
Notranje in/ali zunanje zaščitne prevleke na jeklenih ceveh - Specifikacija prevlek pri avtomatskem vročem cinkanju

Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants

Innere und/oder äußere Schutzüberzüge für Stahlrohre - Festlegungen für durch Schmelztauchverzinken in automatisierten Anlagen hergestellte Überzüge

Revetements intérieur et/ou extérieur des tubes en acier - Spécifications pour revêtements de galvanisation à chaud sur des lignes automatiques

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EUROPEAN STANDARD
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English version

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This European Standard was approved by CEN on 9 August 1997.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 29 "Steel tubes and fittings for steel tubes", the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by June 1998, and conflicting national standards shall be withdrawn at the latest by June 1998.

The European Committee for Iron and Steel Standardization (ECISS) instructed the Technical Committee ECISS/TC 29 to draw up a European Standard for hot dip galvanized coatings for steel tubes.

This task has been undertaken by the sub-committee ECISS/TC 29/SC 4, the secretariat of which is held by the Association Française de Normalisation (AFNOR). The sub-committee has recognised that the quality required of a hot dip galvanized coating depends on the intended application of the steel tubes and it must relate to the capabilities of the process by which the coating is applied. Consequently this standard specifies a number of coating qualities each with different coating requirements for hot dip galvanized coatings applied to steel tubes in automatic plants. The purchaser is required to specify one of these coating qualities in his enquiry and order.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard:

- 1) this standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA ;
- 2) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

No EURONORM is replaced by this European Standard.

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.

1 Scope

1.1 This European Standard specifies the requirements and tests for hot dip galvanized coatings applied to steel tubes hot dip galvanized in automatic plants (see 3.9) for the following :

- a) gas and water installations, including water intended for human consumption ;
- b) other applications e.g. scaffold tubes, structural hollow sections.

NOTE 1 : Subsequently in this European Standard, the term "tube" includes "hollow section".

NOTE 2 : Hot dip galvanized coatings for steel tubes fabricated (see 3.10) subsequent to manufacture or hot dip galvanized in non-automatic plants are specified in prEN ISO 1461. Hot dip galvanized coatings for steel tube fittings and accessories are within the scope of sub-committee ECISS/TC 29/SC 3.

1.2 In addition to the requirements of this European Standard the general technical delivery requirements specified in EN 10021 apply.

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.

EN 1179	Zinc and zinc alloys - Primary zinc
EN 10021	General technical delivery requirements for steel and iron products
EN 10204	Metallic products - Types of inspection documents (including amendment A1:1995)
EN 10232	Metallic materials - Tube (in full section) - Bend test
EN 10233	Metallic materials - Tube - Flattening test
prEN 10266 ¹⁾	Steel tubes, fittings and structural hollow sections - Definitions and symbols for use in product standards
EN ISO 1460	Metallic coatings - Hot dip galvanized coatings on ferrous materials - Gravimetric determination of the mass per unit area
prEN ISO 1461 ¹⁾	Hot dip galvanized coatings on fabricated ferrous products - Specification

¹⁾ In preparation ; until this document is published as a European Standard, a corresponding national standard should be agreed at the time of enquiry and order.

EN ISO 1463	Metallic and oxide coatings - Measurement of coating thickness - Microscopical method
EN ISO 9001	Quality systems - Model for quality assurance in design, development, production, installation and servicing
EN ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing
ISO 2178	Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method

3 Definitions

For the purpose of this European Standard, the following definitions apply, in addition to those of prEN 10266 :

3.1 hot dip galvanizing

Formation of a coating of zinc and/or zinc-iron alloys produced by dipping prepared steel in molten zinc.

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3.2 hot dip galvanized coating (subsequently referred to as "the coating")

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The coating consisting of zinc-iron alloys usually covered by zinc, obtained by hot dip galvanizing.

3.3 coating mass

The total mass of zinc and/or zinc-iron alloys per unit area of surface (expressed in grammes per square metre, g/m²).

3.4 coating thickness

The total thickness of zinc and/or zinc-iron alloys (expressed in micrometers, μm).

3.5 local coating thickness

The mean value of coating thickness obtained from the specified number of measurements within a reference area for a magnetic test or determined from the single value from a gravimetric test.

3.6 local coating mass

The value of coating mass obtained from a single gravimetric test.

3.7 significant surface

The whole of the inside and/or outside surfaces of the tube depending upon the application, but excluding the end faces.

3.8 reference area

An area of significant surface within which a specified number of single measurements of coating thickness is to be made.

3.9 automatic plant

A plant in which tubes are hot dip galvanized and mechanically handled individually at withdrawal from the hot dip galvanizing bath.

3.10 fabricated

Manipulated e.g. welded, bent, assembled.

4 Designation of coating quality

For the coatings specified in this European Standard, the quality designation shall consist of one of the following to identify the intended application of the tube :

- a) A for gas and water installations, including water intended for human consumption ;
- b) B for other applications ;

followed by a full stop and a number to identify the special requirements for that application (see 8.2.1 and table 1), e.g. A.3.

5 Information to be supplied by the purchaser

5.1 Mandatory information

The following information, when appropriate, shall be supplied by the purchaser to the galvanizer at the time of enquiry and order :

- a) the number of this European standard ;
- b) the designation of coating quality (see clause 4) ;
- c) the product standard to which the tubes to be galvanized were manufactured.

5.2 Options

A number of options are permitted by this European Standard, and they are listed below with the appropriate clause references. Where the purchaser identifies an option he shall include it in his enquiry and order. In the event that the purchaser does not indicate his wish to implement an option, the galvanizer shall supply in accordance with the base specification :

- 1) the minimum local coating thickness on the outside surface is specified. This option applies to coating qualities A.1, A.2 and A.3 only, and the purchaser shall indicate the minimum local coating thickness required (see 8.2.1c) ;
- 2) the chemical composition of the coating shall comply with 8.2.1f. This option applies to coating qualities A.2 and A.3 only ;
- 3) the minimum local coating thickness required is in excess of 55 μm . This option applies to coating quality B.1 only and the purchaser shall indicate the minimum coating thickness required (see 8.2.2), e.g. as specified in prEN ISO 1461 ;
- 4) the type of post galvanizing treatment is specified. The purchaser shall indicate the type of post galvanizing treatment required (see clause 12) ;
- 5) a post galvanizing treatment is precluded (see clause 12).

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6 Hot dip galvanizing process

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6.1 The galvanizer and the stockist, where products are supplied through a stockist, shall operate a quality system in accordance with EN ISO 9002.

NOTE : This requirement is also fulfilled by a quality system in accordance with EN ISO 9001.

6.2 The zinc added to the galvanizing bath shall contain a total of impurities (other than iron and tin) specified in EN 1179 not exceeding 1,5 %.

7 General requirements of the coating

NOTE : The surface quality, thickness and adhesion of the coating may be influenced by the surface condition of the tubes to be coated (see annex A).

7.1 Surface

The coating on both the inside and outside surfaces shall be continuous, smooth and free from flux residues on the significant surface.

NOTE : White marks on the surface of the coating (commonly known as "wet storage stain") are permitted if the requirements for the coating thickness are met.

7.2 Thickness

The coating thickness on the significant surface (inside and/or outside as applicable) shall comply with the requirements of the coating quality specified (see 8.2).

NOTE : Service life increases with increase in coating thickness, but thicker coatings are more susceptible to mechanical damage.

7.3 Adhesion

When tested in accordance with 11.4.2 or 11.4.3 the coating shall show no evidence of flaking on the significant surface. In addition the coating shall show no evidence of cracking on the significant surface when subjected to the bend test. Flaking adjacent to cut faces or at the corners of square or rectangular tubes shall not be cause for rejection.

8 Special requirements of the coating

8.1 All coatings have special requirements which are related to the application of the tube. These are detailed in the coating qualities specified in 8.2 one of which shall be specified by the purchaser in his enquiry and order (see 5.1).

8.2 Requirements of coating quality

8.2.1 Coating qualities, A.1, A.2 and A.3

a) the surface of the coating on the inside surface shall be as smooth as can be achieved by steam blowing.

NOTE 1 : Steam blowing produces a smoother surface on tubes of outside diameter 21,3 mm up to and including 88,9 mm than on tubes of other sizes.

NOTE 2 : Some variations may occur in the surface condition of the coating at the points where the tube is held whilst steam blowing and within 50 mm of the tube ends ;

b) the minimum local coating thickness on the inside surface shall be as specified in table 1 ;

c) unless otherwise specified by the purchaser, the minimum local coating thickness on the outside surface is not controlled.

Option 1 (see 5.2) : The minimum local coating thickness on the outside surface is specified ;

d) for coating quality A.1 the local coating thickness shall be as specified in table 1 at any point of the weld bead on the inside surface of welded tubes (see annex A) ;

e) the product of any post galvanizing treatment e.g. phosphating, shall be water soluble to such a degree that its removal is ensured and no toxic elements remain on the inside surface after flushing ;

f) for coating quality A.1, and for coating qualities A.2 and A.3 when Option 2 is specified, the chemical composition of the coating shall not exceed the following :

Antimony	0,01 % ;
Arsenic	0,02 % ;
Lead	0,8 % ;
Cadmium	0,01 % ;
Bismuth	0,01 %.

For antimony, arsenic, cadmium and bismuth the above requirements can alternatively, at the galvanizer's option, be met by analysing a sample from the galvanizing bath or by a certificate issued by the supplier of the zinc showing conformity with the maximum value specified for each element.

Option 2 (see 5.2) : The chemical composition of the coating shall for coating qualities A.2 and A.3 not exceed the limits given above.

Table 1 : Minimum local coating thickness and chemical composition requirements for coating qualities A.1, A.2 and A.3

Requirements		Coating quality		
		A.1	A.2	A.3
Mandatory	Minimum local coating thickness on the inside surface except at the weld bead	55 μm	55 μm	45 μm
	Minimum local coating thickness on the inside surface at the weld bead	28 μm	1)	1)
	Chemical composition of the coating	see 8.2.1f	1)	1)
Options	Minimum local coating thickness on the outside surface	2)	2)	2)
	Chemical composition of the coating	1)	3)	3)
1) This requirement does not apply. 2) This requirement applies when the purchaser specifies Option 1. 3) This requirement applies when the purchaser specifies Option 2 and a value.				