



Clark County Building Department

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| Division: | Plans Examination | Policy & Procedure: | BP-DI-206 |
| Subject: | Solar Photovoltaic Requirements | Effective Date: | 04/02/2024 |
| Code: | IFC, IBC, IRC, ASCE 7 | Revised Date: | 05/09/2024 |

The purpose of this document is to identify requirements for the installation of Solar Photovoltaic Systems (Solar PV systems) submitted for permits.

1. General Building Requirements

Building Plans Examination shall review clearances of roof mounted photovoltaic systems in accordance with currently adopted International Fire Code as an alternative to requiring a separate Fire Prevention Permit.

Solar photovoltaic systems shall be installed in accordance with the 2018 IFC Section 1204 and the 2018 IBC or, the 2018 IRC Section R324. The electrical portion of the solar PV system shall be installed in accordance with the 2018 NFPA 70. (IFC 1204.1, IRC R324.1)

The following combined clearances apply as noted for both building built per the 2018 IBC or 2018 IRC:

- Roof access pathways shall be over areas capable of supporting fire fighters accessing the roof, with minimal obstructions such as vents, conduit, or mechanical equipment. (IFC 1204.2, IRC R324.6)
- Not fewer than two 36-inch-wide pathways on separate roof planes from the lowest roof edge to the ridge shall be provide on all buildings. One pathway shall be provided on the street or driveway side of the roof. Each roof plane with a PV array shall have not fewer than one 36-inch-wide pathway from the lowest roof edge to ridge. (IFC 1204.2.1.1, IRC R324.6.1)
- Setbacks at Ridge.
 1. For PV arrays occupying 33% or less of the plan view total roof area, a setback of not less than 18 inches wide is required on both sides of a horizontal ridge.
 2. For PV arrays occupying more than 33% of total roof area a setback of 36 inches is required on both sides of a horizontal ridge. (IFC 1204.2.1.2, IRC R324.6.2)
 3. For PV arrays located on both sides of a ridge, at least one side of the ridge should maintain the 36-inch clearance regardless of area coverage.
- Alternate Setbacks at Ridge. Where an automatic sprinkler system is installed within the dwelling in accordance with IFC Section 903.3.1.3 setback shall conform to the following.
 1. For PV arrays occupying 66% or less of the plan view total roof area, a setback of not less than 18 inches wide is required on both sides of a horizontal ridge.
 2. For PV arrays occupying more than 66% of total roof area a setback of 36 inches is required on both sides of a horizontal ridge. (IFC 1204.2.1.2, IRC R324.6.2.1)
 3. For PV arrays located on both sides of a ridge, at least one side of the ridge should maintain the 36-inch clearance regardless of area coverage.

- Panels and modules installed on Group R-3 buildings shall not be placed on the portions of a roof that is below an emergency escape and rescue opening. A pathway of not less than 36 inches wide shall be provided to the emergency escape and rescue opening. (IFC 1204.2.2, IRC R324.6.2.2)
- Ground-mounted PV panel systems shall comply with IFC 1204.1 or IRC R301. Setback requirements shall not apply to ground-mounted, free-standing PV arrays. A clear, brush-free area of 10 feet shall be required for ground-mounted PV arrays. Fire apparatus access lanes shall not be blocked by ground mounted PV panel systems.

Building built per the 2018 IRC, the following roof access exceptions apply.

- IRC Exceptions
 1. Detached, non-habitable, structures, including but not limited to detached garages, parking, shade structures, carports, solar trellises, and similar structures shall not be required to provide roof access.
 2. Roof access, pathways and setbacks need not be provided where the code official has determined that the rooftop operations will not be employed.
 3. These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (17-percent slope) or less.

For buildings built per the 2018 IBC & IFC, the following additional requirements apply.

- There shall be a minimum 6-foot-wide clear perimeter around the outside edges of the roof. (IFC 1204.3.1)
- Interior pathways shall be provided between array sections to meet the following requirements (1204.3.2):
 1. Pathways at intervals not greater than 150 feet throughout the length and width of the roof
 2. A pathway not less than 4 feet wide in a straight line to roof standpipes or ventilation hatches.
 3. A pathway not less than 4 feet wide around roof access hatches, with not fewer than one such pathway to a parapet or roof edge.
- Smoke ventilation requirements (1204.3.3):
 1. Where non-gravity operated smoke and heat vents occur, a pathway not less than 4 feet wide shall be provide bordering all sides.
 2. Smoke ventilation options between array sections shall be one of the following.
 - 2.1 A pathway not less than 8 feet wide.
 - 2.2 Where gravity-operated dropouts smoke and heat vents occur, a 4-foot pathway is required on one side.
 - 2.3 A pathway not less than 4 feet wide bordering 4-foot by 8-foot venting cutouts every 20 feet on alternating sides of the pathway.

Buildings with rapid shutdown solar PV systems shall have permanent labels in accordance with the 2018 IFC Sections 1204.5.1 through 1204.5.3. The following rapid shutdown labeling shall apply:

- The type of solar PV system shutdown shall be labeled with one of the following (IFC 1204.5.1):

1. For solar PV systems that shut down the array and the conductors leaving the array a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of 3/8 inch in black on a yellow background. The remaining characters shall be uppercase 3/16 inches tall in black on white background. The label shall be in accordance with Figure 1204.5.1(1)

SOLAR PV SYSTEM EQUIPPED WITH
RAPID SHUTDOWN.
TURN THE RAPID SHUTDOWN
SWITCH TO THE "OFF" POSITION TO
SHUT DOWN THE PV SYSTEM AND REDUCE
SHOCK HAZARD IN ARAY

2. For PV systems that only shut down the conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of 3/8 inch in white on a red background. The remaining characters shall be uppercase 3/16 inches tall in black on white background. The label shall be in accordance with Figure 1204.5.1(2)

SOLAR PV SYSTEM EQUIPPED WITH
RAPID SHUTDOWN.
TURN THE RAPID SHUTDOWN
SWITCH TO THE "OFF" POSITION TO
SHUT DOWN CONDUCTORS OUTSIDE
THE ARRAY. CONDUCTORS WITHIN
ARRAY REMAIN ENERGIZED IN SUNLIGHT.

- Labels in Section 1204.5.1 shall include a simple diagram of a building with a roof. Diagram sections in red signify section of the solar PV system that are not shut down when the rapid shutdown switch is turned to off. (IFC 1204.5.1.1)
- The rapid shutdown label shall be located within 3 feet of the service disconnecting means to which the PV system are connected and shall indicate the location of all identified rapid shutdown switch if not at the same location. (1204.5.1.2)
- Building with more than one rapid shutdown type, shall provide a detailed plan view diagram of the roof showing each different PV system and a dotted line around areas that remain energized after the rapid shutdown switch is operated. (1204.5.2)

2. Electrical Requirements

No electrical plan review is required for system less than 5kw.

3. Structural Requirements

The Building Official may waive the requirement for a detailed permit application submittal package and engineering for residential installations. Such installations shall meet all of the following criteria:

- Solar PV systems are roof mounted and do not exceed the existing building height at the highest point.

- The solar PV systems weight does not exceed 4 psf.
- The solar panels are mounted parallel to the roof plane to which they are attached.
- The solar PV systems are installed within 24 inches (457 mm) of the roof immediately below.
- The maximum spacing of the solar PV system connection points to the roof shall not exceed 48 inches (1219 mm) on center.
- For wood construction, the solar PV system supports shall be anchored to solid roof rafters or to solid blocking with a minimum of one 5/16-inch (8 mm) diameter lag screw embedded a minimum of 2-1/2 inches (64 mm). For other connection configurations or types of construction, the anchorage shall be as approved by the Building Official.
- Provide a layout plan showing the proposed location of all solar PV system components. Note that all rooftop mounted solar PV systems shall be installed to comply with the layout requirements specified in the IFC.

Residential roof-top solar that do not meet the prescriptive criteria above shall be required to have wet sealed engineering calculations and installation details. Wet sealed engineering calculations and installation details for residential roof-top solar shall not require a plan review.

Support and Mounting- Solar PV systems may be either freestanding or supported by a building structure.

- A freestanding installation is ground mounted and treated as a piece of equipment with no associated occupancy or use. Carports, patio covers or shade structures which support solar PV systems do not meet this condition and shall be designed as building structures in accordance with building code requirements.
- All freestanding installations shall be designed by a Nevada Registered Design Professional. The design shall include plans, details and calculations that clearly indicate requirements for foundations, anchorage, structural support frame and connections. Determination of loads shall be in accordance with the IBC and ASCE 7.
 - Exception: Freestanding installations that are less than 10 feet in height above finished grade and have a net wind area less than 100 square feet may be installed in accordance with the manufacturer’s published installation requirements, when approved by the Building Official.

Solar PV’s that are attached to and supported by a building structure:

- Building integrated components - a type of solar PV that is intended to take the place of a traditional building component (i.e. roofing, wall coverings, windows, etc.). These components shall be subject to the same applicable code requirements as the material which they are replacing unless specific alternate requirements are found elsewhere in the building code.
- Building attached equipment - a type of solar PV that is a standalone system and is attached to a building structure (removal of the system would leave behind an otherwise complete and intact building). All building attached equipment installations shall be designed by a Nevada Registered Design Professional unless the design otherwise satisfies the requirements of Section 3. The design shall include plans, details and calculations that clearly indicate requirements for connection and

support of solar PV systems to the building structure. The following items shall be addressed in the design:

- A layout plan showing the proposed location of all solar PV system components. Note that all rooftop mounted solar PV systems shall be installed to comply with the layout requirements specified in the IFC.
- Wind, Seismic, Snow and Dead loads shall be determined in accordance with the IBC and ASCE 7.
- The determination of minimum roof live loads for rooftop mounted solar PV systems shall comply with this section. Where the proposed solar system component dead load is less than the available roof live loads the uniform roof live loads may be reduced in the area covered by the PV system when these areas are inaccessible. Areas where the clear space between the PV system and the rooftop is 24 inches (610 mm) or less shall be considered inaccessible. The exclusion of the roof live load in the area(s) covered by the PV system does not preclude the design of building roofs from complying with the roof live load requirements in 1607.13 for the loading condition where the PV system may be removed or not installed.
- Where solar PV systems are mounted to an existing structure, the existing structure shall be evaluated under the alteration's provisions of the IEBC.
- Anchorage of the solar PV system to the existing structure.
- Risk Category: The risk category of a solar installations shall be determined in accordance with the Southern Nevada Building Officials code interpretation dated August 8, 2019. See <http://www.snbo.org/wp-content/uploads/2019/09/SNBORiskCategoryofPower-GeneratingStations.pdf>

Prepared By: Plans Examination

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