PV ELECTRICAL INSPECTOR CHECKLIST

Code sections	CODE ARTICLES/ REFERENCE
General Requirements	
1. Local Building Permit: Permits are obtained and displayed as required.	**FBC 105.1**
2. Array Mounting Information: Mounting detail drawing includes roof type and age, mounting system, fasteners spacing and penetration weather sealing methods.	
3. Site Drawing: Site drawings including descriptions and locations of major components.	
4. Installation and Use: Equipment Listed, Labeled, or both shall be installed and used in accordance with instructions.	**110.3(B)**
5. Equipment: Inverters, motor generators, PV modules, ac modules and ac systems, rapid shutdown equipment for PV systems shall be listed or evaluated with field label**.**	**690.4(B)**
6. Qualified Personnel: Installation of equipment, associated wiring, and interconnections shall be performed only by qualified persons.	**690.4(C)**
7. Modules and AC Modules: Modules and ac modules shall be marked in accordance with their listing.	**690.51**
8. Stand-Alone systems: Premises wiring systems shall be adequate to meet the requirements of the code. Wiring on the supply side of a building or structure shall comply with 710.15(G) and 710.15.	**710.15(G); 710.15; 690.10**
9. Associated Articles: Storage Batteries 480, Large scale (PV) Electric Supply 691, Interconnected Electric Power Production Sources 705, Energy Storage Systems 706, Stand Alone Systems 710.	**A480; A691; A705; A706; A710**
Circuit Requirements	

PV ELECTRICAL INSPECTOR CHECKLIST

1. Maximum Voltage: PV system dc circuits on or in buildings shall be permitted to have max voltage of 1000 volts and one- and two-family dwellings max voltage of 600 volts.	**690.7**
2. Photovoltaic Source and Output Circuits: Maximum PV system voltage for the circuit shall be calculated by, sum of the PV module-rated open-circuit voltage of series-connected modules at lowest expected ambient temperature coefficients etc.	**690.7(A); 110.3(B)**
3. PV System Circuits: Maximum currents shall be calculated in accordance with 690.8(A)(1)(a) through (A)(1)(e).	**690.8(A)(1)**
4. Photovoltaic Source Circuit currents. The maximum current shall be the sum of the short -circuit ratings of PV modules connected in parallel multiplied by 125%.	**690.8(A)(1)**
5. Photovoltaic Output Circuit Currents: Maximum current shall be sum of parallel source circuit maximum currents as calculated in 690.8(A)(1)(a).	**690.8(A)(1)(b)**
6. DC-to-DC Converter Source Circuit Current: Maximum current shall be the DC-to-DC converter continuous output current rating.	**690.8(A)(1)(C)**
7. DC-to-DC Converter Output Circuit Current: The maximum current shall be the sum of parallel connected dc-to-dc converted source circuit currents as calculated in 690.8(A)(1)(c).	**690.8(A)(1)(d)**
8. Inverter Output Circuit Current: The maximum current shall be the inverter continuous output current rating.	**690.8(A)(1)(e)**
9. Circuits Connected to Input of Electronic Power Converters. Where the circuit is protected with overcurrent device does not exceed conductor ampacity, maximum current shall be permitted to be the rated input current of the electronic power converter input to with its connected.	**690.9(A)(2)**
10. Conductor Ampacity: Maximum current calculated by 690.8(A) multiplied by 125% without adjustment or correction factors or maximum current calculated by 690.8(A) maximum calculated current with adjustment and correction factors**.**	**690.8(B); T690.31(A)(a); 310.14(C)**

Overcurrent Protection	
1. Circuits and Equipment. PV system dc circuits and inverter output conductors and equipment shall be protected against overcurrent.	**690.9(A)**
2. Circuit Where Overcurrent Protection Not Required: Where conductors have sufficient ampacity for the maximum circuit current and currents from all sources do not exceed maximum overcurrent device rating specified for PV module or electronic power converter.	**690.9(A)(1)**
3. Circuit Where overcurrent Protection is Required on One End: A circuit conductor connected at one end to a current-limited supply.	**690.9(2)**
4. Other Circuits. ends Conductors not greater than (10 ft) in length and not in buildings, protected from overcurrent on one end. Conductors not greater than (10 ft) in length and in buildings protected from overcurrent and in a raceway or metal clad cable. Conductors protected from overcurrent at both**.**	**690.9(A)(3)**
5. Device Rating: Overcurrent devices for PV systems dc circuits shall be listed for PV systems. If required, shall be not less than 125% of the maximum currents calculated in 690.8(A) or an assembly, with its overcurrent device, listed for continuous operation at 100% of its rating permitted to be used at 100% of its rating. Next higher standard size up permitted.	**240.4(B); 690.9(B)**
6. Stand-Alone Systems: Wiring Systems connected to a stand-alone system install in accordance with 710.15.	**690.10**
7. Arc-Fault Circuit Protection (DC): PV DC systems 80 volts dc or greater require a listed PV AFCI or equivalent protection.	**690.11**
8. PV Systems Rapid Shutdown on Buildings: PV Circuits on or in buildings shall include rapid shutdown in accordance with 690.12(A) through (D).	**690.12**
Disconnecting Means	
1. PV Disconnecting Means: Disconnecting means for all PV system wiring and associated premises wiring.	**690.13**

2. Location: Readily accessible location: Above 30 Volt to unqualified persons disconnect locked or tool to open.	**690.13(A)**
3. Max Number of Disconnects: Each PV system shall consist of not more than six disconnecting means, six sets of circuit breakers, etc.	**690.13(C)**
4. Rating: PV disconnect means shall be rated for max circuit current, available fault current and voltage that's available at disconnect terminals.	**690.13(D)**
5. Disconnect Types: One of the following – Manual switch or Circuit breaker, a connector, pull out switch with interrupting rating, remote-controlled switch or controlled circuit breaker, or a listed or approved device intended for application.	**690.13(E)**
6. Disconnecting Means for Isolating PV Equipment: Disconnects of the type required in 690.15(D) Shall be provided to disconnect ac PV modules, fuses, dc-to-dc converters, inverters and charge controllers from all conductors.	**690.15; 690.15(A) through(D)**
7. Location: Isolating devices or equipment disconnect within equipment or within sight and within (10ft) of equipment. Permitted to be remote operated within (10ft) of equipment**.**	**690.15(A)**
Wiring Methods and Materials	
1. Wiring Systems: Check raceways and cable wiring methods for its Uses Permitted or Uses Not Permitted, PV source and output circuits conductors more than 30 volt and installed readily accessible shall be guarded or installed in Type MC cable or raceway.	**690.31(A)**
2. Identification and Grouping: PV system dc circuits and non-PV system or inverter output shall not occupy the same equipment wiring enclosure, raceway circuit barrier or partition used.	**690.31(B)**
3. Identification: PV dc circuit conductors nonsolidly grounded positive conductors marked (+) or POSITIVE and (-) or NEGATIVE, solidly grounded systems marked per 200.6	**690.31(B)(1); 210.5(C)(2)**
4. Grouping: More than one PV system in junction box or raceway shall each be grouped separately and within every (6ft).	**690.31(B)(2)**

5. Cables: PV wire or cable and type DG cable shall be listed. Single-conductor cable, cable tray, multiconductor jacketed cables, etc.	**690.31(C); 690.31(C)(1) – (6)**
6. Flexible Cords and Cables Connected to Tracking PV Arrays: Shall comply with A400, type hard service or potable power cord, extra hard usage, etc.	**690.31(C)(4); 400**
7. Direct-Current Circuits on or in Buildings: PV system dc circuits that exceed 39 volts or 8 amperes inside buildings shall be in metal raceways, mc cable or metal enclosures.	**690.31(D)**
8. Access to boxes: Junction, outlet, and pull boxes behind modules or panels need to be accessible.	**690.34**
Grounding and Bonding	
1. System Grounding: PV system Grounding Configurations (1) – (6).	**690.41(A)**
2. Ground Fault Protection: DC ground fault protection required for more than 30 volts or 8 amperes on PV system dc circuits.	**690.41(B)**
3. Equipment Grounding and Bonding: Non-current carrying metal parts of PV module frames, electrical equipment, and conductor enclosures of PV systems shall connect to an equipment grounding conductor.	**690.43; 690.43(A)- (D); 250.134; 250.136**
4. PV Module Mounting system and Devices: Devices and systems for module mounting used for bonding shall be listed, labeled, and identified for bonding PV modules.	**690.43**
5. Equipment secured to Grounded Metal Supports: Metal supports structures shall have identified bonding jumpers or equipment bonding connected between separate sections and connected to equipment grounding conductor.	**690.43(B)**
6. With Circuit Conductors: Equipment grounding conductors for PV array and support structure within same raceway or cable.	**690.43(C)**
7. Size of Equipment Grounding Conductors: PV circuit equipment grounding conductors sized in accordance with 250.122.	**690.45**

8. Building or Structure Supporting a PV system: Building or structures supporting PV systems shall utilize a grounding electrode system in accordance with A250, Part 3.	**690.47;**
9. Grounding Electrodes and Grounding Electrode Conductors: Grounding electrodes directly connected to PV module frames or support structures.	**690.47(B)**
Markings and signage	
1. Modules and AC Modules: Modules and Ac Modules shall be marked with their listing.	**690.51**
2. DC PV Circuit: Permanent readily visible label with highest max dc voltage in a PV system per 690.7.	**690.53**
3. Interactive System Point of Interconnection: At the disconnecting means as a power source and with rated AC output current and nominal operating AC voltage.	**690.54**
4. Facilities with Stand-Alone systems: Plaques and directories installed in accordance with	**690.56(A); 710.10**
5. Facilities with Utility services and PV systems: Plaques and directories installed in accordance with 705.10 and 712.10.	**690.56(B)**
6. Identification of Power Sources: For interconnected power sources. A Plaque or directory with wording: Caution: MULTIPLE SOURCE OF POWER.	**705.10**
7. Buildings with Rapid Shutdown: Permanent label at each service equipment location to which PV system are connected. Include capitalized 3/8" words: SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN.	**690.56(C)**
8. Rapid Shutdown Switch: Label including words: RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM.	**690.56(C)(2)**
9. PV Disconnecting Means: Each PV disconnecting means permanently marked: PV SYSTEM DISCONNECT. If Line and load energized when disconnect open it shall be marked: WARNING ELECTRIC SHOCK HAZARD TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POITION.	**690.13(B)**

10. Isolating Devices: Isolating devices not rated for interrupting current shall be marked: DO NOT DISCONNECT UNDER LOAD.	**690.15(B)**
11. PV dc Circuit Conductors: Shall be Identified at all termination, connection, and splice points. Markings include +, POSITIVE or POS and -, NEGATIVE, or NEG.	**690.31(B)(1)**
12. Wiring Methods and Enclosure: PV DC system raceways, pull boxes, ETC shall be marked: PHOTOVOLTAIC POWER SOURCE OR SOLAR PV DC CIRCUIT.	**690.31(D)(2)**
13. Busbar: Load-side connection back-fed breaker marked: WARNING DO NOT RELOCATED THIS OVERCURRENT DEVICE and TOTAL RATING OF ALL OVERCURRENT DEVICES SHALL NOT EXCEED AMPACIT OF BUSBAR.	**705.12(B)(3)**
14. ESS Disconnects: ENERGY STORAGE SYSTEM DISCONNECT, ac voltage, max dc voltage, etc.	**706.15(C)**
15. Stationary Battery system disconnect: Labeled: EMERGENCY DISCONNECT. Battery voltage, available fault current etc.	**480.7(B); 480.7(F)**
16. Field-Applied Hazard Markings: Adequately warn of hazards using effective words, colors, symbols. Permanently affixed to equipment or wire method. Not handwritten. Be of sufficient durable to withstand the environment involved.	**110.21(B)**
Connections to Other sources	
1. Equipment Approval: Interactive equipment operating in parallel with power production sources shall be listed for interactive function.	**705.6**
2. Conductors: Minimum 6 AWG copper or 4 AWG Aluminum for connections on Supply-side of service disconnecting means.	**705.11(B)**
3. Overcurrent Protection: Readily accessible overcurrent protection device within 10’ of conductor length from the point of connection for dwellings and 16.5’ other than dwellings.	**705.11(C)**
4. Ground-Fault Protection: Required on grounded wye services exceeding 150 volts to ground and over 1000 amperes.	**705.11(E); 230.95**

5. Dedicated overcurrent and disconnect: for each source interconnection shall be made by dedicated circuit breaker or fusible disconnect.	**705.12(A)**
6. Bus or Conductor Ampere Rating: Power source output circuit current multiplied by 125% shall be used in ampacity calculations for feeders, taps, and busbars. 705.12(B)(1) through (B)(3).	**705.12(B)**
7. Disconnecting Means, Source: Provide disconnecting means for power source output circuit conductors from electric power production equipment from conductors of other systems. Circuit breaker or switch, simultaneously disconnect all ungrounded conductors, readily accessible, etc. 705.20(1)-(8).	**705.20**
8. Overcurrent Protection: Power source output circuit conductors and equipment shall have overcurrent protection.	**705.30**
9. Generators: Shall have overcurrent protection for generators in accordance with	**445.12; 705.30(D)**
10. Ground-Fault Protection: The output of an interaction system shall have line-side GFP.	**705.32; 230.95**
Batteries and Controllers	
1. ESS Disconnecting Means: Provide means for all ungrounded conductors derived from ESS or part of listed ESS equipment, readily accessible, within sight of ESS, outside dwelling, etc.	**706.15(A)**
2. Dwelling Units: Maximum of 100 Volts dc for one-and two-family dwelling units with ESS.	**706.20**
3. Overcurrent Protection Ampere Ratings: Not be less than 125% of the maximum currents calculated in	**706.30(A)**
4. Current Limiting: Current-limiting overcurrent device shall be installed for each dc output circuit. 706.31	**706.31**
5. Solo means of Regulating charging: Systems using diversion charge controllers shall have a secondary independent means for overcharging prevention.	**706.33(B)(1)**

6. Circuits with Diversion Charge Controller and Diversion load: Diversion load Current rating is less than or equal to charge controller rating, load voltage greater than max ESS voltage, Power rating of diversion load shall be minimum of 150% of charging source Emergency Disconnect: One-and two-family dwellings, outside readily accessible disconnecting means**.**	**480.7(B)**
7. ESS Using Interactive Inverters: Interactive inverters shall have secondary independent control for ESS charging.	**706.33(B)(3)**
8. DC Disconnect Methods: Disconnect means required for ungrounded conductors from a stationary battery system more than 60 volts dc.	**480.7(A); 480.7(A)-(G)**
9. Emergency Disconnect: One-and two-family dwellings, outside readily accessible disconnecting means.	**480.7(B)**
10. Current Limiting: Current-limiting overcurrent device shall be installed for each dc output circuit.	**706.31**
11. Live Parts. Battery terminals and other live parts guarded.	**480.10(B); 110.27**
12. Spaces About Battery Systems: Check for working spaces from edge of battery cabinet, rack, or tray.	**480.10(C); 110.26**
13. Egress: Personnel doors in battery rooms shall open in egress and installed with listed panic or fire exit hardware**.**	**480.10(E)**
14. Illumination: Shall provide illumination for working spaces containing battery systems.	**480.10(G)**