BRITISH STANDARD

BS EN
10143:2006

Continuously hot-dip coated steel sheet and strip — Tolerances on dimensions and shape

The European Standard EN 10143:2006 has the status of a British Standard

ICS 77.140.50

National foreword

This British Standard is the official English language version of EN 10143:2006. It supersedes BS EN 10143:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/10, Flat rolled steels products, which has the responsibility to:

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 14, an inside back cover and a back cover.

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EUROPEAN STANDARD

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EN 10143

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English Version

Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape

Tôles et bandes en acier revêtues en continu par immersion à chaud - Tolérances sur les dimensions et sur la forme

Kontinuierlich schmelztauchveredeltes Blech und Band aus Stahl - Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 24 May 2006.

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Contents

Foreword

This document (EN 10143:2006) 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of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

This document supersedes EN 10143:1993.

In comparison with EN 10143:1993 the following alterations were considered:

a) Leaded flat products in accordance with EURONORM 153 are no longer referred to.

b) Applicable product thickness exceeded to maximal 6,50 mm (with additional specification of 0,20mm minimum thickness)

c) Applicable width ranges exceeded from three to four.

d) Thickness tolerances specified for four (instead of two) yield strength ranges.

e) Reduced thickness tolerances for products with (R_e or $R_{p0,2}$) < 360 MPa.

f) Altered thickness tolerances for products with $R_{p0,2}$ ≥ 360 MPa.

g) Flatness tolerances decreased.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard applies to continuously zinc (Z), zinc-iron alloy (ZF), zinc-aluminium alloy (ZA), aluminium-zinc alloy (AZ) and aluminium-silicon alloy (AS) hot-dip coated flat products made of low carbon and high strength steels for cold forming and of structural steels with a minimum thickness of 0,20 mm and a maximum thickness of 6,50 mm, delivered as sheet, wide strip, slit wide strip or cut lengths obtained from slit wide strip or sheet. The concerned standards are EN 10292, EN 10326, EN 10327 and hot-dip coated products according to prEN 10336.

It does not apply for

— hot-rolled sheet and strip without coating (see EN 10051) and

— uncoated or electrolytically coated cold rolled sheet and strip (see EN 10131).

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 10079:1992, *Definition of steel products*

3 Terms and definitions

For the purposes of this document, the terms and definitions for hot-dip coated flat products in accordance with EN 10079:1992 and the following apply.

3.1
nominal (specified) thickness
whole order thickness of the metallically coated product

NOTE Nominal thickness includes both substrate and coating.

4 Designation

4.1 Products conforming to this European Standard shall be designated in the following order (see also Clause 5):

a) type of product (sheet, wide strip, slit wide strip or cut length);

b) the reference to this European Standard, i.e. EN 10143;

c) nominal thickness in mm;

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

e) nominal width in mm;

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

and cut lengths only);

d with special tolerances on length (sheets and cut lengths only);

i) the letter FS for sheets or cut lengths ordered with special tolerances on flatness;

j) the letters CS for slit strip ordered with special tolerances on camber.

4.2 The product designation in accordance with 4.1 shall be followed by the complete designation of the steel ordered (e.g. according to EN 10327).

Example 1 Strip, delivered with dimensional tolerances in accordance with EN 10143 with nominal thickness of 0,80 mm, ordered with normal thickness tolerances, nominal width 1 200 mm, ordered with normal width tolerances, ordered with normal flatness tolerances, made of steel DX53D+ZF (1.0355+ZF) in accordance with EN 10327, coating mass 100 g/m² (100), coating finish R, surface quality B, surface treatment oiled (O):

Strip EN 10143–0,80x1200–steel EN 10327 DX53D+ZF100–R–B–O

or:

Strip EN 10143–0,80x1200–steel EN 10327 1.0355+ZF100–R–B–O

Example 2 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 HX300LAD +ZF (1.0932+ZF) in accordance with EN 10292, coating mass 100 g/m² (100), coating finish R, surface quality B, surface treatment oiled (O):

1 sheet EN 10143–0,80Sx1200Sx2500FS–steel EN 10292 HX300LAD+ZF100–R–B–O

or:

1 sheet EN 10143-0,80Sx1200Sx2500FS–steel EN 10292 1.0932+ZF100–R–B–O

5 Condition of delivery

5.1 Flat products according to this European Standard may be delivered as follows:

a) with normal or special thickness tolerances (see Tables 1 to 4);

b) with normal or special width tolerances (see Tables 5 and 6);

c) with normal or special length tolerances for sheet or cut lengths (see Table 7);

d) with normal or special flatness tolerances for sheet or cut lengths (see Tables 8 and 9);

e) with normal or special tolerances on camber for slit strip of width less than 600 mm (see Clause 11).

5.2 In the absence of information on the order in respect of the condition of delivery given in 5.1, the flat products shall be delivered with normal tolerances on thickness, width, length, flatness and camber.

6 Tolerances on thickness

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

In the case of slit coils or cut lengths having a width ≤ 80 mm, the position of the measurement shall be at the middle axis.

ss shall be as given in Tables 1 to 4 and apply over the whole length. For coating ating designations Z450 and Z600, the normal and special tolerances specified in 0,01 mm apply.

Tolerances closer than special tolerances may be agreed at the time of enquiry and order.

In the case of products for which no yield strength is specified, the tolerances specified in Table 2 for the grades DX51D and S550GD and in Table 4 for all other grades apply, unless otherwise agreed at the time of enquiry and order.

Table 1 — Tolerances for steel grades with specified minimum yield strength R_e or specified minimum proof strength $R_{p0,2}$ < 260 MPa

Dimensions in millimetres

Nominal thickness t	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1 200 [b]	1 200 < w ≤ 1 500	> 1 500	≤ 1 200 [b]	1 200 < w ≤ 1 500	> 1 500
0,20 < t ≤ 0,40	± 0,04	± 0,05	± 0,06	± 0,030	± 0,035	± 0,040
0,40 < t ≤ 0,60	± 0,04	± 0,05	± 0,06	± 0,035	± 0,040	± 0,045
0,60 < t ≤ 0,80	± 0,05	± 0,06	± 0,07	± 0,040	± 0,045	± 0,050
0,80 < t ≤ 1,00	± 0,06	± 0,07	± 0,08	± 0,045	± 0,050	± 0,060
1,00 < t ≤ 1,20	± 0,07	± 0,08	± 0,09	± 0,050	± 0,060	± 0,070
1,20 < t ≤ 1,60	± 0,10	± 0,11	± 0,12	± 0,060	± 0,070	± 0,080
1,60 < t ≤ 2,00	± 0,12	± 0,13	± 0,14	± 0,070	± 0,080	± 0,090
2,00 < t ≤ 2,50	± 0,14	± 0,15	± 0,16	± 0,090	± 0,100	± 0,110
2,50 < t ≤ 3,00	± 0,17	± 0,17	± 0,18	± 0,110	± 0,120	± 0,130
3,00 < t ≤ 5,00	± 0,20	± 0,20	± 0,21	± 0,15	± 0,16	± 0,17
5,00 < t ≤ 6,50	± 0,22	± 0,22	± 0,23	± 0,17	± 0,18	± 0,19

[a] The thickness tolerances in the region of coil welds may be increased by a maximum of 50 % over a length of 10 m. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of enquiry and order, to normal and special (negative and positive) tolerances. For thicker coatings, see 6.2.

[b] Wide strip: width ≥ 600 mm; slit wide strip: rolling width ≥ 600 mm, slit to width less than 600 mm.

Table 2 — Tolerances for steel grades with specified minimum proof strength 260 MPa ≤ $R_{p0,2}$ < 360 MPa and for grades DX51D and S550GD

Dimensions in millimetres

Nominal thickness t	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1 200 [b]	1 200 < w ≤ 1 500	> 1 500	≤ 1 200 [b]	1 200 < w ≤ 1 500	> 1 500
0,20 < t ≤ 0,40	± 0,05	± 0,06	± 0,07	± 0,035	± 0,040	± 0,045
0,40 < t ≤ 0,60	± 0,05	± 0,06	± 0,07	± 0,040	± 0,045	± 0,050
0,60 < t ≤ 0,80	± 0,06	± 0,07	± 0,08	± 0,045	± 0,050	± 0,060
0,80 < t ≤ 1,00	± 0,07	± 0,08	± 0,09	± 0,050	± 0,060	± 0,070
1,00 < t ≤ 1,20	± 0,08	± 0,09	± 0,11	± 0,060	± 0,070	± 0,080
1,20 < t ≤ 1,60	± 0,11	± 0,13	± 0,14	± 0,070	± 0,080	± 0,090
1,60 < t ≤ 2,00	± 0,14	± 0,15	± 0,16	± 0,080	± 0,090	± 0,110
2,00 < t ≤ 2,50	± 0,16	± 0,17	± 0,18	± 0,110	± 0,120	± 0,130
2,50 < t ≤ 3,00	± 0,19	± 0,20	± 0,20	± 0,130	± 0,140	± 0,150
3,00 < t ≤ 5,00	± 0,22	± 0,24	± 0,25	± 0,17	± 0,18	± 0,19
5,00 < t ≤ 6,50	± 0,24	± 0,25	± 0,26	± 0,19	± 0,20	± 0,21

[a] The thickness tolerances in the region of coil welds may be increased by a maximum of 50 % over a length of 10 m. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of enquiry and order, to normal and special (negative and positive) tolerances. For thicker coatings, see 6.2.

[b] Wide strip: width ≥ 600 mm; slit wide strip: rolling width ≥ 600 mm, slit to width less than 600 mm.

Table 3 — Tolerances for steel grades with specified minimum proof strength 360 MPa ≤ $R_{p0,2}$ ≤ 420 MPa

Dimensions in millimetres

Nominal thickness t	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1 200 [b]	1 200 < w ≤ 1 500	> 1 500	≤ 1 200 [b]	1 200 < w ≤ 1 500	> 1 500
0,35 ≤ t ≤ 0,40	± 0,05	± 0,06	± 0,07	± 0,040	± 0,045	± 0,050
0,40 < t ≤ 0,60	± 0,06	± 0,07	± 0,08	± 0,045	± 0,050	± 0,060
0,60 < t ≤ 0,80	± 0,07	± 0,08	± 0,09	± 0,050	± 0,060	± 0,070
0,80 < t ≤ 1,00	± 0,08	± 0,09	± 0,11	± 0,060	± 0,070	± 0,080
1,00 < t ≤ 1,20	± 0,10	± 0,11	± 0,12	± 0,070	± 0,080	± 0,090
1,20 < t ≤ 1,60	± 0,13	± 0,14	± 0,16	± 0,080	± 0,090	± 0,110
1,60 < t ≤ 2,00	± 0,16	± 0,17	± 0,19	± 0,090	± 0,110	± 0,120
2,00 < t ≤ 2,50	± 0,18	± 0,20	± 0,21	± 0,120	± 0,130	± 0,140
2,50 < t ≤ 3,00	± 0,22	± 0,22	± 0,23	± 0,140	± 0,150	± 0,160
3,00 < t ≤ 5,00	± 0,22	± 0,24	± 0,25	± 0,17	± 0,18	± 0,19
5,00 < t ≤ 6,50	± 0,24	± 0,25	± 0,26	± 0,19	± 0,20	± 0,21

[a] The thickness tolerances in the region of coil welds may be increased by a maximum of 50 % over a length of 10 m. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of enquiry and order, to normal and special (negative and positive) tolerances. For thicker coatings, see 6.2.

[b] Wide strip: width ≥ 600 mm; slit wide strip: rolling width ≥ 600 mm, slit to width less than 600 mm.

Table 4 — Tolerances for steel grades with specified minimum proof strength 420 MPa < $R_{p0,2}$ ≤ 900 MPa

Dimensions in millimetres

Nominal thickness t	Normal tolerances [a] for a nominal width w			Special tolerances (S) [a] for a nominal width w		
	≤ 1200 [b]	1200 < w ≤ 1500	> 1500	≤ 1200 [b]	1200 < w ≤ 1500	> 1500
0,35 < t ≤ 0,40	± 0,06	± 0,07	± 0,08	± 0,045	± 0,050	± 0,060
0,40 < t ≤ 0,60	± 0,06	± 0,08	± 0,09	± 0,050	± 0,060	± 0,070
0,60 < t ≤ 0,80	± 0,07	± 0,09	± 0,11	± 0,060	± 0,070	± 0,080
0,80 < t ≤ 1,00	± 0,09	± 0,11	± 0,12	± 0,070	± 0,080	± 0,090
1,00 < t ≤ 1,20	± 0,11	± 0,13	± 0,14	± 0,080	± 0,090	± 0,110
1,20 < t ≤ 1,60	± 0,15	± 0,16	± 0,18	± 0,090	± 0,110	± 0,120
1,60 < t ≤ 2,00	± 0,18	± 0,19	± 0,21	± 0,110	± 0,120	± 0,140
2,00 < t ≤ 2,50	± 0,21	± 0,22	± 0,24	± 0,140	± 0,150	± 0,170
2,50 < t ≤ 3,00	± 0,24	± 0,25	± 0,26	± 0,170	± 0,180	± 0,190
3,00 < t ≤ 5,00	± 0,26	± 0,27	± 0,28	± 0,23	± 0,24	± 0,26
5,00 < t ≤ 6,50	± 0,28	± 0,29	± 0,30	± 0,25	± 0,26	± 0,28

[a] The thickness tolerances in the region of coil welds may be increased by a maximum of 50 % over a length of 10 m. This increase is applicable to all thicknesses and, unless otherwise agreed at the time of enquiry and order, to normal and special (negative and positive) tolerances. For thicker coatings, see 6.2.

[b] Wide strip: width ≥ 600 mm; slit wide strip: rolling width ≥ 600 mm, slit to width less than 600 mm.

7 Tolerances on width

7.1 General

Width is measured perpendicularly to the longitudinal axis of the product.

The tolerances on width of flat products in low carbon and high yield strength steels are given in 7.2 for sheet and wide strip and in 7.3 for slit wide strip of width < 600 mm.

7.2 Sheet and wide strip of width ≥ 600 mm

The tolerances on width of sheet and wide strip shall be as given in Table 5.

Table 5 — Tolerances on width of sheet and wide strip of width ≥ 600 mm

Dimensions in millimetres

Nominal width w	Normal tolerances	Special tolerances (S)
600 ≤ w ≤ 1 200	$^{+5}_{0}$	$^{+2}_{0}$
1 200 < w ≤ 1 500	$^{+6}_{0}$	$^{+2}_{0}$
1 500 < w ≤ 1 800	$^{+7}_{0}$	$^{+3}_{0}$
w > 1 800	$^{+8}_{0}$	$^{+3}_{0}$

7.3 Slit wide strip of width less than 600 mm

The tolerances on width of slit wide strip of width < 600 mm shall be as given in Table 6.

Table 6 — Tolerances on slit wide strip of width less than 600 mm

Dimensions in millimetres

Tolerance class	Nominal thickness t	Nominal width			
		w < 125	125 ≤ w < 250	250 ≤ w < 400	400 ≤ w < 600
Normal	t < 0,6	$^{+0,4}_{0}$	$^{+0,5}_{0}$	$^{+0,7}_{0}$	$^{+1,0}_{0}$
	0,6 ≤ t < 1,0	$^{+0,5}_{0}$	$^{+0,6}_{0}$	$^{+0,9}_{0}$	$^{+1,2}_{0}$
	1,0 ≤ t < 2,0	$^{+0,6}_{0}$	$^{+0,8}_{0}$	$^{+1,1}_{0}$	$^{+1,4}_{0}$
	2,0 ≤ t ≤ 3,0	$^{+0,7}_{0}$	$^{+1,0}_{0}$	$^{+1,3}_{0}$	$^{+1,6}_{0}$
	3,0 < t ≤ 5,0	$^{+0,8}_{0}$	$^{+1,1}_{0}$	$^{+1,4}_{0}$	$^{+1,7}_{0}$
	5,0 < t ≤ 6,5	$^{+0,9}_{0}$	$^{+1,2}_{0}$	$^{+1,5}_{0}$	$^{+1,8}_{0}$
Special (S)	t < 0,6	$^{+0,2}_{0}$	$^{+0,2}_{0}$	$^{+0,3}_{0}$	$^{+0,5}_{0}$
	0,6 ≤ t < 1,0	$^{+0,2}_{0}$	$^{+0,3}_{0}$	$^{+0,4}_{0}$	$^{+0,6}_{0}$
	1,0 ≤ t < 2,0	$^{+0,3}_{0}$	$^{+0,4}_{0}$	$^{+0,5}_{0}$	$^{+0,7}_{0}$
	2,0 ≤ t ≤ 3,0	$^{+0,4}_{0}$	$^{+0,5}_{0}$	$^{+0,6}_{0}$	$^{+0,8}_{0}$
	3,0 < t ≤ 5,0	$^{+0,5}_{0}$	$^{+0,6}_{0}$	$^{+0,7}_{0}$	$^{+0,9}_{0}$
		$^{+0,6}_{0}$	$^{+0,7}_{0}$	$^{+0,8}_{0}$	$^{+1,0}_{0}$

8 Tolerances on length

The length is measured along one of the long sides of the sheet or cut length.

The tolerances on length shall be as given in Table 7 and apply to all products covered by this European Standard.

Table 7 — Tolerances on length

Dimensions in millimetres

Nominal length	Normal tolerances	Special (S) tolerances
< 2 000	$^{+6}_{0}$	$^{+3}_{0}$
≥ 2 000 and ≤ 8 000	$^{+0,3\ \%\ \text{of the length}}_{0}$	$^{+0,15\ \%\ \text{of the length}}_{0}$
> 8 000	by agreement	

9 Tolerances on flatness

9.1 Steel grades with specified minimum R_e or $R_{p0,2}$ < 360 MPa

The tolerance on flatness is the maximum permitted distance between the sheet and the horizontal surface on which it is placed. Flatness tolerances shall be as given in Tables 8 and 9.

The measurement of waviness is only made on sheet edges.

The flatness tolerances apply only to sheet.

Flatness tolerances closer than special tolerances _ may be agreed at the time of enquiry and order.

Table 8 — Flatness tolerances for steel grades with specified minimum yield strength R_e or specified minimum proof strength $R_{p0,2}$ < 260 MPa

Dimensions in millimetres

Tolerance class	Nominal width w	Maximum wave height for nominal thickness t			
		t < 0,7	0,7 ≤ t < 1,6	1,6 ≤ t < 3,0	3,0 ≤ t ≤ 6,5
Normal	w < 1 200	10	8		15
	1 200 ≤ w < 1 500	12	10		18
	w ≥ 1 500	17	15		23
Special (FS)	w < 1 200	5	4	3	8
	1 200 ≤ w < 1 500	6	5	4	9
	w ≥ 1 500	8	7	6	12

Table 9 — Flatness tolerances for steel grades with specified minimum proof strength 260 MPa ≤ $R_{p0,2}$ < 360 MPa and for grades DX51D and S550GD

Dimensions in millimetres

Tolerance class	Nominal width w	Maximum wave height for nominal thickness t			
		t < 0,7	0,7 ≤ t < 1,6	1,6 ≤ t < 3,0	3,0 ≤ t ≤ 6,5
Normal	w < 1 200	13	10		18
	1 200 ≤ w < 1 500	15	13		25
	w ≥ 1 500	20	19		28
Special (FS)	w < 1 200	8	6	5	9
	1 200 ≤ w < 1 500	9	8	6	12
	w ≥ 1 500	12	10	9	14

9.2 Steel grades with specified minimum $R_{p0,2}$ ≥ 360 MPa

For these steel grades, the values for flatness tolerances shall be specified at the time of enquiry and order.

10 Tolerances on out-of-squareness

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

The out-of-squareness shall not exceed 1 % of the actual width of the sheet.

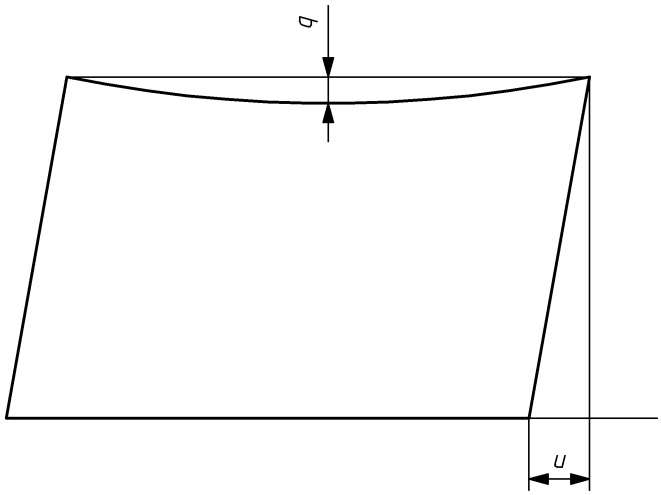

Figure 1 — Out-of-squareness u and edge camber q

11 Tolerances on edge camber

The edge camber q is the maximum distance between a longitudinal edge and a straight edge supported on the latter (see Figure 1).

n the concave edge. The basis of measurement shall be a distance of 2 m taken
se of sheets and cut lengths with a length less than 2 m, the basis measurement

The edge camber shall not exceed 5 mm over a length of 2 m. For lengths less than 2 m, the edge camber shall not exceed 0,25 % of the actual length.

For slit wide strip of width < 600 mm a special edge camber tolerance (CS) of 2 mm maximum on a length of 2 m may be specified. This special edge camber tolerance is not applicable for steels with specified minimum proof strength $R_{p0,2}$ ≥ 280 MPa.

12 Superimposition of dimensions

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

Bibliography

[1] EN 10051, *Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels — Tolerances on dimensions and shape*

[2] EN 10131, *Cold rolled uncoated low carbon and high yield strength steel flat products for cold forming — Tolerances on dimensions and shape*

[3] EN 10292, *Continuously hot-dip coated strip and sheet of steels with higher yield strength for cold forming — Technical delivery conditions*

[4] EN 10326, *Continuously hot-dip coated strip and sheet of structural steels — Technical delivery conditions*

[5] EN 10327, *Continuously hot-dip coated strip and sheet of low carbon steels for cold forming — Technical delivery conditions*

[6] prEN 10336, *Continuously hot-dip coated and electrolytically coated strip and sheet of multiphase steels for cold forming — Technical delivery conditions*

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