SLOVENSKI STANDARD
oSIST prEN 10348:2023

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Jekla za armiranje betona - Pocinkana jekla za armiranje izdelkov

Steel for the reinforcement of concrete - Galvanized reinforcing steel products

Stahl für die Bewehrung von Beton - Verzinkte Betonstahlerzeugnisse

Aciers pour béton armé - Produits en acier galvanisés pour l'armature du béton

Ta slovenski standard je istoveten z: **prEN 10348**

ICS:

77.140.15	Jekla za armiranje betona	Steels for reinforcement of concrete

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English Version

Steel for the reinforcement of concrete - Galvanized reinforcing steel products

Aciers pour béton armé - Produits en acier galvanisés pour l'armature du béton

Stahl für die Bewehrung von Beton - Verzinkte Betonstahlerzeugnisse

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

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European foreword

This document (prEN 10348:2023) has been prepared by Technical Committee CEN/TC 459/SC4 “Concrete reinforcing and prestressing steels”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 10348-2:2018.

1 Scope

This document specifies requirements for hot-dip galvanized reinforcing steel in the form of products which meet the requirements of EN 10080 and subjected, where appropriate, to further processing, e.g. bars, bent bars, stirrups, products straightened from coils, products cut from bars, welded structures and any other components fabricated for use in the reinforcement of concrete.

This document does not apply to hot dip galvanized reinforcement for pre-stressing or components of these reinforcements.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10080, *Steel for the reinforcement of concrete - Weldable reinforcing steel - General*

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

EN ISO 1461:2009, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:2009)*

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

EN ISO 14713-2:2020, *Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part 2: Hot dip galvanizing (ISO 14713-2:2019)*

EN ISO 15630-1, *Steel for the reinforcement and prestressing of concrete - Test methods - Part 1: Reinforcing bars, rods and wire (ISO 15630-1)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
hot-dip galvanizing
formation of a coating of zinc and/or zinc iron alloys on steel products by dipping prepared steel in a zinc melt

3.2
reinforcing steel products
reinforcing steel in the form of products which meet the requirements of EN 10080 and subjected, where necessary, to further processing, e.g. bars, bent bars, stirrups, products straightened from coils, products cut from bars, welded structures and any other components fabricated for use in the reinforcement of concrete

3.3
galvanized reinforcing steel products
reinforcing steel products which have been hot dip galvanized before or after any working operations that may have been applied (e.g. cutting, welding, bending, etc.)

3.4
manufacturer
organization which produces galvanized reinforcing steel according to the scope of this document

Note 1 to entry: The manufacturer can apply the galvanized coating or sub-contract the galvanizing to a third-party organization (the galvanizer). The manufacturer can apply the operations of cutting/bending/welding or sub-contract this operation to a third-party organization (the fabricator).

3.5
test unit
quantity of coated reinforcing steel products that is represented by the samples which have been tested

3.6
rib height
h
distance from the highest point of the rib (transverse or longitudinal) to the surface of the core, to be measured normal to the axis of the sample

3.7
indentation depth
t
distance between the surface of the wire and the deepest point of the indentation

4 Symbols

Symbols used in this document are listed in Table 1.

Table 1 — List of symbols

Symbol	Unit	Description
d	mm	Nominal diameter of the reinforcing steel
d_n	mm	Nominal diameter of the coated product
e	µm	Average thickness of the zinc coating
fP	-	Relative indentation area
fR	-	Relative rib area
h	mm	Rib height
t	mm	Depth of indentation
L_o	mm	Length of the test piece
m	g/m^2	Mass of zinc per unit area
M	g	Mass of the uncoated test piece
M_z	g	Mass of the zinc coated test piece
ΔM	g	Mass of the zinc
S	mm^2	Total coated area of the test piece

5 Materials

5.1 Reinforcing steel

Reinforcing steel products to be galvanized shall be made from reinforcing steel within the scope of EN 10080.

NOTE For information on the effect of the chemical composition of the reinforcing steel on the coating, see EN ISO 14713-2:2020 (Table 1).

Reinforcing steel that is bent cold prior to hot dip galvanizing can be susceptible to embrittlement. To minimize this risk for steel reinforcement products that are bent cold prior to galvanizing, the mandrel diameter shall be equal to, or greater than, the values specified in Table 2.

Table 2 — Minimum bend diameter for bars bent prior to galvanizing

Nominal diameter of the reinforcing steel bar d (mm)	Minimum bend diameter
$d \leq 16$	$6d$
$16 < d < 36$	$8d$
$d \geq 36$	$10d$

5.2 Zinc melt

The chemical composition of the contents of the hot dip galvanizing bath shall satisfy the requirements of EN ISO 1461:2009.

5.3 Repair material

Material for repairing damaged coating and renovating uncoated areas shall satisfy the requirements of EN ISO 1461:2009.

6 Designation

In addition to the designation of the reinforcing steel product before galvanizing, the designation shall include the following:

— reference to this document;

— additional symbol +Z (hot-dip galvanized coating).

7 Information to be supplied at the time of enquiry and order

The following information shall be supplied at the time of enquiry and order:

— quantity ordered;

— designation of the product in accordance with Clause 6;

— packaging and protection requirements;

— surface treatment if required (e.g. passivation, etc);

— requirements for documentary information to accompany the delivery (e.g. delivery note, type).

8 Galvanizing

8.1 Coating application

The galvanizing shall be, with the exception of the requirements of 9.4 and 10.2, in accordance with EN ISO 1461:2009.

Galvanizing may be applied:

— before further working operations when applied (e.g. cutting, welding, bending, etc);

— to the final reinforcing steel products after further working operations.

The temperature of the application of the hot-dip galvanized coating shall be no higher than 465°C.

8.2 Renovation

The total uncoated surface area shall not exceed 0,5 % of the surface area in any one metre length of the reinforcing steel. The repair of uncoated areas shall be according to EN ISO 1461:2009, 6.3.

Repair of damaged coating due to transport, storage and further fabrication should apply in accordance with this section. When galvanized steel reinforcing products, are sheared, saw-cut, or cut by other means after the galvanizing process, the cut ends should be repaired. When bending galvanized rebar after the hot-dip galvanizing process, some cracking or flaking of the galvanized coating at the bend can occur. Some cracking and flaking of the galvanized coating in the bend area is not cause for rejection. Any flaking or cracking can be repaired by an acceptable repair method as defined in EN ISO 1461:2009.

9 Performance characteristics

9.1 Steel mechanical properties

The mechanical properties of galvanized reinforcing steels shall be those agreed at the time of enquiry and order (see EN 10080 and the non-conflicting product specification defining the technical class).

The mechanical properties of galvanized reinforcing steels manufactured according to Clause 8 are those of the reinforcing steel before galvanizing, therefore further testing of mechanical properties is not required.

9.2 Dimensions, mass per metre and tolerances

For the requirements of dimensions, mass and tolerances EN 10080 shall apply except for the tolerance of mass per metre. The upper limit for the maximum deviation of the mass per metre does not apply to the galvanized reinforcing steel products.

The specified nominal diameter of the base material which is declared in accordance to EN 10080 shall not be changed by galvanizing.

The mass per metre of galvanized rebar should not be used to determine the nominal diameter.

9.3 Bond strength and surface geometry of the galvanized rebar

The requirements in the relevant product specification for the technical class shall apply.

9.4 Durability

Durability is determined by mass of zinc deposited per unit area.

The mass of zinc deposited per nominal unit area (g/m^2) shall not be less than the values specified in Table 3.

Table 3 — Specified values of the mass of zinc per unit area and related coating thickness

Steel diameter (mm)	**Coating mass** g/m^2	**Coating thickness** µm
> 6	610	85
≤ 6	505	70

When the coating thickness is measured the coating mass shall be calculated by using the formula:

$$m = e*7,2$$

where

e is the value of the thickness, expressed in micrometres (µm);

m is the value of the mass of zinc per unit area, expressed in grams per square metre (g/m^2).

The mass of zinc per unit area shall be determined using the provisions given in 11.2.

The coating uniformity shall be such that the average value of the coating thickness determined in accordance with the method described in 11.2.1 shall not be less than the minimum thickness values stated in Table 3. Local value may be lower but not less than 80 % of the specified values given in Table 3.

With reference to EN ISO 1461:2009 and EN ISO 14713-2:2020 it is not necessary to evaluate the coating adhesion.