INTERNATIONAL STANDARD

ISO 16163

Second edition
2005-02-15

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

Reference number
ISO 16163:2005(E)

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.org
Web www.iso.org

Published in Switzerland

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This second edition cancels and replaces the first edition (ISO 16163:2000), which has been technically revised.

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.

2 Dimensional tolerances

Dimensional tolerances are given in Tables 1 to 11.

Table 1 — Normal thickness tolerances for commercial, 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, 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	> 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

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

[a] Thickness tolerances for sheet in coil form are the same as for sheets 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 %, by 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.

Table 3 — Restricted thickness tolerances for commercial, 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, mm	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] Thickness tolerances for sheet in coil form are the same as for sheets 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, tolerances are increased 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, 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, mm	Thickness tolerances [a, b, c, d, e] for specified thicknesses									
	⩽ 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 Thickness tolerances for sheet in coil form are the same as for sheets 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, tolerances are increased 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 5 — Width tolerances for coils and cut lengths, not resquared

Dimensions and tolerances 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 length	Tolerance
⩽ 3 000	$^{+20}_{0}$
> 3 000 ⩽ 6 000	$^{+30}_{0}$
> 6 000	$^{+0,5\ \% \times \text{length}}_{0}$

NOTE For resquared material, more restrictive tolerances are subject to negotiation.

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

Dimensions and tolerances in millimetres

Form	Camber tolerance
Coils	20 in any 5 000 length
Cut lengths	0,4 % × length
NOTE 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. For resquared material, more restrictive tolerances are subject to negotiation.	

Table 8 — Out-of-square tolerance for cut lengths, not resquared

Dimensions	Out-of-square tolerance
All thicknesses and all sizes	1 % x width
NOTE Out-of-square is the greatest deviation of an end edge from a straight line, at right angles to a side and touching one corner as shown in Figure 2. It can also be measured as one-half the difference between the diagonals of a 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	$^{+2}_{0}$
	> 1 200	$^{+3}_{0}$
> 3 000	All widths	$^{+3}_{0}$
NOTE Out-of-square is the greatest deviation of an end edge from a straight line at right angles to a side and touching one corner 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 ordered to resquared tolerances, consideration may have to be given to extreme variations in temperature.		

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

Dimensions and tolerances in millimetres

Specified thickness	Specified width	Flatness tolerance [b] Specified strength level of R_e		
		< 220 N/mm^2	220 to 340 N/mm^2	> 340 N/mm^2
⩽ 0,7	⩽ 1 200	15	23	29
	> 1 200 ⩽ 1 500	18	27	34
	> 1 500	22	33	41
> 0,7 ⩽ 1, 2	⩽ 1 200	12	18	23
	> 1 200 ⩽ 1 500	15	23	29
	> 1 500	19	29	36
> 1,2	⩽ 1 200	10	15	19
	> 1 200 ⩽ 1 500	12	18	23
	> 1 500	17	26	33

[a] This table also applies to sheet cut to length from coils by the customer when agreed-upon flattening procedures are performed.

[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.

Table 11 — Restricted flatness tolerances for cut lengths with a specified strength level < 220 N/mm^2

Dimensions and tolerances in millimetres

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

[a] 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.