SLOVENSKI STANDARD
SIST EN 10326:2004

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SIST EN 10147:2001
SIST EN 10154:2003
SIST EN 10214:1997
SIST EN 10215:1998

Kontinuirno vroļ e prevleļ eni trakovi in ploļ evine konstrukcijskih jekel ï Tehniļ ni dobavni pogoji

Continuously hot-dip coated strip and sheet of structural steels - Technical delivery conditions

Kontinuierlich schmelztauchveredeltes Band und Blech aus Baustählen - Technische Lieferbedingungen

Bandes et tôles en aciers de construction doux revetues en continu par immersion a chaud - Conditions techniques de livraison

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77.140.50	Ploġļ ati jekleni izdelki in polizdelki	Flat steel products and semi-products

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English version

Continuously hot-dip coated strip and sheet of structural steels - Technical delivery conditions

Bandes et tôles en aciers de construction doux revêtues en continu par immersion à chaud - Conditions techniques de livraison

Kontinuierlich schmelztauchveredeltes Band und Blech aus Baustählen - Technische Lieferbedingungen

This European Standard was approved by CEN on 23 April 2004.

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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.

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Foreword

This document (EN 10326:2004) 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of an identical text or by endorsement, at the latest by January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document supersedes EN 10147:2000 and, together with EN 10327, it also supersedes EN 10154:2002, EN 10214:1995 and EN 10215:1995.

This document includes a Bibliography.

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

1 Scope

1.1 This document specifies requirements for continuously hot-dip coated products made of structural steels coated with zinc (Z), zinc-iron alloy (ZF), zinc-aluminium alloy (ZA), aluminium-zinc alloy (AZ) and aluminium-silicon alloy (AS) (see Table 1) with thicknesses from 0,35 mm up to 3,0 mm unless otherwise agreed (see 1.2). 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).

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

1.3 The products covered by this document are mainly used where minimum yield strength and corrosion resistance are the most important factors. Corrosion resistance of the alloy is proportional to the coating thickness, hence to its mass (see also 7.3.2).

NOTE +ZF coated products should not be used without additional organic coating.

1.4 This document is not applicable to:

- continuously hot-dip coated flat products of low-carbon steel strip and sheet for cold forming (see EN 10327);
- electrolytic galvanized cold rolled steel flat products (see EN 10152);
- continuously organic coated (coil coated) flat steel products (see EN 10169-1, ENV 10169-2 and EN 10169-3);
- continuously hot-dip coated strip and sheet of steels with higher 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, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature.*

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

EN 10021:1993, *General technical delivery requirements for steel and steel products.*

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

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

EN 10079:1992, *Definition of steel products.*

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

EN 10204:1991, *Metallic products - Types of inspection documents.*

CR 10260, *Designation systems for steel - Additional symbols.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10021:1993, EN 10079:1992 and EN 10204:1991 and the following apply.

NOTE 1 General guidelines for the protection of iron and steel can be found in EN ISO 14713.

NOTE 2 In the present cases, strip is continuously hot-dip coated in a bath the composition of which is given in 3.1 to 3.4.

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 7.4.2)

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 7.4.3)

3.3
hot-dip zinc-aluminium alloy coating (ZA)
application of a zinc-aluminium coating by immersing the prepared products in a molten bath which is composed of zinc and approximately 5 % Aluminium

3.4
hot-dip aluminium-zinc alloy coating (AZ)
application of an aluminium-zinc coating by immersing the prepared products in a molten bath which is composed of 55 % Aluminium, 1,6 % silicon and the balance zinc

3.5
hot-dip aluminium-silicon alloy coating (AS)
application of an aluminium-silicon coating by immersing the prepared products in a molten bath which is composed of aluminium and 8 % to 11 % silicon

3.6
coating mass
total mass of coating including both surfaces of the product (expressed in grams per square metre)

4 Classification and designation

4.1 Classification

In accordance with EN 10020 the steel grades covered by this standard are non-alloy quality steels. They are classified in accordance with their increasing minimum yield strength ($R_{p0,2}$) (see Table 1).

4.2 Designation

4.2.1 Steel names

For the steel grades covered by this document, the steel names as given in Table 1 are allocated in accordance with EN 10027-1 and CR 10260.

4.2.2 Steel numbers

For the steel grades covered by this document, the steel numbers as given in Table 1 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 (EN 10326);

g) steel name or steel number and symbol for the type of hot-dip coating as given in Table 1;

h) number designating the nominal mass of coating (e.g. 275 = 275 g/m² including both surfaces, see Tables 3 to 6);

i) letter denoting the coating finish (N, M or R, see 7.4 and Tables 4 and 5);

j) letter denoting the surface quality (A, B or C, see 7.5 and Tables 4 to 6);

k) letter denoting the surface treatment (C, O, CO and 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 S320GD+Z (1.0250+Z) in accordance with EN 10326, coating mass 275 g/m² (275), coating finish M, surface quality B, chemically passivated (C):

1 sheet EN 10143-0,80Sx1200Sx2500FS

steel EN 10326-S320GD+Z275-M-B-C

or:

1 sheet EN 10143-0,80Sx1200Sx2500FS

steel EN 10326-1.0250+Z275-M-B-C

5.2 Options

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

a) delivery of products in thicknesses > 3 mm (see 1.2);

b) verification of the product analysis (see 7.1.2);

c) products supplied suitable for the manufacture of a specific part (see 7.2.2);

d) coating masses different from those of Tables 3 to 5 and/or special requirements for different coating masses on each surface (see 7.3.2);

e) products with pronounced spangle (see 7.4.2.1 or 7.4.5);

f) special requirements for a maximum Al-Fe-Si alloy layer mass occurring during hot-dip aluminium-silicon coating (see 7.4.6);

g) requirement for special applications on bright appearance for hot-dip aluminium-silicon coated products (type B surface, see NOTE to 7.5.3);

h) type of S coating (see 7.6.5);

i) products supplied free from coil breaks (see 7.7);

j) special requirements for a maximum or minimum value for the coating mass per product surface (see 7.8.2);

k) notification of which surface has been inspected (see 7.10.1);

l) testing for compliance with the requirements of this document (see 8.1.1 and 8.1.2);

m) supply of an inspection document and type of document (see 8.1.2);

n) marking desired by branding of the products (see 9.2);

o) requirement 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 deviations from the cast analysis given in Table 1 shall meet the requirements in Table 2.

Table 1 — Steel grades and mechanical properties (longitudinal test pieces)

Designation			Chemical composition % by mass max.					Mechanical properties		
Steel grade		Symbols for the types of hot-dip coating	C	Si	Mn	P	S	0,2 %-proof strength $R_{p0,2}$ [a] MPa * min.	Tensile strength R_m [b] MPa * min.	Elongation A_{80} [c] % min.
Steel name	Steel number									
S220GD	1.0241	+Z,+ZF,+ZA,+AZ	0,20	0,60	1,70	0,10	0,045	220	300	20
S250GD	1.0242	+Z,+ZF,+ZA,+AZ,+AS						250	330	19
S280GD	1.0244	+Z,+ZF,+ZA,+AZ,+AS						280	360	18
S320GD	1.0250	+Z,+ZF,+ZA,+AZ,+AS						320	390	17
S350GD	1.0529	+Z,+ZF,+ZA,+AZ,+AS						350	420	16
S550GD	1.0531	+Z,+ZF,+ZA,+AZ						550	560	-

* 1MPa = 1 N/mm^2.

[a] If the yield point is pronounced, the values apply to the upper yield point (R_{eH}).

[b] For all grades except S550GD, a range of 140 MPa can be expected for tensile strength.

[c] For product thicknesses ≤ 0,70 mm (including coating) the minimum elongation values (A_{80}) shall be reduced by 2 units.

Table 2 — Permissible deviations of the product analysis from specified limits on cast analysis given in Table 1

Element	Specified limit of the cast analysis in Table 1 % by mass	Permissible deviation of the product analysis % by mass
C	0,20	+ 0,02
Si	0,60	+ 0,03
Mn	1,70	+ 0,10
P	0,10	+ 0,01
S	0,045	+ 0,005

7.2 Mechanical properties

7.2.1 The products shall be supplied on the basis of the mechanical property requirements in Table 1.

7.2.2 If so agreed at the time of enquiry and order, products specified in Table 1 may be supplied with suitability for manufacturing a specific part. In this case the values given in Table 1 do not apply. The reject tolerances arising when the material is processed shall not exceed a specific proportion to be agreed at the time of enquiry and order.

7.2.3 A reduction in the formability of all the coated products specified in this standard may occur by ageing. Therefore it is in the interest of the user to use the products as soon as possible after receiving them.

7.2.4 The tensile test values apply to longitudinal test pieces and are related to the test piece cross section without coating.

7.3 Coatings

7.3.1 The products shall be supplied with coatings of zinc (Z), zinc-iron-alloy (ZF), zinc-aluminium-alloy (ZA), aluminium-zinc-alloy (AZ) and aluminium-silicon-alloy (AS) as given in Tables 3 to 6.

7.3.2 The coating masses for all available grades are given in Table 3. Deviating coating masses and/or different coating masses on each surface may be supplied if agreed at the time of enquiry and order.

Thicker coatings may limit the formability and weldability of the products. Therefore, the forming and weldability requirements should be taken into account when ordering the coating mass.

The two surfaces may have a different appearance as a result of the manufacturing process.

Table 3 — Available coating materials

Coating designation	Minimum coating mass [a], g/m², total both surfaces		Theoretical guidance values for coating thickness per surface in the single spot test µm		Density g/cm³
	Triple spot test	Single spot test	Typical value [b]	Range [c]	
Zinc coating masses (Z)					
Z100	100	85	7	5 to 12	7,1
Z140	140	120	10	7 to 15	
Z200	200	170	14	10 to 20	
Z225	225	195	16	11 to 22	
Z275	275	235	20	15 to 27	
Z350	350	300	25	19 to 33	
Z450	450	385	32	24 to 42	
Z600	600	510	42	32 to 55	
Zinc-iron coating masses (ZF)					
ZF100	100	85	7	5 to 12	7,1
ZF140	140	120	10	7 to 15	
Zinc-aluminium alloy coating masses (ZA)					
ZA095	95	80	7	5 to 12	6,9
ZA130	130	110	10	7 to 15	
ZA185	185	155	14	10 to 20	
ZA200	200	170	15	11 to 21	
ZA255	255	215	20	15 to 27	
ZA300	300	255	23	17 to 31	
Aluminium-zinc alloy coating masses (AZ)					
AZ100	100	85	13	9 to 19	3,8
AZ150	150	130	20	15 to 27	
AZ185	185	160	25	19 to 33	
Aluminium-silicon alloy coating masses (AS)					
AS060	60	45	8	6 to 13	3,0
AS080	80	60	14	10 to 20	
AS100	100	75	17	12 to 23	
AS120	120	90	20	15 to 27	
AS150	150	115	25	19 to 33	

[a] See 7.8.
[b] Coating thicknesses can be calculated from the coating masses (see 7.8.1).
[c] The user can expect, that these limiting values are obtained on the upper surface and on the reverse surface.