



# SLOVENSKI STANDARD SIST EN 10336:2007

01-junij-2007

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Continuously hot-dip coated and electrolytically coated strip and sheet of multiphase steels for cold forming - Technical delivery condition

Kontinuierlich schmelztauchveredeltes und elektrolytisch veredeltes Band und Blech aus Mehrphasenstählen zum Kaltumformen - Technische Lieferbedingungen

Bandes et tôles en aciers multiphasés revetus en continu par immersion a chaud et revetus par voie électrolytique pour formage a froid - Conditions techniques de livraison

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**Ta slovenski standard je istoveten z: EN 10336:2007**

**ICS:**

77.140.50 Ú[[ z aãk \|^} ãã å^ \ ãã Flat steel products and semi-products  
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ICS 77.140.50

English Version

## Continuously hot-dip coated and electrolytically coated strip and sheet of multiphase steels for cold forming - Technical delivery conditions

Bandes et tôles en aciers multiphasés revêtus en continu par immersion à chaud et revêtus par voie électrolytique pour formage à froid - Conditions techniques de livraison

Kontinuierlich schmelztauchveredeltes und elektrolytisch veredeltes Band und Blech aus Mehrphasenstählen zum Kaltumformen - Technische Lieferbedingungen

This European Standard was approved by CEN on 15 March 2007.

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.

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

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## Foreword

This document (EN 10336:2007) 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 October 2007, and conflicting national standards shall be withdrawn at the latest by October 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 United Kingdom.

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## 1 Scope

**1.1** This European Standard specifies requirements for continuously hot-dip coated and electrolytically coated flat products made of multiphase steels for cold forming (see Table 1, Table 3 and Table 4) coated with zinc (Z and ZE), zinc-iron alloy (ZF) or zinc-nickel alloy (ZN) with thicknesses of 0,35 mm to 3,0 mm, unless otherwise agreed (see 1.2).

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

This European Standard applies to strip of a width  $\geq 600$  mm and sheets cut from it.

**1.2** If agreed at the time of enquiry and order, this European Standard may also be applied to continuously hot-dip coated flat products of thicknesses  $> 3,0$  mm. In this case the mechanical property, adhesion of the coating and surface condition requirements should also be agreed at the time of enquiry and order.

**1.3** The products covered by this European Standard are mainly used where cold formability, high strength and corrosion resistance are the most important factors. Corrosion resistance of the coating is proportional to the coating mass (see also 7.3.5)

**1.4** This European Standard is not applicable to:

- continuously hot dip coated steel flat products made of low carbon steels (see EN 10327);
- continuously hot-dip coated structural steel flat products (see EN 10326);
- electrolytically zinc coated cold rolled steel flat products (see EN 10152);
- continuously organic coated (coil coated) steel flat products (see EN 10169-1, EN 10169-2 and EN 10169-3);
- electrolytically zinc-nickel coated cold rolled steel flat products (see EN 10271); and
- continuously hot-dip coated strip and sheet of steels with high yield strength for cold forming (see EN 10292).

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

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

EN 10079:2007, *Definition of steel products*

EN 10131, *Cold rolled uncoated and zinc or zinc-nickel electrolytically coated low carbon and high yield strength steel flat products for cold forming - Tolerances on dimensions and shape*

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 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 products in a molten bath containing a zinc content of at least 99 % (see also 7.3.2.2)

#### 3.2

##### **hot-dip zinc-iron coating (ZF)**

application of a zinc coating by immersing the prepared products in a molten bath containing a zinc content of at least 99 %; subsequent annealing produces an iron-zinc coating with an iron content of normally 8 % to 12 % (see also 7.3.2.3)

#### 3.3

##### **electrolytic zinc coating (ZE)**

application of a zinc coating by electrolysis on a suitably prepared steel surface from an aqueous salt solution by the use of an electric current

#### 3.4

##### **electrolytic zinc-nickel coating (ZN)**

application of a zinc nickel coating by electrolysis on a suitably prepared steel surface from an aqueous salt solution by the use of an electric current

NOTE Flat products may have a zinc or zinc-nickel coating on one or both surfaces. If both surfaces are coated, a different coating thickness may be applied on each side (this process is referred to as differential zinc or zinc-nickel coating).

#### 3.5

##### **FB (ferritic-bainitic) steel**

steel containing, independent of the rolling process, 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

#### 3.6

##### **DP (dual-phase) 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

#### 3.7

##### **TRIP (transformation induced plasticity) steel**

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

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

#### 3.8

##### **CP (complex-phase) steel**

steel with a ferrite/bainite matrix containing small amounts of martensite, retained austenite and or pearlite

NOTE An extreme grain refinement is caused by retarded recrystallisation or precipitation of micro-alloying elements

### 3.9

#### MS (martensitic) 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

### 3.10

#### coating mass

total mass of coating (expressed in grams per square metre) given for both surfaces in the case of Z or ZF coating and separately for each surface in the case of ZE or ZN coating (see 7.3.5)

NOTE The nominal coating mass is used as coating designation in the case of hot dip coated products (Z, ZF). For electrolytically coated products (ZE, ZN), the coating thickness is used for coating designation.

## 4 Classification and designation

### 4.1 Classification

The steel grades covered by this standard are alloy quality steels in accordance with EN 10020. They are classified in accordance with their increasing minimum tensile strength ( $R_m$ ) (see Table 1, Table 3 and Table 4).

### 4.2 Designation

#### 4.2.1 Steel names

For the steel grades covered by this standard, the steel names are allocated in accordance with EN 10027-1.

#### 4.2.2 Steel numbers

For the steel grades covered by this standard, the steel numbers 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 or EN 10131 – see 7.4);
- 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 European Standard, i. e. EN 10336;
- g) steel name or steel number and symbol for the type of coating as given in Table 1;
- h) number designating the nominal mass of coating for Z, ZF (e.g. 275 = 275 g/m<sup>2</sup> including both surfaces) or the nominal coating thickness for ZE, ZN (e.g. ZN 50/20 = 5,0 µm thickness on one side, 2,0 µm thickness on the other side) (see Table 5 through Table 9 );
- i) letter denoting the coating finish of hot dip coated products (N, M or R, see 7.3.2 and Table 5 and Table 6);
- j) letter denoting the surface quality (A, B or C, see 7.3.3.2; or A or B, see 7.3.3.3);
- k) letter(s) denoting the surface treatment (C, O, CO, P or S for hot dip coated products and C, O, CO, P, S, PC, PCO or PO for electrolytically coated products, see 7.3.4.1).



## EXAMPLE 1:

1 sheet, delivered with dimensional tolerances in accordance with EN 10143 with a nominal thickness of 0,80 mm, ordered with special thickness tolerances (S), with a nominal width of 1 200 mm, ordered with special width tolerances (S), with a nominal length of 2 500 mm, ordered with special flatness tolerances (FS), made of steel HCT600X in accordance with EN 10336, hot dip zinc-iron coated, coating mass 100 g/m<sup>2</sup> (100), coating finish R, surface quality B, surface treatment oiled (O):

1 sheet EN 10143–0,80Sx1200Sx2500FS–steel EN 10336–HCT600X+ZF100–R–B–O

or

1 sheet EN 10143–0,80Sx1200Sx2500FS–steel EN 10336–1.0941+ZF100–R–B–O

## EXAMPLE 2:

Strip delivered with dimensional tolerances in accordance with EN 10131, with nominal thickness of 1,20 mm, nominal width of 1 500 mm, made of steel HCT780C in accordance with EN 10336, electrolytically zinc coated with a nominal thickness of 5 µm on both surfaces (50/50), surface quality A, surface treatment phosphated (P):

Strip EN 10131–1,20x1500–steel EN 10336–HCT780C+ZE50/50–A–P

or

Strip EN 10131–1,20x1500–steel EN 10336–1.0954+ZE50/50–A–P

## 5.2 Options

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

- (standards.iteh.ai)
- a) Specification of product thicknesses deviating from those given in the scope (see 1.2);
  - b) verification of the product analysis (see 7.1.2);
  - c) specification of the values in Table 3 and Table 4 for longitudinal instead of transverse test pieces (see 7.2.2);
  - d) coating masses different from those in Table 7 to Table 9 (see 7.3.1.2);
  - e) different coating masses on each surface (see 7.3.1.3);
  - f) products with pronounced spangle (see 7.3.2.2.a));
  - g) requirement on surface roughness (see 7.3.3.4);
  - h) inspection of both surfaces or notification of which surface has been inspected (see 7.3.3.5.a));
  - i) maximum or minimum value for the coating mass per product surface (see 7.3.5.1);
  - j) one side coating with specified rest coating mass on the uncoated surface (see 7.3.5.2.e));
  - k) specification of tolerances, other than those of EN 10131 for electrolytically coated products and those of EN 10143 for hot-dip coated products (see 7.4);
  - l) maximum value for the coating mass per surface (see 7.3.5.2.f));
  - m) testing for compliance with the requirements of this standard (see 8.1.1 and 8.1.2);
  - n) supply of an inspection document and type of document (see 8.7);
  - o) marking desired by branding of the products (see 9.2);
  - p) requirements for packing (see Clause 10).

## 6 Manufacturing process

The processes used in steelmaking and manufacture of the products are left to the discretion of the manufacturer.

## 7 Requirements

### 7.1 Chemical composition

7.1.1 The chemical composition according to the cast analysis shall be as specified in Table 1.

7.1.2 If a product analysis is agreed at the time of enquiry and order, the permitted deviations from the cast analysis given in Table 1 shall meet the requirements in Table 2.

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Table 1 — Chemical composition (cast analysis)

| Steel designation       |              | % by mass                                   |        |         |         |        |        |                     |            |            |        |        |
|-------------------------|--------------|---|--------|---------|---------|--------|--------|---------------------|------------|------------|--------|--------|
| Steel grade             |              | Symbols for the types of available coatings | C max. | Si max. | Mn max. | P max. | S max. | Al <sub>total</sub> | Cr+Mo max. | Nb+Ti max. | V max. | B max. |
| Steel name <sup>a</sup> | Steel number |   |        |         |         |        |        |                     |            |            |        |        |
| FB steels               |              |   |        |         |         |        |        |                     |            |            |        |        |
| HDT450F                 | 1.0961       | +Z, +ZF, +ZE, +ZN                           | 0,18   | 0,50    | 1,20    | 0,030  | 0,010  | ≥ 0,015             | 0,30       | 0,05       | 0,15   | 0,005  |
| HDT560F                 | 1.0959       |   | 0,18   | 0,50    | 1,80    | 0,025  | 0,010  | ≥ 0,015             | 0,30       | 0,15       | 0,15   | 0,005  |
| DP steels               |              |   |        |         |         |        |        |                     |            |            |        |        |
| HCT450X                 | 1.0937       | +Z, +ZF, +ZE, +ZN                           | 0,14   | 0,80    | 2,00    | 0,080  | 0,015  | ≤ 2,00              | 1,00       | 0,15       | 0,20   | 0,005  |
| HCT500X                 | 1.0939       |   |        |         | 0,17    |        |        |                     |            |            |        |        |
| HCT600X                 | 1.0941       |   | 0,18   |         |         |        |        |                     |            |            |        |        |
| HDT580X                 | 1.0936       |   |        |         | 0,23    |        |        |                     |            |            |        |        |
| HCT780X                 | 1.0943       |   |        |         |         |        |        |                     |            |            |        |        |
| HCT980X                 | 1.0944       |   |        |         |         |        |        |                     |            |            |        |        |
| TRIP steels             |              |   |        |         |         |        |        |                     |            |            |        |        |
| HCT690T                 | 1.0947       | +Z, +ZF, +ZE, +ZN                           | 0,32   | 2,20    | 2,50    | 0,12   | 0,015  | ≤ 2,00              | 0,60       | 0,20       | 0,20   | 0,005  |
| HCT780T                 | 1.0948       |   |        |         |         |        |        |                     |            |            |        |        |
| CP steels               |              |   |        |         |         |        |        |                     |            |            |        |        |
| HCT600C                 | 1.0953       | +Z, +ZF, +ZE, +ZN                           | 0,18   | 0,80    | 2,20    | 0,080  | 0,015  | ≤ 2,00              | 1,00       | 0,15       | 0,20   | 0,005  |
| HDT750C                 | 1.0956       |   |        |         |         |        |        |                     | 0,23       |            |        |        |
| HCT780C                 | 1.0954       |   | 1,20   |         |         |        |        |                     |            |            |        |        |
| HDT780C                 | 1.0957       |   |        |         |         |        |        |                     | 0,22       |            |        |        |
| HDT950C                 | 1.0958       |   |        |         |         |        |        |                     |            |            |        |        |
| HCT980C                 | 1.0955       |   |        |         |         |        |        |                     |            |            |        |        |