

Q My customer saw some ash on the surface of the galvanized part and now he wants the whole lot rejected. What do I tell them?

A Zinc ash is an oxide film that develops on the surface of the galvanizing bath. During the dipping and withdrawal stages, the ash may become "burnt" onto the steel if proper skimming of the surface is not performed. The ash residue is a gray or yellowish deposit consisting of a zinc oxide and zinc chloride mixture. Ash and flux residues are easily recognizable since they show up black on the galvanized background. These two types of deposits give totally different coating defects. Fig. 1 shows what the ash deposit appears like.

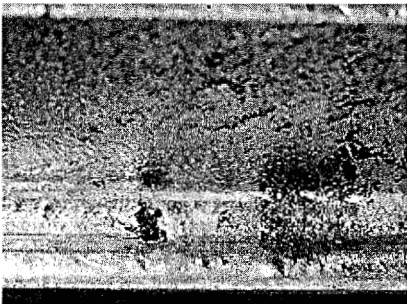


Fig. 1
Ash Deposit

Distinguishing between flux and ash deposits is important. Flux residues are deposits composed primarily of zinc chloride and appear black, gray, white, or yellowish as shown in Fig. 2. The flux deposits may become active corrosion sites due to the influence of moisture and atmospheric conditions. The combination of flux and moisture generates hydrochloric acid and attacks the steel. This can result in premature local coating failure.

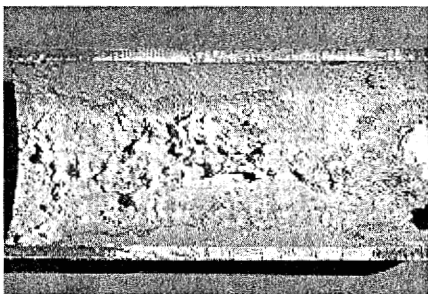


Fig. 2
Flux Deposit

A reasonably typical delta alloy layer can be present on the steel, but the zeta and bath metal layers are disrupted by the flux inclusions. The presence of flux in the coating has caused numerous black voids. These voids are the result of gas in the flux expanding. This is shown in Fig. 3.

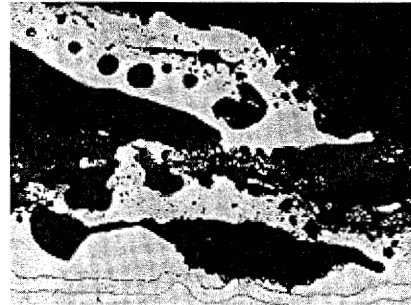


Fig. 3
Microstructure of
Flux Deposit

Unlike the flux deposit, under the ash deposit a galvanized coating is still present on the steel with the delta and zeta alloy layers intact. Ash inclusions form totally on the surface and are enclosed or just visible in the free zinc layer. As shown in Fig. 4, the microstructure of the zinc and ash inclusion is still complete.

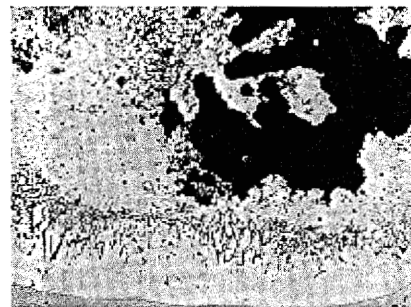


Fig. 4
Microstructure of
Ash Deposit

The zinc ash, unlike the flux, will have no detrimental effect on the service of the product. ASTM A123 states that "Galvanized articles shall be free from un-coated areas, blisters, flux deposits, and dross inclusions. Lumps, projections, globules, or heavy deposits of zinc, which will interfere with the intended use of the material, will not be permitted". Therefore zinc ash that is not detrimental to the appearance of the finished product or that does not interfere with the product's function is not cause for rejection. Tell the customer the steel is fully protected and the ash will disappear as the coating weathers.