

TECHNICAL BULLETIN

Chalking vs. Color Fade

How does paint breakdown over time?

The main cause of paint film deterioration is the degradation of several components, including the binder and certain pigments. This is caused by the formation of free radicals (molecules) that generate in the paint film from prolonged exposure to UV light, moisture, or even certain chemicals. Free radicals are highly reactive and either form or breakdown chemical bonds in substances. In the case of paint durability on exposure, free radicals actually damage the film and can cause the binder to breakdown.

The most obvious signs of this occurrence is the change in color and loss of gloss. However, it is important to distinguish the difference between binder degradation and, ultimately, chalking of the paint film from just the simple change in color from a pigment not having light fastness (good color retention). For example, the classic change of a bright red label, bumper sticker or even paint film to a bright pink.

How do you know when it is chalking versus color fade?

Change in appearance is the first indication that the paint film is chalking. Chalking is the loss of binder due to degradation that leads to a white/chalky substance on the surface. This can easily be seen by taking a black cloth or rubbing your hand on the surface and seeing a chalky residue of the film transfer to the cloth or your hand. This is different from the change in color that occurs without chalking, which is typically due to the pigment selection having poor color fastness.

In **Figure 1**, notice that the panel C area below the yellow line has significantly shifted in color and is showing the white chalky residue on the paint film. It is important to note that the area above the dashed yellow line was not exposed to UV light, so it still shows the original blue color. The area below was exposed

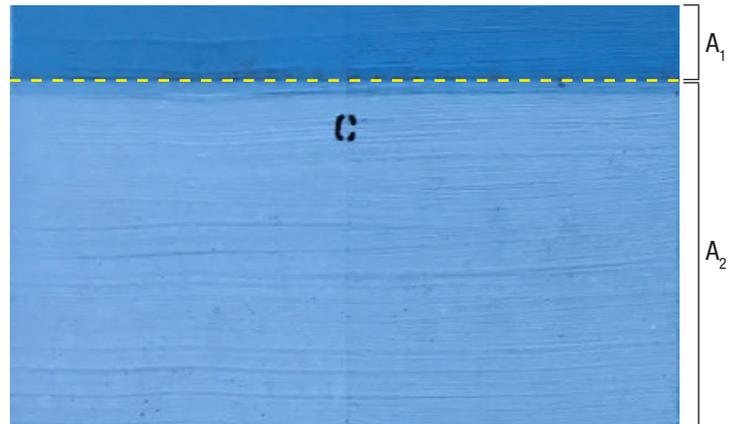


Figure 1

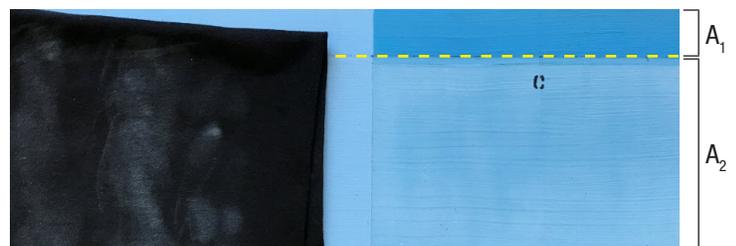


Figure 2

Unexposed = A₁

Exposed = A₂

to UV light, so it has the excessive chalking. In **Figure 2**, notice that taking the black cloth and rubbing the lighter area illustrates the level of chalkiness of the paint film.

In true color fade without chalking, the binder has not actually degraded, and thus, the film performance and gloss are typically not impacted. In color fade, the appearance of the film for color is no longer aesthetically acceptable due to this shift in color.

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Figure 3 shows that the UV exposed area below the yellow line does not show color fade on the left panel (P12). However, on the right panel (P11), there is significant color fade, but no signs of chalking. This is due to the color pigment difference, where the one on the left has better color retention and the one on the right does not.

Why does one paint last longer than another?

Not all paints are created equal. The binder type, pigment choice and other formulation properties determine the ultimate lifespan and durability of paint. Just as all paints are not created equal, it is true that not all binders and pigments are equal in quality. There are varying degrees of quality in the resin and pigment choices, just as there are varying degrees of quality in paint choices. Using high quality exterior paints will provide improved performance and durability.

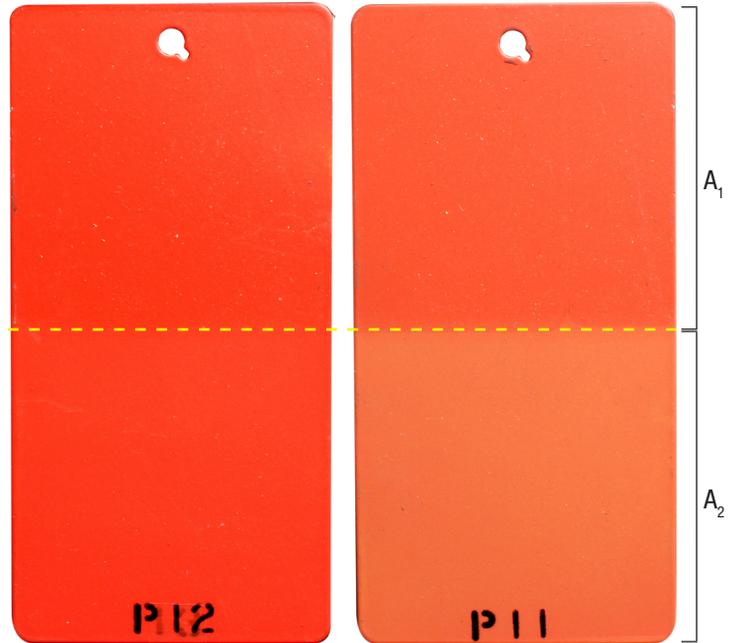


Figure 3

Unexposed = A₁
Exposed = A₂

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