
Chapter

14

Coatings

Ceramic Coatings

Insulating coatings (more accurately named *reflective paint coatings*) have been used in industrial applications for years. Until recently, the white roofs seen on many a yellow school bus were perhaps the closest this innovative technology made it into the residential environment. These ceramic coatings basically reflect solar radiant energy and are now being found in a number of residential applications. The ceramic technology in this fluid-applied insulation is a “cousin” to the ceramic particles in the heat shield tiles used on the space shuttles to block heat during reentry into the Earth’s atmosphere. These coatings contain hollow ceramic bubbles that have a tremendous ability to reflect and dissipate heat. Extremely durable and easy to apply, the paint’s thermal properties of reflection, refraction, and dissipation make it a good insulator for walls, roofs, and even interiors. Ceramic-filled paint provides benefits year-round, but it is particularly effective at blocking the radiant heat from the summer sun. It is not intended to replace thermal mass insulations, however, especially in northern climates where retaining indoor heat is of primary concern.

Most products consist of a 100 percent acrylic elastomeric emulsion containing ceramic microspheres that range in size from 10 to 100 μm . Since ceramic particles block radiant heat, it is difficult to give this paint a typical R-value rating, yet tests demonstrate a significant drop between inside and outside temperatures of wall and roof installations. These coatings are typically nontoxic, although

there are epoxy-based and urethane-based coatings for industrial applications. The elastomeric coatings for residential use possess excellent resistance to changes in weather.

Product description

Ceramic-filled paints for residential application are available as acrylic, acrylic-elastomeric, and urethane- or epoxy-based. The water-based products are the most popular for residential use at present because of their ease of use and cleanup.

Certain characteristics among all types make the idea of an “insulating paint” actually possible. Ceramic paint has tiny micro-sized hollow ceramic particles or flat platelets in a water-based acrylic vehicle. In the paint can the spheres are suspended, making the paint look and feel like ordinary paint. When the paint is applied, the spheres or platelets move toward the surface to create a heat-reflecting and heat-dissipating surface. As the paint dries on a surface, the microspheres pack together underneath to create an insulating barrier.

Residential consumers have reported that the dried paint looks just like typical exterior house paint. Many of these coatings are designed for high build and can stretch and contract substantially without breaking or wrinkling. Most products can be rolled or brushed on, but spraying will depend on the specific manufacturer’s instructions.

Ceramic-filled coatings can seal a substrate and provide a water-proof surface. They are also suitable on metal surfaces where expansion and extreme weathering characteristics, including resistance to ponding, are important. Most products provide a 10- or 15-year limited warranty against chipping, flaking, and peeling. The manufacturer’s full written warranty should be reviewed for more specific information.

R-value

R-value ratings are not available for liquid coatings, although manufacturers report a simplistic variety of equivalences in their product-specific literature. These range from equivalent R-values of R-10 to R-24. Color choice influences the effectiveness, with white coatings providing the higher R-values.

Limitations

Ceramic paints are designed to protect against radiant heat and have a reduced effect on conductive heat. The use of these coatings

is much more effective in keeping heat out in the summer, but they will, to a lesser degree, keep heat in during the winter.

Color selections are limited. One manufacturer provides only an antique white that is tinted with up to 8 oz of colorant per gallon. Bright white is the most efficient, but tests show that reflective properties are dramatically decreased after minimal color is added.

Fire resistance

American Society for Testing and Materials (ASTM) Standard E84-87 tests of products reviewed for this book report that ceramic paints have both flame spread and smoke development ratings of 5.

Installation standards and practices

Ceramic-filled paint typically is applied at a thickness of up to 15 mil, much thicker than ordinary house paint. This heavy coat often covers small cracks and imperfections and to a small degree even reduces noise indoors. Additional paint can be applied but may not be cost-effective after two or three coats.

Temperature recommendations for application vary among products, typically to a maximum air temperature of 110°F. As with all products, manufacturers' instructions need to be followed for proper application procedures.

Paint Additives

As presented in the Preface of this book, the specific mention of a commercial name does not imply endorsement, nor does failure to mention a manufacturer imply criticism. Research for this book, however, revealed only one manufacturer of paint additives for insulating coatings.

Product description

INSULADD is a ceramic microsphere paint additive that is mixed with ordinary paint to block heat transfer through surfaces. Formulated for use with interior and exterior latex house paints, this additive is also suited for industrial coatings, roof coatings, epoxy, urethane, and high-temperature paints.

As in premixed ceramic coatings, INSULADD works by refracting, reflecting, and dissipating radiant heat. The adhesion, useful service life, coverage, or color of the base paint is reportedly not

affected by the additive. INSULADD is suitable with all interior and exterior paints, regardless of the brand.

The mixing process is very simple: Stir one bottle of the additive in with 1 gal of paint. If a sprayer is to be used for paint application, a slightly larger spray tip than normal is needed, and all screen filters should be removed. Two coats of paint with INSULADD in each coat are recommended for the best results. A coverage rate of 200 ft²/gal for most house paints on smooth surfaces should be achieved.

R-value

The manufacturer claims that an equivalent R-value of R-20 can be obtained relevant to radiant heat gain when INSULADD is mixed with a light-colored house paint.

Appendix

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