

## Rooftop Photovoltaic Systems – Windstorm Guidelines

### Highly Protected Risk (HPR) Asset Protection “starts on the roof”

#### Overview

The roof is a building’s most critical and yet most vulnerable asset. When the wind begins to blow, all elements of the roof must perform uniformly including equipment that is installed on the roof. Similar to how seatbelts function in a car, well designed rooftop equipment securement will prevent equipment movement up to the limits of the structure’s design. Roof mounted Photovoltaic (PV) electric power generation systems present unique engineering design challenges as compared to other roof mounted equipment. When subjected to high winds, inadequately secured PV systems may become dislodged resulting in severe damage system, roof cover and structure making the building more vulnerable to the ongoing wind threat.



*Typical rooftop PV system with panels near the roof edges*

#### Purpose



*Common PV system installation practices expose your roof to severe windstorm damage*

This guideline is intended to draw attention to typical rooftop PV System installation practices and deficiencies. Despite close attention being paid to windstorm resistance for roof structures and roof covers; rooftop equipment including most PV systems are commonly installed without any means for securement other than weight. Also, often there is less rigorous control over the methods used to secure PV systems when the installation occurs in between new construction or re-roofing projects. When improperly secured, PV system components may become dislodged during high winds resulting in windborne debris damage to other equipment and the roof cover. In addition, damaged PV systems have the potential to become a significant rooftop fire ignition source. When rooftop equipment is not well secured, damage to the roof makes all of the assets within the facility more vulnerable to numerous hazards. From a risk assessment standpoint, a building’s roof is a single point failure mode potential. Utilizing the approach outlined in this technical resource will equip the user to address PV system securement in both construction and retrofit circumstance.

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## Rooftop PV System Securement – General Guidelines

Tokio Marine America (TMA) HPR Property Loss Control recommends following Factory Mutual (FM) datasheets for best protection against Natural Hazards. These windstorm guidelines adhere to the technical advice detailed in the referenced documents. Whether considering new construction, major renovations, maintenance related roof replacement or repairs or updating your risk management plan, follow the TMA HPR Loss Control “WIND” advice as a best practice.

- **W**herever your facility is located, all new important structures should be designed to meet applicable standards
- **I**nvestigate all existing important structures for conformance to appropriate standards
- **N**ecessary retrofit upgrades should be strategically considered following the advice of your Account Team
- **D**ecide in advance to meet these guidelines by inclusion in corporate design specifications



*TMA HPR Loss Control Plan Review services are available to assist with your project*

Equipment installed on roofs generally needs to be secured to the structure in a manner *equivalent to or exceeding* the strength of the structure itself. If this is not the case, rooftop equipment will become dislodged at a lower wind speed than the roof and roof cover. When rooftop PV equipment becomes dislodged, its components can damage the roof cover and the damaged system may result in a fire involving roof above-deck components. This may also cause premature failure of the roof cover or structure during high wind exposure. Securing rooftop equipment protects the building, roof cover and its contents from unexpected additional damage.



*While mechanically secured, this system lacks fasteners at every seam*

## Rooftop PV Equipment Securement - Best Practices

Advanced planning during the design and installation of new roof mounted PV systems is the key method to help prevent wind uplift damage to a PV system mounted on a roof. All new installations should adhere to the technical guidance in this guideline and the applicable resources. Existing systems are difficult to modify once installed without significant cost associated with a revised design and re-installation. However, in consultation with your TMA HPR Property Account Team, existing systems should be considered for practical retrofits to limit the potential for severe property damage and business interruption.



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