

Modified bitumens: are they becoming America's choice?

In the overcrowded roofing market, it may have seemed like folly for anyone to attempt to introduce another roofing system. But if the statistics listed in the National Roofing Contractors Association's *Commercial, Industrial and Institutional Roofing Materials Guide* are any indication, there were plenty of manufacturers ready to take the plunge when modified bitumen roofing technology was imported into the United States.

By the *Guide's* count there are 35 modified bitumen manufacturers promoting 99 polymer-modified bitumen membranes in this country. And despite fierce competition from other roofing systems, modified bitumen roofing is flourishing and is predicted to continue its success for years to come.

Unfortunately for some, a sort of roofing evolution is taking place, with some species of systems gaining dominance in the roofing jungle while other systems fall by the wayside. According to Al Spingler, product manager for The Celotex Corp.'s roofing products, "Modified bitumens will grow at the expense of EPDM." This will occur not because modified bitumens are a better product, he explained, but because EPDM has the largest percentage of the single-ply market to draw from.

Other manufacturers and contractors interviewed for this article believe that modified bitumens will take over part of the BUR market. This is because BUR manufacturers can produce both BUR membranes and modified bitumen membranes on the same equipment. Within the next five years, BUR manufacturers expect their equipment to be used at least 50 percent, if not more, for modified bitumen membrane production. BUR installers will also find it easy to switch to modified bitumen. Contractors who do large amounts of BUR work already have the expensive equipment needed to apply modified bitumen membranes—kettles, torches, mops and trained workers.

The European immigrant makes good

by Kathleen Aharoni

Presently, "50 percent of the roofing market is BUR and 50 percent is everything else," John Van Wagoner of Prospect Industries, Inc., McLean, Va., told *Roofing Spec.* In the "everything else" category, "50 percent is EPDM, 25 percent is polymer-modified bitumen and 25 percent is PVC, PIB, Hypalon, Neoprene, etc.," Van Wagoner explained.

Regardless of whose market they are eating into, modified bitumens are expected to continue their growth. According to Jim Adams, group products manager at W.R. Grace, "eventually modified bitumens will be considered their own classification," instead of being considered as part of the present BUR or single-ply categories.

The exodus to America

The modified bitumen membrane originated in Europe during the 1960s, when single-ply roofing systems were first introduced. Over there, they quickly dominated the market. During the 1970s, modified bitumen membranes, technology and manufacturing equipment began to be imported into the United States, and the systems' popularity and use have grown here as well.

"There is a major change in process," according to the "Report on Commercial Roofing in the U.S.—A Special Survey" produced by the Corporate Research Center (CRC) in New York. The national survey found that only a little more than half of the 82.9 percent of the contractors polled who said they used hot BUR most frequently would continue this practice. One-third of the BUR users plan to install modified bitumen in the future, either exclusively or along with BUR, according to the survey.

In its interpretation of the survey results, CRC states, "This would show a strong movement to modified bitumen, and reflects what might possibly be the most significant shift in roofing contractor philosophy: a change from 'building roofs' onsite to 'installing roofs' manufactured at the factory."

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How bitumen is modified

The two modified bitumen products that seem to enjoy the most success in the United States are membranes modified with either atactic polypropylene (APP) or styrene block polymers such as styrene butadiene styrene (SBS) or styrene butadiene rubber (SBR).

APP-modified systems command a larger market share in Europe. But despite APP's better ultraviolet radiation resistance and lower cost, SBS products are more popular in the United States, according to Jim Rizzo, president of modified bitumen manufacturer Tri-Ply, Inc.

The SBS-modified membranes cost more because they must be used with a polyester reinforcement and a granular coating, Celotex's Spingler says. But SBS membranes can be applied with a mop as well as a torch, making them more attractive to the large BUR contractors who already have or can afford kettles.

APP-modified membranes, on the other hand, must be torch-applied. This restriction may make some contractors wary of using them because the torching operation is more vulnerable to rooftop fires and injuries. (See the sidebar on torching safety.)

"Another modifier that may have an influence on the market in the future would be Uniroyal's ionic elastomer," Van Wagoner predicts. This partially cross-linked EPDM elastomer is currently being evaluated for modifying asphalt in shingles and other rolled products. The product's properties are similar to SBS's, Paul Hinkley of Uniroyal says. Uniroyal plans to introduce the modifier commercially some time next year.

Call out the reinforcements

Another important variable that affects a modified bitumen membrane's quality is its reinforcement. Typically, spun-bonded polyester, fiber glass or a mixture of the two is used. According to Van Wagoner, "because of the elasticity of the polymer-modified bitumen (at least 15 percent for APP and 25 percent for SBS), an equivalent reinforcement with the ability to accommodate movement is preferred." Van Wagoner also estimates that the random weave polyester fabric that is beginning to immigrate from Europe into the United States BUR market will find itself a significant place in modified bitumen production as well.

Fiber glass, which is approximately half the price of polyester and has greater tensile strength, lacks polyester's elongation properties. However, if membranes are to meet the National Bureau of Standards' criteria for tensile strength, then fiber glass must be used. Van Wagoner disputes this requirement, claiming that a membrane's ability to accommodate movement and stress is more important than tensile strength.

Some manufacturers try to combine the advantages of both types of reinforcements by sandwiching them together in the membrane. Others are skeptical of this approach. John Gentry of Phillips Fibers told *Roofing Spec*, "I personally don't understand the fiber glass/polyester mix; they actually work against each other."

Phillips Fibers, in addition to manufacturing a polyester-reinforced membrane, produces a membrane reinforced with thermoplastic rubber (TPR). TPR has high resilience and rebound, Gentry states. However, it does make the product more expensive, he admits. W.R. Grace also makes a TPR-reinforced modified bitumen membrane. Grace's TPR modifier is a cross-laminated polyethylene film.

Modified installation

Modified bitumen membranes can be installed with hot-mopped asphalt, as a self-adhering sheet (sometimes referred to as peel-and-stick) or by torching. Asphalt-mopped modified bitumens are applied similarly to BUR membranes. This technique is usually used in a totally adhered or partially adhered roofing system. Mopping can be done on substrates such as nailable or non-nailable decks, various types of insulations (except those susceptible to hot bitumens) and existing smooth-surfaced BURs. The same environmental restraints that affect BUR installation, such as temperature and climate, also affect modified bitumen application.

Torching becomes hot problem for modified bitumen users

The rapid growth of torch-applied modified bitumen use may be keeping some manufacturers and contractors in business, but unfortunately, it may be keeping a few fire departments in business as well.

Fires and smouldering from torch-applied modified bitumen roofing is becoming a very serious problem, according to some reports. Officials in New York City consider the problem so grave that they now require workers who use propane torches to attend a specified number of seminar hours on proper torch handling. In Los Angeles torching on roofs is being banned, says John Gentry of Phillips Fibers. And an increasing number of fire marshalls in other localities are also prohibiting rooftop torching.

Being prepared and careful are probably the keys to safe torching. James Mansfield of James Mansfield & Sons Co., Inc., Lyons, Ill., says that he has had no problems with fires or smouldering because "each of my men carries an extinguisher on his belt. In addition, we have two or three large extinguishers on the roof."

Besides carrying fire extinguishing materials or having them readily available, roofing contractors should appoint individuals to carefully inspect projects for smouldering before workers disappear for the day. Many fires have resulted from

smouldering materials going unnoticed until they burst into flame some time after they had been exposed to torching.

If you are working on a reroofing job, be sure you aren't torching the membrane to fiberboard or torching flashing materials onto cant strips. Both fiberboard and cant strips are highly flammable.

If you want to use modified bitumen membranes, and you don't want to risk a fire, you might try a mopped or self-adhered system. However, if you are using a product that must be torch-applied, such as an APP-modified membrane, you have no satisfactory alternative. Although several NRCA roofing contractors have tried using heat guns and manufacturers have experimented with microwave and infrared radiation, torching still is the fastest and most efficient way to install a modified bitumen that requires heat for application.

Some help may be coming from the manufacturers shortly. If your modified bitumen manufacturer doesn't offer a torching safety seminar already, it is probably in the process of organizing one. According to Tri-Ply's Jim Rizzo, safety "boils down to training."

NRCA would also like to remind you of a few safety tips for using liquid propane gas (LP-Gas) safely:

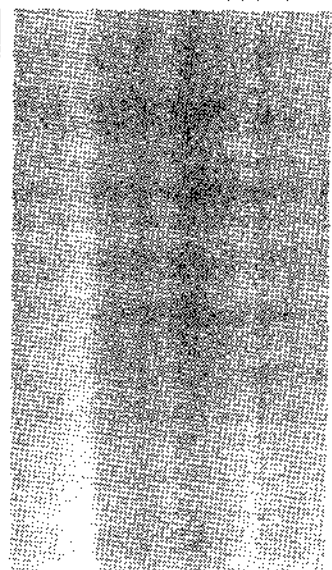
- Keep tar and other foreign materials from accumulating on LP-Gas valves and containers.
 - LP-Gas containers mounted close to burners should have a heat reflector shield between the burners and containers.
 - Control valves on LP-Gas containers should be opened slowly, but completely. The flame should be adjusted with the valve.
 - When shutting off the burner, close the LP-Gas container valve first, and let the remaining gas burn out of the hose before closing the burner valve.
- To make sure your fire extinguisher is handy and usable:
- Roofers should not use extinguishers with soda acid; it spreads the flame.
 - Water should not be used to extinguish a roof fire.
 - When using a foam type extinguisher, apply a complete blanket of foam over the burning surface.
 - When using a dry chemical type extinguisher, direct the chemical stream at the base of the fire from a safe distance of about 10 to 15 feet. Sweep the fire away from you, starting at its nearest point and moving the chemical stream toward the furthest point.

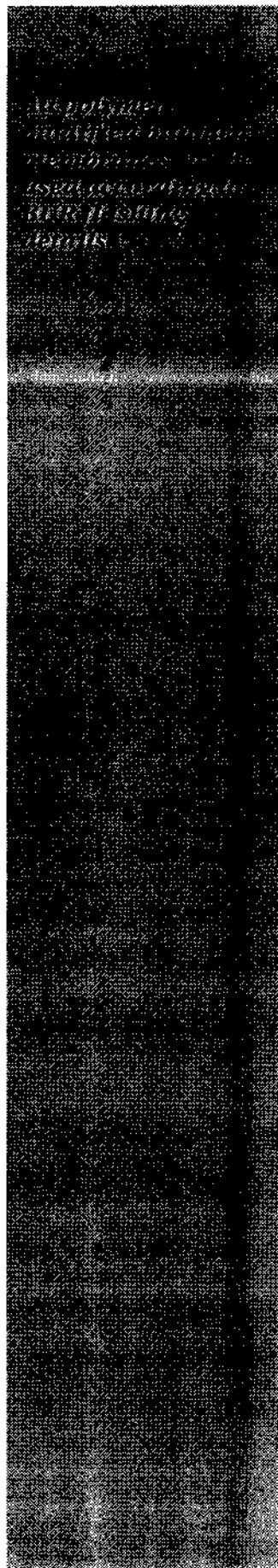
Self-adhering modified bitumen sheets contain a release paper on the membrane's underside to prevent it from sticking to itself in the roll. It must be installed over an approved substrate and is generally preceded by a primer that is allowed to dry. These membranes are also used primarily in totally adhered or partially attached systems. They can be used on most substrates, including nailable and non-nailable decks, a variety of insulations and over properly prepared, old smooth-surfaced BURs. Phillip's Gentry suggests that self-adhering systems not be installed in temperatures below 50 degrees or when rain is imminent.

According to the peel-and-stick systems' manufacturers, this type of installation is becoming more popular. W.R. Grace's

Adams said sales of the company's self-adhering membrane have grown an average of 40 percent per year since 1979. This statistic seems to correlate directly with modified bitumen growth in the United States, he adds. Phillip's Gentry predicts that more peel-and-stick systems will be specified because of the dangers contractors are experiencing with torched-on systems.

The most popular technique for applying modified bitumens is by torching. It is also the most dangerous, however. Roofers must exercise extreme care to be sure that torching is not done on combustible surfaces such as fiberboard or cant strips. Also, the polyester reinforcement within modified bitumen membranes can be damaged if the material is overheated.





Generally, torch-applied systems are totally or partially adhered. However, "some manufacturers are marketing their membranes for use in loose-laid systems," Van Wagoner says. Torch-applied membranes can be installed over nailable and non-nailable decks, directly over some fire-resistant insulations, or over other insulations with an approved base sheet or other fire-resistant overlayment. They are also widely used over existing smooth-surfaced BURs that retain sufficient integrity to provide an acceptable substrate. Most manufacturers suggest torching in above-freezing temperatures.

All three of these installation methods incorporate flashing procedures that use the same basic membrane used in the roof's field. The flashings generally incorporate a double membrane installation for vertical and horizontal transitions at terminations and penetrations. Flashing details are often simplified by eliminating cant strips and other complexities that are required for built-up roofing. All polymer-modified bitumen membranes can be used according to BUR flashing details. Some polymer-modified bitumen membranes are currently specified by BUR manufacturers as a base flashing for their roofing membranes.

Van Wagoner and Spingler, among others, believe that part of modified bitumen's fast rise is due to the fact that when asbestos flashings were taken off the market, many manufacturers specified modified bitumens to take their place. Flashing with modified bitumens introduced contractors to the systems and made the decision to install them on the entire roof easier.

At long last

As with any roofing system, the bottom line is how long it will last on the roof. A paper presented in Brighton, England in 1981 at the Second International Symposium on Roofing addressed this subject. The paper, titled "The Durability Assessment of Bitumen/Polymer Roofings," by S.J. Kerry and J.O. May stated, "With the data now at hand, it is becoming possible to envisage, with selected bitumen polymers, properly designed and executed roofs having a life in excess of 30 years."

Tri-Ply's Rizzo claims that coated modified bitumen systems should last 25 years and non-coated systems 15 years. Tri-Ply gives a 10-year warranty for its coated system and a six-year and 12-year warranty on its non-coated system. W.R. Grace predicts that its self-adhered system, which does require a topcoat, will last 10 to 15 years and warrants its system for that length of time.

Standards to come

As of yet, U.S. standards for modified bitumen membranes are non-existent. The only current North American consensus standard for modified bitumens is the Canadian General Standards Board 37-GP-56M, which is currently being rewritten.

However, according to Cy Tilsen of Tilsen Roofing Co., Madison, Wis., it is essential that "some standard be established that will dispel the rumor that modified bitumens' tensile strength is so strong that they will withstand any building movement." Jim Rizzo of Tri-Ply believes it is very important to get ASTM standards out because there are a lot of bad products on the market.

An ASTM standard is currently being written for modified bitumen products, but is not expected to be finalized for a while. ASTM's D-8 committee will be meeting in June to discuss the standard.

The Midwest Roofing Contractors Association (MRCA), through its technical and research committee, has produced performance criteria for modified bitumens. This document, designated MB-30, was issued "as a step toward establishing performance for prefabricated reinforced modified bitumen roof systems," the MRCA document states.

The future?

Thus far, the American roofing market has taken its direction from the European market. If this trend continues, the modified bitumen system may become the reroofing system of choice for American contractors. In Italy, where it is said that the modified bitumen market began, over 75 percent of the reroofing is done with modified bitumens. And unlike EPDM, says Rizzo, modified bitumens are good for repair and maintenance work.

During the short time they have been in America, modified bitumens have gained a reputation for low cost, availability and versatility. According to manufacturers, contractors and consultants, they have the future.