



HISTORIC PRESERVATION COMMISSION

Marc Elrich
County Executive

Sandra I. Heiler
Chairman

Date: November 18, 2019

MEMORANDUM

TO: Hadi Mansouri
Department of Permitting Services

FROM: Dan Bruechert
Historic Preservation Section
Maryland-National Capital Park & Planning Commission

SUBJECT: Historic Area Work Permit #893683: Solar Panel Installation

The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **Approved** at the November 13, 2019 HPC meeting.

The HPC staff has reviewed and stamped the attached construction drawings.

THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: Andrew Parton
Address: 25 Holt Place, Takoma Park

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once work is complete the applicant will contact Dan Bruechert at 301.563.3400 or Dan.bruechert@montgomeryplanning.org to schedule a follow-up site visit.



Critter Guard

APPROVED
 Montgomery County
 Historic Preservation Commission

Sandra L. Heiler

REVIEWED
 By Dan.Bruechert at 2:15 pm, Nov 18, 2019



SolarEnergyWorld
 Because Tomorrow Matters
 Solar Energy World LLC.
 5681 Main Street
 Elkridge, MD 21075
 (888) 497-3233

Disclaimer:
 This drawing is the property of Solar Energy World Inc. The information herein contained shall be used for the sole benefit of Solar Energy World. It shall not be disclosed to others outside the recipient's organization, in whole or in part, without the written permission of Solar Energy World, except in connection with the sale and use of the respective Solar Energy equipment.

Stamp

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 31585, EXPIRATION DATE: JULY 18, 2021.
 *STAMPED AND SIGNED FOR STRUCTURES ONLY

Revisions

REV	DESCRIPTIONS	BY	DATE
01	Made E001, S001 and S002	JMP	9/25/2019
01	REMOVED PANELS FROM FRONT OF HOUSE	TML	4-NOV-19

Project Name and Address

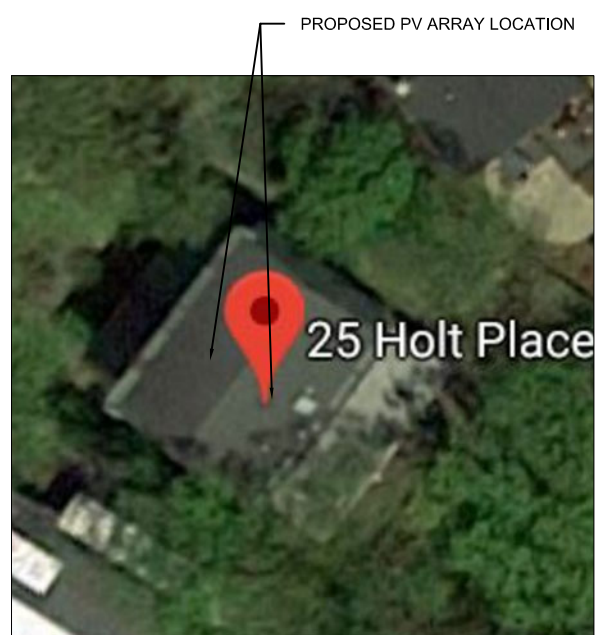
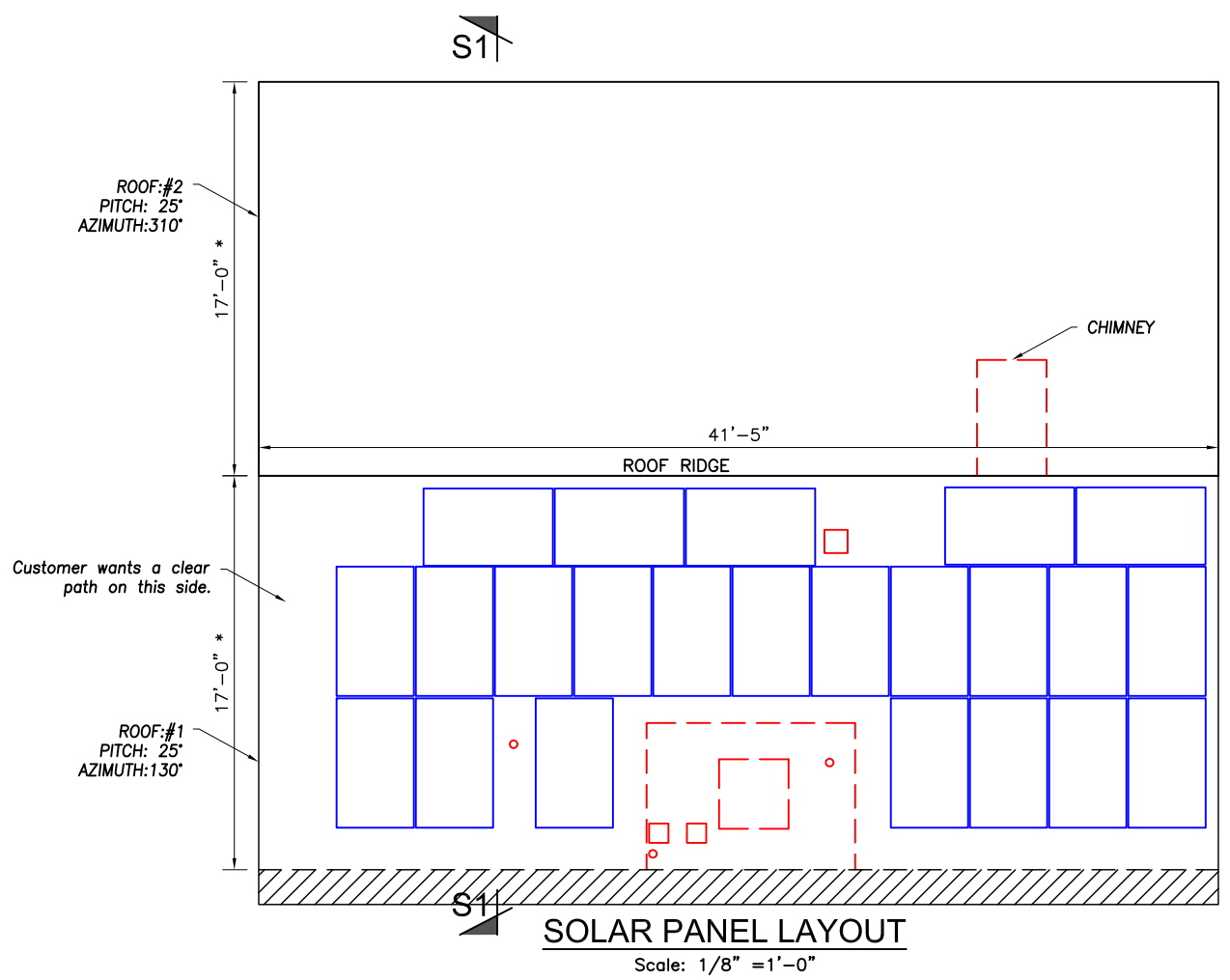
Andrew Partan
 25 Holt Pl,
 Takoma Park, MD 20912
 8.395 kW

Drawn by
 DTK

Date
 25-SEPT-2019

Scale
 AS NOTED

Sheet
A001



- NOTES:**
1. THE SYSTEM SHALL INCLUDE [23] LG ELECTRONICS LG365Q1C-A5 MODULES.
 2. SNAPNRACK SOLAR MOUNT RAIL WILL BE INSTALLED IN ACCORDANCE WITH SNAPNRACK INSTALLATION MANUAL.
 3. DIMENSIONS MARKED (*) ARE ALONG ROOF SLOPE.
 4. REFER STRUCTURAL DRAWING FOR SECTIONS MARKED AND ADDITIONAL NOTES.

LG NeON[®]R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

Mechanical Properties

Cells	6 x 10
Cell Vendor	LG
Cell Type	Monocrystalline / N-type
Cell Dimensions	161.7 x 161.7 mm / 6 inches
Dimensions (L x W x H)	1,700 x 1,016 x 40 mm
	66.93 x 40.0 x 1.57 in
Front Load	5,000Pa / 125 psf
Rear Load	5,400Pa / 113 psf
Weight	18.5 kg / 40.79 lb
Connector Type	MC4 (MC), 05-B (Renhe)
Junction Box	IP68 with 3 Bypass Diodes
Cables	1,000 mm x 2 ea / 39.37 in x 2 ea
Glass	High Transmission Tempered Glass
Frame	Anodized Aluminum

Certifications and Warranty

Certifications	IEC 61215, IEC 61730-1/-2
	UL 1703
	IEC 61701 (Salt mist corrosion test)
	IEC 62716 (Ammonia corrosion test)
	ISO 9001
Module Fire Performance	Type 1 (UL 1703)
Fire Rating	Class C (ULC/ORD C 1703, IEC 61730)
Product Warranty	25 years
Output Warranty of P _{max}	Linear Warranty*

* 1) First 5 years 95%, 2) After 5th year 0.4% annual degradation, 3) 25 years 87.0%

Temperature Characteristics

NOCT*	[°C]	44 ± 3
P _{max}	[%/°C]	-0.300
V _{oc}	[%/°C]	-0.240
I _{sc}	[%/°C]	0.037

Electrical Properties (STC*)

Model		LG365Q1C-A5	LG360Q1C-A5	LG355Q1C-A5	LG350Q1C-A5
Maximum Power (P _{max})	[W]	365	360	355	350
MPP Voltage (V _{mpp})	[V]	36.7	36.5	36.3	36.1
MPP Current (I _{mpp})	[A]	9.95	9.87	9.79	9.70
Open Circuit Voltage (V _{oc})	[V]	42.6	42.7	42.7	42.7
Short Circuit Current (I _{sc})	[A]	10.80	10.79	10.78	10.77
Module Efficiency	[%]	21.1	20.8	20.6	20.3
Operating Temperature	[°C]	-40 ~ +90			
Maximum System Voltage	[V]	1,000 (UL / IEC)			
Maximum Series Fuse Rating	[A]	20			
Power Tolerance	[%]	0 ~ +3			

The nameplate power output is measured and determined by LG Electronics at its sole and absolute discretion.

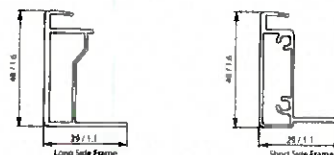
* STC (Standard Test Condition) Irradiance 1000 W/m², Cell Temperature 25 °C, AM 1.5

Electrical Properties (NOCT)

Model		LG365Q1C-A5	LG360Q1C-A5	LG355Q1C-A5	LG350Q1C-A5
Maximum Power (P _{max})	[W]	275	271	267	264
MPP Voltage (V _{mpp})	[V]	36.6	36.4	36.2	36.0
MPP Current (I _{mpp})	[A]	7.51	7.45	7.39	7.32
Open Circuit Voltage (V _{oc})	[V]	40.2	40.2	40.2	40.1
Short Circuit Current (I _{sc})	[A]	8.70	8.69	8.68	8.67

* NOCT (Nominal Operating Cell Temperature) Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

Dimensions (mm / inch)



Characteristics

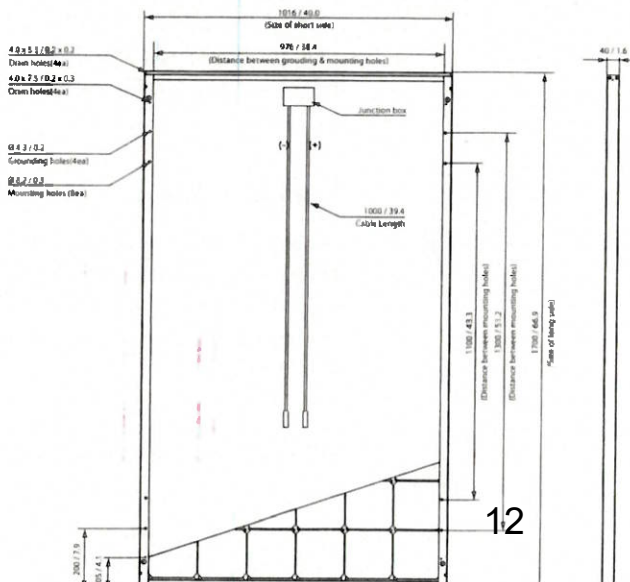
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Historic Preservation Commission



REVIEWED

By Dan.Bruechert at 2:15 pm, Nov 18, 2019

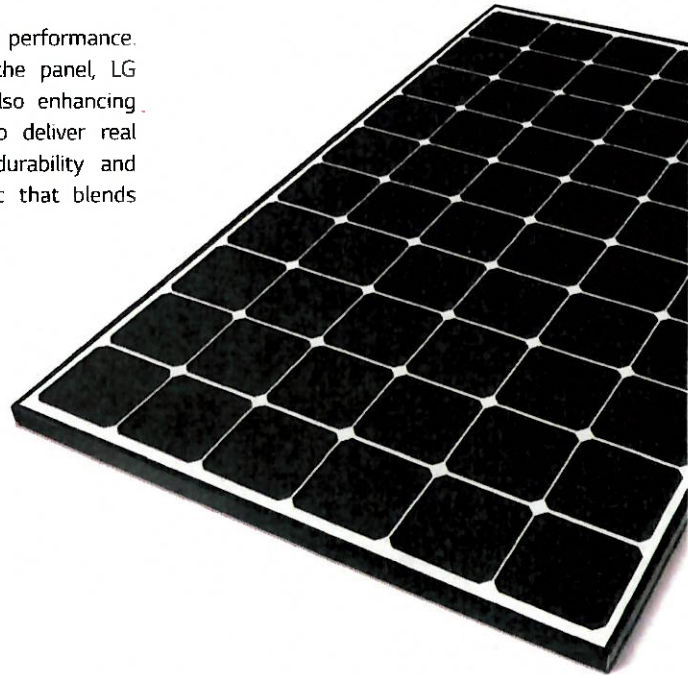


LG NeON[®] R

LG365Q1C-A5 | LG360Q1C-A5 | LG355Q1C-A5 | LG350Q1C-A5

365W | 360W | 355W | 350W

LG NeON[®] R is powerful new solar product with world-class performance. Employing a new electrode-free cell structure on the front of the panel, LG NeON[®] R maximizes the utilization of the available light while also enhancing reliability. LG NeON[®] R demonstrates LG's ongoing dedication to deliver real value: It combines an industry-leading warranty with superior durability and performance under real-world conditions, plus a modern aesthetic that blends seamlessly with virtually any roof.



Features



25-Year Warranty

LG offers the longest warranty in the industry, covering the NeON[®] R for 25 years. At that time, the panel is guaranteed to deliver at least 87% of its original performance.



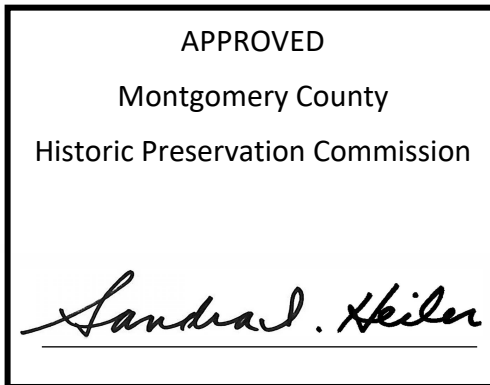
Roof-Friendly Design

LG NeON[®] R has been designed with curb appeal in mind. By removing the electrodes from the visible side, LG has created a cleaner look that won't detract from the beauty of your home.



Better Performance on Sunny Days

The panel now offers an improved temperature coefficient, so it works more efficiently than before even on hot, sunny days.



REVIEWED

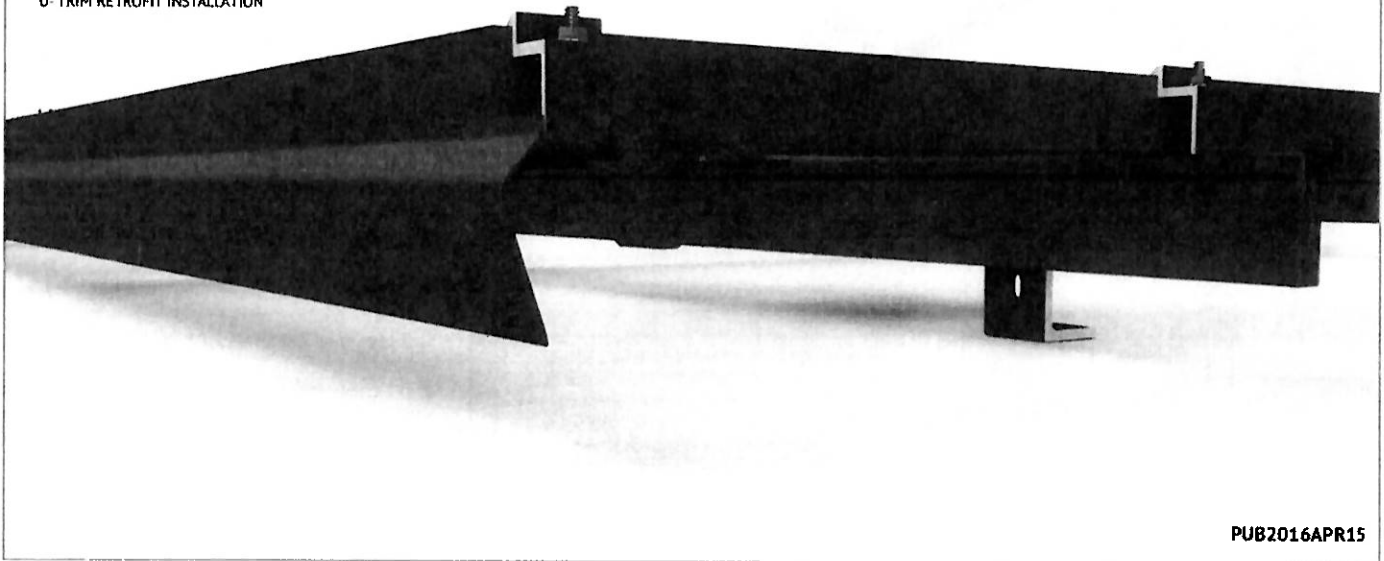
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enhanced power
R assures exceptional
impact installations
lea

forced frame, LG NeON[®] R
sive front load of up to
5,400 Pa

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- M - BONDING CONNECTION GROUND PATHS
- N - BONDING CONNECTION GROUND PATHS - MAINTENANCE
- O - TRIM RETROFIT INSTALLATION



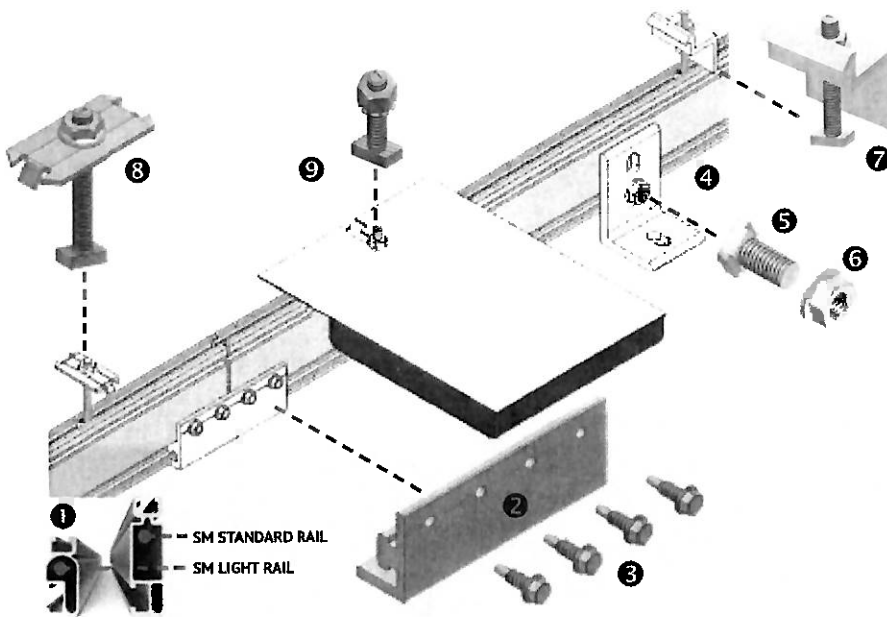
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➊ **RAIL:** Supports PV modules. Use at least two per row of modules. Aluminum extrusion, available in mill, clear anodized, or dark anodized.

➋ **RAIL SPLICE:** Non structural splice joins, aligns, and electrically bonds rail sections into single length of rail. Forms either a rigid or thermal expansion joint, 4 inches long, pre-drilled (see page F). Anodized aluminum extrusion available in clear or dark.

➌ **SELF-DRILLING SCREW:** (No. 12 x 3/8") - Use 4 per rigid splice or 2 per expansion joint. Stainless steel. Supplied with splice. In combination with rigid splice, provides rail to rail bond.

➍ **L-FOOT:** Use to secure rails through roofing material to building structure. Refer to loading tables or U-Builder for spacing.

➎ **L-FOOT T-BOLT:** (3/8" x 3/4") - Use one per L-foot to secure rail to L-foot. Stainless steel. Supplied with L-foot. In combination with flange nut, provides electrical bond between rail and L-foot.

➏ **SERRATED FLANGE NUT (3/8"):** Use one per L-foot to secure and bond rail to L-foot. Stainless steel. Supplied with L-foot.

➐ **MODULE ENDCLAMP:** Provides bond from rail to endclamp. Pre-assembled aluminum clamp available in clear or dark finish. Supplied washer keeps clamp and bolt upright for ease of assembly.

➑ **MODULE MIDCLAMP:** Pre-assembled clamp provides module to module and module to rail bond. Stainless steel clamp and T-bolt. Available in clear or dark finish.

➒ **MICROINVERTER MOUNTING BOLT:** Pre-assembled bolt and nut attaches and bonds microinverter to rail. Washer at base keeps bolt upright for ease of assembly.

NOTE - POSITION INDICATOR: T-bolts have a slot in the hardware end corresponding to the direction of the T-Head.

Wrenches and Torque

	Wrench Size	Recommended Torque (ft-lbs)
1/4" Hardware ●●●	7/16"	*10
3/8" Hardware ●	9/16"	*30
#12 Hardware ●	5/16"	10

Torques are not designed for use with wood connectors
*w/Anti-Seize

Anti-Seize*

Stainless steel hardware can seize up, a process called galling. To significantly reduce its likelihood

1. Apply minimal lubricant to bolts, preferably Anti-Seize commonly found at auto parts stores
2. Shade hardware prior to installation, and
3. Avoid spinning stainless nuts onto bolts at high speed

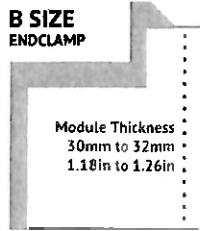
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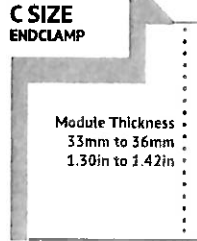
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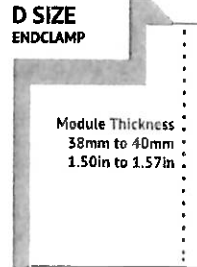
**B SIZE
ENDCLAMP**



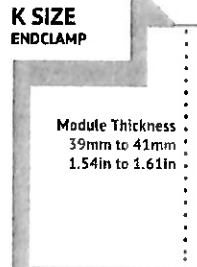
**C SIZE
ENDCLAMP**



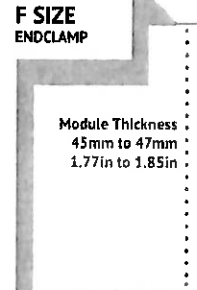
**D SIZE
ENDCLAMP**



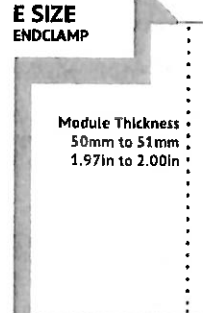
**K SIZE
ENDCLAMP**



**F SIZE
ENDCLAMP**



**E SIZE
ENDCLAMP**



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PLANNING YOUR SOLARMOUNT INSTALLATIONS

The installation can be laid out with rails parallel to the rafters or perpendicular to the rafters. Note that SOLARMOUNT rails make excellent straight edges for doing layouts.

Center the installation area over the structural members as much as possible.

Leave enough room to safely move around the array during installation. Some building codes and fire codes require minimum clearances around such installations, and the installer should check local building code requirements for compliance.

The length of the installation area is equal to:

- the total width of the modules,
- plus ¼" inch for each space between modules (for mid-clamp),
- plus approximately 3 inches (1½ inches for each Endclamp)

LAYING OUT L-FEET FOR TOP CLAMPS

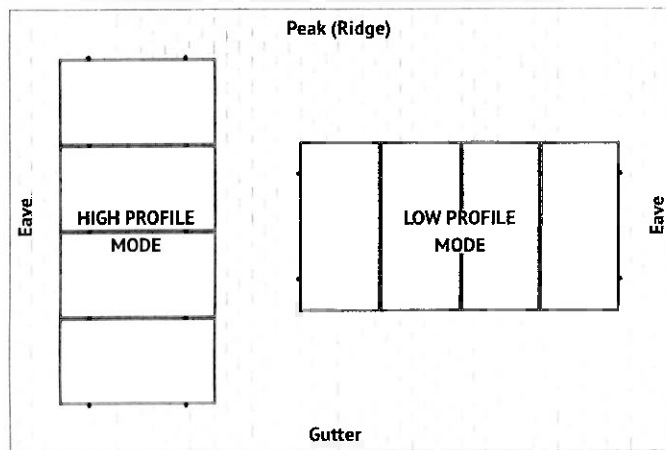
L-feet, in conjunction with proper flashing equipment and techniques, can be used for attachment through existing roofing material, such as asphalt shingles, sheathing or sheet metal to the building structure.

Locate and mark the position of the L-foot lag screw holes within the installation area as shown below. Follow manufacturer module guide for rail spacing based on appropriate mounting locations.

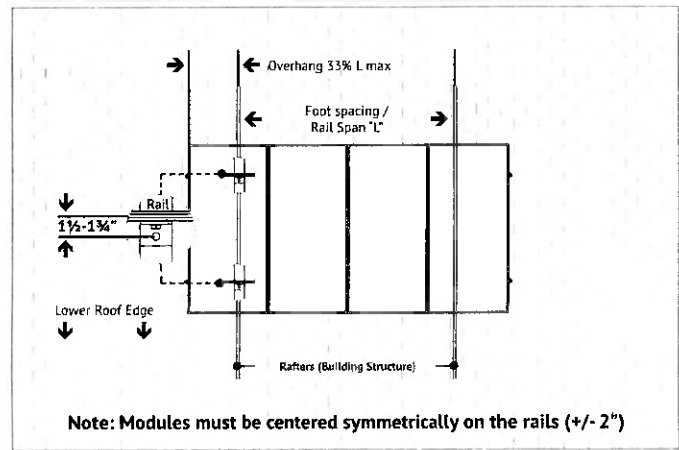
If multiple rows are to be installed adjacent to one another, it is not likely that each row will be centered above the rafters. Adjust as needed, following the guidelines below as closely as possible.

Refer to Unirac Solarmount D&E Guide & U-Builder for allowable spans and cantilevers.

RAILS MAY BE PLACED PARALLEL OR PERPENDICULAR TO RAFTERS



LAYOUT WITH RAILS PERPENDICULAR TO RAFTERS (RECOMMENDED)



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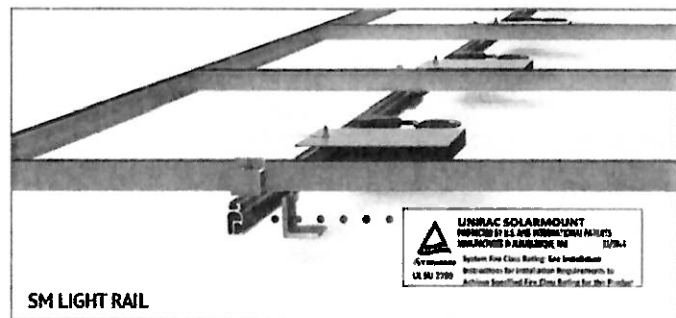
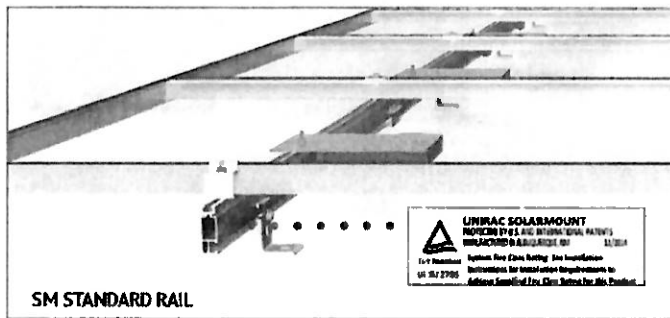
SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the SOLARMOUNT Installation Guide. SOLARMOUNT has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into our UL 2703 product certification. SOLARMOUNT has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the SOLARMOUNT design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes \geq 2 inches per foot, or 9.5 degrees). There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for SOLARMOUNT. Module Types & System Level Fire Ratings are listed below:

Rail Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation	Mitigation Required
Standard Rail	Type 1, Type 2, Type 3 & Type 10	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required
Light Rail	Type 1 & Type 2	Class A, Class B & Class C	East-West	Landscape OR Portrait	None Required
			North-South	Landscape OR Portrait	None Required


UL2703 CERTIFICATION MARKING LABEL

Unirac SOLARMOUNT is listed to UL 2703. Marking Labels are shipped with the Midclamps. After the racking system is fully assembled, a single Marking Label should be applied to the SOLARMOUNT rail at the edge of the array. Note: The sticker label should be placed such that it is visible, but not outward facing.



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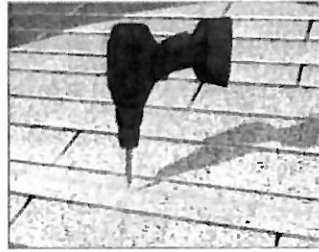


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ROOF PREPARATION: Layout and install flashing at rafter locations determined per Design and Engineering Guide.



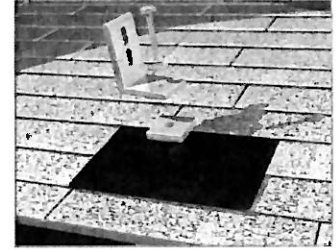
DRILL PILOT HOLES: Center the roof attachment over the rafter and drill a pilot hole(s) for the lag bolt(s).

NOTE: Determine lag bolt size and embedment depth.

Quick Tip: Pre-drill the pilot hole through the flat flashing lag bolt location for easier installation.

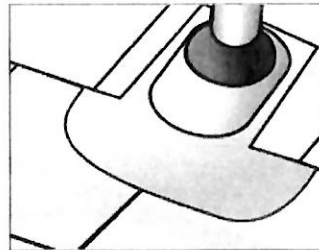


FLAT FLASHING INSTALLATION: Insert the Flat Flashing so the top part is under the next row of shingles and the hole lines up with the pilot hole.



INSTALL LAG BOLTS & L-FOOT: Insert the lag bolt through the L-Foot in the order shown in the illustration. Verify proper orientation before tightening lag bolts.

See Unirac Flat Flashing Manual for Additional Details.



2 PIECE ALUMINUM STANDOFF WITH FLASHING & L-FOOT:

- If necessary cut an opening in the roofing material over a rafter to accommodate the flashing riser.
- Install the standoff, ensuring that both lag bolts are screwed into the rafter.
- Insert the flashing under the shingle above and over the shaft of the standoff. (No-Calk™ collar does not require sealing of the flashing and standoff shaft)
- Add L-Foot to top with bolt that secures the EPDM washer to the top of the standoff.

See Standoffs & Flashings Installation Manual 907 2 for Additional Details.



TOP MOUNT TILE HOOK & L-FOOT:

- Remove or slide up the roof tile, position the roof hook above the roof rafter
- Place Tile Hook in the middle of the underlying interlocking tile's valley. Drill 3/16 inch pilot holes through the underlayment into the center of the rafters. Securely fasten each tile hook to the rafters with two 5/16" x 3 1/2" lag screws. Slide down or re-insert the tile.
- Attach L Foot to tile roof hook.

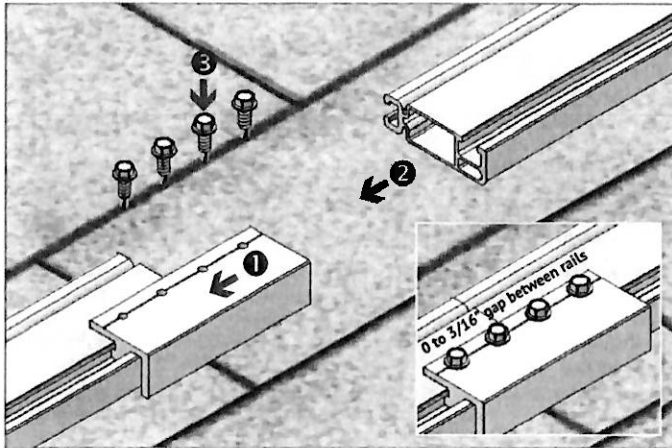
See Tile Hook Universal Mount Installation Manual for Additional Information.

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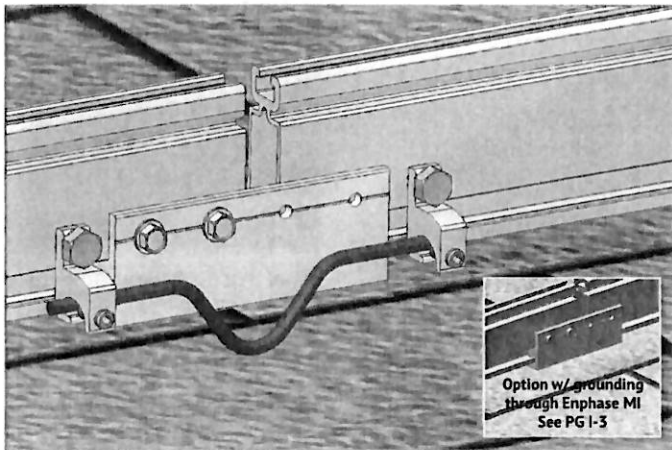


SPLICE INSTALLATION (IF REQUIRED PER SYSTEM DESIGN)

If your installation uses SOLARMOUNT splice bars, attach the rails together before mounting to the L-feet / footings. Use splice bars only with flush installations or those that use low-profile tilt legs. A rail should always be supported by more than one footing on both sides of the splice. There should be a gap between rails, up to 3/16" at the splice connections. T-bolts should not be placed less than a distance of 1" from the end of the rail regardless of a splice.

TORQUE VALUE (See Note on PG. A)

Hex head socket size 5/16" - Do not exceed 10 ft.-lbs. Do not use Anti-Seize.
Max length of spliced rail is 40 ft. An expansion joint is required > 40 ft.



EXPANSION JOINT USED AS THERMAL BREAK

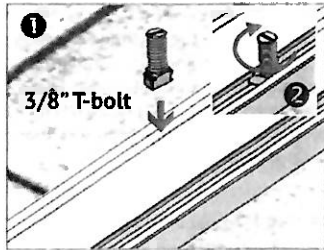
Expansion joints prevent buckling of rails due to thermal expansion. Splice bars may be used for thermal expansion joints. To create a thermal expansion joint, slide the splice bar into the footing slots of both rail lengths. Leave approximately 1/2" between the rail segments. Secure the splice bar with two screws on one side only. Footings (such as L-feet or standoffs) should be secured normally on both sides of the splice. No PV module or mounting hardware component should straddle the expansion joint. Modules must clearly end before the joint with mounting hardware (top mount Endclamps) terminating on that rail. T-bolts should not be placed less than a distance of 1" from the end of the rail regardless of a splice. The next set of modules would then start after the splice with mounting hardware beginning on the next rail. **A thermal break is required every 40 feet of continuously connected rail. For additional concerns on thermal breaks in your specific project, please consult a licensed structural engineer. Runs of rail less than 40 feet in length, with more than two pairs spliced together, are an acceptable installation for the SOLARMOUNT systems.**

Bonding connection for splice used as a thermal break. Option shown uses two IlSCO lugs (Model No. GBL-4DBT P/N GBL-4DBT - see product data sheet for more details) and solid copper wire.

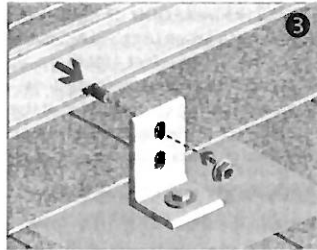
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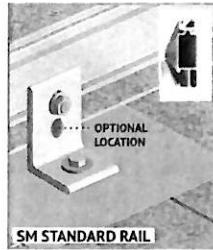
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1
PLACE T-BOLT INTO RAIL & SECURE BOLT: Insert 3/8" T-bolt into rail at L-foot locations. Apply Anti-Seize to bolt. Rotate T-bolt into position.



2
SECURE T-BOLT: Apply Anti-Seize to bolt. Rotate T-bolt into position.

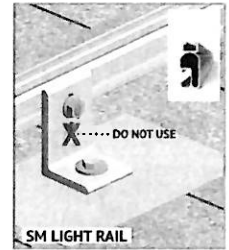


SM STANDARD RAIL: Use either slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Standard rail.



SM LIGHT RAIL: For a lower profile array when using SM Light rail, rotate the L-foot to orient the side with only one (1) slot against the rail. Only use the slot location closest to the rail to connect the lag bolt to the flashing / roof on the side with two (2) slots.

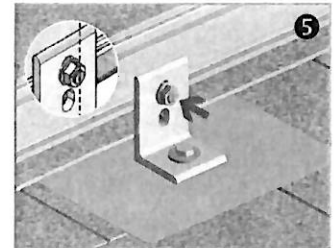
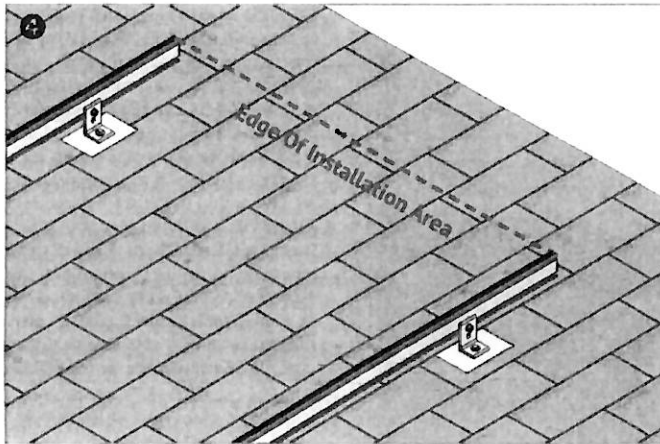
NOTE: Use only the top slot to connect the L-foot to the rail to obtain the desired height and alignment when using SM Light rail.



ALIGN RAILS: Align one pair of rail ends to the edge of the installation area. The opposite pair of rail ends will overhang installation area. Do not Trim them off until the installation is complete. If the rails are perpendicular to the rafters, either end of the rails can be aligned, but the first module must be installed at the aligned end.

If the rails are parallel to the rafters, the aligned end of the rails must face the lower edge of the roof. Securely tighten all hardware after alignment is complete.

Mount modules to the rails as soon as possible. Large temperature changes may bow the rails within a few hours if module placement is delayed.



ALIGN POSITION INDICATOR: Hand tighten nut until rail alignment is complete. Verify that position indicator on bolt is vertical (perpendicular to rail)

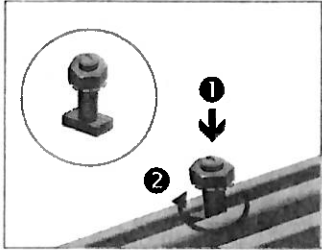
TORQUE VALUE (See Note on PG. A)
 3/8" nut to 30 ft-lbs

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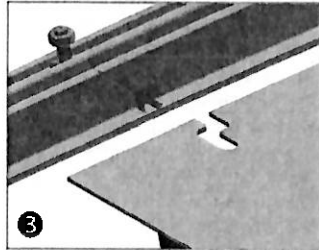
Sandra L. Heiler

REVIEWED

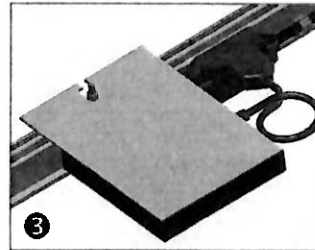
By Dan.Bruechert at 2:16 pm, Nov 18, 2019



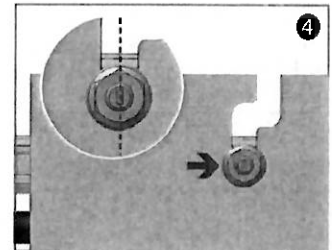
INSTALL MICROINVERTER MOUNT T-BOLT: Apply Anti-Seize and install pre-assembled 1/4" dia. bonding T-bolts into top 1/4" rail slot at microinverter locations. Rotate bolts into position.



INSTALL MICROINVERTER: Install microinverter on to rail. Engage with bolt.



INSTALL MICROINVERTER:
TORQUE VALUE (See Note on PG. A)
1/4" nut to 10 ft-lbs w/Anti-Seize



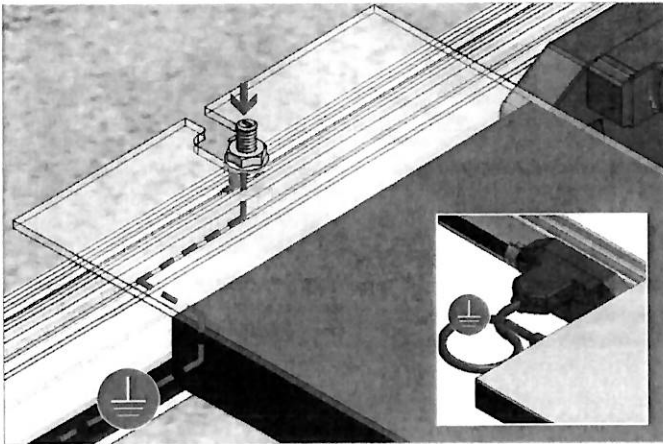
ALIGN POSITION INDICATOR: Verify that position indicator on bolt is perpendicular to rail.

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SM EQUIPMENT GROUNDING THROUGH ENPHASE MICROINVERTERS

The Enphase M215 and M250 microinverters have integrated grounding capabilities built in. In this case, the DC circuit is isolated from the AC circuit, and the AC equipment grounding conductor (EGC) is built into the Enphase Engage integrated grounding (IG) cabling.

In order to ground the SOLARMOUNT racking system through the Enphase microinverter and Engage cable assembly, there must be a minimum of three PV modules connected to the same trunk cable within a continuous row. Continuous row is defined as a grouping of modules installed and bonded per the requirements of this installation guide sharing the same two rails. The microinverters are bonded to the SOLARMOUNT rail via the mounting hardware. Complete equipment grounding is achieved through the Enphase Engage cabling with integrated grounding (IG). No additional EGC grounding cables are required, as all fault current is carried to ground through the Engage cable.

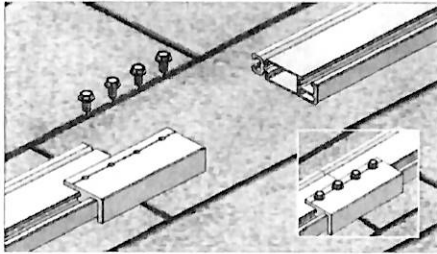
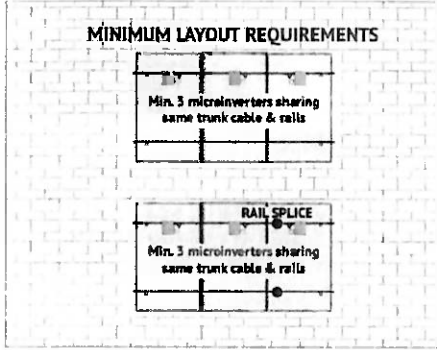
SOLARMOUNT INTEGRATED BONDING ADVANTAGE
WITH SYSTEM GROUNDING THROUGH ENPHASE MICROINVERTERS
LOSE ALL THE COPPER & LUGS

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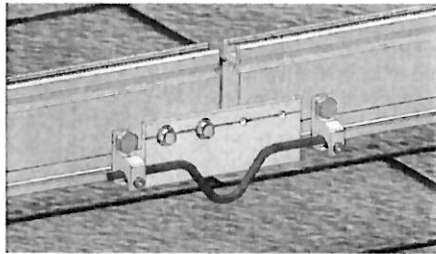
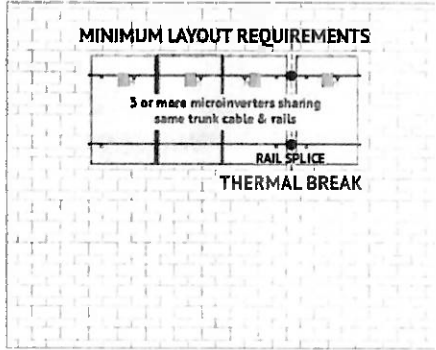
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 By Dan.Bruechert at 2:16 pm, Nov 18, 2019

CONTINUOUS RAIL & ELECTRICAL BONDING SPLICE
Enphase Microinverter (MI) Requirements
 (Model No. M215 & M250)
 3 Microinverters sharing same trunk cable & rails



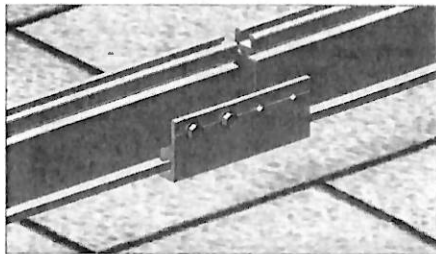
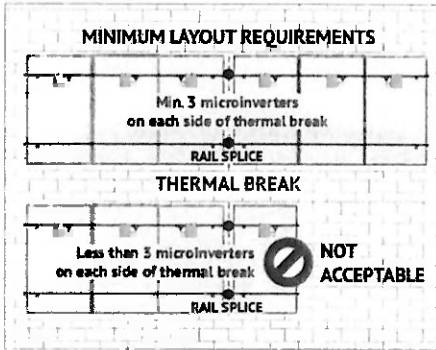
ELECTRICAL BONDING SPLICE

EXPANSION JOINT W/GROUNDING LUGS & COPPER JUMPER
Enphase Microinverter (MI) Requirements
 (Model No. M215 & M250)
 3 or more Microinverters sharing same trunk cable & rails



**EXPANSION JOINT USED AS THERMAL BREAK W/
GROUNDING LUGS & COPPER JUMPER**

EXPANSION JOINT W/O ELECTRICAL BONDING CONNECTION
Enphase Microinverter (MI) Requirements
 (Model No. M215 & M250)
 Min. 3 Microinverters on each side of thermal break



**EXPANSION JOINT USED AS THERMAL BREAK W/O
ELECTRICAL BONDING CONNECTION**

NOTE: THE ABOVE IMAGES ARE SAMPLE CONFIGURATIONS TO ILLUSTRATE THE REQUIREMENTS FOR SM SYSTEM GROUNDING THROUGH ENPHASE MICROINVERTERS DESCRIBED ON PAGE I-2

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