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PEOPLE'S REPUBLIC OF CHINA**

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

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting:

This document is modified to adopt ISO 23363:2020 "Electrodeposition layers and related finishing electroless nickel phosphorus-ceramic composite coatings":

The technical differences between this document and ISO 23363:2020 and their reasons are as follows:

---The scope of application has been increased to comply with my country's technical conditions;

---Replaced ISO 2859-1 with normatively cited GB/T 2828.1 and replaced it with normatively cited GB/T 2828.3 ISO 2859-3 (see Chapter 6), which replaces ISO 2080 (see Chapter 3) with the normative reference GB/T 3138, which uses the normative the quoted GB/T 6461 replaces ISO 10289 (see 5.7), the normatively quoted GB/T 9790 replaces ISO 4516, and the normatively quoted GB/T 10125 replaces ISO 9227, and the normatively quoted GB/T 10610 replaces ISO 4288 (See 5.2), replaced ISO 4526 (see 5.14) with normatively cited GB/T 12332, with normatively cited GB/T 12334 replaces ISO 2064 (see Chapter 3), and replaces ISO 4519 with normatively cited GB/T 12609 (see Chapter 6), replacing ISO 4527 (see Chapter 3, 5:3, 5:11, 5:13, 5:14) with normatively cited GB/T 13913, with the normatively quoted GB/T 16921 replaces ISO 3497 (see 5.3), and the normatively quoted GB/T 19349 ISO 9587 (see Chapter 3), replaced ISO 9588 (see Chapter 3, 5:9, 5:10) with the normative reference GB/T 19350, with the normatively cited GB/T 20018 replaced ISO 3543 (see 5.3), and the normatively cited GB/T 31563 ISO 9220 to adapt to my country's technical conditions and improve operability;

---Move the note in Table A:1 to the first paragraph of Appendix A in order to comply with my country's technical conditions:

This document has made the following editorial changes:

---Added quotations from Table A:1 and Table B:1:

Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents:

Introduction

Electroless nickel-phosphorus (Ni-P) alloy coatings are usually produced in hot, slightly acidic or occasionally alkaline solutions, using hypophosphite ions as reducing agents:

agent, produced by the controlled chemical reduction of nickel ions to the catalytic surface: Since the deposited nickel alloy is the catalyst for the reaction, the process is A

self-sustaining or autocatalytic process:

Nanoceramic particles dispersed in the electroless nickel plating solution may combine with the deposited Ni-P layer to form nickel-phosphorus-ceramic (Ni-P-ceramic) Composite plating: There is no molecular bond between the Ni-P matrix and the doped ceramic particles: This incorporation phenomenon is mainly caused by the impact of particles on the surface of the workpiece:

caused by impact, settling, and subsequent coating by the growing Ni-P matrix: Because the treatment solution spreads freely over the surface, the process Formation of deposits of uniform thickness on the surface of irregularly shaped objects: Physical and chemical properties and structure of electroless nickel phosphorus-ceramic composite coating Depends on the size, type, chemical inertness and deposition uniformity of ceramic particles as well as electroless plating conditions (such as pH, temperature, plating solution composition, used the quality of surfactants, substrates and their pretreatment, activation methods and subsequent heat treatment, etc.):

The application of electroless nickel phosphorus-ceramic composite materials is beneficial to improving the hardness, wear and corrosion resistance of the coating, which depends on the ceramic nature:

Electrodeposited layers and related finishes Electroless nickel phosphorus-ceramic composite coating

1 Scope

This document specifies the requirements for electroless nickel-phosphorus-ceramic composite coatings from solution plating onto metallic and non-metallic substrates:

This document applies to electroless nickel phosphorus-ceramic composite coatings on metal and non-metal substrates:

This document does not apply to ternary nickel alloys and nickel-boron ceramic composite coatings:

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text: Among them, the dated quotations for undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document:

GB/T 2828.1 Enumeration sampling inspection procedures Part 1: Batch-by-batch inspection sampling plan retrieved by acceptance quality limit (AQL) (GB/T 2828.1-2012,ISO 2859-1:1999,IDT) GB/T 2828.3 Enumeration sampling inspection

procedures Part 3: Jump batch sampling procedures (GB/T 2828.3-2008, ISO 2859-3: 2005, IDT)

GB/T 3138 Terminology for surface treatment of metals and other inorganic coatings (GB/T 3138-2015, ISO 2080:2008, IDT) GB/T 6461 Rating of specimens and specimens after corrosion testing of metal and other inorganic coatings on metal substrates (GB/T 6461-2002, ISO 10289:1999, IDT) GB/T 9790 Metallic materials Vickers and Knoop microhardness tests of metal and other inorganic coatings (GB/T 9790-2021, ISO 4516:2002, MOD) GB/T 10125 Artificial Atmosphere Corrosion Test Salt Spray Test (GB/T 10125-2021, ISO 9227:2017, MOD) GB/T 10610 Product Geometric Specification (GPS) Rules and methods for surface structure assessment by surface structure profiling method (GB/T 10610-2009, ISO 4288:1996, IDT) GB/T 12332 Nickel plating for metal coating engineering (GB/T 12332-2008, ISO 4526:2004, IDT) GB/T 12334 Definition and general rules for thickness measurement of metal and other non-organic coatings (GB/T 12334-2001, ISO 2064:1996, IDT) GB/T 12609 Sampling procedures for counting and inspection of electrodeposited metal coverings and related finishes (GB/T 12609-2005, ISO 4519:1980, IDT) GB/T 1391 Specifications and test methods for electroless nickel-phosphorus alloy coatings on metal coverings (GB/T 13913-2008, ISO 4527:2003, IDT) GB/T 16921 Metal coating thickness measurement X-ray spectrometry (GB/T 16921-2005, ISO 3497:

2000, IDT)

GB/T 19349 Metal and other inorganic coatings for steel pretreatment to reduce the risk of hydrogen embrittlement (GB/T 19349-2012, ISO 9587:2007, IDT) GB/T 19350 Treatment of steel coated with metal and other inorganic coatings to reduce the risk of hydrogen embrittlement (GB/T 19350-2012, ISO 9588:2007, IDT) GB/T 20018 Metal and non-metal coating thickness measurement beta-ray backscattering method (GB/T 20018-2005,