



# Residential Rooftop Photovoltaic Systems



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## For Jurisdictions Within Sonoma County

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### Purpose

In an effort to promote a consistent methodology for processing permits by all jurisdictions within Sonoma County, this standardized permit submittal has been developed for residential (one and two family dwellings and legally permitted accessory buildings) roof mounted PV systems in cooperation with the Redwood Empire Association of Code Officials and Solar Sonoma County. If the project is located in a historical district, in a homeowner's association, or is a ground mount system, additional requirements for review may be required.

**Effective Dates:** This document is effective September 10, 2012 through December 31, 2013. Revisions may be necessary based upon adoption and effective date of 2013 California Code of Regulations, Title 24, and/or local amendments.

### Design and Review

1. All PV applications shall be reviewed at the front counter for completeness. If possible, every attempt will be made to review and approve projects that are residential PV systems "over-the-counter".
2. Systems using new technology (i.e., microinverters, thin film panels, etc.) may be required to submit detailed plans and specifications for plan review.
3. All PV system plans shall specify:
  - a. Conductor wiring methods and wire type, system and solar panel grounding methods as per inverter and solar panel manufacturer's listings, and PV system DC and AC disconnects.
  - b. Signage [on panel(s), disconnects and transmission line conductors].
  - c. Placement of equipment and modules with associated access and pathways.
  - d. Equipment type, listing, testing agency approvals, etc.
  - e. Module attachment details.
4. Printed material shall be resistant to fading per UL 969, and CEC Article 690.

### Worksheet Requirements

1. General information: Name of applicant, address of project, name of licensed contractor, size of system (DC Rating) being installed.
2. Completion of system detail worksheet and site plan. (attached)
3. Single line diagram of electrical equipment clearly showing size of main panel, sub panels, PV system equipment, including make, model, size of units, and disconnects.
4. Listing information, including mounting attachment to roof, wire type, method of grounding, of PV modules and mounting racks.



## **Photovoltaic Disconnect Requirements**

1. PV disconnect shall be installed in a readily accessible location and located together when possible. All electrical panel disconnecting means shall be designed to shut off all power (solar and domestic).
2. Microinverter systems must have label on the exterior of the main service panel stating "Microinverter System Solar Breaker inside Panel is PV System Disconnect".
  - a. A separate AC disconnect may be required between micro-inverter systems and the main service panel. Check with local jurisdiction.*

## **Protection of Emergency Responders**

The following conditions shall be verified and apply to all roof and ground mount solar PV systems:

1. All sharp edges and fastener tips shall be covered or crimped over to eliminate sharp edges. This will minimize risk of injury to emergency responders (or any other individual accessing the roof top).
2. All roof surface mounted conduits, pipes, braces, etc. crossing the pathways are to be clearly identified by a red/white reflective tape, or other approved identifying material. Check with the local jurisdiction for the disconnect requirements of these systems.

## **Access Requirements & Array Configurations**

All arrays shall be mounted per the listing installation instructions of the system. Pathways shall be established in the design of the solar installation and clearly indicated on the plans. All roof access pathways shall be located at a structurally supported location on the building, such as over a bearing wall, or beam lines. Arrays shall be located in a manner that provides access pathways for the following conditions:

1. Residential buildings with hip roof layouts: Modules shall be located in a manner that provides one 3 ft. wide clear pathway from the eave to the ridge on each roof slope where panels are located.
2. Residential buildings with a single ridge: Modules shall be located in a manner that provides two three-foot (3') wide access pathways from the eave to the ridge on each roof slope where arrays are located.
3. Hips and valleys: Panels/modules shall be located no closer than 18 inches (457 mm) to a hip or a valley if panels/modules are to be placed on both sides of a hip or valley. If the panels are to be located on only one side of a hip or valley that is of equal length then the panels shall be permitted to be placed directly adjacent to the hip or valley.

Modules shall be located no higher than 3 ft. below the ridge for fire ventilation purposes.

**Project shall comply with local fire codes of the respective jurisdictions. The State Fire Marshal Guidelines or proposed International Fire Code changes have been adopted by local jurisdictions as amendments to the 2010 California Fire Code and are enforced by local jurisdictions. It is recommended that for installations not in conformance with the State Fire Marshal Guidelines, you contact the local fire and building department prior to submitting your application.**

**SUBMIT AND SIGN THE COMPLETED CHECKLIST WITH YOUR APPLICATION**

PROPERTY OWNER \_\_\_\_\_  
 PROJECT LOCATION \_\_\_\_\_

**INSTALLER'S COMPANY NAME, ADDRESS, & LICENSE NUMBER**

COMPANY NAME \_\_\_\_\_  
 BUSINESS ADDRESS \_\_\_\_\_  
 BUSINESS PHONE \_\_\_\_\_ STATE LIC. NO. \_\_\_\_\_

**INSTALLER'S SIGNATURE** \_\_\_\_\_ **DATE** \_\_\_\_\_

By signing, I certify the information I have provided is correct and agree to comply with all applicable city or county ordinances and state laws and that the project identified above will be installed in accordance with the requirements set forth in the 2010 California Code of Regulations, Title 24, and local code amendments.

**WORKSHEET INFORMATION - ROOF DESIGN  
 PV SYSTEM COMPONENTS**

APPROXIMATE AGE OF ROOF: \_\_\_\_\_ ROOFING TYPE:  COMP SHINGLE  TILE  SHAKE  METAL  OTHER  
 RAFTER SIZE: \_\_\_\_\_ **X** \_\_\_\_\_ RAFTER SPACING  16" O.C  24" O.C.  OTHER: \_\_\_\_\_  
 WORST CASE RAFTER SPAN SUPPORTING ARRAY (FT-IN.): \_\_\_\_\_ ARRAY WEIGHT: \_\_\_\_\_ LBS. PER SF.  
 RAFTERS THAT ARE OVER-SPANNED OR IF THE ARRAY IS OVER 5 LBS. PER SF., DESIGN BY A LICENSED PROFESSIONAL MAY BE REQUIRED

**PV MODULE RATINGS**

MODULE MANUFACTURER \_\_\_\_\_  
 MODULE MODEL \_\_\_\_\_  
 MAX POWER-POINT CURRENT ( $I_{mp}$ ) \_\_\_\_\_ A  
 MAX POWER-POINT VOLTAGE ( $V_{mp}$ ) \_\_\_\_\_ V  
 OPEN-CIRCUIT VOLTAGE ( $V_{oc}$ ) \_\_\_\_\_ V  
 SHORT-CIRCUIT CURRENT ( $I_{sc}$ ) \_\_\_\_\_ A  
 MAX SERIES FUSE (OCPD) \_\_\_\_\_ A  
 MAXIMUM POWER ( $P_{max}$ ) \_\_\_\_\_ W  
 MAX VOLTAGE (TYP 600V<sub>DC</sub>) \_\_\_\_\_ V  
 VOC TEMP COEFF \_\_\_\_\_  
 IF COEFF SUPPLIED CIRCLE UNITS \_\_\_\_\_

**INVERTER RATING**

INVERTER MANUFACTURER \_\_\_\_\_  
 INVERTER MODEL \_\_\_\_\_  
 MAX DC VOLT RATING \_\_\_\_\_ V  
 MAX POWER @ 40° C \_\_\_\_\_ W  
 NORMAL AC VOLTAGE \_\_\_\_\_ V  
 MAX AC CURRENT \_\_\_\_\_ A  
 MAX OCPD RATING \_\_\_\_\_ A

**SIGN FOR DC DISCONNECT  
 PHOTOVOLTAIC POWER SOURCE**

RATED MPP CURRENT \_\_\_\_\_ A  
 RATED MPP VOLTAGE \_\_\_\_\_ V  
 MAX SYSTEM VOLTAGE \_\_\_\_\_ V  
 MAX CIRCUIT VOLTAGE \_\_\_\_\_ A

**MODULE CONFIGURATION**

NO. MODULES IN SERIES \_\_\_\_\_  
 NO. OF STRINGS IN PARALLEL \_\_\_\_\_  
 TOTAL RATED POWER OF SYSTEM (@STC) \_\_\_\_\_  
 AC GROUNDING \_\_\_\_\_ AWG \_\_\_\_\_ CEC Sec  
 ELECTRODE CONDUCTOR \_\_\_\_\_ 690.47 (C) (2)

**SIGN FOR INVERTER OCPD AND AC DISCONNECT  
 (IF USED)**

AC OUTPUT CURRENT \_\_\_\_\_ A  
 NOMINAL AC VOLTAGE \_\_\_\_\_ V

## Plan Submittal Checklist

1. All PV system plans shall show and/or specify in the following order:
  - \_\_\_ a. Basic site plan provided showing location of structure and equipment.
  - \_\_\_ b. Array configuration and placement of equipment and modules on roof with dimensioned access and pathways.
  - \_\_\_ c. Electrical single line drawing including:
    - showing size and location of the main electrical panel and sub panels
    - equipment grounding
    - combiner/junction box location
    - the AC / DC disconnect box
    - conduit size from the array to the power source
    - inverter string sizing or micro inverter branch circuit details.
    - conductor wiring methods and insulation rating, system and solar panel grounding methods as per inverter and solar panel manufacturer's listings, and PV system DC and AC disconnects.
    - listing information, including mounting, wire type, method of grounding, of PV modules and mounting racks.
  - \_\_\_ d. Signage (on panel(s), disconnects and transmission line conductors).
  - \_\_\_ e. Provide cut sheets for all PV equipment and mounting systems including, but not limited to:
    - PV modules
    - rack mounting system
    - mounting brackets
    - grounding hardware
    - inverters or micro inverters
    - panel and rack attachment details
  - \_\_\_ f. Equipment type, listing, testing agency approvals, etc.
  - \_\_\_ g. Plans must show compliance with amendments to the California Fire Code by the local jurisdiction (see attachment).
  - \_\_\_ h. Permanent labels and signage with a red background and white lettering resistant to fading pursuant to UL 969 and California Electrical Code Article 690 and permanently affixed.

*\*Points 1a. and 1b. may be listed on the same diagram.*