

NON-CHROMATED OXIDE COATING FOR ALUMINUM SUBSTRATES

Abstract of the Disclosure

(A) A process for forming a cobalt conversion coating on a metal substrate, thereby imparting corrosion resistance and paint adhesion properties. The invention was developed as a replacement for the prior art chromic acid process. The process includes the steps of: (a) providing a cobalt conversion solution comprising an aqueous solution containing a soluble cobalt-III hexavalent complex, the concentration of the cobalt-III hexavalent complex being from about 0.01 mole per liter of solution to the solubility limit of the cobalt-III hexavalent complex; and (b) contacting the substrate with the solution for a sufficient amount of time, whereby the cobalt conversion coating is formed. The substrate may be aluminum or aluminum alloy, as well as Cd plated, Zn plated, Zn-Ni plated, and steel. The cobalt-III hexavalent complex may be present in the form of $Me_m[Co(R)_6]_n$, wherein Me is Na, Li, K, Ca, Zn, Mg, or Mn, and wherein m is 2 or 3, n is 1 or 2, and R is a carboxylate having from 1 to 5 C atoms.

(B) A chemical conversion coating solution for producing the cobalt conversion coating on a metal substrate, the solution including an aqueous solution containing a soluble cobalt-III hexavalent complex, the concentration of the cobalt-III hexavalent complex being from about 0.01 mole per liter of solution to the solubility limit of the cobalt-III hexavalent complex.

(C) A coated article exhibiting acceptable corrosion resistance and paint adhesion properties, the article including: (a) a metal substrate; and (b) a cobalt conversion coating formed on the substrate, the cobalt conversion coating including aluminum oxide Al_2O_3 as the largest volume percent, and cobalt oxides CoO , Co_2O_3 , and Co_3O_4 .

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