

Common Causes for Irregularities and Finish Defects - Epoxies

Polyamide/Amine Blush or Surface Enrichment

Occurs when the proper cure cycle of catalysed epoxies is interrupted or slowed. The “lighter” polyamide or amine hardener separates from the epoxy and floats to the surface where it oxidizes and turns yellow or brownish in colour.

Check By:

The polyamide/amine blush can be confirmed by rubbing the surface lightly with a clean rag saturated with MEK or Epoxy Thinners. The yellow appearance will be removed, but may later return.

Caused By:

Improper Mixing

- Areas rich in polyamide or amine content may exhibit yellowing/blushing and/or an oily exudate
- Areas rich in epoxy content will appear normal in colour for a period of time, but may eventually discolour
- May result in colour variations along the same coated surface
- Drying and curing times may be affected

Improper Hardener

Epoxy coatings are formulated with optimum levels of a hardener for a given level of epoxy resin. This ratio differs from product to product. The use of an improper hardener may result in an under catalysed or over catalysed product.

Under catalysed Films:

- May appear dry but will not fully cure
- May appear soft and gummy

Over catalysed Films:

- May be hard and brittle
- Both will result in discoloration, yellowing, and reduced performance properties

Insufficient Induction (Sweat-In Time)

Many epoxy coatings require a specified induction time in order to fully “compatibilise” the epoxy resin and the hardener. When required, this pre-reaction will reduce the likelihood of poor film appearance and poor coating performance. Lower temperatures and/or high humidity will generally require longer induction periods.

Improperly induced epoxies will exhibit:

- A lower gloss than expected
- Yellowing becoming progressively worse over time
- Polyamide/amine blushing
- Poor color acceptance
- Reduced chemical resistance
- Softer film
- Color float and/or color variation

It is possible that the coating material applied initially may develop low gloss and discolor, while the rest of the surface, painted with the same material, will appear normal as induction time has increased.

Low Temperature

Most epoxies are formulated for application at temperatures above 10 – 13 °C. Temperatures below 10°C will stop the rate of the chemical reaction between the epoxy and the hardener. The evaporation of the solvents in the coating are also inhibited.

- Both of these conditions will increase the likelihood of blushing, discoloration and down-glossing.
- Be aware that surface temperatures may be much lower than the air temperature. Epoxy coatings should never be applied below the recommended temperature range, or when temperatures are expected to fall below the minimum recommended temperature during the first 72 hours of cure.

High Humidity, Moisture Condensation, Stagnant Air

- Most epoxies are designed for application up to a maximum 85%RH
- High humidity and/or the presence of moisture may cause discoloration or a “greasy” feel and poor uniformity of appearance
- The polyamide/amine may separate and cause discoloration. Maximum effort should be made to increase fresh air circulation to minimize this effect.

Insufficient Curing of Water-Based Primers or Fillers

If water-based primers are not sufficiently cured prior to Top coating, moisture migrating through the fresh epoxy film will inhibit the drying and curing of the epoxy. This will cause discoloration, low gloss and possibly delamination.