

February 15, 2011

# SANTA ROSA FIRE DEPARTMENT FIRE PREVENTION BUREAU PLAN REVIEW CHECKLIST



## PHOTOVOLTAIC SYSTEMS

<b>Address:</b>		<b>Permit #:</b>
<b>Inspector:</b>	<b>Date:</b>	<b>Status:</b>
<b>Inspector:</b>	<b>Date:</b>	<b>Status:</b>
<b>A-Approved; AC-Approved w/comments; I-Incomplete; D-Denied</b>		

This Checklist outlines general requirements. Information contained herein applies to typical instances and may not address all circumstances.

### REFERENCES

Standard for Fire Safety Elements of Solar Photovoltaic Systems

### FILE REVIEW

**Y**      **N**     Permit fees entered in Permits Plus. 3<sup>rd</sup> or greater checks require an hourly fee for the review.

### GENERAL REQUIREMENTS FOR ALL SYSTEMS:

- Marking.** PV Systems shall be identified using weather resistant signage. UL 969 shall be used as a standard for weather rating
- Signage.** The Main Service Disconnect shall be equipped with a warning sign:
  - o Residential - the marking may be placed within the main service disconnect
  - o Commercial - the marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the lever is operated.
  - o Marking Sign Details
    - Red Background
    - White Lettering
    - Minimum 3/8" Letter Height
    - All capital letters
    - Arial or similar font, Non-bold
    - Reflective weather resistant material suitable for the environment (durable adhesive materials must meet this requirement)

**CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED**

- Marking DC Circuit** - Marking is required on all interior and exterior DC conduit, raceways, enclosures, cable assemblies, and junction boxes:
  - o Marking shall be placed every 10 feet, at turns and above and/or below penetrations, and at all DC combiner and junction boxes.

Y

N

**Marking Sign Details**

- Red Background
- White Lettering
- Minimum 3/8" Letter Height
- All capital letters
- Arial or similar font, Non-bold
- Reflective weather resistant material suitable for the environment (durable adhesive materials must meet this requirement).

**CAUTION: SOLAR CIRCUIT**

**Remote Disconnect** - DC Circuits shall be equipped with a means for remote disconnect located downstream from the photovoltaic array at the point where the circuit enters the structure.

- Control of the remote disconnect shall be located within five feet of the building's main electrical panel.
- The remote disconnect shall be listed and meet the requirements of the California Electrical Code.

Exceptions:

1. DC Circuits contained in rigid or electrical metallic tubing running between the array combiner box and the main electrical panel which are entirely exterior to the building need not be equipped with a means of remote disconnect other than the disconnects intrinsic to the system.
2. DC Circuits contained in rigid or electrical metallic tubing running between the array combiner box and the main electrical panel that run through the interior of the building when installed a minimum of 18" below the roof assembly when measured parallel to the surface of the roof.
3. The system inverter may be used for remote disconnect when located immediately upstream of the roof penetration where the circuit enters the structure.

**DC Disconnect Signage** shall be located immediately next to the remote disconnect control as follows:

- Marking Content: CAUTION: SOLAR CIRCUIT DISCONNECT
- Red Background
- White Lettering
- Minimum 3/8" Letter Height
- All capital letters
- Arial or similar font, Non-bold
- Reflective weather resistant material suitable for the environment (durable adhesive materials must meet this requirement)

**CAUTION: SOLAR CIRCUIT DISCONNECT**

**Access, Pathways, and Smoke Ventilation**

- Ensure access to the roof
- Provide pathways to specific areas of the roof
- Provide for smoke ventilation opportunity areas
- Provide emergency egress from the roof

See Exceptions next page:

Exceptions to this requirement may be requested where access, pathway or ventilation requirements are reduced due to:

- Unique site specific limitations
- Alternative access opportunities (as from adjoining roofs)
- Ground level access to the roof area in question
- Other adequate ventilation opportunities when approved by the fire code official
- Adequate ventilation opportunities afforded by panel set back from other rooftop equipment (for example: shading or structural constraints may leave significant areas open for ventilation near HVAC equipment)
- Automatic ventilation device
- New technology, methods, or other innovations that ensure adequate fire department access, pathways and ventilation opportunities

Designation of ridge, hip, and valley does not apply to roofs with 2-in-12 or less pitch. All roof dimensions are measured to centerlines.

A roof access points shall be defined as an area that does not require ladders to be placed over openings (i.e., windows, vents, or doors), that are located at strong points of building construction and in locations where ladders will not be obstructed by tree limbs, wires, signs or other overhead obstructions.

**OCCUPANCY SPECIFIC**

**Residential – Single and Two-Unit Residential Dwellings**

- | Y                        | N                        |  |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Layout</b> – Refer to the roof diagrams in the PV Standard  |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Access</b> <ul style="list-style-type: none"><li>○ <b>Residential Buildings with hip roof layouts:</b><ul style="list-style-type: none"><li>▪ Provide one three-foot wide clear access pathway from the eave to the ridge on each roof slope where panels are located. The access pathway shall be located at a structurally strong location on the building (such as a bearing wall).</li></ul></li><li>○ <b>Residential Buildings with a single ridge:</b><ul style="list-style-type: none"><li>▪ Provides two three-foot wide access pathways from the eave to the ridge on each roof slope where panels are located.</li></ul></li><li>○ <b>Hips and Valleys:</b><ul style="list-style-type: none"><li>▪ Modules shall be located no closer than one and one half feet to a hip or a valley if panels 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 may be placed directly adjacent to the hip or valley.</li></ul></li></ul> |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Ventilation</b> <ul style="list-style-type: none"><li>○ Modules shall be located no higher than three feet below the ridge.</li></ul>   |

**Commercial Buildings and Residential Housing with three or more units.**

- |                          |                          |  |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Layout</b> – Refer to the roof diagrams in the PV Standard                                |
| <input type="checkbox"/> | <input type="checkbox"/> | <b>Access.</b> Provide a minimum six foot wide clear perimeter around the edges of the roof. |

Exception: If either axis of the building is 250 feet or less, there shall be a minimum four feet wide clear perimeter around the edges of the roof.

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Y      N

- Pathways.** Pathways shall meet the following requirements:
  - Shall be over structural members.
  - Center line axis pathways shall be provided in both axes of the roof. Center line axis pathways shall run on structural members or over the next closest structural member nearest to the center lines of the roof.
  - It shall be in a straight line not less than four feet clear width to skylights and/or ventilation hatches.
  - It shall be a straight line not less than four feet clear width to roof fire protection standpipe outlets.
  - It shall provide not less than four feet clear width around roof access hatch with at least one pathway not less than 4 feet in clear width to parapet or roof edge.
  
- Ventilation.** Arrays shall be no greater than 150 by 150 feet in distance in either axis. Ventilation options between array sections shall be either:
  - A pathway eight feet or greater in width
  - Four feet or greater in width pathway and bordering on existing roof skylights or ventilation hatches
  - Four feet or greater in width pathway and bordering 4' X 8' "venting cutouts" every 20 feet on alternating sides of the pathway.

**LOCATION OF DC CONDUCTORS**

- Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities.
  
- Conduit runs between sub arrays and to DC combiner boxes shall use the design that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes are to be located such that conduit runs are minimized in the pathways between arrays.
  
- To limit the hazard of cutting live conduit in venting operations, DC wiring shall be run in metallic conduit or raceways when located within enclosed spaces in a building and shall be run, to the maximum extent possible, along the bottom of load-bearing members.

**OTHER**

- Setback requirements do not apply to ground-mounted, free standing photovoltaic arrays. A clear brush area of 10' is required for ground mounted photovoltaic arrays.