PKN Product Knowledge Network

Everything you need to know about nonstick-coated houseware products — FREE.

Surface Preparation

Getting the Most Out of Substrate Preparation

COATING INFORMATION

Preparing a substrate properly is the first step toward a successful coating. Proper preparation can vary, depending on the substrate, the end use of the coating and the cost. Reputable coating manufacturers outline all details of the recommended surface preparation on the product data sheet included with the coating shipment. Here's a brief summary of some of the basic steps to achieve ideal preparation:

- Alkaline Wash
- Vapor Degreasing
- Mechanical Cleaning (Grit Blasting)
- High Temperature Oxidation or Baking
- Zinc Phosphate PreTreatment
- Chemical Cleaning/Acid Etching

Alkaline Wash

A properly maintained alkaline wash system will effectively clean most organic and inorganic surface contaminants. By varying the strength of the alkaline solution, these washers can apply an effective alkaline etch to certain metal substrates, like aluminum, and in some cases eliminate the need for further substrate pretreatments like grit-blasting. An alkaline wash is an effective pretreatment prior to grit- blasting as it will reduce contamination of the blast media, and thus extend the media's usable life.

Vapor Degreasing

This is the easiest and most efficient way to remove petroleum-based oils and greases, but could have difficulty effectively removing waterborne, or emulsified oils and some inorganic contaminants, like salts. A degreaser is a chamber into which a solvent is placed, which is then heated at the bottom and cooled at the top. The solvent vaporizes, rises, and condenses on parts that have been placed in the vapor zone of the chamber. It then falls back to the bottom, carrying any impurities with it. The solvent is vaporized

repeatedly, and since it vaporizes more readily than oil, any oil and impurities are left behind on the bottom of the chamber.

Mechanical Cleaning (Grit-Blasting)

This involves blasting the substrate with a sharp medium. The substrate and application will determine the blast profile required. It is crucial that the parts to be blasted be as clean as possible before blasting, since contamination with dirt or oil not only shortens the life of the blast media, but can also interfere with adhesion. Note: because of labor, this is the most costly method of preparation.

High-Temperature Oxidation or Baking

At the very least this is a cleaning operation, but if properly done it can be a substrate pretreatment. It can be undertaken in production ovens prior to coating. This process has three advantages:
It drives oil out of powdered (sintered) metal parts, many of which tend to absorb oil that can seep out during cure and contaminate the coating. The parts should be baked at a temperature higher than the coating's cure temperature.
It can eliminate or reduce coating defects such as blisters, fisheyes, pin holes and streaks.
And, if the substrate is chemically or mechanically cleaned (activation) prior to baking (passivation), it forms a bonded oxide layer on stainless steel and some steel substrates that promotes coating adhesion and could eliminate the need for further pretreatments. (The part should reach at least 600-650°F [315-345°C] for proper formation of the oxide layer.)

Zinc Phosphate Pretreatment

This process deposits fine crystals of zinc phosphate with minimum porosity on the substrate. These improve adhesion, flexibility and corrosion resistance. The 5 steps typically recommended here include: an alkaline clean, water rinse, deposition of zinc phosphate, a second water rinse and chromate sealer. It's important to monitor temperature, immersion time, pH and concentration of solution, and rinse water contamination to insure consistent results.

Chemical Cleaning /Acid Etching:

This method, also called "pickling," is a common shortcut that involves dipping parts into a solution of heated hydrochloric or sulfuric acid; however, this does not effectively clean corrosion from the porous folds and cavities of metal. There are two other problems:
Acid etching may cause hydrogen embrittlement (the loss of ductility in metal caused by the absorption of hydrogen gas).
The acid attacks the metal, leaving residues of "smut" that are deposits of carbon and metal oxide. "Smut" adheres loosely to the metal underneath, thereby reducing adhesion.

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Whichever method is used, careful and complete preparation of the substrate is the best way to guarantee maximum results from a coating.

This information has been created by the Retail Marketing Team at Whitford. The Product Knowledge Network (PKN) offers you everything you need to know about nonstick-coated housewares products — all for FREE.

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