This guideline is developed by the Tri-chapter Uniform Code Committee and is intended to enhance regional consistency in application and enforcement of the Building Code. Please verify acceptance of this guideline with your local building department prior to its application.

CODE REFERENCE (S):

2013 California Electrical Code Article 690 Solar Photovoltaic Systems

ISSUE (S):

There is a substantial increase in the number of solar photovoltaic system installations because of the California Solar Initiative and the Governor's support for solar energy. However, the permitting process for these systems is not consistent among jurisdictions. Often times, the submitted plans are incomplete and thus delay permit issuance. This guideline will promote uniformity of solar photovoltaic plans in our region and help expedite permit issuance.

PROPOSED GUIDELINE:

Plans submitted for a permit must contain the following items:

1) Plan view showing location of the PV installation and layout of existing roof framing members that support the system;

2) Details on mounting of PV modules, type and number of roof coverings, and subsequent weatherproofing of the roof;

3) Electrical single-line diagram clearly identifying all devices installed in the PV system and indicating total kVA rating of system;

4) Clearly identify the point of interconnection with the utility supplied wiring system and provide details on main breaker, PV breaker and rating of bussing;
5) Indicate type and size of all conduit and conductors throughout the PV system;

6) Provide manufacturer's cut-sheets and installation instructions for all PV modules, mounting systems, combiner boxes (if used), inverters, and disconnects;

7) Provide structural calculations, prepared by a registered California design professional, if the total weight of the photovoltaic system is over five pounds per square foot;

8) The installation of the PV system shall conform to the requirements of CEC Article 690 and any other applicable articles or standards.

A sample of the plan view and electrical one-line diagram pages are attached.
1. Panels mounted on aluminum racking
2. PV array mounts to roof structure with 5/16" lags embedded 2.5" into rafters or see note #5 below
3. PV panels are anchored at 48" O.C. trusses/rafters are at 24" O.C. or see note #5 below
4. Weight of PV modules and assembly shall be less than 5 lbs per square foot
5. All installation must comply with manufacturer’s installation instructions

**Array Conduit & Wiring Arrangement**

See standard electrical diagram on next drawings for array conduit and wiring arrangement

PV Array Layout & Wiring Plan

A minimum of 3'-0" is required between the edge of the photovoltaic array, the edges of the roof and the roof peak

Customer Name

Address

Drawn By

Check By

Scale

N.T.S.

Date Drawn

Company Logo

Company Name Address
PV MODULE RATING @ STC
MODULE MANUFACTURER ___________________
MODULE MODEL # ___________________
OPEN-CIRCUIT VOLTAGE (Voc) = _______V
SHORT-CIRCUIT CURRENT (Is) = _______A
MAX POWER (Pmax) = _______W
Voc TEMPERATURE COEFF. = _______

No. OF MODULES IN SERIES

SYSTEM VOLTAGE AND CURRENT
(After application of correction factors)
OPEN-CIRCUIT VOLTAGE (Voc) = _______V
SHORT-CIRCUIT CURRENT (Is) = _______A

INVERTER RATING
INVERTER MODEL # ___________________
MAX DC VOLT RATING = _______V
MAX POWER @ 40°C = _______W
NOMINAL DC VOLTAGE = _______V
MAX. AC CURRENT = _______A
MAX OCPD RATING = _______A

AC DISCONNECT RATING
DISCONNECT AMP RATING = _______A
DISCONNECT VOLT RATING = _______V

DC DISCONNECT RATING
DISCONNECT AMP RATING = _______A
DISCONNECT VOLT RATING = _______V

DC GROUNDING ELECTRODE CONDUCTOR SIZE
#8 AWG MIN

AC GROUNDING ELECTRODE CONDUCTOR SIZE
#8 AWG MIN

GROUNDING ELECTRODE CONDUCTOR size per 690.47, PV grounding electrode conductor (min. 8 AWG) connected with irreversible crimp connections per 690.47

CIRCUIT CONDUCTORS
CONDUCTOR SIZE & TYPE:
CONDUCTOR SIZE:
CONDUCTOR TYPE:
NUMBER OF CONDUCTORS:
Red: _______ Black: _______ White: _______
GROUNDING ELECTRODE CONDUCTOR SIZE: #8 AWG MIN

SYSTEM VOLTAGE AND CURRENT
(After application of correction factors)
OPEN-CIRCUIT VOLTAGE (Voc) = _______V
SHORT-CIRCUIT CURRENT (Is) = _______A

INVERTER RATING
INVERTER MODEL # ___________________
MAX DC VOLT RATING = _______V
MAX POWER @ 40°C = _______W
NOMINAL DC VOLTAGE = _______V
MAX. AC CURRENT = _______A
MAX OCPD RATING = _______A

AC DISCONNECT RATING
DISCONNECT AMP RATING = _______A
DISCONNECT VOLT RATING = _______V

DC DISCONNECT RATING
DISCONNECT AMP RATING = _______A
DISCONNECT VOLT RATING = _______V

Notes:
1. INSTALLER TO BE PREPARED TO PROVIDE PHYSICAL PROOF THAT PANELS INSTALLED IN FIELD MATCH THOSE SPECIFIED ON PLANS AND TO PROVIDE ATTIC ACCESS TO VERIFY ARRAY ATTACHMENTS UPON REQUEST.
2. AC & DC SIDE GROUNDING ELECTRODE CONDUCTOR TO BE BONDED PER ART. 690.47, AND MADE WITH IRREVERSIBLE CONNECTION PER ART. 250.64(C).
3. BONDING JUMPER REQUIRED TO MAINTAIN CONTINUITY BETWEEN SOURCE OF OUTPUT CIRCUIT GROUNDED CONDUCTOR WHILE PV EQUIPMENT IS REMOVED PER ART. 690.49.
4. PROVIDE SYSTEM LABELS AND WARNING FOR DC DISCONNECT, AC DISCONNECT AND INVERTER. LABELS TO BE AFFIXED PRIOR TO FINAL INSPECTION. WHERE ALL TERMINALS OF A DISCONNECTING MEANS ARE CAPABLE OF BEING ENERGIZED IN AN OPEN POSITION, A WARNING SIGN PER 690.17 MUST BE SUPPLIED.
5. ALL SYSTEMS INCLUDING SUPPORT FRAME SHALL BE GROUNDED IN ACCORDANCE WITH 690.43. EQUIPMENT GROUNDING CONDUCTORS FOR PHOTOVOLTAIC MODULES SMALLER THAN A #6 SHALL COMPLY WITH 250.120(C).

SAMPLE ELECTRICAL DIAGRAM FOR SMALL SCALE, SINGLE-PHASE PV SYSTEMS
(Revised TUCC Policy #11 - May 8, 2014)