Specifying Elastomeric Wall Coatings

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Photo courtesy of H. Mark Weidman.

An elastomeric wall coating is applied over masonry to provide an exterior finish that is durable.

Weathered and deteriorated masonry walls have long represented one of the most difficult maintenance challenges for the contractor. In the past five years, recoating with an elastomeric wall coating has become one method for repairing these surfaces.

Increased demand for elastomeric wall coatings, in combination with the lack of any officially recognized specifications for performance properties of these coatings, has led to the introduction of many products that claim elastomeric performance but that do not have the properties that are inherent to truly durable, high-performance elastomeric coatings. As a result, applicators and specifiers are often confused as to what properties are most important when specifying an elastomeric coating and what questions they can ask to ensure that the product specified can achieve this performance.

The most important performance properties of a quality elastomeric wall coating are flexibility over a broad range of temperatures, resistance to dirt pick-up and hydrolysis, and ultraviolet stability. These coatings need to allow water vapor to escape while blocking the transmission of bulk water. In addition, even a high-quality coating must be applied over a sound, properly prepared surface for outstanding durability.

The purpose of rehabilitating buildings is to protect, beautify, and restore them to their original luster. If the coating used for the renovation does not have the performance properties listed above, it may soon crack, become dirty, and potentially peel off the building. Many applicators probably have seen some or all of these problems. Thus, it is important for contractors to have an understanding of the best combination of performance properties in an elastomeric coating.

When trying to determine the quality of an elastomeric coating, the two most important details to know are the type of polymer that is used as the binder and how the product was formulated.

Comparing Base Polymers

There are typically three types of polymers that can be formulated into coatings that are labeled as elastomeric coatings — 100-percent acrylic, styrenated acrylic, and vinyl acetate containing copolymers. There are critical differences between the three types of binders in elasticity, resistance to hydrolysis, and ultraviolet stability.

One hundred percent acrylic elastomeric emulsion polymers are the only products that have demonstrated the ability to provide an elastomeric coating with all three properties. Of the commercially available binders, neither the styrene acrylic nor the vinyl acetate polymers are as flexible at low temperatures as the 100-percent acrylic elastomeric binders.

To obtain acceptable performance when using styrene acrylic and vinyl acetate polymers, the formulator may incorporate an external plasticizer into the coating. Although an external plasticizer can improve flexibility, there are serious drawbacks to its use.

First, typical plasticizers will only enhance elongation and flexibility in a relatively narrow range of temperatures. If the ambient temperature runs outside this range on the high side, the coating risks losing its recovery properties, becomes gummy, and can flow apart under the stresses caused by the dimensional fluctuations of cracks in the masonry.

In addition to a limited range of effective operating temperatures, external plasticizers suffer from another serious disadvantage — they migrate from the interior of the coating film to the surface and eventually out of the coating entirely. This phenomenon has a detrimental effect on the formulation's dirt resistance. Dirt from the air tends to adhere to the oily, liquid plasticizer which seriously detracts from the coating's appearance.

The migration of plasticizer from the coating also has adverse effects on flexibility and durability. When the plasticizer leaches out, the coating reverts to its original rigid, inelastic state. Unable to tolerate the dimen-

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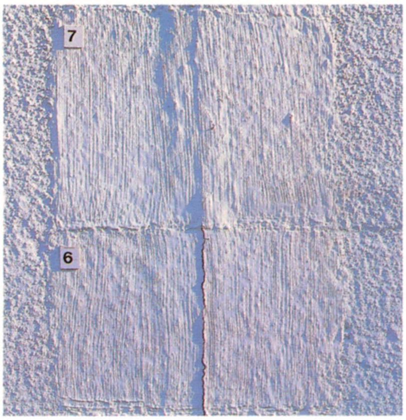

Elastomeric wall coatings are popular for repairing weathered masonry walls.

sional fluctuations of the underlying micro cracks, the coating film embrittles and fractures, particularly at low temperatures.

Internally plasticized 100-percent acrylic binders have neither of these shortcomings. Instead of depending on a separate, external component to impart flexibility to the coating, they derive elasticity from a unique combination of special composition, molecular weight, and cross linking. As a result, they retain their flexibility over extended periods. Moreover, formulations based on the 100-percent acrylic elastomeric binders retain their elastomeric properties over a broader range of temperatures.

In comparing the different types of binders in other areas of performance, the 100-percent acrylic binders have a significant edge over styrenated acrylics in ultraviolet stability and over vinyl acetate products in hydrolysis resistance. On extended exposure, water borne coatings based on 100-percent acrylic binders are more resistant to chalking and yellowing, and are not as vulnerable to damage from ambient moisture in an alkaline environment.

While using a 100-percent acrylic-based coating is essential, all 100-percent acrylics are not alike. Chemists have developed elastomeric binders that, when properly formulated, have flexibility over a broad range of temperatures, resistance to hydrolysis, and ultraviolet stability while also incorporating a unique dirt pick-up resistant technology that outperforms coatings containing styrene acrylic, vinyl acetate, and other all-acrylic binders. Since dirt pick-up resistance is crucial to the performance of a coating, it is important to select a coating that is based on these 100-percent acrylic elastomeric binders.

The collective advantages provided by coatings based on 100-percent acrylic elastomeric binders with dirt pick-up resistant chemistry translate into superior durability in both protective and decorative terms. Since these coatings retain eleasticity and do not yellow or pick up dirt readily, they maintain an aestheticaly pleasing appearance far longer than coatings based on other types of binders.

Formulating High-Quality Elastomeric Coatings

While the choice of binder in formulating a high-quality elastomeric coating is paramount, there are several other key considerations. These include type of pigment, extender, volume solids, and pigment volume concentration (PVC = Vp + Ve/Vp + Ve + Vb; where Vp = Volume of pigment, Ve = Volume of extender, and Vb = Volume of binder).

Titanium dioxide is the principal pigment and is used mostly for hiding. The type of extender influences durability, particularly chalking. Extenders can serve numerous purposes in coatings; however, generally, they are employed as low-cost replacements for comparatively expensive titanium dioxide.

Depending on grade, calcium carbonate extenders may not possess the same durability as silica extenders. In whites and other light hues, the extender choice may not be a major issue. The nature of the extender, however, can have a much greater impact on the durability in darker colors and deep tones where it can cause chalking or hazing. In these types of formulations, a silica may be the more appropriate choice.

Another factor that influences total performance is volume solids. The volume solids of the coating, the number of application coats, and the wet film thickness of each coat determine the dry film thickness of the elastomeric coating. The higher volume solids coating leads to fewer applications of the coating (lower labor costs) to achieve an adequate dry film thickness (approximately 10 to 20 mils).

PVC level is important because it expresses the relative amounts of pigment, extender, and binder present in the formulation. The higher the PVC, the greater the proportion of pigment and extender to the binder in the coating. By taking out binder and replacing it with extenders and pigments, elastomeric properties are lost and durability of the coating is at risk. In general, the greater the volume of 100-percent acrylic binder in a formulation, the better its ability to elongate, bridge cracks, and recover. It will also adhere better to the substrate, chalk less, and have superior flexibility at low temperatures.

In summary, you get what you pay for in performance. Since the product costs often are a minor component of the total job cost, it pays to specify a 100-percent acrylic binder that has true elastomeric properties as well as superior dirt pick-up resistance in elastomeric coatings.

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