

# SVENSK STANDARD

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### **Tråd och trådprodukter av stål – Beläggning av icke-järnmetall – Del 2: Beläggning av zink eller zinklegeringar**

### **Steel wire and wire products – Non-ferrous metallic coatings on steel wire – Part 2: Zinc or zinc alloy coatings**

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Denna standard ersätter SS-EN 10244-2, utgåva 1.

The European Standard EN 10244-2:2009 has the status of a Swedish Standard. This document contains the official English version of EN 10244-2:2009.

This standard supersedes the Swedish Standard SS-EN 10244-2, edition 1.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 10244-2**

April 2009

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English Version

## Steel wire and wire products - Non-ferrous metallic coatings on steel wire - Part 2: Zinc or zinc alloy coatings

Fils et produits tréfilés en acier - Revêtements métalliques non ferreux sur fils d'acier - Partie 2 : Revêtement de zinc ou d'alliage de zinc

Stahldraht und Drahterzeugnisse - Überzüge aus Nichteisenmetall auf Stahldraht - Teil 2: Überzüge aus Zink und Zinklegierungen

This European Standard was approved by CEN on 20 December 2008.

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## Foreword

This document (EN 10244-2:2009) has been prepared by Technical Committee ECISS/TC 30 "Steel wires", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10244-2:2001.

Some significant technical changes from the previous edition of this standard have been made like the addition of new mass requirements for a coating of Zn95Al5 (in Table 2, see E) and the correction of the Formula in 5.2.3.6 "Expression of results".

This European Standard for non-ferrous metallic coating on steel wire is made up of the following parts:

- *Part 1: General principles*
- *Part 2: Zinc or zinc alloy coatings*
- *Part 3: Aluminium coatings*
- *Part 4: Tin coatings*
- *Part 5: Nickel coatings*
- *Part 6: Copper, bronze or brass coatings*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

## 1 Scope

This part of this European Standard specifies the requirement for coating mass, other properties and testing of zinc and zinc alloy coatings on steel wire and steel wire products of circular or other section.

## 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 1179, *Zinc and zinc alloys — Primary zinc*

EN 10218-1, *Steel wire and wire products — General – Part 1: Test methods*

EN 10244-1:2009, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 1: General principles*

ISO 7802, *Metallic materials - Wire - Wrapping test*

ISO 7989-2:2007, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc-alloy coating*

ASTM B 750, *Standard Specification for GALFAN (Zinc-5% Aluminium-Mischmetal) Alloy in Ingot Form for Hot-Dip Coatings.*

## 3 Terms and definitions

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

### 3.1

#### **wire with zinc or zinc alloy coating**

wire to which zinc or zinc alloy coating has first been applied to protect it against corrosion.

NOTE The coating method may be hot dipping in a bath of molten zinc or by means of an aqueous solution of suitable electrolyte. In the hot dipping process wiping media may be used to modify the mass of coating

### 3.2

#### **zinc or zinc alloy coating**

zinc to which deliberately other elements are added in order to obtain particular characteristics.

NOTE In all cases the quantity of zinc in the alloy shall be minimum 50 %. The most common alloy elements are aluminium, tin, nickel but other elements may also be considered

### 3.3

#### **mass of coating**

mass of zinc per unit of surface area expressed in grams per square metre of surface of bare wire



**Table 1 — Mass requirements for a coating of Zn**

Diameter <i>d</i> mm	Classes <sup>a</sup>					
	A g/m <sup>2</sup>	AB g/m <sup>2</sup>	B g/m <sup>2</sup>	C g/m <sup>2</sup>	D g/m <sup>2</sup>	A x 3 <sup>b</sup> g/m <sup>2</sup>
0,15 ≤ <i>d</i> < 0,20	—	—	15	—	10	—
0,20 ≤ <i>d</i> < 0,25	30	20	20	20	15	—
0,25 ≤ <i>d</i> < 0,32	45	30	30	25	15	—
0,32 ≤ <i>d</i> < 0,40	60	30	30	25	15	—
0,40 ≤ <i>d</i> < 0,50	85	55	40	30	15	—
0,50 ≤ <i>d</i> < 0,60	100	70	50	35	20	—
0,60 ≤ <i>d</i> < 0,70	115	80	60	40	20	—
0,70 ≤ <i>d</i> < 0,80	130	90	60	45	20	—
0,80 ≤ <i>d</i> < 0,90	145	100	70	50	20	—
0,90 ≤ <i>d</i> < 1,00	155	110	70	55	25	—
1,00 ≤ <i>d</i> < 1,20	165	115	80	60	25	—
1,20 ≤ <i>d</i> < 1,40	180	125	90	65	25	540
1,40 ≤ <i>d</i> < 1,65	195	135	100	70	30	585
1,65 ≤ <i>d</i> < 1,85	205	145	100	75	30	615
1,85 ≤ <i>d</i> < 2,15	215	155	115	80	40	645
2,15 ≤ <i>d</i> < 2,50	230	170	125	85	45	690
2,50 ≤ <i>d</i> < 2,80	245	185	125	95	45	735
2,80 ≤ <i>d</i> < 3,20	255	195	135	100	50	765
3,20 ≤ <i>d</i> < 3,80	265	210	135	105	60	795
3,80 ≤ <i>d</i> < 4,40	275	220	135	110	60	825
4,40 ≤ <i>d</i> < 5,20	280	220	150	110	70	840
5,20 ≤ <i>d</i> < 8,20	290	—	—	110	80	870
8,20 ≤ <i>d</i> ≤ 10,00	300	—	—	110	80	900

<sup>a</sup> The coating class with a designation starting with A relates to thick coatings (generally final coating). Designations ending in B relate to classes usually but not always obtained by (zinc coating) and subsequent drawing. Classes C and D are standard classes for low mass coating which are usually produced but not exclusively, produced by hot zinc dipping and then wiping.

<sup>b</sup> A x 3 relates to very high mass requirement three times higher than class A. Other multiples of Class A are possible and these classes will be identified in the same way, e.g. A x 4.

## 4 Coating requirements

### 4.1 Requirements for the coatings material

The zinc or zinc alloy used for the coating shall comply with the standard EN 1179. For zinc-alloy grades not mentioned in the EN the alloy shall be specified at the enquiry and order. For Zn95Al5 reference is made to ASTM B 750 with or without mischmetal (MM).<sup>1</sup>

1) Mischmetal is a mixture of rare earth metals (La and others) which is a by product from zinc production.

The ingot of the material used for the zinc coating shall be of minimum 99,95 % purity (according to Z3 of EN 1179) unless otherwise stated in the relevant product standard or other specification in the order. Coatings applied by electrolysis shall contain a minimum of 99 % zinc.

## **4.2 Requirements relating to coating on the wire**

### **4.2.1 Coating mass**

The minimum mass of zinc per unit of surface area of the wire shall comply with the requirements of Table 1.

If no class of zinc coating or no coating mass is specified the coating shall be called "regular coating". Such a coating shall be not less than 1 g zinc mass per Kg of zinc coated wire (equivalent to the coating mass in  $\text{g/m}^2$  not less than two times the wire diameter expressed in mm).

The requirements for zinc-aluminium coatings of type Zn95Al 5 are given in Table 2.

For other zinc alloy coatings, the manufacturer and supplier shall agree on the required coating mass.

### **4.2.2 Appearance of coating**

The coating applied to the wire shall be reasonably smooth and as evenly distributed as industrial technology allows and not show discontinuities such as bare patches, dross contamination, etc.

NOTE The Zn95Al5 zinc-aluminium alloy might show difference in colour and become darker with time. This does not affect the corrosion protection performance.

### **4.2.3 Dipping test**

When specified the dipping (immersion) test shall be carried out according to the procedure detailed in 5.3. However, it should be pointed out that there is no correlation between the number of dips and the mass of the coating and that the result is influenced as much by the conditions of manufacture of the coating as by the uniformity of the coating.

Table 3 gives the minimum number of immersions for coatings of classes A and AB.

The dipping test does not apply to class B, C and D.

Table 2 — Mass requirements for a coating of Zn95Al5

Diameter mm	Mass of coating <sup>a</sup> g/m <sup>2</sup>			
	A	AB	B	E <sup>b</sup>
0,20 ≤ d < 0,25	—	20	20	40
0,25 ≤ d < 0,40	—	30	30	
0,40 ≤ d < 0,50	85	55	40	
0,50 ≤ d < 0,60	100	70	50	
0,60 ≤ d < 0,70	115	80	60	
0,70 ≤ d < 0,80	130	90	60	
0,80 ≤ d < 0,90	145	100	70	
0,90 ≤ d < 1,00	155	110	70	
1,00 ≤ d < 1,20	165	115	80	
1,20 ≤ d < 1,40	180	125	90	
1,40 ≤ d < 1,65	195	135	100	
1,65 ≤ d < 1,85	205	145	100	
1,85 ≤ d < 2,15	215	155	115	
2,15 ≤ d < 2,50	230	170	125	
2,50 ≤ d < 2,80	245	185	125	60
2,80 ≤ d < 3,20	255	195	135	
3,20 ≤ d < 3,80	265	210	135	
3,80 ≤ d < 4,40	275	220	135	
4,40 ≤ d < 5,20	280	220	150	
5,20 ≤ d < 8,20	290	—	—	
8,20 ≤ d < 10,00	300	—	—	

<sup>a</sup> The coating class with a designation starting with A relates to thick coatings (generally final coating). Designations ending in B relate to classes usually but not always obtained by (zinc coating) and subsequent drawing.

<sup>b</sup> the corrosion resistance of this class E must be at least equivalent of these from a zinc coating according Table 1 class B

Table 3 — Minimum number of dips

Nominal diameter mm	Class A of coating		Class AB of coating	
	Number of dips		Number of dips	
	of 1 min	of 1/2 min	of 1min	of 1/2 min
0,40 ≤ d < 0,60	—	1	—	—
0,60 ≤ d < 0,90	1	—	—	1
0,90 ≤ d < 1,00	1	1	—	1
1,00 ≤ d < 1,40	1	1	1	—
1,40 ≤ d < 1,65	2	—	1	—
1,65 ≤ d < 1,85	2	—	1	—
1,85 ≤ d < 2,15	2	—	1	1
2,15 ≤ d < 2,80	2	1	1	1
2,80 ≤ d < 4,40	3	—	2	—
4,40 ≤ d < 5,20	3	1	2	—
5,20 ≤ d < 8,20	3	1	—	—
8,20 ≤ d < 10,00	4	—	—	—