# City of Belle Isle Job Site Card Electrical PERMIT 2018-07-036

PERMIT MUST BE POSTED ON SITE - A permit expires in 6 months if approved inspections are not recorded /scheduled within that time frame. You are responsible for scheduling and keeping track of all your inspections -

Permit Number: 2018- 07-036
Site Address: 3016 Indian Dr 32812
Class: □ Residential

Issue Date: 7/26/2018
Parcel #: 29-23-30-4389-03-010
Subdivision:

Description of Work: **Electrical –Installation of photo voltaic solar panels on roof 1050 sf.**

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Issued To: MOMENTUM SOLAR
Name: FRANZ, MATTHEW

Business Phone: 386 956-1354
Contractor License # EC13008217

Payment Date & Method: 8/22/2018
□ Visa □ Master Card □ Amex □ Discover ☒ Check / Money Order # 1440

**Schedule Inspections via Email at: BIDscheduling@universalengineering.com**
**SCHEDULE INSPECTIONS BY 3:00 PM CUT OFF TIME**
**Inspection Results Will Be Sent Out the Following Business Day**

"WARNING TO OWNER: YOUR FAILURE TO RECORD A NOTICE OF COMMENCEMENT MAY RESULT IN YOUR PAYING TWICE FOR IMPROVEMENTS TO YOUR PROPERTY. IYOU INTEND TO OBTAIN FINANCING, CONSULT WITH YOUR LENDER OR AN ATTORNEY BEFORE RECORDING YOUR NOTICE OF COMMENCEMENT."

| ELECTRICAL | INSPECTOR | DATE | COMMENTS |
|---|---|---|---|
| 300 Temp Pole | | | |
| 310 TUG | | | |
| 320 Underground | | | |
| 330 Rough | | | |
| 340 Footer Steel Bonding | | | |
| 350 Pool Light | | | |
| 360 PrePower | | | |
| 370 Meter ReSet | | | |
| 380 Final | | | |
| | | | |

**Inspection requests are to be emailed to BIDscheduling@UniversalEngineering.com; a confirmation email will be sent back to you upon scheduling. Next-Day Inspection requests must be made by 3pm. Please include the following in your request: Permit #, project address, type of inspection, date of the requested inspection, a contact name & a contact phone number. AM or PM may be requested but cannot be guaranteed**

Universal Engineering Sciences - 3532 Maggie Blvd., Orlando, FL 32811 Tel 407-581-8161 Fax 407-581-0313
www.universalengineering.com

# City of Belle Isle

Universal Engineering Sciences 3532 Maggie Blvd., Orlando, FL 32811
Tel 407-581-8161 * Fax 407-581-0313 * www.universalengineering.com

RECEIVED JUL 13 2018

## APPLICATION FOR ELECTRICAL PERMIT

**WARNING TO OWNER:** YOUR FAILURE TO RECORD A NOTICE OF COMMENCEMENT MAY RESULT IN YOUR PAYING TWICE FOR IMPROVEMENTS TO YOUR PROPERTY. A NOTICE OF COMMENCEMENT MUST BE RECORDED AND POSTED ON THE JOB SITE BEFORE THE FIRST INSPECTION. IF YOU INTEND TO OBTAIN FINANCING, CONSULT WITH YOUR LENDER OR AN ATTORNEY BEFORE RECORDING YOUR NOTICE OF COMMENCEMENT.

**DATE OF APPLICATION:** 7/11/18 **PERMIT NUMBER** 2018-07-036

The undersigned hereby applies for a permit to make electrical installations as indicated below. PLEASE PRINT

Project Address 3016 Indian Dr 3016 Indian Dr., Belle Isle FL 32809 x 32812

Property Owner Amber Bassett and Ryan Jones Amber Bussell & Ryan Jones Phone 732-902-6224

Property Owner's Mailing Address 3016 Indian Dr Same City Belle Isle

State FL Zip Code 32812 **Parcel Id Number:** 29-23-30-4639-03-010 29-23-30-4639-03-010

To obtain this information, please visit http://www.ocpafl.org/Searches/ParcelSearch.aspx

**Class of Building:** Old ☐ New ☐ **Type of Building:** Residential ☒ Commercial ☐ Other ☐

**Type of Work:** New ☐ Alteration ☐ Addition ☐ Repair ☐ Low Voltage New ☐ Existing ☐

**INDICATE THE QUANTITY OF ALL EQUIPMENT TO BE INSTALLED**

| | | | |
|---|---|---|---|
| Dishwasher | Exhaust Fan | Disposal | Water Heater |
| Hood Fan | Dryer | Paddle Fan | Outlets |
| Fixtures | Spa | Pool | Switches |
| Electric Signs | Meter Reset | Low Voltage | Stoves |
| Pumps | Motors | Air Conditioning (tons) | Furnace (KW) |

**Temporary Construction Pole** _____ **One (1) New Meter Service** 18.3 KW Amperage/Voltage/Phase

**Meter Service Upgrade** from _____ (Amperage/Voltage/Phase) to _____ (Amperage/Voltage/Phase) = _____ (Difference in Size)

**Relocate** Existing Meter Service (No Service Size Change) _____

**Other:** Installation of photo voltaic solar panels on roof 1050sf photovoltaic

☐ **PERMIT FEE BASED ON METER SERVICE SIZE SCHEDULE** ..... $ _____
(IF NO METER SERVICE WORK BEING DONE, USE VALUATION OF JOB FOR PERMIT FEE)

☐ **VALUATION OF JOB** (VALUATION OF ALL MATERIALS, LABOR, AND FIXTURES INSTALLED $ 18761.00 $ 18761.-

**Building Official:** _____ Date 7-15-18

Verified Contractor's Licenses & Insurance are on file _____ Date 7-17-18
NOC

**Permit Fee = $** 127.-
**Review Fee = $** 63.50
**1% BCAIB Fee = $** 2 min
**1.5% DCA Fee = $** 2.86
**TOTAL Permit = $** 195.36

*I hereby certify that the above is true and correct to the best of my knowledge.* PAID BY CHECK 1440

I hereby make Application for Permit as outlined above, and if same is granted I agree to conform to all Florida Building Code Regulations and City Ordinances regulating same and in accordance with plans submitted. The issuance of this permit does not grant permission to violate any applicable Town and/or State of Florida codes and/or ordinances.

LICENSE HOLDER SIGNATURE _____ LICENSE # EC13008217 EC13008217

LICENSE HOLDER NAME Matthew Franz Matthew Franz COMPANY NAME Momentum Solar Momentum Solar

Street Address 6248 Parkline Blvd Suite 100 Orlando FL 32809

City Orlando State FL Zip Code 32809 Phone Number 732-902-6224

Email Address fpermits@momentumsolar.com 732-902-6224

NOTE: The Building Permit Number is required if the Electrical Installation is associated with any construction or alteration where a Building Permit has been issued.

Building Permit Number NA

box 1st
1K
18x5
37
90
127
63.50
190.50

116 766

fl permits@momentum solar .com

Permit Number: 2018-07-636
Folio/Parcel ID #: 292330438903010
Prepared by: Tamarya Webb/ Momentum Solar
8248 Parkline Blvd. Suite 100
Orlando, FL 32809
Return to: Momentum Solar
8248 Parkline Blvd. Suite 100
Orlando, FL 32809

DOC# 20180413719
07/13/2018 10:15:12 AM Page 1 of 1
Rec Fee: $10.00
Phil Diamond, Comptroller
Orange County, FL
IP - Ret To: MOMENTUM SOLAR

# NOTICE OF COMMENCEMENT

State of Florida, County of
The undersigned hereby gives notice that improvement will be made to certain real property, and in accordance with Chapter 713, Florida Statutes, the following information is provided in this Notice of Commencement.

1. **Description of property** (legal description of the property, and street address if available)
   Lake Conway Park G/138 Lot 1 Blk C 3016 Indian Dr Belle Isle, FL 32812
2. **General description of improvement**
   Solar Panel Installation on Rooftop
3. **Owner information or Lessee information if the Lessee contracted for the improvement**
   Name Amber Bassett and Ryan Jones
   Address 3016 Indian Dr Belle Isle FL 32812
   Interest in Property Owner
   **Name and address of fee simple titleholder** (if different from Owner listed above)
   Name N/A
   Address
4. **Contractor**
   Name Momentum Solar / Cameron Christensen Telephone Number 732-902-6224
   Address 8248 Parkline Blvd. Suite 100, Orlando, FL 32809
5. **Surety** (if applicable, a copy of the payment bond is attached)
   Name N/A Telephone Number
   Address Amount of Bond $
6. **Lender**
   Name N/A Telephone Number
   Address
7. **Persons within the State of Florida designated by Owner upon whom notices or other documents may be served as provided by §713.13(1)(a)7, Florida Statutes.**
   Name Telephone Number
   Address
8. **In addition to himself or herself, Owner designates the following to receive a copy of the Lienor's Notice as provided in §713.13(1)(b), Florida Statutes.**
   Name Telephone Number
   Address
9. **Expiration date of notice of commencement** (the expiration date will be 1 year from the date of recording unless a different date is specified)

**WARNING TO OWNER: ANY PAYMENTS MADE BY THE OWNER AFTER THE EXPIRATION OF THE NOTICE OF COMMENCEMENT ARE CONSIDERED IMPROPER PAYMENTS UNDER CHAPTER 713, PART I, SECTION 713.13, FLORIDA STATUTES, AND CAN RESULT IN YOUR PAYING TWICE FOR IMPROVEMENTS TO YOUR PROPERTY. A NOTICE OF COMMENCEMENT MUST BE RECORDED AND POSTED ON THE JOB SITE BEFORE THE FIRST INSPECTION. IF YOU INTEND TO OBTAIN FINANCING, CONSULT WITH YOUR LENDER OR AN ATTORNEY BEFORE COMMENCING WORK OR RECORDING YOUR NOTICE OF COMMENCEMENT.**

Amber Bassett
Signature of Owner or Lessee, or Owner's or Lessee's Authorized Officer/Director/Partner/Manager — Signatory's Title/Office

The foregoing instrument was acknowledged before me this 11 day of July (month/year) by Amber Bassett (name of person)

as Owner (Type of authority, e.g., officer, trustee, attorney in fact) for (Name of party on behalf of whom instrument was executed)

Tamarya L Webb
Signature of Notary Public – State of Florida — Print, type, or stamp commissioned name of Notary Public

Personally Known ____ OR Produced ID X
Type of ID Produced D.L.

Notary Public State of Florida
Tamarya L Webb
My Commission GG 217566
Expires 05/14/2022

State of FLORIDA, County of ORANGE
I hereby certify that this is a true copy of the document as reflected in the Official Records
PHIL DIAMOND, COUNTY COMPTROLLER
BY: _____ D.C.
DATED: 7/13/18

COUNTY COMPTROLLER SEAL ORANGE COUNTY FLORIDA

# CITY OF BELLE ISLE, FLORIDA

Universal Engineering Sciences 3532 Maggie Blvd., Orlando, FL 32811
Tel 407-581-8161 * Fax 407-581-0313 * www.universalengineering.com

## POWER OF ATTORNEY

Date: 7/11/18 Permit #: 2018-07-036

I hereby name and appoint Stephon Anderson, Tichinia Venture, Melissa Fleming, Amaryllis Vega, Karra Webb (print name) of Momentum Solar (company name) to be my lawful attorney-in-fact to act for me and apply to the City of Belle Isle Building Department for a Electrical (type of permit) permit for work to be performed at the following location: 3016 Indian Dr (street address), Belle Isle, FL ☐ 32809 ☒ 32812 and to sign my name and do all things necessary to this appointment.

Certified Contractor's Printed Name: Matthew Franz

License Number: EC13008217

Certified Contractor's Signature: _____

---

The foregoing instrument was acknowledged before me this 11 days of July of 2018 by Matthew Franz who is personally known to me or who produced _____ as identification and who did not take an oath.

State of Florida
County of Orange

_____
Notary Public, Orange County, Florida

(seal)

Notary Public State of Florida
Tamarya L Webb
My Commission GG 217566
Expires 05/14/2022

STATE OF FLORIDA
**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**

CONSTRUCTION INDUSTRY LICENSING BOARD
2601 BLAIR STONE ROAD
TALLAHASSEE FL 32399-0783

(850) 487-1395

CHRISTENSEN, CAMERON
MOMENTUM SOLAR
2 DESERET DRIVE
EAST BRUNSWICK NJ 08816

Congratulations! With this license you become one of the nearly one million Floridians licensed by the Department of Business and Professional Regulation. Our professionals and businesses range from architects to yacht brokers, from boxers to barbeque restaurants, and they keep Florida's economy strong.

Every day we work to improve the way we do business in order to serve you better. For information about our services, please log onto www.myfloridalicense.com. There you can find more information about our divisions and the regulations that impact you, subscribe to department newsletters and learn more about the Department's initiatives.

Our mission at the Department is: License Efficiently, Regulate Fairly. We constantly strive to serve you better so that you can serve your customers. Thank you for doing business in Florida, and congratulations on your new license!

STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND
PROFESSIONAL REGULATION

CVC57036 ISSUED: 10/30/2017

CERTIFIED SOLAR CONTRACTOR
CHRISTENSEN, CAMERON
MOMENTUM SOLAR

IS CERTIFIED under the provisions of Ch 489 FS.
Expiration date AUG 31 2018 L1710300000863

DETACH HERE

RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, SECRETARY

**STATE OF FLORIDA**
**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**
**CONSTRUCTION INDUSTRY LICENSING BOARD**

| LICENSE NUMBER |
| --- |
| CVC57036 |

The SOLAR CONTRACTOR
Named below IS CERTIFIED
Under the provisions of Chapter 489 FS.
Expiration date: AUG 31, 2018

CHRISTENSEN, CAMERON
MOMENTUM SOLAR
8248 PARKLINE BOULEVARD, SUITE 100
ORLANDO FL 32809

ISSUED: 10/30/2017 DISPLAY AS REQUIRED BY LAW SEQ # L1710300000863

STATE OF FLORIDA

**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**

ELECTRICAL CONTRACTORS LICENSING BOARD
2601 BLAIR STONE ROAD
TALLAHASSEE FL 32399-0783

(850) 487-1395

FRANZ, MATTHEW
MOMENTUM SOLAR
325 HIGH STREET
METUCHEN NJ 08840

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STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND
PROFESSIONAL REGULATION

EC13008217 ISSUED: 12/07/2017

CERTIFIED ELECTRICAL CONTRACTOR
FRANZ, MATTHEW
MOMENTUM SOLAR

IS CERTIFIED under the provisions of Ch 489 FS
Expiration date AUG 31 2018 L1712070000652

DETACH HERE

RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, SECRETARY

**STATE OF FLORIDA**
**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**
**ELECTRICAL CONTRACTORS LICENSING BOARD**

| LICENSE NUMBER |
| --- |
| EC13008217 |

The ELECTRICAL CONTRACTOR
Named below IS CERTIFIED
Under the provisions of Chapter 489 FS.
Expiration date: AUG 31, 2018

FRANZ, MATTHEW
MOMENTUM SOLAR
8248 PARKLINE BOULEVARD, SUITE 100
ORLANDO FL 32809

ISSUED: 12/07/2017 DISPLAY AS REQUIRED BY LAW SEQ # L1712070000692

# Scott Randolph, Tax Collector — Local Business Tax Receipt — Orange County, Florida

This local business tax receipt is in addition to and not in lieu of any other tax required by law or municipal ordinance. Businesses are subject to regulation of zoning, health and other lawful authorities. This receipt is valid from October 1 through September 30 of receipt year. **Delinquent penalty is added October 1.**

**2017** **EXPIRES 9/30/2018**

1802-1190683

1802 CERT ELECTRICAL CON $30.00 1 EMPLOYEE

SCOTT RANDOLPH, TAX COLLECTOR • ORANGE COUNTY, FLORIDA •

| | |
|---|---|
| TOTAL TAX | $30.00 |
| PREVIOUSLY PAID | $30.00 |
| TOTAL DUE | $0.00 |

FRANZ MATTHEW

MOMENTUM SOLAR
FRANZ MATTHEW
325 HIGH ST
METUCHEN NJ 08840

8248 PARKLINE BLVD #100
U - ORLANDO, 32809

PAID: $30.00 2503-03505507 12/11/2017

This receipt is official when validated by the Tax Collector.

**STATE OF FLORIDA**
**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**

ELECTRICAL CONTRACTORS LICENSING BOARD
2601 BLAIR STONE ROAD
TALLAHASSEE FL 32399-0783

(850) 487-1395

FRANZ, MATTHEW
MOMENTUM SOLAR
164 FRANKLIN STREET
SECAUCUS NJ 07094

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STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND
PROFESSIONAL REGULATION

EC13008217 **ISSUED:** 11/26/2017

CERTIFIED ELECTRICAL CONTRACTOR
FRANZ, MATTHEW
MOMENTUM SOLAR

IS CERTIFIED under the provisions of Ch 489 FS
Expiration date AUG 31, 2018 L1711260001419

DETACH HERE

RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, SECRETARY

**STATE OF FLORIDA**
**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**
**ELECTRICAL CONTRACTORS LICENSING BOARD**

| LICENSE NUMBER | |
|---|---|
| EC13008217 | |

The ELECTRICAL CONTRACTOR
Named below IS CERTIFIED
Under the provisions of Chapter 489 FS.
Expiration date: AUG 31, 2018

FRANZ, MATTHEW
MOMENTUM SOLAR
5728 MAJOR BLVD SUITE 307
ORLANDO FL 32819

ISSUED: 11/26/2017 DISPLAY AS REQUIRED BY LAW SEQ # L1711260001419

# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 12/11/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| | |
|---|---|
| PRODUCER<br>Brown & Brown Insurance<br>2000 Midlantic Dr. - Suite 440<br>Mount Laurel, NJ 08054<br>Brian DiLuigi | CONTACT NAME: Lisa MacDonald<br>PHONE (A/C, No, Ext): 732-504-2001 FAX (A/C, No): 732-504-2011<br>E-MAIL ADDRESS: lmacdonald@bbdvins.com |
| INSURED<br>Pro Custom Solar LLC dba<br>Momentum Solar<br>8248 Parkline Blvd. Suite 100<br>Orlando, FL 32809 | INSURER(S) AFFORDING COVERAGE — NAIC #<br>INSURER A : Gotham Insurance Company — 25569<br>INSURER B : New York Marine & Gen Ins Co — 16608<br>INSURER C : Hiscox Insurance Company Inc — 10200<br>INSURER D :<br>INSURER E :<br>INSURER F : |

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSD | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS | |
|---|---|---|---|---|---|---|---|---|
| A | X COMMERCIAL GENERAL LIABILITY<br>CLAIMS-MADE [X] OCCUR<br>GEN'L AGGREGATE LIMIT APPLIES PER:<br>POLICY [X] PRO-JECT [ ] LOC<br>OTHER: | | | GL201700010726 | 12/12/2017 | 12/12/2018 | EACH OCCURRENCE<br>DAMAGE TO RENTED PREMISES (Ea occurrence)<br>MED EXP (Any one person)<br>PERSONAL & ADV INJURY<br>GENERAL AGGREGATE<br>PRODUCTS - COMP/OP AGG | $ 1,000,00<br>$ 100,00<br>$ 5,00<br>$ 1,000,00<br>$ 2,000,00<br>$ 2,000,00 |
| B | AUTOMOBILE LIABILITY<br>X ANY AUTO<br>ALL OWNED AUTOS<br>SCHEDULED AUTOS<br>X HIRED AUTOS<br>X NON-OWNED AUTOS | | | AU201700012651 | 04/21/2017 | 04/21/2018 | COMBINED SINGLE LIMIT (Ea accident)<br>BODILY INJURY (Per person)<br>BODILY INJURY (Per accident)<br>PROPERTY DAMAGE (Per accident) | $ 1,000,00<br>$<br>$<br>$ |
| A | X UMBRELLA LIAB X OCCUR<br>EXCESS LIAB CLAIMS-MADE<br>DED X RETENTION $ 10000 | | | UM201700004884 | 12/12/2017 | 12/12/2018 | EACH OCCURRENCE<br>AGGREGATE | $ 5,000,00<br>$ 5,000,00 |
| B | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY<br>ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [N] N/A<br>If yes, describe under DESCRIPTION OF OPERATIONS below | | | WC201700012773 | 12/12/2017 | 12/12/2018 | X PER STATUTE OTH-ER<br>E.L. EACH ACCIDENT<br>E.L. DISEASE - EA EMPLOYEE<br>E.L. DISEASE - POLICY LIMIT | $ 1,000,00<br>$ 1,000,00<br>$ 1,000,00 |
| C | Professional Liab | | | ANE1860007.17<br>(CLAIMS MADE) | 12/01/2017 | 12/12/2018 | Limit | 1,000,00 |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Cameron Christensen : CVC57036
Ryan Snyder: EC13003709
Matthew Franz: EC13008217

CERTIFICATE HOLDER

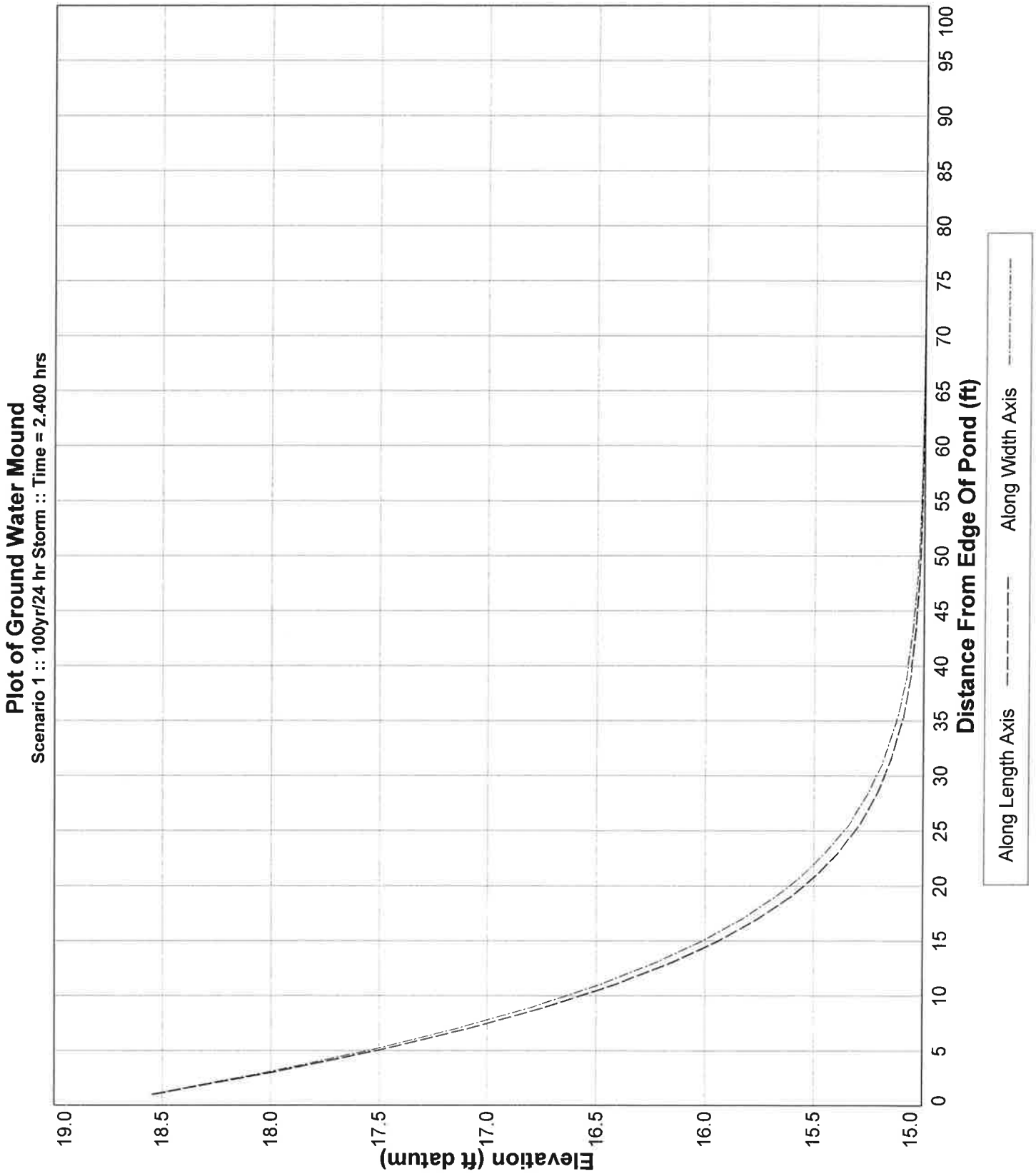
City of Belle Isle
1600 Nela Avenue
Belle Isle, FL 32809

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

**PONDS Version 3.3.0265**
**Retention Pond Recovery - Refined Method**
**Copyright 2012**
**Devo Seereeram, Ph.D., P.E.**



rated heat appliances, motors and generators, neon transformers and tubing, panel service, power transformers, ranges and ovens, refrigerator display cases, sign outlets, sub panel and meter, time clocks, washers, dryers, disposals, window HVAC outlet, x-ray and dental units.

t Randolph, Tax Collector **Local Business Tax Receipt** **Orange County, Florida**

business tax receipt is in addition to and not in lieu of any other tax required by

cott Randolph, Tax Collector **Local Business Tax Receipt** **Orange County, Florida**

is local business tax receipt is in addition to and not in lieu of any other tax required by law or municipal ordinance. Businesses are subject to regulation of zoning, health and oth
vful authorities. This receipt is valid from October 1 through September 30 of receipt year. **Delinquent penalty is added October 1.**

2017 **EXPIRES** **9/30/2018**

1801 SOLAR CONTRACTOR $30.00 1 EMPLOYEE

1801-1188390

SCOTT RANDOLPH, TAX COLLECTOR • ORANGE COUNTY, FLORIDA •

| | |
|---|---|
| TOTAL TAX | $30.00 |
| TRANSFER FEES | $3.00 |
| PREVIOUSLY PAID | $33.00 |
| TOTAL DUE | $0.00 |

CAMERON CHRISTENSEN- QUALIFIER

MOMENTUM SOLAR
CAMERON CHRISTENSEN- QUALIFIER
8248 PARKLINE BLVD #100
ORLANDO FL 32809

8248 PARKLINE BLVD #100
U - ORLANDO, 32809

PAID: $33.00 (Multiple) 2504-03325975 10/6/2017

This receipt is official when validated by the Tax Collector.

RICK SINGH, CFA - ORANGE COUNTY PROPERTY APPRAISER

Searches | Sales Search | Results | Property Record Card | My Favorites | Sign up for e-Notify...

# 3016 Indian Dr < 29-23-30-4389-03-010 >

Name(s)
Bassett Amber M
Jones Ryan M

Mailing Address On File
3016 Indian Dr
Belle Isle, FL 32812-3737
Incorrect Mailing Address?

Physical Street Address
3016 Indian Dr

Postal City and Zipcode
Orlando, Fl 32812

Property Use
0103 - Single Fam Class III

Municipality
Belle Isle


**View 2017 Property Record Card**

Property Features | Values, Exemptions and Taxes | Sales Analysis | Location Info | Market Stats | Update Information

**2018 values will be available in August of 2018.**

## Property Description

View Plat

LAKE CONWAY PARK G/138 LOT 1 BLK C

**Total Land Area** 13,328 sqft (+/-) | 0.31 acres (+/-) GIS Calculated Notice

## Land

| Land Use Code | Zoning | Land Units | Unit Price | Land Value | Class Unit Price | Class Value |
|---|---|---|---|---|---|---|
| 0100 - Single Family | R-1-AA | 1 LOT(S) | working... | working... | working... | working... |

Page 1 of 1 (1 total records)

## Buildings

| Important Information | | | Structure | | | |
|---|---|---|---|---|---|---|
| More Details | **Model Code:** | 01 - Single Fam Residence | **Actual Year Built:** | 1955 | **Gross Area:** | 1915 sqft |
| | **Type Code:** | 0103 - Single Fam Class III | **Beds:** | 3 | **Living Area:** | 1739 sqft |
| | **Building Value:** | working... | **Baths:** | 1.0 | **Exterior Wall:** | Concrete Block Stucco |
| | **Estimated New Cost:** | working... | **Floors:** | 1 | **Interior Wall:** | Wood Panel |

Page 1 of 1 (1 total records)

## Extra Features

| Description | Date Built | Units | XFOB Value |
|---|---|---|---|
| CVAL - Aluminum Cover | 01/01/1955 | 242 Square Feet | working... |
| AB1 - Accessory Building 1 | 01/01/2007 | 220 Square Feet | working... |

Page 1 of 1 (2 total records)

This Data Printed on 07/11/2018 and System Data Last Refreshed on 07/10/2018

**Daniel W. Dunzik** **Architect LEED-AP**
**370 Burnt Hill Rd. Skillman, NJ. 08558** **908-872-3664**
**Studiogdesign@comcast.net**
July 10, 2018

Orlando, FL

Attn: Construction Official
Re: Proposed Photovoltaic Solar Panel Installation
Amber Bassett
3016 Indian Dr.
Orlando, FL 32812

Reviewed for Code Compliance
Universal Engineering Sciences

Dear Sir:
Certification: I have reviewed the engineering testing reports for the racking and attachments to be used on this project and I certify that the products are capable of supporting the code required loads and are suitable for this installation when installed in strict compliance with the manufacturers printed instructions.

Regarding the solar panel array installation on the above referenced project please note that An inspection was performed and analysis of the existing structure was conducted. There is adequate structural capacity for the installation of the array with the following recommendations:

1. The array will be installed on the existing roof. The roof is constructed of 2"x6" wood rafters @ 16" O.C. spanning 10'9" with 1/2" plywood sheathing. The new array (See Site map by contractor) will add 2.63 Lb. / Sf. overall to the roof. No additional structure support is required for the existing roof structure.

2. The system shall be secured to the roof using the "Ecofasten Solar" "Rock-IT" ® attachment system. The installation shall be in strict compliance with manufacturers printed instructions. The attachment system shall be UL 1703 approved tested. The attachments shall be min. 5/16" x 4" long stainless-steel lags with a min. embedment of 3" into the rafters. Attachments shall be @ 48" o.c. Max. in roof wind zone 1 and @ 24" o.c. Max. in roof wind zone 2 and 3 lags to alternate rafters. Provide 6 mil. vapor barrier between dissimilar metals. Provide water tight gasket and sealant at all penetrations. Attachments shall follow panel rows as specified by the system manufacturer's installation manual. The panel angle shall match the roof slope.

Structural Design Loads per ASCE 7-10
- Dead Loads = 10 psf (+2.6psf, New Solar Panels) = 12.6 psf.- Live Load =20psf
Total dead weight on attachment = 19Lb. Max.
Ch. 30 Wind Loads Components and Cladding
-windloads = 140 mph Exposure B zone 1=+/- 31.4 psf., Zone 2&3=+/-77.7psf.
Area of Panels largest array = 1131sf
Tributary area panels/attachment max. 1131sf/ $141_{min}$ = 8sf.
Min Number of Attachments =141.
Wind pressure 31.4 x Area 1131/ 141 No. Attachments = 623
TABLE 10.3.1 NDS Pull out strength of 5/16"x4" lags in rafter =W'= WxCdxCt =266lbs/in embedment x 3"embedment = 798 x1.6Cd x1.0Ct = 1,276 Lbs Max. > 623lbs/attachment OK

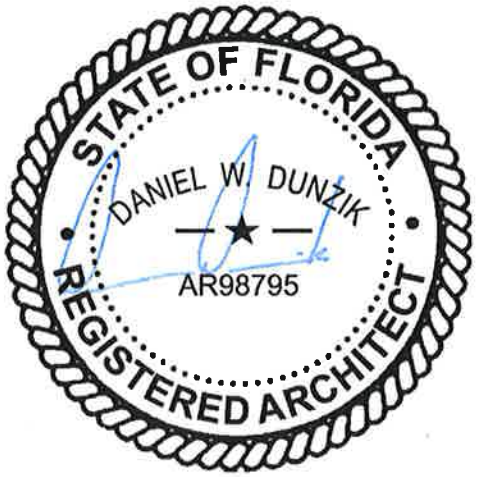
**Daniel W. Dunzik** Architect LEED-AP
**370 Burnt Hill Rd. Skillman, NJ. 08558** **908-872-3664**
**Studiogdesigns@comcast.net**

3. Solar modules shall be UL-1703 rated. Refer to manufacturers specifications sheets.

4. Positive drainage of the system shall be so as not to void the existing roof warrantee.

5. Florida Administrative Code, 2017 Florida Building Code - Residential Sixth Edition, ASCE-7-10, 2017 Florida Building Code – Energy Conservation, Sixth Edition, 2014 National Electric Code, All Local Governing County and Municipal Ordinances adopted by reference or enacted by law. All components used meet the criteria of the Florida Solar Energy Center.

If you have any questions relating to this matter, please contact me at your earliest convenience. Thank you.




Digitally signed by: Daniel W. Dunzik
DN: CN = Daniel W. Dunzik email = STUDIOGDESIGN@COMCAST.NET C = AD O = RA. LEED-AP OU = Fl. Lin. No.AR98795
Date: 2018.07.10 14:58:22 -05'00'


Daniel W. Dunzik, RA. LEED-AP
FL. Lic. No. AR98795

**Daniel W. Dunzik** Architect LEED-AP
370 Burnt Hill Rd. Skillman, NJ. 08558 908-872-3664

January 29, 2018

Building Department

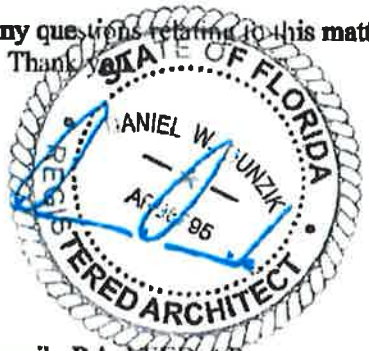
Attn: Plan Reviewer

Re:Proposed Photovoltaic Solar Panel Installation

Dear Sir:
I have reviewed the following documents related to the "EcoFasten Solar" ROCK-IT SYSTEM 4.0 and certify that the attachment system when installed in strict compliance with the manufacturers Installation Manual appropriate for this application and is in compliance with the latest building codes including Florida Administrative Code, 2017 Florida Building Code - Residential Sixth Edition, ASCE-7-10, 2017 Florida Building Code – Energy Conservation, Sixth Edition, 2014 National Electric Code, All Local Governing County and Municipal Ordinances adopted by reference or enacted by law. I make this certification for the following listed documents:

1. ROCK-IT SYSTEM 4.0 Installation Manual
2. PZSE, Inc Structural Engineers Certification.
3. EcoFasten Solar Certificate No. US 82150026
4. ROCK-IT SYSTEM 4.0 Cut Sheet for Coupling, Hybrid Coupling, and Mount.

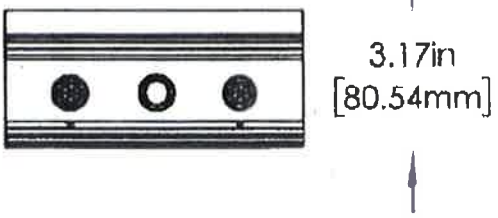
If you have any questions relating to this matter, please contact me at your earliest convenience. Thank you.

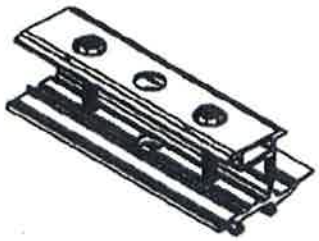


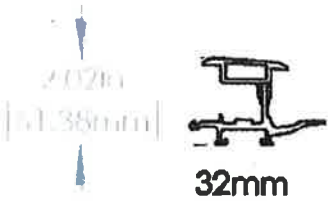

Daniel W. Dunzik, RA. LEED-AP
Fl. Lic. No. AR98795

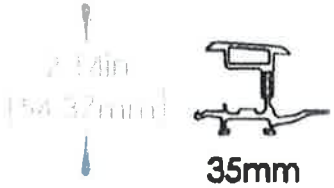
# Cut Sheet - Rock-It-4.0-Coupling

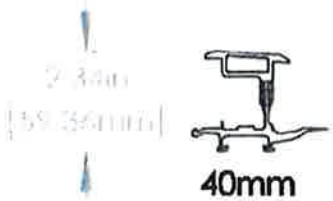
1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.




ALPINE SNOWGUARDS® | EcoFasten Solar®

4741 W Polk Stree Ste. 4
Phoenix, AZ 85043

Toll Free Phone 1.888.766.4273
Toll Free Fax 1.888.766.9994

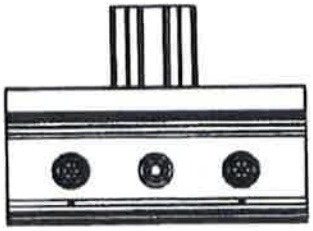
Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

Material: See Spec Sheet

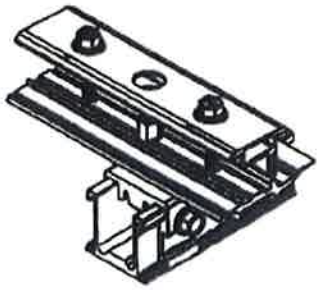
Scale: 1:4 6/28/2017 ASG: - EFS: x

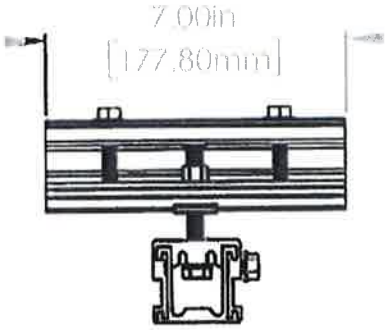
# Cut Sheet - Rock-It-4.0-Hybrid Coupling

1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.



3.16in
[80.29mm]






32mm

35mm

40mm

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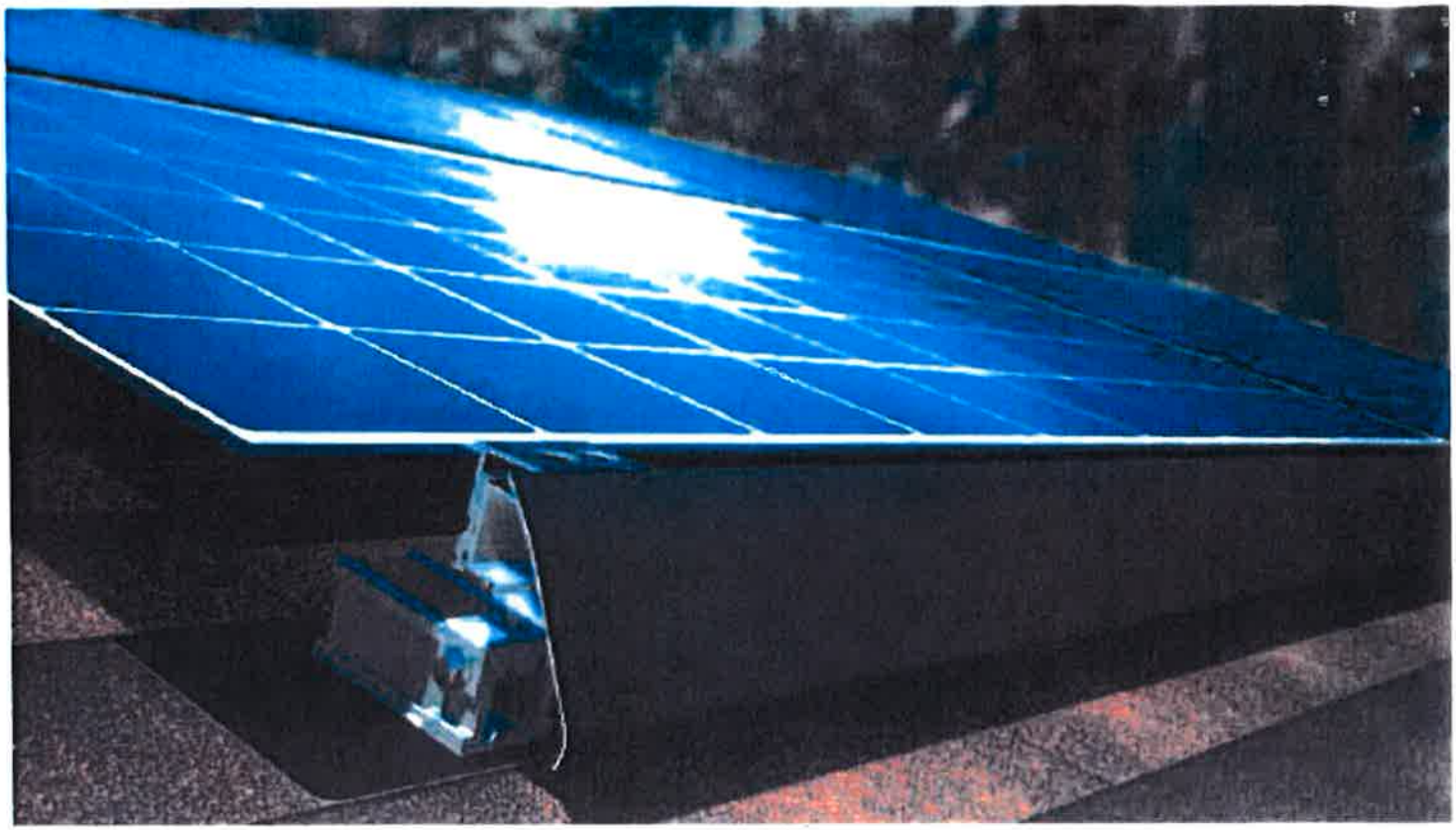
Toll Free Fax 1.888.766.9994

Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

Material: See Spec Sheet
Scale: 1:1 6/28/2017 ASG: - EFS: X



# ROCK-IT SYSTEM 4.0

## RAIL-FREE RACKING

UTILIZES ECOFASTEN SOLAR'S PATENTED TECHNOLOGY

EcoFasten Solar

EcoFasten Solar®

Committed to the connection

Document Date: 9.8.2017

## Contents

# ROCK-IT SYSTEM 4.0

**Designed with the installer in mind.**

**EcoFasten Solar specializes in solar roof attachments that are fast and easy to install, straightforward, secure and cost-effective. EcoFasten offers a wide variety of standard products as well as custom solutions, for a one-stop source for all of your rooftop anchoring needs. Products are rigorously tested and approved above and beyond industry standards in-house and by third party agencies. EcoFasten's patented conical sealing system has been in service in the snow guard and solar industries for two decades.**

## Features

- New and improved design
- Fastest, easiest to level system on the market
- Integrated electrical bonding
- SIMPLE- only 4 components
- North-South adjustability
- Only one tool required (1/2" deep well socket)
- Vertical adjustment of 3"-4"

## SYSTEM COMPONENTS* - REQUIRED

ROCK-IT SLIDE
4" FOR COMP SHINGLE
8" FOR TILE

ROCK-IT 4.0
MOUNT

ROCK-IT 4.0 COUPLING
& LOAD BEARING FOOT

ROCK-IT 4.0
ARRAY SKIRT

## SYSTEM COMPONENTS* - OPTIONAL

ROCK-IT 4.0
HYBRID MOUNT
(REFER TO PG. 5)

ROCK-IT CLIP SS
(REFER TO PG. 6)

ROCK-IT CLIP 2.0
(REFER TO PG. 6)

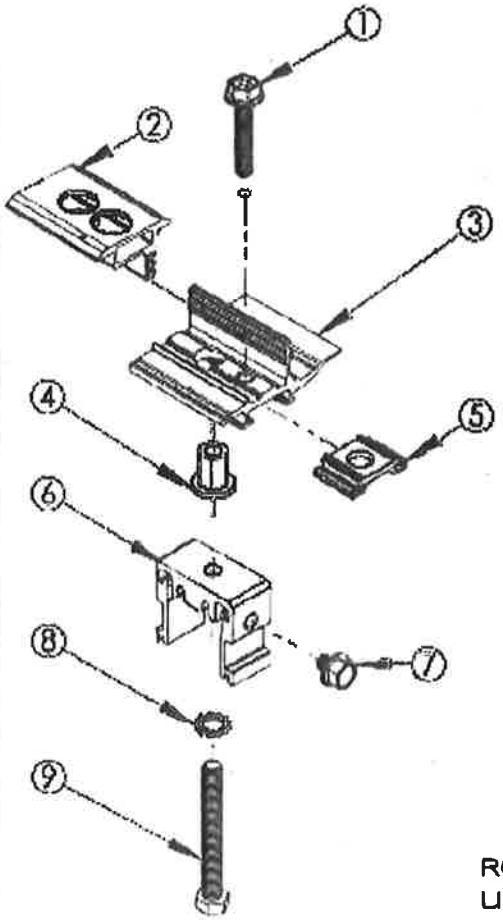
ROCK-IT 4.0
ARRAY SKIRT
END CAPS
(END CAPS COME PRE-INSTALLED ON EAST END OF SKIRT SECTIONS)

EcoFasten Solar

EcoFasten Solar products are protected by the following U.S. Patents:

8,151,522 8,153,700 8,181,398 8,166,713 8,146,299
8,209,914 8,245,454 8,272,174 8,225,557 9,010,038
9,134,040 9,175,478 9,212,833

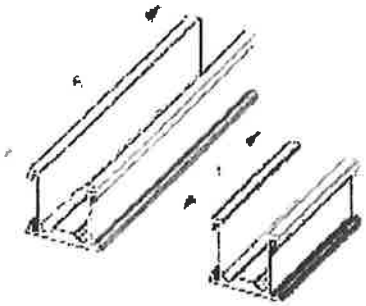
*Components for use with 32mm modules are available as special order. Components for use with 32mm modules are labeled as such on system packaging. Please refer to evaluated, compatible modules grid on page 15 to identify system compatible 32mm modules.




# ROCK-IT 4.0 MOUNT ASSEMBLY

## NOTE: ITEMS 1-7 SHIP ASSEMBLED

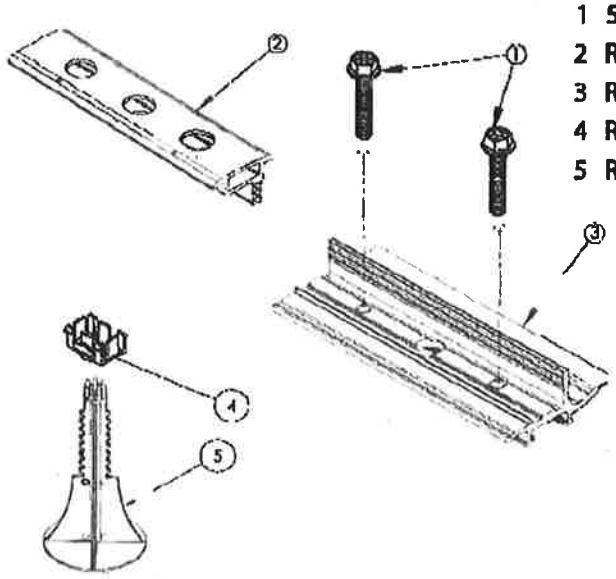
1 5/16"-18 x 1.75" Hex Serrated Flange Bolt 300 Series SS
2 Rock-It 4.0 Mid-Clamp 6000 Series AL
3 Rock-It 4.0 Shelf 6000 Series AL
4 Flange Level Nut 300 Series SS
5 Rock-It 4.0 Tie Plate 6000 Series AL
6 Rock-It Pedestal 6000 Series AL
7 5/16"-18 x 3/8" Hex Serrated Flange Bolt 300 Series SS
8 3/8" ID Star Washer 300 Series SS
9 3/8"-16 x 3" Hex Tap Bolt 300 Series SS



ROCK-IT SLIDES ARE ACCEPTABLE BRACKETS FOR USE WITH ROCK-IT 4.0 (SOLD SEPARATELY)

# ROCK-IT 4.0 COUPLING ASSEMBLY

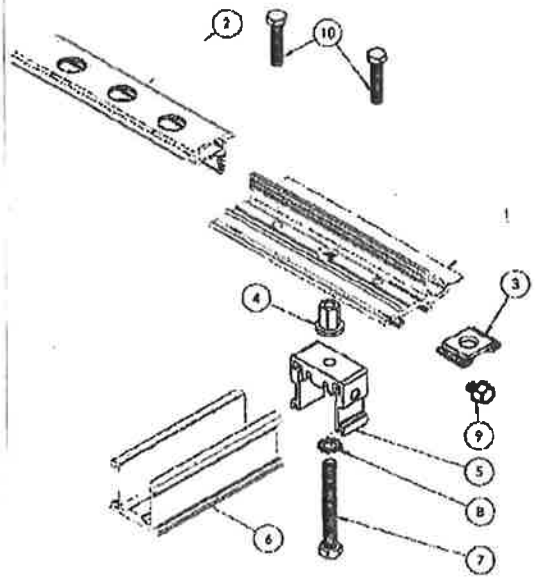
## NOTE: ITEMS 1-3 SHIP ASSEMBLED




1 5/16"-18 x 1.75" Hex Serrated Flange Bolt 300 Series SS
2 Rock-It 4.0 Coupling Mid-Clamp 6000 Series AL
3 Rock-It 4.0 Coupling Shelf 6000 Series AL
4 Rock-It Load Bearing Foot Clip
5 Rock-It Load Bearing Foot Base

# ROCK-IT 4.0 HYBRID MOUNT ASSEMBLY

NOTE: ITEMS 1-10 SHIP ASSEMBLED

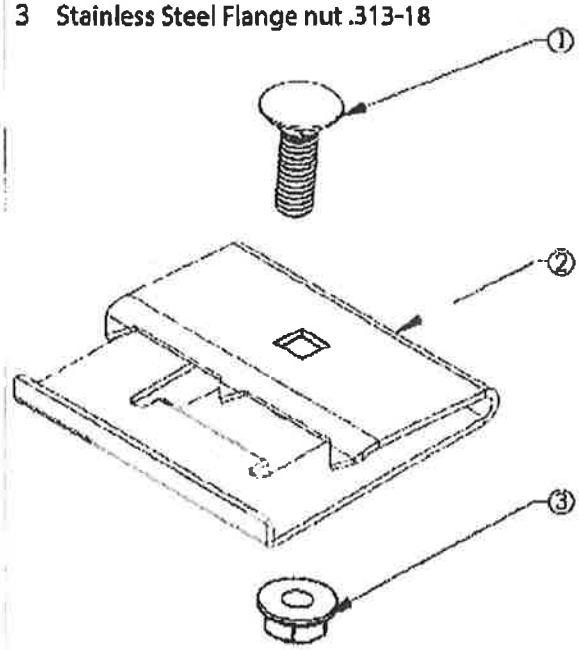


1 Rock-It 4.0 Shelf 6000 Series AL
2 Rock-It 4.0 Coupling Mid-Clamp 6000 Series AL
3 Rock-It 4.0 Coupling Tie Plate6000 Series AL
4 Flange Level Nut 300 Series SS
5 Rock-It Pedestal 6000 Series AL
6 Rock-It Slide 6000 Series AL
7 3/8"-16 x 3" Hex Tap Bolt 300 Series SS
8 3/8" ID Star Washer 300 Series S
9 5/16"-18 x 3/8" Hex Serrated Flange Bolt 300 Series SS
10 5/16"-18 x 1.5" Hex Serrated Flange Bolt 300 Series SS

## ROCK-IT CLIP SS ASSEMBLY

NOTE: ITEMS 1-3 SHIP ASSEMBLED

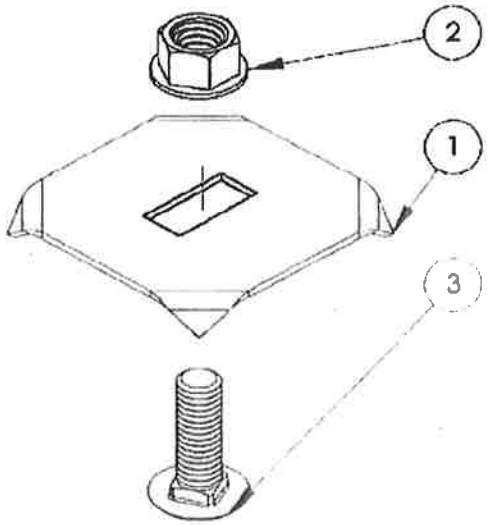
1 Stainless Steel Carriage Bolt - .313-18X.75
2 Rock-It Clip SS
3 Stainless Steel Flange nut .313-18



## ROCK-IT CLIP 2.0 ASSEMBLY

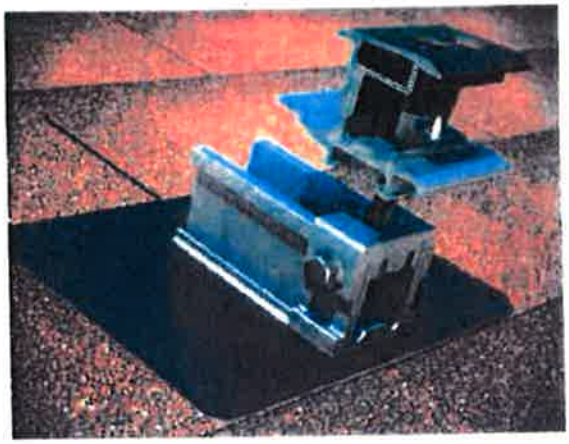
NOTE: ITEMS 1-3 SHIP ASSEMBLED

1 Rock-It Clip 2.0
2 Stainless Steel Flange nut .313-18
3 Bolt .3125-18x1x1-S



## Array Layout

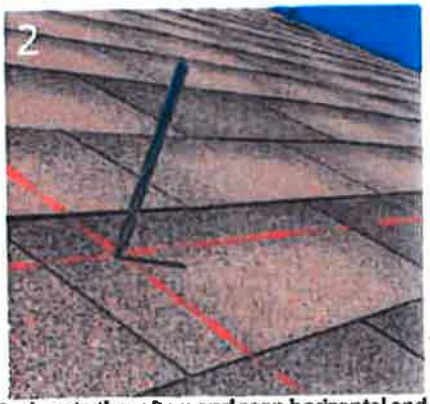
- Find the required structural attachment points. Mark these using a vertical (N-S) chalk line on the center of the rafters.
- Spacing may vary depending upon project specific structural requirements; i.e. high snow and wind load areas may require lesser bracket spacing in the E-W axis vs. the maximum spacing. Max spacing is 48" for portrait orientation and 72" for landscape orientation. Consult project layout diagram for project specific bracket spacing on the roof.
- Install Rock-It Mounts to predetermined mount spacing.

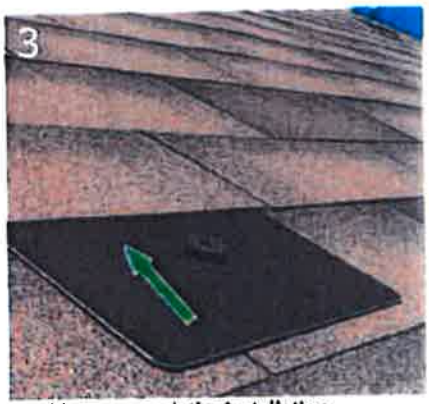


- The Rock-It Array Skirt sections are the width of a typical 60 cell module – use the Rock-It Array Skirt as a guide to lay out module placement.

Note: The distance between the rows of mounts is calculated by the module dimension N-S plus 1 3/8" (35mm). Lag screw should be installed as close to center of exposed shingle as possible. The minimum distance between the lag screw and the edge of the shingle is 1/2".

## GreenFasten™ Flashing Install



1 Locate the rafters and snap horizontal and vertical lines to mark the installation position for each GreenFasten flashing.

2 Drill a pilot hole (1/4" diameter) for the lag bolt. Backfill with sealant. EcoFasten Solar recommends an EPDM mastic.

3 Insert the flashing so the top part is under the next row of shingles and pushed far enough up slope to prevent water infiltration through vertical joint in shingles. The leading edge of flashing must butt against upper row of nails to prevent turning when torqued.

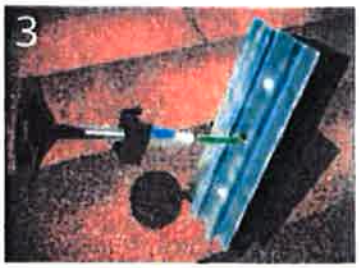
4 Line up pilot hole with GreenFasten flashing hole.

Insert the lag bolt through the EPDM bonded washer, the Rock-It slide, the gasketed hole in the flashing and into the rafter.

Torque: The range is between 100-140 torque inch-pounds depending on the type of wood and time of year. The visual indicator for proper torque is when the EPDM on the underside of the bonded washer begins to push out the sides as the washer compresses. If using an impact wrench to install the fasteners be careful not to over torque the fastener. You may need to stop and use a ratchet to finish the install.

*The Engineer of Record shall check capacity of rafter to support lag screw loading.

# ROCK-IT SYSTEM 4.0 INSTALL



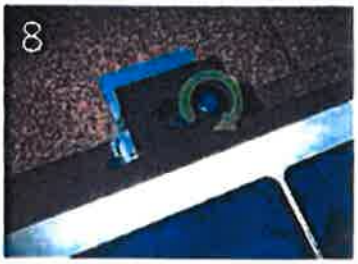


Fig. A

**1** Install EcoFasten Solar Flashing with Rock-It Mounts
- Follow EcoFasten Solar Install Instructions for flashing and bracket install (GreenFasten shown above).
- Optimum vertical distance between lag bolts is 1 3/8" plus module dimension.
- Set mounts on eave most row so that the Rock-It Pedestal is on the South end of Rock-It Slide.
- Set mounts on all upper rows so that the Rock-It Pedestal is on the North end of Rock-It Slide.

**2** Install Rock-It Array Skirt onto Eave Mounts
- Slide Rock-It Array Skirt into front channel on Rock-It Shelf.
- Array Skirt End Caps are pre-installed on the East end of each skirt section, and are used to couple the skirt sections where needed (see Fig. A ).
- Tighten Mid-Clamp bolt, clamping Rock-It Array Skirt to mount. Torque to 200 in-lbs. (130 in-lbs. when installing with 32mm modules).

**3-4** Install Rock-It Couplings (when joining 4 panels with a coupling, the use of a load bearing foot is required)
- Prior to mounting on the roof, snap Load Bearing Foot into the bottom of Rock-It Coupling if required. (Each Load Bearing Foot is set to same height as the Rock-It Mounts - adjust accordingly)
- On eave row only, slide Rock-It Array Skirt onto Rock-It Coupling Shelf. Torque to specified value.
- NOTE: If a coupling lands on a rafter, the Hybrid Mount* should be used in place of the Rock-It Coupling (refer to image 3a). *Hybrid Mount can be made in the field by assembling a coupling to a mount pedestal, or by purchasing separately.

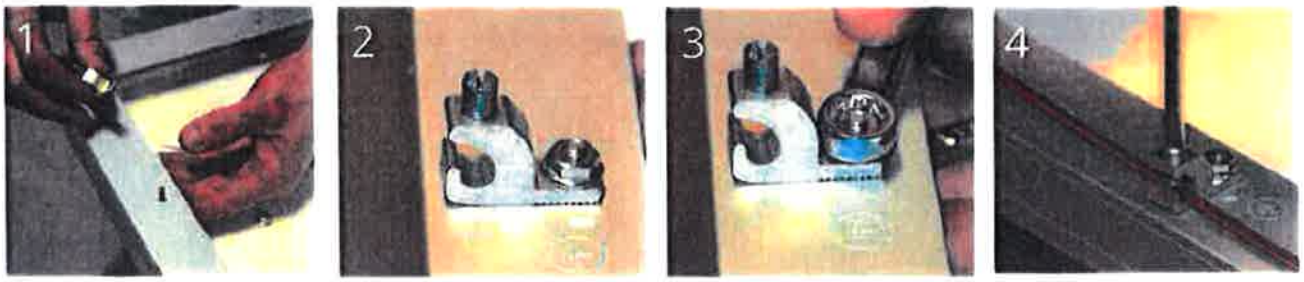
**5** Align and Straighten First Row of the Rock-It System with Rock-It Array Skirt
- Use North-South adjustment of the Rock-It Pedestal to straighten Rock-It Array Skirt and align module with Array Skirt.
- Torque screw on side of Rock-It Pedestal to 150 in-lbs to secure it to the Rock-It Slide.
- Adjust Flange Level Nut to level the system (optional – can be leveled during or after installation).

**6-9** Install 1st Row of PV Modules
- Slide upslope Rock-It Mounts down to engage top of first module.
- Install Rock-It Couplings on the upslope side of 1st row of panels.
- Torque 2nd row of Mid-Clamps on Rock-It Mounts and Rock-It Couplings to specified value.
- Install balance of PV modules, ensuring that the Rock-It Pedestals are in the appropriate position, then torque Mid-Clamps to secure modules.

**10** Level the Rock-It System
- When assembly is complete, level the entire system by adjusting Flange Level Nuts (Flange Level Nuts have no torque value).
- Height between roof surface and underside of modules should be 3" or less, when installed with Type 2 modules.

INSTALLATION NOTE: Modules should be installed so that the junction box is installed upslope, away from the leading edge of the array.

# Grounding Lug Install




## Necessary Components:

- One of the following ground lugs (or any UL 2703 compliant ground lug):
  - Burndy CL50-1TN Ground Lug (UL 2703 - E351343 / UL 467 - E9999)
  - ILSCO SGB-4 Ground Lug (UL 2703 - E354420 / UL 467 - E34440)
  - ILSCO GBL-4DBT (UL 2703 - E354420 / UL 467 - E34440)
  - ILSCO GBL-4DBTH (UL 2703 - E354420 / UL 467 - E34440)
  - ILSCO GBL-4SS (UL 2703 - E354420 / UL 467 - E34440)

Note: Drill and deburr hole in Ground Lug prior to installation

- 14 AWG - 4 AWG Copper Ground Wire*
- 8-32 x 0.5" Serrated Flange Head Bolt (300 Series SS)
- 8-32 Serrated Flange Nut (300 Series SS)
- 11/32" and 1/4" wrenches or ratchets/sockets

Torque Values:
14-10 AWG= 20 in-lbs.
8 AWG= 25 in-lbs.
6-4 AWG= 35 in-lbs.

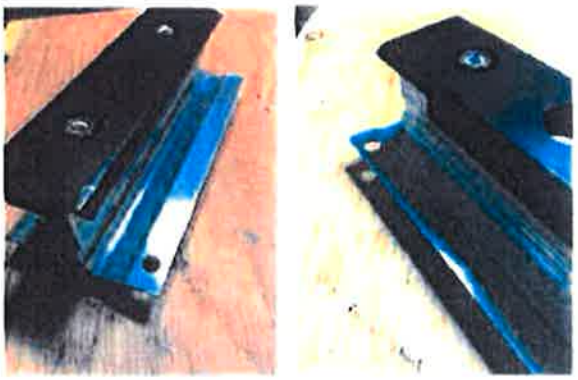
1 Insert the flange bolt into the module ground hole. Place Star Washer over bolt. Place ground lug over the bolt and Star Washer, and turn to desired orientation.

2 Install Flange Nut.

3 Tighten Flange Nut/Bolt.

4 Place wire in Ground Lug channel and tighten set screw to complete assembly.

*Wire should be sized in accordance with the National Electrical Code, NFPA 70, Section 690.45, and a minimum of 1/4" clearance required between bare copper wire and aluminum.

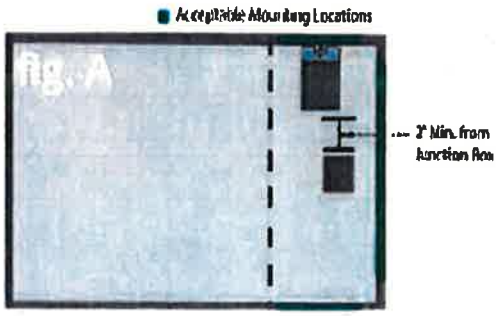


Drill hole per grounding lug manufacturers specifications in the upslope part of Rock-It Coupling for attaching grounding lug.

Note: Deburr hole in Ground Lug and Rock-It Coupling prior to installation.

## ROCK-IT CLIP SS INSTALL






1 **Locate all parts**

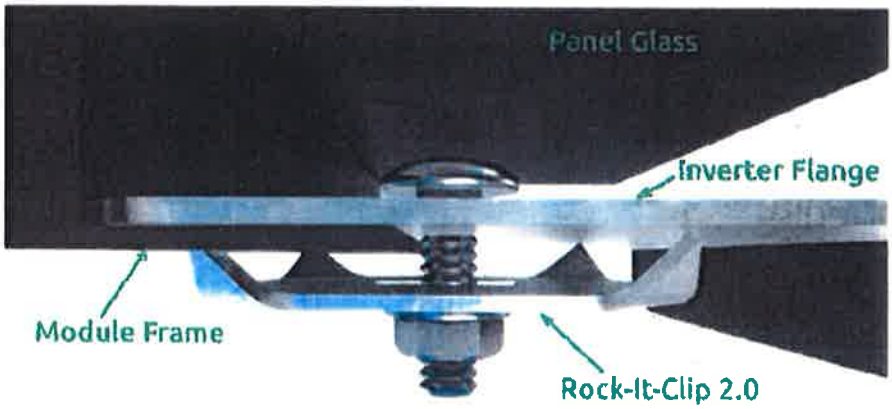
- Locate the Rock-It Clip SS, micro-inverter/power optimizer, and the section of the module frame in which you will be mounting the micro-inverter/power optimizer.

See fig. A for acceptable mounting locations.

2 **Install the Rock-It Clip SS**

- Slide the Rock-It Clip SS onto the lip of the module frame.
- Slide the micro-inverter/power optimizer into the opposite lip of the Rock-It Clip SS.
- Tighten the bolt to 150 in-lb minumum to clamp the Rock-It Clip SS to the module frame and the micro-inverter/power optimizer to the Rock-It Clip SS.
- Ensure that the lip on the clip is tight against the frame and that the micro-inverter/power optimizer flange is tight against the clip flange to avoid rotation during tightening.

## ROCK-IT CLIP 2.0 INSTALL




1 Locate all parts

- Locate the Rock-It Clip 2.0, micro-inverter/power optimizer, and the section of the module frame in which you will be mounting the micro-inverter/power optimizer.

2 Install the Rock-It Clip 2.0 (See below detail)

- Slide the Rock-It Clip 2.0 onto the lip of the micro-inverter/power optimizer.
- Slide the micro-inverter/power optimizer into the opposite lip of the module frame.
- Tighten the bolt to 150 in-lb to clamp the Rock-It Clip 2.0 to the module frame and the micro-inverter/power optimizer to the Rock-It Clip 2.0.
- Ensure that the lip on the clip is tight against the frame and that the micro-inverter/power optimizer flange is tight against the clip flange to avoid rotation during tightening.

## Snow Load 0-20 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 159 | 93 | 59 | 103 | 103 | 103 |
| | | C | 114 | 67 | 42 | 103 | 88 | 88 |
| | | D | 96 | 56 | 35 | 91 | 74 | 74 |
| 90 mph | 115 mph | B | 146 | 85 | 54 | 103 | 103 | 103 |
| | | C | 104 | 61 | 38 | 98 | 80 | 80 |
| | | D | 88 | 51 | 32 | 83 | 68 | 68 |
| 100 mph | 125 mph | B | 123 | 72 | 45 | 103 | 95 | 95 |
| | | C | 88 | 51 | 32 | 83 | 68 | 68 |
| | | D | 74 | 43 | 27 | 70 | 57 | 57 |
| 110 mph | 140 mph | B | 98 | 57 | 36 | 93 | 76 | 76 |
| | | C | 70 | 41 | 26 | 66 | 54 | 54 |
| | | D | 59 | 34 | 22 | 56 | 46 | 46 |
| 120 mph | 150 mph | B | 85 | 50 | 31 | 81 | 66 | 66 |
| | | C | 61 | 36 | 22 | 58 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing

2.) Maximum allowed spacing approved by EcoFasten Solar is 72"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module width of 40"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 0-20 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 91 | 53 | 33 | | | |
| | | C | 66 | 38 | 24 | 61 | 50 | 50 |
| | | D | 55 | 32 | 20 | 52 | 42 | 42 |
| 90 mph | 115 mph | B | 83 | 49 | 30 | | | |
| | | C | 59 | 35 | 22 | 56 | 46 | 46 |
| | | D | 50 | 29 | 18 | 47 | 38 | 38 |
| 100 mph | 125 mph | B | 70 | 41 | 26 | | 54 | 54 |
| | | C | 50 | 29 | 18 | 47 | 39 | 39 |
| | | D | 42 | 26 | 15 | 40 | 32 | 32 |
| 110 mph | 140 mph | B | 56 | 33 | 20 | 53 | 43 | 43 |
| | | C | 40 | 23 | 14 | 38 | 31 | 31 |
| | | D | 34 | 19 | 12 | 32 | 26 | 26 |
| 120 mph | 150 mph | B | 49 | 28 | 18 | 46 | 37 | 37 |
| | | C | 35 | 20 | 12 | 33 | 27 | 27 |
| | | D | 29 | 17 | 10 | 28 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff

2.) Maximum allowed spacing approved by EcoFasten Solar is 48"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module length of 70"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 21-30 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 110 | 93 | 59 | 88 | 88 | 88 |
| | | C | 110 | 67 | 42 | 88 | 88 | 88 |
| | | D | 96 | 56 | 36 | 88 | 88 | 88 |
| 90 mph | 115 mph | B | 110 | 85 | 54 | 88 | 88 | 88 |
| | | C | 104 | 61 | 38 | 88 | 88 | 88 |
| | | D | 88 | 51 | 32 | 88 | 88 | 88 |
| 100 mph | 125 mph | B | 110 | 72 | 45 | 88 | 88 | 88 |
| | | C | 88 | 51 | 32 | 88 | 88 | 88 |
| | | D | 74 | 43 | 27 | 88 | 57 | 57 |
| 110 mph | 140 mph | B | 98 | 57 | 36 | 88 | 88 | 88 |
| | | C | 70 | 41 | 26 | 66 | 54 | 54 |
| | | D | 59 | 34 | 22 | 56 | 46 | 46 |
| 120 mph | 150 mph | B | 86 | 50 | 31 | 88 | 66 | 66 |
| | | C | 61 | 36 | 22 | 58 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing

2.) Maximum allowed spacing approved by EcoFasten Solar is 72"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module width of 40"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 21-30 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 88 | 53 | 33 | 88 | 88 | 88 |
| | | C | 65 | 38 | 24 | 88 | 88 | 88 |
| | | D | 55 | 32 | 20 | 88 | 88 | 88 |
| 90 mph | 115 mph | B | 88 | 49 | 30 | 88 | 88 | 88 |
| | | C | 59 | 35 | 22 | 88 | 88 | 88 |
| | | D | 50 | 29 | 18 | 88 | 38 | 38 |
| 100 mph | 125 mph | B | 88 | 41 | 26 | 88 | 88 | 88 |
| | | C | 59 | 29 | 18 | 88 | 39 | 39 |
| | | D | 42 | 26 | 15 | 40 | 32 | 32 |
| 110 mph | 140 mph | B | 56 | 33 | 20 | 88 | 88 | 88 |
| | | C | 40 | 23 | 14 | 38 | 31 | 31 |
| | | D | 34 | 19 | 12 | 32 | 26 | 26 |
| 120 mph | 150 mph | B | 49 | 28 | 18 | 88 | 37 | 37 |
| | | C | 35 | 20 | 12 | 33 | 27 | 27 |
| | | D | 29 | 17 | 10 | 28 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff

2.) Maximum allowed spacing approved by EcoFasten Solar is 48"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module length of 70"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 31-40 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | | | 56 | | | |
| | | C | | 67 | 42 | | | |
| | | D | | 56 | 35 | | | |
| 90 mph | 115 mph | B | | | 54 | | | |
| | | C | | 61 | 38 | | | |
| | | D | | 51 | 32 | | | |
| 100 mph | 125 mph | B | | | 46 | | | |
| | | C | | 51 | 32 | | | |
| | | D | 74 | 43 | 27 | | | |
| 110 mph | 140 mph | B | | 57 | 36 | | | |
| | | C | 70 | 41 | 26 | | | |
| | | D | 59 | 34 | 22 | | 46 | 46 |
| 120 mph | 150 mph | B | | 50 | 31 | | | |
| | | C | 61 | 36 | 22 | | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing
2.) Maximum allowed spacing approved by EcoFasten Solar is 72"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module width of 40"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 31-40 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | | | 33 | | | |
| | | C | | 38 | 24 | | | |
| | | D | | 32 | 20 | | | |
| 90 mph | 115 mph | B | | 49 | 30 | | | |
| | | C | | 35 | 22 | | | |
| | | D | | 29 | 18 | | | |
| 100 mph | 125 mph | B | | 41 | 26 | | | |
| | | C | | 29 | 18 | | | |
| | | D | 42 | 26 | 15 | | | |
| 110 mph | 140 mph | B | | 33 | 20 | | | |
| | | C | 40 | 23 | 14 | | | |
| | | D | 34 | 19 | 12 | | 26 | 26 |
| 120 mph | 150 mph | B | 49 | 28 | 18 | | | |
| | | C | 35 | 20 | 12 | | 27 | 27 |
| | | D | 29 | 17 | 10 | 28 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff
2.) Maximum allowed spacing approved by EcoFasten Solar is 48"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module length of 70"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 41-50 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 66 | 66 | 59 | 51 | 51 | 51 |
| | | C | 66 | 66 | 42 | 51 | 51 | 51 |
| | | D | 66 | 56 | 35 | 51 | 51 | 51 |
| 90 mph | 115 mph | B | 66 | 66 | 54 | 51 | 51 | 51 |
| | | C | 66 | 61 | 38 | 51 | 51 | 51 |
| | | D | 66 | 51 | 32 | 51 | 51 | 51 |
| 100 mph | 125 mph | B | 66 | 66 | 45 | 51 | 51 | 51 |
| | | C | 66 | 51 | 32 | 51 | 51 | 51 |
| | | D | 66 | 43 | 27 | 51 | 51 | 51 |
| 110 mph | 140 mph | B | 66 | 57 | 36 | 51 | 51 | 51 |
| | | C | 66 | 41 | 26 | 51 | 51 | 51 |
| | | D | 59 | 34 | 22 | 51 | 46 | 46 |
| 120 mph | 150 mph | B | 66 | 50 | 31 | 51 | 51 | 51 |
| | | C | 61 | 36 | 22 | 51 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing
2.) Maximum allowed spacing approved by EcoFasten Solar is 72"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module width of 40"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 41-50 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | | | 33 | 25 | 25 | 25 |
| | | C | | 38 | 24 | | | |
| | | D | | 32 | 20 | | | |
| 90 mph | 115 mph | B | | | 30 | | | |
| | | C | | 35 | 22 | | | |
| | | D | | 29 | 18 | | | |
| 100 mph | 125 mph | B | | | 26 | | | |
| | | C | | 29 | 18 | | | |
| | | D | | 26 | 15 | | | |
| 110 mph | 140 mph | B | | 33 | 20 | | | |
| | | C | | 23 | 14 | | | |
| | | D | | 19 | 12 | | | |
| 120 mph | 150 mph | B | | 28 | 18 | | | |
| | | C | 35 | 20 | 12 | | | |
| | | D | 29 | 17 | 10 | | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff
2.) Maximum allowed spacing approved by EcoFasten Solar is 48"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module length of 70"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 51-60 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 55 | 55 | 55 | 34 | 34 | 34 |
| | | C | 55 | 55 | 42 | 34 | 34 | 34 |
| | | D | 55 | 55 | 35 | 34 | 34 | 34 |
| 90 mph | 115 mph | B | 55 | 55 | 54 | 34 | 34 | 34 |
| | | C | 55 | 55 | 38 | 34 | 34 | 34 |
| | | D | 55 | 51 | 32 | 34 | 34 | 34 |
| 100 mph | 125 mph | B | 55 | 55 | 45 | 34 | 34 | 34 |
| | | C | 55 | 51 | 32 | 34 | 34 | 34 |
| | | D | 55 | 43 | 27 | 34 | 34 | 34 |
| 110 mph | 140 mph | B | 55 | 55 | 36 | 34 | 34 | 34 |
| | | C | 55 | 41 | 26 | 34 | 34 | 34 |
| | | D | 55 | 34 | 22 | 34 | 34 | 34 |
| 120 mph | 150 mph | B | 55 | 50 | 31 | 34 | 34 | 34 |
| | | C | 55 | 36 | 22 | 34 | 34 | 34 |
| | | D | 51 | 30 | 19 | 34 | 34 | 34 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing
2.) Maximum allowed spacing approved by EcoFasten Solar is 72"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module width of 40"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 51-60 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | | | | | | |
| | | C | | | 24 | | | |
| | | D | | 32 | 20 | | | |
| 90 mph | 115 mph | B | | | 30 | | | |
| | | C | | | 22 | | | |
| | | D | | 29 | 18 | | | |
| 100 mph | 125 mph | B | | | 26 | | | |
| | | C | | 29 | 18 | | | |
| | | D | | 26 | 15 | | | |
| 110 mph | 140 mph | B | | | 20 | | | |
| | | C | | 23 | 14 | | | |
| | | D | | 19 | 12 | | | |
| 120 mph | 150 mph | B | | 28 | 18 | | | |
| | | C | | 20 | 12 | | | |
| | | D | 29 | 17 | 10 | | | |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff
2.) Maximum allowed spacing approved by EcoFasten Solar is 48"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module length of 70"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

# Grounding Information

The rail-free Rock-It System may be used to mount and ground PV modules that comply with UL 1703, only when that specific module has been evaluated for mounting and grounding, in compliance with the included installation instructions.

Note: Grounding lug must be visible to inspectors from the entire perimeter of the PV array.

Multiple Use Grounding Pins

Grounding pins within the Mid-Clamp are multiple use bonding/grounding devices. Modules will need to be adjusted if the Mid-Clamps are loosened to ensure there is "new" metal to pierce into upon retightening.

**Grounding Method**

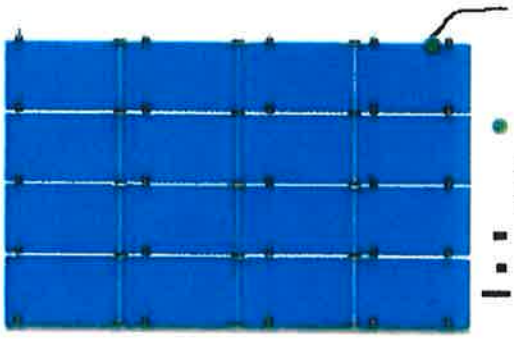
Rock-It 4.0 Mount bonds N-S rows of modules

Rock-It 4.0 Coupling bonds E-W rows of modules

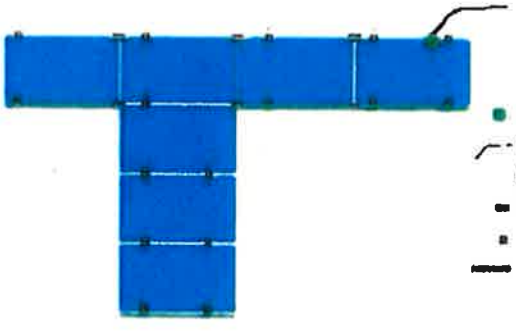
Rock-It Array Skirt bonds E-W along the entire array when installed

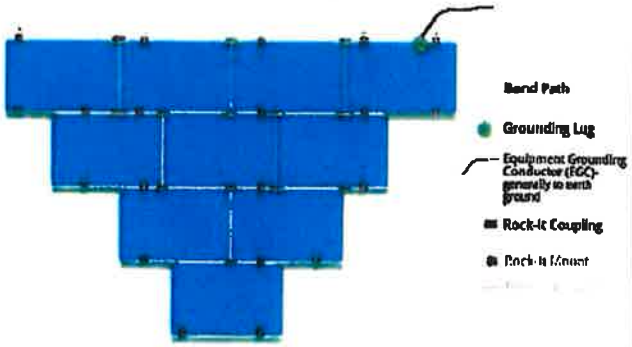
One Burndy CL50-1TN ground lug is required per PV array, limited to 300 modules placed in either portrait or landscape orientation.

# Bonding Assembly and Bonding Path




Integrated Bonding

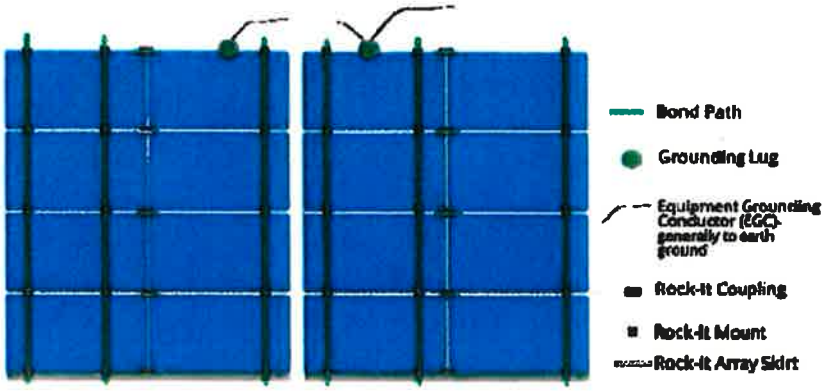


# Thermal Expansion and Bonding

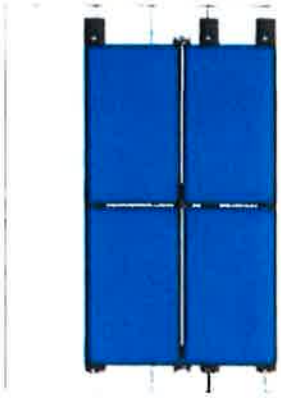
A thermal expansion gap is required per each continuous 40' length of modules.

Omit a coupling and leave a 2" gap in the Rock-It Array Skirt and also between the modules at that point.



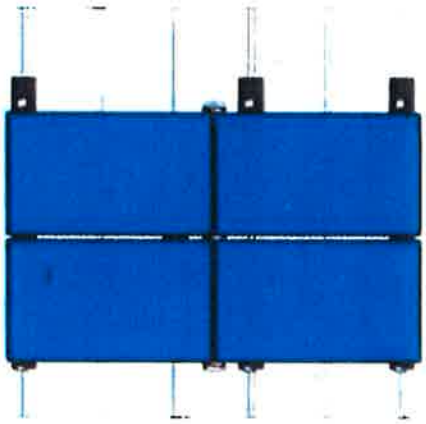

# Bracket Spacing

## Portrait Orientation



Maximum east/west bracket spacing is 48" OC.

## Landscape Orientation

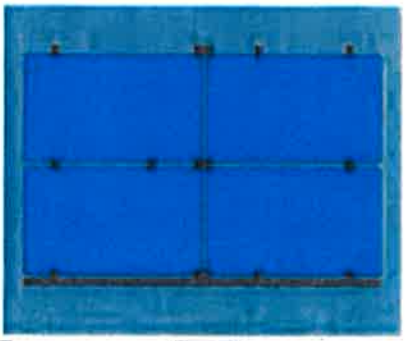


Max east/west bracket spacing is 72" OC.
32mm modules: Max east/west bracket spacing is 48" OC.

Spacing may vary depending upon project specific structural requirements; i.e. high snow and wind load areas may require lesser spacing E-W than the maximum.

# Staggered Layout

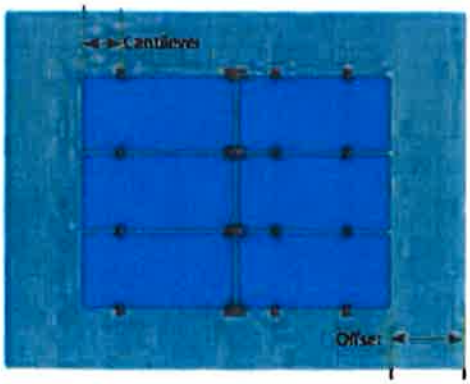
## Staggered Mounting Points



Rock-It Mount  Rock-It Coupling

The array layout instructions in this installation manual offer a general overview of layout. Periodically, due to a variety of factors (roof obstacles, shading, etc.) other layouts are required.

# Cantilever and Offset




Cantilever: Maximum cantilever is 1/3 bracket spacing. For portrait orientation installations, check layout prior to installing.

Offset: Offset from all roof edges depends on wind speed, snow loads, local fire and building codes per location

# ROCK-IT SYSTEM 4.0

## SYSTEM SPECIFICATIONS

| | | | |
|---|---|---|---|
| Max No. of Panels | 300 Modules per ground lug | Materials | 300 Series Stainless, 6000 Series Aluminum |
| Max System Voltage | 1000VDC | Coating | Black Andodization/Mill Finish |
| Class A Fire Rating | With UL1703 Type 1 Rated Modules, see note below. | Lug Specifications | Burndy CL50-1TN Ground Lug (UL Listing #KDER E9999) |
| Leveling Range | 3-4" | Ground Wire Per above Lug spec. | 14 AWG- 4 AWG Copper Ground Wire |
| Rock-It Slide Comp Range<br>Rock-It Slide Tile | 3"<br>7" | Max Module Size | 64.96"(1650mm) x 39.05"(992mm) x 2"(50mm) |
| Min/Max Roof Slope | 1/2:12/12:12 | Max Downforce/Uplift Rating | 45 PSF |
| Max Anchor Spacing (35mm/40mm)<br>Max Anchor Spacing (32mm) | 72"<br>48" | Rock-It Mount Load Rating | 547lbs with Single 5/16" Lag 3.0 Safety Factor |
| Skirt Box QTY | 6 units | Slide Fastening Hole | 5/16" diameter |
| Mount Box QTY<br>Rock-It Slide Box QTY | 12 units<br>50 units | Module Cantilever | Maximum cantilever is 1/3 bracket spacing |
| Coupling Box QTY | 12 units | Warranty | 20 Year Material and Workmanship |

Codes: National Electric Code, ANSI/NFPA 70, NEC 250, NEC 690, IRC, IBC

Standards: UL 2703: First Edition, UL 1703


The EcoFasten Solar Rock-It System is a rooftop PV racking system consisting of 6000 Series Aluminum and 300 Series Stainless Steel components. The Rock-It System includes the rack components but does not include the PV panels, inverters or electrical components. The PV modules to be used with Rock-It shall be certified under UL 1703. The system shall be used on steep slope roofs mounted over a Class A fire rated roofing material and attached to the roof structure using 5/16" diameter, minimum 4" long 300 series Stainless Steel lag bolts with minimum thread embedment depth of 2 1/2" into the roof structure.

## Periodic re-inspection for loose components

The system is subject to re-inspection as required by the PV module manufacturer or by the Authority Having Jurisdiction. Re-Inspection, as required, should include evaluation of any loose components or loose fasteners. All loose components and fasteners should be secured in accordance with these instructions. The system should also be evaluated for any evidence of corrosion. Any corrosion should be removed. Any affected part should be cleaned or replaced in accordance with these instructions.

## Features

- New and improved design
- Fastest, easiest to level system on the market
- Integrated electrical bonding
- SIMPLE- only 4 components
- North-South adjustability
- Only one tool required (1/2" deep well socket)
- Vertical adjustment of 3"-4"

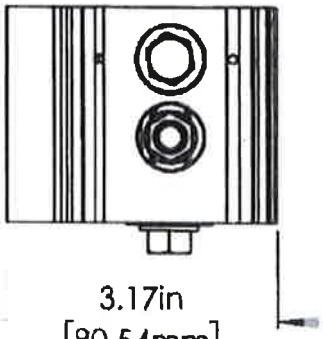
## Evaluated, Compatible Modules

| Module Manufacturer | Model Type ("x" used to indicate variable text) | Module Dimensions (mm) | Module Dimensions (in) | Downward Pressure Design Load (psf) | Upward Pressure Design Load (psf) | Down-slope Design Load (psf) | Maximum Clamp Spacing (in) |
|---|---|---|---|---|---|---|---|
| Trina Solar | TSM-xxx-PD05.08 | 1640 x 992 x 40 | 64.56"x39.05"x1.57" | 99.9 | 99.9 | 20 | 72 |
| Canadian Solar | CS6P-xxxM | 1698 x 922 x 40 | 64.48"x36.66"x1.57" | 99.9 | 99.9 | 20 | 72 |
| Canadian Solar | CS6P-xxP | 1638 x 982 x 40 | 64.5"x39.7"x1.57" | 99.9 | 99.9 | 20 | 72 |
| Jinko Solar | JKMxxxP-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 90 | 90 | 20 | 72 |
| Jinko Solar | JKMxxxM-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 90 | 90 | 20 | 72 |
| Jinko Solar | JKMxxxPP-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 90 | 90 | 20 | 72 |
| Jinko Solar | JKMxxxMM-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 90 | 90 | 20 | 72 |
| Yingli Solar | YLxxxP-29b | 1650 x 990 x 40 | 64.96"x38.97"x1.57" | 90 | 90 | 20 | 72 |
| LG Electronics | LG300N1C-B3 | 1640 x 1000 x 35 | 64.57"x39.37"x1.38" | 90 | 90 | 20 | 72 |
| LG Electronics | LG300N1K-G4 | 1640 x 1000 x 40 | 64.57"x39.37"x1.57" | 90 | 90 | 20 | 72 |
| Astronergy | ASxxxM/156-60S | 1640 x 992 x 40 | 64.5"x39.05"x1.58" | 90 | 90 | 20 | 48 |
| RECOM | RCM-2xx-6MB | 1640 x 992 x 35 | 64.56"x39.05"x1.97" | 90 | 90 | 20 | 72 |
| Silfab | SLAxxP | 1650 x 990 x 38 | 64.96"x38.97"x1.49" | 90 | 90 | 20 | 72 |
| Solaria | PowerXT xxxR-BX | 1621 x 1056 x 40 | 63.89"x41.59"x1.57" | 90 | 90 | 20 | 48 |
| Hanwha - Q Cells* | Q.PRO G4 2xx | 1670 x 1000 x 32 | 65.75"x39.37"x1.25" | 90 | 90 | 20 | 48 |
| Hanwha - Q Cells* | Q.PRO G4 2xx | 1670 x 1000 x 32 | 65.75"x39.37"x1.25" | 90 | 90 | 20 | 72 |
| Supreme | GxB-3xxT | 1670 x 997 x 40 | 65.75"x39.25"x1.57" | 90 | 90 | 20 | 48 |
| REC | REC-xxx-6MB | 1678 x 997 x 30 | 65.94"x39.25"x1.6" | 20 | 20 | 20 | 72 |
| REC | REC-xxx-6MB | 1675 x 997 x 38 | 65.94"x39.25"x1.5" | 90 | 90 | 20 | 48 |
| SolarWorld | SW xxx Mono Black | 1675 x 961 x 33 | 65.95"x37.8"x1.30" | 20 | 20 | 20 | 72 |
| SolarWorld | SW xxx Mono Black | 1675 x 961 x 33 | 65.95"x37.8"x1.30" | 90 | 90 | 20 | 48 |

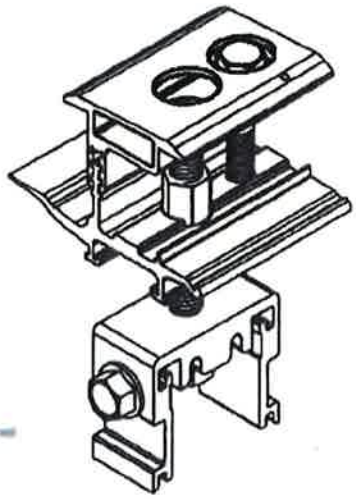
*Hanwha Q- Cells 32mm modules to be used with special order Rock-It System components. Call for details.

# Cut Sheet - Rock-It-4.0-Mount

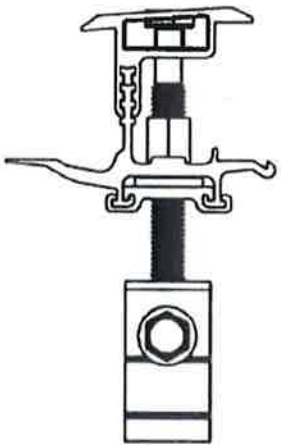
1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.

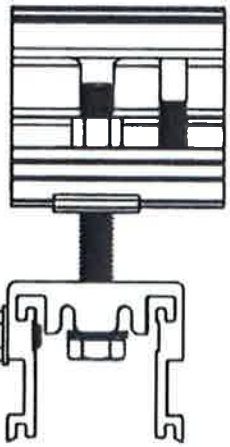


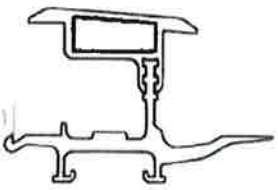
3.17in
[80.54mm]



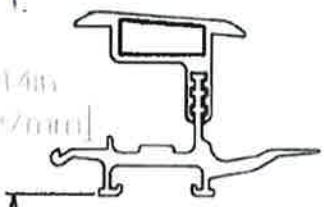
2.50in
[63.50mm]



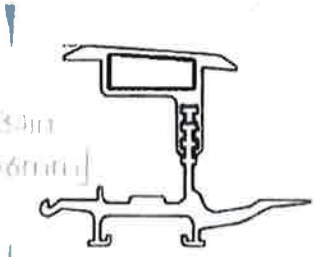




32mm



35mm



40mm

ALPINE SNOWGUARDS | EcoFasten Solar®

4741 W Polk Street Ste. 4
Phoenix, AZ 85043

Toll Free Phone 1.888.766.4273
Toll Free Fax 1.888.766.9994

Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

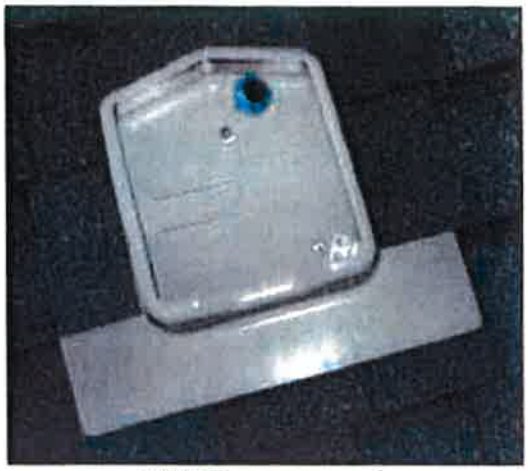
Material: See Spec Sheet
Scale: 1:2 6/28/2017 ASG: - EFS: x

# SolaDeck

**FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE**

**Basic Features**

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included



SolaDeck Model SD 0783

## SolaDeck UL50 Type 3R Enclosures

Available Models:
Model SD 0783 - (3" fixed Din Rail)
Model SD 0786 - (6" slotted Din Rail)

## SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

**Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System**

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
1- Power Distribution Block 600VDC 175AMP
1- Bus Bar with UL lug

**Model SD 0786-41 6" Slotted Din Rail fastened using steel studs**

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
4- Din Rail Mounted Terminal Blocks
Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.

Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.

Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.

Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

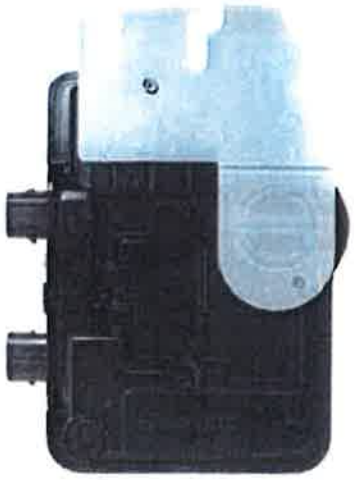
*RSTC Enterprises, Inc • 2219 Helmstead Road • Eau Claire, WI 54703*
*For product information call 1(866) 367-7782*

# Enphase IQ 6 and IQ 6+ Microinverters

The high-powered smart grid-ready Enphase IQ 6 Micro™ and Enphase IQ 6+ Micro™ dramatically simplify the installation process while achieving the highest efficiency for module-level power electronics.

Part of the Enphase IQ System, the IQ 6 and IQ 6+ Micro integrate seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ 6 and IQ 6+ Micro extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing. Enabling Enphase to provide an industry-leading warranty of up to 25 years.



### Easy to Install

- Lightweight and simple
- Faster installation with improved two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014)

### Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure

### Smart Grid Ready

- Complies with fixed power factor, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles

* The IQ 6+ Micro is required to support 72-cell modules

To learn more about Enphase offerings, visit **enphase.com**

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# Enphase IQ 6 and IQ 6+ Microinverters

| INPUT DATA (DC) | IQ6-60-2-US AND IQ6-60-5-US | | IQ6PLUS-72-2-US AND IQ6PLUS-72-5-US | |
|---|---|---|---|---|
| Commonly used module pairings[1] | 195 W - 330 W + | | 235 W - 400 W + | |
| Module compatibility | 60-cell PV modules only | | 60-cell and 72-cell PV modules | |
| Maximum input DC voltage | 48 V | | 62 V | |
| Peak power tracking voltage | 27 V - 37 V | | 27 V - 45 V | |
| Operating range | 16 V - 48 V | | 16 V - 62 V | |
| Min/Max start voltage | 22 V / 48 V | | 22 V / 62 V | |
| Max DC short circuit current (module Isc) | 15 A | | 15 A | |
| Overvoltage class DC port | II | | II | |
| DC port backfeed under single fault | 0 A | | 0 A | |
| PV array configuration | 1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit | | | |
| **OUTPUT DATA (AC)** | **IQ6-60-2-US AND IQ6-60-5-US** | | **IQ6PLUS-72-2-US AND IQ6PLUS-72-5-US** | |
| Peak output power | 240 VA | | 290 VA | |
| Maximum continuous output power | 230 VA | | 280 VA | |
| Nominal voltage/range[2] | 240 V / 211-264 V | 208 V (1Φ) / 183-229 V | 240 V / 211-264 V | 208 V (1Φ) / 183-229 V |
| Nominal output current | 0.96 A | 1.11 A | 1.17 A | 1.35 A |
| Nominal frequency | 60 Hz | | 60 Hz | |
| Extended frequency range | 47 - 68 Hz | | 47 - 68 Hz | |
| Power factor at rated power | 1.0 | | 1.0 | |
| Maximum units per 20 A branch circuit | 16 (240 VAC) | | 13 (240 VAC) | |
| | 14 (single-phase 208 VAC) | | 11 (single-phase 208 VAC) | |
| Overvoltage class AC port | III | | III | |
| AC port backfeed under single fault | 0 A | | 0 A | |
| Power factor (adjustable) | 0.7 leading ... 0.7 lagging | | 0.7 leading ... 0.7 lagging | |
| **EFFICIENCY** | **@240 V** | **@208 V (1Φ)** | **@240 V** | **@208 V (1Φ)** |
| CEC weighted efficiency | 97.0 % | 96.5 % | 97.0 % | 96.5 % |
| **MECHANICAL DATA** | | | | |
| Ambient temperature range | -40°C to +65°C | | | |
| Relative humidity range | 4% to 100% (condensing) | | | |
| Connector type | MC4 or Amphenol H4 UTX | | | |
| Dimensions (WxHxD) | 219 mm x 191 mm x 37.9 mm (without bracket) | | | |
| Weight | 1.5 kg (3.3 lbs) | | | |
| Cooling | Natural convection - No fans | | | |
| Approved for wet locations | Yes | | | |
| Pollution degree | PD3 | | | |
| Environmental category / UV exposure rating | Outdoor - NEMA 250, type 6 (IP67) | | | |
| **FEATURES** | | | | |
| Communication | Power line | | | |
| Monitoring | Enlighten Manager and MyEnlighten monitoring options<br>Compatible with Enphase IQ Envoy | | | |
| Compliance | UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01<br>This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions. | | | |

1. No enforced DC/AC ratio. See the compatibility calculator at enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.

To learn more about Enphase offerings, visit **enphase.com**


2017-05-01

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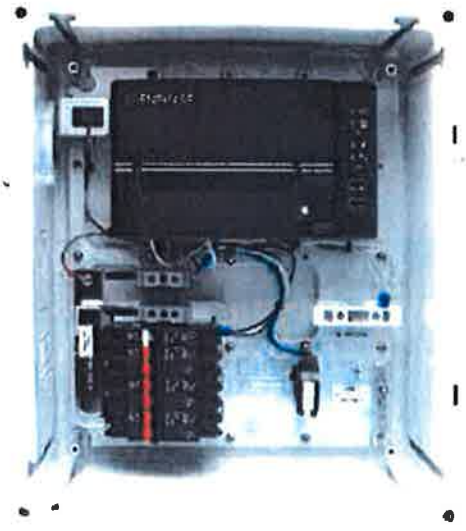
Enphase Networking

# Enphase IQ Combiner

## (X-IQ-AM1-240-B)

The Enphase IQ Combiner™ with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV installations by providing a consistent, pre-wired solution for residential applications.



### Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular

### Simple

- Three pre-installed 20 A / 240 VAC circuit breakers
- Provides production metering and optional consumption monitoring

### Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year warranty

UL LISTED

To learn more about Enphase offerings, visit enphase.com

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# Enphase IQ Combiner

| | |
|---|---|
| **MODEL NUMBER** | |
| IQ Combiner X-IQ-AM1-240-B | IQ Combiner with Enphase IQ Envoy™ for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional consumption monitoring (+/- 2.5%). |
| **ACCESSORIES (order separately)** | |
| Enphase Mobile Connect™<br>CELLMODEM-03 (4G / 12-year data plan)<br>CELLMODEM-01 (3G / 5-year data plan) | Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) |
| Consumption Monitoring CT<br>CT-200-SPLIT | Split core current transformers enable whole home consumption metering (+/- 2.5%). |
| **ELECTRICAL SPECIFICATIONS** | |
| Rating | Continuous duty |
| Solar branch circuit breakers | Three 2-pole 20 A/240 VAC DIN rail-mounted breakers |
| Maximum system voltage | 240 VAC |
| Rated output current | 48 A |
| Rated input current, each input | 16 A |
| Maximum fuse/circuit breaker rating (output) | 60 A |
| Production Metering CT | 200 A solid core pre-installed and wired to IQ Envoy |
| **MECHANICAL DATA** | |
| Dimensions (WxHxD) | 38.0 x 38.7 x 20.3 cm (15.0" x 15.3" x 8.0") |
| Weight | 5.1 kg (11.2 lbs) |
| Ambient temperature range | -40° C to +46° C (-40° to 115° F) |
| Cooling | Vented, natural convection, plus heat shield |
| Enclosure environmental rating | Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction |
| Wire size | 14 to 6 AWG copper conductors for branch inputs.<br>14 to 4 AWG copper conductors for combined output.<br>Follow local code requirements for conductor sizing. |
| Altitude | To 2000 meters (6,560 feet) |
| **INTERNET CONNECTION OPTIONS** | |
| Integrated Wi-Fi | 802.11b/g/n |
| Ethernet | 802.3, Cat5E (or Cat 6) UTP Ethernet cable - not included |
| Cellular | Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) - not included |
| **COMPLIANCE** | |
| Compliance, Combiner | UL 1741 |
| Compliance, IQ Envoy | UL 916<br>CAN/CSA C22.2 No. 61010-1<br>47 CFR, Part 15, Class B, ICES 003<br>IEC/EN 61010-1:2010,<br>EN50065-1, EN61000-4-5, EN61000-6-1, EN61000-6-2<br>Metering: ANSI C12.20 accuracy class 0.5 |

**To learn more about Enphase offerings, visit enphase.com**


2017-08-17

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powered by Q.ANTUM DUO

# Q.PEAK DUO BLK-G5 300-320

## Q.ANTUM SOLAR MODULE

**The new Q.PEAK DUO BLK-G5 solar module from Q CELLS impresses with its outstanding visual appearance and particularly high performance on a small surface thanks to the innovative Q.ANTUM DUO Technology. Q.ANTUM's world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions — both with low-intensity solar radiation as well as on hot, clear summer days.**

### Q.ANTUM TECHNOLOGY: LOW LEVELIZED COST OF ELECTRICITY
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.3%.

### 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) regarding IEC.

### A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance guarantee[2].

### STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2018

Q CELLS

VDE Quality Tested
✓ High reliability
✓ low degradation
✓ frequent product surveillance
ID. 40032687

[1] APT test conditions according to IEC/TS 62804-1:2015, method B (–1500V, 168h)
[2] See data sheet on rear for further information.

### THE IDEAL SOLUTION FOR:

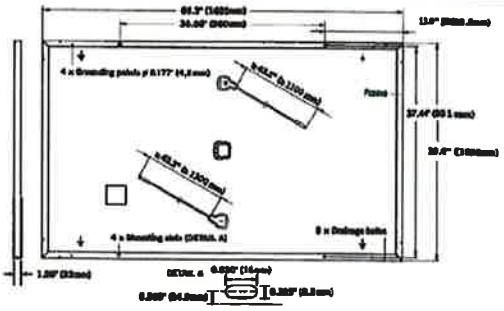
Rooftop arrays on residential buildings

Engineered in **Germany**

Q CELLS

## MECHANICAL SPECIFICATION

| | |
|---|---|
| Format | 66.3 in x 39.4 in x 1.26 in (including frame)<br>(1685 mm x 1000 mm x 32 mm) |
| Weight | 41.2 lbs (18.7 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 x 20 monocrystalline Q.ANTUM solar half-cells |
| Junction box | 2.76-3.35 in x 1.97-2.76 in x 0.51-0.83 in<br>(70-85 mm x 50-70 mm x 13-21 mm), decentralized, IP67 |
| Cable | 4 mm² Solar cable; (+) ≥43.3 in (1100 mm), (–) ≥43.3 in (1100 mm) |
| Connector | Multi-Contact MC4, IP68 |

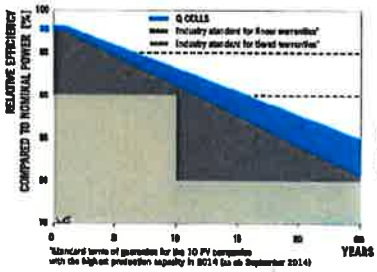


## ELECTRICAL CHARACTERISTICS

| POWER CLASS | | | 300 | 305 | 310 | 315 | 320 |
|---|---|---|---|---|---|---|---|
| **MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)** | | | | | | | |
| Minimum | Power at MPP[1] | $P_{MPP}$ [W] | 300 | 305 | 310 | 315 | 320 |
| | Short Circuit Current[1] | $I_{SC}$ [A] | 9.72 | 9.78 | 9.83 | 9.89 | 9.94 |
| | Open Circuit Voltage[1] | $V_{OC}$ [V] | 39.48 | 39.75 | 40.02 | 40.29 | 40.56 |
| | Current at MPP | $I_{MPP}$ [A] | 9.25 | 9.31 | 9.36 | 9.41 | 9.47 |
| | Voltage at MPP | $V_{MPP}$ [V] | 32.43 | 32.78 | 33.12 | 33.46 | 33.80 |
| | Efficiency[1] | η [%] | ≥17.8 | ≥18.1 | ≥18.4 | ≥18.7 | ≥19.0 |
| **MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]** | | | | | | | |
| Minimum | Power at MPP | $P_{MPP}$ [W] | 224.1 | 227.8 | 231.6 | 235.3 | 239.1 |
| | Short Circuit Current | $I_{SC}$ [A] | 7.83 | 7.88 | 7.92 | 7.97 | 8.01 |
| | Open Circuit Voltage | $V_{OC}$ [V] | 37.15 | 37.40 | 37.66 | 37.91 | 38.17 |
| | Current at MPP | $I_{MPP}$ [A] | 7.28 | 7.32 | 7.37 | 7.41 | 7.45 |
| | Voltage at MPP | $V_{MPP}$ [V] | 30.78 | 31.11 | 31.44 | 31.76 | 32.08 |

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

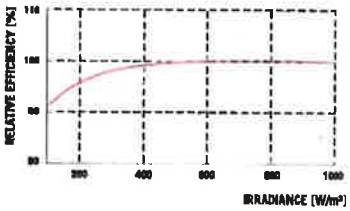
### Q CELLS PERFORMANCE WARRANTY




At least 98 % of nominal power during first year.
Thereafter max. 0.54 % degradation per year.
At least 93.1 % of nominal power up to 10 years.
At least 85 % 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 organization 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] | –0.28 |
| Temperature Coefficient of $P_{MPP}$ | γ | [%/K] | –0.37 | Normal Operating Module Temperature | NMOT | [°F] | 109 ±5.4 (43 ±3 °C) |

## PROPERTIES FOR SYSTEM DESIGN

| | | | | |
|---|---|---|---|---|
| Maximum System Voltage $V_{SYS}$ | [V] | 1000 (IEC) / 1000 (UL) | Safety Class | II |
| Maximum Series Fuse Rating | [A DC] | 20 | Fire Rating | C (IEC) / TYPE 1 (UL) |
| Max. Design Load, Push / Pull (UL)[2] | [lbs/ft²] | 75 (3600 Pa) / 55 (2667 Pa) | Permitted module temperature on continuous duty | –40 °F up to +185 °F<br>(–40 °C up to +85 °C) |
| Max. Test Load, Push / Pull (UL)[2] | [lbs/ft²] | 113 (5400 Pa) / 84 (4000 Pa) | [2] see installation manual | |

## QUALIFICATIONS AND CERTIFICATES

UL 1703; VDE Quality Tested; CE-compliant;
IEC 61215:2016; IEC 61730:2016, Application class A

## PACKAGING INFORMATION

| | |
|---|---|
| Number of Modules per Pallet | 32 |
| Number of Pallets per 53' Trailer | 30 |
| Number of Pallets per 40' High Cube Container | 26 |
| Pallet Dimensions (L x W x H) | 69.3 in x 45.3 in x 46.9 in<br>(1760 mm x 1150 mm x 1190 mm) |
| Pallet Weight | 1415 lbs (642 kg) |

**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.
300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

| PV MODULE RATINGS | |
|---|---|
| MODULE MAKE | HANWHA |
| MODEL | Q.PEAK DUO BLK-G5 305 |
| MAX POWER | 305W |
| OPEN CIRCUIT VOLTAGE | 39.75V |
| MPP VOLTAGE | 32.78V |
| SHORT CIRCUIT CURRENT | 9.78A |
| MPP CURRENT | 9.31A |

| INVERTER RATINGS | |
|---|---|
| INVERTER MAKE | ENPHASE |
| MODEL | IQ6-60-2-US |
| MAX OUTPUT POWER | 240W |
| OPEN DC VOLTAGE | 48V |
| NOMINAL AC VOLTAGE | 240V |
| MAX AC CURRENT | 0.96A |
| CEC INVERTER EFFICIENCY | 97% |

| SUB PANEL BREAKER SIZE | # OF MODULES | PV BREAKER PER BRANCH |
|---|---|---|
| | UP TO 16 | 20A |

VOLTAGE DROP CALCULATIONS

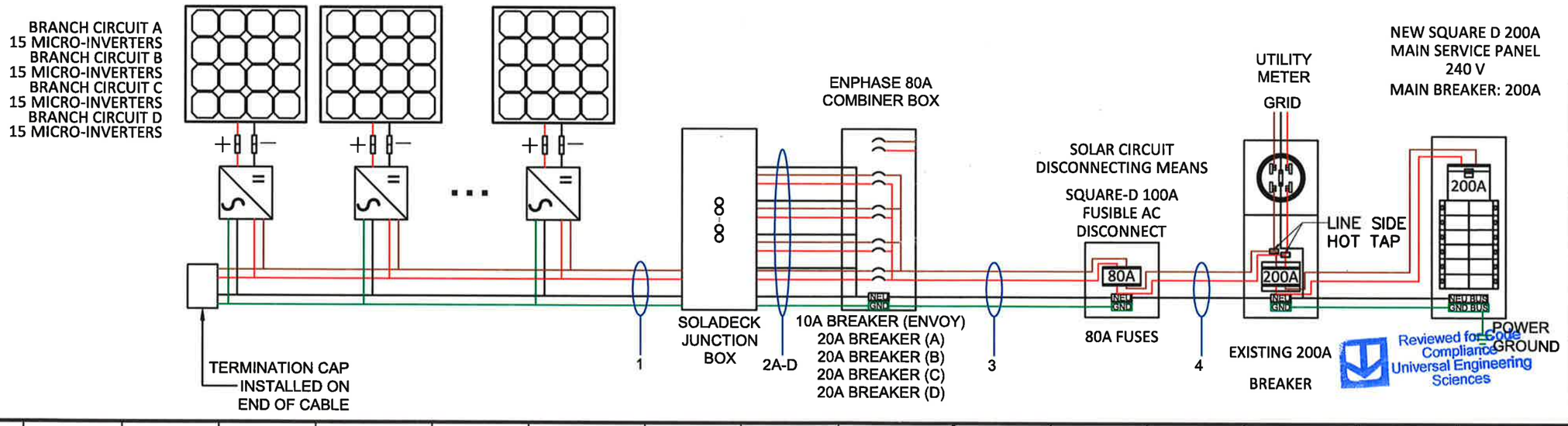
FORMULA USED PER NEC 2014 HANDBOOK 215.2(A)(4) WHERE APPLICABLE

| WIRE RUN | $V_{mp}$ | $I_{mp}$ | R | L (FT) | $V_o$ | % $V_o$ | WIRE SIZE |
|---|---|---|---|---|---|---|---|
| BRANCH TO J-BOX | 240.00 | 14.4 | 1.98 | 98.75 | 5.631 | 2.35% | 12 AWG |
| J-BOX TO LOAD CENTER | 240.00 | 57.6 | 1.24 | 50.00 | 7.142 | 2.98% | 10 AWG |
| LOAD CENTER TO AC DISCONNECT | 240.00 | 72 | 0.308 | 3.00 | 0.133 | 0.06% | 04 AWG |
| AC DISCONNECT TO INTERCONNECTION | 240.00 | 72 | 0.308 | 10.00 | 0.444 | 0.18% | 04 AWG |

**SOLAR INSTALLER NOTES:**
**200A SERVICE PANEL UPGRADE REQUIRED**
**200A METER PAN UPGRADE REQUIRED**

SPLICES AND TAPS MADE WITHIN OVER-CURRENT DEVICE ENCLOSURES SHALL NOT EXCEED 40% OF CROSS SECTIONAL AREA OF THE SPACE

60 HANWHA Q.PEAK DUO BLK-G5 305 305W MODULES PAIRED WITH
60 ENPHASE IQ6-60-2-US MICRO-INVERTERS




| Wire Tag | Conduit | Wire Qty | Wire Gauge | Wire Type | Temp. Rating | Wire Ampacity (A) | Temp. Derate | Conduit Fill Derate | Derated Ampacity (A) | Inverter Qty | NOC (A) | NEC Correction | Design Current (A) | Ground Size | Ground Wire Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | OPEN AIR | 4 | 12 AWG | Trunk Cable | 90°C | 30 | 0.96 | 1 | 28.80 | 15 | 0.96 | 1.25 | 18.00 | 12 AWG | Trunk Cable |
| 2A | 1" PVC | 2 | 10 AWG | THWN-2 | 90°C | 40 | 0.96 | 0.7 | 26.88 | 15 | 0.96 | 1.25 | 18.00 | 08 AWG | THWN-2 |
| 2B | 1" PVC | 2 | 10 AWG | THWN-2 | 90°C | 40 | 0.96 | 0.7 | 26.88 | 15 | 0.96 | 1.25 | 18.00 | 08 AWG | THWN-2 |
| 2C | 1" PVC | 2 | 10 AWG | THWN-2 | 90°C | 40 | 0.96 | 0.7 | 26.88 | 15 | 0.96 | 1.25 | 18.00 | 08 AWG | THWN-2 |
| 2D | 1" PVC | 2 | 10 AWG | THWN-2 | 90°C | 40 | 0.96 | 0.7 | 26.88 | 15 | 0.96 | 1.25 | 18.00 | 08 AWG | THWN-2 |
| 3 | 1" PVC | 3 | 04 AWG | THWN-2 | 75°C | 85 | 0.96 | 1 | 81.60 | 60 | 0.96 | 1.25 | 72.00 | 08 AWG | THWN-2 |
| 4 | 1" PVC | 3 | 04 AWG | THWN-2 | 75°C | 85 | 0.96 | 1 | 81.60 | 60 | 0.96 | 1.25 | 72.00 | | THWN-2 |

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**STRUCTURAL ENGINEERING**

**SOLAR CONTRACTOR**


CAMERON CHRISTENSEN
CERTIFIED SOLAR CONTRACTOR
LICENSE NUMBER: CVC57036
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5728 MAJOR BLVD. SUITE 307
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**CUSTOMER INFORMATION**

AMBER BASSETT
3016 INDIAN DRIVE
ORLANDO, FL, 32812
352-235-4315

**PV SYSTEM INFORMATION**

SYSTEM SIZE (DC ): 18.3 KW
60 MODULES: HANWHA Q.PEAK DUO BLK-G5 305
60 INVERTERS: ENPHASE IQ6-60-2-US

**PROJECT INFORMATION**

| | | |
|---|---|---|
| INITIAL | DATE: 7/10/2018 | DESIGNER: AD |
| REV: | DATE: | DESIGNER: |
| REV: | DATE: | DESIGNER: |

ELECTRICAL

**PV-4**

**ELECTRICAL NOTES:**

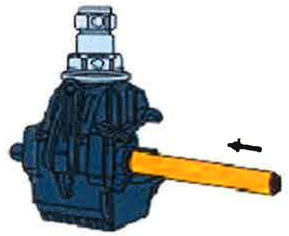
1. ALL CALCULATIONS FOR VOC, VMAX, IMP AND ISC HAVE BEEN CALCULATED USING THE MANUFACTURED STRING CALCULATOR BASED ON ASHRAE 2% HIGH AND EXTREME MINIMUM TEMPERATURE COEFICIENTS.
2. THE ENTIRE ARRAY IS BONDED ACCORDING TO (NEC 690.46 - 250.120 paragraph C). THE GROUND IS CARRIED AWAY FROM THE GROUNDING LUG USING #6 BARE COPPER WIRE.
3. THIS SYSTEM COMPLIES WITH NEC 2014
4. BRANCH CIRCUIT CALCULATION FOR WIRE TAG 1 DISPLAYS THE LARGEST BRANCH CIRCUIT IN SYSTEM. OTHER BRANCH CIRCUITS WILL HAVE LOWER DESIGN CURRENT THAN THE ONE SHOWN. IN ADDITION, VOLTAGE DROP CALCULATIONS FROM PANELS TO THE COMBINER BOX WILL BE SHOWN IN A SIMILAR FASHION
5. ALL CONDUCTORS ARE SIZED BASED ON NEC 2014 ARTICLE 310
6. ALL EQUIPMENT INSTALLED IS RATED AT 90°C
7. INVERTER NOC (NOMINAL OPEN CURRENT) OBTAINED FROM EQUIPMENT DATASHEET
8. CONTRACTOR RESPONSIBLE FOR COMPLYING WILL ALL LOCAL OR NATIONAL CODE REQUIREMENTS AND EQUIPMENT INSTALLATION INSTRUCTIONS
9. EACH MODULE MUST BE GROUNDED ACCORDING TO SUNMODULE USER INSTRUCTIONS
10. ALL EQUIPMENT SHALL BE LISTED PER NEC 690.4(D)
11. PER NEC 690.17, PROVIDE A WARNING SIGN AT ALL LOCATIONS WHERE TERMINALS OF THE DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION> SIGN SHALL READ *WARNING - ELECTRIC SHOCK HAZARD - DO NOT TOUCH TERMINALS - OR EQUIVALENT.
12. PER NEC 705.10, PROVIDE A PERMANENT PLAQUE OR DIRECTORY SHOWING ALL ELECTRIC POWER SOURCES ON THE PREMISES AT SERVICE ENTRANCE.
13. INTERCONNECTION METHOD SHALL COMPLY WITH NEC 690.64
14. AND OPTION FOR A SINGLE CIRCUIT BRANCH TO BE SPLIT INTO TWO SUB-CIRCUIT BRANCHES IS ACCEPTABLE.
15. ALL CONDUCTORS MUST BE COPPER.
16. NEUTRAL AND EQUIPMENT GROUNDING CONDUCTOR BONDED AS PER NEC 250.24(C).
17. EQUIPMENT GROUNDING CONDUCTOR IS CONNECTED TO A GROUNDING ELECTRODE SYSTEM PER 250.54(D).
18. FUSES FOR PV DISCONNECT HAVE AIC RATINGS OF 200KA AC AND 20KA DC.
19. SUPPLY SIDE CONNECTION SHALL BE MADE USING ILSCO INSULATION PIERCING CONNECTORS (IPC). MAKE, MODEL, AND RATING OF INTERCONNECTION CAN BE SEEN ON TABLE 1 BELOW.
20. METHOD OF INTERCONNECTION CAN BE SEEN IN FIGURE 1.

**TABLE 1:**

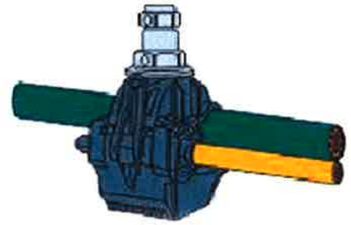
| MAKE | MODEL | VOLTAGE RATING | CONDUCTOR RANGE MAIN | CONDUCTOR RANGE TAP |
|---|---|---|---|---|
| ILSCO | IPC 4020 | 600 V | 4/0-4 AWG | 6-14 AWG |
| ILSCO | IPC 4006 | 600 V | 4/0-2 AWG | 2/0-6 AWG |

**FIGURE 1:**

1.Adjust the connector nut to suitable location

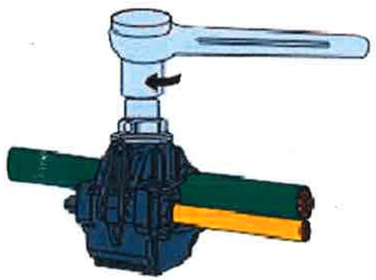


2.Put the branch wire into the capsheath fully

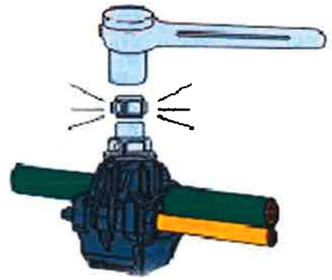


3.Insert the main wire,if there are two lays of insulated lay in the main cables,should strip a certain length of the first insulated lay from inserted

4.Turn the nut by hand,and fix the connector in suitable location



5.Screw the nut with the sleeve spanner.



6.Screw the nut continually until the top part is cracked and dropped down.

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ELECTRICAL

**PV-4.1**

| TAG | LABEL | QUANTITY | LOCATION | NOTE |
|---|---|---|---|---|
| Ⓐ | | 1 | UTILITY SERVICE DISCONNECT | POINT OF INTERCONNECTION |
| Ⓑ | ⚠WARNING<br>PHOTOVOLTAIC POWER SOURCE<br>PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN<br>⚠WARNING<br>THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR. | 1 | COMBINER BOX | 1 AT ANY JUNCTION BOX OR DC COMBINER IF USED |
| Ⓒ | ⚠WARNING<br>ELECTRICAL SHOCK HAZARD<br>DO NOT TOUCH TERMINALS<br>TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION | 1 | JUNCTION BOX | 1 AT ANY JUNCTION BOX OR DC COMBINER IF USED |
| Ⓓ | PHOTOVOLTAIC AC DISCONNECT<br>MAXIMUM AC OPERATING CURRENT 57.60A<br>MAXIMUM AC OPERATION VOLTAGE 264 V<br>⚠WARNING<br>ELECTRICAL SHOCK HAZARD<br>DO NOT TOUCH TERMINALS<br>TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION<br>PHOTOVOLTAIC SYSTEM<br>INSTALLED BY MOMENTUM SOLAR<br>325 HIGH STREET<br>METUCHEN, NJ 08840<br>PHONE NUMBER:732-902-6224 | 1 | AC DISCONNECT | 1 OF EACH AT FUSED AC DISCONNECT<br>COMPLETE VOLTAGE AND CURRENT VALUES ON DISCONNECT LABEL |
| Ⓔ | LINE SIDE TAP<br>⚠WARNING<br>DUAL POWER SOURCE<br>SECOND SOURCE IS PHOTOVOLTAIC SYSTEM<br>NOMINAL AC OPERATING VOLTAGE 240 V<br>RATED AC OPERATING CURRENT 57.60 A | 1 | MAIN DISCONNECT PANEL | 1 OF EACH AT BUILDING MAIN DISCONNECT PANEL |
| Ⓕ | ⚠WARNING<br>DUAL POWER SOURCE<br>SECOND SOURCE IS PHOTOVOLTAIC SYSTEM | 1 | UTILITY METER | 1 AT UTILITY METER |

EXAMPLES

Ⓐ

Ⓑ

Ⓒ

Ⓓ

Ⓔ

Ⓕ

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## STRUCTURAL ENGINEERING

LUIS R. PEREZ LICENSE No. 80653 STATE OF FLORIDA PROFESSIONAL ENGINEER

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## CUSTOMER INFORMATION

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## PV SYSTEM INFORMATION

SYSTEM SIZE (DC ): 18.3 KW
60 MODULES: HANWHA Q.PEAK DUO BLK-G5 305
60 INVERTERS: ENPHASE IQ6-60-2-US

**PROJECT INFORMATION**

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| INITIAL | DATE: 7/10/2018 | DESIGNER: AD |
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EQUIPMENT LABELS

# PV-4.2

| PLAN KEY | |
|---|---|
| PV-1 | COVER PAGE |
| PV-1.1 | COVER PAGE CONT. |
| PV-2 | PANEL LAYOUT |
| PV-3 | LAYOUT DETAIL |
| PV-4 | THREE LINE DIAGRAM |
| PV-4.1 | ELECTRICAL CONT. |
| PV-4.2 | EQUIPMENT LABELS |

HANWHA Q.PEAK DUO BLK-G5 305
305 WATT MODULE
66.3" X 39.4" X 1.26"
(SEE DATASHEET)

| BILL OF MATERIALS | |
|---|---|
| MODULES | 60 |
| INVERTERS | 60 |
| CLAMP ASSEMBLY | 108 |
| COUPLING ASSEMBLY | 76 |
| BONDING CLIP | 11 |
| SKIRTS | 21 |
| LOAD CENTER | 1 |
| 100A FUSIBLE AC DISCONNECT | 1 |
| 80A FUSES | 2 |
| 125A LINE TAPS | 2 |
| 20A BREAKERS | 4 |
| 15A BREAKER | 1 |
| ENVOY-S | 1 |
| NEMA 3R PVC BOX | 1 |

| SYSTEM INFORMATION | |
|---|---|
| MODULE | HANWHA Q.PEAK DUO BLK-G5 305 |
| INVERTER | ENPHASE IQ6-60-2-US |
| RACKING | ECOFASTEN ROCK-IT SYSTEM |
| SYSTEM SIZE (DC) | 18.3 KW |
| LOCATION | 28.464529 , -81.344071 |

## GENERAL NOTES:

THIS PV SYSTEM HAS BEEN DESIGNED TO MEET THE MINIMUM DESIGN STANDARDS FOR BUILDING AND OTHER STRUCTURES OF THE ASCE 7-10, 6TH EDITION 2017 FLORIDA RESIDENTIAL CODE, 6TH EDITION 2017 FLORIDA FIRE PREVENTION CODE, NEC 2014 AND ALL LOCAL CODES & ORDINANCES.

ROOF SHALL HAVE NO MORE THAN TWO LAYERS OF COVERING IN ADDITION TO THE SOLAR EQUIPMENT.

INSTALLATION OF SOLAR EQUIPMENT SHALL BE FLUSH MOUNTED, PARALLEL TO AND NO MORE THAN 6-INCHES ABOVE THE SURFACE OF THE ROOF.

ANY PLUMBING VENTS ARE NOT TO BE CUT OR COVERED FOR SOLAR EQUIPMENT INSTALLATION. ANY RELOCATION OR MODIFICATION OF THE VENT REQUIRES A PLUMBING PERMIT AND INSPECTION.

ALL DESIGN, CALCULATIONS ARE PERFORMED BY DANIEL DUNZIK REGISTERED ARCHITECT. FLORIDA STATE STATUTE 471.003(3) PROVIDES THAT LICENSED ARCHITECTS ARE EXEMPTED FROM THE PROVISIONS OF CHAPTER 471 ENGINEERING AND NOT PRECLUDED FROM PERFORMING ENGINEERING SERVICES FOR INTEGRATED SYSTEMS AND SERVICES THAT ARE INCIDENTAL TO BUILDINGS AND STRUCTURES.

## INVERTER PLACEMENT:

SYSTEM UTILIZES "ENPHASE" MICRO-INVERTERS WITH RAPID SHUTDOWN CONTROL LOCATED ON THE BACK SIDE OF EACH MODULE.

## STRUCTURAL STATEMENT:

THE EXISTING STRUCTURE IS ADEQUATE TO SUPPORT THE NEW LOADS IMPOSED BY THE PHOTOVOLTAIC MODULE SYSTEM INCLUDING UPLIFT & SHEAR.EXISTING RAFTER SIZES & DIMENSIONS CONFORM TO 6TH EDITION 2017 FLORIDA RESIDENTIAL CODE

MOUNTING BRACKETS AND HARDWARE MEET OR EXCEED FLORIDA CODE REQUIREMENTS FOR THE DESIGN CRITERIA OF THE TOWN.

| CLIMATIC & GEOGRAPHIC DESIGN CRITERIA TABLE R301.2(1) | |
|---|---|
| SPEED (MPH) | 140 |
| TOPOGRAPHIC EFFECTS | B |
| SPECIAL WIND REGION | NO |
| WIND BORNE DEBRIS ZONE | 2 |
| SEISMIC DESIGN CATEGORY | C |
| CLIMATE ZONE | 2A |
| WIND EXPOSURE CATEGORY | B |

FBC, Residential 2017

TABLE R301.2.1.3

WIND SPEED CONVERSIONS[a]

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $V_{ult}$ | 110 | 115 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |
| $V_{asd}$ | 85 | 89 | 93 | 101 | 108 | 116 | 124 | 132 | 139 | 147 | 155 |

For SI: 1 mile per hour = 0.447 m/s.

a. Linear interpolation is permitted.

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**STRUCTURAL ENGINEERING**

LUIS R. PEREZ LICENSE No. 80653 STATE OF FLORIDA PROFESSIONAL ENGINEER

7-19-18

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| REV: | DATE: | DESIGNER: |

COVER PAGE

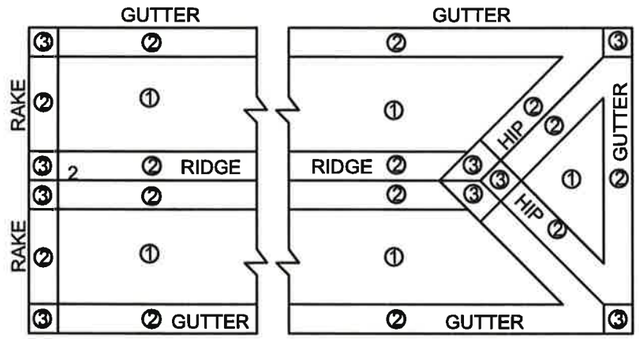
**PV-1**

1. ALL WIND DESIGN CRITERIA ARE FOR GABLE AND HIP RESIDENTIAL ROOFS CONSIDERED FROM AN ANGLE OF MIN. 9.5 ° ( $\frac{2}{12}$) TO MAX. 45° ($\frac{12}{12}$) NOT TO EXCEED 30' MEAN ROOF HEIGHT WITH A MIN $\frac{5}{16}$" LAG BOLT (ASTE A276) STAINLESS STEEL INTO THE RAFTER OR BLOCKING BETWEEN RAFTERS W/ MIN. EMBEDMENT OF 3"
2. THIS STRUCTURAL DESIGN REFLECTS STRUCTURAL CONNECTIONS TO THE EXISTING STRUCTURE ONLY. MODULE TO RACK-IT LOADING AND CERTIFICATION PER MECHANICAL LOAD TESTS IAW/ANSI UL2703 CONDUCTED ON BEHALF OF ECOLIBRIUM SOLAR BY TUV RHEELAND REFERENCE FILE L2-ELS150128a (REV 1)
3. ROOF SEALANTS SHALL CONFORM TO ASTMC920 AND ASTM 6511 AND IS THE RESPONSIBILITY OF THE CONTRACTOR TO FILL ALL HOLES WATER TIGHT.
4. "ROCK-IT" ATTACHMENTS ARE MANUFACTURED BY ECOFASTEN SOLAR ARIZONA. AND SHALL BE INSTALLED IN STRICT COMPLIANCE WITH MANUFACTURERS PRINTED INSTRUCTIONS.

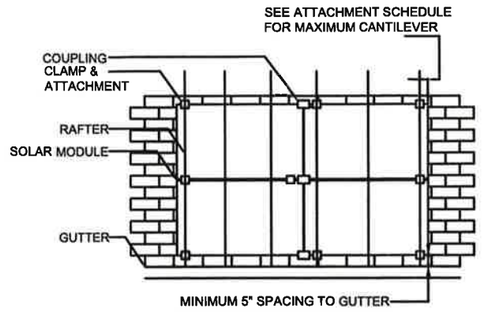
ROCK-IT TO RAFTER ATTACHMENT SPACING SCHEDULE

| ULTIMATE DESIGN WIND SPEED (MPH) | ROOF ZONE 1 MAX. SPAN / MAX. CANTILEVER (INCHES) | ROOF ZONE 2 & 3 MAX. SPAN / MAX. CANTILEVER (INCHES) |
|---|---|---|
| 115 | 48" O.C. / 16" MAX. | 24" O.C. / 12" MAX. |
| 125 | 48" O.C. / 16" MAX. | 24" O.C. / 12" MAX. |
| 130 | 48" O.C. / 16" MAX. | 24" O.C. / 12" MAX. |
| 140 | 40" O.C. / 16" MAX. | 20" O.C. / 10" MAX. |
| 150 | 35" O.C. / 16" MAX. | 18" O.C. / 8" MAX. |
| 160 | 32" O.C. / 12" MAX. | 15" O.C. / 8" MAX. |

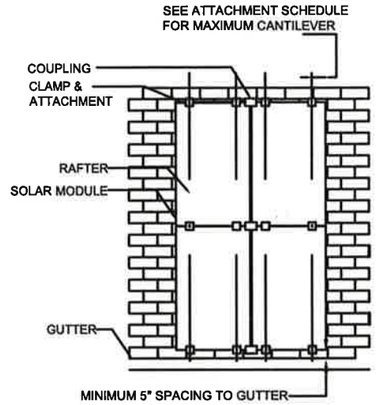
TABLE REFLECTS ATTACHMENT SPACINGS THAT EXCEED MANUFACTURERS SPECIFICATIONS FOR WIND LOADS AS PER ASCE 07-10. RISK CATEGORY II TOPOGRAPHIC EFFECTS B,C, & D AND ROOF WIND ZONES 1,2,& 3. ROOF ZONES 2 & 3 ARE WITHIN 48" OF ANY OUTER EDGE, HIP, RIDGE, OR GUTTER LINE FOR STRUCTURES 30'- 0" OR LESS MEAN ROOF HEIGHT.



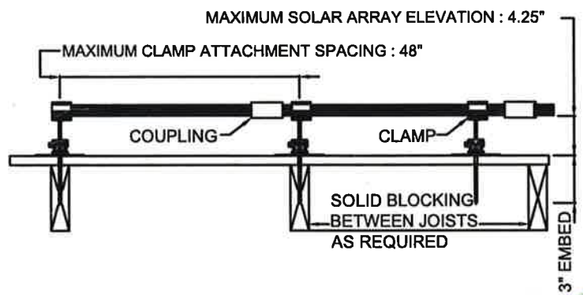

ROOF WIND ZONES AS PER IRC R301.2(7)
ROOF ZONES 2 & 3 ARE 48" FROM OUTER ROOF EDGES, RIDGES, HIPS, RAKES, AND GUTTER EDGES FOR STRUCTURES BELOW 30'-0" MEAN ROOF HT.

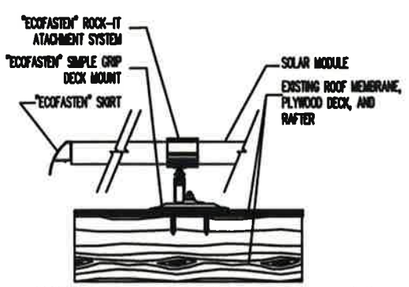



ECOFASTEN SOLAR ROCK-IT 4.0 MOUNTING DETAIL
ECOFASTEN SOLAR ROCK-IT 4.0 RAIL-LESS MOUNTING SYSTEM INTEGRATED WITH FLASHING, COUPLINGS AND ADJUSTABLE CLAMP ATTACHMENTS




ECOFASTEN SOLAR ROCK-IT 4.0 MOUNTING DETAIL
ECOFASTEN SOLAR ROCK-IT 4.0 RAIL-LESS MOUNTING SYSTEM INTEGRATED WITH FLASHING, COUPLINGS AND ADJUSTABLE CLAMP ATTACHMENTS



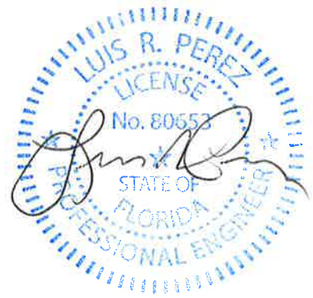

ALL COMPONENTS SHALL BE AS MANUFACTURED BY "ECOFASTEN SOLAR" AND INSTALLED IN STRICT COMPLIANCE WITH MANUFACTURERS PRINTED SPECIFICATIONS.

Reviewed for Code Compliance
Universal Engineering Sciences

momentum SOLAR

PRO CUSTOM SOLAR LLC D.B.A. MOMENTUM SOLAR
325 HIGH STREET, METUCHEN, NJ 08840
(732) 902-6224
MOMENTUMSOLAR.COM

## STRUCTURAL ENGINEERING




## SOLAR CONTRACTOR

CAMERON CHRISTENSEN
CERTIFIED SOLAR CONTRACTOR
LICENSE NUMBER: CVC57036
MOMENTUM SOLAR
5728 MAJOR BLVD. SUITE 307
ORLANDO FL. 32819

## CUSTOMER INFORMATION

AMBER BASSETT
3016 INDIAN DRIVE
ORLANDO, FL, 32812
352-235-4315

## PV SYSTEM INFORMATION

SYSTEM SIZE (DC ): 18.3 KW
60 MODULES: HANWHA Q.PEAK DUO BLK-G5 305
60 INVERTERS: ENPHASE IQ6-60-2-US

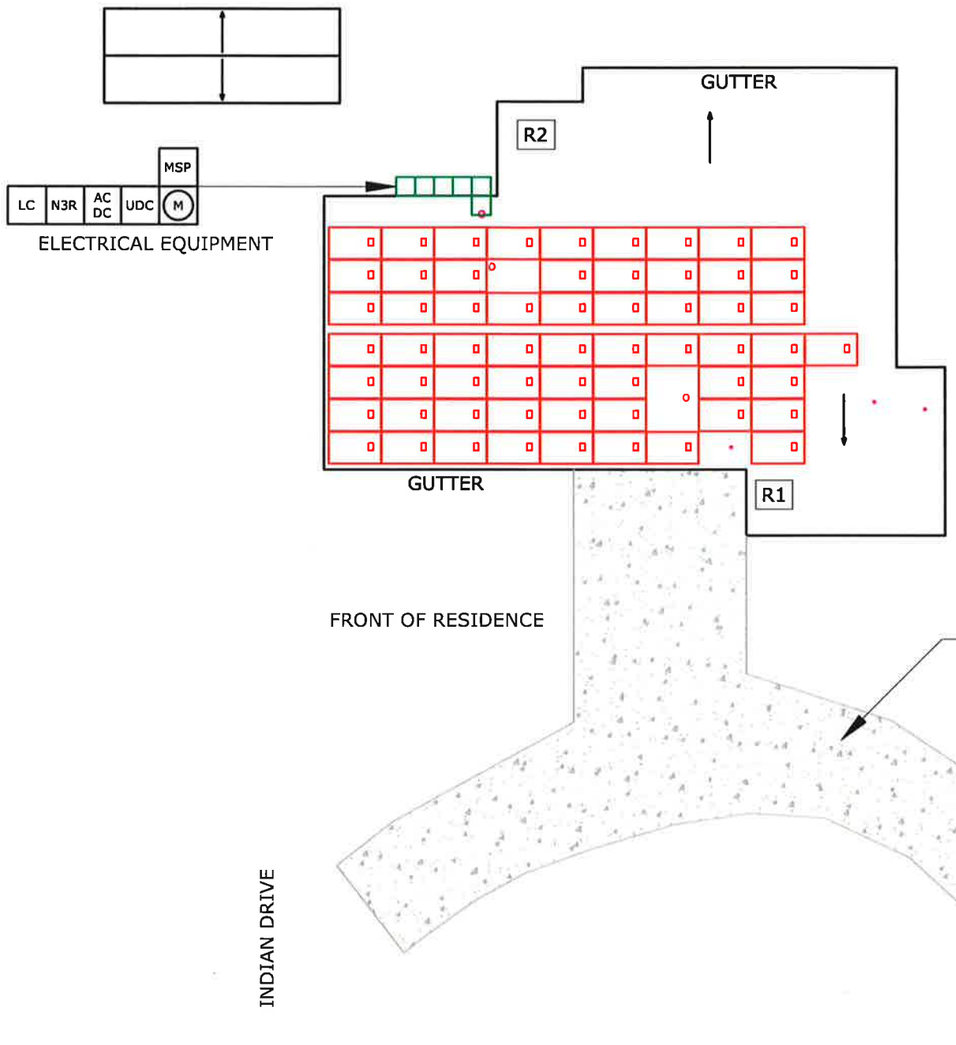
**PROJECT INFORMATION**

| | | |
|---|---|---|
| INITIAL | DATE: 7/10/2018 | DESIGNER: AD |
| REV: | DATE: | DESIGNER: |
| REV: | DATE: | DESIGNER: |

COVER PAGE

**PV-1.1**

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




| ROOF | MODULE COUNT | TILT | AZIMUTH | SHADING |
|---|---|---|---|---|
| R1 | 26 | 8° | 93° | 85% |
| R2 | 34 | 8° | 273° | 87% |
| | | | | |
| | | | | |

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**STRUCTURAL ENGINEERING**

LUIS R. PEREZ LICENSE No. 88653 STATE OF FLORIDA PROFESSIONAL ENGINEER

Reviewed for Code Compliance Universal Engineering Sciences

**SOLAR INSTALLER NOTES:**
**200A SERVICE PANEL UPGRADE REQUIRED**
**200A METER PAN UPGRADE REQUIRED**

**NOTE:**
1. ROOF COVERING MATERIAL IS COMPOSED OF SINGLE LAYER ASPHALT COMPOSITE SHINGLE.
2. REFER TO LAYOUT DETAIL DRAWING PV-3 FOR ALL ROOFTOP DIMENSIONS.

## SYMBOL LEGEND

| | | | |
|---|---|---|---|
| MSP | MAIN SERVICE PANEL | | CHIMNEY |
| SP | SUB-PANEL | | SKYLIGHT |
| M | UTILITY METER | | VENT |
| AC DC | AC DISCONNECT | | PIPE VENT |
| UDC | UTILITY DISCONNECT | | FAN |
| LC | LOAD CENTER | | SATELLITE DISH |
| N3R | NEMA 3R BOX W/ ENVOY-S | | FIRE SETBACKS AS PER 6TH EDITION 2017 FFPC |
| CB | COMBINER BOX | | MIN 3'x3' GROUND ACCESS POINT |
| | MODULE | | PITCH DIRECTION |

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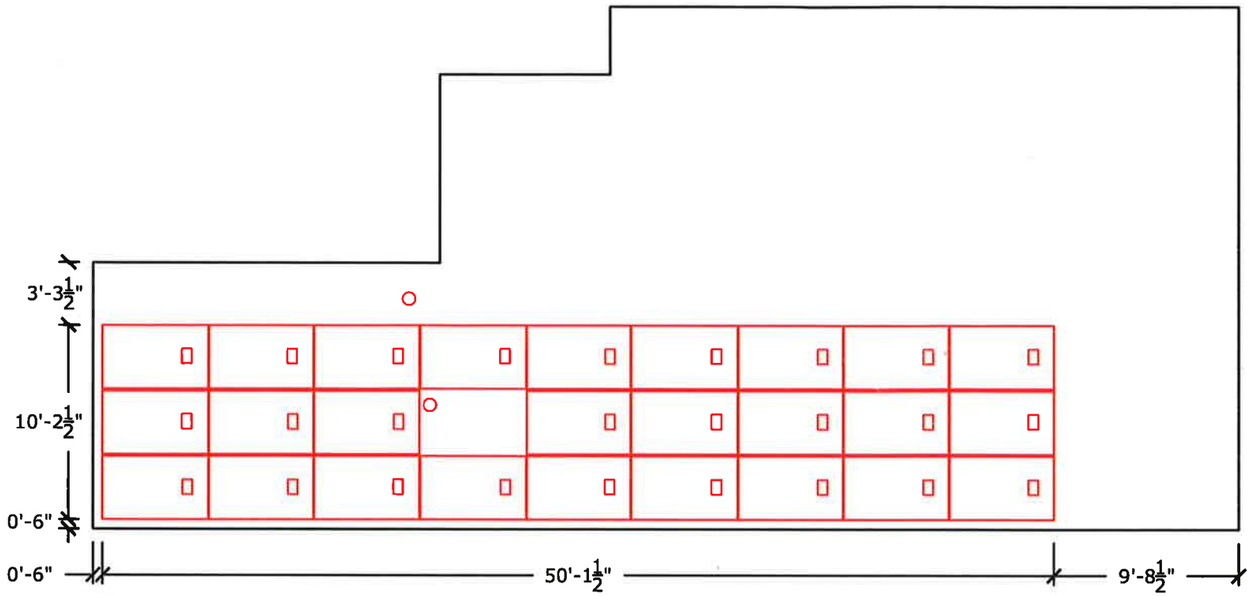
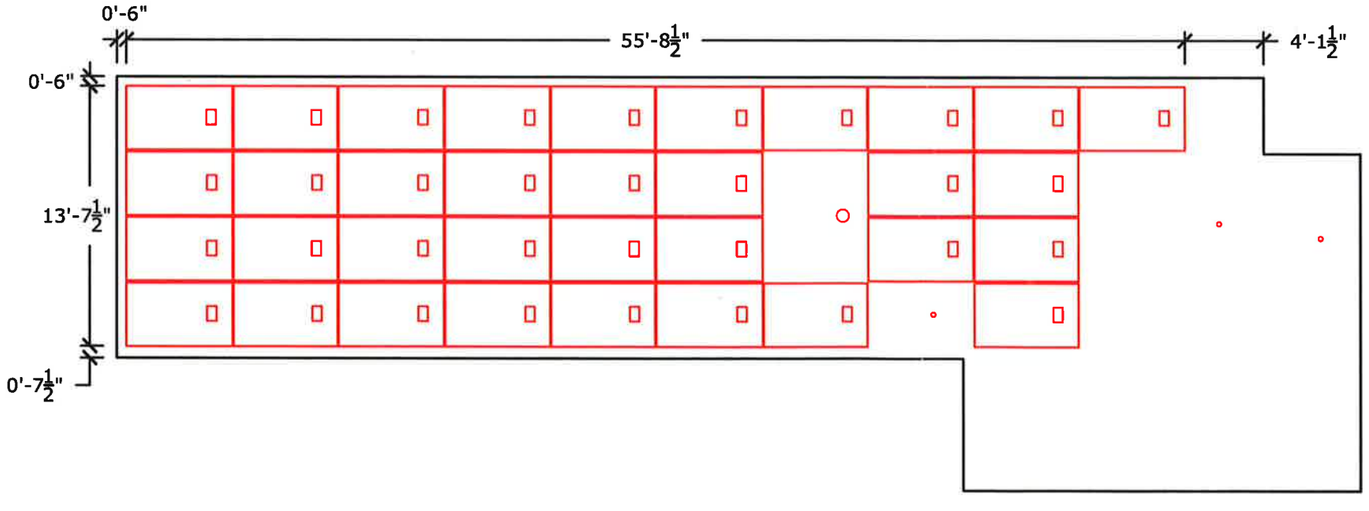
PANEL LAYOUT

**PV-2**

R1 - ARRAY 1 LAYOUT DETAIL
SCALE: 1/8" = 1'-0"
TILT: 8°
AZIMUTH: 93°
SHADING: 85%




R2 - ARRAY 2 LAYOUT DETAIL
SCALE: 1/8" = 1'-0"
TILT: 8°
AZIMUTH: 273°
SHADING: 87%

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LAYOUT DETAIL

**PV-3**