
International Standard



7452

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Hot-rolled structural steel plates — Tolerances on dimensions and shape

Tôles en acier de construction laminées à chaud — Tolérances sur dimensions et forme

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Descriptors : iron and steel products, hot rolled products, metal plates, form tolerances, dimensional tolerances.

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7452 was prepared by Technical Committee ISO/TC 17, *Steel*.

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Hot-rolled structural steel plates — Tolerances on dimensions and shape

1 Scope and field of application¹⁾

1.1 This International Standard specifies the tolerances on the dimensions and shape of hot-rolled, non-alloyed, alloyed and stainless steel plates, either in the as-rolled state or which have been subjected to heat treatment.

It applies to plates of nominal thickness up to 150 mm and of width up to 4 000 mm whose specified minimum yield stress is equal to or less than 700 N/mm².

Tolerances on dimensions and shape of steel plates having a specified minimum yield stress greater than 700 N/mm² should be the subject of agreement at the time of ordering.

1.2 This International Standard does not include round plate, custom-made plate, checker plate or bulb plate for flooring or wide flats.

It does not apply to continuous hot-rolled steel plates when these are defined in specific International Standards (see ISO 4995, ISO 4996, ISO 5951, ISO 5952).

2 References

ISO 4995, *Hot-rolled steel sheet of structural quality*.

ISO 4996, *Hot-rolled steel sheet of high yield stress structural quality*.

ISO 5951, *Hot-rolled steel sheet of higher yield strength with improved formability*.

ISO 5952, *Continuously hot-rolled steel sheet of structural quality with improved atmospheric corrosion resistance*.

3 Tolerances on dimensions

3.1 Thicknesses

3.1.1 The tolerances on thicknesses shall conform to the values in table 1. If specified when ordering, the plates may be supplied

- either with a variable minus tolerance depending on the nominal thickness (class A);
- or with a constant minus tolerance of 0,3 mm (class B).

The maximum difference in thickness on the same plate is identical, whatever class A or B tolerances apply. This requirement applies only by special agreement at the time of ordering.

3.1.2 The special provisions applicable to ground parts of the surface of the plates are given in the International Standards for the corresponding products.

3.1.3 By agreement at the time of ordering, plates may also be supplied with other types of tolerances with respect to the nominal thicknesses (symmetrical, wholly over or wholly under, etc.), provided that the permissible deviation range given in table 1 and the maximum difference in thickness on the same plate are respected.

1) Definitions of the products referred to in this International Standard will form the subject of a future International Standard.

Table 1 — Tolerances on thickness

Values in millimetres

Nominal thickness <i>e</i>	Permissible deviation on nominal thickness (see 5.1.1)				Maximum deviation in thickness in the same plate ¹⁾				
	Class A		Class B		Width of the plate ²⁾				
	under	over	under	over	< 2 000	> 2 000 < 2 500	> 2 500 < 3 000	> 3 000 < 3 500	> 3 500 ≤ 4 000
3 < <i>e</i> < 5	-0,4	0,8	-0,3	0,9	0,8	0,9	0,9		
5 < <i>e</i> < 8	-0,4	1,1	-0,3	1,2	0,9	0,9	1,0	1,0	
8 < <i>e</i> < 15	-0,5	1,2	-0,3	1,4	0,9	1,0	1,0	1,1	1,1
15 < <i>e</i> < 25	-0,6	1,3	-0,3	1,6	1,0	1,1	1,2	1,2	1,3
25 < <i>e</i> < 40	-0,8	1,4	-0,3	1,9	1,1	1,2	1,2	1,3	1,3
40 < <i>e</i> < 80	-1,0	1,8	-0,3	2,5	1,2	1,3	1,4	1,4	1,5
80 < <i>e</i> < 150 ³⁾	-1,0	2,2	-0,3	2,9	1,3	1,4	1,5	1,5	1,6

1) The values are only guaranteed by special agreement at the time of ordering.

2) For nominal widths over 4 000 mm, the permissible deviations should be the subject of agreement between the manufacturer and purchaser.

3) For nominal thicknesses over 150 mm, the permissible deviations should be the subject of agreement between the manufacturer and purchaser.

3.2 Widths

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Table 3 — Tolerances on length

Values in millimetres

3.2.1 Permissible deviations on nominal widths shall conform to the values in table 2.

Table 2 — Tolerances on width

Values in millimetres

Nominal width <i>l</i>	Permissible deviation	
	minus	plus
<i>l</i> < 2 000	0	+ 20
2 000 < <i>l</i> < 3 000	0	+ 25
3 000 < <i>l</i> < 4 000 ¹⁾	0	+ 30

1) For nominal widths above 4 000 mm, the tolerances on width should be the subject of agreement between the manufacturer and purchaser.

NOTE — Subject to agreement at time of order, a minus permissible deviation of 6 mm may be tolerated.

3.2.2 Permissible deviations on nominal widths of plates with mill edges should be the subject of agreement between the manufacturer and purchaser.

3.3 Lengths

The permissible deviation on nominal lengths shall conform to the values in table 3.

Nominal length <i>L</i>	Permissible deviation	
	minus	plus
<i>L</i> < 4 000	0	+ 20
4 000 < <i>L</i> < 6 000	0	+ 30
6 000 < <i>L</i> < 8 000	0	+ 40
8 000 < <i>L</i> < 10 000	0	+ 50
10 000 < <i>L</i> < 15 000	0	+ 75
15 000 < <i>L</i> < 20 000 ¹⁾	0	+ 100

1) For nominal lengths above 20 000 mm, the permissible deviation should be the subject of agreement between the manufacturer and purchaser.

NOTE — Subject to agreement at time of order, a minus permissible deviation of 6 mm may be tolerated.

4 Tolerances on shape

4.1 Superimposing of the dimensions

Except in cases where a minus tolerance is permitted on width and length at time of order, the dimensions on the ordered plate shall fit within the delivered size.

In addition, by agreement when ordering, the camber may be limited to 0,2 % of the actual length of the plate and the out-of-squareness to 1 % of the actual width of the plate (see the figure, and 5.4 and 5.5).

4.2 Flatness

4.2.1 The tolerances on flatness shall conform to the values given in table 4 for the two steel types defined as follows :

- Steel L : Plates with a specified minimum yield strength less than or equal to 460 N/mm², not quenched and tempered.
- Steel H : Plates with a specified minimum yield strength greater than 460 N/mm² and equal to or less than 700 N/mm² and quenched and tempered plates.

In the case of stainless steels, the flatness tolerances should be the subject of agreement at the time of ordering.

NOTE — Attention is drawn to the fact that the handling of the plate or storage under unfavourable conditions may produce deviations greater than those measured on leaving the factory.

4.2.2 If the distance between the points of contact of the rule with the plates is less than 1 000 mm, the flatness tolerances shall be 1 % of the distance between the points of contact, but with a minimum value of 50 % of the values in table 4 for the 1 000 mm rule and a maximum value of 100 % of these values.

4.2.3 Special flatness tolerances

Special flatness tolerances may be agreed on order.

4.2.4 If measuring lengths or measuring conditions different from those specified in this International Standard are used, flatness tolerances should be the subject of agreement at the time of ordering.

5 Measurements

Measurements shall be made at ambient temperature.

5.1 Thickness

5.1.1 The thickness shall be measured at any point more than 15 mm from the edges of the plate.

However, by agreement at the time of ordering, conformity with the values of table 1 may be determined by measuring the thickness at a distance 15 to 30 mm from a longitudinal edge.

5.1.2 In the case of plates with untrimmed edges, the location where the thickness is measured should be the subject of agreement at the time of ordering.

5.2 Width

The width shall be measured perpendicular to the main axis of the plate.

5.3 Length

The length is deemed to be the length of the largest rectangle contained in the plate delivered.

5.4 Camber

Camber is the maximum deviation between a longitudinal edge and the straight line joining the two ends of this edge. It shall be measured on the concave edges of the plate (see the figure) and quoted as a percentage of the plate length.

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Table 4 — Flatness tolerances

Values in millimetres

Rule Nominal thickness	Flatness tolerances			
	Steel L (see 4.2.1)		Steel H (see 4.2.1)	
	1 000 ¹⁾	2 000 ¹⁾	1 000 ¹⁾	2 000 ¹⁾
3 < e < 5	9	15	12	18
5 < e < 8	8	13	11	16
8 < e < 15	7	11	10	14
15 < e < 25	7	10	10	13
25 < e < 40	6	9	9	12
40 < e < 150	5	8	8	11

1) Only one value is measured and, unless otherwise specified, the 2 000 mm rule is used.

5.5 Squareness

The out-of-squareness, u , is the orthogonal projection of one transverse edge on a longitudinal edge (see the figure) and quoted as a percentage of the plate width.

5.6 Flatness

To measure the flatness, the plates shall be laid on a surface considered flat.

Deviation with respect to flatness shall be determined by measuring the distance between the plate and a rule either of 1 000 mm or of 2 000 mm in length which may be placed in any direction. The permissible deviations between the plate and these 2 types of rule are given in table 4. Only one length of the rule is used for measuring and, unless otherwise specified, the 2 000 mm rule is used.

Only the portion between two points of contact of the rule and the plate is taken into consideration.

Measurement is made at least 20 mm from the longitudinal edges and a least 200 mm or 100 mm from the plate ends, depending on whether the tolerances are standard or special (see the figure).

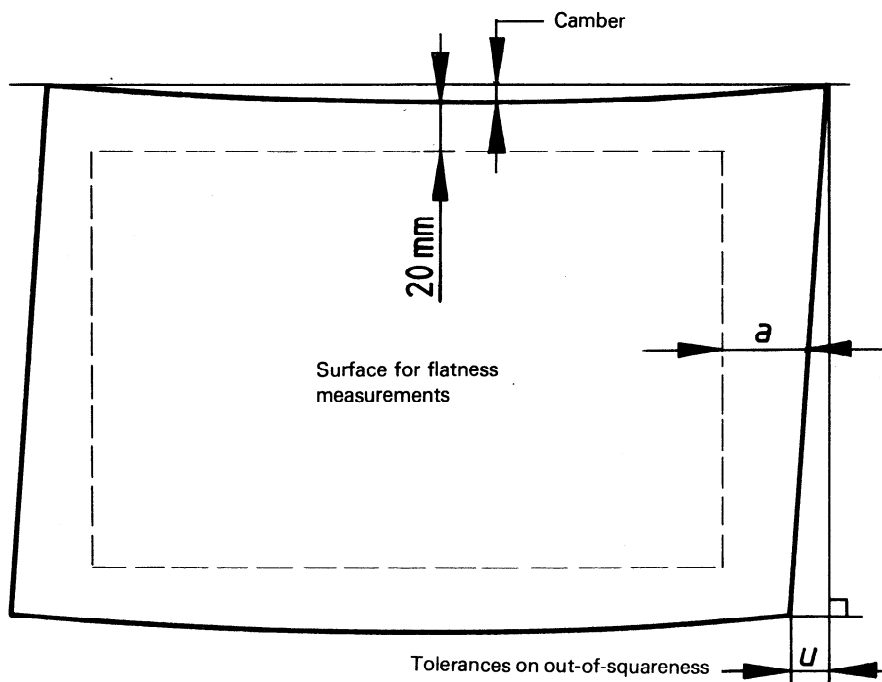
NOTE — Other measuring conditions may be used by agreement at the time of ordering (see 4.2.4).

6 Information to be stated in the order

The following information shall be given in the wording of the order :

- 6.1 Class of tolerance on thickness, A or B (see 3.1.1) or other type of tolerance on thickness (see 3.1.3).
- 6.2 Where necessary, amount of the deviation between maximum thickness and minimum thickness of the same plate (see 3.1.1).
- 6.3 In the case of plates with untrimmed edges, the point chosen for measuring the thickness (see 5.1.2).
- 6.4 In the case of plates with mill edges, the permissible deviation on width (see 3.2.2).
- 6.5 Where necessary, the minus deviation on width and length (see 3.2.1 and 3.3).
- 6.6 Tolerance on camber (see 4.1).
- 6.7 Tolerance on out-of-squareness (see 4.1).
- 6.8 Where necessary, use of the 1 000 mm rule for measuring the flatness tolerance (see table 4).
- 6.9 When necessary, special flatness tolerances (see 4.2.3).
- 6.10 Where necessary, in the case of deliveries at actual weight, an indication that excess mass stipulations have been observed (see clause A.4).

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$a = 200$ mm for standard flatness tolerances
 $a = 100$ mm for special flatness tolerances

Figure — Location of measurements

Annex

Excess mass

(Only applicable to deliveries at actual weight.)

A.1 The excess weight is the variation in mass expressed as a percentage of the theoretical mass of the product.

The theoretical mass is determined by taking the density of the steel to be 7,85 kg/dm³, unless otherwise specified in the International Standards for the corresponding products.

A.2 The excess masses corresponding to the thickness tolerance class A or B (see 3.1.1) are given in table 5.

A.3 Table 5 applies to deliveries with the same nominal dimensions and of the same quality, whose mass is between 25 and 75 t.

The excess masses for deliveries of different masses are given in note 1) to table 5.

A.4 Excess masses that exceed the limits of table 5 will not cause rejection of the product, unless otherwise agreed at the time of ordering.

A.5 For other thickness tolerances than those of class A and B, the excess masses quoted in table 5 shall be modified accordingly.

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Table 5 — Excess masses for class A and B (see 3.1.1) as a percentage of the theoretical mass

Nominal thickness e mm	Class	Permissible deviation on nominal thickness mm		Excess mass ^{1) 2)}				
		under	over	Width of plate mm				
				< 2 000	≥ 2 000 < 2 500	> 2 500 < 3 000	> 3 000 < 3 500	> 3 500 < 4 000
3 < e < 5	A	-0,4	0,8	8,5	9,5	10,5		
	B	-0,3	0,9	11	12	13,5		
5 < e < 8	A	-0,4	1,1	7	7,5	8,5	9	
	B	-0,3	1,2	9	9,5	10	11	
8 < e < 15	A	-0,5	1,2	6	6	6,5	7	7,5
	B	-0,3	1,4	7,5	8	8,5	9	9,5
15 < e < 25	A	-0,6	1,3	4,5	4,5	5	5	5,5
	B	-0,3	1,6	6	6	6,5	6,5	7
25 < e < 40	A	-0,8	1,4	3,5	3,5	4	4	4
	B	-0,3	1,9	5	5	5,5	5,5	5,5
40 < e < 80	A	-1,0	1,8	3,5	3,5	4	4	4
	B	-0,3	2,5	5	5	5,5	5,5	5,5
80 < e < 150	A	-1,0	2,2	3,5	4	4	4	4
	B	-0,3	2,9	4,5	4,5	4,5	4,5	4,5

- 1) mass supplied ≥ 150 000 kg : 80 % of the value indicated
75 000 kg ≤ mass supplied < 150 000 kg : 90 % of the value indicated
25 000 kg ≤ mass supplied < 75 000 kg : value indicated
10 000 kg ≤ mass supplied < 25 000 kg : 120 % of the value indicated
mass supplied < 10 000 kg : 140 % of the value indicated
single plate : excess mass greater than 140 % of the value indicated

However, these values must be reduced to the calculated value, obtained by matching each nominal dimension to its maximum tolerance.

- 2) Deviation of average theoretical mass due to overlength and overwidth included.

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