# In defense of built-up roofing

by **Tom Bollnow**

Despite recent concerns about asphalt labeling, bitumen fume exposure and fire hazards, there are many reasons to be encouraged about the state of the built-up roofing (BUR) industry.

In the current business environment, many things are evaluated relative to an arbitrary high-tech scale, and in the roofing industry, BUR systems rarely are considered to be high-tech. But reports about problems with BUR systems often are exaggerated and inaccurate.

A truly high-tech roof system should be based on state-of-the-art research and development and possess long-term performance attributes. BUR systems fit this definition.

## Market share

It is a tribute to the BUR industry that BUR continues to maintain a strong position in the low-slope roofing market. NRCA's annual market surveys reveal that BUR has maintained a steady 20 percent or more share of total U.S. low-slope roofing sales during the past several years.

So why does BUR continue to hold its market position if it is perceived as antiquated and plagued with negative environmental issues, such as bitumen fumes and fire hazards? The answer is that it continues to perform well.

## System performance

BUR system performance is measured according to the National Bureau of Standards Building Science Series (NBS BSS) No. 55, *Preliminary Performance Criteria for Bituminous Membrane Roofing*, which was published in 1974. *The NRCA Roofing and Waterproofing Manual, Fifth Edition*, lists the 20 performance attributes contained in NBS BSS No. 55. There is no significance to the order in which the criteria are listed.

NBS BSS No. 55 Section 6.1 states that a BUR membrane should have a tensile strength of not less than 200 lbf/in (35 kN/m) in the weakest direction when tested at 0 F (-18 C). The BUR industry has applied this principle successfully for the past 25 years. Although tensile strength is the most commonly referenced performance criteria, it is not necessarily the most important. It also is not necessarily true that tensile strength values significantly above 200 lbf/in (35 kN/m) equate proportionately to increased service life.

The minimum membrane tensile strength criterion was developed during a period when insulation was attached to steel decks with hot asphalt or cold adhesive. Insufficient insulation attachment to roof decks resulted in membranes splitting and pulling away from roof edges, parapets or penetrations. The use of fiberglass-reinforced ply sheets and the FM Global requirement for mechanically fastening insulation to steel decks have made the incidence of BUR membrane splitting a rare occurrence.

Roof membrane elongation also is necessary to help relieve the tension produced when a membrane cools and wants to contract more than the substrate to which it is secured. The elongation properties of a properly installed BUR system are more than adequate to prevent splitting caused by thermal movement.

All the performance attributes in NBS BSS No. 55 act together to determine a BUR system's quality. BUR systems possess a unique redundancy provided by multiple layers of bitumen or cold adhesive and reinforcement plies that create a membrane's characteristics. The performance criteria coupled with the Asphalt Roofing Manufacturers Association/NRCA *Quality Control Guidelines for the Application of Built-Up Roofing* have helped to improve BUR systems to the point where they are more reliable than ever.

## Composition today

Current BUR systems are composed of four components: reinforcement ply sheets, weatherproofing bitumens, surfacings and flashings. Fiberglass- and organic-reinforced ply sheets are the most common reinforcements. Surfacings and flashings generally are prescribed for each specific BUR system.

ASTM D 2178, "Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing," requires Type IV felt to have a minimum tensile strength of 44 lbf/in (7.7 kN/m) and Type VI felt to have a minimum tensile strength of 60 lbf/in (10.5 kN/m) measured in the weakest direction. The Midwest Roofing Contractors Association tested Type IV fiberglass-reinforced ply sheets in 1980, 1981, 1984 and 1987 and Type IV and Type VI ply sheets in 1997 according to ASTM D 2178 and NBS BSS No. 55. The research prompted a marked improvement of fiberglass-reinforced ply sheets that eventually all but eliminated splitting as a performance concern.

Coal-tar-pitch roof systems use coal-tar-saturated organic felt or coal-tar-coated fiberglass-reinforced ply sheets. There are some BUR systems available that use nonwoven polyester with hot asphalt, as well as other types of polyester mats with liquid-applied asphalt. These systems may provide increased service life but at a relatively higher cost.

The weatherproofing components used to adhere reinforcing plies to each other and, in some instances, to substrates are referred to as bitumens. Standard asphalts, Type I coal-tar-pitch, polymer-modified asphalt, and cold-applied coal-tar and solvent-based asphalts are used in BUR systems. Polymer-modified bitumens most often are used in specialized BUR systems. Asphaltic-based liquid adhesives can be rolled, squeegeed or sprayed for interply applications.

BUR has evolved from a crude combination of bitumen, felt and surfacing to a relatively sophisticated combination of bitumen, reinforcement and surfacing. When combined in various configurations, the resultant roof systems can be efficient and high-performing.

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