FORT • ATKINSON
CITY OF FORT ATKINSON

Solar PV Permit & Inspection Checklist

Permit #_____ Installer_____

Job Address_____
Email:_____

Call 920-397-9901 to schedule an inspection. **Please have the permit number and project address available.**

Required Documentation

- ☐ Manufacturer's specifications for the inverter
- ☐ Manufacturer's specifications for the module
- ☐ Manufacturer's specifications for the optimizer (if used)
- ☐ Verification that the racking system grounding and bonding is listed

Inspections Process FAQ's

- **How many inspections are required for accessory use solar PV projects? Which specific inspections are those?**
  - *Most projects that are installed per their manufacturer specifications, Wisconsin state building codes, and Wisconsin state electrical codes, can expect to have **simply one building & electrical inspection**. However, inspections may vary depending on the nature and quality of the project.*

- **What details will inspectors be looking for?**
  - *The following four (4) inspections categories are the primary points of interest: 1. PV Inverter, 2. Wiring Methods & Disconnecting Means, 3. System Grounding, 4. Interconnection.*

- **PV Inverter**
  - ☐ Is the PV system utility-interactive or standalone? 690.2
  - ☐ Is all the equipment listed for PV application? 690.4
  - ☐ Is the system grounded or ungrounded? (if ungrounded, the system needs to comply with 690.35)
  - ☐ Has DC Ground-Fault Protection been provided and properly labeled? 690.5 & 690.35(C)?
  - ☐ What is the maximum PV system voltage? 690.7
  - ☐ Is all listed equipment rated for the maximum voltage? 690.7
  - ☐ Determine the maximum circuit current for the PV Source and Output Circuit; Inverter Output Circuit; Stand-Alone Inverter Input Circuit; and DC to DC Converter Output (refer to inverter documentation)

2. **Wiring Methods and Disconnecting Means**
    - □ Are the conductor and cable ampacities determined at 125% before adjustment factors? 690.8 (B)
    - □ How are the PV Source and Output Circuit protected from overcurrent? 690.9 (A&B)
    - □ Do AC or DC OCPD's have the appropriate voltage, current and interrupt ratings? 690.9(C)
    - □ Has arc-fault circuit protection been provided for DC source and/or output circuits? 690.11
    - □ Is a rapid shutdown required and if so, how is it accomplished and identified? 690.12
    - □ Is the PV disconnect permanently marked and installed in a readily accessible location? 690.13
    - □ Has the fuse disconnecting means, if required, been installed? 690.16
    - □ Are PV source or output circuits > 30 volts in a raceway or guarded if readily accessible? 690.31
    - □ Is single conductor cable used outdoors Type USE-2 or listed & labeled PV wire? 690.31(C) (Ungrounded systems must be labeled PV wire only. 690.35)
    - □ Are PV source or output circuits on or inside a building in a metal raceway and marked? 690.31(G)
    - □ Are all connectors polarized, guarded, latching-type or tool-safeguarded, rated to interrupt the available current or labeled "Do Not Disconnect Under Load"? 690.33

3. **System Grounding**
    - □ Has the system been grounded at one single point? 690.42
    - □ Is all exposed non-current carrying metal parts of the PV system grounded? 690.43(A&B)
    - □ Are the mounting structures or systems used for equipment grounding? 690.43(C&D)
    - □ Are the interconnecting devices used for equipment grounding listed and identified? 690.43 (C&D)
    - □ Is the EGC properly sized and protected if exposed and smaller than #6? 690.50, 250.122, 250 .120(c)
    - □ Has the grounding electrode system been installed? 690.47
    - □ If both are present, has the DC grounding electrode system been bonded to the AC GES? 690.47(C)
    - □ Was an auxiliary electrode installed at the array? 690.47

4. **Interconnection**
    - □ Has a plaque or directory been installed at each disconnecting means (capable of interconnection) denoting all electric power sources & power production sources? 705.10
    - □ Has the point of connection to other sources been installed per 705.12? 690.64
    - □ Is the supply side disconnect readily accessible and within 10’ of the connection point? 705.12 (A)
    - □ Are the utility interactive inverters connected to the system through a dedicated circuit breaker or fusible disconnecting means? 705.12(D)(1)
    - □ Does the bus or conductor ampacity comply with 705.12(D) (2)?
    - □ Have all the required labels been applied? (See appendix 1 “NEC Labelling Requirements”)

The City of Fort Atkinson administers Wisconsin state construction and electrical-related codes, which provide minimum standards to protect life, property and ensure public well-being. All utility interconnections to be approved by WE Energies prior to submittal of plans and application for permit.

Building

- 2021 Uniform Dwelling Code
- Applies to single and two-family dwellings, townhouses, and accessory structures

- 2015 International Building Code W/ Wisconsin amendments
- Applies to Commercial and Industrial Buildings and Accessory structures.

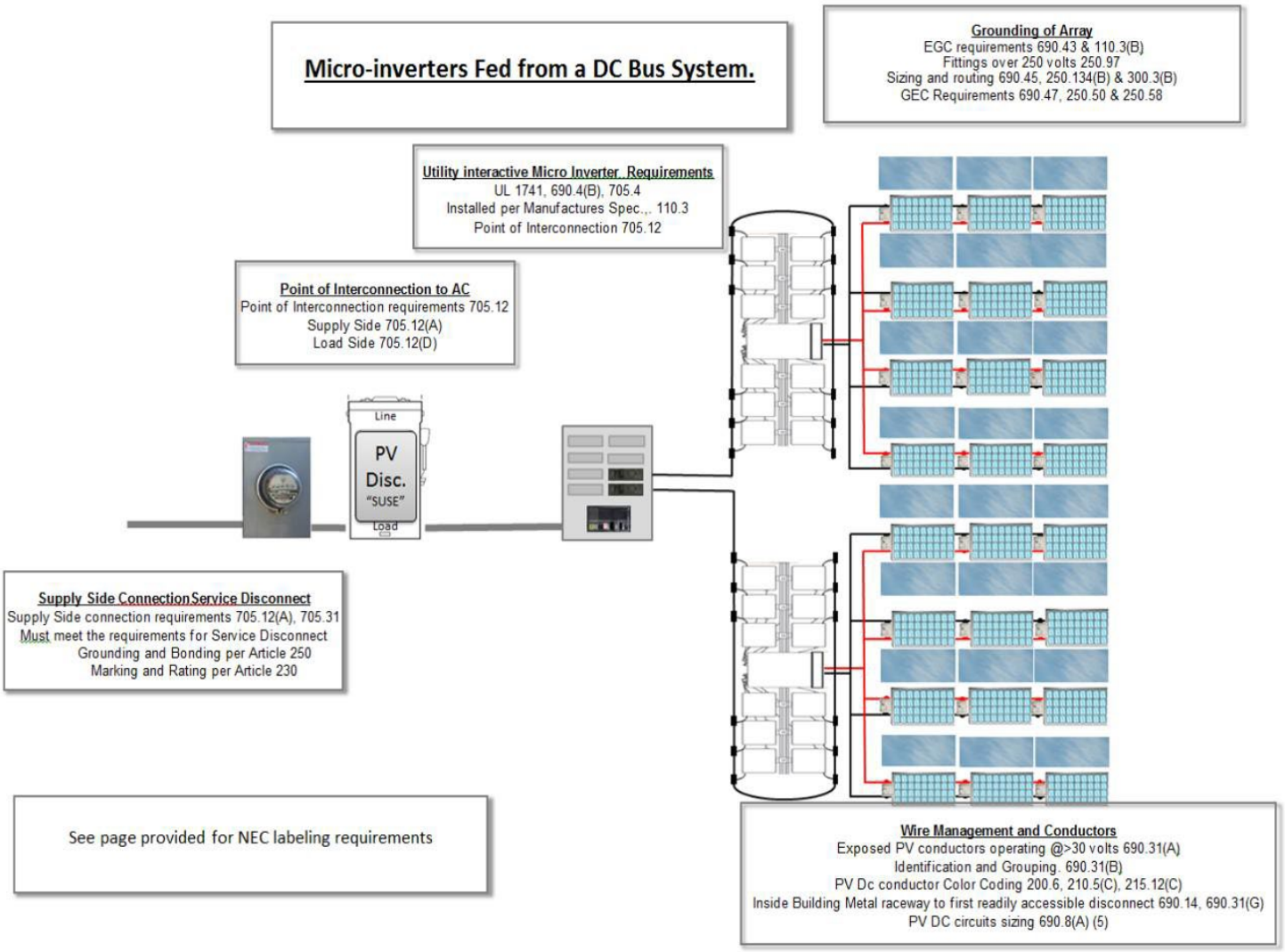
Electrical

- **2017 National Electrical Code (NEC)**
  - Additional Wisconsin statutes and rules from SPS 316 apply.

Where can I find the electrical code?

- The **2017 National Electrical Code** cannot be accessed online. Your local library may have a copy.

Electrical Diagrams

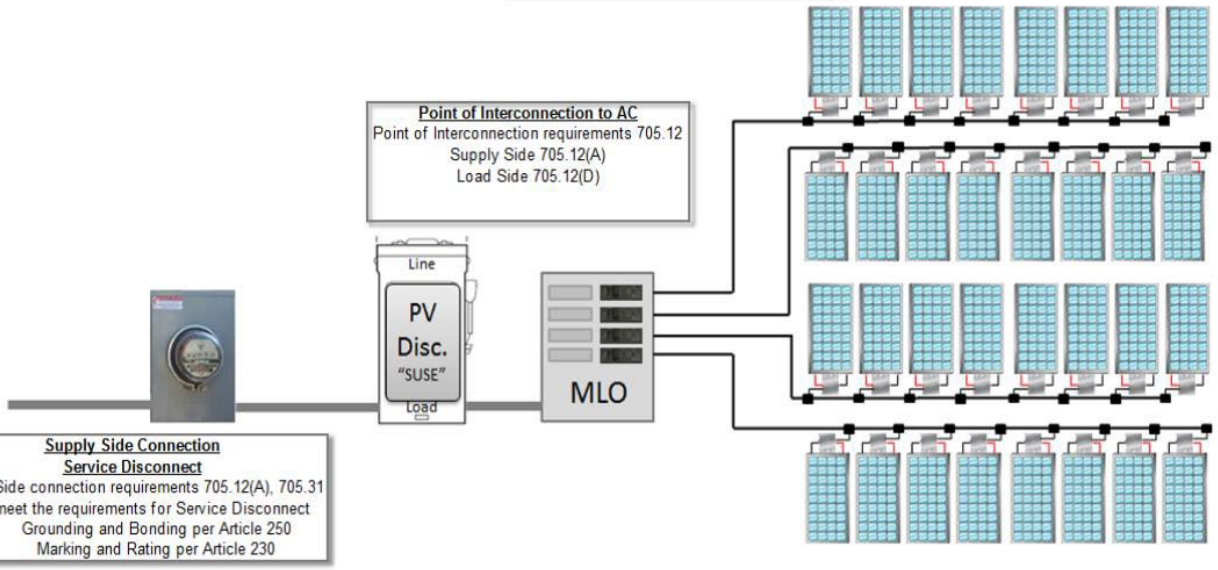


Micro-inverters at the Modules.

Grounding of Array
EGC requirements 690.43 & 110.3(B)
Fittings over 250 volts 250.97
Sizing and routing 690.45, 250.134(B) & 300.3(B)
GEC Requirements 690.47, 250.50 & 250.58

Utility interactive Micro Inverter Requirements
UL 1741, 690.4(B), 705.4
Installed per Manufactures Spec, 110.3
Point of Interconnection 705.12

Point of Interconnection to AC
Point of Interconnection requirements 705.12
Supply Side 705.12(A)
Load Side 705.12(D)



Supply Side Connection
Service Disconnect
Supply Side connection requirements 705.12(A), 705.31
Must meet the requirements for Service Disconnect
Grounding and Bonding per Article 250
Marking and Rating per Article 230

See page provided for NEC labeling requirements

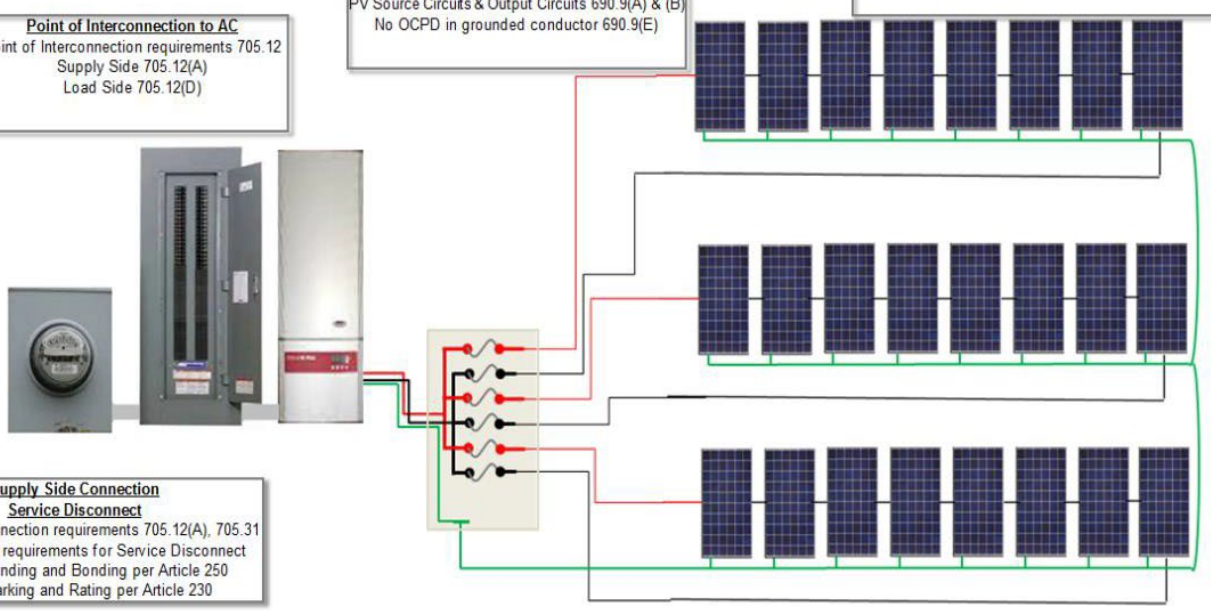
Wire Management and Conductors
Inside Building Metal raceway to first readily accessible disconnect 690.14, 690.31(G)
Inverter Output circuits sizing 690.8(A)(2) & (B)(1)

String System with PV Output Circuits and Overcurrent Protection at DC Combiner.

Grounding of Array
EGC requirements 690.43 & 110.3(B)
Fittings over 250 volts 250.97
Sizing and routing 690.45, 250.134(B) & 300.3(B)
GEC Requirements 690.47, 250.50 & 250.58

Overcurrent Protection of DC circuits
OCPD rated DC 110.3(A), 690.9(C) & (D)
PV Source Circuits & Output Circuits 690.9(A) & (B)
No OCPD in grounded conductor 690.9(E)

Point of Interconnection to AC
Point of Interconnection requirements 705.12
Supply Side 705.12(A)
Load Side 705.12(D)



Supply Side Connection
Service Disconnect
Supply Side connection requirements 705.12(A), 705.31
Must meet the requirements for Service Disconnect
Grounding and Bonding per Article 250
Marking and Rating per Article 230

Wire Management and Conductors
Exposed PV conductors operating @>30 volts 690.31(A)
Identification and Grouping. 690.31(B)
PV Dc conductor Color Coding 200.6, 210.5(C), 215.12(C)
Inside Building Metal raceway to first readily accessible disconnect 690.14, 690.31(G)
PV DC circuits sizing 690.8(A) (5)

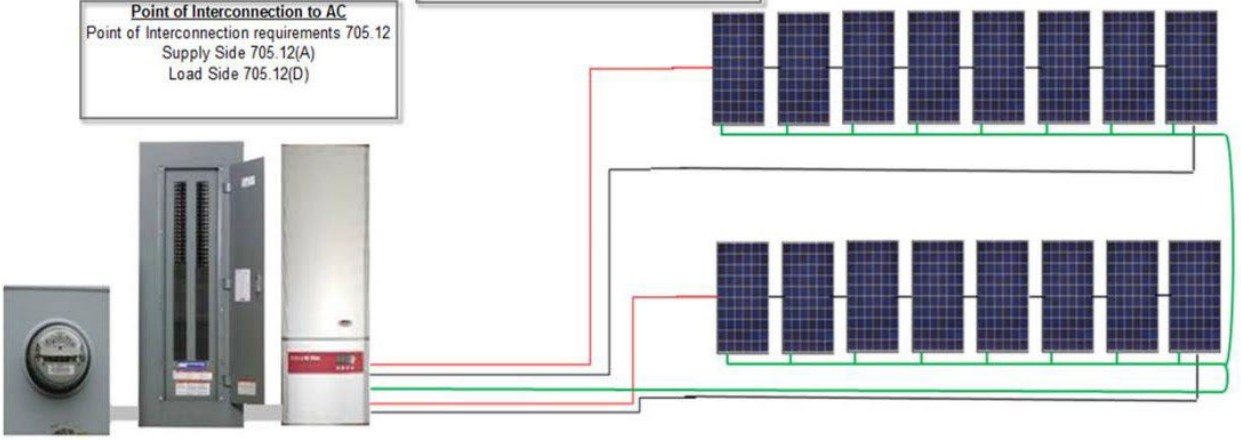
See page provided for NEC labeling requirements

String System without PV Output Circuits no Overcurrent Protection Required.

Grounding of Array
EGC requirements 690.43 & 110.3(B)
Fittings over 250 volts 250.97
Sizing and routing 690.45, 250.134(B) & 300.3(B)
GEC Requirements 690.47, 250.50 & 250.58

Overcurrent Protection of DC circuits
OCPD rated DC 110.3(A), 690.9(C) & (D)
PV Source Circuits & Output Circuits 690.9(A) & (B)
No OCPD in grounded conductor 690.9(E)

Point of Interconnection to AC
Point of Interconnection requirements 705.12
Supply Side 705.12(A)
Load Side 705.12(D)

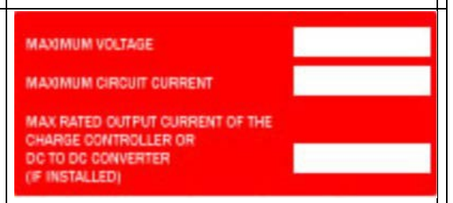


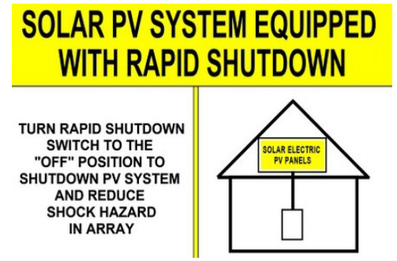
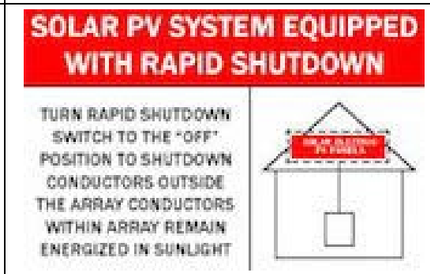
Supply Side Connection
Service Disconnect
Supply Side connection requirements 705.12(A), 705.31
Must meet the requirements for Service Disconnect
Grounding and Bonding per Article 250
Marking and Rating per Article 230

Wire Management and Conductors
Exposed PV conductors operating @>30 volts 690.31(A)
Identification and Grouping. 690.31(B)
PV Dc conductor Color Coding 200.6, 210.5(C), 215.12(C)
Inside Building Metal raceway to first readily accessible disconnect 690.14, 690.31(G)
PV DC circuits sizing 690.8(A) (5)

See page provided for NEC labeling requirements

2017 NEC Labeling Requirements

Section	Location of Label	Label Text and Appearance
690.54	All interactive system(s) points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating ac voltage.	
690.56(B) 690.4(D) 705.10 705.12	A permanent plaque or directory, denoting all electric power sources on or in the premises, shall be installed at each service equipment location and at locations of all electric power production sources capable of being interconnected.	
690.13(B) 690.15	Each PV system disconnecting means shall plainly indicate whether in the open (off) or closed (on) position and be permanently marked: “PV SYSTEM DISCONNECT” Or equivalent.	
690.53	A permanent label for the direct-current PV power source indicating the information specified in (1) through (5) shall be provided by the installer at the PV disconnecting means.	
690.31 (G)(3)	The following wiring methods and enclosures that contain PV power source conductors shall be marked: (1) Exposed raceways, cable trays, and other wiring methods (2) Covers or enclosures of pull boxes and junction boxes (3) Conduit bodies in which any of the available conduit openings are unused	
690.31(G) (3)	Where circuits are embedded in built-up, laminate, or membrane roofing materials in roof areas not covered by PV modules and associated equipment, the location of circuits shall be clearly marked.	

Section	Location of Label	Label Text and Appearance
690.13(B) 690.15	Where all terminals of the disconnecting means may be energized in the open position, a warning sign shall be mounted on or adjacent to the disconnecting means.	
705.12 (B)(2)(3)(b)	A permanent warning label shall be applied to the distribution equipment adjacent to the back-fed breaker from the inverter.	
705.12 (B)(2)(3)(c)	Permanent warning labels shall be applied to distribution equipment	
690.56 (C) Buildings with Rapid Shutdown PV systems shall have permanent labels as described in 690.56(C) (1) through (C)(3)	(1)(a) For PV systems that shut down the array and conductors leaving the array: The title “SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN” shall utilize capitalized characters with a minimum height of 3/8 in. in black on yellow background, and the remaining characters shall be capitalized with a minimum height of 3/16 in. in black on white background.	
	(b) For PV systems that only shut down conductors leaving the array: The title “SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN” shall utilize capitalized characters with a minimum height of 3/8 in. in white on red background, and the remaining characters shall be capitalized with a minimum height of 3/16 in. in black on white background.	
	(3) A rapid shutdown switch shall have a label located on or no more than 3 ft from the switch that includes this wording. The label shall be reflective, with all letters capitalized and having a minimum height of 3/8 in., in white on red background.	
The labels in 690.56(C)(1)(a) and (b) shall include a simple diagram of a building with a roof. The diagram shall have sections in red to signify sections of the PV system that are not shut down when the rapid shutdown switch is operated. The rapid shutdown label in 690.56(C)(1) shall be located on or no more than 3 ft from the service disconnecting means to which the PV systems are connected and shall indicate the location of all identified rapid shutdown switches if not at the same location. **(2) Buildings with More Than One Rapid Shutdown Type.** For buildings that have PV systems with both rapid shutdown types or a PV system with a rapid shutdown type and a PV system with no rapid shutdown, a detailed plan view diagram of the roof shall be provided showing each different PV system and a dotted line around areas that remain energized after the rapid shutdown switch is operated.		