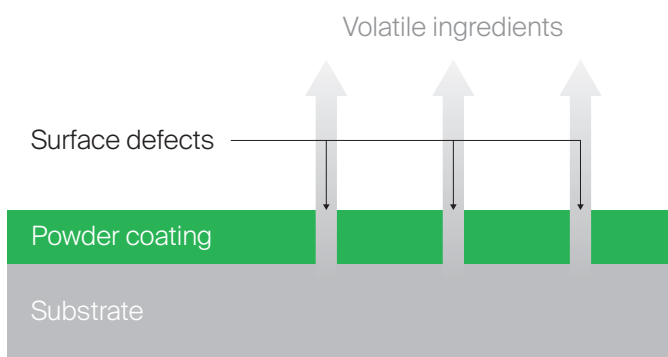




# What is outgassing?

During the curing cycle, volatile ingredients may be emitted from the surface which can cause surface contaminants and imperfections in the finish coat. Potential sources of volatiles other than the powder ingredients include primer coatings that may be underneath the powder coating, metal pretreatment conversion coatings, and oils, moisture, or other contaminants that are on or in the substrate prior to coating. If excessive amounts of volatile substances are generated late in the cure cycle, they may create defects in the forming film.



## What factors influence outgassing defects associated with painting?

- Structural quality of the substrate
- Age of substrate and storage conditions (humidity)
- Pretreatment process, including pre-heating
- Rust (oxidation) on substrate
- Chemistry and film type (smooth, texture, metallic, etc.) of the powder coating
- Thickness of coating applied
- Substrate heat up rate
- Bake oven temperature
- Film appearance criteria for quality acceptance

## Are there generalizations about how to best counteract outgassing?

- Low temperature cure is more likely to be successful than higher temperature bake.
- Either very fast cure (short gel time) or very slow cure (long gel time) may be successful.
- Preheating of parts prior to powder coating should be at a temperature equal to or higher than that at which the powder is subsequently baked.
- Application of a powder coating “primer” may help seal the substrate against outgassing prior to a second coating application.
- Applying the powder at the recommended mil thicknesses, you allow the air or contaminant vapors to pass through the coating while in gel state, burst and flow out smoothly. Too many mils may make it difficult for the air to release and coating to flow out.

## What substrates are prone to outgassing?

- Metal castings
- Galvanized Steel
- Hot rolled steel
- Molded plastic
- Sheet molding compound
- Bulk molding compound
- Fiber reinforced plastic

## What can be done to minimize the detrimental effects of outgassing?

Preheating of a part prior to painting may eliminate enough volatile substances from the part to permit it to be painted without the occurrence of defects from outgassing. The time and temperature of preheating required to minimize outgassing must be determined by trials. Generally painting needs to be done shortly after preheating is carried out, since volatiles substances may recur, either by absorption from the environment or migration for the substrate interior.

## Is there a powder coating that eliminates outgassing?

While there is no powder coating product that can eliminate all occurrences of outgassing in severe cases, there are ways to reduce outgassing occurrences during the application process, and there are products PPG makes that are designed to reduce the chances outgassing occurs. We call these Anti-Outgassing, Gas-Free or Anti-Gas powder coatings.

## What are some common PPG powder coatings to help protect against outgassing?

**PCMB70106** Gray Anti-Gas Epoxy Primer  
**PCS791020G** Gray Anti-Gas Polyester HAA Primer  
**PCMT701010G** Ultra Gray ESD Epoxy Primer  
**PCTA99171** Gloss Black AOG Ultra-durable TGIC Polyester  
**PCMA90111** Flat Black AOG Epoxy

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