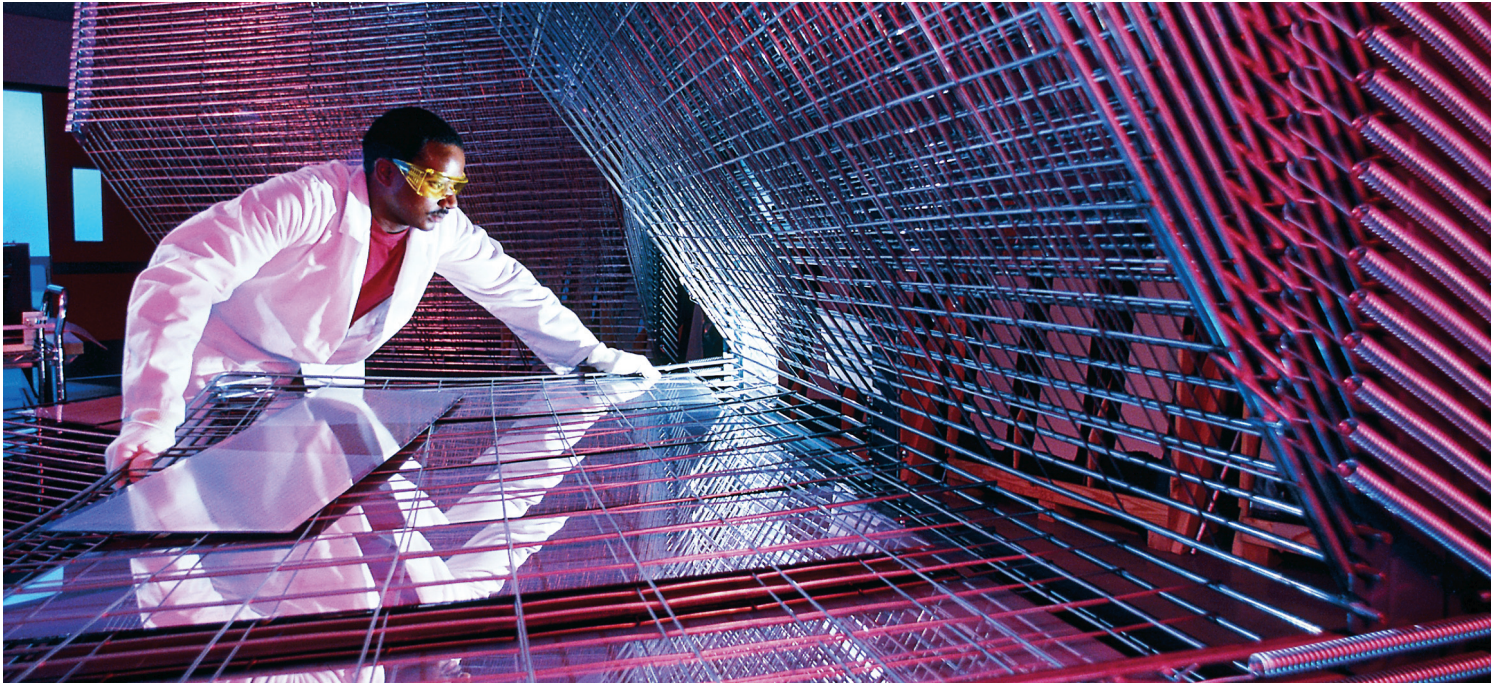


The New Power in Roofing

Photovoltaic modules and panels



Initially, photovoltaic technology was limited to modules and panels installed on top of the roofing system or as stand-alone structures. Technology has since evolved to include building integrated photovoltaics.

These photovoltaic modules/shingles are composed of flat-plate photovoltaic module/panels fabricated in sheets that resemble three-tab composite shingles and provide both protection against the elements and produce electrical power.

The Photovoltaic Modules and Panels (QIGU) product category covers flat-plate photovoltaic modules and panels intended for mounting on buildings or on ground-supported frames. Roof-mounted modules or panels are evaluated for one of three mounting methods: (1) integral to the roof of

a building, (2) directly on a building's roof or (3) on a rack with a space above the roof surface. When mounted integral to a building's roof, the module serves as the waterproof membrane. Direct-mounted panels are placed upon the building's waterproof membrane (shingles or the like). Rack-mounted styles are spaced away from the building's roof member. Rack-mounted styles may also be installed separate from buildings.

Photovoltaic panels and modules are investigated in accordance with ANSI/UL

1703 Standard for Safety of Flat-Plate Photovoltaic Modules and Panels. This standard includes a comprehensive set of requirements that addresses the overall construction, electrical safety, electrical performance, flammability performance and environmental exposure conditions.

Electrical installation — Installation of the modules and panels, including connection between the modules and the panels and the load, static inverters or

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controller is intended to be in accordance with Article 690 of the National Electrical Code®. The modules and panels are intended to be connected to electrical loads, controllers or to static inverters that convert the DC power the modules or panels generate to other types of power compatible with the intended loads. In addition to their voltage, current and power ratings, modules and panels are marked to indicate terminal polarity, maximum series overcurrent device rating and minimum acceptable diode bypassing (if needed).

Roof covering flammability — Installation of modules on or integral to a building's roof system may adversely affect the roof covering materials' resistance to external fire exposure if the module has a lesser or no fire resistance rating. Roof covering materials will not be adversely affected when the modules have an equal or greater fire resistance rating than the roof covering material.

Photovoltaic modules/shingles that have been investigated for compliance with the UL 790 Test Methods for Fire Tests of Roof Coverings Standard are identified as Class A, B or C to denote their UL Classification for resistance to external fire exposure. Modules or panels that have not been identified with respect to their resistance to external fire exposure are marked "Not Fire Rated." Information on these certifications can be found in the guide information to the TFX Prepared Roof Covering product category.

Wind uplift — Photovoltaic modules/shingles have been investigated to resist a wind uplift of 60 mph, unless specifically identified in the UL Listing. ATSM D3161, Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method), is used to evaluate the modules/shingles when specified in the UL Listing for wind speeds up to 110 mph.

General considerations — These panels and modules are intended to be installed in accordance with the manufacturer's installation instructions and applicable

electrical and building codes. Unless otherwise specified, photovoltaic modules/shingles are limited to nominal 15/32-in. thick (minimum) plywood decks and to inclines sufficient to permit drainage.

Certified products include a UL Listing Mark that reads "Photovoltaic Panel" or "Photovoltaic Module." Combination photovoltaic module/shingles include a UL Listing Mark that includes the words "Photovoltaic Module or Panel," and "Prepared Roof Covering Material."