

INSPECTION CHECKLIST

This checklist is an extensive list of common code compliance issues for PV systems based on the requirements of the 2005 National Electrical Code® and industry standards. It is intended as a guide for PV system designers, installers, inspectors, and operators. However, this list does not include every potential requirement and the user should reference all other relevant documentation to ensure system compliance.

GENERAL PRACTICES AND COMPONENTS	REFERENCE	COMPLIANCE / NOTES
Equipment Approval. All conductors and equipment shall be listed.	110.2	
Manufacturer's Instructions. Equipment shall be installed and used in accordance with any instructions included in the listing or labeling.	110.3(B)	
PV Conductors Alone. PV source and output circuit conductors shall not be run with other conductors of different systems.	690.4(B)	
"For Solar PV Use." Inverters shall be identified for use in solar PV systems.	690.4(D)	
GFP. Ground fault protection shall be included for arrays mounted on dwellings.	690.5	
AC Modules. AC modules shall have appropriate markings, overcurrent protection, disconnect means, and GF protection.	690.6; 690.52	
Site Drawings. Site drawings should include descriptions and locations of major components.		
Electrical Diagram. Electrical diagram should include component interconnects, conductor types and sizes, conduit types and sizes, disconnects, and point of interconnection.		
Array Mounting Information. Mounting detail drawing should include roof type and age, mounting system, roof bolt spacing, and penetration weather sealing method.		
System Specifications. System information labeling includes V_{oc} , V_{mp} , I_{sc} , I_{mp} , inverter VAC_{max} and IAC_{max} , and battery VOP_{max} and V_{eq} .	690.53–690.56	
Owner's Documentation. Documentation should include system warranty, component warranties, owner's manuals, utility interconnection agreement, and instructions for operation and maintenance.		
Local Building Permit. Permits should be obtained and displayed as required.		

CIRCUIT VOLTAGE AND CURRENT REQUIREMENTS	REFERENCE	COMPLIANCE / NOTES
Maximum System Voltage. Maximum system voltage shall be calculated for the lowest temperature and must be less than the module maximum voltage rating (usually 600 V).	690.7	
600 V Limit. Maximum system voltage shall be less than 600 V for dwellings.	690.7(C)(D)	
Source-Circuit Conductors. Conductors used for source-circuit wiring must be rated for 90°C, sunlight resistance, and wet service.	690.31(B) note	
PV I_{max}. PV source- and output-circuit conductors and overcurrent protection devices shall be sized for no less than $I_{sc} \times 156\%$. Temperature-derated ampacity must also be greater than the rating of the overcurrent device.	690.8(A)(1); 690.8(B)	
Inverter Output I_{max}. Inverter output conductors and overcurrent devices shall be sized for the inverter continuous output current rating $\times 125\%$.	690.8(A)(3); 690.8(B)	
Stand-Alone Inverter. Input circuit conductors and overcurrent devices shall be sized for input current at rated output efficiency at lowest operating voltage $\times 125\%$.	690.8(A)(4); 690.8(B)	
Equipment V_{max}. Equipment and devices shall be rated for maximum system voltage at lowest temperature.	690.7; 110.4	

OVERCURRENT PROTECTION	REFERENCE	COMPLIANCE / NOTES
General. PV source circuit, PV output circuit, inverter output circuit and storage battery circuit conductors and equipment shall be protected in accordance with Article 240.	690.9(A); 240	
Location. Overcurrent protection should be located near the charge controller or battery.	690.9(A) FPN	

Transformers. Overcurrent protection shall be provided for power transformers in accordance with Article 450.3.	690.9(B)	
Supplementary Overcurrent Protection. Branch-circuit or supplementary-type overcurrent devices shall be permitted for PV source circuits, but shall be no greater than the series fuse on module listing.	690.9(C); 110.3(B); UL1703	
Listed for DC. Overcurrent devices shall be listed for use in DC circuits and shall have the appropriate voltage, current, and interrupting ratings.	690.9(D)	
Multiwire Branch Circuits. No multiwire branch circuits are allowed on 120 V inverter output circuit or panels.	690.10(C)	
Fuses. Locations of fuses shall be identified. Fuses shall be rated for $I_{sc} \times 156\%$.	690.9(A); 690.8(B)	
Bypass Diodes. Locations of bypass diodes shall be identified. Diodes shall be rated for $I_{sc} \times 156\%$.	690.8(B)	

DISCONNECT MEANS	REFERENCE	COMPLIANCE / NOTES
DC Disconnect. Disconnect means shall be provided between photovoltaic power system output and other building conductors, no disconnect in grounded conductor.	690.13(A)	
Accessibility. Photovoltaic disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the system conductors (not in bathrooms).	690.14(C)	
Marking. Each photovoltaic system disconnect means shall be marked, suitable for use, no more than six grouped disconnects for PV system.	690.14(C)	
AC Disconnect. Disconnect means shall be provided for inverters, batteries, charge controllers, and the like, from all ungrounded conductors of all sources.	690.15	
Bi-fed Fuses. Disconnecting means shall be provided to independently disconnect a fuse from all sources of supply if the fuse is energized from both directions.	690.16	
Features. Switches or circuit breakers shall be provided to disconnect ungrounded conductors, are readily accessible, have on/off indication, and have appropriate interrupt rating.	690.17	
Disconnects energized in open position must be labeled as such.	690.17	
Roof DC Disconnect vs Conduit. Where PV source circuits are run inside a building, they shall be in metallic raceways from the point of penetration into the building to first accessible disconnect.	690.31E; 690.14(C)(1)	

CONDUCTORS AND WIRING METHODS	REFERENCE	COMPLIANCE / NOTES
Wiring Connections. Wiring connectors shall be listed for the intended use and environment. Screw terminals shall be tightened to the recommended torque. Crimp-on terminals shall be used with listed crimping tool.	110.14	
Wiring Methods. Standard and appropriate wiring methods shall be used. Wet-rated conductors should be used in conduits in exposed locations.	300; 690.31(A)	
Color Codes. Grounded conductors shall be white or gray and grounding conductors shall be green, green/yellow, or bare.	400.22	
Strain Relief. Strain relief or conduit shall be used on all conductors.	300.4; 400.10	
Insulation Types. Single conductor cables type SE, UF, USE, and USE-2 single-conductor are permitted in PV source circuits. If exposed to sun, sunlight-resistant cable must be used.	690.31(B)	
Flexible Conductors. Tracking or movable array mounts shall use flexible conductors identified for hard service and outdoor use.	690.31(C); 400.3	
Small Conductors. Single-conductor cables in sizes 16 AWG and 18 AWG shall be permitted for module interconnections when such cables meet the ampacity requirements of 690.8.	690.31(D); 310.15	
Module Connectors. Module connectors shall be polarized, noninterchangeable, guarded, locking, and have "first to make / last to break" contact for grounded conductor.	690.33	

Junction Boxes. Junction boxes shall be used for conductor connections and to protect live parts. Boxes shall be of appropriate type for application, accessible, and appropriate size.	690.34; 300.15; 370	
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GROUNDING	REFERENCE	COMPLIANCE / NOTES
DC Grounding. One DC conductor shall be grounded for two-wire PV systems operating above 50 V. DC grounding shall be made at any single point on the PV output circuit.	690.41; 690.42; 250.4(A)	
Ungrounded Systems. Ungrounded systems must have overcurrent protection in each of the ungrounded conductors.	240.20; 240.21	
Equipment Grounding. All non-current-carrying metal components shall be grounded in all PV systems, including module frames, equipment, conduit, and boxes as applicable.	690.43	
Grounding Electrode. AC and DC grounding electrode conductors may be connected to same ground electrode system.	690.47(C)	
DC Grounding Electrode Conductor. The size of the ground electrode conductor for a DC system shall be no smaller than #8 AWG copper or #6 aluminum, no smaller than neutral or largest conductor, and no larger than #6 AWG copper or #4 aluminum.	250.166	

MAKINGS AND LABELS	REFERENCE	COMPLIANCE / NOTES
Modules. PV modules shall be labeled with UL listing, series fuse requirement, V_{oc} , V_{max} , I_{sc} , I_{max} , P_{max} .	690.51	
DC Disconnect. PV power source shall be labeled with V_{oc} , V_{max} , I_{max} , and I_{sc} at the DC disconnect.	690.53	
AC Disconnect. Point of interconnection shall be labeled with inverter V_{max} and I_{max} at AC disconnect.	690.54	
Batteries. Batteries shall be labeled with V_{op} , V_{max} , V_{eq} , and polarity.	690.55	
Stand-Alone Systems. Exterior visible notice shall indicate the presence of a stand-alone system and the location and means of disconnection.	690.56(A)	
Plaque at Utility Meter. If PV and utility service disconnects are not located together, service disconnect shall have a label indicating the locations of the PV disconnects.	690.56(B)	
Backfed Circuit Breaker. Circuit breakers backfed from an inverter shall be marked as an additional power source.	690.64(B)(5)	

UTILITY INTERCONNECTION	REFERENCE	COMPLIANCE / NOTES
Listed Inverters. Inverters shall be listed and identified for interactive operation.	690.60; UL1741	
Islanding. Interactive inverters shall de-energize when utility power source is lost.	690.61	
Supply-Side Interconnection. Disconnecting means and overcurrent device shall be provided for a supply-side interconnection.	690.64(A)	
Load-Side Interconnection. Load side interconnections shall be made at dedicated branch circuit or fusible disconnect.	690.64(B)(1)	
Busbar Ratings. Ampere ratings of all breakers feeding panel shall not exceed busbar rating (or 120% of busbar rating for dwellings).	690.64(B)(2)	
GFCI. Interconnection shall be on the line side of any ground-fault protection equipment.	690.64(B)(3)	
Marking. Overcurrent devices supplying power to busbar shall be marked to indicate the presence of all sources of power.	690.64(B)(4)	

BATTERIES AND CHARGE CONTROL	REFERENCE	COMPLIANCE / NOTES
General. Installation shall use appropriate racks, trays, and means of ventilation.	480.8; 480.9; 480.10	
Dwelling Voltage Limit. Operating voltage of battery systems for dwellings shall be less than 50 V nominal.	690.71(B)	
Access. Battery terminals and other live parts shall be guarded and adequate working space shall be provided.	480.99(B), (C)	
Fuses. Current-limiting fuses (types RK-5, RK-1, T) shall be installed on battery output circuits.	690.71(C)	

Cases and Racks. Nonconductive cases are required for batteries greater than 48 V nominal. Conductive racks must be at least 6" from top of battery case.	690.71(D)	
Series Disconnects. Series disconnects shall be provided for battery strings over 48 V nominal.	690.71(E)	
Maintenance Disconnect. A disconnect shall be provided for the grounded conductor of each string for battery systems over 48 V, accessible only to qualified persons.	690.71(F)	
Charge Control. Battery charge control shall be used in any system where charge rates are greater than 3% of battery capacity.	690.72(A)	
Diversion Charge Controller. Diversion charge controllers shall have a secondary, independent means for charge control. DC diversion loads, conductors, and overcurrent devices must be rated for at least 150% of the controller current rating.	690.72(B)	
Temperature Probes. Temperature compensation probes for inverters and charge controllers should be attached to the side of a battery or between batteries.	NABCEP Study Guide	
Battery Wiring. Battery interconnections should be made with #2/0 AWG and larger flexible cables. Such cables shall be listed for hard-service use and identified as moisture-resistant.	690.74 400	