

# COLD



Relevant steelmaking regulation  
**EUROPEAN STANDARD: UNI EN 10130 : 2007**

## Areas of use

- Automotive
- Household and sanitary appliances (refrigerators, washing machines, dishwashers, electric motor and compressor components, kitchen countertops)
- Radiators and boilers
- Packaging (drums for oil, paint, chemicals)
- Furniture pipe (special profiles for cabinets, bed frames, shelving)
- Hardware (garden)
- Trade (service centers)

## Cold drawing and bending steels

These steels are ranked in ascending order of formability: from the least critical moldings (DC01) to the deepest draws (DC06 and DC07). They are produced in static annealing or continuous annealing.

- They can be supplied with different requirements for surface appearance, surface finish and surface protection.

## Technical supply conditions

*The standard applies to cold-rolled, uncoated flat products made of low-carbon steel, with width greater than or equal to 600 mm, thickness greater than 0.35 mm, and, unless otherwise specified at the time of the order, lower than or equal to 3 mm, intended for deep drawing or cold forming, supplied in the form of sheets, wide strips, sheared wide strips, and strips made from sheared wide strips or sheets.*

- **The surface appearance** can be either type A or B, unless otherwise requested at the time of order, the material is supplied with appearance A.

*The surface finish can be shiny, semi-shiny, normal, or rough. If not specified at the time of the order, products are supplied with normal surface finish.*

- **For surface protection**, the material is typically supplied oiled; oil-free products can be supplied on request, but in that case a much higher risk of rusting must be taken into account.

SURFACE FINISH	SYMBOL	ROUGHNESS FINISH
Shiny	b	$Ra \leq 0.4 \mu m$
Semi-shiny	g	$Ra \leq 0.9 \mu m$
Normal	m	$0.6 \mu m < Ra \leq 1.9 \mu m$
Rough	r	$Ra > 1.6 \mu m$

## SURFACE APPEARANCE

<b>A</b>	Defects such as pores, slight scratches, small marks, slight scoring, or slight staining that do not adversely affect formability or the application of surface coatings are allowed.
<b>B</b>	The surface with the best appearance must be free of defects that would impair the uniformity of a quality paint or electrolytic coating; the other surface must be at least Type A

CHEMICAL  
COMPOSITION



Quality	C (%)	P (%)	S (%)	M (%)	Ti (%)
EN 10130 : 2007	<b>max</b>	<b>max</b>	<b>max</b>	<b>max</b>	<b>max</b>
<b>DC01</b>	0.12	0.045	0.045	0.60	-
<b>DC03</b>	0.10	0.035	0.035	0.45	-
<b>DC04</b>	0.08	0.030	0.030	0.40	-
<b>DC05</b>	0.06	0.025	0.025	0.35	-
<b>DC06</b>	0.02	0.020	0.020	0.25	0,3j
<b>DC07</b>	0.01	0.020	0.020	0.20	0,2j



MECHANICAL CHARACTERISTICS

Quality	$R_{e a}$	$R_m$	$A_{80 b}$	$r_{c d}$	$n_c$
	<b>MPa</b>	<b>MPa</b>	<b>min (%)</b>	<b>min</b>	<b>min</b>
<b>DC01</b>	-/280g	270/410	28	-	-
<b>DC03</b>	-/240g	270/370	34	1.3	-
<b>DC04</b>	-/210g	270/350	38	1.6	0.180
<b>DC05</b>	-/180g	270/330	40	1.9	0.200
<b>DC06</b>	-/170h	270/330	41	2.1	0.220
<b>DC07</b>	-/150h	250/310	44	2.5	0.230

Notes: 1 MPa = 1 N/mm<sup>2</sup>

Tensile tests performed on transverse specimens  
Values of r and n apply only to products with thickness greater than or equal to 0.5 mm

■ e = laminate thickness in mm

■ Tensile tests performed on transverse specimens

## Tolerances by size and shape



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### ATTENTION:

Unless otherwise specified at the time of the order, thickness is less than or equal to 3 mm, supplied in the form of sheets, wide strips, sheared wide strips, or strips obtained from sheared wide strips or sheets.

The standard applies to cold-rolled flat products, uncoated and coated with zinc or zinc-nickel by electrolytic means, made of low-carbon, high-strength steel, by cold drawing and bending, with a minimum thickness of 0.35 mm.

Thickness tolerance for steels with minimum yield strength  $R_e < 260 \text{ MPa}$

# 1

Nominal thickness	Normal tolerance for nominal width w			Special tolerance for nominal width w		
	≤ 1200	> 1200 to ≤ 1500	> 1500	≤ 1200	> 1200 to ≤ 1500	> 1500
= 0.35 to 0.40	± 0.03	± 0.04	± 0.05	± 0.020	± 0.025	± 0.030
> 0.40 to 0.60	± 0.03	± 0.04	± 0.05	± 0.025	± 0.030	± 0.035
> 0.60 to 0.80	± 0.04	± 0.05	± 0.06	± 0.030	± 0.035	± 0.040
> 0.80 to 1.00	± 0.05	± 0.06	± 0.07	± 0.035	± 0.040	± 0.050
> 1.00 to 1.20	± 0.06	± 0.07	± 0.08	± 0.040	± 0.050	± 0.060
> 1.20 to 1.60	± 0.08	± 0.09	± 0.10	± 0.050	± 0.060	± 0.070
> 1.60 to 2.00	± 0.10	± 0.11	± 0.12	± 0.060	± 0.070	± 0.080
> 2.00 to 2.50	± 0.12	± 0.13	± 0.14	± 0.080	± 0.090	± 0.100
> 2.50 to 3.00	± 0.15	± 0.15	± 0.16	± 0.100	± 0.110	± 0.120

Thickness tolerance for steels with minimum yield strength  $R_e < 260 \text{ MPa} \leq R_e < 340 \text{ MPa}$

# 2

Nominal thickness	Normal tolerance for nominal width w			Special tolerance for nominal width w		
	≤ 1200	> 1200 to ≤ 1500	> 1500	≤ 1200	> 1200 to ≤ 1500	> 1500
= 0.35 to 0.40	± 0.04	± 0.05	± 0.06	± 0.025	± 0.030	± 0.035
> 0.40 to 0.60	± 0.04	± 0.05	± 0.06	± 0.030	± 0.035	± 0.040
> 0.60 to 0.80	± 0.05	± 0.06	± 0.07	± 0.035	± 0.040	± 0.050
> 0.80 to 1.00	± 0.06	± 0.07	± 0.08	± 0.040	± 0.050	± 0.060
> 1.00 to 1.20	± 0.07	± 0.08	± 0.10	± 0.050	± 0.060	± 0.070
> 1.20 to 1.60	± 0.09	± 0.11	± 0.12	± 0.060	± 0.070	± 0.080
> 1.60 to 2.00	± 0.12	± 0.13	± 0.14	± 0.070	± 0.080	± 0.100
> 2.00 to 2.50	± 0.14	± 0.15	± 0.16	± 0.100	± 0.110	± 0.120
> 2.50 to 3.00	± 0.17	± 0.18	± 0.18	± 0.120	± 0.130	± 0.140

Thickness tolerance for steels with minimum yield strength  $R_e < 340 \text{ MPa} \leq R_e < 420 \text{ MPa}$

# 3

Nominal thickness	Normal tolerance for nominal width w			Special tolerance for nominal width w		
	≤ 1200	> 1200 to ≤ 1500	> 1500	≤ 1200	> 1200 to ≤ 1500	> 1500
= 0.35 to 0.40	± 0.04	± 0.05	± 0.06	± 0.030	± 0.035	± 0.040
> 0.40 to 0.60	± 0.05	± 0.06	± 0.07	± 0.035	± 0.040	± 0.050
> 0.60 to 0.80	± 0.06	± 0.07	± 0.08	± 0.040	± 0.050	± 0.060
> 0.80 to 1.00	± 0.07	± 0.08	± 0.10	± 0.050	± 0.060	± 0.070
> 1.00 to 1.20	± 0.09	± 0.10	± 0.11	± 0.060	± 0.070	± 0.080
> 1.20 to 1.60	± 0.11	± 0.12	± 0.14	± 0.070	± 0.080	± 0.100
> 1.60 to 2.00	± 0.14	± 0.15	± 0.17	± 0.080	± 0.100	± 0.110
> 2.00 to 2.50	± 0.16	± 0.18	± 0.19	± 0.110	± 0.120	± 0.130
> 2.50 to 3.00	± 0.20	± 0.20	± 0.21	± 0.130	± 0.140	± 0.150

## Tolerances by size and shape



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### ATTENTION:

Unless otherwise specified at the time of the order, thickness is less than or equal to 3 mm, supplied in the form of sheets, wide strips, sheared wide strips, or strips obtained from sheared wide strips or sheets.

Thickness tolerance for steels with minimum yield strength  $420 \text{ MPa} < R_e$

# 4

Nominal thickness	Normal tolerance for nominal width w			Special tolerance for nominal width w		
	≤ 1200	> 1200 to ≤ 1500	> 1500	≤ 1200	> 1200 to ≤ 1500	> 1500
0.35 to 0.40	± 0.05	± 0.06	± 0.07	± 0.035	± 0.040	± 0.050
> 0.40 to 0.60	± 0.05	± 0.07	± 0.08	± 0.040	± 0.050	± 0.060
> 0.60 to 0.80	± 0.06	± 0.08	± 0.10	± 0.050	± 0.060	± 0.070
> 0.80 to 1.00	± 0.08	± 0.10	± 0.11	± 0.060	± 0.070	± 0.080
> 1.00 to 1.20	± 0.10	± 0.11	± 0.13	± 0.070	± 0.080	± 0.100
> 1.20 to 1.60	± 0.13	± 0.14	± 0.16	± 0.080	± 0.100	± 0.110
> 1.60 to 2.00	± 0.16	± 0.17	± 0.19	± 0.100	± 0.110	± 0.130
> 2.00 to 2.50	± 0.19	± 0.20	± 0.22	± 0.130	± 0.140	± 0.160
> 2.50 to 3.00	± 0.22	± 0.23	± 0.24	± 0.160	± 0.170	± 0.180

Tolerance on the width of sheets and wide strips

# 5

Nominal width w	Normal tolerance		Special tolerance	
	under	over	under	over
w ≤ 1200	0	+4	0	+2
1200 < w ≤ 1500	0	+5	0	+2
w > 1500	0	+6	0	+3

Tolerance on sheets and strips width **less than 600 mm.**

# 6

Tolerance Class	Nominal thickness t	Nominal width							
		w < 125		125 ≤ w < 250		250 ≤ w < 400		400 ≤ w < 600	
		under	over	under	over	under	over	under	over
Normal	t < 0.6	0	+0.4	0	+0.5	0	+0.7	0	+1.0
	0.6 ≤ t < 1.0	0	+0.5	0	+0.6	0	+0.9	0	+1.2
	1 ≤ t < 2	0	+0.6	0	+0.8	0	+1.1	0	+1.4
	2 ≤ t ≤ 3	0	+0.7	0	+1.0	0	+1.3	0	+1.6
Special	t < 0.6	0	+0.2	0	+0.2	0	+0.3	0	+0.5
	0.6 ≤ t < 1.0	0	+0.2	0	+0.3	0	+0.4	0	+0.6
	1 ≤ t < 2	0	+0.3	0	+0.4	0	+0.5	0	+0.7
	2 ≤ t ≤ 3	0	+0.4	0	+0.5	0	+0.6	0	+0.8

## Tolerances by size and shape



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### Length tolerance

7

Nominal width	Normal tolerance		Special tolerance	
	under	over	under	over
<2000	0	6	0	3
≥2000	0	0.3% of the length	0	0.15% of the length

### Flatness tolerance for steels with minimum yield strength $R_e < 260 \text{ MPa}$

8

Class tolerance	Nominal width w	Nominal thickness		
		t < 0.7	0.7 ≤ t < 1.2	t ≥ 1.2
Normal	w < 600	7	6	5
	600 ≤ w < 1200	10	8	7
	1200 ≤ w < 1500	12	10	8
	w ≥ 1500	17	15	13
Special	w < 600	4	3	2
	600 ≤ w < 1200	5	4	3
	1200 ≤ w < 1500	6	5	4
	w ≥ 1500	8	7	6
	w < 1500	Height of edge wave of length over 200 mm must be less than 1% of its length		
	w ≥ 1500	Height of edge wave of length over 200 mm must be less than 1,5% of its length For edge waves of length less than 200 mm the maximum height must not exceed 2mm		

### Flatness tolerance for sheets with minimum yield strength $260 \leq R_e < 340 \text{ MPa}$

9

Class tolerance	Nominal width w	Nominal thickness		
		t < 0.7	0.7 ≤ t < 1.2	t ≥ 1.2
Normal	600 ≤ w < 1200	13	10	8
	1200 ≤ w < 1500	15	13	11
	w ≥ 1500	20	19	17
Special	600 ≤ w < 1200	8	6	5
	1200 ≤ w < 1500	9	8	6
	w ≥ 1500	12	10	9

## Tolerances by size and shape



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Steels with minimum yield strength of  $Re2$  **340 MPa**

# 10

For these steels, the flatness tolerance values **should be specified in the order.**

Out-of-square tolerance

# 11

The **out-of-square (u)** is the orthogonal projection of the transverse side along the longitudinal side (see Figure 1).

Out-of-square must not exceed 1% of the sheet width.

Lapping tolerance

# 12

The **lapping (q)** is the maximum distance between the longitudinal edge and a reference straight side (see Figure 1).

The lapping should be measured on the concave side.

The base of the measurement should be 2 meters, taken on any point on the concave edge.

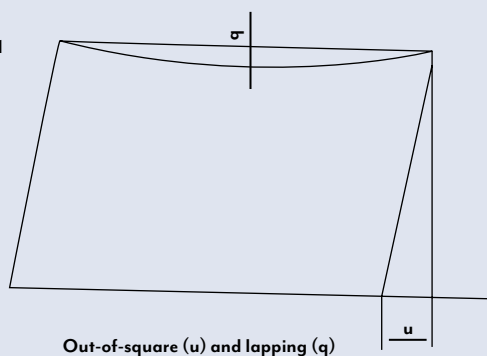
If the metal sheet has a length of less than 2 meters, the base of the measurement should be equal to its length.

Lapping should not exceed 5 mm over a length of 2 meters. For lengths of less than two meters, the lapping should not exceed 0.25 percent of the length itself.

For strips less than 600 mm wide, a special lapping tolerance (CS) of maximum 2 mm on a length of 2 meters can be specified.

**This special tolerance is not applicable to strips with a high yield strength.**

Figure 1



Out-of-square (u) and lapping (q)