

## PHOTOVOLTAIC SYSTEMS AND ASPHALT SHINGLE ROOFS

### Introduction

Photovoltaic (PV) systems convert sunlight into electricity. These systems have been successfully installed on residential asphalt shingle roofs for many years. The two common attachment methods are rack-mounted and roof-integrated (RIPV). The latter is sometimes referred to as building-integrated (BIPV) method. Framed rigid PV panels/modules are commonly mounted on racks attached to the roof's supporting structure. Some PV panels are also shaped like asphalt shingles to be integrated into the shingle roof system.

Proper installation of the PV system is critically important. As with any roofing project, consideration of factors such as safety, design, codes, installation, and integration with other building components is necessary to obtain the desired results. Consult the PV system manufacturer, local building codes, and the asphalt shingle manufacturer for specific requirements. In the event that the specific shingle manufacturer is unknown, generally accepted roofing practices should be followed.

### Safety and Product Handling

If the proper precautions and protective equipment are used, PV systems can be installed safely and without incident. Several areas requiring attention are listed below:

- **Fall Hazards:** As with all roofing systems, working at heights can be dangerous. Follow all necessary precautions and safety guidelines in accordance with Ministry of Labour regulations and proper roofing practices, including the use of appropriate fall protection/fall arrest equipment.
- **Shock/Electrocution Hazard:** PV modules generate an electric current. Do not drive nails or screws into any part of the PV module other than in locations specified by the manufacturer. Follow the PV manufacturer's mounting instructions and local code requirements (building code and fire code) for location of panels and wiring. Avoid contacting free ends of connectors with metallic objects and do not install in wet conditions.
- **Additional Safety Precautions:** Additional safety information can be found in the National Roofing Contractors Association's Guidelines for Roof-mounted Photovoltaic System Installations and in CSA Standard C22.1-12 (Canadian Electrical Code), Section 50 Solar photovoltaic systems.

*For more information on this subject or other asphalt shingle technical issues, you may contact CASMA by e-mail at [casma@casma.ca](mailto:casma@casma.ca), or visit our website: [www.casma.ca](http://www.casma.ca). The information contained in this bulletin is for general education and is not intended to replace advice from a qualified contractor or direction on usage/installation from the manufacturer. Consumers should be aware of the safety hazards associated with work on roofs and, before doing so themselves, should consider following CASMA's advice of using qualified contractors. This bulletin may be reproduced with permission on condition that it be reproduced in whole, unedited, with attribution of copyright to CASMA.*

## **Design, Installation, and Maintenance**

- Local codes increasingly contain specific requirements for PV installation. These requirements should be followed carefully to ensure the safety of the home's occupants, firefighters, and anyone that may be performing work on the roof or in the attic of the home.
- All vertical and horizontal loads from the PV system should be transferred to the building structure without deformation or overloading the roof system or its components.
- Assess the arrangement and location of attic ventilation, gutters, plumbing vents, and other existing roof-mounted equipment to ensure the PV product/systems does not interfere with the effectiveness of other roof system components. Provide sufficient clearances around the array for roof venting (per local fire code) and regular maintenance.
- In colder climates, consideration should be given to possible drifting snow or ice dams in/around rack-mounted PV systems, which may increase roof loads beyond the original design considerations.
- Typically, PV systems should be installed concurrently with new asphalt shingles or shortly after a new roof installation. Doing so will reduce the chance of roof deterioration before the useful life of the PV is reached.
- Proper waterproofing and flashing of mounting locations where PV system components intersect with or penetrate the shingle layer is critical and must be done carefully to ensure the roof system's long-term water-tightness.
- Consider a semi-annual roof/PV system inspection and maintenance program performed by a professional roofing contractor, per National Roofing Contractors Association recommendations.

## **Important Legal Disclosure**

This Technical Bulletin is not intended to provide a comprehensive list of all safety cautions, design considerations, installation practices, or maintenance requirements relating to PV installation on asphalt shingle roofs. Rather, it provides an overview of some important concerns one should consider when contemplating PV installation. Asphalt shingle roofs can provide a suitable substrate for commercially available PV systems. It is important that the roof system and the PV system be constructed to comply with all requirements of the building code(s), the shingle manufacturer, and the PV module manufacturer. CASMA makes no warranties or recommendations otherwise regarding the suitability or performance of PV systems installed on roofs in conjunction with asphalt shingles.

## **NRCA Roof-Mounted Photovoltaic System Installations Guide**

For additional information on photovoltaic systems on asphalt shingle roofs, see the National Roofing Contractors Association's Guidelines for Roof-Mounted Photovoltaic System Installations.

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