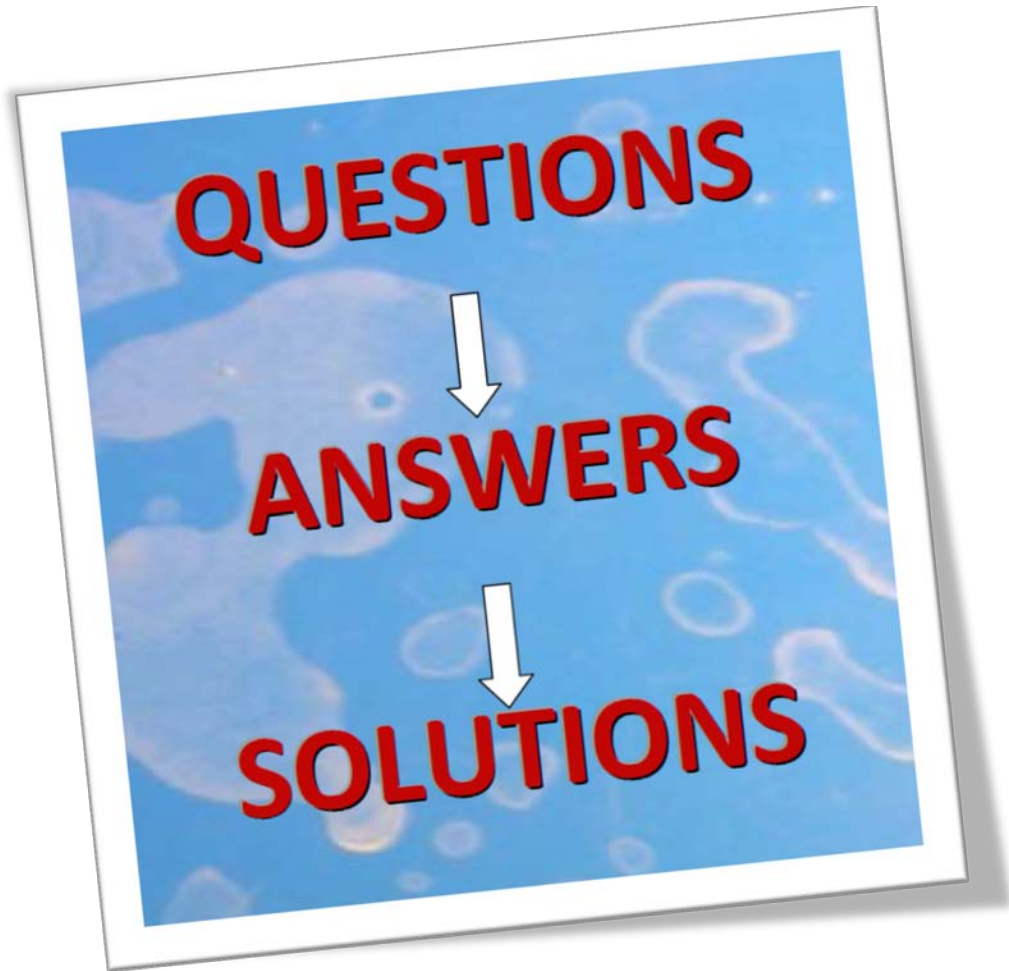


The Amine Blush “Phenomenon”

Getting the Finish You Deserve from Your New Epoxy Floor



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PROTECTIVE INDUSTRIAL
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Resinous Flooring & Concrete Protection Systems

It's Starts Off Without a Hitch

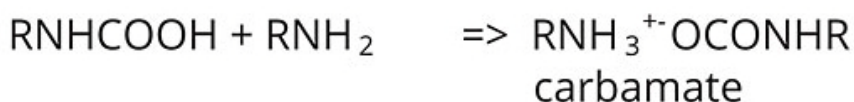
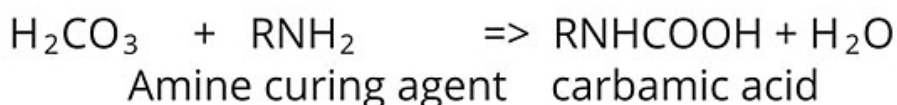
Coatings manufacturers and application contractors are dedicated to high quality in all their products and services. They listen carefully to end-user needs and develop custom, floor coating solutions to solve unique problems. Careful project management, product quality, surface preparation, temperature and humidity control, component mixing and coating application are the keys to success. But, have you ever returned to your facility, the next morning after curing, and thought your new floor coating looked absolutely horrible? Everything seemed to have gone well, but you don't know what just happened.

Your application contractor will say you have a sweat-out, blush or a bloom. All of these common terms refer to an amine blush. When epoxy coatings are applied in adverse conditions (usually high humidity), they can cure with an unintended hazy or greasy finish, known as an amine blush. The recommended solution is removal using either denatured alcohol or a vinegar wipe followed by a clean water wipe or rinse. Amine blush should be removed immediately for effective bonding and performance of your floor coating system. However, some degree of gloss is almost inevitably lost, and to be safe, most applicator contractors choose to sand the epoxy just in case all of the contaminant was not removed before applying additional coats of either epoxy or polyurethane. This certainly will add product and labor costs, not to mention time, to your industrial floor project.

The Science behind Amine Blush

Amine blush is a chemical reaction that can occur when environmental conditions are favorable for the amine curing agent on the surface of the coating to react with carbon dioxide and moisture in the atmosphere to form a carbamate.

Chemical Reactions Forming Amine Blush



Source: pcimag.com

How Does Amine Blush Affect An Epoxy Coating?

Besides looking bad, how does amine blush affect your floor?

- Reduced cleanability
- Less stain resistance
- Tacky surface feeling
- Decreased gloss
- Compromised adhesion of subsequent topcoats
- Quicker yellowing

Amine Blush

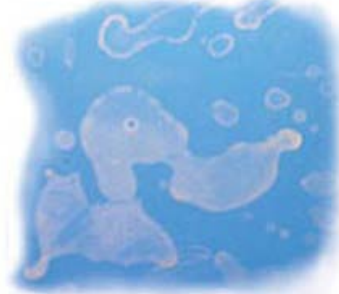


Image source - www.pcimag.com

A Simple Misunderstanding

A much less known fact is that epoxy applicators tend to encounter this problem **more** in the winter months, but not for the direct reason of colder temperatures. Frequently, epoxy applicators try to increase the temperature in the area by utilizing portable heaters, commonly called salamanders. These portable heaters are fueled by either propane or kerosene. The heaters are often left on overnight or during the curing cycle. Additionally, ventilation often is reduced or cut off completely with the intent of insulating and conserving the heat. The problem with generating heat in this fashion is that these heaters generate a high degree of CO₂ gas (carbon dioxide) as a by-product of their combustion. In the right conditions with low ceilings and poor ventilation, or even heater malfunction, CO₂ levels can easily reach 2000-3000 ppm. This is 8 times the normal atmospheric concentration! Most often, people are initially unaware of this occurrence. However, when returning the next day and finding a terrible looking, streaky, yellow, dimpled, greasy floor, they realize that something has gone awry. When the CO₂ levels are considered and determined to be the cause, it is also likely that people will confirm in hindsight that they generally “did not feel right”, or noticed that they had a headache.

Many facilities, such as large aircraft hangars, use special heaters referred to as “ventless” or “make-up” heaters. These have a high output of CO₂ and are meant to be used only as supplemental heaters in areas that often have doors opening and closing throughout the day, which purges the CO₂ gas. However some building owners or application contractors will operate these heaters to help temper a worksite and leave the doors shut to maintain the correct installation temperature as specified in the epoxy coating product’s technical data sheet. They might think they are doing the right thing, but unbeknownst to them, they are potentially creating a problem that they are completely unaware of.

Indoor concentrations of CO₂ are almost always higher than outdoors. The American Society of Heating, Refrigerating, and Air Conditioning Engineers recommends that indoor CO₂ levels be less than 700 ppm above the outdoor value. Average indoor CO₂ concentration is typically between 500-800 ppm. Therefore, since most epoxy floor coatings are applied indoors, levels of this type are unlikely to cause an issue. When levels above 1000 ppm occur, the potential for amine blush dramatically increases. When levels are beyond 1500 ppm, it is highly likely that problems will occur.

Although not a common consideration, especially in the winter months, it is a good idea to know the air quality of your environment when installing epoxy floor coatings. While almost completely undetectable, CO₂ concentrations may be elevated to the point to where a disaster can occur with regard to the quality of your floor finish. Simple air monitoring can be done at a relatively low investment and can save you money and headaches (literally).






Taming the Elephant in the Room

What are some easy ways to guard against amine blush? We recommend the following tips that can be executed before, during and after the epoxy coating application to help maintain a proper cure cycle.



5 TIPS TO HELP AVOID AMINE BLUSH DURING YOUR NEXT EPOXY FLOORING PROJECT

Amine Blush is a chemical reaction between naturally-occurring Carbon Dioxide and an amine curing agent in the presence of moisture. This reaction forms a carbamate that reveals itself as an oily or greasy surface film.

 1	Monitor and maintain proper moisture and humidity levels in the area where the coating project will occur. Refer to manufacturer's recommendations as specified in the flooring product technical literature.
 2	Monitor Carbon Dioxide levels and avoid use of combustion heating systems that emit high levels of CO ₂ gas.
 3	If downtime is not a factor, consider slower-curing floor coatings. In general, fast-cure amine hardeners are more prone to exhibit amine blush.
 4	Employ the use of an inexpensive colorimetric Amine Blush test kit between floor coats.
 5	Improper product mixing can potentially contribute to amine blush. Review manufacturer's mix ratio information and mixing and application instructions.

It is always recommended to work with a reputable installation contractor that understands unique polymer product intricacies. If your facility has known moisture or tempering issues, it is best to share this information with your flooring contractor prior to installation.

Helpful Links for Your Next Epoxy Flooring Project

PIP E-Guide:

“Polymer Flooring: One Solution Does Not Meet All of Your Industrial Needs”

SingleSource Program Overview:



PIP’s Industrial Flooring Self-Assessment Tool:

**Our Industrial Flooring
Self-Assessment Will
Change The Way You Think
About Flooring Needs**



 **Take the Assessment**



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Tom Vath is the Technical Director of Protective Industrial Polymers, a company that manufactures high-performance resinous floor coatings for industrial manufacturing environments, which has a keen focus on developing unique solutions for managing electrostatic, microbial, chemical, explosion and safety risk concerns. He is a thermoset industrial coatings formulator and has been formulating specialty coating systems for over 25 years. Tom works closely with PIP staff and application contractor partners to develop coating systems that combine usability with superior performance. You can follow Tom on [LinkedIn](#) or contact Protective Industrial Polymers at 866-361-3331.