

ASK DR. GALV

Q I've heard of powdering your nose, but powdering galvanized steel? Ha! I wouldn't even know where to begin. Is the surface preparation any different from that for paint? Or are there special considerations when choosing to powder-coat galvanized steel?

A Powder-coating galvanized steel is a common practice in Europe and is slowly but surely increasingly being specified in North America. If done properly, this duplex system will provide many years of corrosion protection.

First, in order to promote adherence of any high quality protective coating to a surface, the cleanliness of the surface is essential. So, no, the surface preparation for applying paint or a powder coating does not differ. There are, however, differences in the process of applying the two types of coatings, thus, different types of problems that can occur.

There are three major areas of concern when powder-coating galvanized steel. The first is "pin holing" or "blistering." This is caused by the formation of small gas bubbles during the curing stages of the powder-coating process.

This is the result of air or decomposition products that have formed during or after the curing process. Small blisters are not a concern, but large blisters and/or craters that have penetrated to the zinc surface, as shown in FIGURE 1 (#3 & #4 are large craters), may be detrimental to the coating and must be repaired. Any trace of water that remains from

pretreatment may also cause pin-holing of the powder-coating. Adding polyethylene oxide, an anti-blistering agent, to the powder-coating alleviates this problem.

The second area of concern is in the post-treatment of galvanized steel. Per ASTM D 6386, quenching should be avoided. Typically, quench baths contain dirt and oils that can interfere with the powder's adherence to the zinc

surface. Passivation agents that are commonly applied to galvanized steel to prevent the formation of wet storage stain should be avoided. Passivations render the surface of the zinc reactive to the common pretreatments in the powder-coating process. Typically, iron phosphate or zinc phosphate is applied as a pretreatment on galvanized steel to etch the surface. This etching promotes excellent adherence of the powder-coating to the galvanized surface.

The final concern when applying powder-coating to galvanized steel is temperature. If parts are to be cured at temperatures above 390 F (200 C), voids or separation between the eta and zeta layers of the galvanized coating may occur. This is known as the Kirkendall Effect. The voids will cause large blisters on the powder coating. Typically, powder coatings are cured at temperatures around 280 F (140 C).

These three considerations should point you in the right direction to providing quality powder-coated galvanized steel. For more information on powder coatings and other duplex systems call the AGA offices.

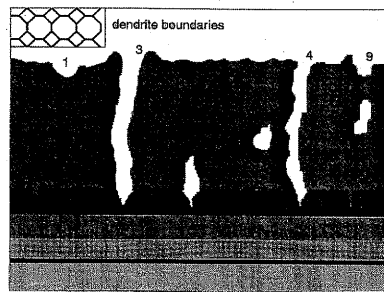


FIGURE 1: Blisters and craters in a powder-coating on hot-dip galvanized steel. Taken from *Duplex Systems* by van Eijnsbergen