PPG Powder Coatings

Why do powder coatings have a shelf life?

Powder coatings have a shelf life due to two main factors: physical instability and chemical instability, both of which limit their useful life.

Please be reminded that when handling solvents that may pose significant health and safety risks, it is essential to use appropriate personal protective equipment (PPE). Always adhere to the safety recommendations detailed in the relative Safety Data Sheets (SDS).

What is physical instability?

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Physical instability in powder coatings occurs when they soften upon heating, which is necessary for adherence to the substrate.

The gradual or sudden loss of original particle size characteristics can be described with various terms, such as: clumping, agglomeration, stickiness, blocking, fusion, brick-formation, etc. Elevated temperatures are the primary cause of physical instability.

What is chemical instability?

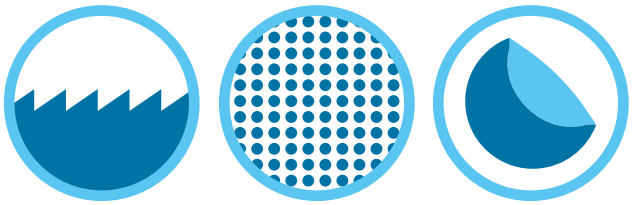
Each particle is carefully formulated mixture designed to minimize chemical reactions.

Each particle of a thermoset powder coating is a carefully formulated mixture of reactive and inert materials designed to minimize chemical reactions under manufacturing, transport, storage and application conditions, while maximizing chemical reactivity during baking. However, some products may experience chemical reactions, known as “advancement,” even at ambient temperatures during extended transportation or storage. This reactivity occurs without visible changes or significant heat release, making it undetectable by simple observation.

What are the visible symptoms of chemical instability?

Thermoset powder coatings that have advanced in their chemical reactions during storage typically show changes in the cured film, including:

- Reduced flow resulting in loss of film smoothness, characterized by:
  - Increased orange peel texture at standard applied film thickness
  - A fine sandpaper-like texture
- Gloss reduction especially at a 20-degree angle
- Decreased adhesion to the substrate



Reduced flow | Gloss reduction | Decreased adhesion

How is product expiration determined?

Product quality can be effectively assessed by testing key characteristics of an aged powder sample and comparing them to the values recorded at the time of manufacture. These key characteristics include:

- Particle size
- Moisture (water) content
- Reaction rate (gel time)
- Melt flow (inclined glass plate flow)
- Spray-out of the powder onto a test panel (appearance and adhesion)

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