Project Pinpoint data reveal roof systems' strengths, limitations

Problems	Membrane Systems				
	BUR	SBS	APP	EPDM	PVC
Blistering	16%	20.5%			
Embrittlement					20.6%
Flashing	12.6%		16.5%	14.8%	
Lap defects		17.1%	28.6%	22.6%	
Puncture/tear				9.2%	10.6%
Ridge/wrinkle	18.4%	13.6%	17.1%		
Shrinkage		10.2%		18.8%	23.8%
Splitting	13.6%		11.1%		16.3%

NRCA Project Pinpoint Explanation of Failure Modes in Built-Up Roof Membrane

Blistering
Blistering is the result of moisture, trapped within a roof assembly, expanding to vapor (1400 x expansion). Most of the entrapment occurs during construction when good roofing practices are not followed. Some blisters occur as a result of damaged membrane allowing water to enter the roof assembly.

When the roof membrane surface temperature increases during the day, the entrapped moisture turns to a vapor and the vapor subsequently creates a blister resulting in a weakened area of the membrane. KLB-10O can't cure the more severe problems of workmanship, but its adhesive properties, which are more than ten times greater than asphalt, can strengthen the weakened area of the membrane, and may actually readhere the membrane once the vapor drive stops and dissipates.

Splitting, Ridging, and Wrinkles
Splitting, ridging, and wrinkles are results of movement of the roof assembly, loss of physical properties of the membrane as it ages, low fatigue resistance and may be accelerated by vapor drive. Many of these causes can be addressed with expansion joints, proper securement of the roof insulation, tightly butted or double layered insulation and vapor retarders where required.

Standard asphalt and fiberglass felts have limited elongation properties and no recovery characteristics. As standard asphalt ages due to exposure to ultra-violet aging and water, it loses what minor elongation properties it did possess. After aging and associated loss in physical properties, movement induced by daily and seasonal thermal cycles results in splitting and ridging of the membrane and ultimately, fatigue failure. The roofing material's initial physical properties, severity of the elements, installation procedures and design elements all have an impact on when this phenomenon occurs.

KLB-100 and polyester reinforcements substantially improve fatigue resistance, elastic properties, and provide greater resistance to aging, therefore overcoming movement induced fatigue therefore extending the roof membrane service life. The use of "ethylene" as one of the copolymers in SEBS provides greater ultra-violet protection thereby slowing the effects of the sun on membrane aging.

Barrett's KLB-100 elastomeric asphalt, by design and engineering, addresses many of the demonstrated weak hesses of standard asphalt systems as evidenced by the NRCA's Project Pinpoint.

KLB-100 also offers:

- improved resistance to standing water due to encapsulation of the asphalt in the polymer matrix
- self-healing characteristics in warm temperatures due to the cold-flow memory nature of the polymer-modified mopping bitumen
- reduced odor due to the polymer content; odor masking products are also available

Superior, long lasting roof applications will always rely on proper design, good application techniques, and quality product. Barrett Company answers all three requirements with

- Approved Applicator Program
- Multiple Roof Designs to meet various owner needs
- Technical Assistance during design and application
- Superior products offer greater assurances of long term performance

Explanation of failure modes in APP Modified Bitumen Membrane

Splitting, Ridging, and Wrinkles

APP membrane's problems in these areas is somewhat improved yet almost identical to built-up roofing. This is consistant with the minor physical property improvements of APP modified asphalt and fiberglas reinforecements compared with conventional BUR. The same causes and corrective measures are present.

Lap Defects

Lap defects problems associated with this system are high due to this product being applied in a one or two ply configuration, making the laps more critical. The greater mass and thickness of this product also works against it at "T" laps (a side and end lap at the same point) at "T" joints it is common for small amounts of water wick into the lap, undermining its watertight integrity

Explanation of failure modes in SBS Modified Bitumen Membranes

Blistering

SBS Modified Bitumen develop blisters in the installed system for the same reasons as built-up roofing assemblies. The reason blisters are more problematic is due to SBS being non permeable and to phased construction. Phased construction is when the underlying base plies are installed and left exposed and then at a later date the finish ply or cap sheet is installed. This construction method creates the potential for surface moisture on the base plies to be trapped in the assembly when the cap sheet is installed if the contractor does not thoroughly assure the substrate is dry.

Ridging and Wrinkles

This problem is greatly reduced due to the elastic properties of the styrene and butydene polymers in the bitumen and the polyester reinforcements. Fiberglass reinforcements offer far fewer elastic properties. The continuing presence of ridging and wrinkles is a result of the use of fiberglass reinforcing or excessive substrate movement related to improper insulation securement or lack of proper expansion joint placement.

Shrinkage

Shrinkage is most often associated with polyester reinforced modified bitumens. Most often the shrinkage is a result of the manufacturer running his machinery too hot or too fast and stretching the polyester mat during production and winding it up in a roll under tension. After being installed the polyester relaxes or snaps back to its original shape. This problem can be reduced by the contractor unrolling the modified bitumen roll and allowing it to relax before application. This procedure is standard in some manufacturer's application guidelines.

Lap Defects

SBS modified bitumen roll goods experience the same problems with laps as the APP modified bitumens. The problems is less accute due to the improved elastic properties of SBS polymers vs. APP polymers and a far greater number of three ply applications. Redundancy created with three and four ply applications and the use of an elastomeric asphalt are the most effective ways to address lap problems.