Hot commodity: EPDM that's cool

School-roof restoration pays energy dividend with enhanced solar reflectivity, extended service life

By Joe Maty, Editor, JAC

With interest on the rise in turning dark-colored roofs into highly reflective, light-colored roofs, makers of roof coatings are hot on the trail of technologies that will deliver new opportunities for the use of these heat-reducing coatings.

Needless to say, one key to successfully exploiting these emerging market opportunities is meeting the technical challenge of making the reflective coating stick to the surface of existing roofs of various types.

Mule-Hide Products Co. Inc., a Beloit, WI-based manufacturer of acrylic elastomeric roof coatings, is hitching its hopes for sales growth in part to coatings materials that can transform aging EPDM rubber roofs into bright, new, highly solar-reflective surfaces.

EPDM (ethylene propylene diene monomer) accounts for a major share of the low-slope roof marketplace for both new and existing buildings. The National Roofing Contractors Association (NRCA) estimated the market share for EPDM roofs at 27% of new construction and 25% of re-roofing of low-slope roofs in 2006. For 2007, the NRCA's annual market survey—issued in early 2008—projected that EPDM roofs would account for 26.9% of new construction and 24.3% of re-roofing work involving low-slope roofs.

The black EPDM roof of the BVM Maternity school in northern Illinois was restored following Mule-Hide Inc.'s EPDM Restoration System™ program. The program includes preparation of the existing roof with thorough cleaning and repairs, application of a proprietary resurfacing agent to the existing roof to facilitate coating adhesion, and application of a white reflective acrylic elastomeric coating. Photo courtesy of Mule-Hide Inc.

But for all its advantages—economics, durability, performance, and the availability of white EPDM—most EPDM roofs already installed are black in color, and thus absorb rather than reflect sunlight. This contributes to heat generation and transfer into the building in sunny, warm weather, while also adding to the so-called "urban heat island" effect.

Enter into this realm of the dark EPDM roof the cooling effect of the light-colored, reflective coating. Mule-Hide offers as an antidote to the simmering fever of the dark roof the A-300 FINISH, an acrylic elastomeric, white reflective roof coating. The product is part of the company's EPDM Restoration System™, designed to help turn black EPDM roofs into reflective, seamless "cool roofs." A key element in the system is the company's A-151 ReSurface Agent™, a proprietary product designed to etch the existing roof surface, creating a profile, or "teeth" to facilitate a strong adhesive bond of coating to the EPDM membrane.

The restoration challenge

The practical results of this EPDM restoration system can be seen first-hand at a private elementary school in northern Illinois, the BVM Maternity Catholic Elementary School in the town of Bourbonnais. Here, an aging EPDM roof was recoated with Mule-Hide's restoration-coating system in a program to extend the life of the existing roof and transform the black-colored roof into a white, reflective, "cool" roof.

The existing roof was a fully adhered EPDM, installed in the

mid-1980s. By late 1999, leaks had developed along seams of the membrane and around penetrations such as skylights. Roofing and roof-coating contractor Marty Worby had repaired those leaks in 1999 as a way to "buy time," he said. Eight years later, school officials agreed that the time had come for a complete restoration and coating project.

Worby started with the A-151 resurfacing agent. This restoration cleaner and surface-treatment agent is applied by sprayer to the dry EPDM roof surface after any loose dirt and debris are air-blown or swept from the roof. The agent is allowed to dwell for at least five minutes, and is then power-washed off. When properly cleaned, the roof surface will appear jet-black, according to application directions from Mule-Hide.

The resurface-agent formula is a mixture of sodium metasilicate, water, and proprietary inorganic-salt and surfactant ingredients, and is characterized by a high pH level of 13.0 to 13.5. The VOC content is zero, but rinse water generated during use should not be discharged into an open body of water.

Following the cleaning/resurfacing, Worby repaired any roof sections that had been compromised. Here, any damaged roofing and polyisocyanurate insulation were removed and replaced with comparable materials.

The primary coating product used—Mule-Hide's A-300 FINISH—is described as an acrylic-based elastomeric material offering a high degree of exterior durability, a high level of flexibility even in low-temperature environments, and high reflectivity. The product is high in solids (approximately 70% by weight), low in VOCs at 37.6 grams per liter, and can be applied in temperatures ranging from 40 to 100 F, according to the company's product literature. Ratings from the Cool Rating Council (CRRC) indicate an initial reflectance of 86% and three-year reflectance values of up to 72%, with emissivity of 91%.

The coating is typically applied in two coats, with a total dry film thickness of approximately 40 mils.

Also used in certain areas of the roof was Mule-Hide's A-350 FINISH, a modified acrylic elastomeric coating for roof sections subject to periodic ponding of water. The product is formulated with higher solids content and an acrylic resin specially designed to provide enhanced water resistance. The product is similar to the primary roof coating in its application characteristics, VOC content, cured-film flexibility, and other properties.

For flashing and sealing around penetrations, Worby used Mule-Hide's A-200 Flashing Grade sealant, a flexible, acrylic elastomeric flashing-grade sealant for use in waterproofing and sealing of roof fasteners, seams, penetrations, and lap joints.

Selling sustainability

Worby said the restoration and coating approach represents an economical, sustainable option for aging EPDM roofs. But he cautioned that the approach can't serve as a "fix all" for damaged, degraded, and leaking roofs. In these types of situations, the roof, or at least the areas that are compromised, must be replaced. In this case, Worby said he emphasized the need to pursue the restoration and coating option sooner rather than later.

"I told them if they didn't catch it right away, they could not use the coating, which would be a fraction of the cost of putting on a whole new roof," he said.

"As long as you don't have serious damage or wear, with leaks, this approach will do the job. When you have the first sign of a leak, that's when you should look at coatinging."

As for ensuring that the restoration approach works successfully, Worby said attention to cleaning, pretreatment, and application guidelines is critical. "If put on right and in the right conditions, it's a great roof," he said, adding that the roof-coating approach has frequently resulted in failures when these factors aren't taken into account.

Jeff Litaker, Mule-Hide Southern Midwest territory manager, also emphasized the importance of thorough cleaning and preparation of the roof surface as a crucial part of the restoration/coating program. "It's important to use the resurfacing system at the properly applied rate. Then, the contractor should check on the condition to make sure it is clean, and if necessary repeat the process." Litaker said the surface should resemble a bicycle-tire tube that is prepared and cleaned before patching: a shiny black appearance.

The EPDM restoration system offered by Mule-Hide is designed for use only on a black-colored EPDM roof. A white-colored EPDM roof is not a candidate for the program due to chalking of the white pigment in the sheet membrane, which interferes with coating adhesion, Litaker says.

But in situations where the roof type and condition are a good match for the restoration system, Mule-Hide says the technology can deliver extended roof service life of 10 years or more, contributing to sustainability and delaying the need for roof tear-off and landfill disposal. And the cool-roof dividend is proving to be a hot commodity in the current climate of heightened interest in all things green and energy efficient.

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