



**SLOVENSKI STANDARD**  
**SIST EN 12330:2000**  
**01-december-2000**

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Corrosion protection of metals - Electrodeposited coatings of cadmium on iron or steel

Korrosionsschutz von Metallen - Galvanische Cadmiumüberzüge auf Eisenwerkstoffen

Protection contre la corrosion des métaux - Revêtements électrolytiques de cadmium sur fer ou acier

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**EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM**

EN 12330

May 2000

ICS 25.220.40

**English version**

Corrosion protection of metals

**Electrodeposited coatings of cadmium on iron or steel**

Protection contre la corrosion des  
métaux – Revêtements électroly-  
tiques de cadmium sur fer ou acier

Korrosionsschutz von Metallen –  
Galvanische Cadmiumüberzüge auf  
Eisenwerkstoffen

This European Standard was approved by CEN on 2000-02-03.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 262 "Metallic and other inorganic coatings", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2000, and conflicting national standards shall be withdrawn at the latest by November 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**WARNING** Due to regulations the alteration of which is for the time being outside the competence of the CEN members, this European Standard contains A-deviations as detailed in annex ZB (informative).

## Introduction

Electrodeposited coatings of cadmium can be chromate treated in order to retard the formation of corrosion products on surfaces of coatings exposed to corrosive atmospheres. When corrosion protection is the main purpose of the coating, the usual practice is to apply a chromate conversion coating on top of the electrodeposited cadmium coating. This is particularly effective in retarding the formation of corrosion products which form on cadmium coatings under certain conditions (see annex A).

Certain types of chromate conversion coating can be coloured in order to facilitate identification of the treated articles.

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## 1 Scope

This European Standard specifies requirements for electrodeposited coatings of cadmium on iron or steel with or without supplementary treatment.

This European Standard does not specify chromate finishes which are required only for improving the adhesion of paints or varnishes.

**NOTE** This European Standard is not intended to be used alone, but is the complement of EN 1403. It is necessary for the purchaser to specify the cadmium electrodeposited coating in accordance with the designation as specified in EN 1403.

**WARNING** The use of cadmium is subject to health, safety and environmental legislations at European and national levels, and these should be consulted.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN ISO 3543, *Metallic and non-metallic coatings — Measurement of thickness — Beta backscatter method (ISO/DIS 3543:1998)*.

prEN ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods (ISO/DIS 3497:1998)*.

EN 1403:1998, *Corrosion protection of metals — Electrodeposited coatings — Method of specifying general requirements*.

EN ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method (ISO 1463:1982)*.

EN ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution (ISO 2177:1985)*.

EN ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method (ISO 2178:1982)*.

EN ISO 2360, *Non-conductive coatings on non-magnetic basis metals — Measurement of coating thickness — Eddy current method (ISO 2360:1982)*.

EN ISO 2819, *Metallic coatings on metallic substrates — Electrodeposited and chemically deposited coatings — Review of methods available for testing adhesion (ISO 2819:1980)*.

EN ISO 3613:1994, *Chromate conversion coatings on zinc and cadmium — Test methods (ISO 3613:1980)*.

EN ISO 3892, *Conversion coatings on metallic materials — Determination of coating mass per unit area — Gravimetric methods (ISO 3892:1980)*.

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

### 3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 1403 apply.

### 4 Information to be supplied by the purchaser

The information to be supplied by the purchaser shall be as specified in EN 1403. In addition, the purchaser shall use the designation specified in clause 5.

### 5 Designation

#### 5.1 General

In addition to the requirements specified in EN 1403, the appropriate designation according to the severity of service conditions which the coating has to withstand (see annex B) shall be used.

NOTE Examples of designations are given in annex C.

#### 5.2 Heat treatment

The heat treatment designation as described in EN 1403 shall be used (see clause 6).

#### 5.3 Supplementary treatments

##### 5.3.1 Chromate conversion coatings

The codes for chromate conversion coatings given in annex B shall be used.

NOTE See annex A for more information on chromate conversion coatings.

##### 5.3.2 Other supplementary treatments

Treatments carried out after chromating to enhance corrosion resistance (sealants) or provide colour (dyes) shall be specified in the designation using the symbols given in EN 1403.

NOTE See the introduction, A.2 and A.4 for more information on sealing and dyeing.

### 6 Heat treatment

Any heat treatment for the relief of hydrogen embrittlement shall be carried out before a chromate conversion coating is applied. Heat treatment shall be carried out as soon as possible after coating and in any case within 4 h.

NOTE 1 Heat treatment procedures and classes are specified in ISO 9587 for stress relieving before processing and in ISO 9588 for embrittlement relief after processing, but other conditions may be specified by the purchaser.

NOTE 2 Heat treatment in accordance with the recommended conditions can never guarantee complete freedom from hydrogen embrittlement.

## 7 Requirements

### 7.1 General

All tests (including corrosion resistance tests) shall be deferred until the expiry of a period of 24 h after the chromating process has ended.

**NOTE** Chromate conversion coatings harden with age by gradual dehydration. They should therefore be handled carefully for the first 24 h after the treatment.

### 7.2 Appearance

Over the significant surface, the electroplated articles shall be free from clearly visible plating defects such as blisters, pits, roughness, cracks or unplated areas. See also 4.1 d) of EN 1403:1998.

Parts which have been given supplementary treatment shall be free from untreated areas on the significant surface.

### 7.3 Thickness

#### 7.3.1 Minimum local thickness

When tested in accordance with one of the following standards the minimum local thickness of the cadmium coating on articles having a significant surface of greater than 1 cm<sup>2</sup> shall conform to that specified in its designation: EN ISO 1463, EN ISO 2177, EN ISO 2178, EN ISO 2360, prEN ISO 3497, prEN ISO 3543.

**NOTE** Before using the method specified in EN ISO 2177, it is necessary to remove the chromate or other supplementary treatment using a very mild abrasive, for example a paste of levigated alumina or magnesium oxide. In the case of heavy conversion coatings, the results will therefore be slightly low.

#### 7.3.2 Average thickness

For articles having a significant surface of less than 100 mm<sup>2</sup>, the minimum local thickness shall be deemed to be the minimum value of the average determined by the method specified in annex D.

### 7.4 Adhesion

#### 7.4.1 Adhesion of cadmium coating

When tested by the burnishing test in accordance with EN ISO 2819 the cadmium coating shall have good adhesion.

#### 7.4.2 Adhesion of coloured chromate coatings

Coloured chromate coatings shall be tested in accordance with 3.6 de l'EN ISO 3613:1994.

### 7.5 Corrosion resistance

When tested in accordance with the neutral salt spray (NSS) test described in ISO 9227 for the times given in tables 1 and 2, the test surface shall remain free from red corrosion product when examined by the unaided eye or corrected vision. Slight staining of the test surface shall not be a cause of rejection. The test surface shall comprise those parts of the significant surfaces of the test specimens that can be touched by a ball 20 mm in diameter or as otherwise specified by the purchaser (see clause 4).

**NOTE** Red corrosion indicates corrosion of the basis metal.



**Table 1 — Corrosion resistance of the cadmium coating only**

Cadmium coating thickness ( $\mu\text{m}$ )	Neutral salt spray test time (h)
5	48
8	72
12	192
25	360

**Table 2 — Corrosion resistance of the entire coating (cadmium coating plus chromate conversion coating)**

(Partial) designation	Service condition number	Neutral salt spray test time (h)
Cd5/A Cd5/F	0	72
Cd5/C Cd5/D Cd8/A Cd8/F	SIST EN 12330:2000 <a href="https://standards.iteh.ai/catalog/standards/sist/b7d18580-b78f-40cc-a43a-262c716a6940/sist-en-12330-2000">https://standards.iteh.ai/catalog/standards/sist/b7d18580-b78f-40cc-a43a-262c716a6940/sist-en-12330-2000</a>	96
Cd8/C Cd8/D	2	120
Cd12/C Cd12/D	3	240
Cd25/C Cd25/D	4	480