



SLOVENSKI STANDARD SIST EN 10346:2009

01-junij-2009

BUXca Yý U
SIST EN 10292:2007
SIST EN 10326:2004
SIST EN 10327:2004
SIST EN 10336:2007

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

Kontinuierlich schmelztauchveredelte Flacherzeugnisse aus Stahl - Technische Lieferbedingungen

Produits plats en acier revetues en continu par immersion a chaud - Conditions technique de livraison

<https://standards.itih.ai/catalog/standards/sist/729df740-640c-42f8-b264-3d32f5915713/sist-en-10346:2009>

Ta slovenski standard je istoveten z: EN 10346:2009

ICS:

77.140.50 Ú[[z aak \ | ^ } aä a^ \ | ää] [| ä ä ^ \ | ä Flat steel products and semi-products

SIST EN 10346:2009 en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 10346:2009

<https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009>

EUROPEAN STANDARD

EN 10346

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2009

ICS 77.140.50

Supersedes EN 10292:2007, EN 10326:2004, EN
10327:2004, EN 10336:2007

English Version

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

Produits plats en acier à bas carbone revêtus en continu
par immersion à chaud - Conditions technique de livraison

Kontinuierlich schmelztauchveredelte Flacherzeugnisse
aus Stahl - Technische Lieferbedingungen

This European Standard was approved by CEN on 31 January 2009.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

[SIST EN 10346:2009](https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009)

<https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009>



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
Foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Classification and designation.....	8
4.1 Classification	8
4.1.1 General	8
4.1.2 Low carbon steels for cold forming.....	8
4.1.3 Steels for construction	8
4.1.4 Steels with high proof strength for cold forming.....	8
4.1.5 Multiphase steels for cold forming.....	8
4.2 Designation	8
4.2.1 Steel names.....	8
4.2.2 Steel numbers	8
5 Information to be supplied by the purchaser	9
5.1 Mandatory information.....	9
5.2 Options	9
6 Manufacturing and processing	10
6.1 Manufacturing	10
6.2 Processing	10
6.2.1 Ageing.....	10
6.2.2 Coating appearance	11
6.2.3 Surface protection	11
7 Requirements.....	11
7.1 Chemical composition	11
7.2 Mechanical properties.....	15
7.2.1 General	15
7.2.2 Low carbon steels for cold forming.....	16
7.2.3 Steels for construction	17
7.2.4 Steels with high proof strength for cold forming.....	18
7.2.5 Multiphase steels for cold forming.....	19
7.3 Type of coatings and coating mass.....	21
7.4 Coating finish.....	23
7.4.1 General	23
7.4.2 Zinc coated products (Z).....	23
7.4.3 Zinc-iron alloy coated products (ZF)	23
7.4.4 Zinc-aluminium coated products (ZA).....	23
7.4.5 Aluminium-zinc coated products (AZ)	23
7.4.6 Aluminium-silicon coated products (AS).....	23
7.5 Surface quality	23
7.5.1 General	23
7.5.2 Types of surface qualities	25
7.5.3 Roughness	25
7.6 Surface treatment (surface protection)	25
7.6.1 General	25
7.6.2 Chemical passivation (C).....	26
7.6.3 Oiling (O)	26
7.6.4 Chemical passivation and oiling (CO).....	26
7.6.5 Phosphating (P)	26
7.6.6 Sealing (S)	26
7.7 Coil breaks and bends (kinks).....	26
7.7.1 Freedom from coil breaks.....	26

7.7.2	Bends (kinks) by winding on coiler drums	27
7.8	Stretcher strains	27
7.9	Coating mass	27
7.10	Adhesion of coating	27
7.11	Surface condition	27
7.12	Tolerances on dimensions and shape	27
7.13	Suitability for further processing.....	27
8	Inspection.....	28
8.1	Types of inspection and inspection documents.....	28
8.2	Test units.....	28
8.3	Tests to be carried out.....	28
8.4	Sampling	28
8.5	Test methods	29
8.5.1	Tensile test.....	29
8.5.2	Plastic strain ratio and hardening exponent	29
8.5.3	Bake Hardening index.....	29
8.5.4	Surface inspection	30
8.5.5	Coating mass	30
8.6	Retests.....	30
9	Marking.....	30
10	Packing.....	31
11	Storage and transportation	31
Annex A	(normative) Reference method for determination of the zinc, zinc-iron, zinc-aluminium and aluminium-zinc coating mass.....	32
Annex B	(normative) Reference method for determination of the aluminium-silicon coating mass.....	34
Annex C	(normative) Method for determination of the mass of the Al-Fe-Si alloy layer.....	36
Bibliography	37

SIST EN 10346:2009
<https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009>

EN 10346:2009 (E)**Foreword**

This document (EN 10346:2009) has been prepared by Technical Committee ECISS/TC 27 “Surface coated flat products - Qualities, dimensions, tolerances and specific tests”, the secretariat of which is held by DIN.

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 September 2009, and conflicting national standards shall be withdrawn at the latest by September 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 10292:2007, EN 10326:2004, EN 10327:2004, and – together with EN 10152:2009 – EN 10336:2007.

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 10346:2009](https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009)

<https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009>

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, of steels with high proof strength for cold forming and coated with zinc (Z), zinc-iron alloy (ZF), zinc-aluminium alloy (ZA), aluminium-zinc alloy (AZ) or aluminium-silicon alloy (AS), and for continuously hot-dip coated products made of multiphase steels for cold forming coated with zinc (Z) zinc-iron alloy (ZF) or zinc-aluminium alloy (ZA) with thicknesses of 0,35 mm to 3 mm unless otherwise agreed.

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 (≥ 600 mm width) and cut lengths (< 600 mm width).

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

NOTE 2 By agreement at the time of enquiry and order, this European Standard is applicable to continuously hot-dip coated flat products in thicknesses $< 0,35$ mm or > 3 mm with agreed mechanical properties, adhesion of coating and surface condition requirements.

NOTE 3 The products covered by this European Standard are used where cold formability, high strength, a defined minimum yield strength and 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 10169-1 and EN 10169-2 or EN 10169-3 for building and general engineering applications.

NOTE 4 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).

[SIST EN 10346:2009](https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009)

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 10002-1:2001, *Metallic materials – Tensile testing – Part 1: Method of test at ambient temperature*

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

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

EN 10049, *Measurement of roughness average R_a and peak count RP_c 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)*

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*

EN 10346:2009 (E)

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 containing a zinc content of at least 99 % (see also 7.4.2)

3.2

hot-dip zinc-iron alloy coating (ZF)

application of a zinc coating by immersing the prepared strip in a molten bath containing a zinc content of at least 99 % and a subsequent annealing which produces an iron-zinc coating with an iron content of normally 8 % to 12 % (see also 7.4.3)

3.3

hot-dip zinc-aluminium alloy coating (ZA)

application of a zinc-aluminium coating by immersing the prepared strip in a molten bath which is composed of zinc and approximately 5 % aluminium and small amounts of mischmetal (see also 7.4.4)

3.4

hot-dip aluminium-zinc alloy coating (AZ)

application of an aluminium-zinc coating by immersing the prepared strip in a molten bath which is composed of 55 % aluminium, 1,6 % silicon and the balance zinc (see also 7.4.5)

3.5

hot-dip aluminium-silicon alloy coating (AS)

application of an aluminium-silicon coating by immersing the prepared strip in a molten bath which is composed of aluminium and 8 % to 11 % silicon (see also 7.4.6)

3.6

bake-hardening steel (B)¹⁾

steel that demonstrates an increase in proof strength following heating in the region of 170 °C for 20 min

NOTE 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.

3.7

complex-phase steel

CP steel

steel with a ferritic/bainitic matrix containing small amounts of martensite, retained austenite and/or perlite where an extreme grain refinement is caused by retarded recrystallisation or precipitation of micro-alloying elements

3.8

dual-phase steel

DP steel

steel with a ferritic matrix containing a martensitic second phase present in the form of islands and eventually bainite as a complementary phase

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

1) Symbol used in the steel name (see Table 3).

3.9**ferritic-bainitic steel****FB steel**

steel containing bainite or strengthened bainite in a matrix consisting of ferrite and/or strengthened ferrite

NOTE The strengthening of the matrix is caused by a high density of dislocations, by grain refinement and precipitation of micro-alloying elements.

3.10**interstitial free steel (Y)¹⁾****IF steel**

steel whose composition is controlled to achieve improved r - and n -values

NOTE 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.

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

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

NOTE Combined precipitation and grain refinement hardening modes allow reaching a high mechanical resistance while reducing the content of alloying elements.

3.12**martensitic steel****MS steel**

steel with a martensitic matrix containing small amounts of ferrite and/or bainite produced by thermomechanical rolling

NOTE Within the group of multiphase steels the MS steels show the highest tensile strength level.

[SIST EN 10346:2009](#)

3.13**transformation induced plasticity steel****TRIP steel**

steel with a mainly ferritic matrix containing retained austenite where, during the forming process, retained austenite can transform to martensite (TRIP effect)

NOTE Due to its high work-hardening rate the steel reaches high uniform elongation values and high tensile strength levels.

3.14**coating mass**

total mass of coating (expressed in grams per square metre) given for both surfaces (see 7.9)

NOTE In combination with the symbol for the coating type (Z, ZF, ZA, AZ, AS), the nominal coating mass is used as coating designation.

1) Symbol used in the steel name (see Table 3).

EN 10346:2009 (E)**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 and 4) or non-alloy quality steels (steels in accordance with Table 2) in accordance with EN 10020.

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 6):

- DX51D: bending and profiling quality;
- DX52D: drawing quality;
- DX53D: deep drawing quality;
- DX54D: special deep drawing quality;
- DX55D: special deep drawing quality (only +AS);
- DX56D: extra deep drawing quality;
- DX57D: super deep drawing quality.

ITEH STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 10346:2009](https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009)

4.1.3 Steels for construction

<https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-1de3d5804713/sist-en-10346-2009>

The steel grades are classified in accordance with their increasing minimum proof strength $R_{p0,2}$ (see Table 7).

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 8).

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 9 and 10).

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

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 4;
- h) number designating the nominal mass of coating (e.g. 275 = 275 g/m² including both surfaces, see Table 11);
- i) letter denoting the coating finish (N or M, see 7.4 and Tables 12 to 14);
- j) letter denoting the surface quality (A, B or C, see 7.5 and Tables 12 to 14);
- 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+ZF (1.0355+ZF) in accordance with EN 10346, coating mass 100 g/m² (100), surface quality B, surface treatment oiled (O):

1 sheet EN 10143–0,80Sx1200Sx2500FS–steel EN 10346–DX53D+ZF100–B–O

or:

1 sheet EN 10143–0,80Sx1200Sx2500FS–steel EN 10346–1.0355+ZF100–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. thicknesses < 0,35 mm or > 3 mm) (see NOTE 2 to Clause 1);
- 2) Specification of hot rolled products deviating from those generally covered in the scope (see NOTE 4 to Clause 1);
- 3) verification of the product analysis (see 7.1.2);
- 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);

EN 10346:2009 (E)

- 6) specification of the values in Tables 9 and 10 for longitudinal instead of transverse test pieces (see 7.2.5.3);
- 7) coating masses different from those of Table 11 and/or special requirements for different coating masses on each surface (see 7.3.2);
- 8) special coatings and/or surface qualities (see Tables 12 and 14, footnote a));
- 9) hot-dip zinc coated products with pronounced spangle (see 7.4.2.1 or 7.4.5);
- 10) special requirements for a maximum Al-Fe-Si alloy layer mass occurring during hot-dip aluminium-silicon coating (see 7.4.6);
- 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);
- 18) determination of the tensile properties and/or the Bake-Hardening Index BH_2 and/or the coating mass by calculation (see 8.3);
- 19) notification of which surface has been inspected (see 8.5.4.2);
- 20) marking desired by branding of the products (see 9.2);
- 21) requirement for packing (see Clause 10).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 10346:2009](https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-18c5d5804715/sist-en-10346-2009)

<https://standards.iteh.ai/catalog/standards/sist/729df740-640c-42f8-b264-18c5d5804715/sist-en-10346-2009>

6 Manufacturing and processing**6.1 Manufacturing**

The processes used in steelmaking and, unless there are restrictions by the selected steel grade (see footnote a to Table 4), the manufacture of the products shall be left to the discretion of the manufacturer.

6.2 Processing**6.2.1 Ageing**

Due to ageing, a reduction in formability can take place for all the products supplied according to this document. Coil breaks or fluting can occur additionally during processing. The risk of coil breaks increases, especially for thicknesses > 0,9 mm, with the duration of storage.

Therefore the user should process the products after their receipt as quick as possible (see 7.2.1.3).