



# COATINGS TECH NOTE 6

## OVERVIEW OF WHITE COATINGS AND THEIR APPLICATION

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The two main purposes of white coatings are 1) to protect roof membranes, resulting in longer roof life cycles; and 2) to reflect solar radiation, resulting in lower energy costs. In general, a white coating consists of a binder blended with pigments and other additives. There are literally hundreds of different white coating products, which are formulated and manufactured by many diverse companies. Most can be conveniently classified according to the binder they use.

### Binders, Pigments and Liquid Carriers

Binders usually are made of an organic compound or silicone compound. Most binders are elastic polymers with elongation and tensile characteristics, or elastomers which can return to their original shape after being stretched or deformed. In white coatings, the elastomer binder is the viscous, pliant material that bonds the pigments and makes them adhere to the surface. Common elastomers used as binders in white coatings include acrylic, silicone, rubber, vinyl and urethane.

Titanium dioxide and zinc oxide are the common pigments that impart a bright white color to the coatings. However, other pigments can be combined with these compounds to yield a variety of pastel colors.

Most white coatings in use today are water-based. These products, often referred to as latex coatings, are available in a variety of polymer types. The water in latex coatings serves as a liquid carrier, allowing the pigment and binder to be spread onto the surface as a thin coating. For some white coatings, organic solvents are used as the liquid carrier, while others, often referred to as reactive coatings, may have sufficient flowability to eliminate the need for a liquid carrier. Reactive coatings are generally prepared with multiple-part resins often blended on site immediately before application, prior to curing.

### Compatibility with Membranes

White coatings can be applied to practically any roofing membrane or system. They are commonly applied to sprayed polyurethane roofs, metal roofs, single-ply rubber roofs and modified bitumen roofs. They can even be applied to certain kinds of asphalt built up roofs. It is important to establish compatibility between the white coating and the underlying roof surface. The manufacturer's recommendations should be consulted for detailed information about specific coatings.



## Primers and Surface Preparation

Primers are useful for improving adhesion between roof surfaces and coatings or for imparting additional properties to the roof coating systems. For example, a rubber roof coating may provide better adhesion to a rubber roof membrane or better permeability ("perm") rating on a sprayed polyurethane roof. Most white coatings impart greater reflectivity and UV protection to the system.

Manufacturer literature should be consulted and followed to properly prepare the surface for the coating. Professional roofing contractors should be employed for most coating installations. For certain systems, contractors may need to be specially trained by the manufacturer in the application of the coating. Proper application of the roof coating factors strongly in the subsequent life and performance of the coating.

Surfaces should be clean and dry, and they must have a positive slope to drains. Application of white coatings over dirty, wet or contaminated surfaces may produce unsatisfactory results. Acrylic latex coatings are sensitive to dew, rain and other moisture during curing. It is important that the application be done with strict adherence to the manufacturer's recommendations.

## Application

Coatings are typically applied by airless spraying, rolling or brushing. Due to the variety of coating types, climatic conditions and surfaces to be coated, it is important to consult the manufacturer for proper application rates and related recommendations.

## Permeability

Many white coatings are waterproof, but some are not. The property of permeability (perm rating) to liquid water, water vapor and gases varies greatly, depending on the type of coating.

- Acrylic coatings are breathable, which means they have a high moisture-vapor transmission rate or permeability.
- Silicone coatings are also classified as breathable types.
- Butyl rubbers, Hypalon and neoprenes have a very low permeability, i.e., they are highly resistant to moisture transmission.

The perm rating should not be confused with weatherability, or resistance to weathering. A coating with low permeability still may require a protective topcoat, to ensure satisfactory weathering resistance.

## Cleanliness and Aging

Roofs that have white coatings in arid, dusty regions, or in places where farm plowing or construction exposes the earth to wind, are likely to accumulate dirt more than in areas with greenery or where occasional rainfall washes away the dirt. The frequency and intensity of



precipitation and the slope of the roof also affect the cleanliness of the coatings over time. As with other white surfaces, white coatings discolor and darken slightly after several years of service.

Two values of reflectivity are often quoted to represent the performance of new coatings and three-year-old weathered white coatings, respectively. Generally, a small decrease in reflectivity occurs over time, depending on several factors. Wind-blown dirt and dust can decrease the reflectivity of white coatings, depending on the age of the coating and regional climate characteristics.

UV radiation tends to be blocked rather than reflected by a white coating. A white coating still protects against UV radiation even when foreign particles reduce the reflectivity.

To maintain their reflectivity, roofs may be periodically refreshed with a new topcoat, typically for less than the cost of the initial coating.

The maintenance schedule depends on the type of coating, type of roof, the purpose of the coating and regional climate differences. Typically, white coatings should be refreshed every three to seven years.

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