

Memorandum

Date:	August 25, 2015
To:	Municipal Building Officials
From:	Joseph V. Cassidy, P.E., Acting State Building Inspector
Subject:	Solar Photovoltaic (PV) Systems

The purpose of this memorandum is to clarify frequently asked questions regarding the installation of solar photovoltaic systems within the State of Connecticut.

The following questions and answers are to clarify the installations of Solar Photovoltaic (PV) Systems within the State of Connecticut.

1. Question: Which article do I use when installing a PV System?

Answer: The general rules of Chapters 1 thru 4 apply per 90.3. Also, Article 690 and Article 705 apply.

In addition to the general installation requirements that must be used for the wiring of a PV system, the requirements of Article 690 cover the use of stand-alone and utility-interactive PV systems. Utility-interactive photovoltaic systems are also subject to the requirements for interconnected electric power production sources contained in Article 705. Section 690.3 Other Articles states: "Wherever the requirements of other articles of this Code and Article 690 differ, the requirements of Article 690 shall apply". However, if the system is operated in parallel with a primary source(s) of electricity, the requirements in Article 705 apply.

2. Question: When doing a line side tap off the service conductors within a main disconnect panel and providing a separate disconnecting means for the PV System, does the disconnecting means have to be "Suitable for Service Disconnecting Means"?

Answer: These conductors are considered "connections" ahead of the service and are not to be considered as "tap conductors" in reference to the NEC. In addition the location requirements for a "connection" ahead of the service disconnect would have to meet the requirements of Article 705 in general and specifically 705.21. Again, it is important to note that these are not taps as defined in Article 240 and they do not need to meet those requirements.

The disconnect for the PV System is not part of the service even though it is tapped from the service conductors. Section 690.17 Switch or Circuit Breaker as referred to by the 2005 and the 2011 NEC states: The disconnecting means for ungrounded conductors shall consist of a manually operable switch(es) or circuit breaker(s) complying with all of the following requirements:

1. Located where readily accessible
2. Externally operable without exposing the operator to contact with live parts
3. Plainly indicating whether in the open or closed position
4. Having an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment.

In the 2014 NEC Section 690.17(E) Interrupting Rating states in part: “The building or structure disconnecting means shall have an interrupting rating sufficient for the maximum circuit voltage and current that is available at the line terminals of the equipment”

In order to comply with the nominal voltage and current available at the line terminals, which could be 25,000 fault amps or more, the disconnecting means would have to be listed to handle the fault current.

Also, disconnecting means are required for the DC side of the inverter. 2011 NEC Section 690.14(A) Disconnecting Means states: “The disconnecting means shall not be required to be suitable as service equipment and shall comply with 690.17”.

3. Question: Are back-fed breakers required to comply with NEC Section 408.36(F) Back-Fed Devices?

Answer: No, for utility-interactive systems 2011 NEC Section 690.64 refers the user to Section 705.12. Section 705.12(6) Fastening states: Listed plug-in-type circuit breakers backfed from utility-interactive inverters that are listed and identified as interactive shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.

4. Question: Does the line side tap PV disconnect have to meet the grouping requirements of 230.72 Grouping of Disconnects for service disconnecting means?

Answer: No, the line side “connection” disconnect, or “utility disconnect” as it is commonly referred to is not part of the service and is not defined as a service disconnecting means. There are other requirements for the notification and placarding of these disconnecting means.

NOTE: The Code does not address the length of conductors either at this time. The commentary part of the Code indicates that the conductors be as short as possible and the PV disconnect be properly labeled with warning sign.

5. Question: In reference to a “Line Side Tap” is the grounded conductor on the supply side of the service equipment for PV systems required to be bonded to the PV system disconnect in accordance with 250.24?

Answer: No, however, it is important to note that these connections are not “Taps”. In any event the metal enclosures do need to be properly bonded and the sizing would be in accordance with 250.102. The requirement would be more of a 250.110 requirement than a 250.24 requirement. This bonding would be maintaining zero contact potential more than providing a path for fault currents. It could carry ground fault currents but there is no overcurrent device to open which is why the sizing requirements of 250.102 are essential.

6. Question: If metallic conduit is used between the supply side connection and the PV disconnect, does the conduit require bonding bushings?

Answer: If other than service cable is being used to connect the PV disconnect to the supply side “connection”, then NEC Section 250.92 Services shall be followed as if the PV disconnect was part of a service.

As in item 5 above the NEC is really silent relative to this and it should be fixed in 2017 if possible. The common safe practice would be to bond the metallic parts in accordance with 250.92.

7. Question: Is a guard rail required if the solar panels are less than 10 feet from the edge of a roof on a commercial building?

Answer: No, the solar panels need no maintenance if a panel goes bad it is replaced.

In actuality there is maintenance that can be performed such as a bad connector or frayed wire. That being said the NEC has no requirement for guard rails, however, model building codes and OSHA do establish requirements for working within these fall zones.

8. Question: Can a monitoring device (Power Blaster) for a PV system be installed within the electrical panel?

Answer: Yes, if they are installed per the manufacturer’s installation instructions as prescribed in NEC Section 110.3(B) Installation and Use that states: “Listed or labeled equipment shall be installed and used in accordance with any instructions included in listing or labeling”. NEC Section 312.8 Switch and Overcurrent Device Enclosures with Splices, Taps, and Feed-Through Conductors requires any cross

section of wiring space not to exceed 75 percent of the cross-sectional area of that space.

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