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Continuously cold-rolled steel sheet products — Dimensional and shape tolerances

Tôles en acier laminées à froid en continu — Tolérances sur dimensions et forme

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 16162 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 12, *Continuous mill flat rolled products*.

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Continuously cold-rolled steel sheet products — Dimensional and shape tolerances

1 Scope

This International Standard applies to dimensional and shape tolerances for all continuously cold-rolled steel sheet products. If a conflict exists with another continuously cold-rolled steel sheet standard that standard shall prevail.

NOTE Cold-rolled strip is not covered by this International Standard nor is cold-rolled sheet for subsequent coating.

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Table 1 — Normal thickness tolerances for coils and cut lengths

Dimensions and trolerances in millimetres

Specified width	Thickness tolerances [a, b] for specified thicknesses[c]									
	⩽ 0,4	> 0,4 ⩽ 0,6	> 0,6 ⩽ 0,8	> 0,8 ⩽ 1,0	> 1,0 ⩽ 1,2	> 1,2 ⩽ 1,6	> 1,6 ⩽ 2,0	> 2,0 ⩽ 2,5	> 2,5 ⩽ 3,0	> 3,0 ⩽ 4,0
> 600 ⩽ 1 200	± 0,04	± 0,05	± 0,07	± 0,08	± 0,09	± 0,11	± 0,13	± 0,15	± 0,18	± 0,20
> 1 200 ⩽ 1 500	± 0,05	± 0,06	± 0,08	± 0,09	± 0,10	± 0,12	± 0,14	± 0,16	± 0,19	± 0,21
> 1 500 ⩽ 1 800	—	± 0,08	± 0,09	± 0,10	± 0,12	± 0,14	± 0,16	± 0,18	± 0,21	± 0,23

[a] The thickness tolerances for sheet in coil form are the same as for sheet supplied in cut lengths but in cases where welds are present, the tolerances shall be double those given over a length of 15 m in the vicinity of the weld.

[b] For specified strength levels of R_e = 360 N/mm^2 and greater, increase the thickness tolerances by 10 % applying normal rounding-off procedures.

[c] Thickness is measured at any point on the sheet not less than 25 mm from a side edge.

Table 2 — Restricted thickness tolerances for coils and cut lengths

Dimensions and tolerances in millimetres

Specified width	Thickness tolerances [a, b] for specified thicknesses[c]									
	⩽ 0,4	> 0,4 ⩽ 0,6	> 0,6 ⩽ 0,8	> 0,8 ⩽ 1,0	> 1,0 ⩽ 1,2	> 1,2 ⩽ 1,6	>1,6 ⩽ 2,0	> 2,0 ⩽ 2,5	> 2,5 ⩽ 3,0	> 3,0 ⩽ 4,0
> 600 ⩽ 1 200	± 0,025	± 0,035	± 0,04	± 0,045	± 0,055	± 0,07	± 0,08	± 0,10	± 0,11	± 0,12
> 1 200 ⩽ 1 500	± 0,035	± 0,045	± 0,05	± 0,06	± 0,07	± 0,08	± 0,09	± 0,11	± 0,12	± 0,13
> 1 500 ⩽ 1 800	—	± 0,05	± 0,05	± 0,06	± 0,07	± 0,08	± 0,09	± 0,11	± 0,12	± 0,13

[a] The thickness tolerances for sheet in coil form are the same as for sheet supplied in cut lengths but in cases where welds are present, the tolerances shall be double those given over a length of 15 m in the vicinity of the weld.

[b] For specified strength levels of R_e = 360 N/mm^2 and greater, increase the thickness tolerances by 10 % applying normal rounding-off procedures.

[c] Thickness is measured at any point on the sheet not less than 25 mm from a side edge.

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Table 3 — Width tolerances for coils and cut lengths not resquared

Dimensions and tolerances in millimetres

Specified width	Tolerance
$\leqslant$ 1 200	$^{+3}_{0}$
> 1 200 $\leqslant$ 1 500	$^{+5}_{0}$
> 1 500	$^{+6}_{0}$
NOTE For resquared material more restrictive tolerances are subject to negotiation.	

Table 4 — Length tolerances for cut lengths, not resquared

Dimensions and tolerances in millimetres

Specified width	Tolerance
$\leqslant$ 2 000	$^{+10}_{0}$
> 2 000 $\leqslant$ 8 000	$^{+0,5\ \% \times \text{length}}_{0}$
> 8 000	$^{+40}_{0}$
NOTE For resquared material more restrictive tolerances are subject to negotiation.	

Table 5 — Camber tolerances for coils and cut lengths, not resquared

Form	Camber tolerance
Coil	20 mm in any 5 000 mm length
Cut lengths	0,4 % $\times$ length
NOTE For resquared material more restrictive tolerances are subject to negotiation. Camber is the greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight edge as shown in Figure 1.	

Table 6 — Out-of-square tolerance for cut lengths, not resquared

Dimensions	Out-of-square tolerance
All thicknesses and all sizes	1 % $\times$ width
NOTE Out-of-square is the greatest deviation of an edge from a straight line at right angles to a side and touching one corner, the measurement being taken as shown in Figure 2. It can also be measured as one-half the difference between the diagonals of the cut length sheet. For resquared material more restrictive tolerances are subject to negotiation.	

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Table 7 — Out-of-square tolerances for resquared material

Dimensions and tolerances in millimetres

Specified length	Specified width	Out-of-square tolerance
⩽ 3 000	⩽ 1 200	$^{+2}_{0}$
	> 1 200	$^{+3}_{0}$
> 3 000	All widths	$^{+3}_{0}$
NOTE Out-of-square is the greatest deviation of an edge from a straight line at right angles to a side and touching one corner, the measurement being taken as shown in Figure 2. It can also be measured as one-half the difference between the diagonals of the cut length sheet. When measuring material to resquared tolerances, consideration may have to be given to extreme variations in temperature.		

Table 8 — Standard flatness tolerances for cut lengths, excluding structural quality

Dimensions and tolerances in millimetres

Specified thickness	Specified width	Flatness tolerance [a]
⩽ 0,7	⩽ 1 200	15
	> 1 200 ⩽ 1 500	18
	> 1 500	22
> 0,7 ⩽ 1,2	⩽ 1 200	12
	> 1 200 ⩽ 1 500	15
	> 1 500	19
> 1,2	⩽ 1 200	10
	> 1 200 ⩽ 1 500	12
	> 1 500	17
NOTE Maximum deviation from a flat horizontal surface: with the sheet lying under its own weight on a flat surface, the maximum distance between the lower surface of the sheet and the flat horizontal surface is the maximum deviation from flatness as shown in Figure 3.		
[a] These tolerances are only applicable to sheet up to and including 5 000 mm length. Tolerances for sheet having a length exceeding 5 000 mm shall be subject to agreement. This table also applies to sheet cut to length from coils by the customer when agreed-upon flattening procedures are performed.		

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Table 9 — Restricted flatness tolerances for cut lengths, excluding structural quality

Dimensions and tolerances in millimetres

Specified thickness	Specified width	Flatness tolerance [a]
⩽ 0,7	⩽ 1 200	6
	> 1 200 ⩽ 1 500	7
	> 1 500	8
> 0,7 ⩽ 1,2	⩽ 1 200	5
	> 1 200 ⩽ 1 500	6
	> 1 500	7
> 1,2	⩽ 1 200	4
	> 1 200 ⩽ 1 500	5
	Over 1 500	6

NOTE Maximum deviation from a flat horizontal surface: with the sheet lying under its own weight on a flat surface, the maximum distance between the lower surface of the sheet and the flat horizontal surface is the maximum deviation from flatness as shown in Figure 3.

[a] These tolerances are only applicable to sheet up to and including 5 000 mm length. Tolerances for sheet having a length exceeding 5 000 mm shall be subject to agreement. This table also applies to sheet cut to length from coils by the customer when agreed-upon flattening procedures are performed.

Table 10 — Standard flatness tolerances for structural quality cut lengths [a]

Dimensions and tolerances in millimetres

Specified thickness	Specified width	Flatness tolerance [b]
⩽ 0,7	⩽ 1 200	23
	> 1 200 ⩽ 1 500	27
	> 1 500	33
> 0,7 ⩽ 1,2	⩽ 1 200	18
	> 1 200 ⩽ 1 500	23
	> 1 500	29
> 1,2	⩽ 1 200	15
	> 1 200 ⩽ 1 500	19
	> 1 500	26

NOTE This table does not apply to full hard sheet (CH550).

[a] This table also applies to sheet cut to length from coils by the customer when agreed-upon flattening procedures are performed. For specified strength levels of R_e = 360 N/mm^2 and greater, increase the flatness tolerances by 25 %.

[b] Maximum deviation from a flat horizontal surface: with the sheet lying under its own weight on a flat surface, the maximum distance between the lower surface of the sheet and the flat horizontal surface is the maximum deviation from flatness as shown in Figure 3.

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