



California State Fire Marshal Information Bulletin 14-002

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FIRE CLASSIFICATION FOR ROOF MOUNTED SOLAR PHOTOVOLTAIC PANELS/MODULES [SYSTEMS] AND APPLICATION OF THE 2013 CALIFORNIA BUILDING STANDARDS CODE

On January 1, 2014 the 2013 California Building Standards Code, California Code of Regulations (CCR), Title 24, became effective. As part of the 2013 California Building Standards Code, Part 2 and Part 2.5 provisions for the fire classification of roof mounted photovoltaic panels/modules [systems] were updated to comply with the most recent edition of Underwriters Laboratories Inc. (UL) 1703 *Standard for Flat-Plate Photovoltaic Modules and Panels* published in October 2013.

The Office of the State Fire Marshal (OSFM) was recently informed by industry that presently there is an insufficient supply of UL 1703 compliant Class A, Class B or Class C fire rated tested and listed photovoltaic panels/modules [systems] to meet present demand. This circumstance may prohibit the permitting of projects to install solar photovoltaic systems on roofs, which in turn curtails efforts to meet current sustainability goals. The issuance of the most recent edition of UL 1703 and its adoption into the 2013 California Building Code (CBC), specifically Section 1505.9 and California Residential Code (CRC) Section R902.4 necessitates the need for guidance from the OSFM on this matter. These sections read in part:

“Rooftop mounted photovoltaic panels and modules [systems] shall be tested, listed and identified with a fire classification in accordance with UL 1703...”

In view of the effective date of the building standards identified above, and to provide suitable time for the testing and listing of photovoltaic panels/modules [systems] to meet the current UL 1703 standard, the Office of the State Fire Marshal recommends that local authority having jurisdiction accept photovoltaic panels and modules having a Class C rating under the previous version of UL 1703 (2002 edition with revisions through April 2008) or UL 790 (2004 edition with revisions through October 2008). This recommendation is based on the photovoltaic testing that was done during the past five years by UL and Solar America Board for Codes and Standards (Solar ABCs) and is discussed in the “Background and Justification” section of this bulletin.

Background and Justification:

The 2013 California Building and Residential Code as noted above are primarily based on national model codes promulgated and published by the International Code Council and in turn adopted by reference into Title 24 Parts 2 and 2.5. The promulgation of these model codes provided the basis for the provisions relating to PV in the California Codes. The 2012 International Building Code (IBC) Section 1509.7.2 includes requirements for fire classification of rooftop mounted photovoltaic (PV) *systems* and the 2012 International Residential Code (IRC) Section M2302.2.1 includes requirements for noncombustible or fire-retardant materials. A key objective of the adopted code requirement is that the installation of PV does not diminish the minimum fire safety requirements for the roof. Roof systems have long received fire classification ratings. These ratings are based on the ability to prevent a fire from penetrating through the roof and the ability to minimize the spread of a fire along the roof surface.



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The requirements of the IBC Section 1509.7.2 will need careful examination in its application. The language of this section states that the fire classification of PV *systems* must match the minimum required fire classification of the roof assembly over which they are mounted as required in IBC Section 1505. With any rooftop structure, the PV structure should not degrade the fire resistance properties of the roof, so as not to place the building and its inhabitants at an unanticipated risk. However, straightforward implementation of this requirement is not possible for the following reason(s).

PV *modules* are a component of a rooftop mounted PV system and, although PV *modules* can receive a fire classification rating in accordance with UL 1703, there are currently no PV *systems* with a fire classification rating. Thus, as currently written, Section 1509.7.2 refers to the fire classification rating of a system, and this exact approach is not yet achievable.

In the absence of a PV *system* fire rating, it may seem appropriate to substitute the PV *module* fire classification rating in order to achieve the desired result, which is the preservation of the roof assembly's original fire classification. However, simply using the PV module fire classification rating may not provide the desired result in most cases.

Over the past five years, rigorous testing by UL and Solar ABCs revealed that the performance of a *system* (which includes PV modules on standoff mounted racks) exposed to fire or flame is not the same as that of a *module* alone. Currently, modules receive a fire classification rating based on testing the module alone, not as part of a PV system. The results of these tests show that actual performance of a rack-mounted PV system exposed to fire or flame is strongly dependent on the mounting geometry of the PV array and properties of the components that make up the specific PV module type, but the results are not necessarily dependent on the fire classification rating of the module. (A summary of this research is published in a Solar ABCs report available at:

<http://www.solarabcs.org/about/publications/reports/flammability-testing/index.html>)

As a result of this testing and in consideration of the current requirements of IBC Section 1509.7.2, a working group composed of representatives from the PV industry, the roofing industry, standards development, the building and fire enforcement community, and government laboratory experts developed and proposed a new test methodology to determine fire classification ratings for PV systems. The new test methodology was adopted by the ANSI/UL 1703 Standard Technical Panel, and was published October 25, 2013.

Proposed Emergency Regulations:

The Office of the State Fire Marshal is presently developing emergency building standards to temporarily stay the effective date of CBC Section 1505.9 and CRC Section R902.4 for 180 days. This proposed rulemaking is anticipated to be before the California Building Standards Commission for action at its scheduled April 22, 2014 meeting. This information bulletin serves as an interim alternative providing guidance until such action can be accomplished.

Questions or comments regarding this Information Bulletin should be directed to Division Chief Kevin Reinertson, Code Development and Analysis at (916) 327-4998, or by electronic mail to kevin.reinertson@fire.ca.gov.