



SLOVENSKI STANDARD SIST EN 10346:2015

01-oktober-2015

Nadomešča:
SIST EN 10346:2009

Kontinuirno vroče prevlečeni jekleni ploščati izdelki - Tehnični dobavni pogoji

Continuously hot-dip coated steel flat products - Technical delivery conditions

Kontinuierlich schmelztauchveredelte Flacherzeugnisse aus Stahl - Technische Lieferbedingungen

Produits plats en acier revêtus en continu par immersion à chaud - Conditions techniques de livraison

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Ta slovenski standard je istoveten z: EN 10346:2015

ICS:

77.140.50	Ploščati jekleni izdelki in polizdelki	Flat steel products and semi-products
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EUROPEAN STANDARD

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Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions

Produits plats en acier revêtus en continu par immersion à
chaud pour formage à froid - Conditions techniques de
livraison

Kontinuierlich schmelztauchveredelte Flacherzeugnisse aus
Stahl - Technische Lieferbedingungen

This European Standard was approved by CEN on 16 April 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 10346:2015) has been prepared by Technical Committee ECISS/TC 109 “Coated and uncoated flat products to be used for cold forming”, 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of an identical text or by endorsement, at the latest by January 2016, and conflicting national standards shall be withdrawn at the latest by January 2016.

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 10346:2009.

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

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EN 10346:2015 (E)**1 Scope**

This European Standard specifies requirements for continuously hot-dip coated products made of low carbon steels for cold forming, of steels for construction and of steels with high proof strength for cold forming coated with zinc (Z), zinc-iron alloy (ZF), zinc-aluminium alloy (ZA), aluminium-zinc alloy (AZ), aluminium-silicon alloy (AS) or zinc-magnesium alloy (ZM) and for continuously hot-dip coated products made of multiphase steels for cold forming coated with zinc (Z), zinc-iron alloy (ZF), zinc-aluminium alloy (ZA) or zinc-magnesium alloy (ZM) in thicknesses of $0,20 \text{ mm} \leq t < 3,0 \text{ mm}$.

By agreement at the time of enquiry and order, this European Standard is applicable to continuously hot-dip coated flat products of an expanded validity range defined for thicknesses $t < 0,20 \text{ mm}$ or in thicknesses $3,0 \text{ mm} \leq t \leq 6,5 \text{ mm}$ with agreed mechanical properties and test specimens, adhesion of coating and surface condition requirements.

The thickness is the final thickness of the delivered product after coating.

This document applies to strip of all widths and to sheets cut from it ($\geq 600 \text{ mm}$ width) and cut lengths ($< 600 \text{ mm}$ width).

NOTE 1 Products coated with (pure) aluminium can also be available, but are not covered by this European standard.

NOTE 2 The products covered by this European Standard are used where cold formability, high strength, a defined minimum yield strength and/or corrosion resistance are the most important factors. Corrosion resistance of the product is proportional to the coating thickness, hence to its mass (see also 7.3.2). The products covered by this European Standard can be used as substrates for organic coated flat products specified in EN 10169 for building and general engineering applications.

NOTE 3 By agreement at the time of enquiry and order, this European Standard is applicable to other continuously hot-dip coated hot rolled steel flat products (e.g. in accordance with EN 10149-2).

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2 Normative References

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 606, *Bar coding - Transport and handling labels for steel products*

EN 10020:2000, *Definition and classification of grades of steel*

EN 10021:2006, *General technical delivery conditions for steel products*

EN 10027-1, *Designation systems for steels - Part 1: Steel names*

EN 10027-2, *Designation systems for steels - Part 2: Numerical system*

EN 10049, *Measurement of roughness average Ra and peak count R_{Pc} on metallic flat products*

EN 10079:2007, *Definition of steel products*

EN 10143, *Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape*

EN 10204:2004, *Metallic products - Types of inspection documents*

EN 10325, *Steel - Determination of yield strength increase by the effect of heat treatment [Bake-Hardening-Index]*

EN ISO 6892-1:2009, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2009)*

ISO 10113, *Metallic materials — Sheet and strip — Determination of plastic strain ratio*

ISO 10275, *Metallic materials — Sheet and strip — Determination of tensile strain hardening exponent*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10021:2006, EN 10079:2007, EN 10204:2004 and the following apply.

NOTE General definitions and guidelines for the protection of iron and steel can be found in EN ISO 14713.

3.1

hot-dip zinc coating (Z)

application of a zinc coating by immersing the prepared strip in a molten bath of zinc

Note 1 to entry: The zinc content is at least 99%.

Note 2 to entry: See also 7.4.2.

3.2

hot-dip zinc-iron alloy coating (ZF)

application of a zinc-iron coating by immersing the prepared strip in a molten bath of zinc and a subsequent annealing

Note 1 to entry: The zinc content of the bath is at least 99%.

Note 2 to entry: The annealing produces an iron-zinc coating with an iron content of normally 8 % to 12 %.

Note 3 to entry: See also 7.4.3. <https://standards.iteh.ai/catalog/standards/sist/caa674c1-6f08-4beb-bae5-5e43a3877da0/sist-en-10346-2015>

3.3

hot-dip zinc-aluminium coating (ZA)

application of a zinc-aluminium coating by immersing the prepared strip in a molten bath of zinc-aluminium

Note 1 to entry: The composition of the bath is approximately 5% aluminium, small amounts of mischmetal and the balance zinc.

Note 2 to entry: See also 7.4.4.

3.4

hot dip zinc-magnesium coating (ZM)

application of a zinc-magnesium coating by immersing the prepared strip in a molten bath of zinc-aluminium-magnesium

Note 1 to entry: The composition of the bath is sum of aluminium and magnesium from 1,5 % to 8 %, containing minimum of 0,2 % magnesium and the balance zinc.

Note 2 to entry: For information on chemical composition and density, the manufacturer may be asked for advice.

Note 3 to entry: See also 7.4.5.

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3.5
hot-dip aluminium-zinc alloy coating (AZ)
 application of an aluminium-zinc coating by immersing the prepared strip in a molten bath of aluminium-zinc-silicon

Note 1 to entry: The composition of the bath is 55% of aluminium, 1,6% of silicon and the balance zinc.

Note 2 to entry: See also 7.4.6.

3.6
hot-dip aluminium-silicon alloy coating (AS)
 application of an aluminium-silicon coating by immersing the prepared strip in a molten bath of aluminium-silicon

Note 1 to entry: The composition of the bath is 8 % to 11 % silicon and the balance aluminium.

Note 2 to entry: See also 7.4.7.

3.7
bake-hardening steel (B)¹⁾
 steel exhibiting an increase in proof strength following heating in the region of 170 °C for 20 min

Note 1 to entry: These steels have a good suitability for cold forming and present a high resistance to plastic straining (which is increased on finished parts during heat treatment) and a good dent resistance.

3.8
complex-phase steel (C)¹⁾
 steel with a multiphase microstructure containing mainly bainite, ferrite, whereas martensite, tempered martensite, retained austenite and pearlite may be present as additional phases

Note 1 to entry: The fine grained microstructure may be generated by retarded recrystallisation or precipitation of micro-alloying elements.

3.9
dual-phase steel (X)¹⁾
 steel consisting of mainly ferrite and martensite and possible bainite as a complementary phase

Note 1 to entry: According to their high tensile strength levels, dual phase steels show a low yield strength ratio and a high work hardening rate.

3.10
ferritic-bainitic steel (F)¹⁾
 steel with a matrix of ferrite or strengthened ferrite containing bainite or strengthened bainite

Note 1 to entry: The strengthening of the matrix is caused by a high density of dislocations, by grain refinement and precipitation of micro-alloying elements.

3.11
high strength interstitial free steel (Y)¹⁾
 steel whose composition is controlled to achieve improved plastic strain ratio r and strain hardening exponent n values

Note 1 to entry: These steels have both, a high mechanical strength and an excellent suitability for cold forming, due to their solid solution hardening and interstitial free microstructure.

¹⁾ Symbol used in the steel name (see Tables 3, 4 and 5).

3.12**low alloy/micro-alloyed steel (LA)¹⁾**

steel containing one or more of alloying elements Nb, Ti and V to achieve required proof strength levels

Note 1 to entry: Combined precipitation and grain refinement hardening modes allow reaching a high mechanical resistance while reducing the content of alloying elements.

Note 2 to entry: Alternatively, carbon-manganese alloying concepts in combination with grain refinement may be used.

3.13**low carbon steel**

steel with low carbon content characterized by low yield strength and high ductility

3.14**steel for construction**

steel with minimum strength levels and no special demand for suitability for cold forming

3.15**transformation induced plasticity steel (T)¹⁾**

steel with a ferritic matrix containing retained austenite capable of transformation into martensite during the forming process (TRIP effect)

Note 1 to entry: Because of high work-hardening rate the steel reaches high uniform elongation values and high tensile strength levels.

3.16**coating mass**

total mass of coating given for both surfaces (see 7.9)

Note 1 to entry: In combination with the symbol for the coating type (Z, ZF, ZA, ZM, AZ, AS), the nominal coating mass is used as coating designation

Note 2 to entry: The coating mass is expressed in grams per square metre.

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4 Classification and designation**4.1 Classification****4.1.1 General**

The steels covered by this document are alloy quality steels (steels in accordance with Tables 1, 3, 4 and 5) or non-alloy quality steels (steels in accordance with Table 2) in accordance with EN 10020:2000.

4.1.2 Low carbon steels for cold forming

The steel grades are classified in accordance with their increasing suitability for cold forming as follows (see Table 7):

- DX51D: bending and profiling quality;
- DX52D: drawing quality;
- DX53D: deep drawing quality;
- DX54D: special deep drawing quality;
- DX55D: special deep drawing quality (only +AS);

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- DX56D: extra deep drawing quality;
- DX57D: super deep drawing quality.

4.1.3 Steels for construction

The steel grades are classified in accordance with their increasing minimum proof strength $R_{p0,2}$ (see Table 8).

4.1.4 Steels with high proof strength for cold forming

The steel grades are classified in accordance with their increasing minimum proof strength $R_{p0,2}$ (see Table 9).

4.1.5 Multiphase steels for cold forming

The steel grades are classified in accordance with their increasing minimum tensile strength R_m (see Tables 10 and 11).

4.2 Designation**4.2.1 Steel names**

The steel names in accordance with this document are allocated in accordance with EN 10027-1.

4.2.2 Steel numbers

The steel numbers in accordance with this document are allocated in accordance with EN 10027-2.

5 Information to be supplied by the purchaser**5.1 Mandatory information**

[SIST EN 10346:2015](https://standards.iteh.ai/catalog/standards/sist/caa674c1-6f08-4beb-bae5-5e43a3877da0/sist-en-10346-2015)

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

- a) quantity to be delivered;
- b) type of product (strip, sheet, cut length);
- c) number of the dimensional standard (EN 10143);
- d) nominal dimensions and the tolerances on dimensions and shape and, if applicable, letters denoting relevant special tolerances;
- e) term "steel";
- f) number of this document, i.e. EN 10346;
- g) steel name or steel number and symbol for the type of hot-dip coating as given in Tables 1 to 5;
- h) number designating the nominal mass of coating (e.g. 275 = 275 g/m² including both surfaces, see Table 12);
- i) letter denoting the coating finish (N or M, see 7.4.2 and Table 13);
- j) letter denoting the surface quality (A, B or C, see 7.5 and Tables 13 to 15);
- k) letter denoting the surface treatment (C, O, CO, P, PO or S, see 7.6).

EXAMPLE 1 sheet, delivered with dimensional tolerances in accordance with EN 10143 with nominal thickness of 0,80 mm, ordered with special thickness tolerances (S), nominal width 1 200 mm, ordered with special width tolerances (S), nominal length 2 500 mm, ordered with special flatness tolerances (FS), made of steel DX53D+Z (1.0951+Z) in accordance with EN 10346, coating mass 100 g/m² (100), minimized spangle (M), surface quality (B), surface treatment oiled (O):

1 sheet EN 10143 — 0,80Sx1200Sx2500FS — steel EN 10346 — DX53D+Z100–M–B–O

or:

1 sheet EN 10143 — 0,80Sx1200Sx2500FS — steel EN 10346 — 1.0951+Z100 –M–B–O.

5.2 Options

A number of options are specified in this document and listed below. If the purchaser does not indicate a wish to implement any of these options, the products shall be supplied in accordance with the basis specification of this document (see 5.1).

- 1) Specification of product thicknesses deviating from those generally covered in the scope (i.e. $t < 0,20$ mm or $3 \text{ mm} \leq t \leq 6,5$ mm) (see Clause 1);
- 2) Specification of hot rolled products deviating from those generally covered in the scope (see NOTE 3 to Clause 1);
- 3) verification of the product analysis (see 7.1);
- 4) date of supply for products free from stretcher strains when cold forming (see 7.2.1.3);
- 5) products supplied suitable for the manufacture of a specific part (see 7.2.2.2 and 7.2.4.2);
- 6) coating masses different from those of Table 12 and/or special requirements for different coating masses on each surface (see 7.3.2);
- 7) special coatings and/or surface qualities (see Tables 13 and 15 footnote a);
- 8) hot-dip zinc coated products with pronounced spangle (see 7.4.2.1 or 7.4.6);
- 9) special requirements for a maximum Al-Fe-Si alloy layer mass occurring during hot-dip aluminium-silicon coating (see 7.4.7);
- 10) hot-dip coated products with surface quality A without skin passing (see 7.5.2.1);
- 11) requirement for special applications on bright appearance for aluminium-silicon coated products (type B surface, see NOTE to 7.5.2.2);
- 12) range and verification of surface roughness (see 7.5.3);
- 13) selection of the protective oil (see 7.6.1);
- 14) type of S coating (see 7.6.6);
- 15) products free from coil breaks (see 7.7.1);
- 16) maximum or minimum value for the coating mass on each product side (see 7.9);
- 17) type of inspection and, if applicable, inspection document to be delivered (see 8.1);