INTERNATIONAL STANDARD

**ISO 16162**

Fourth edition
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# Cold-rolled steel sheet products — Dimensional and shape tolerances

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



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## Foreword

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

This fourth edition cancels and replaces the third edition (ISO 16162:2010), which has been technically revised.

# Cold-rolled steel sheet products — Dimensional and shape tolerances

## 1 Scope

This International Standard applies to dimensional and shape tolerances for all cold-rolled steel sheet products.

Note Cold-rolled steel strip is not covered by this International Standard.

## 2 Dimensional tolerances

Dimensional tolerances are given in Tables 1 to 8.

**Table 1 — Thickness tolerances for coils and cut lengths**

Dimensions and tolerances in millimetres

| Specified width | Thickness tolerances for specified thicknesses [a,b,c,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 | ±0,03 | ±0,04 | ±0,05 | ±0,06 | ±0,07 | ±0,09 | ±0,11 | ±0,13 | ±0,15 | ±0,16 |
| > 1 200 ≤ 1 500 | ±0,05 | ±0,05 | ±0,05 | ±0,07 | ±0,08 | ±0,10 | ±0,12 | ±0,14 | ±0,16 | ±0,17 |
| > 1 500 ≤ 1 800 | — | ±0,06 | ±0,07 | ±0,08 | ±0,10 | ±0,12 | ±0,14 | ±0,16 | ±0,19 | ±0,19 |

When International Standards that reference this standard permit sheet that is slit to less than 600 mm in width to be considered as sheet, tolerances shall be subject to agreement.

[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 MPa 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.

[d] The specified thickness range captions apply as a specific value.

[e] The tolerances provided in this table are based on normal thickness (tolerance over and under). For ordered thicknesses other than nominal, the total tolerance is twice the tabled value and may be distributed as agreed upon between the buyer and seller.

**Table 2 — Width tolerances for coils and cut lengths, not resquared**

Dimensions and tolerances in millimetres

| Specified width | Tolerance |
|---|---|
| ≤ 1 200 | $^{+3}_{0}$ |
| > 1 200 ≤ 1 500 | $^{+5}_{0}$ |
| > 1 500 | $^{+6}_{0}$ |

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

**Table 3 — Length tolerances for cut lengths, not resquared**

Dimensions and tolerances in millimetres

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

**Table 4 — 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 5 — Out-of-square tolerance for cut lengths, not resquared**

| Dimensions | Out-of-square tolerance |
|---|---|
| All thicknesses and all sizes | 0,7 % 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 the cut length sheet. | |



**Table 6 — Out-of-square tolerances for resquared material**

Dimensions and tolerances in millimetres

| Specified length | Specified width | Out-of-square tolerance |
|---|---|---|
| ≤ 3 000 | ≤ 1 200 | $^{+1}_{0}$ |
| | > 1 200 | $^{+2}_{0}$ |
| > 3 000 | All widths | $^{+2}_{0}$ |
| 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 to resquared tolerances, consideration may have to be given to extreme variations in temperature. | | |

**Table 7 — Standard flatness tolerances for cut lengths**

Dimensions and tolerances in millimetres

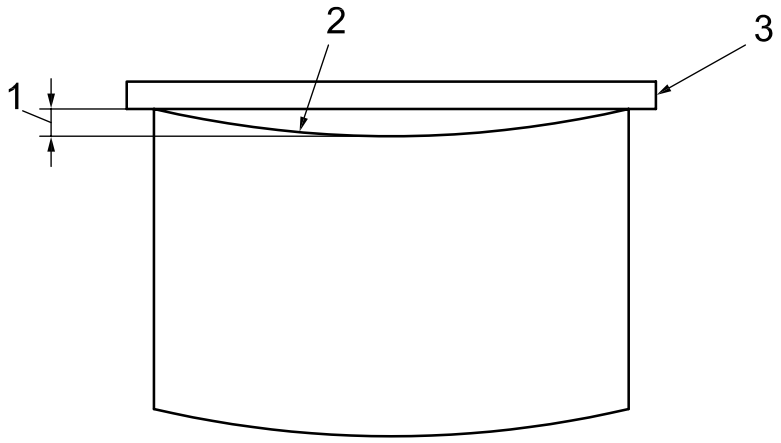
| Specified thickness | Specified width | Flatness tolerance specified strength level of $R_e$ | | |
|---|---|---|---|---|
| | | < 220 MPa | ≥ 220 ≤ 340 MPa | > 340 MPa |
| ≤ 0,7 | ≤ 1 200 | 12 | 15 | 18 |
| | > 1 200 ≤ 1 500 | 15 | 18 | 21 |
| | > 1 500 | 19 | 22 | 27 |
| > 0,7 ≤ 1, 2 | ≤ 1 200 | 10 | 13 | 16 |
| | > 1 200 ≤ 1 500 | 12 | 15 | 19 |
| | > 1 500 | 17 | 20 | 25 |
| > 1,2 | ≤ 1 200 | 10 | 10 | 16 |
| | > 1 200 ≤ 1 500 | 12 | 13 | 19 |
| | > 1 500 | 17 | 19 | 25 |
| NOTE This table does not apply to full hard sheet (CH550). | | | | |
| Maximum deviation from a flat horizontal surface: with the sheet lying under its own weight, the maximum distance between the lower surface of the sheet and the flat horizontal surface (maximum deviation from flatness), as shown in Figure 3. This table also applies to sheet cut to length from coil by the customer when agreed-upon flattening procedures are performed. | | | | |

**Table 8 — Restricted flatness tolerances for cut lengths**

Dimensions and tolerances in millimetres



| Specified thickness | Specified width | Flatness tolerance specified strength level of $R_e$ | | |
|---|---|---|---|---|
| | | < 220 MPa | ≥ 220 ≤ 340 MPa | > 340 MPa |
| ≤ 0,7 | ≤ 1 200 | 5 | 8 | — |
| | > 1 200 ≤ 1 500 | 6 | 9 | — |
| | > 1 500 | 8 | 12 | — |
| > 0,7 ≤ 1, 2 | ≤ 1 200 | 4 | 6 | — |
| | > 1 200 ≤ 1 500 | 5 | 8 | — |
| | > 1 500 | 7 | 10 | — |
| > 1,2 | ≤ 1 200 | 4 | 5 | — |
| | > 1 200 ≤ 1 500 | 5 | 6 | — |
| | > 1 500 | 6 | 9 | — |
| NOTE This table does not apply to full hard sheet (CH550). | | | | |
| Maximum deviation from a flat horizontal surface: with the sheet lying under its own weight, the maximum distance between the lower surface of the sheet and the flat horizontal surface (maximum deviation from flatness), as shown in Figure 3. This table also applies to sheet cut to length from coil by the customer when agreed-upon flattening procedures are performed. | | | | |




**Key**

1 edge camber
2 side edge (concave side)
3 straight edge

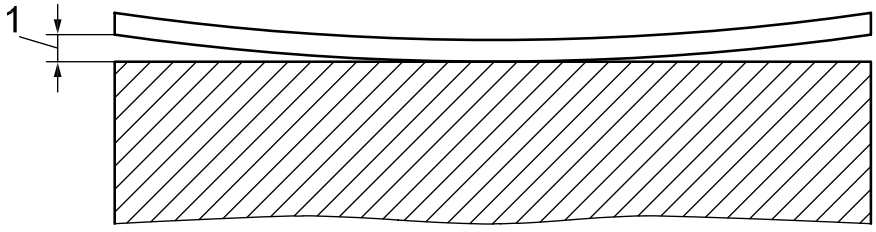
**Figure 1 — Measurement of camber**




**Key**

1 out-of-square
2 straight edge
3 side edge

**Figure 2 — Measurement of out-of-square**




**Key**

1 maximum deviation from flatness

**Figure 3 — Measurement of flatness**