Electroless Nickel

[AMS-2404C, AMS-2405B, AMS-2433B]

Previously Mil-C-26074. Coatings typically used to provide a hard-ductile, wear-resistant and corrosion-resistant surface for operation in service temperatures up to 1000°F (538°C). Electroless nickel plating provides uniform build-up on complex shapes.
Electroless nickel plating, also known as chemical or autocatalytic nickel plating. In contrast to the electroplating technique, electroless (chemical)
nickel plating baths work without an external current source. The plating operation is based upon the catalytic reduction of nickel ions on the surface being plated.
There are 3 main types of electroless nickel coatings:

1. nickel-phosphorus
2. nickel-boron
3. poly alloys

Nickel-phosphorus is generally used for engineering applications. The most widely used electroless nickel is deposited by the catalytic reduction of nickel ions with sodium hypo- phosphite in acid baths at pH 4,5ñ5,0, and at a temperature of 85ñ95°C. The deposits contains typically 3 to 13% phosphorus by weight. The alloy obtained is dependent upon the chemical composition of the solution and the operating conditions. The phosphorus content significantly influences its chemical and physical properties in both the as-plated condition and after heat treatment. A distinction is made between three variants:

1. Phosphorus content between 3 and 7%. These coatings have excellent high wear resistance. Excellent corrosion resistance in concentrated caustic soda.
2. Phosphorus content between 9 and 12%. Corrosion protection and abrasion resistance are good enough for most applications. The plating
bath works particularly economically.
3. Phosphorus content between 10 and 13%. The coatings are very ductile and corrosion resistant. They fulfil the highest demands for corrosion resistance against chlorides and simultaneous mechanical stress.

Nickel-boron is very often used in industrial wear applications for its as-plated hardness which is higher than that of nickel-phosphorus. The boron content can be varied from 0.1 to 10%. The re- ducing agent used is dimethylamine boron or sodium borohydride depending on the desired alloy composition.