Grid-tied PV System Grounding Electrode Conductor Requirements

A grounding electrode conductor is required per NEC 690.47 from the inverter to the existing building grounding electrode conductor.

NEC 690.47(C)(3) allows for a single conductor to serve as both equipment ground as well as the bond between AC and DC systems for inverters with a DC ground fault protection system. What this means is that you can use one conductor to meet both the requirements of 690.45 for equipment grounding, as well as 690.47, but this conductor must be sized in accordance with the requirements of 690.47(C)(7) to satisfy the grounding electrode conductor requirement.

NEC 690.47(C)(7) requires that this conductor be sized to meet 250.66 for the AC side as well as 250.166 for the DC side. Both sections indicate that the smallest allowable grounding electrode conductor is #8 AWG copper. The grounding electrode conductor must also be installed according to NEC 250.64. For systems physically separate from the building, such as a pole or ground mounted array, a separate ground rod (bonded to existing grounding electrode conductor) is also required. The use of an additional ground rod is also recommended for installations where chances of lightning strike are high.

Therefore #8 AWG copper or #6 AWG aluminum are the smallest size conductors that you can use to properly bond a PV inverter with GFDI circuitry to the facility grounding electrode conductor system. This is true for all grid connected PV systems.

PV System Equipment Ground

NEC 690.45(A) requires that equipment grounding conductors for PV source and output circuits be sized in accordance with NEC table 250.122, which allows for a smaller gauge ground wire, such as a # 10 or #12 AWG, to be used in this portion of the PV system. This equipment-grounding requirement is **only** for equipment near the PV source (module string) and PV output circuits (DC combiner to inverter). However, for purposes of mitigating damage from potential lighting strikes or other electrical shortages, BEF recommends the use of #8AWG or larger wire for this purpose as well. The ground wire must be properly bonded to PV modules and racking.

For further information please consult your NEC codebook. Also see:
Home Power Magazine, Issue 102 - Jon Wiles “Code Corner – PV Grounding”

Home Power Magazine, Issue 103 - Jon Wiles “Code Corner – PV Grounding Continued”