



# SLOVENSKI STANDARD

## SIST EN 13858:2007

01-februar-2007

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SIST EN 13858:2004

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Corrosion protection of metals - Non-electrolytically applied zinc flake coatings on iron or steel components

Korrosionsschutz von Metallen - Nicht elektrolytisch aufgetragene schuppenförmige Zinküberzüge auf Werkstücken aus Eisen oder Stahl

Protection des métaux contre la corrosion - Revêtements non électrolytiques de lamelles de zinc sur des composants en fer ou en acier

Ta slovenski standard je istoveten z: EN 13858:2006

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English Version

## Corrosion protection of metals - Non-electrolytically applied zinc flake coatings on iron or steel components

Protection des métaux contre la corrosion - Revêtements non électrolytiques de lamelles de zinc sur des composants en fer ou en acier

Korrosionsschutz von Metallen - Nicht elektrolytisch aufgetragene schuppenförmige Zinküberzüge auf Werkstücken aus Eisen oder Stahl

This European Standard was approved by CEN on 6 October 2006.

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.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This document (EN 13858:2006) 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 May 2007, and conflicting national standards shall be withdrawn at the latest by May 2007.

This document supersedes EN 13858:2003.

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

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## Introduction

The purpose of non-electrolytically applied zinc flake coatings, which may contain a small proportion of aluminium flakes, is for corrosion protection of steel components. If needed, these coatings may also incorporate an integral lubricant, for improving lubricity. Variations in colour or lubricity are obtained by applying a suitable supplementary coating to zinc flake-based coatings.

The non-electrolytically applied zinc flake coatings for iron and steel components are obtained by cold immersion or by pneumatic or electrostatic gun-spraying of the coating liquid, followed by curing. Coating processes by cold immersion ensure complete coverage of components, even with complex shapes. These coatings are not suitable for components that are used at temperatures higher than the curing temperature.

Mechanical cleaning methods of the metal surfaces are preferred for steel parts having a tensile strength of 1 000 MPa and greater ( $R_m \geq 1\ 000$  MPa) to avoid the risk of hydrogen embrittlement. If acid chemical cleaning methods are used, stress relief heat treatment is required for high strength steels ( $R_m \geq 1\ 000$  MPa) if they contain tensile stresses (see Clause 6.1.2).

Zinc protects steel by galvanic action, i.e. sacrificial action takes place to protect steel when it is in close contact with the steel, and after weathering, zinc oxides are formed on the coating surface. These oxides are voluminous and plug the pores in the coating to provide barrier protection. Apart from cathodic corrosion protection, the zinc flakes also provide barrier properties due to the platelet structures.

Artificial atmosphere corrosion tests of these coatings can provide some measure of guidance for corrosion protection. However, the duration and results of accelerated corrosion tests, such as the neutral salt spray test, have no direct relation to the corrosion protection in other environments.

**WARNING** —This European Standard calls for the use of substances and/or procedures that may be injurious to health if adequate safety measures are not taken. This European Standard does not address any health hazards, safety matters or environmental conditions associated with its use. It is the responsibility of the user of this European Standard to establish appropriate health and safety practices and take suitable actions for any national and International regulations.

## 1 Scope

This European Standard specifies requirements for non-electrolytically applied coatings, composed mainly of zinc flakes, for protection against corrosion of steel components, excluding threaded fasteners. These coatings may also be provided with integral lubricant if needed.

NOTE 1 Requirements for threaded fasteners are given in EN ISO 10683.

The temperature and duration of curing the coating can influence the mechanical properties of components because of their change of metallurgical conditions. These coatings should not be applied to components that can be used at temperatures higher than the curing temperature, unless specifically ordered.

NOTE 2 If aluminium flakes, when added to zinc flake dispersion, form a continuous bond, a high risk of hydrogen embrittlement for steels of tensile strength over 1 800 MPa may exist because of the sacrificial action of the coating during corrosion reactions in storage and/or in service.

## 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.

EN 60454-2, *Specifications for pressure-sensitive adhesive tapes for electrical purposes — Part 2: Methods of test* (IEC 60454-2:1994)

EN ISO 2064:2000, *Metallic and other inorganic coatings — Definitions and conventions concerning the measurement of thickness* (ISO 2064:1996)

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests* (ISO 9227:2006)

EN ISO 16348:2003, *Metallic and other inorganic coatings — Definitions and conventions concerning appearance* (ISO 16348:2003)

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

ISO 4519, *Electrodeposited metallic coatings and related finishes — Sampling procedures for inspection by attributes*

## 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN ISO 2064:2000 and EN ISO 16348:2003 apply.

## 4 Information to be supplied by the purchaser to the processor

When ordering articles for non-electrolytically applied zinc flake coatings on iron or steel conforming to this European Standard, the purchaser shall provide the following information in writing in the contract, purchase order or in the engineering drawing:

- a) number and date of this European Standard, i.e. EN 13858: 2006;
- b) designation (see clause 5);
- c) specification and metallurgical condition of the component (heat treatment, hardness and/or other characteristics), which may be influenced by the coating process, and any process temperature limitation;
- d) significant surface and the requirement of coating thickness on the significant surface, including the coating of holes, recesses and presence of rack marks;

NOTE Requirements for coating thickness on the non-significant surface and the presence of uncoated areas can also be specified (see 6.2.1);

- e) requirement of dimensional tolerances including any excesses of coatings in complicated shapes of components; these areas shall be agreed between supplier and purchaser;
- f) tensile strength of the component and requirement of stress relief heat treatment;
- g) requirements of the type of coating processes (see Annex A), type of coating (with aluminium flakes or without aluminium flakes, see 6.1.3), coating thickness (see Table 1) and coating adhesion (see 6.2.3);
- h) requirement of supplementary coating, e.g. sealants, lubricants, colours, etc. (see 6.2.4);
- i) requirement of accelerated corrosion test (see clause 6.3);
- j) requirement of any additional tests or performance tests for lubricated coatings whether using integral coating lubricants, or lubricants applied after coatings;
- k) sampling and inspection requirements (see clause 7).

## 5 Designations

### 5.1 General

The designation shall consist of the following:

- a) term “non-electrolytically applied”;
- b) number of this European Standard, EN 13858;
- c) hyphen (-);
- d) chemical symbol of the basis metal;
- e) stroke (/);
- f) symbols for the zinc flake coating and the method of application (see 5.4.1), as well as any coatings that may be applied prior to or after deposition, separated by strokes for each stage in the coating sequence in the order of application. The coating designation includes the thickness of the coating in micrometers ( $\mu\text{m}$ ).



## 5.2 Basis metal

The basis metal shall be designated by its chemical symbol or its principal constituent if an alloy. For example, Fe for iron and steel.

The specific alloy may be identified by its standard designation (for example, its UNS number as given in ASTM DS-56G, or its national or regional equivalent) placed between the symbols "< >", for example, Fe<G434000>.

## 5.3 Pre-process stress relief heat treatment

Stress relief heat treatment prior to application of a coating may be required for some basis materials. Brackets shall be placed around the letters, SR, the temperature in Celsius, and the time in hours. The temperature shall be in parenthesis after the letters, SR; for example, [SR (210) 3].

## 5.4 Type and thickness of coatings

### 5.4.1 Type of coating

- i immersion application;
- p pneumatic application;
- fl flake;
- yc coating with chromate;
- nc coating without chromate;
- T1 paints, varnishes or similar coatings;
- T2 organic or inorganic sealants;
- T3 colour;
- T4 oil or other lubricants.

### 5.4.2 Thickness of coating

Non-electrolytically applied zinc flake coating, by immersion or pneumatic processes, shall be designated by the symbol "Zn" with the prefix "fl" and a further prefix "i" or "p" for immersion and pneumatic application processes respectively, followed by a number giving the minimum local thickness of the coating in  $\mu\text{m}$ . For example, iflZn4 or pflZn4 designate zinc flake coatings with 4  $\mu\text{m}$  thickness by immersion or pneumatic processes respectively. The minimum thickness of the zinc flake coating shall be in accordance with Table 1.

### 5.4.3 Examples of coating designations

A non-electrolytically deposited zinc flake coating, applied by immersion process, of 4  $\mu\text{m}$  thick on steel (Fe), with chromates:

Non-electrolytically applied zinc flake coating EN 13858 – Fe/iflZn4/yc

A non-electrolytically deposited zinc flake coating, without chromate, applied by pneumatic process, of 8  $\mu\text{m}$  thick on high strength steel that is stress relieved at 210 °C for 3 h before the application of the coating with organic sealant (T2):

Non-electrolytically applied zinc flake coating EN 13858 – Fe/[SR(210)3]/pflZn8/nc/T2