

# Adhesive Fastening of Insulation to Structural Decks

By Stan Choiniere



*Adhesive applied in a serpentine ribbon form.*

**T**raditionally, insulation has been attached to structural roof decks with either hot asphalt or mechanical fasteners. Multi-layer insulation systems have also been bonded together with asphalt. In the majority of cases, this is still true; however, a number of special circumstances may dictate that an alternate attachment method be used. One such option is the use of urethane foam adhesives.

Urethane foam products can be modified for many different applications. Depending on the amount of rise, the foam can be used as an insulation as well as an adhesive. Generally speaking, for adhesive applications, a low-rise foam product will be used. The foam is available with a variety of delivery and application systems and they are either one- or two-component systems.

One-part adhesives are typically dispensed from low-pressure cylinders through a hose and wand system. In some cases, they may be applied with a poured-in-place system. The one-part products are moisture cure systems, using the ambient moisture in the air to facilitate the curing process. The speed of cure is dependent on the moisture in the air and the air temperature.

Two-part adhesives, as the name implies, utilize two components that are pumped through a spray rig and mixed in a specially designed spray gun. When the two parts are combined, a chemical reaction is initiated. The amount of rise and the speed of cure can be controlled by regulating the catalyst.

Generally, the one-part products are applied in ribbons on the roof deck, or in the case of multi-layer insulation systems, to the base insulation board. With two-part products and the spray equipment used with them, full coverage of the substrate is common. With irregular surfaces, this can be an advantage.

The inherent advantages of using a urethane foam adhesive over bonding adhesives or cold-applied asphaltic products include:

- The fast cure time provides high bond strength within 1-2 hours vs. days.
- The expanding nature of the foam will compensate for irregular bonding surfaces.
- There is very little odor, if any, when compared with asphalt or solvent-based adhesives, thus allowing for use in sensitive areas such as schools, hospitals, and other medical care facilities.
- The process reduces construction noise. Many facilities are sensitive to noise and are unable to suspend business while roofing projects are being performed. The use of mechanical fasteners (especially when pre-drilling concrete and gypsum decks), can create very noisy conditions. Urethane foam adhesives have been used on many such projects to avoid interruption of business.



*Insulation board stock being placed into a low-rise urethane adhesive (note 4 x 4 board size).*

- The ability to adhere directly to built-up roof systems with certain types of foam adhesives allows for the installation of a new roof without disruption of the old roof. This further reduces the noise levels, eliminating disposal expenses and avoiding potential asbestos issues.

While not suggesting that structurally unsafe roof decks be left in place, there are instances where a roof deck may not be capable of holding a mechanical fastener but may still be structurally sound. Under these circum-

**Typical  
two-  
component  
spray  
equipment.**



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*An example of full-coverage spray application.*

stances, a urethane foam adhesive can be a very cost-effective and high-performance solution.

Depending on the specific product, urethane foam adhesive can be used to attach insulation to any type of roof deck and even directly to BUR coverings.

Factory Mutual allows adhering to all approved substrates except steel and wood. For multi-layer insulation over steel deck, the Factory Mutual-approved application is to mechanically attach the first layer of insulation and to bond subsequent layers. This is especially effective with tapered insulation systems and also eliminates thermal bridges. Again, approvals and compatibility are product-specific, but most types of rigid insulation can be used with urethane foam adhesive. Systems using urethane foam adhesive have achieved very high wind ratings when following specific construction assemblies.

There are further safety issues to consider with urethane foam adhesives vs. asphalt. The most obvious is the fact that the urethane foam adhesive is not hot and will not cause burns. Eye and breathing protection are recommended while applying urethane foam adhesive. Some city ordinances prohibit the use of hot asphalt, and Department of Transportation (DOT) regulations are making the transportation of kettles more difficult. Getting the product to the roof is also easier with urethane foam adhesive. Even products that use spray equipment are much easier to use, especially as building height increases.

Urethane foam adhesives are not the solution for every project. They are not the most cost effective option on steel decks,

nor are they Factory Mutual approved direct-to-steel. But when compared to labor-intensive applications such as pre-drilling and fastening to gypsum decks or dealing with hot asphalt on concrete, urethane foam adhesive becomes a very effective alternative. ■

## ABOUT THE AUTHOR

**Stan Choiniere** is National Technical Manager for Olympic Fasteners. He has over 20 years of experience in the commercial roofing industry, where he has been involved in the development of fastening systems for many roofing applications, as well as for other construction fields. He holds patents for many of his designs. Stan has been active with SPRI for 20 years and has held many positions, including chairman of the fastener committee and of the overall technical committee. He has been on the Board of Directors of SPRI for 15 years and served as President of SPRI in 2001. Choiniere has written many technical papers that have been published in trade journals. He also has presented some of his work to groups such as NRCA and RCI.



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