ASPHALT ROOFING™
MANUFACTURERS ASSOCIATION

technical bulletin

Asphalt Roofing
Manufacturers Association

National Press Building
529 14th Street, NW, Suite 750
Washington, DC 20045
Tel: (202) 591-2450 • Fax: (202) 591-2445
www.asphaltroofing.org

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: The latter method is sometimes referred to as building integrated photovoltaics. Framed rigid PV panels/modules are commonly mounted on racks attached to the roof's supporting structure. PV panels with specialized frames may also be integrated into the shingle roof system. 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 roofing 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: Working at heights can be dangerous. Follow all necessary precautions and safety guidelines in accordance with OSHA 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 NEC Article 690.

Design, Installation, and Maintenance

- Local codes increasingly contain specific requirements for PV system 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.
- Ensure that the arrangement and location of the PV system installation on or above the roof deck do not interfere with the effectiveness of other roof system components. Provide sufficient clearances around the PV system for roof venting (per local fire code) and regular maintenance.

- In colder climates, drifting snow or ice dams in/around rack-mounted PV systems may increase roof loads beyond the original design criteria, may cause a blockage of other roof components, and may create the potential for large areas of snow to slide off the PV system surface. Installation of snow guards on the roof may be advisable.
- Typically, PV systems should be installed concurrently or shortly after the installation of new asphalt shingles. Doing so will reduce the chance of roof deterioration before the service life of the PV system 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 Contractor Association recommendations.

Important Legal Disclosure

This Technical Bulletin is not intended to provide a comprehensive list of all safety precautions, design considerations, installation practices, or maintenance requirements relating to PV systems on asphalt shingle roofs. Rather, it provides an overview of some important issues one should consider when contemplating PV system installation. Asphalt shingle roofs can provide a suitable substrate for commercially available PV systems; however, it is important that the roof system and the PV system be constructed and installed in compliance with all requirements of applicable building code(s), the shingle manufacturer, and the PV system manufacturer. ARMA makes no warranties or representations regarding the suitability of PV systems for, or the performance of PV systems installed on, asphalt shingle roofs.

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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