Colorfastness of Swimming Pool Plaster Pigment

onBalance - Que Hales, Doug Latta and Kim Skinner

The swimming pool environment is more challenging to concrete/plaster surfaces than other architectural concrete surfaces for two reasons. One, the surface is maintained under water. Second, the water is chlorinated. Integrally pigmented (colored) plaster makes the situation even more challenging. With colored plaster, the consumer has paid a higher price and therefore has higher expectations. Also, the type and quality of the pigment used affects the overall appearance and durability of the plaster. Lastly, blemishes are more visible on colored plaster than on white plaster.

Various types of pigments are used to color plaster for swimming pools. Pigments that are susceptible to bleaching are not appropriate for the swimming pool environment. Common industry practices for chlorinating swimming pool water can cause high levels of chlorine which some pigments cannot withstand. Some examples of this are:

- Bleach added to a non-circulating pool. The bleach puddles in the bowl of the pool, causing chlorine levels of up to 120,000 ppm. (This practice is accepted as an industry standard for chlorinating swimming pool water.)

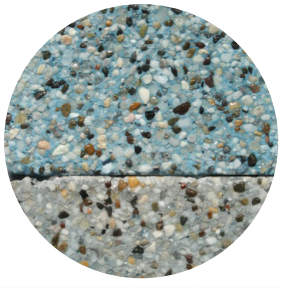
- Calcium hypochlorite broadcast across the surface of a pool. This can cause chlorine levels of up to 64,000 ppm sitting on the plaster surface until the powder has dissolved. (This practice is accepted as an industry standard for chlorinating swimming pool water.)

- Of course, a trichlor tablet sitting on the bottom of a pool would have a bleaching effect. However, this is NOT an industry standard practice as the trichlor is acidic and will also etch the plaster.

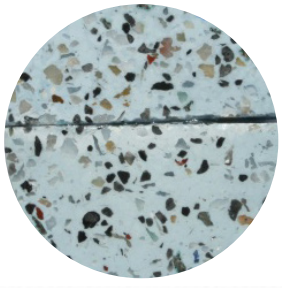
Over the course of the last two years, onBalance has consulted for several pool owners whose plaster has lost some or all of its color. In each case, blame for the color loss was attributed to chemical mismanagement and the service company (or their insurance) was expected to pay for a re-plaster of the pools. When onBalance analyzed the plaster in these pools, we determined that the pigment used was not colorfast in the presence of chlorine.

onBalance has since analyzed a number of colored plaster samples, representing various types of pigments from multiple manufacturers. We have found that a majority of the samples are colorfast to bleach. However, there are some common colored plaster and exposed aggregate products that lose their color in the presence of bleach or granular shock. There appears to be a correlation between bleaching and the use of organic pigments. However, the inorganic pigments are colorfast to bleach.

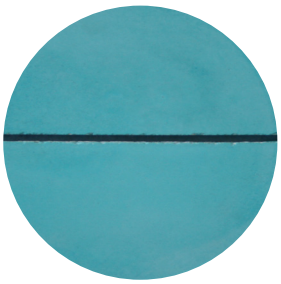
Non-Colorfast



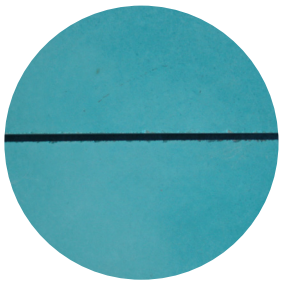
Colorfast



Additionally, onBalance analyzed colorfastness in the presence of high levels of cyanuric acid (30,000 ppm), and moderate and high levels of salt (3,000 ppm and 10,000 ppm) and found that neither the cyanuric acid nor the salt had any effect on the color of the plaster, regardless of whether the pigment was organic or inorganic.



Subjected to 30,000 ppm Cyanuric Acid for one month.



Subjected to 10,000 ppm salt for one month.

The consumer should be able to make an informed decision about the product they are purchasing. onBalance's recommendation is that the plasterers use inorganic pigments or warn the customer that the lower cost, organic pigments are cheaper for a reason!