105.7.13 Solar photovoltaic power systems. A construction permit is required to install or modify solar photovoltaic power systems.

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through 605.11.4, the *International Building Code* and NFPA 70.

Exception: Detached, nonhabitable Group U ~~structures including, but not limited to, parking shade structures, carports, solar trellises, and similar~~ structures shall not be subject to the requirements of this section.

605.11.1 Marking. Marking is required on interior and exterior direct-current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes and disconnects.

605.11.1.1 Materials. The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking as required in Sections 605.11.1.2 through 605.11.1.4 shall have all letters capitalized with a minimum height of 3/8 inch (9.5 mm) white on red background.

605.11.1.2 Marking content. The marking shall contain the words "~~WARNING:~~ PHOTOVOLTAIC POWER SOURCE."

605.11.1.3 Main service disconnect. The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.

605.11.1.4 Location of marking. Marking shall be placed on interior and exterior DC conduit, raceways, enclosures and cable assemblies every 10 feet (3048 mm), within 1 foot (305 mm) of turns or bends and within 1 foot (305 mm) above and below penetrations of roof/ceiling assemblies, walls or barriers.

605.11.2 Locations 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 be installed in a manner 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 shall be located such that conduit runs are minimized in the pathways between arrays. 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.

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.3.
Roof access, pathways, and spacing requirements shall be provided to facilitate fire fighting operations on the roof.

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Exceptions:
1. Structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.
2. Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire ~~chief~~ code official has been provided or where the fire code official ~~chief~~ has determined vertical ventilation techniques will not be employed.

605.11.3.1 Roof access points. When determining ~~R~~roof access points, consideration ~~-~~shall be given to ~~located in areas that *take into account* do not require~~ the placement of *fire department* ground ladders, which minimizes exposure over openings such as windows or doors. ~~, and~~ Roof access should be located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.
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605.11.3.2 Residential systems for one- and two-family dwellings. Approved a~~A~~ccess to non-paneled roof~~s~~ areas ~~residential systems~~ for one- and two-family dwellings shall be provided for the purpose of ventilation in a fire condition ~~provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4.~~

Exceptions:

1) Residential dwellings with appoved automatic sprinkler systems installed in accordance with IFC 903.3.1.3.
2) Residential dwellings with approved mechanical or passive ventilation systems
3) Where the fire code official determines that the slope of the roof is too steep for emergency access,
4) Where the fire code official determines that vertical ventilation tactics will not be utilized on the structure or in the area, department, or district. ~~reviewed and approved by the local jurisdiction.~~

~~**605.11.3.2.1 Residential buildings with hip roof layouts.** Panels/modules installed on residential buildings with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels/modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.~~
~~**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.~~

~~**605.11.3.2.2 Residential buildings with a single ridge.** Panels/modules installed on residential buildings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels/modules are located.~~
~~**Exception:** This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.~~

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~~**605.11.3.2.3 Residential buildings with roof hips and valleys.** Panels/modules installed on residential buildings with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels/modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.~~
~~**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.~~

~~**605.11.3.2.4 Residential building smoke ventilation.** Panels/modules installed on residential buildings shall be located no higher than 3 feet (914 mm) below the ridge in order to allow for fire department smoke ventilation operations.~~

605.11.3.3 ~~**Other than residential**~~ **Commercial and multi-family buildings.** Access to systems for commercial and multi-family occupancies ~~other than one- and two-family dwellings~~ shall be provided in accordance with Sections 605.11.3.3.1 through 605.11.3.3.3 ~~*meeting the requirements of the local jurisdiction*~~.

Exception: Where it is determined by the *fire code official* that the roof configuration is similar to that of a one- or two-family dwelling, the residential access and ventilation requirements in Sections 605.11.3.2.1 through 605.11.3.2.4 shall be permitted to be used.

605.11.3.3.1 Access. There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof. ~~*Access shall be provided to accommodate fire fighter roof operations.*~~

Exception: Where either axis of the building is 250 feet (76 200 mm) or less, there shall be a minimum 4-foot-wide (1290 mm) clear perimeter around the edges of the roof.

605.11.3.3.2 Pathways. The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting the live load of fire fighters accessing the roof.
2. The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting the live load of fire fighters accessing the roof. ~~*The pathway shall be a minimum of 3 feet clear.*~~
3. Shall be a straight line not less than 4 feet (1290 mm) ~~*located to*~~ clear to skylights or ventilation hatches.
4. Shall be a straight line not less than 4 feet (1290 mm) ~~*located to*~~ clear to roof standpipes.
5. Shall provide not less than 4 feet (1290 mm) clear ~~*access*~~ around roof access hatch*es* with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.

605.11.3.3.3 Smoke ventilation. The solar installation shall be designed to meet the following requirements~~*: the requirements for smoke ventilation practices utilized by the local fire jurisdiction.*~~

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1. Arrays shall be no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.
2. Smoke ventilation options between array sections shall be one of the following:
2.1. A pathway 8 feet (2438 mm) or greater in width.
2.2. A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or smoke and heat vents.
2.3. A 4-foot (1290 mm) or greater in width pathway and bordering 4-foot by 8-foot (1290 mm by 2438 mm) "venting cutouts" every 20 feet (6096 mm) on alternating sides of the pathway.

605.11.4 Ground-mounted photovoltaic arrays. Ground-mounted photovoltaic arrays shall comply with Sections 605.11 through 605.11.2 and this section. Ground array wiring shall be routed in conduit. ~~Setback requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground-mounted photovoltaic arrays.~~

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