Rooftop photovoltaic applications

by Mark S. Graham

Interest in rooftop photovoltaic applications has been growing largely because of increasing electricity costs, advances in photovoltaic technology, declining photovoltaic module costs and building owners' increasing interest in environmental protection. This growth presents roofing professionals with new opportunities, but with these opportunities comes the need to be aware of code requirements and applicable standards.

Code requirements

Electrical installations, including photovoltaic applications, typically are governed by the National Fire Protection Association's NFPA 70®: National Electrical Code® (NEC). NEC's Article 690—Solar Photovoltaic Systems applies specifically to photovoltaic installations and provides requirements for photovoltaic systems and the related array circuits, inverters and controllers.

NEC specifically requires that photovoltaic modules and panels and their related equipment be listed for specific installations.

Standards

ANSI/UL 1703, "Flat-Plate Photovoltaic Modules and Panels," provides a consensus-developed basis for evaluating flat-plate photovoltaic modules and panels intended for use on or integral with buildings. The standard also applies to modules or panels that are free-standing (not attached to buildings).

ANSI/UL 1703 provides specific requirements regarding the construction, performance, testing, rating and marking of photovoltaic module and panel products.

Included in ANSI/UL 1703 are provisions for testing external fire resistances of rooftop photovoltaic modules and panels. The test method used is UL 790, "Tests for Fire Resistance of Roof Coverings," which is the same test Underwriters Laboratories (UL) Inc. uses to base its Class A, Class B and Class C external fire-resistance ratings for roof systems. Both the spread-of-flame and burning-brand portions of UL 790 are used to fire test photovoltaic modules and panels.

Photovoltaic modules and panels should comply with ANSI/UL 1703

Photovoltaic module and panel products that satisfy ANSI/UL 1703's requirements and are included in UL's follow-up service (verification of continuing manufacturing as originally evaluated) are eligible to be UL-certified and bear a UL listing mark label. Information about UL-certified photovoltaic modules and panels can be found by accessing www.ul.com, selecting "Certifications" and entering Category Code QIGU.

Photovoltaic module and panel products that are included in UL's certification program will bear a UL listing mark label, which includes the UL symbol, the word "listed," a control number, and the words "Photovoltaic Module" or "Photovoltaic Panel."

Also, listing mark labels for products that have been evaluated for their external fire resistances will denote "Class A," "Class B" or "Class C," depending on the specific external fire resistance achieved. The labels for photovoltaic module or panel products that have not been tested for their external fire resistances will indicate "Not Fire Rated."

UL also provides classification services for photovoltaic modules and panels that, in addition to complying with ANSI/UL 1703, also comply with IEEE 1262, "IEEE Recommended practice for qualification of photovoltaic (PV) modules"; IEC 61215, "Crystalline silicon terrestrial photovoltaic modules—Design qualification and type approval"; and IEC 61646, "Thin-film terrestrial photovoltaic modules—Design qualification and approval."

If UL has classified specific photovoltaic modules or panels according to these additional standards, the applicable additional standard designation will be included with a classification mark in addition to the UL listing mark label.

Recommendations

If you install photovoltaic products on rooftops (whether integral to roof systems, directly on roof surfaces or on a rack system above roof surfaces), you should become familiar with and comply with their specific electrical code requirements.

Also, photovoltaic modules and panels used in rooftop installations should comply with ANSI/UL 1703, be classified, bear a listing mark label and include an external fire-resistance classification rating that is commensurate with a roof system's required class rating.

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