# CITY OF MONTE SERENO

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# RESIDENTIAL PHOTOVOLTAIC SYSTEMS

## BUILDING DIVISION REQUIREMENTS

A permit is required to install a photovoltaic system. Permits are required prior to installation or replacement of photovoltaic (PV) systems. Following is a listing of the general requirements for permit applications based on the 2022 California Electrical Code, 2022 California Building Code, and 2022 California Residential Code. This brochure is intended to provide general information, contact the Building Department for any questions or additional information.

### Installation Standards

- PV systems shall be installed by qualified persons. This is defined as a person who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid hazards involved. (CEC 690.4 (C))
- Penetrations of the roof material shall be sealed in accordance with the roofing manufacturer's requirements. (CBC 107.2.4 and CRC R907)

### Electrical Requirements

- PV panels and modules shall be listed and labeled in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. Inverters shall be listed in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction. All other associated equipment shall be listed by a nationally recognized testing laboratory (i.e. UL) for the intended application (CEC 690.13)
- The PV main disconnecting breaker shall be located at the opposite end of the bus bar from the main disconnecting circuit breaker.
- PV conductors shall be sized at 125% of the maximum PV current. (CEC 705.12(B)(1))
- Circuit breakers that are back-fed must be suitable for such operation (circuit breakers labeled "Line" and "Load" are not suitable for back-feeding.) (CEC 710.15, 705.12(D))
- All equipment frames shall be grounded. (CEC 690.43)
- A grounding electrode conductor shall not be less than the following:

| GROUNDING ELECTRODE CONDUCTOR FOR AC SYSTEMS (Table 250.66) | | | |
|---|---|---|---|
| Size of Largest Ungrounded Service-Entrance Conductor | | Size of Grounding Electrode Conductor | |
| Copper | Aluminum or Copper-Clad Aluminum | Copper | Aluminum or Copper-Clad Aluminum |
| 2 or smaller | 1/0 or smaller | 8 | 6 |
| 1 or 1/0 | 2/0 to 3/0 | 6 | 4 |
| 2/0 or 3/0 | 4/0 or 250 | 4 | 2 |

## Disconnecting Means

- Means shall be provided to disconnect the PV system from all wiring systems including energy storage, power, and utilization equipment associated with premises wiring. (CEC 690.13)
- The PV system disconnecting means shall be installed at a readily accessible location. Where disconnecting means of systems above 30V are readily accessible to unqualified persons, any enclosure door or hinged cover that exposes live parts when open shall be locked or require a tool to open. (CEC 690.13)
- Each PV system disconnecting means shall plainly indicate whether in off or on position and be permanently marked “PV SYSTEM DISCONNECT” or equivalent. (CEC 690.13(B))

## Rapid Shutdown Requirements

PV system circuits installed on or in buildings shall include a rapid shutdown function that controls specific conductors as follows: (CEC 690.12)

- Controlled conductors outside of the array boundary shall comply with CEC 690.12(B)(1) and inside the array boundary shall comply with CEC 690.12(B)(2).
- Controlled conductors shall be limited to not more than 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation. (CEC 690.12(B)(1))
- Voltage and power shall be measured between any two conductors and between any conductor and ground. (CEC 690.12(B)(2))

## **Roof Pathways** (CBC 3111, CRC R324.6)

PV panels shall be located to provide the following roof-top clearances (except for PV installed on a detached non-habitable building or on roofs with a slope of 2:12 or less):

- **Pathways**. At least two pathways shall be provided on all buildings. These two pathways shall be on separate roof planes and located from the lowest roof edge to the ridge and be a minimum of 36” wide. At least one pathway shall be provided on the street or driveway side of the roof.

  Each roof plane with a PV array shall have a pathway that is a minimum of 36” wide and provided from the lowest roof edge to the ridge on the same roof plane as the PV array, on an adjacent roof plane, or straddling the same and adjacent roof planes.

Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be in areas with minimal obstructions such as vent pipes, conduit, or mechanical equipment.

- **Setback at Roof Ridge**. PV systems covering not more than 33% (or 66% if the building has fire sprinklers) the roof area shall have a minimum 18" setback from both sides of a horizontal roof ridge. Where a PV system covers more than 33% (or 66% where the building has fire sprinklers) of the roof area, a minimum 36" setback from both side of a horizontal roof ridge is required.

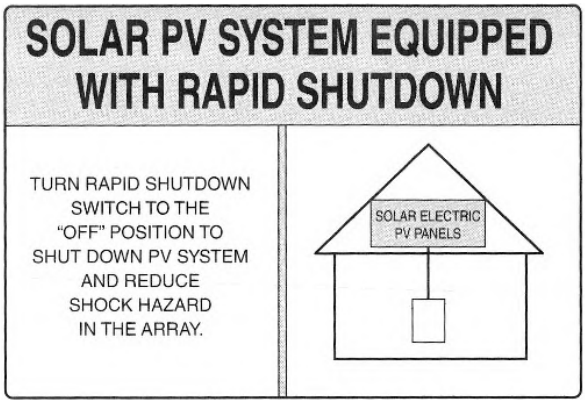
## Structural Requirements

Unless otherwise designed by a California registered civil/structural engineer with calculations, plans, and details (stamped and signed by the engineer of record and approved by the city), PV systems shall meet the following structural requirements:

- The roof shall be structurally sound without signs of structural deflection or sagging.
- The combined weight of the modules and support components shall not exceed 5 psf.
- The clearance from the underside of the module and the roof surface shall be a minimum of 2" and a maximum of 10".
- Panels shall be anchored to the roof framing at a maximum of 4' on center in each direction with a minimum 5/16" diameter bolt embedded a minimum of 2-1/2" into the roof framing.

## Marking/Labeling Requirements

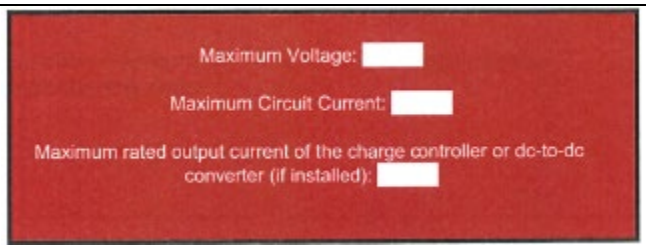
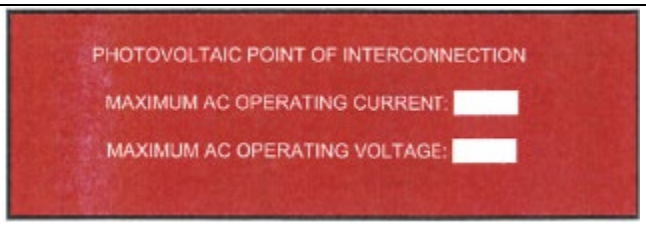
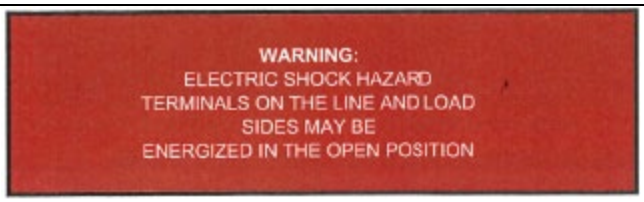
All marking and labeling shall be a minimum of 3/8" high white letters on a red background and the material shall be suitable for the environment where it is located (unless otherwise specified below). In general, marking and labeling shall be applied as follows:




Located no more than 1' from the service disconnecting means. CEC 590.56(C)(1)(a)


DC circuit raceways and enclosures, conduits, and combiner/junction boxes. CEC 690.31.(G)(3)


Located at each PV system disconnect (may be AC or DC). CEC 690.13(B)

| | |
|---|---|
|  <br>Located at each DC PV disconnecting means. CEC 690.53 |  <br>Located at all interactive system(s) points of interconnection. CEC 690.54 |
|  <br>Located at each PV system disconnecting means. CEC 690.13(B) |  <br>Located at the rapid shutdown initiation device. CEC 690.56.(C)(3) |
|  <br>Located at distribution equipment adjacent to the back-fed breakers from the power source when using this “sum of breakers” code compliance rule. CEC 705.12(B)(2)(3)(c) |  <br>Located at each PV system disconnecting means where line and load may be energized in the open position. CEC 690.13(B) |
|  <br>Located at DC disconnecting means where terminals on both line and load side may remain energized. CEC 690.13(B) |  <br>Located at back-feed breaker is using 120% rule (if applicable). CEC 705.12.(B)(2)(3)(b) |
|  <br>Located at each service equipment location and at the location(s) of the system disconnect(s) for all electric power production sources capable of being interconnected. CEC 705.10 |  <br>Located at electrical equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources. CEC 705.12(B)(3) |

### Smoke and Carbon Monoxide Alarms (CBC 907.2.11.1, CRC 314 and 315)

Smoke alarms shall be installed on the ceiling or wall (between 4" and 12" of the ceiling) in all sleeping rooms, each area/hallway adjacent to sleeping rooms, each story of the building, and in any basement. Smoke alarms shall be replaced 10 years after the date of manufacture listed on the alarm (if no date is listed the alarm shall be replaced). Newly installed smoke alarms shall have a 10-year battery.

Carbon monoxide (CO) alarms shall be installed on the ceiling or wall (above the door header) in each area/hallway adjacent to sleeping rooms, each occupiable story, and within a bedroom if the bedroom or attached bathroom contains a fuel-burning appliance. CO alarms are not required if there is no fuel-burning appliance or fireplace in the house and where the garage is detached from the house.

## PERMIT PROCESS

### Building Permit Review

1. Permits can be obtained/submitted online at: https://epermits.montesereno.org/.

### Inspections

2. One final inspection is required after all the work has been completed. An extension ladder that extends a minimum of three feet above the roof eave and safely tied off shall be provided for the inspector.
   A completed Smoke Alarm and Carbon Monoxide Alarm Certification Form shall be provided to the building inspector.

### Building Permit Application Requirements

- ☐ A completed Building Permit Application
- ☐ Site plan showing the location of the building and the location of the PV panels with roof pathways dimensioned.
- ☐ Electrical plans including single line diagram and load calculations (if main breaker is less than 200 amps).
- ☐ Equipment brochure with installation requirements and UL listing.
- ☐ Roof framing plan showing rafter size, spacing, span, slope, etc.
- ☐ Attachment details for the panels to the roof structure.
- ☐ The weight of the panels to be installed on the roof (if the weight of the panels is excessive the existing roof structure and lateral design may need to be upgraded to accommodate the added load).