SLOVENSKI STANDARD
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Šeradiranje cinkove difuzijske prevleke na železovih izdelkih - Zahteve

Sherardizing - Zinc diffusion coatings on ferrous products - Specification

Sherardisieren - Zink-Diffusionsüberzüge auf Eisenwerkstoffen - Anforderungen

Shérardisation - Revetement par diffusion de zinc sur les produits ferreux - Spécifications

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Sherardizing - Zinc diffusion coatings on ferrous products - Specification

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This European Standard was approved by CEN on 20 February 2003.

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This European Standard exists 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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document EN 13811:2003 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of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

Annex A is normative. Annexes B and C are informative.

This document includes a Bibliography.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies minimum thickness requirements for three classes of zinc coating applied to ferrous products by the sherardizing process for the purpose of protection against corrosion and abrasion.

It also specifies minimum requirements for the zinc dust to be used during the sherardizing process.

This standard does not specify any requirements for the surface condition (finish or roughness) of the basis material before sherardizing.

After-treatments or overcoating of sherardized articles is not covered by this standard.

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 (including amendments).

EN 10204, *Metallic products — Types of inspection documents*.

EN ISO 1460, *Metallic coatings — Hot dip galvanized coatings on ferrous materials — Gravimetric determination of the mass per unit area (ISO 1460:1992)*.

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

EN ISO 3549, *Zinc dust pigments for paints — Specifications and test methods (ISO 3549:1995)*.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
sherardizing
solid diffusion process in which articles are heated in close contact with zinc dust and an inert material such as sand

3.2
sherardized coating
coating consisting of zinc/iron alloys obtained by the sherardizing process, and subsequently passivated

NOTE ‘Sherardized coating’ is referred to in this standard as ‘coating’.

3.3
coating mass
total mass of zinc/iron alloys per unit area of surface, expressed in grams per square metre, g/m^2

3.4
coating thickness
total coating thickness of zinc/iron alloys, expressed in micrometres, µm

3.5
significant surface
the part of the article covered or to be covered by the coating and for which the coating is essential for serviceability and/or appearance and where the coating must meet all of the specified requirements

[ISO 2064:1996, definition 3.1]

3.6
control sample
article, or group of articles, from a lot which is selected for testing

3.7
reference area
area within which a specified number of single measurements is required to be made

[ISO 2064:1996, definition 3.3]

3.8
local coating thickness
mean value of coating thickness obtained from a number of measurements within a reference area in a magnetic or electro-magnetic test

3.9
local coating mass
value of coating mass obtained from a single gravimetric test

3.10
inspection lot
one or more articles of the same type and size comprising either a single order or a single delivery load or the number of articles identified as a lot by the sherardizer

4 General requirements

4.1 Zinc dust

When determined in accordance with EN ISO 3549 the zinc dust used in the sherardizing process shall contain a mass fraction of not less than 94 % of metallic zinc and total impurities (other than zinc oxide) of not more than 2% mass fraction.

4.2 Information to be supplied by the purchaser

Information shall be supplied by the purchaser in accordance with annex A.

5 Sampling

A control sample (3.6) for thickness testing shall be taken randomly from each inspection lot (3.10) selected for testing. The minimum number of articles to form the control sample shall be taken in accordance with Table 1.

Alternatively, sampling procedures selected from ISO 2859-1 and ISO 2859-3 may be used.

Acceptance inspection shall be undertaken before the products leave the sherardizer's custody, unless otherwise specified at the time of ordering by the purchaser.

Table 1 — Control sample size related to batch size

Number of articles in the batch	Minimum number of articles in the control sample
1 to 3	All
4 to 500	3
501 to 1 200	5
1 201 to 3 200	8
3 201 to 10 000	13
Above 10 000	20

6 Coating requirement

6.1 Thickness

When tested in accordance with 6.2.3, the local coating thickness shall be not less than the values given in Table 2.

NOTE 1 Coatings applied by sherardizing are designed to protect ferrous products against corrosion and abrasion. The service life of such coatings in a given environment is approximately proportional to the coating thickness.

NOTE 2 When thicker coatings than those specified in this European Standard are required for extremely aggressive conditions and/or when an exceptionally long service life is required, their specification should be the subject of agreement between the sherardizer and the purchaser.

Table 2 — Coating thickness

Class of coating	Local coating thickness (minimum value) /µm
Class 15	15
Class 30	30
Class 45	45
NOTE 1 The three classes of coating thickness given in Table 2 should be suitable for the majority of applications. Guidance on the selection of coating thickness is given in C.6. NOTE 2 There can be a requirement for specific pre-treatment when thicker coatings, e.g. Class 45, are specified. The purchaser should seek the advice of the sherardizer in such cases. NOTE 3 The local coating thickness should only be determined in relation to reference areas selected in accordance with 6.2.2.	

6.2 Test methods

6.2.1 General

The local coating thickness shall be determined in accordance with the magnetic method (EN ISO 2178) or the gravimetric method (EN ISO 1460). The magnetic method is generally more appropriate for routine quality control.

NOTE Annex B provides additional information on the determination of thickness.

6.2.2 Reference areas

The number and position of reference areas and their sizes for the gravimetric test shall be chosen with regard to the shape and size of the article(s) in order to obtain a result as representative as possible of average coating mass per unit area.

For articles with a significant surface area greater than or equal to 1 000 mm^2, there shall be at least one reference area on each article in the control sample. Control sample sizes are given in Table 1.

For articles with a significant surface area of less than 1 000 mm^2, there shall be enough articles grouped together to provide at least 1 000 mm^2 surface for an individual reference area. Hence, the total number of articles tested shall equal the number of articles required to provide one reference area multiplied by the total number of articles in a control sample, in accordance with Table 1 (or the total number of articles sherardized, if that is less). Alternatively, sampling procedures selected from ISO 2859-1 and ISO 2859-3 may be used.

6.2.3 Magnetic method

The reference areas shall be within, and representative of, those which would have been chosen for the gravimetric method.

A minimum of five magnetic test readings shall be taken within each reference area. Because the area over which each measurement is made in this method is very small, individual figures may be lower (typically up to 15 %) than the values for the local thickness. This is irrelevant as only the average value over the whole of each reference area is required to be equal to, or greater than, the local coating thickness minimum value.

If the local coating thickness on a control sample does not conform to 6.1, twice the original number of articles (or all the articles, if that is the lower number) shall be taken from the batch and tested. If this larger control sample conforms to 6.1, the batch shall be deemed to conform. Failure of the larger control sample to meet the requirements of 6.1 shall constitute grounds for rejection of the batch. If the batch is rejected, individual articles may be submitted for re-testing.

When more than five articles have to be taken to make up a reference area of at least 1 000 mm^2, a single magnetic measurement shall be taken on each article if a suitable area of significant surface exists. If such a suitable area does not exist, the gravimetric method given in EN ISO 1460 shall be used. If a sufficient number of measurements are made within the reference area, effectively the same coating thickness will be determined by the magnetic method as the gravimetric method.

6.2.4 Gravimetric method

The mass of sherardized coating per unit area shall be determined in accordance with EN ISO 1460 and the nominal density of the coating in grams per cubic centimetre (g/cm^3). In case of dispute, this shall be the referee method.

7 Certificate of conformity

When required, the sherardizer shall provide a certificate of conformity with the requirements of this European Standard (see EN 10204).