The 411 on Roof Coatings

Choosing the Right Coating for the Substrate Can Extend Roof Service Life, Cool Temperatures and Save Energy

Roof coatings are a fast-growing market segment in the roofing industry—and it makes good sense why that is the case. Application of a roof coating on a new or existing roof can provide added durability, extend roof service life, save on energy costs, and avoid the hassle and expense of a full tear-off and replacement.

COATING TYPES

Roof coatings come in many formulations and are appropriate for installation over all roof system types. The first question many have is which coating is appropriate for which substrate? Coatings are most broadly divided into asphaltic- and polymer-based materials. Asphaltic-based coatings are solvent-based “cut backs” or water-based emulsions. They can be black or aluminized. They have the ability to be used in cold and inclement weather. Aluminized coatings are used when a reflective and ultraviolet-, or UV-, stable asphalt coating is needed.

The most common polymer-based coatings include acrylics, polyurethanes and silicone coatings. Acrylic water-based coatings are ideal for high UV environments where a reflective roof is desired. They can be colored...
but generally are sold in white, tan and gray. Many specialized versions are made to be compatible with specific substrates. Polyurethane coatings are typically solvent-based and come in two main types, aromatic and aliphatic. Urethanes have good mechanical properties and high abrasion resistance. They are suggested for use in hail-prone regions or where a roof is exposed to heavy foot traffic.

Silicone coatings, like acrylic coatings, perform well in high UV environments where a reflective roof is desired. Often silicone is used in locations where rain is a daily occurrence or if the roof is often wet and experiences excessive amounts of ponded water. In addition, butyl, fluoropolymer, PMMA, polyester, STPE, SEBS and styrene-acrylics can be used to formulate roof coatings.

Coating thickness (dry film thickness) has an effect on performance. In general, thicker coatings will have increased service life and will provide additional durability regardless of coating type. Also very important is the specification written for each project. Every project is different and every specification should be tailored to every project to ensure the correct coating and application is appropriate for the roof and coating type. Coating manufacturers’ specifications should be the basis for every coating project and be coordinated with project specifications.

**SUBSTRATES**

Asphaltic-based coatings are most commonly used on built-up roof (BUR) and modified bitumen (MB) membranes; they are rarely, if ever, used on single-ply roof membranes. All types of polymer-based coatings are used on BUR, MB, metal and single-ply roofs. There is information to assist with the evaluation and preparation of the substrate in the ASTM standard titled, “Standard Guide for Evaluation and Preparation of Roof Membranes for Coating Application”.

From a material-quality standpoint, it is important to use products that meet or exceed their ASTM specifications.

**CASE STUDIES**

**Cooler Interior Temperatures**

A highly reflective coating was installed over an existing uninsulated metal roof on a 35,000-square-foot steel processing facility.

Prior to coating application, the roof was power-washed, more than 10,000 fasteners were removed and replaced, and all metal-panel seams and fastener locations were sealed. The roof was primed with a water-based primer and coated with two coats of acrylic coating.

The building was instrumented with thermocouples to monitor the before and after temperatures. Rooftop temperatures were reduced 30 degrees F. Before the reflective coating was added, the interior of the facility was extremely hot, reducing the productivity of the workers. In fact, the interior regularly was about 100 F from noon until 4:30 p.m. After coating, the maximum interior temperature was reduced to 90 F and was reached only at about 5 p.m. The reduction in afternoon temperatures significantly improved worker productivity, and the projected payback from increased worker productivity alone was only two years.

**Extended Service Life**

A reflective coating was installed over an existing mechanically attached, black EPDM roof system with an R-15. The roof was leaking because of open seams and split flashings, causing interior damage and disrupting employees. Because the EPDM membrane still had significant service life, it was less expensive to repair and coat instead of replacing the roof.

Prior to coating, the membrane was power-washed and the seams and flashings were repaired. A two-coat urethane coating was installed. The energy use to cool the building was reduced by 10 percent. Future EPDM repair costs were eliminated, as were future employee disruptions. The energy savings alone offset more than half the cost of the project. Additionally, the cost of roof replacement was deferred for a decade.

**Cooler Rooftop Temperatures**

A coating was installed over an air-conditioned, 65,000-square-foot, smooth-surfaced built-up roof system. The five-year old roof was not leaking and was dry (per an infrared scan). The objective of adding the coating was to cool, protect and extend the roof’s service life. Because it was only five-years old, there was significant service life remaining, and adding the coating extended its service life even further. Prior to coating, the roof had a 35 percent reflectivity value, and the roof surface temperature was more than 140 F on an 82 F sunny day.

After coating application, the roof surface reflectivity was about 80 percent, and on an equivalently hot and sunny day, the roof surface temperature was under 100 F—more than a 40-degree F reduction in rooftop temperatures. Because of time-of-use demand charges during the middle of the day, the cost savings was nearly 10 percent while the energy savings was just above 7 percent.

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material standards, which are listed in the International Building Code and International Residential Code. Meeting the building-code requirements provides the minimum safeguards for materials used for construction.

WHEN TO COAT
More commonly a roof coating is installed on an existing roof to extend roof service life while the roof still has significant remaining service life. A coating installed on a new roof can provide a reflective surface to help reduce energy costs or it can be installed to act as a protective layer.

When installing a coating on an existing roof, consider the following:

- The roof should have remaining service life. A coating cannot add life back into a roof but can prevent a roof from aging as quickly as it would without the coating, therefore extending a roof’s service life.
- The coating should be compatible with the existing roof.
- The roof should drain properly. Areas of ponding water should be repaired and/or modified prior to coating. Coatings do not hold up well under areas of ponded water. While coatings may potentially stop minor leaks, the roof should be properly repaired and dried prior to coating application. Coatings may be able to seal pinhole leaks, which are leaks not visible to the naked eye. If the roof is leaking, the roof leak will need to be identified and repaired prior to any re-coating; do not expect the coating to find and seal the leaks. It is critical to remove and replace any wet or deteriorated insulation.

A coating installed on a new roof should:
- Be a component of the overall roof system. Roofing manufacturers sell systems; components are compatible and tested collectively. Use a roof coating that is part of the warranted system.
- Not be installed until the roof has appropriately weathered. A coating may require a primer for adequate adhesion on new asphaltic roof systems.

ENERGY SAVINGS AND FINANCIAL INCENTIVES
There are a number of benefits to coating an existing roof system. As shown in the case studies, page 71, a roof coating can provide energy-use reduction and cost savings. Similar projects can also receive tax incentives and energy rebates, providing additional savings to the building owner.

The single best source for incentives for reflective roof coating installation is the Washington, D.C.-based Roof Coatings Manufacturers Association’s
Reflective Roof Rebate Database, RoofCoatings.org/reflective-roof-rebates-database. The RCMA database includes a comprehensive list of rebates, loans, grants, and tax credits pertaining to reflective roof coatings applied to low- and steep-slope roofs. The database covers all of the U.S. and includes state, local and utility company rebate programs. The database is updated every three months; California, Florida and Texas are updated on a monthly basis.

For example, in a search done in July, there are 25 different incentives in the state of Florida, which includes three local rebate and financing programs; 20 utility-based loans, rebates and incentive programs; and two federally funded programs. It’s important to note that the RCMA Reflective Roof Rebate Database is available for anyone to use; finding incentives and rebates in your area has never been easier.

CONSIDER COATINGS
Coatings extend the service life of roofs and provide energy-saving benefits for building owners and homeowners. Roof coatings are designed to protect and extend the useful service life of roof assemblies for new construction and, more commonly, existing roof coverings. Reflective roof coatings extend the life of the roof by reducing heat transfer into the building, decreasing thermal shock (thermal expansion and contraction of the roof membrane) and helping to mitigate leaks. 

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