

“Knowledge protects all parties involved when developing a concrete curing and sealing specification in today’s market.”

Concrete Curing & Sealing

Dianne Carey

Prior to September 1999, most construction liquid manufacturers marketed curing and sealing products noted for their high volatile organic compounds (VOC) formulations. These solvent-based products were not environmentally friendly to the atmosphere, or to the contractor’s workers applying the material. In theory, the U.S. Environmental Protection Agency (EPA) changed all of this when it issued the Architectural Coatings Rule (AIM Regulation). This regulation was specifically designed to decrease the amount of VOCs emitted into the atmosphere, thus reducing the formation of ground level ozone (smog).

Manufacturers were given a specified time to comply with the new requirements. However, we are aware of a growing number of violations involving manufacturers who either are willing to take the risk of getting caught and fined, or who, for various reasons, often profit driven, are not willing to develop lower VOC technologies for their product lines. The structural engineer is caught in the middle. In many cases, they are unaware of the EPA Regulation, because manufacturers have failed to communicate coating type definitions and allowable VOC emissions. In the event that contractor employees are over-exposed to solvents in the VOC containing products, all parties from the specifier to the contractor may face liability.

The time has come to update concrete curing and sealing specifications to meet 21st century regulations and requirements.

Why Cure?

Although it is one of the final steps in the concrete construction process, curing and/or sealing of concrete is one of the most important and often one of the most neglected and misunderstood procedures.

The American Concrete Institute publishes a document, ACI 308, *Guide to Curing Concrete* which outlines commonly accepted methods, procedures and materials for curing concrete. There are a number of methods available for curing concrete.

- Water cure, including sprinkling, fogging, or ponding
- Burlap
- Cotton Mats
- Plastic Sheet Materials/Tarps
- Curing Papers
- Liquid Membrane-Forming Curing Compounds

Liquid Membrane-Forming Curing Compounds offer several advantages over other methods of curing. They are cost effective, provide ease of application and are less labor intensive. In general terms, a curing compound is a coating that is applied to freshly placed concrete to prevent moisture loss. These coatings are considered “temporary” coatings, as they will degrade and dissipate with exposure to sunlight (UV) and traffic.

ACI 308 references two ASTM International (American Society for Testing and Materials) Specifications, to help ensure the development of quality concrete:

- ASTM C 309: Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C 1315: Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing

As the titles indicate, ASTM C 309 addresses strictly Curing Compounds, while the ASTM C 1315 Specification addresses compounds designed for curing and sealing concrete.

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Pictured above: An application of W.R. Meadows’ Liqui-Hard at a parking garage in Israel.

Curing and Sealing

Curing and Sealing compounds can be applied to either freshly placed or existing concrete. While a curing compound will dissipate and eventually wear away, a Curing and Sealing compound is a more durable coating. These products are typically composed of Acrylic Resins, in either a solvent or water base. When applied to fresh concrete these coatings will prevent moisture loss, as does a conventional curing compound.

Curing and Sealing compounds are specifically formulated to be “breathable”. In other words, they let the water-vapor pass through the film, but not the liquid water from the concrete. This property allows the products to be applied to freshly placed as well as existing concrete, without blistering, loss of adhesion, etc. In addition, these products provide a much more durable film that will not rapidly degrade from exposure to UV or traffic. A Curing and Sealing compound will provide more permanent protection, offering improved chemical resistance and a high gloss or satin finish to the surface of the concrete.

EPA Ruling

In September 1999, the U. S. EPA (Environmental Protection Agency) issued the Architectural Coatings Rule (AIM Regulation) to decrease the amount of VOCs emitted into the atmosphere. This mandate from the EPA outlines definitions and allowable VOC emissions from numerous types of coatings used in the U.S. today. Many coating types have been defined in the ruling, and maximum VOC limits have been assigned based on these category definitions.

As defined in the AIM Regulation, the maximum allowable VOC Content for Concrete Curing Compounds is 350 g/L (grams per liter). The maximum allowable VOC Content for Concrete Curing and Sealing Compounds is 700 g/L.

One of the often over-looked requirements of the EPA Regulation is the requirement that in order

“ONE OF THE OFTEN OVER-LOOKED REQUIREMENTS OF THE EPA REGULATION...”

to be considered a “Curing and Sealing Compound”, not only must the VOC of the product be below 700 g/L, but the product must also meet *all* of the requirements of the ASTM C 1315 Specification. The ASTM C 1315 Specification addresses many physical properties that are necessary for a product to obtain optimum performance as a Curing and Sealing Compound for concrete.

When the EPA required that a product meet *all* aspects of the ASTM C 1315 Specification, two of the most often over-looked or ignored requirements are that all products must meet a *minimum* of 25% Solids, and that the products may *not* have a Flash Point below 100 °F. (The lower the Flash Point, the more flammable and volatile the product.)

By attaching the ASTM C 1315 Specification to the VOC Ruling, the EPA has eliminated the older “low solids” products, and also any products formulated solely with flammable solvents such as Xylene - regardless of whether or not they meet the maximum VOC requirement!

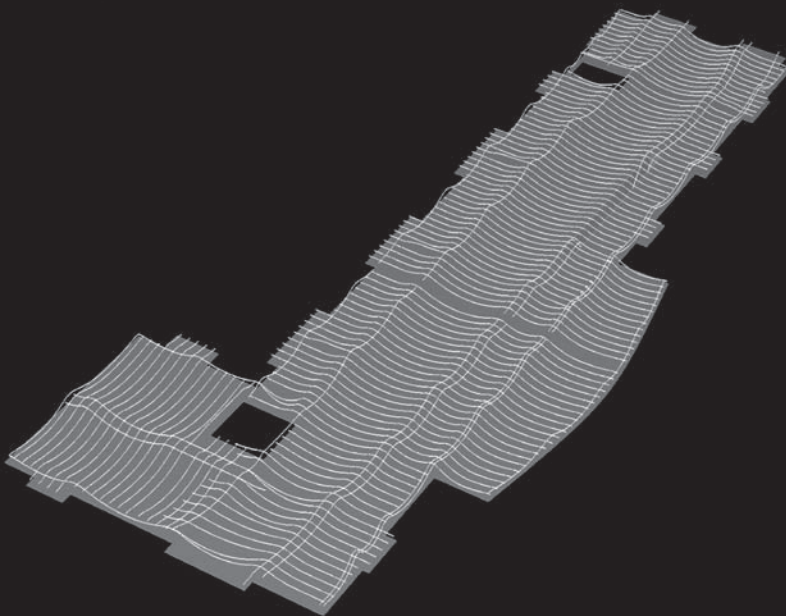
Importance for Structural Engineers

It is extremely important to know that you recommend a VOC compliant (legal) product when you specify a concrete Curing and/or Sealing compound. In an EPA enforcement case, monetary fines may be charged to the manufacturer, the distributor and/or the end-user of a non-compliant product. These fines can be federal as well as state enforced, and are determined based on the severity or degree of the violation as determined by the EPA. Furthermore, additional legal action may be pursued by workmen who believe that a specified product caused them to suffer the effects of serious illness. In such cases, litigation may be focused toward all parties involved in the use as well as the specification of the product.

Curing and Sealing are essential steps in obtaining quality concrete. In today’s market, proper selection of a Curing and Sealing compound is critical not only from a performance standpoint, but from a compliance standpoint as well. Knowledge is the key to protecting all parties involved. Contact the curing and sealing compound manufacturer serving you, and ask to be brought up to date on how their products comply with the current EPA Regulations.

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