INTERNATIONAL STANDARD

ISO 16163

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Continuously hot-dipped coated steel sheet products — Dimensional and shape tolerances

Tôles en acier revêtues en continu par immersion à chaud — Tolérances sur dimensions et forme

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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 16163 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 12, *Continuous mill flat rolled products*.

Continuously hot-dipped coated steel sheet products — Dimensional and shape tolerances

1 Scope

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

Table 1 — Normal thickness tolerances for commercial, lock-forming, drawing, drawing aluminum-killed and extra deep drawing stabilized interstitial free quality coils and cut lengths

Dimensions and tolerances in millimetres

Specified width	Thickness tolerances [a] for specified thicknesses [b, 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	> 4,0 ⩽ 5,0
> 600 ⩽ 1 200	± 0,05	± 0,06	± 0,08	± 0,09	± 0,10	± 0,12	± 0,18	± 0,19	± 0,21	± 0,23	± 0,25
> 1 200 ⩽ 1 500	± 0,06	± 0,07	± 0,09	± 0,10	± 0,11	± 0,13	± 0,20	± 0,22	± 0,23	± 0,25	± 0,27
> 1 500 ⩽ 1 800	—	± 0,09	± 0,10	± 0,11	± 0,13	± 0,15	± 0,22	± 0,24	± 0,25	± 0,27	± 0,29

NOTE Thicknesses up to 1,6 mm are generally produced with cold-rolled substrate.

[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] Given the difference in tolerances and physical properties of hot rolled and cold rolled sheet products, the user and the supplier may negotiate a specific type of substrate. The relationship between coating mass in g/m^2 and the thickness in micrometres can be retrieved from the respective standards.

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

Table 2 — Normal thickness tolerances for structural-quality coils and cut lengths

Dimensions and tolerances in millimetres

Specified width	Thickness tolerances [a, b, c] for specified thicknesses [d, e]										
	⩽ 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	> 4,0 ⩽ 5,0
> 600 ⩽ 1 200	± 0,06	± 0,07	± 0,09	± 0,10	± 0,11	± 0,13	± 0,18	± 0,19	± 0,21	± 0,23	± 0,25
> 1 200 ⩽ 1 500	± 0,07	± 0,08	± 0,10	± 0,11	± 0,12	± 0,14	± 0,20	± 0,22	± 0,23	± 0,25	± 0,27
> 1 500 ⩽ 1 800	—	± 0,10	± 0,11	± 0,12	± 0,14	± 0,16	± 0,22	± 0,24	± 0,25	± 0,27	± 0,29

[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] Tolerances for grade 550 shall be as agreed upon between the purchaser and the manufacturer.

[d] Given the difference in tolerances and physical properties of hot rolled and cold rolled sheet products, the user and the supplier may negotiate a specific type of substrate. The relationship between coating mass in g/m^2 and the thickness in micrometres can be retrieved from the respective standards.

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

NOTE Thicknesses up to 1,6 m are generally produced with cold-rolled substrate.

Table 3 — Restricted thickness tolerances for commercial, lock-forming, drawing, drawing aluminum-killed, extra deep drawing (stabilized interstitial free) and structural quality coils and cut lengths — hot rolled substrate

Dimensions and tolerances in millimetres

Specified width	Thickness tolerances [a, b, c] for specified thicknesses [d, e]				
	⩽ 2,0	> 2,0 ⩽ 2,5	> 2,5 ⩽ 3,0	> 3,0 ⩽ 4,0	> 4,0 ⩽ 5,0
> 600 ⩽ 1 200	± 0,14	± 0,15	± 0,16	± 0,18	± 0,20
> 1 200 ⩽ 1 500	± 0,15	± 0,16	± 0,18	± 0,19	± 0,22
> 1 500 ⩽ 1 800	± 0,15	± 0,18	± 0,20	± 0,22	± 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] Tolerances for grade 550 shall be as agreed upon between the purchaser and the manufacturer.

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

[e] The relationship between coating mass in g/m^2 and the thickness in micrometres can be retrieved from the respective standards.

Table 4 — Restricted thickness tolerances for commercial, lock-forming, drawing, drawing aluminum-killed, extra deep drawing (stabilized interstitial free) and structural quality coils and cut lengths — cold rolled substrate

Dimensions and tolerances in millimetres

Specified width	Thickness tolerances [a, b, c] for specified thicknesses[d, e]									
	⩽ 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	± 0,035	± 0,045	± 0,05	± 0,055	± 0,065	± 0,08	± 0,09	± 0,11	± 0,12	± 0,13
> 1 200 ⩽ 1 500	± 0,045	± 0,055	± 0,06	± 0,07	± 0,08	± 0,09	± 0,10	± 0,12	± 0,13	± 0,14
> 1 500 ⩽ 1 800	—	± 0,06	± 0,07	± 0,07	± 0,08	± 0,09	± 0,10	± 0,12	± 0,13	± 0,14

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 Tolerances for grade 550 shall be as agreed upon between the purchaser and manufacturer.

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

e The relationship between coating mass in g/m^2 and the thickness in micrometres can be retrieved from the respective standards.

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

Values in millimetres

Specified width	Tolerance
⩽ 1 500	$^{+7}_{0}$
> 1 500 ⩽ 1 800	$^{+10}_{0}$
NOTE For resquared material more restrictive tolerances are subject to negotiation.	

Table 6 — Length tolerances for cut lengths, not resquared

Dimensions and tolerances in millimetres

Specified width	Tolerance
⩽ 3 000	$^{+20}_{0}$
> 3 000 ⩽ 6 000	$^{+30}_{0}$
> 6 000	+ 0,5 % × length
NOTE For resquared material more restrictive tolerances are subject to negotiation.	

Table 7 — Camber tolerances for coils and cut lengths, not resquared

Form	Camber tolerance
Coil	20 mm in any 5 000 mm length
Cut length	$\begin{matrix}0{,}4\ \% \times \text{length} \\ 0\end{matrix}$
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 8 — Out-of-square tolerance for cut lengths, not resquared

Dimensions	Out-of-square tolerance
All thicknesses and all sizes	1 % × width
NOTE For resquared material more restrictive tolerances are subject to negotiation. 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.	

Table 9 — Out-of square tolerances for resquared material

Dimensions and tolerances in millimetres

Specified length	Specified width	Out-of-square tolerance
⩽ 3 000	⩽ 1 200	$\begin{matrix}+2 \\ 0\end{matrix}$
	> 1 200	$\begin{matrix}+3 \\ 0\end{matrix}$
> 3 000	All widths	$\begin{matrix}+3 \\ 0\end{matrix}$
NOTE When measuring material to resquared tolerances, consideration should be given to extreme variations in temperature. 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.		

Table 10 — Standard flatness tolerances for commercial, lock-forming, drawing, drawing aluminum-killed, and extra deep drawing stabilized interstitial free) quality in cut lengths [a]

Dimensions and tolerances in millimetres

Specified thickness	Specified width	Flatness tolerance [b, c]
⩽ 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

[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.

[c] These tolerances are only applicable to sheet up to and including 5 000 mm length when the thickness is 5 mm or less. Tolerances for sheet exceeding 5 000 mm in length shall be subject to agreement.

Table 11 — Restricted flatness tolerances for cut lengths excluding structural quality

Dimensions and tolerances in millimetres

Specified thickness	Specified width	Specified length	Flatness tolerance [a b]
⩽ 2	⩽ 1 200	⩽ 2 500	9
	> 1 200	> 2 500	15
> 2 ⩽ 5	⩽ 1 200	⩽ 2 500	8
	> 1 200	> 2 500	13

[a] Tolerances for sheet exceeding 5 000 mm in length shall be subject to agreement.

[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.