

TECHNICAL BULLETIN

Factors Influencing the Life of a Coating

The exterior durability or “life of an exterior coating” is influenced by many factors. The reality is not all exterior coatings are created equal. The formulation of a coating plays a significant role on how durable or how long a coating will last. Aside from formulation, there are others factors that can influence a coating's longevity just as much. This is why the same coating can perform differently from one project to the next. Below are some of the key factors that influence the life of a coating (See Diagram 1 on the next page):

Formulation

The formulation is critical in determining the overall properties and potential durability of a coating. Therefore, items like resin, volume solids, colorants and the Pigment Volume Concentration (PVC) of the system are all factors that paint manufacturers evaluate to optimize a coating. PVC is the ratio of volume of pigment to the total volume of pigment & binder (non-volatile) material in the coating. Coatings with a lower PVC ratio are typically better performing than higher PVC ratio coatings. Unlike Dunn-Edwards, most paint manufacturers do not provide PVC of their coatings on Product Data Sheets.

Exposure Direction/Angle

Some exposure angles are more severe than others. What this means is that certain exposure angles may get more UV from sunlight and moisture than others. For example, a south-facing wall will get more UV sunlight than a north-facing wall, which means that when the coating starts to weather from UV, it will happen on the south-facing wall prior to the north. Also, there can be differences in durability on the same exposure direction but at different angles. For example, a south-facing horizontal product may weather faster than a south-facing vertical product as the south facing horizontal surface can be exposed longer to moisture, dirt and other debris. These conditions can accelerate the weathering of the coating,

assuming all other conditions are the same (i.e., substrate, surface preparation, primer used, film thickness).

Most panels at the Dunn-Edwards test fence are exposed to South 45° angle. It is the angle of choice for many industries because specimens receive more total sunlight energy during winter.

Application

The application of a coating is also a key contributor in determining its overall performance. A premium coating that is applied incorrectly will not perform to its potential. Items that must be considered are the substrate and its condition, as well as whether a substrate-specific primer was used; the number of coats of primer and topcoat applied; and the thickness that both the primer coats and topcoats were applied. All these items have a huge part in how long a coating can last.

Environmental Conditions

The environmental conditions that a coating is exposed to throughout its life will determine its lifespan. Items such as moisture, temperature and total UV exposure can dictate the speed at which a coating will degrade



TECHNICAL BULLETIN

Factors Influencing the Life of a Coating

While the factors above impact the life of a coating, below are few examples of why substrates are generally repainted. Typically, coatings are applied to protect or beautify the substrate.

- | | | |
|--------------------------------|---|-------------------|
| 1) Color Retention | 2) Gloss Retention | 3) Mildew |
| 4) Corrosion | 5) Dirt Pick-up | 6) Alkali Burnout |
| 7) Chalking/Binder Degradation | 8) Cracking/Flaking
Loss of Adhesion | 9) Efflorescence |

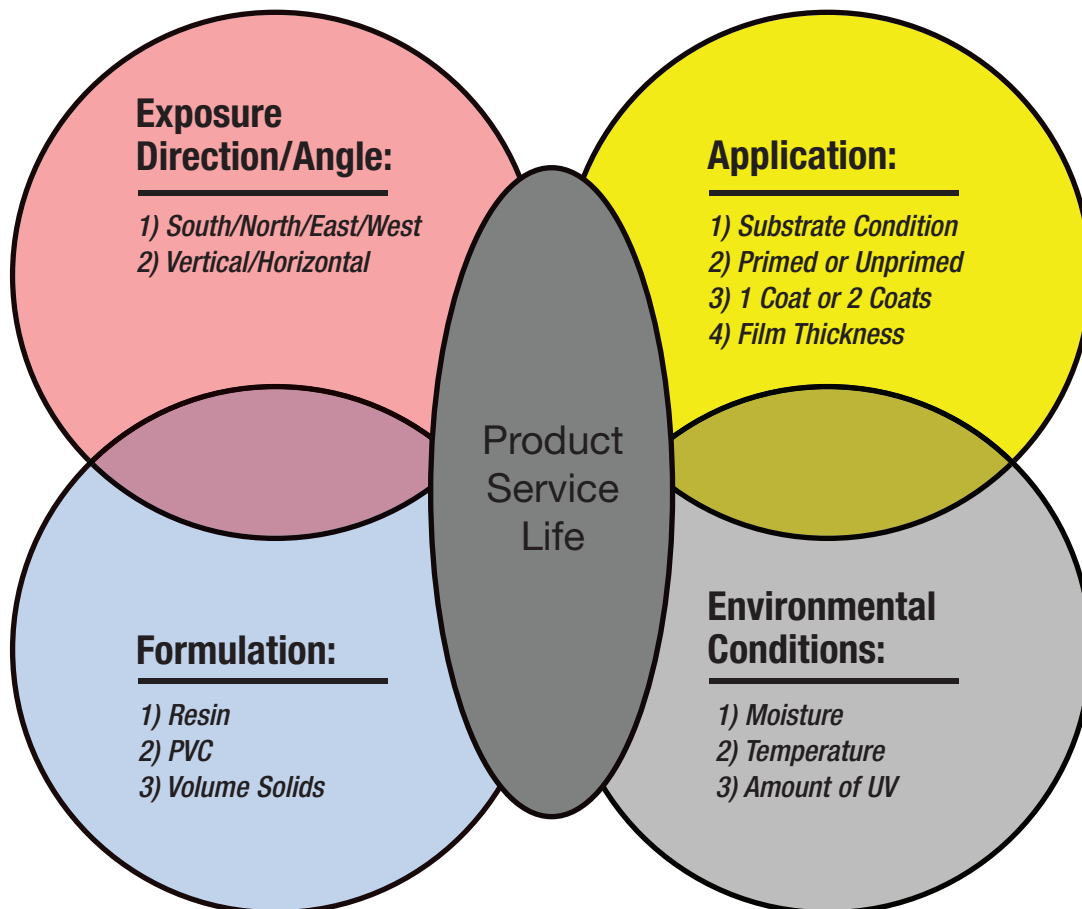


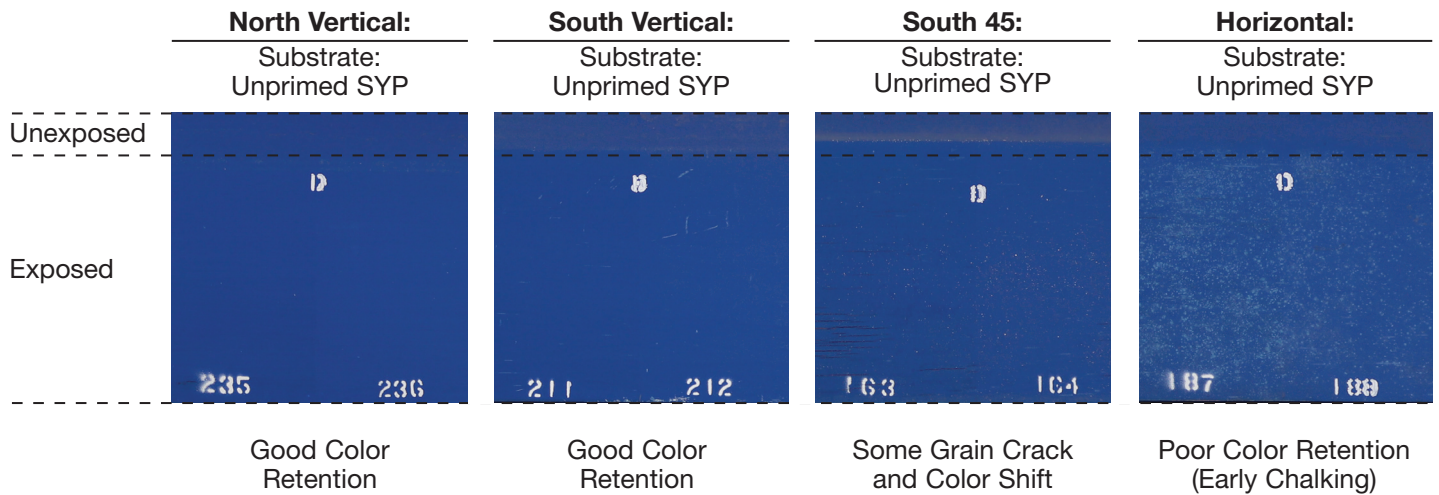
Diagram 1: Factors influencing the Life of a Coating

TECHNICAL BULLETIN

Factors Influencing the Life of a Coating

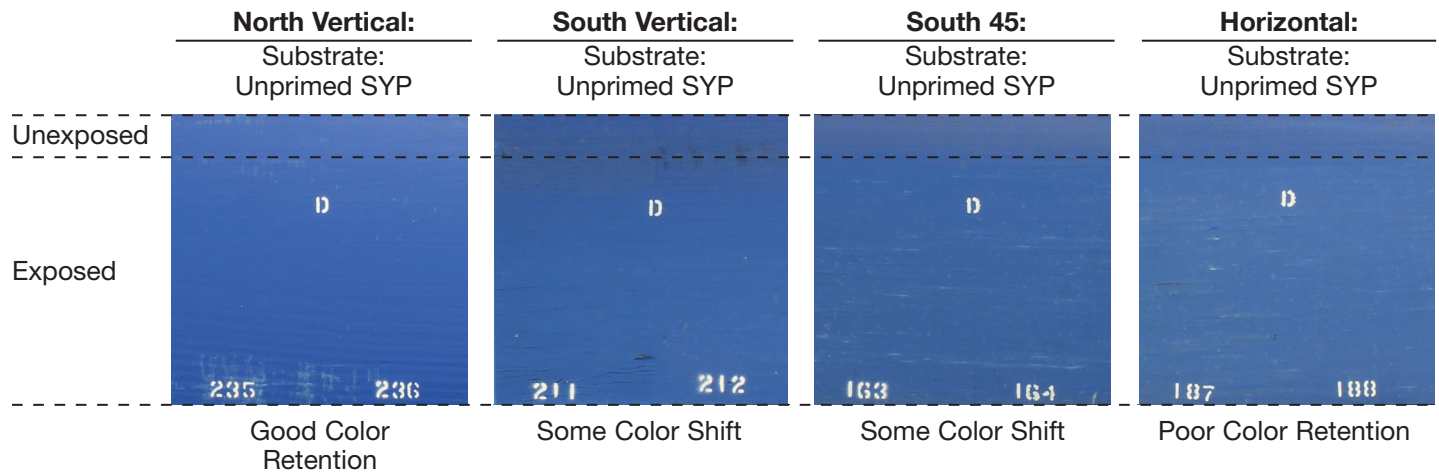
The illustrations below emphasize the differences you can see for the same coating due to the different exposure angles in both Phoenix, Arizona, and Los Angeles, California.

Color Change After 12 Months
Importance of Exposure Angle (Phoenix, AZ)



Increasing UV Exposure and Moisture Contact Due to Exposure Angle

Color Change After 12 Months
Importance of Exposure Angle (Los Angeles, CA)



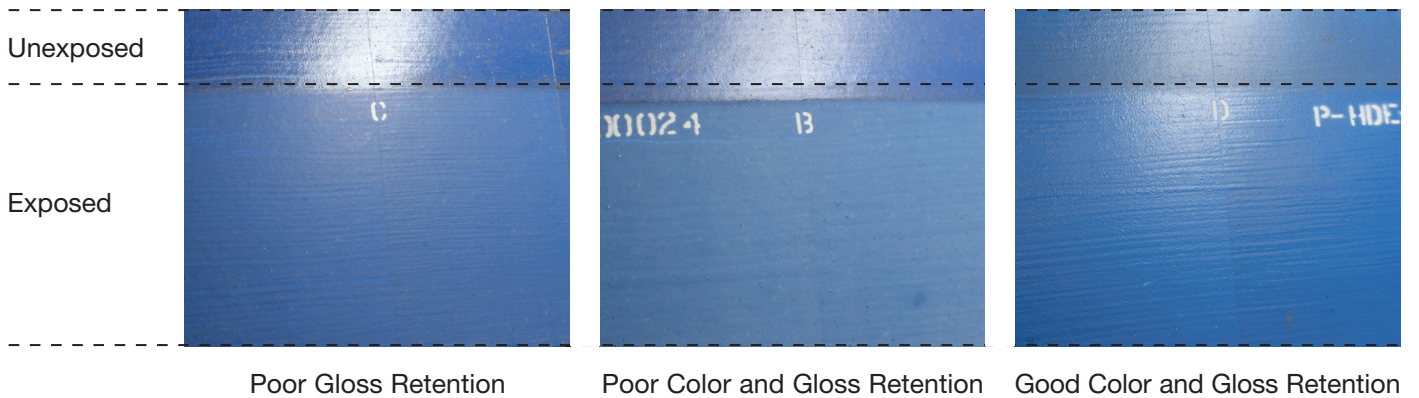
Increasing UV Exposure and Moisture Contact Due to Exposure Angle

TECHNICAL BULLETIN

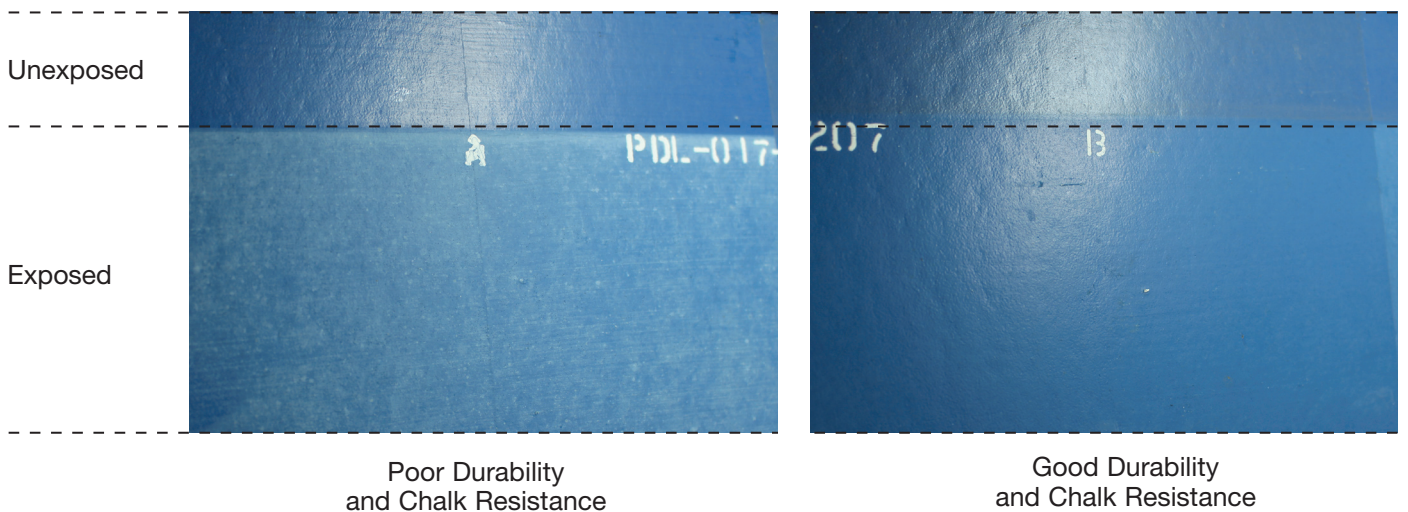
Factors Influencing the Life of a Coating

The pictures below explain the differences you can see on a south 45-degree angle exposure after 18 months of exposure for three different systems. The one on the right has very good color and gloss retention, while the left picture shows poor gloss retention and the middle shows both poor color and gloss retention.

Gloss and Color Change - After 18 Months South 45 Exposure Angle (Los Angeles, CA)



Chalking and Gloss Loss - After 18 Months South 45 Exposure Angle (Los Angeles, CA)

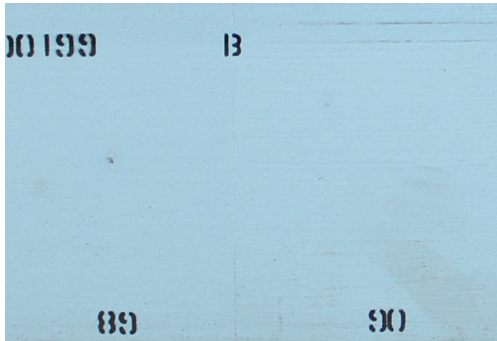


TECHNICAL BULLETIN

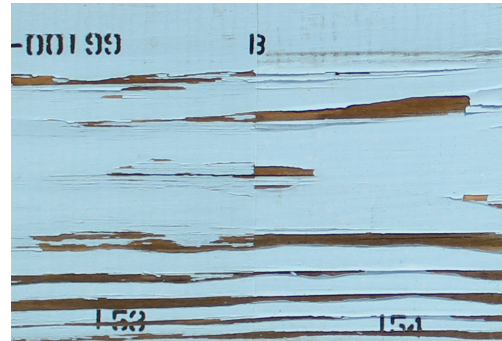
Factors Influencing the Life of a Coating

The photo below demonstrates the differences you can see in the performance of the coating due to the use of a good quality substrate-appropriate primer to extend the life of the topcoat. In the example below, the panel on the left was properly primed, while the one on the right did not use a primer on southern yellow pine (SYP).

Flaking/Grain Crack - After 15 Months South 45 Exposure Angle (Los Angeles, CA)

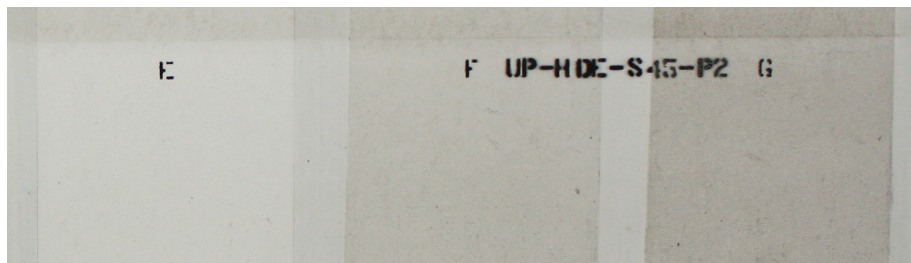


Flexible Substrate (SYP) with Appropriate Primer -
Good Grain Crack and Flaking Resistance



Flexible Substrate (SYP) No Primer Used -
Poor Grain Crack and Flaking Resistance

Dirt Pick-Up Resistance - After 15 Months South 45 Exposure Angle (Los Angeles, CA)



Good Dirt Pick-Up

Poor Dirt Pick-Up

Poor Dirt Pick-Up

TECHNICAL BULLETIN

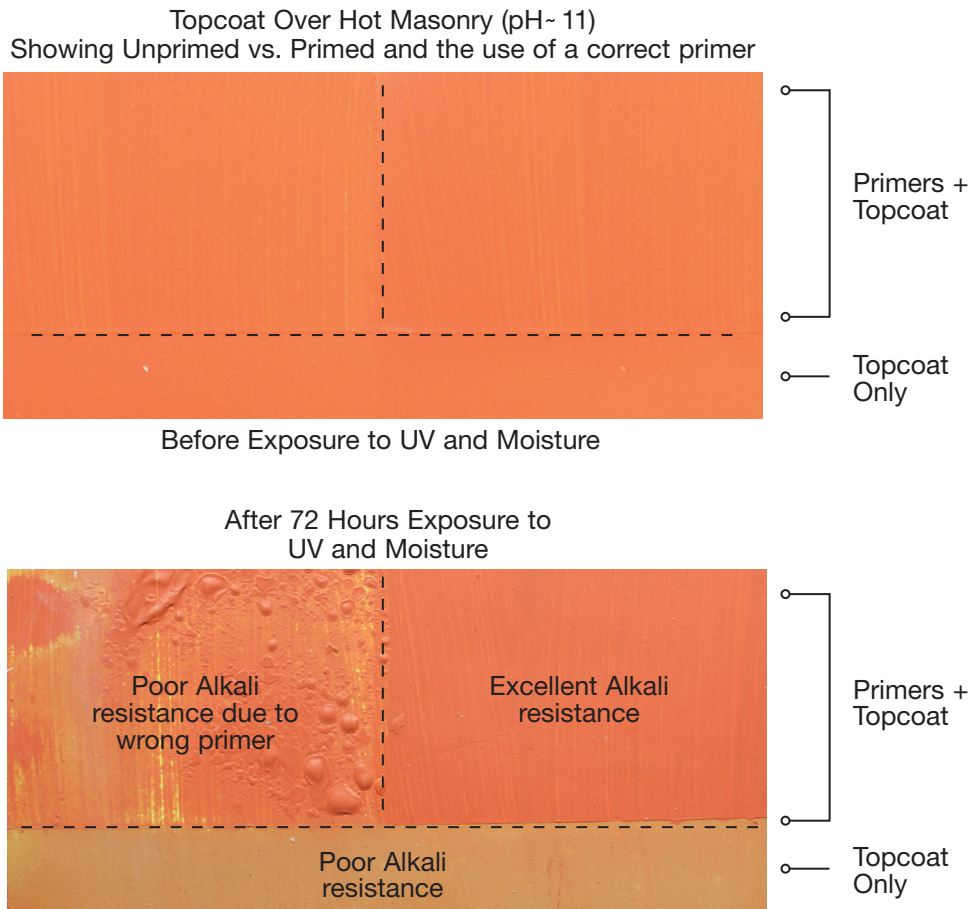
Factors Influencing the Life of a Coating

Importance of Alkali Resistance:

Fresh masonry is likely to contain lime, which is very alkaline (pH greater than 9). If the masonry is not allowed to cure properly the alkalinity of the surface can attack the integrity of the paint film causing color loss and overall deterioration of the film.

The masonry panels below demonstrate the difference you see in the performance of a coating due to the use of a good quality, substrate appropriate primer to extend the life of the topcoat. The top image shows the masonry panel before UV exposure with the wrong primer on the left and correct primer on the right sections and no primer on the entire bottom section. After 72 hours of UV exposure you can clearly see that the correct primer selection will help protect the topcoat from high pH surface and premature color and resin burnout. The image on the bottom shows poor Alkali resistance on the left section where a wrong primer was used and an excellent alkali resistance when using the correct primer. The section with no primer (Topcoat only) also performs poorly due to the absence of a good quality substrate appropriate primer.

Alkali Resistance



TECHNICAL BULLETIN

Factors Influencing the Life of a Coating

Importance of Corrosion Resistance:

Corrosion resistant coatings protect metal components against degradation due to moisture, salt spray, oxidation or other chemical compounds. Anti-corrosion coatings allow for added protection of metal surfaces and act as a barrier to inhibit the contact between chemical compounds or corrosive materials. Coatings with anti-corrosive properties ensure metal components have the longest possible lifespan.

The photo below demonstrates the differences you can see in the performance of the coating due to the use of the recommended dry film thickness (shown on the right), as compared to the left photo that shows the panel that was under-applied, which resulted in the incorrect film thickness. Both are the same primer and were exposed to the same conditions

Dry Film Thickness - Impact on Performance for Corrosion Resistance

Primer Exposed to Corrosive (Salt Spray) Conditions



1 mil
DFT Left



2 mil
DFT Right

Use of Correct Primer - Impact on Primer

Non-DTM Topcoat without Primer
Exposed to Corrosive (Salt Spray) Conditions



Non-DTM Topcoat with Appropriate Primer
Exposed to Corrosive (Salt Spray) Conditions



TECHNICAL BULLETIN

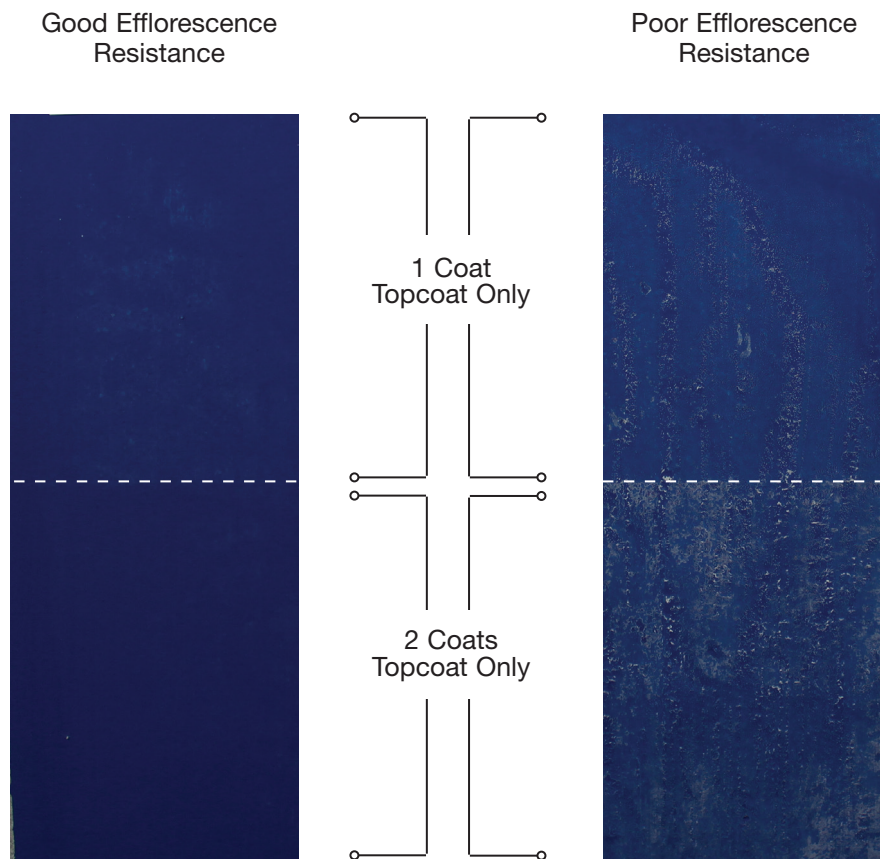
Factors Influencing the Life of a Coating

Importance of Efflorescence Resistance:

Efflorescence is the crystalline deposits of salts that form when moisture is present in or on a cementitious substrate like concrete, stone, stucco, brick and causes these soluble salts to migrate to the surface by leaching and evaporating action of water.

The photos below demonstrate the differences you can see in the performance of a coating due to the use of a lower quality product on the right, compared to a higher quality product on the left. The top (1 coat) versus the bottom (2 coats) on each picture, illustrates the impact that the final dry film thickness can have on the coating's ability to resist efflorescence.

Efflorescence Resistance



TECHNICAL BULLETIN

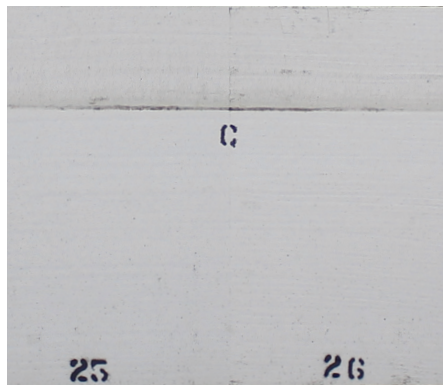
Factors Influencing the Life of a Coating

Importance of Mildew Resistance:

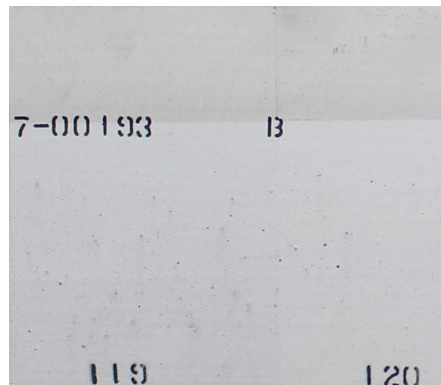
Mildew is a fungus (mold) that grows on many exterior painted surfaces, as well as on interior bathroom walls and other humid or poorly ventilated interior areas. If not corrected, mildew will continue eating the existing paint away, causing eventual paint failure in the affected areas. There is no way to absolutely prevent mildew growth, however, it may be controlled if proper precautions and recommendations are followed.

The panel below shows the importance of using a good-quality coating with the appropriate mildewcide to resist the growth of mildew. Notice the sample on the left is clean with no signs of mildew, where the sample on the right is covered in mildew. It is important to note that the exposure angle and weather conditions play a large part in how long a coating will last before showing signs of mildew on the paint film.

Mildew Resistance - After 21 Months Exposure



Good Mildew Resistance



Poor Mildew Resistance

Follow Us



DUNN-EDWARDS CORPORATION

4885 East 52ND Place, Los Angeles, CA 90058
(888) DE PAINT (337-2468) | dunnedwards.com

Dunn-Edwards® and The #1 Choice of Painting Professionals® are registered trademarks of the Dunn-Edwards Corporation.
©2019 Dunn-Edwards Corporation. All rights reserved. 08/19



**THE #1 CHOICE OF
PAINTING PROFESSIONALS®**