ICC
TRI-CHAPTER
UNIFORM CODE COMMITTEE (TUCC)

POLICY NUMBER: **11**

APPROVAL DATE: **November 6, 2008**

REVISION DATE: **July 8, 2010 (Electrical Diagram)**

SUBJECT: **Residential (Single-Family) Roof Mounted Solar Photovoltaic System Utility Grid - Tie Connection**

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):

2007 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.

PV ARRAY LAYOUT & WIRING PLAN

MOUNTING NOTES

1.PANELS MOUNTED ON ALUMINUM RACKING

2.PV ARRAY MOUNTS TO ROOF STRUCTURE WITH $\frac{5}{16}$" LAGS ENBEDDED $2\frac{1}{2}$" INTO RAFTERS OR SEE NOTE 5 BELOW

3. PV PANELS ARE ANCHORED @ 48" O.C.
TRUSSES/ RAFTERS ARE 24"O.C. OR SEE NOTE 5 BELOW

4.WEIGHT OF PV MODULES AND ASSMEBLY LESS THAN 5 LBS PER SQAURE FOOT

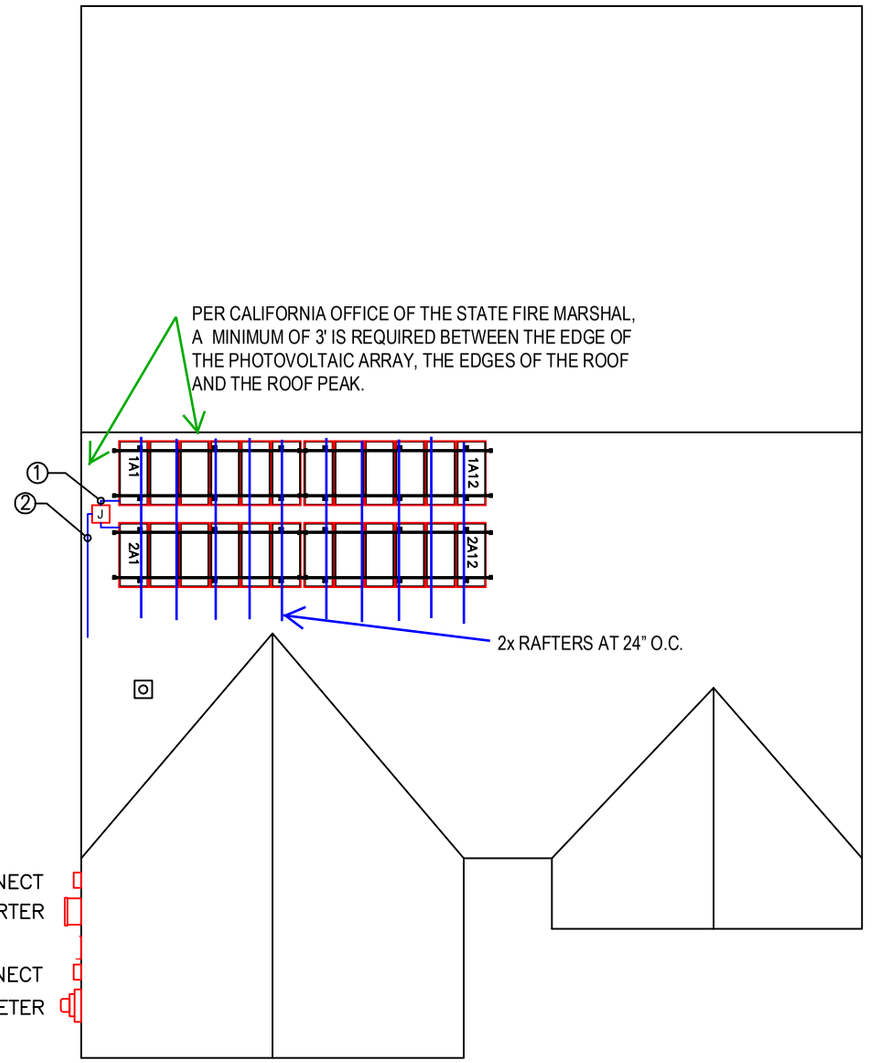
5. ALL INSTALLATIONS MUST COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.

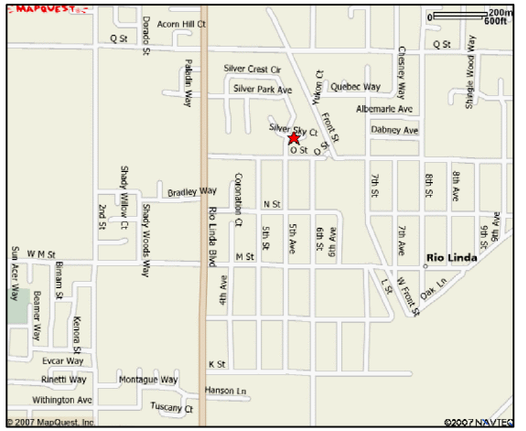
ARRAY CONDUIT & WIRING ARRANGEMENT

1. FREE–AIR / ½" CONDUIT SLEEVE**
(2) #12 AWG; R, W

2. TO DC DISONNECT
1/2" CONDUIT
(4) #12 AWG; (2)R, (2)W
(1) #8 GND

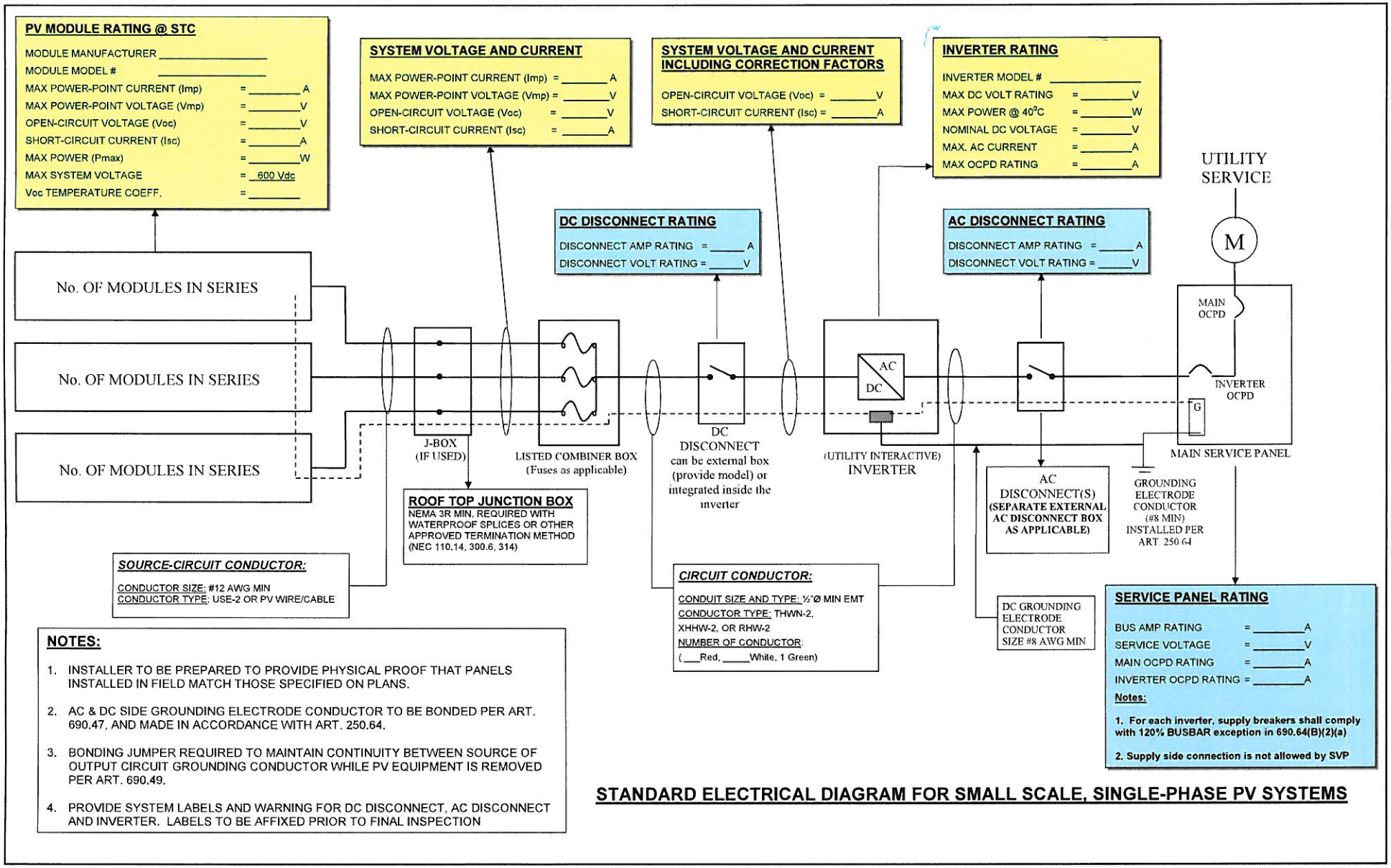
** SLEEVE PROVIDES PROTECTION FROM PHYSICAL DAMAGE PER NEC 300.13 & 300.18





SITE MAP

CUSTOMER NAME			
ADDRESS			
DRAWN BY	?	CHECKED BY	?
SCALE	NTS	DATE DRAWN	?
COMPANY LOGO	COMPANY NAME ADDRESS		


PV MODULE RATING @ STC
MODULE MANUFACTURER _____
MODULE MODEL # _____
MAX POWER-POINT CURRENT (Imp) = _____ A
MAX POWER-POINT VOLTAGE (Vmp) = _____ V
OPEN-CIRCUIT VOLTAGE (Voc) = _____ V
SHORT-CIRCUIT CURRENT (Isc) = _____ A
MAX POWER (Pmax) = _____ W
MAX SYSTEM VOLTAGE = 600 Vdc
Voc TEMPERATURE COEFF. = _____
SYSTEM VOLTAGE AND CURRENT
MAX POWER-POINT CURRENT (Imp) = _____ A
MAX POWER-POINT VOLTAGE (Vmp) = _____ V
OPEN-CIRCUIT VOLTAGE (Voc) = _____ V
SHORT-CIRCUIT CURRENT (Isc) = _____ A
SYSTEM VOLTAGE AND CURRENT INCLUDING CORRECTION FACTORS
OPEN-CIRCUIT VOLTAGE (Voc) = _____ V
SHORT-CIRCUIT CURRENT (Isc) = _____ 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
UTILITY SERVICE
M
DC DISCONNECT RATING
DISCONNECT AMP RATING = _____ A
DISCONNECT VOLT RATING = _____ V
AC DISCONNECT RATING
DISCONNECT AMP RATING = _____ A
DISCONNECT VOLT RATING = _____ V
No. OF MODULES IN SERIES
No. OF MODULES IN SERIES
No. OF MODULES IN SERIES
J-BOX (IF USED)
LISTED COMBINER BOX (Fuses as applicable)
DC DISCONNECT can be external box (provide model) or integrated inside the inverter
AC
DC
(UTILITY INTERACTIVE) INVERTER
MAIN OCPD
INVERTER OCPD
G
MAIN SERVICE PANEL
ROOF TOP JUNCTION BOX
NEMA 3R MIN. REQUIRED WITH WATERPROOF SPLICES OR OTHER APPROVED TERMINATION METHOD (NEC 110.14, 300.6, 314)
AC DISCONNECT(S) (SEPARATE EXTERNAL AC DISCONNECT BOX AS APPLICABLE)
GROUNDING ELECTRODE CONDUCTOR (#8 MIN) INSTALLED PER ART. 250.64
SOURCE-CIRCUIT CONDUCTOR:
CONDUCTOR SIZE: #12 AWG MIN
CONDUCTOR TYPE: USE-2 OR PV WIRE/CABLE
CIRCUIT CONDUCTOR:
CONDUIT SIZE AND TYPE: ½"Ø MIN EMT
CONDUCTOR TYPE: THWN-2, XHHW-2, OR RHW-2
NUMBER OF CONDUCTOR: (___Red, ____White, 1 Green)
DC GROUNDING ELECTRODE CONDUCTOR SIZE #8 AWG MIN
SERVICE PANEL RATING
BUS AMP RATING = _____ A
SERVICE VOLTAGE = _____ V
MAIN OCPD RATING = _____ A
INVERTER OCPD RATING = _____ A
Notes:
1. For each inverter, supply breakers shall comply with 120% BUSBAR exception in 690.64(B)(2)(a)
2. Supply side connection is not allowed by SVP
NOTES:
1. INSTALLER TO BE PREPARED TO PROVIDE PHYSICAL PROOF THAT PANELS INSTALLED IN FIELD MATCH THOSE SPECIFIED ON PLANS.
2. AC & DC SIDE GROUNDING ELECTRODE CONDUCTOR TO BE BONDED PER ART. 690.47, AND MADE IN ACCORDANCE WITH ART. 250.64.
3. BONDING JUMPER REQUIRED TO MAINTAIN CONTINUITY BETWEEN SOURCE OF OUTPUT CIRCUIT GROUNDING 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
STANDARD ELECTRICAL DIAGRAM FOR SMALL SCALE, SINGLE-PHASE PV SYSTEMS