UDC 669.14-158-41 : 621.713

March 1993

Continuously hot-dip metal coated steel sheet and strip

Tolerances on dimensions and shape

English version of DIN EN 10143

DIN EN 10143

Kontinuierlich schmelztauchveredeltes Blech und Band aus Stahl; Grenzabmaße und Formtoleranzen

Supersedes DIN 59232, July 1978 edition.

European Standard EN 10143 : 1993 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This Standard has been prepared by ECISS/TC 27.

The responsible German body involved in its preparation was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee *Maßnormen für Flacherzeugnisse.*

As compared with the July 1978 edition of DIN 59232, the present standard covers a greater number of products (cf. Amendments).

The DIN Standards corresponding to the European Standards referred to in clause 2 of the EN are as follows:

European Standard	DIN Standard
EN 10020	DIN EN 10020
EN 10051	DIN EN 10051
EN 10079	DIN EN 10079
EN 10131	DIN EN 10131
EN 10142	DIN EN 10142
EN 10147	DIN EN 10147
EN 10152	DIN EN 10152
EN 10214	DIN EN 10214*)
EN 10215	DIN EN 10215*)

*) At present at the stage of draft.

Continued overleaf.

EN comprises 6 pages.

Standards referred to

(and not included in **Normative references**)

DIN EN 10020	Definition and classification of steel grades
DIN EN 10051	Continuously hot rolled uncoated unalloyed and alloy steel plate, sheet and strip; tolerances on dimensions and shape
DIN EN 10079	Definition of steel products
DIN EN 10131	Cold rolled uncoated flat products in low carbon steel for cold forming; tolerances on dimensions and shape
DIN EN 10142	Continuously hot-dip galvanized mild steel sheet and strip for cold forming; technical delivery conditions
DIN EN 10147	Continuously hot-dip galvanized structural steel sheet and strip; technical delivery conditions
DIN EN 10152	Electrolytically zinc coated cold rolled steel flat products; technical delivery conditions
DIN EN 10214*)	Continuously hot-dip zinc-aluminium (ZA) coated steel sheet and strip; technical delivery conditions
DIN EN 10215*)	Continuously hot-dip aluminium-zinc (AZ) coated steel sheet and strip; technical delivery conditions

Previous edition

DIN 59232: 07.78.

Amendments

In comparison with the July 1978 edition of DIN 59232, the following amendments have been made.

a) The scope of the standard has been extended to include flat steel products coated with metals other than zinc (e.g. aluminium, lead, etc.).

b) Special tolerances have been specified for thickness, width, length and flatness (cf. tables 2, 4, 5 and 7), and some of the tolerances specified for thickness and width have been changed.

International Patent Classification

C 23 C 002/00
C 23 C 002/06
C 23 C 002/12
G 01 B 021/00

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*) At present at the stage of draft.

Editor's note

*This standard reproduces the official text of the English version of EN 10143 as issued by CEN. In its preparation for publication as DIN EN 10143 (English version), certain points have been noted which we consider to be in need of correction. These have been marked *). The suggested amendments are given below and will be forwarded to the responsible CEN Secretariat for its consideration.*

In presentation, orthography, punctuation and hyphenation, the aim has been to implement the PNE Rules consistently. Obvious errors (e.g. redundancies and omissions) have been rectified without further reference.

Suggested amendments

1 *For the sake of clarity, the first sentence of subclause 4.1 should be amended to read: 'The designation of the products covered by this European Standard shall include the following items, in the following order'.*

2 *For the sake of clarity, footnote 1 to tables 1 and 2 should be amended to read: 'In the case of wide strip and slit wide strip with cold rolled welded zones, the thickness tolerances for such zones are 60 % higher than the values specified, over a reference length of 15 m.'*

3 *To clarify the sense, and since the word 'superimposement' does not exist, subclause 6.7 should be entitled 'Alternative order specification', and the text amended to read: 'Subject to agreement at the time of ordering, the requirements regarding tolerances on out-of-squareness and edge camber may be replaced by the requirement that each sheet supplied contain a rectangle corresponding in terms of length and width to the dimensions as ordered.'*

4 *For the sake of accuracy, the first paragraph of subclause 7.6 should be amended to read: 'The edge camber, q, is the maximum deviation of a longitudinal edge from a straight-edged measuring base applied to it ('reference length').'*

5 *For ease of comprehension, the last paragraph of subclause 7.6 should be amended to read: 'The reference length shall be 2 m, measured between any two points along a longitudinal edge. In the case of sheet and cut lengths less than 2 m long, the reference length shall be equal to the nominal length of the product.'*

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10143

January 1993

UDC 669.14-158-41:621.713

Descriptors: Iron and steel products, metal plate, steel strip, steels, metal coatings, continuous coating, hot-dip coating, designation, dimensions, dimensional tolerances, form tolerances.

English version

Continuously hot-dip metal coated steel sheet and strip

Tolerances on dimensions and shape

Tôles et bandes en acier revêtues d'un métal en continu par immersion à chaud; tolérances sur les dimensions et la forme

Kontinuierlich schmelztauchveredeltes Blech und Band aus Stahl; Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 1993-01-12.

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 bibliographic references concerning such national standards may be obtained on application to the Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 10143:1993 E

Contents

Foreword

This European Standard has been prepared by ECISS/TC 27 'Surface coated flat products', the Secretariat of which is held by DIN.

This European Standard supersedes the following EURONORMs, published by the European Coal and Steel Community (ECSC):

EU 143-79 Continuously hot-dip zinc-coated unalloyed mild steel sheet and coil for cold forming; tolerances on dimensions and shape

and

EU 148-79 Continuously hot-dip zinc-coated unalloyed steel sheet and coil with specific minimum yield strength for structural purposes; tolerances on dimensions and shape

At a meeting of ECISS/TC 27 held on 11 March 1992 in Düsseldorf, the text was agreed for publication as a European Standard. The following countries were represented at that meeting: Austria, Belgium, Finland, France, Germany, Luxembourg, Netherlands, Sweden and the United Kingdom.

This standard was approved by CEN on 1992-06-05.

National standards identical to this European Standard shall be published, and conflicting national standards withdrawn, by July 1993 at the latest.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

1.1 This European Standard specifies tolerances on the dimensions and shape of continuously hot-dip metal-coated flat products (strip of all widths and sheet or lengths cut from it) made from low-carbon steels for cold forming or from structural steels, with thicknesses ≤ 3,0 mm. The thickness is the final thickness of the delivered product including the metal coating.

1.2 This European Standard applies to all hot-dip flat products with metal coatings, for example, of

- zinc or zinc-iron alloy (see EN 10142 and EN 10147);
- aluminium-zinc alloy (see EN 10215[1]));
- zinc-aluminium alloy (see EN 10214[1]));
- aluminium-silicon alloy (see EURONORM 154);
- lead alloy (see EURONORM 153),

provided the relevant technical delivery conditions do not contain any different or additional specifications and no other agreements are reached at the time of ordering.

1.3 This European Standard does not apply to

- cold rolled or hot rolled uncoated steel flat products (see EN 10131 and EN 10051);
- electrolytic coated steel flat products (see EN 10152, for example).

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 10020	Definition and classification of steel grades
EN 10027-1	Designation systems for steels; steel names and principal symbols
EN 10051	Continuously hot rolled uncoated unalloyed and alloy steel plate, sheet and strip; tolerances on dimensions and shape
EN 10079	Definition of steel products
EN 10131	Cold rolled uncoated flat products in low carbon steel for cold forming; tolerances on dimensions and shape
EN 10142	Continuously hot-dip galvanized mild steel sheet and strip for cold forming; technical delivery conditions

[1]) In course of preparation.

EN 10147	Continuously hot-dip zinc-coated structural steel sheet and strip; technical delivery conditions
EN 10152	Electrolytically zinc coated cold rolled steel flat products; technical delivery conditions
EN 10214[1])	Continuously hot-dip zinc-aluminium (ZA) coated steel sheet and strip; technical delivery conditions
EN 10215[1])	Continuously hot-dip aluminium-zinc (AZ) coated steel sheet and strip; technical delivery conditions
EURONORM 153-80[2])	Hot-dip terne (lead alloy) coated cold reduced carbon steel flat rolled products of commercial and drawing qualities; technical delivery conditions
EURONORM 154-80[2])	Hot-dip aluminium-silicon coated carbon steel flat rolled products of commercial and drawing qualities; technical delivery conditions

3 Definitions

For the purposes of this standard, and in addition to the definitions given in EN 10020 and EN 10079, the following definitions apply.

3.1 hot-dip metal coating: Application of a metal coating by dipping suitably prepared products in a bath of molten metal, e.g. aluminium, lead, zinc or their alloys. For the purposes of this standard, wide steel strip is continuously hot-dip coated and where necessary, further processed by longitudinal division into narrower strip (slit strip) or by being cut to form sheet or cut lengths.

3.2 coating mass: Total mass of coating on both sides of product (expressed in grams per square metre).

4 Designation

4.1 The products covered by this European Standard shall be designated as follows in the order given:*)

a) name of product (strip, sheet or cut length);

b) number of this European Standard (EN 10143);

c) nominal thickness, in mm;

d) letter S for products ordered with special thickness tolerances;

e) nominal width, in mm;

f) letter S for products ordered with special width tolerances;

g) nominal length, in mm (for sheet and cut lengths only);

h) letter S for sheet and cut lengths ordered with special length tolerances;

i) letters FS for sheet and cut lengths ordered with special flatness tolerances.

4.2 The designation in accordance with 4.1 shall be supplemented by the complete designation of the steel grade ordered (e.g. as specified in EN 10142, EN 10147, EN 10214, etc.; see 1.2).

4.3 Examples of designation

a) Strip according to this European Standard with a nominal thickness of 1,20 mm and a nominal width of 1500 mm, made from steel designated FeE 250G Z275 NA-C in EN 10147:

Strip EN 10143 - 1,20 × 1500
Steel EN 10147 - FeE 250G Z275 NA-C

NOTE: In the example mentioned above, the designation of the steel grade complies with the November 1991 edition of EN 10147. In the revised edition of that standard (which will be based on EN 10027-1), the designation of that steel grade will read: S250GD + Z275-NA-C.

b) Sheet according to this European Standard with a nominal thickness of 0,80 mm, ordered with special thickness tolerances (S), a nominal width of 1200 mm, ordered with special width tolerances (S), and a nominal length of 2500 mm, ordered with special flatness tolerances (FS), made from steel designated DX53D + ZA 130-B-C in EN 10214:

Sheet EN 10143 -
0,80 S × 1200 S × 2500 - FS
Steel EN 10214 - DX53D + ZA 130-B-C

5 Condition on supply

5.1 Flat products according to this European Standard shall be supplied with:

a) normal or special tolerances on thickness (see tables 1 and 2);

b) normal or special tolerances on width (see tables 3 and 4);

c) normal or special tolerances on length for sheet and cut lengths (see table 5);

d) normal or special tolerances on flatness for sheet and cut lengths (see tables 6 and 7).

5.2 In the absence of information in the order for the condition on supply according to 5.1, the products shall be supplied with normal tolerances on thickness, width, length and flatness.

6 Tolerances on dimensions and shape

6.1 Thickness

6.1.1 The tolerances on thickness are given in

- table 1 for hot-dip metal-coated flat products made from low-carbon steels for cold forming (e.g. as specified in EN 10142) and from structural steels with a minimum yield strength < 280 N/mm², or grade FeE 550G (to be redesignated S 550GD) with a minimum yield strength of 550 N/mm² in the unannealed condition;

- table 2 for hot-dip metal-coated flat products made from structural steels with a minimum yield strength ≥ 280 N/mm².

6.1.2 Thickness tolerances that are closer than the special tolerances given in tables 1 and 2 may be agreed at the time of ordering.

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[2]) Prior to adoption as European Standards, either the EURONORMs referred to or the corresponding national standards may be applied.

Table 1: Tolerances on thickness for hot-dip metal-coated flat products made from low-carbon steels for cold forming (e.g. as specified in EN 10142) and from structural steels with a minimum yield strength of less than 280 N/mm² (including steel grade FeF 550G)

Dimensions in millimetres

Nominal thickness	Normal tolerances for nominal widths[1], [2]			Special tolerances (S) for nominal widths[1], [2]		
	≤ 1200	> 1200 ≤ 1500	> 1500	≤ 1200	> 1200 ≤ 1500	> 1500
≤ 0,40	± 0,05	± 0,06	-	± 0,03	± 0,04	-
> 0,40 ≤ 0,60	± 0,06	± 0,07	± 0,08	± 0,04	± 0,05	± 0,06
> 0,60 ≤ 0,80	± 0,07	± 0,08	± 0,09	± 0,05	± 0,06	± 0,06
> 0,80 ≤ 1,00	± 0,08	± 0,09	± 0,10	± 0,06	± 0,07	± 0,07
> 1,00 ≤ 1,20	± 0,09	± 0,10	± 0,11	± 0,07	± 0,08	± 0,08
> 1,20 ≤ 1,60	± 0,11	± 0,12	± 0,12	± 0,08	± 0,09	± 0,09
> 1,60 ≤ 2,00	± 0,13	± 0,14	± 0,14	± 0,09	± 0,10	± 0,10
> 2,00 ≤ 2,50	± 0,15	± 0,16	± 0,16	± 0,11	± 0,12	± 0,12
> 2,50 ≤ 3,00	± 0,17	± 0,18	± 0,18	± 0,12	± 0,13	± 0,13

[1]) In the case of wide strip and slit wide strip, the thickness tolerances in the region of cold-rolled welds shall be increased my max. 60% over a length of 15 m.*)

[2]) For zinc coatings Z 450 and Z 600, the thickness tolerances shall be increased by 0,02 mm.

Table 2: Tolerances on thickness for hot-dip metal-coated flat products made from structural steels with a minimum yield strength of 280 N/mm² or more (but excluding steel grade FeF 550G (see table 1))

Dimensions in millimetres

Nominal thickness	Normal tolerances for nominal widths[1], [2]			Special tolerances (S) for nominal widths[1], [2]		
	≤ 1200	> 1200 ≤ 1500	> 1500	≤ 1200	> 1200 ≤ 1500	> 1500
≤ 0,40	± 0,06	± 0,07	-	± 0,04	± 0,05	-
> 0,40 ≤ 0,60	± 0,07	± 0,08	± 0,09	± 0,05	± 0,06	± 0,07
> 0,60 ≤ 0,80	± 0,08	± 0,09	± 0,11	± 0,06	± 0,07	± 0,07
> 0,80 ≤ 1,00	± 0,09	± 0,11	± 0,12	± 0,07	± 0,08	± 0,08
> 1,00 ≤ 1,20	± 0,11	± 0,12	± 0,13	± 0,08	± 0,09	± 0,09
> 1,20 ≤ 1,60	± 0,13	± 0,14	± 0,14	± 0,09	± 0,11	± 0,11
> 1,60 ≤ 2,00	± 0,15	± 0,17	± 0,17	± 0,11	± 0,12	± 0,12
> 2,00 ≤ 2,50	± 0,18	± 0,19	± 0,19	± 0,13	± 0,14	± 0,14
> 2,50 ≤ 3,00	± 0,20	± 0,21	± 0,21	± 0,14	± 0,15	± 0,15

[1]) In the case of wide strip and slit wide strip, the thickness tolerances in the region of cold-rolled welds shall be increased my max. 60% over a length of 15 m.*)

[2]) For zinc coatings Z 450 and Z 600, the thickness tolerances shall be increased by 0,02 mm.

6.2 Width

The tolerances on width are given in

- table 3 for products with a nominal width ≥ 600 mm (wide strip and sheet);
- table 4 for products with a nominal width < 600 mm (slit wide strip and cut lengths).

Table 3: Tolerances on width for hot-dip metal-coated flat products with a nominal width of 600 mm or more (wide strip and sheet)

Dimensions in millimetres

Nominal width	Normal tolerances		Special tolerances (S)	
	Lower deviation	Upper deviation	Lower deviation	Upper deviation
≥ 600 ≤ 1200	0	+5	0	+2
> 1200 ≤ 1500	0	+6	0	+2
> 1500	0	+7	0	+3

Table 4: Tolerances on width for hot-dip metal-coated flat products with a nominal width below 600 mm (slit wide strip and cut lengths)

Dimensions in millimetres

Tolerance class	Nominal thickness	Nominal width							
		< 125		≥ 125 < 250		≥ 250 < 400		≥ 400 < 600	
		Lower deviation	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Upper deviation
Normal	< 0,6	0	+0,4	0	+0,5	0	+0,7	0	+1,0
	≥ 0,6 < 1,0	0	+0,5	0	+0,6	0	+0,9	0	+1,2
	≥ 1,0 < 2,0	0	+0,6	0	+0,8	0	+1,1	/	+1,4
	≥ 2,0 ≤ 3,0	0	+0,7	0	+1,0	0	+1,3	0	+1,6
Special (S)	< 0,6	0	+0,2	0	+0,2	0	+0,3	0	+0,5
	≥ 0,6 < 1,0	0	+0,2	0	+0,3	0	+0,4	0	+0,6
	≥ 1,0 < 2,0	0	+0,3	0	+0,4	0	+0,5	0	+0,7
	≥ 2,0 ≤ 3,0	0	+04	0	+0,5	0	+0,6	0	+0,8

6.3 Length

The tolerances on length (for sheet and cut lengths) are given in table 5.

Table 5: Tolerances on length (for sheet and cut lengths)

Dimensions in millimetres

Nominal length	Tolerance on length			
	Normal		Special (S)	
l	Lower deviation	Upper deviation	Lower deviation	Upper deviation
< 2000	0	6	0	3
≥ 2000	0	0,003 × l	0	0,0015 × l

Table 6: Tolerances on flatness for hot-dip metal-coated sheet made from low-carbon steels for cold forming (e.g. as specified in EN 10142) and from structural steels with a minimum yield strength below 280 N/mm²

Dimensions in millimetres

Tolerance class	Nominal width	Nominal thickness		
		< 0,7	≥ 0,7 < 1,2	≥ 1,2
Normal	≥ 600 < 1200	12	10	8
	≥ 1200 < 1500	15	12	10
	≥ 1500	19	17	15
Special (FS)	≥ 600 < 1200	5	4	3
	≥ 1200 < 1500	6	5	4
	≥ 1500	8	7	6

6.4 Flatness

6.4.1 The tolerances on flatness for sheet are given in

- table 6 for hot-dip metal-coated sheet made from low-carbon steels for cold forming (e.g. as specified in EN 10142) and from structural steels with a minimum yield strength below 280 N/mm²;
- table 7 for hot-dip metal coated sheet made from structural steels with a minimum yield strength from 280 N/mm² to below 360 N/mm².

6.4.2 The tolerances on flatness shall be agreed at the time of ordering for sheet made from steels with a higher minimum yield strength (e.g. FeE 550G) and for sheet provided with zinc coating Z 450 or Z 600.

Table 7: Tolerances on flatness for hot-dip metal-coated sheet made from structural steels with a minimum yield strength from 280 to below 360 N/mm²

Dimensions in millimetres

Tolerance class	Nominal width	Nominal thickness		
		< 0,7	≥ 0,7 < 1,2	≥ 1,2
Normal	≥ 600 < 1200	15	13	10
	≥ 1200 < 1500	18	15	13
	≥ 1500	22	20	19
Special (FS)	≥ 600 < 1200	8	6	5
	≥ 1200 < 1500	9	8	6
	≥ 1500	12	10	9

6.5 Out-of-squareness

Unless otherwise agreed (see 6.7), the out-of-squareness, u, shall not exceed 1 % of the actual width of the sheet.

6.6 Edge camber

Unless otherwise agreed (see 6.7), the edge camber, q, shall not exceed 6 mm over a length of 2 m. For lengths under 2 m, the edge camber shall not exceed 0,3 % of the actual length.

For slit wide strip in widths less than 600 mm, a special edge camber tolerance (CS) of 2 mm maximum on a 2 m length may be specified. This special tolerance is not applicable to slit wide strip made from steels with a minimum yield strength ≥ 280 N/mm².

6.7 Superimposement of dimensions +)

By agreement at the time of ordering, the tolerance on out-of-squareness and edge camber may be replaced by the requirement that a perfect rectangle formed by the ordered width and length dimensions can be superimposed onto the sheets delivered.

7 Testing

7.1 Thickness

The thickness may be measured at any point located more than 40 mm from the edges.

For products < 80 mm wide, the location of the measuring points shall be agreed at the time of ordering.

7.2 Width

The width shall be measured at right angles to the longitudinal axis of the product.

7.3 Length

The length shall be measured parallel to the longitudinal axis of the sheet or cut length.

7.4 Flatness

The tolerance on flatness is the maximum permitted distance between the sheet and a flat surface on which it is placed.

7.5 Out-of-squareness

The out-of-squareness, u, is the orthogonal projection of a transverse edge over a longitudinal edge (see figure 1).

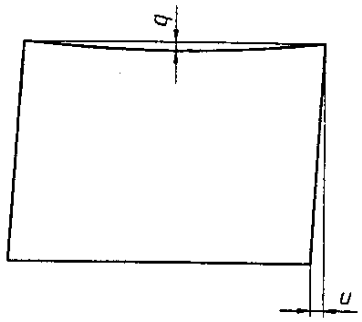

Figure 1: Measurement of out-of-squareness (u) and edge camber (q)

7.6 Edge camber

The edge camber, q, is the maximum distance between a longitudinal edge and a straight edge supported on the latter.+)

Edge camber shall be measured on the concave edge.

The basis of measurement shall be a distance of 2 m taken at any point on the edge. In the case of sheet and cut lengths with a length less than 2 m, the basis of measurement shall be equal to their length.+)