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Metallic coatings — Physical vapour-deposited coatings of cadmium on iron and steel — Specification and test methods

*Revêtements métalliques — Revêtements de cadmium appliqués par
vide sur fer et acier — Spécification et méthodes d'essai*



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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Term(s) and definition(s)	2
4 Information to be supplied by the purchaser to the processor	2
5 Designation	3
6 Requirements	5
7 Sampling	9
8 Rejection	9
Annex A (informative) Additional information concerning equipment, substrate preparation, and process parameters	10
Annex B (normative) Determination of the average thickness of cadmium coatings	12
Annex C (normative) Adhesion test methods	13
Annex D (normative) Sampling	14
Bibliography	15

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 22778 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

Introduction

Cadmium coatings are applied by physical vapour-deposition techniques to iron, steel and other substrates to enhance appearance and improve resistance to corrosion. Unlike electroplating, physical vapour deposition does not introduce hydrogen into the basis material. Hence, vapour-deposited cadmium coatings are especially beneficial for protecting high-strength steels that are susceptible to hydrogen embrittlement. Hydrogen, however, can be introduced into the substrate during fabrication, cleaning, pickling and other treatments, and care must still be exercised to prevent the introduction of hydrogen prior to vapour deposition.

Cadmium is toxic and health, safety and environmental concerns are now eliminating its non-essential uses. There remain, nevertheless, critical applications, often aerospace-related, where the unique properties of cadmium coatings, for example, their corrosion resistance, intrinsic lubricity, ductility, electrical conductivity and low contact resistance, make continued use necessary. One benefit of depositing cadmium by physical deposition techniques is that the process is conducted in a sealed vacuum chamber and exposure to cadmium is at an absolute minimum.

The corrosion resistance of physical vapour-deposited cadmium coatings may be further enhanced by the use of chromate conversion coatings and other supplementary treatments.

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WARNING — The use of this International Standard may involve hazardous materials, operations and equipment. This standard does not address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices, and to determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard specifies requirements for high-purity cadmium coatings produced by physical vapour deposition on iron, steel, and other substrates. It provides test methods to determine that the requirements have been met, and a method for designating the cadmium and chromate conversion coatings and other supplementary treatments.

Cadmium coatings are not suitable for production items that will reach a temperature of 225 °C or higher in service, or that will come into contact with other parts that will reach that temperature.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method*

ISO 2064, *Metallic and other inorganic coatings — Definitions and conventions concerning the measurement of thickness*

ISO 2080, *Electroplating and related processes — Vocabulary*

ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution*

ISO 2360, *Non-conductive coatings on non-magnetic electrically conductive basis materials — Measurement of coating thickness — Amplitude-sensitive eddy-current method*

ISO 2819, *Metallic coatings on metallic substrates — Electrodeposited and chemically deposited coatings — Review of methods available for testing adhesion*

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

ISO 3543, *Metallic and non-metallic coatings — Measurement of thickness — Beta backscatter method*

ISO 3882, *Metallic and other inorganic coatings — Review of methods of measurement of thickness*

ISO 3892, *Conversion coatings on metallic materials — Determination of coating mass per unit area — Gravimetric methods*