Disconnecting Means

PV System

PV system disconnecting means shall be provided in accordance with the 2020 National Electrical Code® (NEC), NFPA 70.(R) [690.13]

A Rapid Shutdown switch shall be provided at a readily accessible location outside the building in accordance with the 2020 National Electrical Code® (NEC), NFPA 70.® [690.12(C)]

Energy Storage System

A readily accessible disconnect shall be provided within sight of the ESS [NEC 706.15(A)]

Where remote actuation of the disconnecting means is employed the controls are not within sight of the ESS, the disconnecting means shall be capable of being locked in the open position. [NEC 706.15(B); 110.25]

Where ESS input and output terminals are more than 5ft from connected equipment, or where circuits from these terminals pass through a wall or partition;
- A disconnecting means is required at the ESS end of the circuit
- If this disconnect is not within sight of the connected equipment a second disconnecting means is required at the connected equipment. [NEC 706.7(A)(2); 706.7(D)]

The disconnecting means for the ESS shall be legibly marked with the nominal ESS voltage, the maximum available fault current from the ESS and the associated clearing time, and the date the calculation was performed. [NEC 706.15(C)]

Signs, Placards, Directories, and Markings Guidance

General

All labeling shall comply with Section 324 of the 2021 International Residential Code and Articles 690 and 705 of the 2020 National Electrical Code® (NEC), NFPA 70

All labeling shall comply with [NEC 110.21 (B)]

Rapid Shutdown Label

Buildings with more than one rapid shutdown type:
A detailed plan view diagram showing each PV system and a dotted line around areas that remain energized after the rapid shutdown switch is operated. [NEC 690.56(C)]

Rapid Shutdown (PV Hazard Control) switch:
This switch shall have a label not greater than 3 feet from the switch that states the following:
RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM [NEC 690.56(C)(1)]

Roof Access, Egress, and Ventilation

General

Access and minimum spacing shall be provided for access to specific areas of the roof, emergency egress from the roof and opportunities for smoke ventilation in accordance with the 2021 International Residential Code [IRC 324.6]

References:

Ridge Setbacks - [IRC R324.6.2]

Sprinklered Occupancies - [IRC R324.6.2.1]

Pathways - [IRC 324.6.1]

Emergency escape and rescue openings - [IRC R324.6.3]

Exceptions:

Detached, non-inhabitable structures [IRC R324.6 Ex. 1]

Low-slope roofs with pitch of less than or equal to 2:12; this exception may not be valid depending on the jurisdiction. [IRC R324.6 Ex. 3]

BIPV systems listed in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards. [IRC R324.6 Ex. 4]

Carbon Monoxide, Smoke & Heat Detectors

SolarAPP+ Fire Bulletin

Guidance:

Carbon Monoxide and smoke detectors shall be provided in accordance with the code or an Affidavit has been provided by the customer. 2021 International Residential Code.[R314, R315]

Rooms and areas within dwelling units, basements and attached garages in which ESS are installed shall be protected by smoke alarms in accordance to the code. A heat detector, listed and interconnected to the smoke alarms, shall be installed in locations within dweling units and attached garages where smoke alarms cannot be installed based on their listing. 2018 International Residential Code. [R314, R315]

Energy Storage System

SolarAPP+ Fire Bulletin

Special Considerations

ESS shall not be installed in sleeping rooms, or closets or spaces opening directly into sleeping rooms. [IRC R328.4]

Aggregate energy ratings shall not exceed:
40kWh within utility closets, basements, and storage or utility spaces
80kWh in attached or detached garages and detached accessory structures
80kWh on exterior walls
80kWh outdoors on the ground
0kWh in habitable space [IRC R328.4,R328.5]

When the ESS is installed in a location subject to vehicle damage it shall be protected by approved barriers. [IRC R328.8]

ESS installed indoors that produce hydrogen or other flammable gases during charging shall be provided with either natural or mechanical ventilation in accordance with Section M1307.4.1 or M1307.4.2. [IRC R328.9; M1307.4]

Individual energy storage systems shall be separated from each other by at least three feet of spacing unless smaller separation distances are documented to be adequate as approved by the code official based on large scale fire testing. [IRC R328.3.1]

Individual ESS unit ratings shall not exceed 20kWh. [IRC R328.5]

ESS shall be installed only in the following locations:
1. Detached garages and detached accessory structures.
2. Attached garages separated from the dwelling unit living space in accordance with the Code.
3. Outdoors or on the exterior side of exterior walls located not less than 3 feet (914 mm) from doors and windows directly entering the dwelling unit.
4. Enclosed utility closets, basements, storage or utility spaces within dwelling units with finished or noncombustible walls and ceilings. Walls and ceilings of unfinished wood-framed construction shall be provided with not less than 5/8 inch Type X gypsum wallboard. [IRC R328.4]

Fire Classification

SolarAPP+ Fire Bulletin

PV System

Rooftop-mounted PV systems shall have the same fire classification as the roof assembly required in 2021 International Residential Code. [R902.4; R324.4.2]

Building-integrated photovoltaic products installed as the roof covering shall be tested, listed, and labeled for fire classification. [IRC R902.3, R324.5.2]

Building-integrated photovoltaic products installed as the roof covering shall comply with the minimum requirements for fire classification set by the jurisdiction. [IRC 902.1]

Product Certifications

SolarAPP+ Fire Bulletin

PV System

PV panels and modules shall be listed and labeled to UL 1703 and/or both UL 61730-1 and UL 61730-2 [NEC 690.4(B)][IRC R324.3.1]

Inverters shall be listed and labeled to UL 1741 [NEC 690.4(B)][IRC R324.3.1]

Hazard Control System

Hazard control system shall be listed and labeled to UL 3741 [NEC 90.7; 110.3(C); 690.4(B); 690.12(B)(2)(1); 690.12(D)]

Energy Storage System

The ESS inverter, for AC Coupled systems, shall be listed and labeled to UL 1741 [IRC R328.6]

The ESS shall be listed and labeled to UL 9540 [IRC R328.2]

The ESS Microgrid Interconnection Device shall be listed and labeled to UL 1741 [IRC R328.6]

Signs, Placards, Directories, and Markings

Service Disconnect

SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN	
TURN RAPID SHUTDOWN SWITCH TO THE “OFF” POSITION TO SHUT DOWN CONDUCTORS OUTSIDE THE ARRAY. CONDUCTORS IN ARRAY REMAIN ENERGIZED IN SUNLIGHT.	Simple Diagram Here

Location: No more than 1 m (3 ft) away from the service disconnecting means.

Code: [NEC 690.56(C)]

RSD Initiation Device

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

Location: Rapid shutdown initiation device.

Code: [NEC 690.56(C)(2)]

Point of Interconnection

CAUTION: MULTIPLE SOURCES OF POWER

(LAYOUT OR DESCRIPTION)

Location: Service location or approved readily accessible location

Code: [NEC 705.10]

WARNING:
TRI POWER SOURCE
SECOND SOURCE IS PV SYSTEM
THIRD SOURCE IS ENERGY STORAGE SYSTEM

Location: Electrical Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources

Code: [NEC 705.12 (C)]

WARNING:
POWER SOURCE OUTPUT CONNECTION -
DO NOT RELOCATE THIS OVERCURRENT DEVICE

Location: At back-feed breaker if using 120% rule (if applicable)

Code: [NEC 705.12(B)(3)(2)]

WARNING:
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR

Location: At distribution equipment adjacent to the back-fed breaker from the power source when using this "sum of breakers" code compliance rule.

Code: [NEC 705.12(B)(3)(3)]

PHOTOVOLTAIC POINT OF INTERCONNECTION

MAXIMUM AC OPERATING CURRENT:

MAXIMUM AC OPERATING VOLTAGE:

Location: All interactive system(s) points of interconnection.

Code: [NEC 690.54]

DC Circuit Raceways and Enclosures

PHOTOVOLTAIC POWER SOURCE

Location: Unless located and arranged so the purpose is evident, labels will be required for DC Circuit Raceways and Enclosures, conduit, and combiner/junction boxes.

Code: [NEC 690.31(D)(2)]

PV System Disconnect

WARNING:
ELECTRIC SHOCK HAZARD TERMINALS ON LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

Location: DC Disconnecting Means where terminals on both line and load side may remain energized. Example language or equivalent.

Code: [NEC 690.13(B)]

PV SYSTEM DISCONNECT

Location: Each PV System Disconnect (May be AC or DC)

Code: [NEC 690.13(B)]

DC String Inverters Equipment Disconnects

WARNING:
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD
SIDES MAY BE
ENERGIZED IN THE OPEN POSITION

Location: Each PV system disconnecting means where line and load may be energized in the open position

Code: [NEC 690.13(B)]

PHOTOVOLTAIC DC DISCONNECT

Location: Each PV system disconnecting means.

Code: [NEC 690.13(B)]

PV SYSTEM MAXIMUM VOLTAGE:

Location: At each DC PV system disconnecting means.

Code: [NEC 690.53]

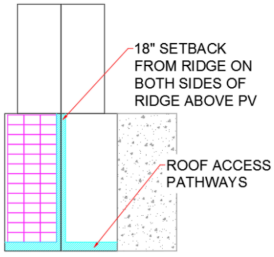
FIRE SAFETY CODE REQUIREMENTS

Does the home have sprinkler systems?	
Percentage of Roof Area covered with PV Total Array Area / Total Roof Area	

Roof Access and Ventilation Diagrams

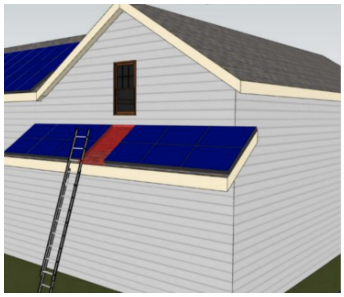
Ridge Setbacks

PV Less Than 33% Roof Area (66% for homes with sprinkler systems)



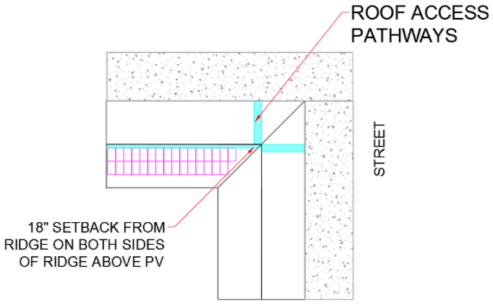
Emergency Escape & Rescue Opening

Minimum 3' Emergency Escape Pathway

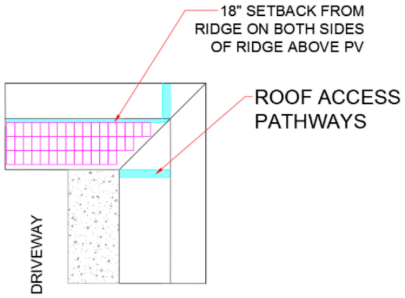


Hips and Valley Setbacks

PV Less Than 33% Roof Area - Street Access (66% for homes with sprinkler systems)



PV Less Than 33% Roof Area - Driveway Access (66% for homes with sprinkler systems)



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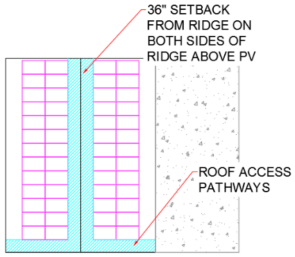
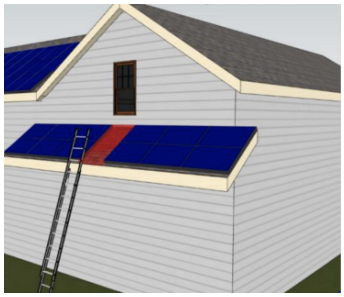


Emergency Escape & Rescue Opening

Minimum 3’ Emergency Escape Pathway



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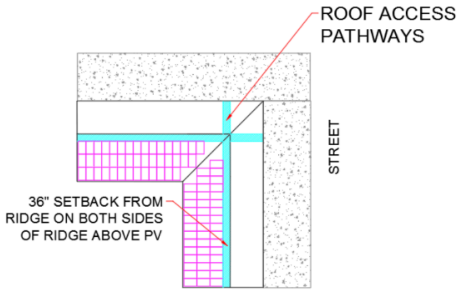

PV More Than 33% Roof Area - Driveway Access (66% for homes with sprinkler systems)