

Cold rolled narrow steel strip — Tolerances on dimensions and shape

The European Standard EN 10140:2006 has the status of a
British Standard

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National foreword

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Kaltband - Grenzabmaße und Formtoleranzen

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Foreword

This document (EN 10140:2006) has been prepared by Technical Committee ECISS/TC 13 “Flat products for cold working - Qualities, dimensions, tolerances and specific tests”, the secretariat of which is held by IBN.

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of an identical text or by endorsement, at the latest by January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

This document supersedes EN 10140:1996.

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

1.1 This European Standard applies to cold rolled narrow strip in coils and cut lengths, in thicknesses up to 10 mm and of widths less than 600 mm, made from unalloyed and alloyed steels, mainly those specified in EN 10132, EN 10139, EN 10268 and prEN 10338, with the exception of stainless and heat-resisting steels and the products given in 1.2.

The application of this European Standard to products with other dimensions shall be agreed separately.

1.2 This European Standard does not cover cold rolled flat products for which a separate standard already exists, particularly the following products:

- cold rolled non-oriented magnetic steel sheet and strip (EN 10106);
- grain-oriented magnetic steel sheet and strip (EN 10107);
- cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state (EN 10341);
- cold rolled uncoated low carbon and high yield strength steel flat products for cold forming (EN 10131);
- cold reduced blackplate (EN 10205).

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 European Standard, the terms and definitions of cold rolled flat products given in clause 1 and those given in EN 10079:1992 shall apply.

4 Form and conditions of delivery

4.1 Form of delivery

Cold rolled narrow strip according to this European Standard may be supplied:

- in coils, of which the dimensions and weight shall be agreed at the time of ordering;

or

- in cut lengths (when coils have been unwound and cut into lengths).

By agreement at the time of order, the preferred internal coil diameter is approximately 500 mm or 400 mm.

For narrow strip in thicknesses of less than 0,5 mm, smaller internal diameters (e.g. 300 mm or 250 mm) may be agreed separately.

NOTE In the case of narrow widths, strip conforming to this standard may also be wound in layers and supplied in the form of a bobbin wound coil.

4.2 Condition of delivery

Unless the edge condition and tolerances on dimensions and shape are specified in the order, products shall be supplied with slit edges (GK) and normal tolerances (A); cut lengths shall be supplied in as produced lengths.

5 Designation

Products conforming to this European Standard shall be designated in the following order:

- a) type of product (narrow strip or cut length);
- b) reference to this European Standard (EN 10140);
- c) nominal thickness in millimetres;
- d) letters B or C for products ordered with fine or precision tolerances on thickness;
- e) nominal width in millimetres;
- f) symbols for type of edge;
- g) letter B for products ordered with fine tolerances on width;
- h) nominal length in millimetres (only for cut lengths);
- i) letter B for products ordered with fine tolerances on length;
- j) letters FS for narrow strip or cut length with fine tolerances on edge camber.

The designation of products shall be followed by the precise designation of the steel grade ordered and the surface appearance.

EXAMPLE 1 The designation for cold rolled narrow strip conforming to this European Standard, 1,50 mm thick, having a normal tolerance on the nominal thickness, a width of 200 mm, slit edges (GK) and made from steel grade DC04 + LC MB RM conforming to EN 10139, is:

Narrow strip EN 10140 - 1,50 x 200 - GK
Steel EN 10139 - DC04 + LC - MB - RM

EXAMPLE 2 The designation for cut length conforming to this European Standard having a nominal thickness of 2 mm, a nominal width of 450 mm, slit edges (GK), a nominal length equal to 4000 mm with fine tolerances (B) on length and made from steel grade DC03 + A MA conforming to EN 10139, is:

Cut length EN 10140 - 2,0 x 450 GK x 4000 B
Steel EN 10139 - DC03 + A - MA

6 Tolerances on dimensions

6.1 Thickness

6.1.1 The tolerances on thickness are normal (A), fine (B) or precision (C) and are given in Table 1.

Table 1 — Tolerance on thickness

Dimensions in millimetres

Nominal thickness		Tolerances on thickness for nominal widths					
		< 125			≥ 125 and < 600 ^a		
>	≤	A	B	C	A	B	C
	0,10	± 0,008	± 0,006	± 0,004	± 0,010	± 0,008	± 0,005
0,10	0,15	± 0,010	± 0,008	± 0,005	± 0,015	± 0,012	± 0,010
0,15	0,25	± 0,015	± 0,012	± 0,008	± 0,020	± 0,015	± 0,010
0,25	0,40	± 0,020	± 0,015	± 0,010	± 0,025	± 0,020	± 0,012
0,40	0,60	± 0,025	± 0,020	± 0,012	± 0,030	± 0,025	± 0,015
0,60	1,00	± 0,030	± 0,025	± 0,015	± 0,035	± 0,030	± 0,020
1,00	1,50	± 0,035	± 0,030	± 0,020	± 0,040	± 0,035	± 0,025
1,50	2,50	± 0,045	± 0,035	± 0,025	± 0,050	± 0,040	± 0,030
2,50	4,00	± 0,050	± 0,040	± 0,030	± 0,060	± 0,050	± 0,035
4,00	6,00	± 0,060	± 0,050	± 0,035	± 0,070	± 0,055	± 0,040
6,00	8,00	± 0,075	± 0,060	± 0,040	± 0,085	± 0,065	± 0,045
8,00	10,00	± 0,090	± 0,070	± 0,045	± 0,100	± 0,075	± 0,050

^a Can be extended to 650 mm: see 6.2.4.

6.2 Width

6.2.1 The edge condition required (as-rolled, slit or special) shall be agreed at the time of ordering. Unless otherwise specified, products are supplied with slit edges (GK).

By special agreement and depending on the technical capabilities of the manufacturer, flat products may be supplied with special edges (SK), for example sharp-edged or round-edged.

6.2.2 The tolerances on width for narrow strip and cut lengths with as-rolled edges (NK) and slit edges (GK) are given in Tables 2 and 3.

By agreement at the time of ordering, slit edged products (GK) may be supplied without minus tolerances (i.e. all plus tolerances) or without plus tolerances (i.e. all minus tolerances) on the nominal width. In this case, the tolerance will be equal to the total range of permissible tolerances given in Tables 2 and 3.

6.2.3 The tolerances on width of products with special edges (SK) shall be agreed at the time of ordering.

6.2.4 The upper limit of 600 mm can be extended to 650 mm by agreement at the time of ordering.

Table 2 — Tolerance on width for narrow strip with as-rolled edges

Dimensions in millimetres

Nominal width		Tolerances on width
	< 40	0 / + 1,6
≥ 40	< 80	0 / + 2,0
≥ 80	< 125	0 / + 2,4
≥ 125	< 250	0 / + 3,0
≥ 250	< 400	0 / + 3,6
≥ 400	< 500	0 / + 4,2
≥ 500	< 600 ^a	0 / + 4,5

^a Can be extended to 650 mm: see 6.2.4.

Table 3 — Tolerances on width for narrow strip with slit edges

Dimensions in millimetres

Nominal thickness		Tolerances on width for nominal widths of					
		< 125		≥ 125 and < 250		≥ 250 and < 600 ^a	
>	≤	A	B	A	B	A	B
	0,60	± 0,15	± 0,10	± 0,20	± 0,13	± 0,25	± 0,18
0,60	1,50	± 0,20	± 0,13	± 0,25	± 0,18	± 0,30	± 0,20
1,50	2,50	± 0,25	± 0,18	± 0,30	± 0,20	± 0,35	± 0,25
2,50	4,00	± 0,30	± 0,20	± 0,35	± 0,25	± 0,40	± 0,30
4,00	6,00	± 0,35	± 0,25	± 0,40	± 0,30	± 0,45	± 0,35
6,00	8,00	± 0,45		± 0,50		± 0,55	
8,00	10,00	± 0,50		± 0,55		± 0,60	

^a Can be extended to 650 mm: see 6.2.4.

NOTE 1 For strip in the hardened and tempered condition, the tolerances on width are to be agreed at the time of ordering.

NOTE 2 For thicknesses greater than 6 mm, the measuring method is to be agreed at the time of ordering.

6.3 Length

Cut lengths shall be supplied in lengths with all plus tolerances as specified in Table 4.

Table 4 — Length tolerances

Dimensions in millimetres

Nominal length L	Plus tolerances relative to the nominal length for	
	Class A	Class B
L ≤ 1 000	+ 10	+ 6
1 000 < L ≤ 2 500	+ 0,01 L	+ 6
L > 2 500	+ 0,01 L	+ 0,003 L

7 Tolerances on shape

7.1 Edge camber

Class A and Class B tolerances on edge camber shall be those given in Table 5 for a gauge length of 1000 mm (see also 8.3).

Table 5 — Tolerance on edge camber

Nominal width W	Dimensions in millimetres	
	Class A (max. deviation)	Class B (FS) (max. deviation)
$10 \leq W < 25$	5,00	2,00
$25 \leq W < 40$	3,50	1,50
$40 \leq W < 125$	2,50	1,25
$125 \leq W < 600^a$	2,00	1,00

^a Can be extended to 650 mm: see 6.2.4.

NOTE 1 The tolerances in Table 5 are only applicable to narrow strip of width at least 10 times the thickness.

NOTE 2 For strip in the hardened and tempered condition, edge camber tolerances may be reduced if agreed at the time of ordering.

Where it is not practicable to measure over 1 000 mm, equivalent tolerances may be calculated from the following formula, the result being rounded to the next highest millimetre

$$\text{Edge camber tolerance} = \frac{(\text{non - standard length})^2}{(\text{standard length})^2} \times \text{edge camber tolerance shown in Table 5} \quad (1)$$

7.2 Flatness of cut lengths

The tolerance on flatness of cut lengths in the direction of rolling shall be 10 mm maximum over 1000 mm. Any other requirements for flatness shall be specially agreed at the time of ordering.

If strip is required to be especially flat across the width, the maximum deviation from flatness and the method of measurement shall be agreed at the time of ordering.

7.3 Out-of-squareness

The out-of-squareness of cut lengths in widths less than or equal to 100 mm shall not exceed 1 mm.

For cut lengths in widths exceeding 100 mm, the out-of-squareness shall not exceed 1 % of the actual width of the cut length.

8 Measurements

8.1 Thickness

The tolerances on thickness given in Table 1 apply only to measurements made at the minimum distances from the edge of the product, as defined in Table 6.

Table 6 — Minimum distances of the measuring points from the edge

Dimensions in millimetres

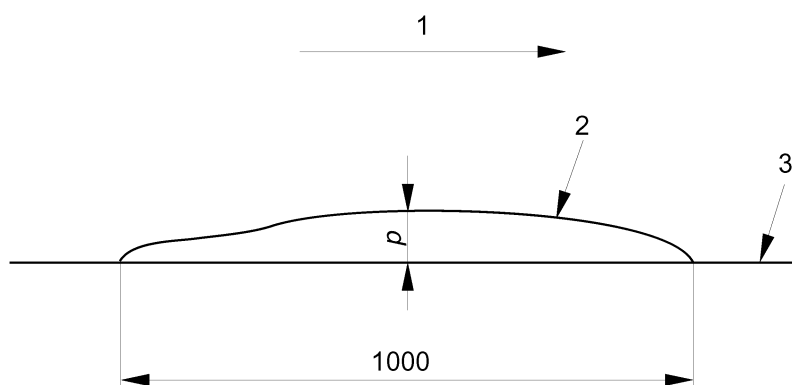
Types of edges	Nominal width W	Minimum distance of measuring from the edges
As – rolled edges	$W \leq 30$ $30 < W < 600^a$	$0,5 W$ 15
Slit edges ^b	$W \leq 20$ $20 < W < 600^a$	$0,5 W$ 10
Other edges	By agreement	

^a Can be extended to 650 mm: see 6.2.4.
^b Measurement throughout the whole width may be performed upon agreement between manufacturer and purchaser.

8.2 Flatness of cut lengths

The deviation from flatness, p (in the direction of rolling) is taken to be the greatest distance between the cut length resting freely on a flat horizontal base and a rule. The gauge length is fixed at 1000 mm (see Figure 1).

Dimensions in millimetres



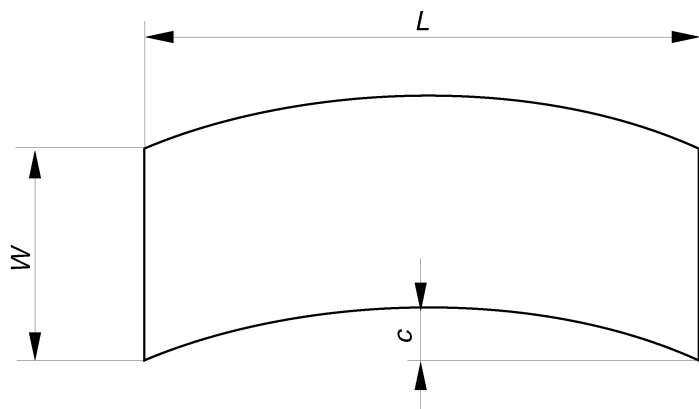
Key

- 1 Direction of rolling
- 2 Product
- 3 Base
- p Deviation from flatness

Figure 1 — Deviation from flatness

8.3 Edge camber

The edge camber c is taken to be the greatest distance between a longitudinal edge and a straight line connecting both ends of the gauge length. It is measured on the concave edge of the product. The gauge length is fixed at 1 000 mm. For narrow strip, the measurement shall be taken at least 3 000 mm from one of the ends of the strip (see Figure 2).



Key

- L Gauge length
- W Product width
- c Edge camber

Figure 2 — Edge camber

9 Packing

Coils shall be secured in such a way that they cannot be damaged or unwound under normal conditions of loading, transportation or careful storage.

Bibliography

- [1] EN 10132, *Cold rolled narrow steel strip for heat treatment – Technical delivery conditions*
- [2] EN 10139, *Cold rolled uncoated mild steel narrow strip for cold forming – Technical delivery conditions*
- [3] EN 10268, *Cold rolled steel flat products with higher yield strength for cold forming – Technical delivery conditions*
- [4] prEN10338, *Cold rolled flat products of multiphase steels for cold forming – Technical delivery conditions*
- [5] EN 10106, *Cold rolled non-oriented electrical steel sheet and strip delivered in the fully processed state*
- [6] EN 10107, *Grain-oriented electrical steel sheet and strip delivered in the fully processed state*
- [7] EN 10341, *Cold rolled electrical non-alloy and alloy steel sheet and strip delivered in the semi-processed state*
- [8] EN 10131 *Cold rolled uncoated low carbon and high yield strength steel flat products for cold forming – Tolerances on dimensions and shape*
- [9] EN 10205, *Cold reduced blackplate in coil form for the production of tinplate or electrolytic chromium/chromium oxide coated steel*

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