

APPLICATION NOTE: BUILT-UP ROOFS AND SUNLINK

Many of the roofs considered for flat roof PV installation are referred to as BUR, an acronym for “built-up roof” that refers to a roofing product made up from bitumen and open weave fabrics described as “roofing felts.” Since roofs have a 15-30 product life, this note will focus on modern BUR systems, which are asphaltic bitumen and felts made from materials such as polyester and fiber glass. BURs are elements in an overall roof system that consists of a roof deck layer attached to the building structure and overlaid with an air barrier, insulation, and a BUR water barrier.

BUR products are made to ASTM specifications and installed by contractors trained by the BUR product manufacturers. Taken as a system, roofs are rated for characteristics such as fire resistance and wind uplift resistance by UL and Factory Mutual. As described above, BUR roofs are treated as system components when tested under protocols such as FM 4474 for wind uplift resistance.

Roof systems are designed specifically to be the top of the building. A BUR is not rated to be joined to another building component or a rooftop structure in a mechanical or adhesive bond. Even so roof-mounted equipment is routinely installed on roofs after the initial completion of the building and roofs are frequently modified e.g., with skylights. The National Roofing Contractors Association (NRCA) Handbook describes procedures that both protect the roof and accommodate the changes and additions that arise from building use. PV generators are sensibly treated as a new type of roof-mounted equipment that is accommodated on an existing building without reducing the useful life of either the roof or the structure.

Resistance to wind and seismic loads by use of adhesives is standard practice in building systems. In a BUR system, bitumen functions as an adhesive at the interface to the roof substrate as well as between the felt layers. Single-ply elastomeric roof membranes (e.g., PVC, EPDM) are designed to adhere to the substrate using compatible adhesives such as urethane formulations.

When a mechanical connection to a roof is not feasible, an adhesive connection can be developed to produce the required performance. Selection of the adhesive should follow recommendations of the BUR manufacturer for materials compatibility. The specific performance of the adhesive joint can be verified by use of peel, shear, or tensile testing following applicable ASTM guidelines.

Bonds between metallic and non-metallic components are common in industrial and construction applications. See, for instance, ASTM D6465 as a basis for adhesive system selection and related ASTM specifications that pertain to adhesive system qualification. An adhesive is an acceptable means for developing restraint against seismic forces. Rooftop friction created by gravity loads resulting from PV system installation is not accepted under building codes as a seismic restraint.

The Eastwood Energy (EE) SunLink PV Module Mounting System (MMS) is a field-deployable light alloy structure that orients and secures PV modules on large, flat rooftops. The interface to the roof is designed for adaptability and consists of aluminum base plates that may be varied in size to accommodate concentrated load limits on roofs. Aluminum will adhere to BUR materials and is often used in BUR roof detailing as a flashing material.

Since BUR materials vary with source, SunLink-to-BUR adhesive joints are developed for each application and qualified through a simple test cycle. Thereafter, Eastwood Energy provides the applicable procedure to the installation contractor. Required installation provisions are no more restrictive than those used for other roof-mounted equipment.

Depending on location and array layout, only a small fraction of SunLink base plates will require adhesive application for a fully code-compliant installation. If roof replacement is anticipated over the 35-year design life of the PV generator, SunLink can be provided with adapters that mate with the base plates. Adapters are the adhered interface to the BUR. Adapters allow for easy removal and reinstallation of the PV generator with or without replacement adapters on reinstallation.