD	Where "xxx" is the module power rating; "Y" can be M, P or MH; "aa" can be blank, 125- or 156-; "ZZ" can be 54, 60, 72, 120, or 144; "b" can be S or SB
Canadian Solar	Canadian Solar modules with 30, 35 and 40 mm frames CSbY-xxxZ Where "b" can be 1, 3 or 6; "Y" can be H, K, P, U, V, W, or X; "xxx" refers to the module power rating; and "Z" can be M, P, MS, PX , M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD Canadian Solar frameless modules CSbY-xxx-Z Where "b" can be 3 or 6; "Y" is K, P, U, or X; "xxx" is the module power rating, and "Z" can be M-FG, MS-FG, P-FG, MB-FG, or PB-FG
CertainTeed	CertainTeed modules with 35 and 40 frames CTxxxYZZ-AA Where "xxx" is the module power rating; "Y" can be M, P or HC; "ZZ" can be 00,01, 10, or 11; and "AA" can be 01, 02, 03 or 04
CSUN	Csun modules with 35 and 40 mm frames YYxxx-zzAbb Where "YY" is CSUN or SST; xxx is the module power rating; "zz" is blank, 60, or 72; and "A" is blank, P or M; "bb" is blank, BB, BW, or ROOF
Ecosolargy	Ecosolargy modules with 35, 40 and 50 mm frames ECOxxxYzzA-bbD Where "xxx" is the module power rating; "Y" can be A, H, S, or T; "zz" can be 125 or 156; "A" can be M or P; "bb" can be 60 or 72; and "D" can be blank or B

MODULE COMPATIBILITY

ET Solar	ET Solar modules with 35, 40 and 50 mm frames ET-Y6ZZxxxAA Where “Y” can be P, L, or M; “ZZ” can be 60 or 72; “xxx” refers to the module power rating; and “AA” can be WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC
Flex	Flex modules with 35, 40 and 50 mm frames and model identifier FXS-xxxYY-ZZ; where "xxx" is the module power rating; "YY" can be BB or BC; and "ZZ" can be MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W
GCL	GCL modules with 35 mm and 40 mm frames GCL-a6/YY xxx Where "a" can be M or P; "YY" can be 60, 72, or 72H; and xxx is the module power rating
GigaWatt Solar	Gigawatt modules with 40 mm frames GWxxxYY Where “xxx” refers to the module power rating; and “YY” can be either PB or MB
Hansol	Hansol modules with 35 and 40 frames HSxxxYY-zz Where "xxx" is the module power rating; "YY" can be PB, PD, PE, TB, TD, UB, UD, or UE; and "zz" can be AN1, AN3, AN4, HV1, or JH2
Hanwha Solar	Hanwha Solar modules with 40, 45 and 50 mm frames HSLaaP6-YY-1-xxxZ Where "aa" can be either 60 or 72; "YY" can be PA or PB; "xxx" refers to the module power rating; and "Z" can be blank or B
Hanwha Q CELLS	Hanwha Q CELLS Modules with 32, 35, 40 and 42mm frames and model identifier aaYY-ZZ-xxx where "aa" can be Q. or B.; "YY" can be PLUS, PRO, PEAK, LINE PRO, LINE PLUS, or PEAK DUO; and "ZZ" can be G3, G3.1, G4, G4.1, L-G2, L-G2.3, L-G3, L-G3.1, L-G3y, L-G4, L-G4.2, L-G4y, LG4.2/TAA, BFR-G3, BLK-G3, BFR-G3.1, BLK-G3.1, BFR-G4, BFR-G4.1, BFR G4.3, BLK-G4.1, G4/SC, G4.1/SC, G4.1/TAA, G4.1/MAX, BFR G4.1/TAA, BFR G4.1/MAX, BLK G4.1/TAA, BLK G4.1/SC, EC-G4.4, G5, BLK-G5, L-G5, L-G5.1, L-G5.2, L-G5.2/H, L-G5.3, G6, G6+, BLK-G6, L-G6, L-G6.1, L-G6.2, L-G6.3, G7, BLK-G6+, BLK-G7, G7.2, G8, BLK-G8, G8+, BLK-G8+ L-G7, L-G7.1, L-G7.2, L-G7.3, L-G8, L-G8.1, L-G8.2, or L-G8.3; and "xxx" is the module power rating
Heliene	Heliene modules with 40 mm frames YYZZxxx Where "YY" can be 36, 60, 72, or 96; "ZZ" can be M, P, or MBLK; and "xxx" is the module power rating
HT-SAAE	HT-SAAE modules with 40 mm frames HT72-156Z-xxx Where "Z" can be M, P, M-C, P-C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C; and "xxx" is the module power rating
Hyundai	Hyundai modules with 33, 35, 40 and 50 mm frames HiY-SxxxZZ Where "Y" can be A, M or S; "xxx" refers to the module power rating; and "ZZ" can be HG, HI, KI, MI, MF, MG, RI, RG(BF), RG(BK), SG, TI, or TG
Itek	Itek Modules with 40 and 50 mm frames IT-xxx-YY Where "xxx" is the module power rating; and "YY" can be blank, HE, or SE, or SE72
JA Solar	JA Solar modules with 35, 40 and 45 mm frames JAyyzz-bbww-xxx/aa Where “yy” can be M, P, M6 or P6; “zz” can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); “bb” can be 48, 60, or 72; "ww" can be S01, S02, S03, S09, or S10; “xxx” is the module power rating; and “aa” can be MP, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB
Jinko	Jinko modules with 35 and 40 mm frames JKMYxxxZZ-aa Where "Y" can either be blank or S; "xxx" is the module power rating; "ZZ" can be P, PP, M; and "aa" can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HBL, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 72, 72-V, 72H-V, 72L-V, 72HL-V or 72-MX Jinko frameless modules JKMxxxPP-DV Where "xxx" is the module power rating
Kyocera	Kyocera Modules with 46mm frames KYxxxZZ-AA Where "Y" can be D or U; "xxx" is the module power rating; "ZZ" can be blank, GX, or SX; and "AA" can be LPU, LFU, UPU, LPS, LPB, LFB, LFBS, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA
LG	LG modules with 35, 40 and 46 mm frames LGxxxYaZ-bb Where "xxx" is the module power rating; "Y" can be A, E, N, Q, S; "a" can be 1 or 2; "Z" can be C, K, T, or W; and "bb" can be A3, A5, B3, G3, G4, K4, or V5
Longi	Longi modules with 30, 35 and 40 mm frames LRa-YYZZ-xxxM Where "a" can be 4 or 6; "YY" can be blank, 60 or 72; "ZZ" can be blank, BK, BP, HV, PB, PE, PH, HBD, HPB, or HPH; "xxx" is the module power rating
Mission Solar	Mission Solar modules with 40 mm frames MSEbbxxxZZaa Where "bb" can be blank or 60A; "xxx" is the module power rating; "ZZ" can be blank, MM, SE, SO or SQ, and "aa" can be blank, 1J, 4J, 4S, 5K, 5T, 6J, 6S, 6W, 8K, 8T, or 9S
Mitsubishi	Mitsubishi modules with 46 mm frames PV-MYYxxxZZ Where "YY" can be LE or JE; xxx is the module power rating; and "ZZ" can be either HD, HD2, or FB

MODULE COMPATIBILITY

Motech	IM and XS series modules with 40, 45 and 50 mm frames
Neo Solar Power	Neo Solar Power modules with 35 mm frames D6YxxxZZaa Where "Y" can be M or P; xxx is the module power rating; "ZZ" can be B3A, B4A, E3A, E4A, H3A, H4A; and "aa" can be blank, (TF), ME or ME (TF)
Panasonic	Panasonic modules with 35 and 40 mm frames BHNxxxYYzzA Where "xxx" refers to the module power rating; "YY" can be either KA, SA or ZA; "zz" can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and "A" can be blank, E or G
Peimar	Peimar modules with 40 mm frames SGxxxYzz Where “xxx” is the module power rating; “Y” can be M or P; and “zz” can be blank, (BF), or (FB)
Phono Solar	Phono Solar modules with 35, 40 and 45 mm frames PSxxxY-ZZ/A Where xxx refers to the module power rating; "Y" can be M or P; "ZZ" can be 20 or 24; and "A" can be F, T or U
Prism Solar	Prism Solar frameless modules BiYY-xxxBSTC Where "YY" can be 48, 60, 60S, 72 or 72S; and "xxx" is the module power rating
REC Solar	REC modules with 30, 38 and 45 mm frames RECxxxYYZZ Where “xxx” is the module power rating; “YY” can be AA, M, NP, PE, PE72, TP, TP2, TP2M, TP2SM, or TP2S; and “ZZ” can be blank, Black, BLK, BLK2, SLV, or 72
Renesola	ReneSola modules with 35, 40 and 50 mm frames JCxxxY-ZZ Where "xxx" refers to the module power rating; "Y" can be F, M or S; and "ZZ" can be Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, or Db-b
Renogy	Renogy Modules with 40 and 50 mm frames RNG-xxxY Where "xxx" is the module power rating; and "Y" can be D or P
Risen	Risen Modules with 35 and 40 mm frames RSMyy-6-xxxZZ Where "yy" can be 60 or 72; "xxx" is the module power rating; and "ZZ" can be M or P Frameless modules RSMyy-6-xxxZZ Where "yy" can be 60 or 72; "xxx" is the module power rating; and "ZZ" can be MDG or PDG
S-Energy	S-Energy modules with 40 frames SNxxxY-ZZ Where "xxx" is the module power rating; "Y" can be M or P; and "ZZ" can be 10, or 15
Seraphim Energy Group	Seraphim modules with 35 and 40 mm frames SEG-6YY-xxxZZ Where "YY" can be MA, MB, PA, or PB; "xxx" is the module power rating; and "ZZ" can be BB, BW, WB or WW
Seraphim USA	Seraphim modules with 40 and 50 mm frames SRP-xxx-6YY Where "xxx" is the module power rating; and "YY" can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX
Sharp	Sharp modules with 35 and 40 mm frames NUYYxxx Where “YY” can be SA or SC; and "xxx" is the module power rating
Silfab	Silfab Modules with 38 mm frames SYY-Z-xxx Where "YY" can be SA or LA; SG or LG; "Z" can be M, P, or X; and "xxx" is the module power rating
Solaria	Solaria modules with 40 mm frames PowerXT xxxY-ZZ Where "xxx" is the module power rating; "Y" can be R or C; and "ZZ" can be AC, BD, BX, BY, PD, PX, PZ, WX or WZ
Solarcity	Solarcity modules with 40 mm frames SCxxxYY Where "xxx" is the module power rating; and "YY" can be blank, B1 or B2
SolarTech	SolarTech modules with 42 mm frames STU-xxxYY Where "xxx" is the module power rating; and "YY" can be PERC or HJT
SolarWorld AG / Industries GmbH	SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames SW-xxx Where "xxx" is the module power rating
SolarWorld Americas Inc.	SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames SWA-xxx Where "xxx" is the module power rating
Stion	Stion Thin film modules with 35 mm frames STO-xxx or STO-xxxA Thin film frameless modules STL-xxx or STL-xxxA Where "xxx" is the module power rating
SunEdison	SunEdison Modules with 35, 40 and 50 mm frames SE-YxxxZABCDE Where "Y" can be B, F, H, P, R, or Z; "xxx" refers to the module power rating; "Z" can be 0 or 4; "A" can be B,C,D,E,H,I,J,K,L,M, or N ; "B" can be B or W; "C" can be A or C; "D" can be 3, 7, 8, or 9; and "E" can be 0, 1 or 2

MODULE COMPATIBILITY

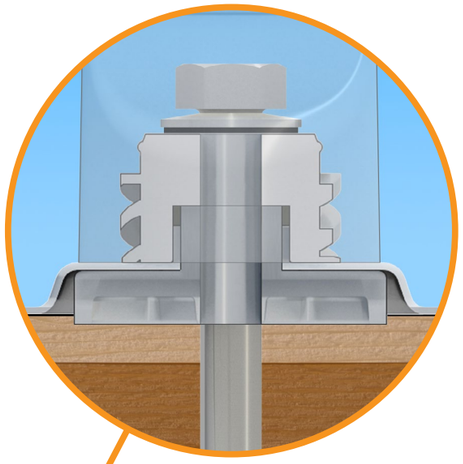
Suniva	Suniva modules with 35, 38, 40, 46 and 50 mm frames OPTxxx-AA-B-YYY-Z MVXxxx-AA-B-YYY-Z Where "xxx" is the module power rating; "AA" is either 60 or 72; "B" is either 4 or 5; "YYY" is either 100,101,700,1B0, or 1B1; and "Z" is blank or B
Sunpower	Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames SPR-Zb-xxx-YY Where "Z" is either A, E, P or X; “b” can be blank, 17, 18, 19, 20, 21, or 22; “xxx” is the module power rating and “YY” can be blank, BLK, COM, C-AC, D-AC, E-AC, G-AC, BLK-C-AC, or BLK-D-AC
Sunpreme	Sunpreme frameless modules GXB-xxxYY Where "xxx" is the module power rating; and "YY" can be blank or SL
Sunspark	Sunspark modules with 40 mm frames SYY-xxZ Where “YY” can be MX or ST; “xxx” is the module power rating; and “Z” can be P or W
Suntech	Vd, Vem, Wdb, Wde, and Wd series modules with 35, 40 and 50 mm frames
Talesun	Talesun modules with 35 and 40 frames TP6yyZxxx-A Where "yy" can be 60, 72, H60 or H72; "Z" can be M, or P; "xxx" is the module power rating; and "A" can be blank, B, or T
Trina	Trina Modules with 30, 35, 40 and 46mm frames TSM-xxxYYZZ Where "xxx" is the module power rating; "YY" can be DD05, DD06, DE14, DE15, DEG15, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and "ZZ" can be blank, .05, .08, .10, .18, .08D, .18D, 0.82, .002, .00S, 05S, 08S, A, A.05, A.08, A.10, A.18, A(II), A.05(II), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), or M Frameless modules TSM-xxxYY Where "YY" can be either DEG5(II), DEG5.07(II), DEG5.40(II), DEG5.47(II), DEG14(II), DEG14C(II), DEG14C.07(II), DEG14.40(II), PEG5, PEG5.07, PEG5.40, PEG5.47, PEG14, or PEG14.40
Vikram	Vikram solar modules with 40 mm frames Syy.ZZ.AAA.bb Where "yy" can be M, P, MBB, MH, MS, MHBB, or PBB; "ZZ" can be 60 or 72; "AAA" is the module power rating; and "bb" can be 03.04 or 05
Winaico	Winaico modules with 35 and 40 mm frames Wsy-xxxz6 Where "y" can be either P or T; "xxx" is the module power rating; and "z" can be either M or P
Yingli	Panda, YGE and YGE-U series modules with 35, 40 and 50 mm frames

IRONRIDGE

FlashFoot2

The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.

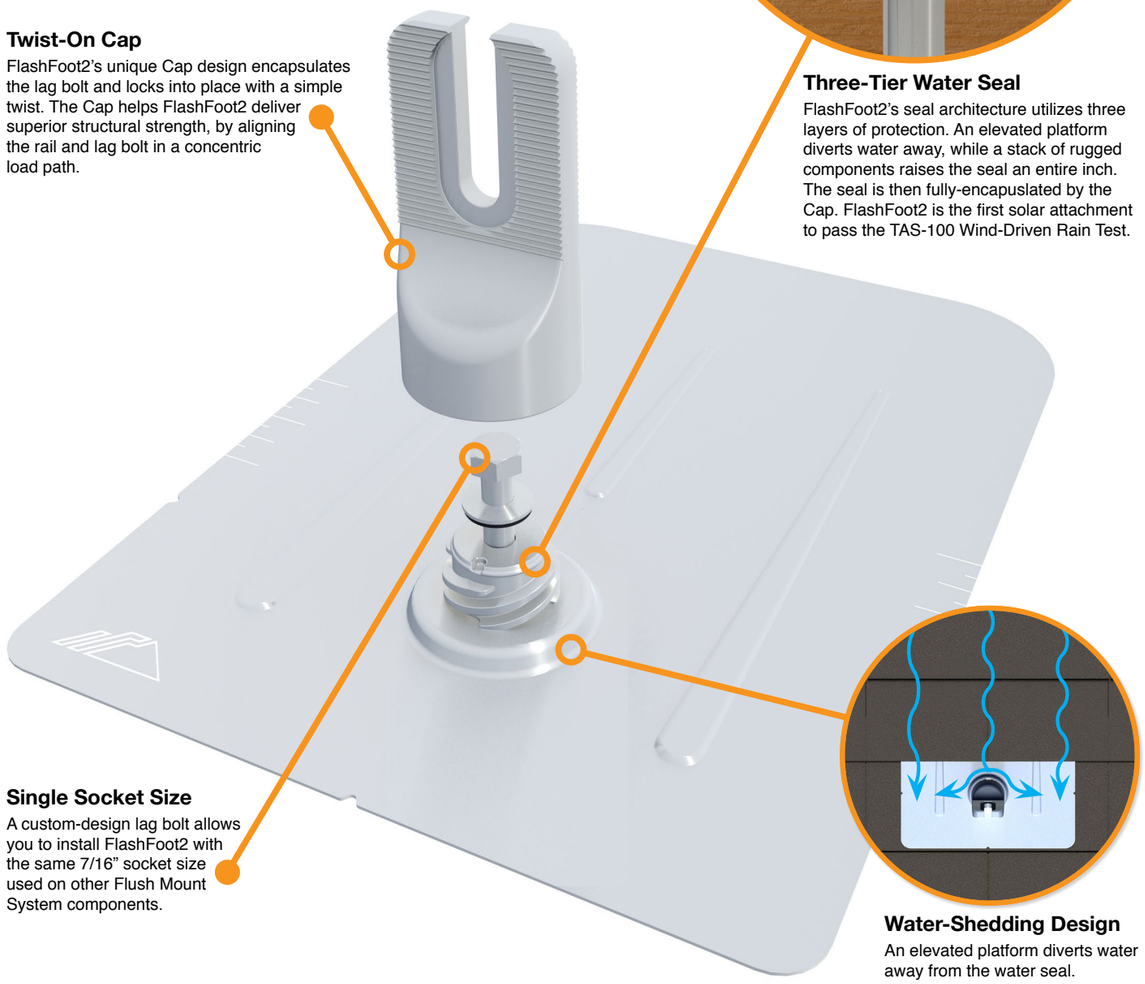


Three-Tier Water Seal

FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapuslated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.

Twist-On Cap

FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.



Single Socket Size

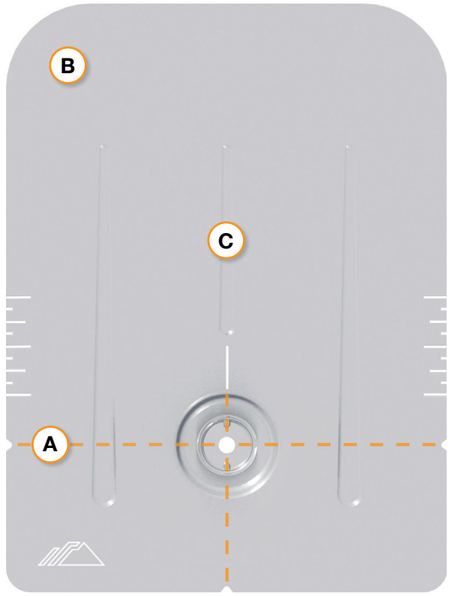
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.

Water-Shedding Design

An elevated platform diverts water away from the water seal.

Tech Brief

Installation Features



A Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

B Rounded Corners

Makes it easier to handle and insert under the roof shingles.

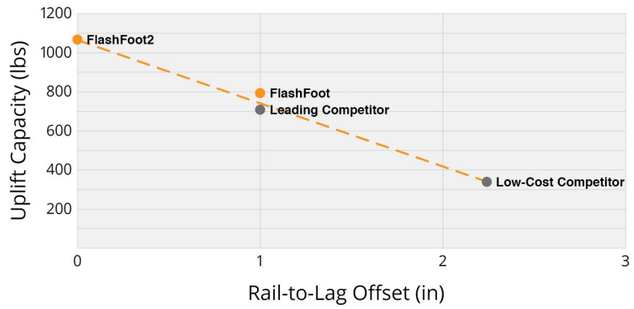
C Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2 is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



Testing & Certification

Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.