INTERNATIONAL STANDARD

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Metallic coatings — Electroplated coatings of zinc and zinc alloys on iron or steel with supplementary Cr(VI)-free treatment

Revêtements métalliques — Revêtements électrolytiques de zinc et d'alliages de zinc sur du fer ou de l'acier avec traitement supplémentaire sans Cr(VI)

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Foreword

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

Introduction

The chromium(VI) free systems differ in 2 points from the chromium(VI)-containing systems:

a) there is no self-healing of the system;

b) higher temperature resistance (> 150 °C), the limit for chromium(VI) containing systems, is ≤ 70 °C.

Metallic coatings — Electroplated coatings of zinc and zinc alloys on iron or steel with supplementary Cr(VI)-free treatment

1 Scope

This International Standard applies to electrodeposited zinc and zinc-alloy coatings on iron and steel with Cr(VI)-free passivation. The zinc-alloy coatings contain nickel or iron as alloying elements (referred to as zinc/nickel and zinc/iron coatings, respectively).

The main purpose of the coatings or coating systems is protecting iron and steel components against corrosion.

This International Standard specifies

— the designations to be used for the above coating systems,

— the minimum corrosion resistance to be achieved in specified test procedures, and

— the minimum coating thicknesses required.

2 Normative references

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

ISO 2080, *Metallic and other inorganic coatings — Surface treatment, metallic and other inorganic coatings — Vocabulary*

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

ISO 3613:2010, *Metallic and other inorganic coatings — Chromate conversion coatings on zinc, cadmium, aluminium-zinc alloys and zinc-aluminium alloys — Test methods*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 9587, *Metallic and other inorganic coatings — Pretreatment of iron or steel to reduce the risk of hydrogen embrittlement*

ISO 9588, *Metallic and other inorganic coatings — Post-coating treatments of iron or steel to reduce the risk of hydrogen embrittlement*

ISO 27830:2008, *Metallic and other inorganic coatings — Guidelines for specifying metallic and inorganic coatings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2080 apply.

4 Designation

4.1 Electrodeposited coatings

The electrodeposited coatings shall be composed of zinc or zinc-alloys as listed in Table 1.

Table 1 — Designation of electrodeposited coatings

Symbol	Definition
Zn	Zinc coating without alloying element
ZnFe	Zinc-alloy containing a mass fraction of 0,3 % to 1,0 % iron
ZnNi	Zinc-alloy containing a mass fraction of 12 % to 16 % nickel

4.2 Passivation

Passivation is the production of conversion coatings by treating coatings with suitable Cr(VI)-free solutions in order to improve their corrosion resistance. The conversion coating may optionally be dyed.

Since the Cr(VI)-free passivations are new coating systems, the new nomenclature is listed in Table 2.

Table 2 — Passivations

Type of passivation	Code	Colouration, surface appearance[a]	Notes
Transparent	An	Colourless to coloured and iridescent	Often referred to as "thin-layer passivation"
Iridescent	Cn	Coloured and iridescent	Often referred to as "thick-layer passivation"
Black	Fn	Black	

[a] Tints are permissible.

4.3 Post treatment

Application of a sealant or top coats increases corrosion resistance.

Sealant layers normally show a thickness of up to 2 µm and are composed of Cr(VI)-free organic and/or inorganic compounds. Coatings that can be removed with cold cleaning agents, such as those with an oil, grease or wax base, are not considered as sealants in the context of this International Standard.

Top coats are normally thicker than 2 µm and are Cr(VI)-free organic thin coatings which may need elevated temperature curing. Particularly for coatings with black passivation, a postdip can be used for increasing corrosion resistance and improving colour depth.

The impact of the post treatments mentioned to component properties such as contact resistance, weldability, compatibility with fuels, performance in bonded joints, etc., when in service shall be assessed on a case by case basis.

Since the range of surface modifications is very large, the use of a post treatment mentioned and the type shall be agreed on in the case of surface coatings that are subject to particular requirements.

NOTE The post treatment mentioned normally remove the interference colours produced by passivation.

Table 3 — Post treatment

Symbol	Meaning
Tx	Sealant may or may not be present[a]
T0	No sealant
T2nL	Sealant without integrated lubricant[b]
T2yL	Sealant with integrated lubricant[b]
T4	Subsequently added lubricant
T7nL	Top coat without integral lubricant[b]
T7yL	Top coat with integral lubricant[b]

NOTE T4 is not considered.

[a] Left to the choice of the coater.

[b] Optional designation of nL or yL, when required.

4.4 Significant (functional) surfaces

Components with complex shapes, particularly those having cavities, may not be capable of meeting the corrosion resistance and minimum thickness criteria required in the accelerated corrosion tests at all the points on the electroplated surface. In such cases, the significant surfaces for the coating system shall be indicated on the drawing by a dot-and-dash line.

If the purchaser does not specify a significant surface, the definition given in ISO 27830:2008, Clause 6 shall apply.

4.5 Examples of designations

Designation of a zinc/nickel alloy coating on a steel (Fe) component having a minimum local coating thickness of 8 µm (8) and iridescent passivation (Cn):

Electroplated coating ISO 19598 – Fe//ZnNi8//Cn//T0

Designation of a zinc/iron alloy coating on a steel (Fe) component having a minimum local coating thickness of 8 µm (8) with black passivation (Fn) and sealant (T2):

Electroplated coating ISO 19598 – Fe//ZnFe8//Fn//T2

Designation of a zinc coating on a steel (Fe) component having a minimum local coating thickness of 12 µm (12) and black passivation (Fn); application of a subsequent sealant is left to the choice of the coater:

Electroplated coating ISO 19598 – Fe//Zn12//Fn//Tx

5 Information to be supplied by the purchaser to the electroplater

The minimum information to be provided by the purchaser to the electroplater shall comprise the following:

a) the tensile strength of the component (to enable the requirements in 7.4 to be taken into account);

b) component information (basis material, production method, heat treatment);

c) information on significant surfaces as required by 4.4;

d) designation of the coating to be applied (see 4.5).

If desired, further requirements, such as appearance, friction properties and media resistance, may be imposed on the properties of the coatings to be applied and the testing extended accordingly.