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PV Inverter Installation and Pre-Commissioning Practices For Solar Mounts & Solar Construction LLC Solar Carports and Shade Structures (Ground Mounted)

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To Whom it May Concern:

Background:

Solar Mounts LLC (“SM”) is a solar carport and metal shade structure design and fabrication company with installation and post-install repair services provided by our affiliated company, Solar Construction LLC.

Solar Mounts LLC designs, fabricates and builds solar carports with PV modules as the main shading element of the design. PV modules are mounted on the metallic structure per UL 2703 (the Safety Standard for Flat Plate PV mounting structures, PV clamping devices, ground lugs, etc.) and in accordance with ANSI/NFPA 70®, National Electrical Code (NEC®)

Although Solar Construction LLC (“SC”) installs the PV modules on the SM solar carports, Solar Mounts and Solar Construction do not do any electrical work. PV module interconnect wires are secured at the back of each PV module. After the metal support structure is erect and the PV modules are mounted on the structure, 3rd party solar electric equipment installation teams connect PV modules to module level electronics and/or to output conductors that can be routed to a PV grid-tie or hybrid inverter.

Inverter Installation

The inverter is commonly mounted to the SM solar carport vertical post. And the inverter(s) are commonly mounted near the top of the post, just under the PV modules and/or the structure under-decking (see Figure 1). This position keeps the high-voltage inverter away from persons / vehicles under the solar car port. Electrical technicians may notice in Figure 1 that inverter output conductors can be routed and protected within the cavity of the I-beam post. This method can improve aesthetics and result in a very clean look.



Figure 1. PV Grid Tie Inverter mounted near the top of the Solar Carport Post

Alternatively, the inverter can be mounted mid-way up the solar carport post (see Figure 2). There are a few advantages to locating the inverter some distance down and away from the very hot PV modules (e.g., 160 F). The inverter may operate at lower operating temperatures (check inverter manufacturer recommendations for clearances around the inverter). And the inverter is easier to service. A position midway up the post may allow maintenance technicians to view the inverter display and service the inverter from a ladder. This position may encourage more frequent visits to the inverters as there is no need to pay for the use of an expensive scissor lift.



Figure 2. Inverter mounted away from the PV modules

The greatest disadvantage to this position is the increased likelihood that the inverter could be accidentally contacted by a vehicle or person under the solar carport, resulting in inverter damage and/or exposure to electrical circuits.

Solar Mounts discourages solar electrical contractors from fencing in or isolating the inverter inside a protective cage, wherever the inverter is positioned on the post. An exception to this rule would be large, 3-phase commercial inverters, typically mounted on the ground (or on a short platform under the carport or adjacent to the carport) and protected from contact by vehicles or people behind secure fencing. These high voltage inverters are only accessible by authorized persons.

Finally, solar contractors may locate the inverter higher on the post to reduce accidental contact by unauthorized persons but could locate dc combiner boxes or an inverter isolation switch at a lower position on the post to support safety and encourage routine maintenance (see Figure 3).



Figure 3. DC / AC Electrical Work Boxes Accessible by Authorized Persons

Inverter Clamping on Solar Mount Metal Structure Posts

Although Solar Mounts designs a small minority of their systems with C-Posts, most SM Carports and metal structures utilize I-Beams. Solar contractors can mount the inverter to the SM I-beams using standard galvanized (or stainless) hardware and Unistrut (or equivalent).



Unistrut is a weldless metal framing system that is easy to install, adjust and reuse, featuring unique channels, fittings, fasteners and accessories.

When using a framing system like Unistrut, the solar contractor is encouraged to position the inverter for maximum cooling by ensuring that the heat sink on the back of the inverter is free of obstructions both under and over the inverter (creating a chimney effect to help cool the inverter). PV output circuits can be routed along SM Z-purlins and brought to the inverter from above. Inverter output circuits can be protected inside the conduit that is positioned to either side of the inverter (see Figure 4), or under the inverter and inside the cavity of the I-beam (see Figures 1 & 2).



Figure 4: Unistrut supporting Inverters and Input / Output Conductors Outside the I-Beam

Inverter Grounding on Solar Mount Metal Structure Posts

SM carport structures are UL 2703 certified and are grounded from the PV module frames to the SM clamping / bonding PV clamps, to the SM purlins, struts and through the posts to the single premises ground. Solar contractors can ground the inverter enclosure via the UL 2703 ground path utilizing the inverter ground point, the Unistrut metallic fastening components and the SM carport post itself.



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