

CITY OF MILPITAS

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INSPECTION CHECKLIST PHOTOVOLTAIC ELECTRICAL POWER SYSTEMS

Referenced Codes:

This checklist is only a guide and applies to any component used or installed in a photovoltaic (PV) system other than a listed, factory-assembled component.

This list should be used in conjunction with Article 690 and other applicable articles of the CEC and includes inspection requirements for both stand-alone and utility-interactive PV systems. Where Article 690 differs from other articles of the NEC, Article 690 takes precedence [CEC 690.3].

**Unless otherwise noted, code references are to the 2022 editions of the California Electrical Code, California Residential Code, and California Building Code.*

| Code Requirements | | Code Section |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| PV ARRAYS | | |
| 1. | Are PV modules listed to UL Standard 1703? | CRC R324.3.1 CBC 3111.3.1 CEC 110.3 CEC 690.4(B) |
| MECHANICAL ATTACHMENT | | |
| 2. | Are modules attached to the mounting structure according to the manufacturer's instructions? | CRC R324.3 CBC 3111.3 |
| 3. | Are roof penetrations secure and weather tight? | CRC R324.4.3 CBC 1503.2 |
| GROUNDING | | |
| 4. | Is each module grounded using the supplied hardware, the grounding point identified on the module, and the manufacturer's instructions? <i>Note: Bolting the module to a 'grounded' structure will usually not meet CEC requirements.</i> | CEC 690.43 |
| 5. | Are properly sized equipment grounding conductors (EGCs) routed with the circuit conductors? | CEC 690.45 |
| CONDUCTOR TYPE | | |
| 7. | Are single-conductor cables in exposed outdoor dc circuits PV wire or cable, or marked sunlight resistant and Type USE-2 or Type RHW-2? | CEC 690.31 |
| 8. | Are conductors in conduit Type RHW-2, THWN-2, or XHHW-2 (90°C, wet-rated)? | CEC 300.9 CEC 310.10(C) CEC 310.15 UL-1703 |
| CONDUCTOR INSULATION | | |
| 9. | Is conductor insulation rated at 90°C to allow for operation at 70°C+? | UL-1703 |
| 10. | If cables or conduits exposed to direct sunlight on or above the rooftop are within 7/8 in. of the roof surface, has 33°C been added to the ambient temperature for derating purposes or have Type XHHW-2 insulated conductors been used? | CEC 310.15(B)(2) |

| Code Requirements | | Code Section | |
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| TEMPERATURE DERATING AMPACITIES | | | |
| 11. | Are the temperature-derated ampacity calculations based on 156% of short-circuit current? | CEC 690.8(A)(1)(a)(1) CEC 690.8(B)(1) | |
| | <i>Note: Suggest temperature derating factors of 65°C in installations where the backs of the module receive cooling air (6" or more from the roof deck) and 75° where no cooling air can get to the backs of the modules. Ambient temperatures exceeding 40°C may require different derating factors.</i> | | |
| 12. | Portable power cords are used only for tracker connections? | CEC 400.10 CEC 690.31 | |
| 13. | Are strain-reliefs, cable clamps, or conduit used for all cables and cords? | CEC 300.4 CEC 400.14 | |
| 14. | Are all components listed for the application and environment? | CEC 690.4(B) | |
| OVERCURRENT PROTECTION | | | |
| 15. | Are overcurrent devices used in PV system dc circuits listed for use in PV systems? | CEC 690.9(B) | |
| 16. | Are overcurrent protection devices rated at 156% of short-circuit current? | CEC 690.8(A)(1)(a)(1) CEC 690.8(B)(1) | |
| 17. | Does each module or series string of modules have any overcurrent protection devices required as part of its listing? | CEC 110.3(B) UL-1703 | |
| ELECTRICAL CONNECTIONS | | | |
| 18. | Are pressure terminals tightened to the recommended torque specification? | CEC 110.14 | |
| 19. | Are crimp-on terminals listed, and installed per the crimping tool specified in their listing? | CEC 110.14 | |
| 20. | Are the twist-on wire connectors listed for the environment (i.e., dry, damp, wet, or direct burial) and installed per the manufacturer's instructions? | CEC 110.14 | |
| 21. | Are the pressure lugs or other terminals listed for the environment (i.e., inside, outside, wet, direct burial)? | CEC 110.14 | |
| 22. | Are the power splicing blocks <i>listed</i> rather than just UL Recognized? | CEC 230.46 | |
| 23. | Are terminals containing more than one conductor listed for multiple conductors? | CEC 110.14 | |
| 24. | Are the connectors or terminals using flexible, <i>fine-stranded</i> conductors listed for use with such conductors (there are different requirements and listing for <i>fine strands</i>)? | CEC 110.14 | |
| CHARGE CONTROLLERS | | | |
| 25. | Is the charge controller listed to UL Standard 1741? | CEC 110.3 | |
| 26. | Are the exposed energized terminals located as to not be readily accessible? | CEC 422.4 | |
| 27. | Does a diversion charge controller have a second independent means to prevent overcharging? | CEC 706.33(B) | |
| DISCONNECTS | | | |
| 28. | Are disconnects in dc circuits listed and labeled for dc operation? <i>Note: Automotive, marine, and telecom devices are not acceptable.</i> | CEC 712.37 | |
| 29. | Is the PV system disconnecting means installed in a readily accessible location? | CEC 690.13(A) | |
| 30. | Are PV wires run outside the building or inside a raceway until the first readily accessible disconnect? | CEC 690.31(C) | |
| 31. | Do the disconnects control all current carrying conductors from the PV source? | CEC 690.13 | |

| Code Requirements | | Code Section | |
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| 32. | Is there a disconnect for PV equipment including modules, fuses, converters, inverters, and charge controllers? | CEC 690.15 | |
| 33. | Are disconnects manually operable switches, circuit breakers, pull out switches, or another approved type? | CEC 690.13(E) | |
| INVERTERS (UTILITY-INTERACTIVE SYSTEMS) | | | |
| 34. | Is the inverter listed to UL 1741 and identified for use in interactive PV power systems? | CEC 110.3 | |
| 35. | Is there a backup charge controller to regulate the batteries <i>[if applicable]</i> when the grid fails? | CEC 690.71 CEC 706.33(B)(3) | |
| 36. | Are the inverter output conductors and equipment protected against overcurrent? | CEC 690.9(A) | |
| 37. | Are the disconnects and overcurrent protection listed for dc and ac? | CEC 110.3 | |
| 38. | Is the sum of 125% of the power source(s) output circuit current and the rating of the overcurrent device protecting the busbar less than the ampacity rating of the busbar? | CEC 705.12(B) | |
| GROUNDING | | | |
| 39. | Are equipment grounding conductors properly sized and connected? | CEC 690.43 | |
| 40. | Are there disconnects and overcurrent protection in both of the ungrounded conductors in each circuit on 12-volt, ungrounded systems? | CEC 240.15 CEC 690.13 | |
| 41. | For dc circuits more than 250 volts dc, has the electrical continuity of metal conduit been ensured using bonding fittings? | CEC 250.97 | |
| CONDUCTORS (GENERAL) | | | |
| 42. | Were standard building wire cables and wiring methods used? | CEC 300.1(A) | |
| 43. | Were wet-rated conductors used in conduits in locations exposed to weather? | CEC 310.10(C) | |
| 44. | Are dc conductors correctly color-coded? <i>Note – This is the same as for ac conductors.</i> | CEC 200.6 | |