



# CITY OF NEWPORT BEACH

## COMMUNITY DEVELOPMENT DEPARTMENT

### LIFE SAFETY SERVICES

# GUIDELINES AND STANDARDS

## Guideline D.06 - Fire Safety Elements of Solar Photovoltaic Roof Systems

### D.06.1 PURPOSE

The installation of solar photovoltaic (PV) roof systems presents a cause of concern for fire fighters safety and firefighting operations including: ability to visibly identify presence of PV system, visibly differentiate PV from non-PV tiles, walking on tiles, firefighter ventilation operations etc. This guideline establishes the minimum standard for the installation of a solar photovoltaic roof system and is intended to mitigate the fire safety issues.

### D.06.2 SCOPE

This guideline applies to all solar photovoltaic roof systems for residential purposes.

### D.06.3 GENERAL REQUIREMENTS

1. Fire Classification for Roof Mounted Solar Photovoltaic Panels/Modules (Systems) and Application of the 2016 California Fire & Building Standards Code.

2016 California Building Code Section 1505.9 Photovoltaic panels and modules. Effective January 1, 2015, Rooftop mounted photovoltaic panels and modules shall be tested, listed and identified with a fire classification in accordance with UL 1703. The fire classification shall comply with Table 1501.1 based on the type of construction of the building.

2. Marking

Each PV system disconnecting means shall be permanently marked to identify it as a PV system disconnect. (California Electrical Code (CEC) 690.13 (B))

Materials used for marking shall be weather resistant. UL 969 shall be used as a standard for weather rating (UL listing of markings is not required).

#### Rapid Shut Down

Cable runs to the rapid shut down box shall be marked. The rapid shut down lines, which run along the roof perimeter, roof ridge, and rapid shut down box location, cannot be shut down or cut by firefighters. With activation of the rapid

shut down device, these lines remain energized. Markings shall be placed every 10 feet on the rapid shut down cable.

#### Marking Content and Format

- Marking Content: CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED
- 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**

#### Main Service Disconnect

Marking may be placed within the main service disconnect. If the main service disconnect is operable with the service panel closed, then the marking should be placed on the outside cover.

#### Marking Content and Format

- Marking Content: CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED
- 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 to alert the fire service to avoid cutting them. Marking shall be placed every 10 feet, at turns and above and/or below penetrations, and at all DC combiner and junction boxes.

### Marking Content and Format

- Marking Content: CAUTION: SOLAR CIRCUIT
- 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**

## Inverters

The inverter is a device used to convert DC electricity from the solar system to AC electricity for use in the building's electrical system or the grid.

No markings are required for the inverter.

### 3. DC wiring

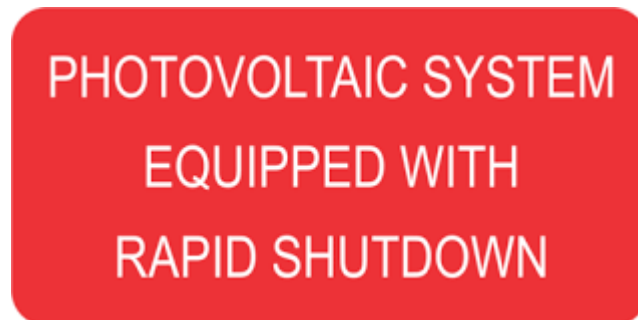
DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members. CFC Sec. 605.11.1.2.6. Exterior DC wiring to be in Ridged Metal Conduit. EMT is not allowed to be exposed to the exterior for AC or DC wiring. NBMC 15.06.040.

### 4. Rapid Shut Down

The rapid shut down (RSD) has two parts, the RSD controller (located at ground level) and RSD box (located 10' from array at roof level). RSD allows firefighters

to quickly and easily control the PV system circuits leaving roof-mounted array. With activation of the RSD, power is shut down from all wiring leaving the array within 30 seconds. As per CEC 690.12, PV system circuits installed on or in buildings shall include a rapid shutdown function that control specific conductors as follows:

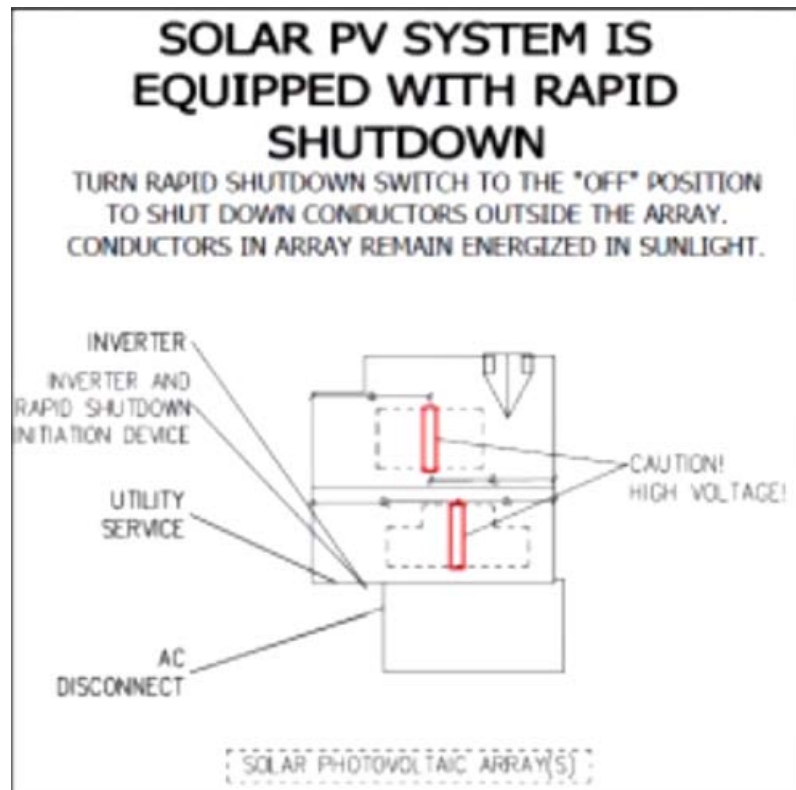
- a. Requirements for controlled conductors shall apply only to PV system conductors or more than 5' in length inside a building, or more than 10' from a PV array.
- b. Controlled conductors shall be limited to not more than 30 volts and 240 volt-amperes within 30 seconds of rapid shutdown initiation.
- c. Voltage and power shall be measured between any two conductors and between any conductor and ground.
- d. The rapid shutdown initiation methods shall be labeled in accordance with CEC 690.56(C).
- e. Equipment that performs the rapid shutdown shall be listed and identified.



The plaque shall be reflective, with all letters capitalized and having a minimum height of 9.5mm ( $\frac{3}{8}$  in.), in white on red background. CEC 690.56 (C).

#### Placard for Fire Department

A placard is required for the rapid shut down device. The placard shall be located no more than three feet from the service disconnecting means to which the PV system is connected. The placard shall include a simple diagram of a building with a roof. The diagram shall have sections in red to signify sections of the PV system that are not shutdown when the rapid shutdown switch is operated.



## 5. Maximum Number of Disconnects

The PV system disconnecting means shall consist of not more than six switches or six circuit breakers mounted in a single enclosure or in a group of separate enclosures. The PV system disconnecting means shall be grouped with other disconnecting means for the system in accordance with 690.13(D). A PV disconnecting means shall not be required at the PV module or array location. CEC 690.13 (D) & (E).

## 6. Smoke Ventilation Operations

In order to conduct vertical ventilation, the tiles (excluding trunk area) must be able to be lifted and removed from the roof. Tiles shall be free and independent from roof system for easy removal. Clips used to secure tiles must be approved by Newport Beach Fire Department (NBFD) to determine if they are suitable for easy removal.