

## RESIDENTIAL ROOFTOP SOLAR ELECTRICAL ONE-LINE DIAGRAM REQUIREMENTS

*The electrical one-line diagram must be used to accurately represent the electrical components of the solar PV system and shall include:*

- The correct conductor sizing based on the ambient temperature, number of conductors, and distance of conduit off the roof.
- The correct “Output circuit” conductors sizing from the combiner to the inverter based on the number of strings multiplied by the “Max amps.”
- Where a combiner box is installed, or where more than two strings of modules are electrically connected together in “parallel,” each individual string shall be protected by its own overcurrent protection device or feeders are for the sum of the short circuit current of all strings. The fuse or breaker shall be listed as being suitable for use in a DC circuit and shall meet or exceed the maximum voltage of the circuit. The rating of the fuse or circuit breaker shall not be larger than the maximum size specified on the lowest rated module in the string.
- Per NEC Section 690.31(E), metallic raceway and enclosures must be used where DC wiring is installed inside of the house.
- Grounding on the DC side of the inverter requires a minimum #8 copper grounding electrode conductor run unspliced from the factory identified system grounding terminal of the inverter to the grounding electrode system of the house.
- The inverter shall be listed and labeled by a recognized electrical testing laboratory and be identified as “Utility interactive.”
- Inverter ground fault protection (GFP) shall comply with NEC 690.5.
- A performance meter and a safety disconnect switch may be required to be installed between the PV power source and the electrical utility equipment. Contact the local serving utility for requirements. Where a performance meter is required by the local utility to record the power produced by the PV system, the output wiring from the inverter shall always connect to the “LINE” side terminals of the meter.
- Where disconnect switches (with or without fuses) are installed in the circuit from the inverter output terminals to the house electrical panel, the wiring originating at the inverter(s) shall always connect to the “LOAD” side terminals of ANY disconnect that has been installed.
- The connection to the service panel shall be through a dedicated circuit breaker that connects to the panel bus bars in an approved manner.
- “Load Side Taps” where the inverter AC wiring does not terminate using a dedicated breaker or set of fuses are prohibited under ANY condition by NEC 690.64(B).
- The location of the PV backfed breaker must be identified per 690.64(B)(7) with the following verbiage:  
**“WARNING INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THE OVERCURRENT DEVICE.”**
- Where it is not possible to locate the PV breakers at opposite ends of the panel bus, the sum of the two PV breakers is not permitted to exceed 100% of the bus rating per NEC 690.64(B)(7)
- Per NEC 690.53, a permanent label for the DC power source shall be installed at the PV DC disconnecting means. This label shall show the following:
  - Rated maximum power-point current.
  - Rated maximum power-point voltage.
  - Maximum system voltage.
  - Short circuit current of the PV system.