INTERNATIONAL STANDARD

ISO 23363

First edition
2020-07

Electrodeposited coatings and related finishes — Electroless Ni-P-ceramic composite coatings

Dépôts électrolytiques et finitions apparentées — Revêtements composites céramiques-Ni-P sans courant

Reference number
ISO 23363:2020(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Electroless nickel-phosphorus (Ni-P) alloy coatings are produced by the controlled chemical reduction of nickel ions onto a catalytic surface in hot, usually mildly acidic or occasionally alkaline solutions using hypophosphite ion as the reducing agent. Because the deposited nickel alloy is a catalyst for the reaction, the process is self-sustaining or autocatalytic.

Fine ceramic (nano-sized) particles dispersed in the electroless nickel plating bath can be incorporated with the deposition of a Ni-P layer, which produces a nickel-phosphorus-ceramic (Ni-P-ceramic) composite coating. There is no molecular bonding between the Ni-P matrix and the incorporated ceramic particles. The incorporation phenomenon basically results from the impact and settling of the particles on the surface of the work piece and the subsequent surrounding of these particles by the growing Ni-P matrix. The deposits produced are uniform in thickness on irregularly shaped articles as the processing solution circulates freely over their surfaces. The physicochemical properties and the structure of electroless Ni-P-ceramic composite coatings are dependent on the size, type, chemical inertness and deposition homogeneity of the ceramic particles as well as plating conditions such as pH, temperature, plating bath composition, surfactants used, quality of the substrates and their pre-treatment, activation methods and post-heat treatment.

Electroless Ni-P-ceramic composite is applied to improve hardness, as well as wear, and corrosion-resistant properties of the coating depending on the nature of the ceramics.