

CPDC Bulletin

23-001

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| <input checked="" type="checkbox"/> Information <input type="checkbox"/> Administrative <input type="checkbox"/> Procedural <input type="checkbox"/> Technical <ul style="list-style-type: none"> <input type="checkbox"/> CCR Title 24 <input type="checkbox"/> Design <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Inspection | | | |
| <p>Bulletin: Design and Construction of PV Structures</p> | | | |
| Effective Date: | January 20, 2023 | | |
| From: | Construction Management | | |
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The Office of the State Fire Marshal (OSFM) is developing formal guidance for Photovoltaic (PV) installations on all State-owned and specified State-occupied buildings. There have been questions on the methods of constructing shade structures with (PV) panels over parking and other locations on California State University property. This informational bulletin gives interim guidance on PV installations based on emerging OSFM policy and approvals.

This bulletin complies with the 2022 California Building (CBC) or Fire Code (CFC) which went into effect on January 1, 2023. All code references are 2019 California Building (CBC) or Fire Code (CFC) or as otherwise noted.

Attachments: Office of Fire Safety Guidelines on Design and Construction of PV Structures

Weblinks: None

Applicability: All Structures owned or occupied by the State including Auxiliary Services, Design Services, Permit Process, Construction Services, Public Private Partnerships, Lease and Acquisitions.

Plan Check Services, Seismic Peer Review Services.

End of Bulletin

**Office of Fire Safety Guidelines
on
Design and Construction of PV Structures**

A. ROOF TOP MOUNTED SOLAR PHOTOVOLTAIC (PV) PANELS SUPPORTED BY A STRUCTURE

General Building Height and Area Limitations (2019 CBC, Section 503.1)

Section 503 of the CBC requires that a building's height, number of stories, and area shall not exceed the limits specified in CBC sections 504 and 506 based on the type of construction as determined by CBC section 602. When the installation of solar PV supported by a structure would cause the building to exceed its allowable height, number of stories or area, Section 503.1, Exception 2 (for solar PV structures with no use below) and Exception 3 (for solar PV structures over parking stalls) provide installation requirements. When these requirements are met, the rooftop PV installations shall not constitute an additional story or additional floor area and the building may exceed the height limit.

If the addition of a solar PV system does not cause a building to exceed its allowable height, number of stories, or building area, the requirements of Exceptions 2 and 3 in Section 503 need not be applied to the installation.

Construction Classification (2019 CBC, Section 602.1)

Buildings and structures erected, altered, or extended in height or area must comply with the fire resistance ratings found in Table 601 and shall be classified as one of the five construction types defined in Sections 602.2 through 602.5. There is one exception to Section 602.1 that identifies 3 conditions when noncombustible structural members supporting solar PV panels are exempted from meeting the fire resistance rating requirements.

Condition #1 is specific to PV panels supported by a structure having no use underneath and exempts the structural members from fire resistance rating requirements if signs are provided, as determined by the enforcing agency, prohibiting any use underneath the panels, including storage.

Condition #2 does not specify whether it applies to PV structures with no use underneath or PV structures over parking stalls and may be used in either installation. Structural members may be exempted from fire resistance rating requirements if the panels have sufficient uniformly distributed and unobstructed openings throughout the top of the array to allow heat and gases to escape, as determined by the enforcing agency. Installations complying with condition #2 are considered equipment.

Condition #3 is specific to solar PV panels supported by a structure **over parking** stalls where the panels constitute the roof and all of the requirements in Exception 3 (items 3.1-3.5) are met. These requirements include, but are not limited to, maximum array dimensions, distance between arrays and drive aisle widths. PV panels installed above parking spaces as allowed per CBC Section 503.1 exception 3, do not constitute a roof assembly including when installed on the top tier of a parking structure.

If the solar PV panel installation does not comply with any of these three conditions in the exception to Section 602.1, then the structural members are required to meet all of the applicable fire resistance ratings according to its construction type classification.

UL 61730-1 and UL 61730-2 are the new listing requirements for PV panels as amended in the 2022 CBC Section 3111.3.5.1. PV panel installations designed under the 2019 CBC must meet the listing requirements of UL 1703 per CBC Section 1505.9.

The use of the 2022 edition for this code section does not change the intent of the current regulation but provides clarity with the new terminology. The Office of the State Fire Marshal recognizes the upcoming adopted code cycle and the applicability of this specific terminology for this application.

Automatic Sprinkler Systems, Installation Requirements, 2019 CBC, Section 903.3.1.1.1.

Automatic sprinklers systems are required to be installed unless exempted by CBC Section 903.3.1.1.1, item #6, or item #7.

Item #6 is a duplicate of 602.1, Condition #1. Solar PV panels supported by a structure having no use underneath are exempt from installing automatic sprinklers if signs are provided, as determined by the enforcing agency, prohibiting any use underneath the panels, including storage.

Item #7 is a duplicate of 602.1, Condition #2. Item #7 also does not specify whether it applies to PV structures with no use underneath or PV structures over parking stalls and may be used in either installation. The installation of automatic sprinklers is not required if the panels have sufficient uniformly distributed and unobstructed openings throughout the top of the array to allow heat and gases to escape, as determined by the enforcing agency.

NOTE: 903.3.1.1.1 Item #6 and Item #7 do NOT require that the solar PV panel supporting structural members are noncombustible.

Rooftop Structures, 2019 CBC, Section 1510

Enclosed PV structures must comply with Rooftop Structures, CBC Section 1510.1.1 and will create an additional story if the structure exceeds one-third the area of the supporting deck.

Rooftop mounted PV panel systems (NOT supported by a structure), 2019 CBC Sections 1510.7 and 1505.9

Per Section 1510.7 and 1505.9, rooftop mounted PV panel systems that are directly attached to the roof assembly shall be tested, listed, and identified with a fire classification in accordance with UL 1703 and UL 2703. The fire classification shall comply with Table 1505.1 based on the type of construction of the building.

B. PHOTOVOLTAIC (PV) PANEL SYSTEM, GROUND MOUNTED, 2022 CBC, SECTION 202 DEFINITION

An independent PV panel system without useable space underneath, installed directly on the ground.

Ground-mounted PV panel systems with no use underneath shall comply with CFC Section 1204.4. The PV panel systems may be unlimited in size while requiring a brush-free area of 10 feet around the array.

C. PHOTOVOLTAIC (PV) SUPPORT STRUCTURE, ELEVATED, 2022 CBC, SECTION 202 DEFINITION

An independent PV panel support structure designed with useable space underneath with minimum clear height of 7 feet 6 inches, intended for secondary use such as providing shade or parking motor vehicles unless a greater minimum clear height for motor vehicles is required by other provisions of the Code.

A PV Support Structure, Elevated that is a standalone structure at grade shall be designed and constructed as equipment, a Storage (S-2) Occupancy, or an Utility (U) Occupancy.

1. PV Support Structure, Elevated – Designed and Constructed as Equipment, unlimited area.

Summary of Design Criteria:

1. Constructed at grade level.
2. Independently supported by non-combustible construction.
3. Open on all sides.
4. Intended for secondary use such as providing shade or parking of motor vehicles.
5. Does not impede fire department access as determined by the local authority having jurisdiction (AHJ).
6. Provides sufficient uniformly distributed and unobstructed openings throughout the array per CBC 602.1 exception 2, to allow heat and gases to escape.

Note: Elevated PV structures providing shade for parking of motor vehicles having array configurations with a depth not greater than 2 parking stalls and uncovered drive aisles will meet this intent.

Automatic Sprinklers

Automatic sprinklers are not required per CBC Section 903.3.1.1.1 #7.

Standpipes

Standpipes are not required per CBC Section 905.3.

Fire Extinguishers

Fire extinguishers are not required per CBC Section 906.1.

Structural requirements

The structure shall comply with the structural requirements in CBC Chapter 16.

2. PV Support Structure, Elevated Designed and Constructed as a U Occupancy

PV support structures meet the definition of a carport per Title 24 Part 6, Section 100.1. These structures are limited to the allowable area per CBC Section 506.2.

Automatic Sprinklers

Automatic sprinklers are not required per CBC Section 903.2 unless utilizing area increases per CBC Section 506.2.

Standpipes

Standpipes are not required per CBC Section 905.3.

Fire Extinguishers

Fire extinguishers are not required in group U occupancies per CBC Section 906.1.

Fire Classification

If the PV panels are installed on a roof assembly of a carport, they shall comply with the fire classification provisions for ROOF MOUNTED PHOTOVOLTAIC (PV) PANEL SYSTEM, 2019 CBC, Section 1505.9.

Structural requirements

The structure shall comply with the structural requirements in CBC Chapter 16.

Fire hydrant locations

Fire hydrants shall comply with CFC Section 507.5 and Appendix C.

Fire flow requirements

Fire flow shall comply with CFC Section 507.3 and Appendix B.

3. PV Support Structure, Elevated Designed and Constructed as an S-2 occupancy

Summary of Design Criteria:

Allowable Area

These structures must comply with CBC Section 406 or shall be limited to the allowable area per CBC Section 506.2.

Fire Classification

If the PV panels are installed on a roof, it shall comply with the fire classification provisions for ROOF MOUNTED PHOTOVOLTAIC (PV) PANEL SYSTEM, 2019 CBC, Section 1505.9.

Automatic Sprinklers

Automatic sprinklers are not required for S-2 open parking garages per CBC 903.2 unless utilizing area increases per CBC Section 506.2.

Standpipes

Standpipes are not required for S-2 open parking garages constructed at grade level as per CBC Section 905.3.

Fire Extinguishers

Fire extinguishers are required in a Group S occupancy per CBC Section 906.1. The requirements and placement of fire extinguishers are based on the character of an anticipated fire per CCR Title 19; Subsection 565(a).

Structural requirements

The structure shall comply with the structural requirements in CBC Chapter 16.

Fire hydrant locations

Fire hydrants shall comply with CFC Section 507.5 and Appendix C.

Fire flow requirements

Fire flow shall comply with CFC Section 507.3 and Appendix B.
