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Hot-rolled structural steel wide flats — Tolerances on dimensions and shape

Larges-plats en acier de construction laminés à chaud — Tolérances sur dimensions et forme

Reference number
ISO 9034 : 1987 (E)

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.

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Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Hot-rolled structural steel wide flats — Tolerances on dimensions and shape

1 Scope and field of application

This International Standard specifies the tolerances on the dimensions, shape and mass of hot-rolled wide flats of non-alloyed and alloyed steels (excluding stainless steels).

It applies to wide flats, as defined in clause 3, of steels with a specified minimum yield strength equal to or less than 700 N/mm^2.

2 Reference

ISO 7788, *Steel — Surface finish of hot-rolled plates and wide flats — Delivery requirements.*

3 Definition

wide flat: A flat product of width greater than 150 mm up to 1 250 mm and a thickness generally over 4 mm, always supplied in lengths, i.e. not coiled. The edges are sharp. Wide flats are hot rolled on their four sides (or in box passes). They may also be produced by shearing or flame cutting wider flat products provided the tolerances as given in this International Standard are observed.

4 Tolerances on dimensions

4.1 Width

The tolerance on width shall be ± 2 % of the nominal width but shall not exceed 10 mm.

4.2 Thickness

4.2.1 The tolerance on thickness for nominal thickness up to 100 mm shall conform to the values in table 1. According to the specification when ordering, the wide flats 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).

4.2.2 By agreeement at the time of ordering, wide flats may also be supplied with other types of tolerances with respect to the nominal thickness (symmetrical, wholly over or wholly under, etc.), provided that the permissible deviation range given in table 1 and the maximum difference in thickness in a transverse cross-section as given in table 2 are respected.

Table 1 — Tolerances of thickness

Values in millimetres

Nominal thickness e	Permissible deviation on nominal thickness (see 6.2)			
	Class A		Class B	
	under	over	under	over
$4 < e < 8$	0,4	0,6	0,3	0,7
$8 < e < 15$	0,5	0,7	0,3	0,9
$15 < e < 25$	0,6	0,8	0,3	1,1
$25 < e < 40$	0,8	0,9	0,3	1,4
$40 < e < 80$	1,0	1,4	0,3	2,1
$80 < e < 100$ [1)]	1,0	2,2	0,3	2,9

1) For nominal thicknesses over 100 mm, the permissible deviations shall be the subject of agreement at the time of ordering.

4.2.3 Special provisions apply to areas affected by surface discontinuities and ground parts of wide flats. The thickness of these affected areas shall comply with the requirements of ISO 7788.

4.2.4 The maximum difference in thickness in a transverse cross-section of the wide flat shall conform to the values given in table 2.

These values are applicable only if specified at the time of ordering.

4.3 Angular accuracy

The tolerance of the angular accuracy (see figure 1) shall conform to the values given in table 3.

These values are applicable only if specified at the time of ordering.

4.4 Length

The tolerance on the nominal length shall be $^{+50}_{0}$ mm.

5 Tolerances on shape

5.1 General

The tolerances on shape are applicable only to wide flats of steels with a specified minimum yield strength equal to or less than 460 N/mm^2. For quenched and tempered steels and steels with a specified minimum yield strength over 460 N/mm^2, shape tolerances shall be the subject of agreement between the manufacturer and purchaser at the time of ordering.

5.2 Straightness

5.2.1 The straightness tolerance q (see figure 2) shall be either 0,25 % or 0,125 % of L (L = length of product).

The tolerance required should be specified at the time of ordering. If the tolerance is not specified wide flats shall be supplied to the 0,25 % tolerance.

Table 2 — Maximum difference in thickness in a transverse cross-section

Values in millimetres

Nominal width b	Difference in thickness max.
$150 < b \leq 500$	0,5
$500 < b \leq 1\,000$	0,6
$1\,000 < b \leq 1\,250$	0,7

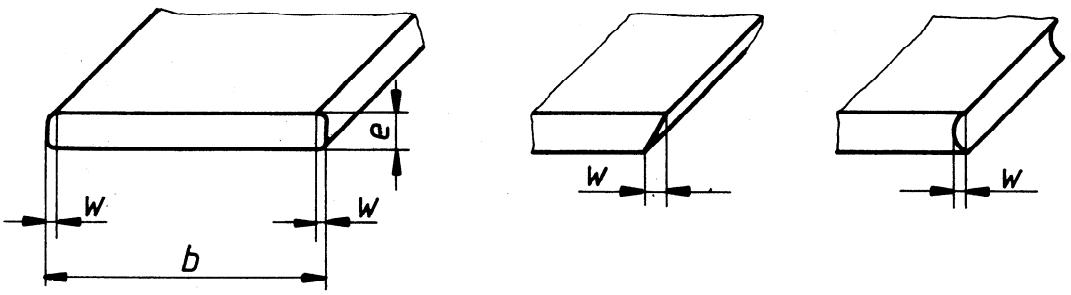

Figure 1 — Angular accuracy

Table 3 — Tolerance on angular accuracy

Values in millimetres

Nominal thickness e	Tolerance w max.
$e < 13$	2,0
$13 \leq e \leq 18$	3,0
$18 < e$	3,5

5.2.2 The values given in 5.2.1 apply to wide flats with nominal thicknesses up to and including 50 mm. For nominal thickness over 50 mm, the straightness tolerance shall be the subject of agreement at the time of ordering.

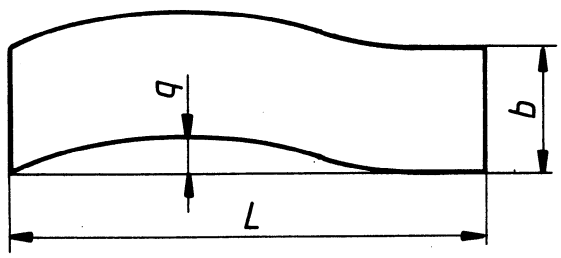

Figure 2 — Measurement of straightness

5.3 Flatness

5.3.1 The tolerance on flatness k_1 perpendicular to the direction of rolling (see figure 3) shall be 0,3 % of b. This value applies for wide flats with nominal thicknesses up to and including 50 mm. For nominal thicknesses over 50 mm, the flatness tolerance shall be the subject of agreement at the time of ordering.

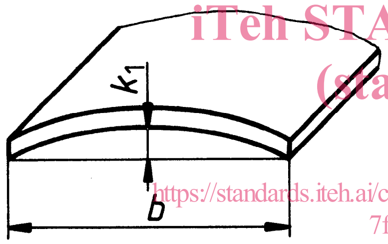

Figure 3 — Measurement of flatness

5.3.2 The tolerance on flatness k_2 in the direction of rolling related to a measuring length of 1 000 mm shall be either 7 or 3 mm.

The tolerance required should be specified at the time of ordering. If the tolerance is not specified, wide flats shall be supplied to the 7 mm tolerance.

5.3.3 The tolerance on flatness k_3 over the entire length L of the product in the longitudinal direction shall be either 0,7 % of L with a maximum of 20 mm or 0,3 % of L with a maximum of 10 mm.

The tolerance required should be specified at the time of ordering. If the tolerance is not specified, wide flats shall be supplied to the 0,7 % tolerance.

NOTE — If measuring conditions different from those specified in 5.3.1 to 5.3.3 are used, the flatness tolerances shall be the subject of agreement at the time of ordering.

5.4 Squareness

The ordered nominal length of the wide flat shall fit within the format delivered (see 6.4).

In addition, if specified at the time of ordering, out-of square value u (i.e. the orthogonal projection of one transverse edge on one longitudinal edge, see figure 4) shall be limited to 5 mm for widths b equal to or less than 500 mm and to 0,01 b for widths b over 500 mm.

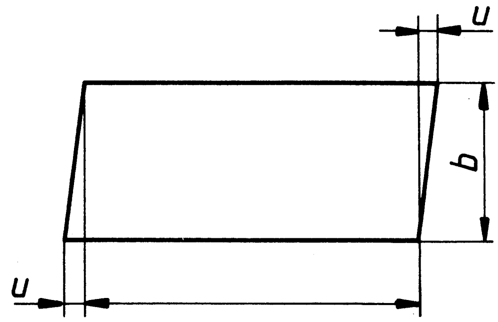

Figure 4 — Measurement of out-of-squareness

6 Measurements

6.1 Width

The width shall be measured at any point perpendicular to the longitudinal axis of the product.

6.2 Thickness

6.2.1 The thickness shall be measured at any point situated more than 15 mm from the longitudinal edges of the wide flat.

NOTE — 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 the longitudinal edges of the wide flat.

6.2.2 The difference in thickness across the width of one transverse cross-section shall be measured on a line running at right angles to the longitudinal edges. The measuring points shall be at a distance of at least 15 mm from the longitudinal edges and at least 100 mm from the ends of the wide flat.

6.3 Length

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

6.4 Straightness

The straightness tolerance is the maximum distance between a longitudinal edge and the straight line joining the two ends of this edge and shall be measured on the concave edge of the product.

6.5 Flatness

6.5.1 To measure the flatness, the wide flat shall rest freely on a flat horizontal surface.

6.5.2 Flatness deviations k_2 (see 5.3.2) shall be measured at a distance of at least 200 mm from the ends of the wide flats. The measuring distance required should be specified at the time of ordering. If the measuring distance is not specified, the 200 mm distance shall be used.

Annex

Excess mass

(applicable only to deliveries at actual mass)

(This annex forms an integral part of the Standard.)

A.1 The excess mass is the variation in mass expressed as a percentage of the theoretical mass of the delivery. Unless otherwise specified in the corresponding quality standard, the theoretical mass is determined by taking a specific mass of the steel of 7,85 kg/dm^3.

A.2 The excess mass corresponding to the thickness tolerance classes A and B (see 4.2.1) are given in table 4.

These values apply to wide flats having the same nominal dimensions and made of the same steel grade with a maximum delivered quantity of 50 t.

In the case of delivered quantites over 50 t, the excess mass values shall be agreed at the time of ordering.

A.3 Excess mass values which exceed the limits of table 4 shall not cause rejection, unless otherwise specified at the time of ordering.

A.4 For thickness tolerances other than those of classes A or B, the excess mass values given in table 4 shall be modified accordingly.

Table 4 — Excess mass values for classes A and B as a percentage (%) of the theoretical mass

Nominal thickness e mm	Excess mass, % for a delivered mass in tonnes					
	Class A			Class B		
	≤ 5	≥ 5 < 15	≥ 15 ≤ 50	≤ 5	≥ 5 < 15	≥ 15 ≤ 50
4 ≤ e < 8	8	7	6,5	9	8	7,5
8 ≤ e < 15	7	6,5	6	8	7,5	7
15 ≤ e < 25	5	4,5	4	6	5,5	5
25 ≤ e < 40	4	4	3,5	5	5	4,5
40 ≤ e < 80	3,5	3,5	3	4,5	4,5	4
80 ≤ e ≤ 100 [1]	3,5	3,5	3	4,5	4,5	4

1) For nominal thickness over 100 mm, the excess mass values shall be the subject of agreement at the time of ordering.

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Descriptors : steels, alloy steels, unalloyed steels, iron-and steel products, hot rolled products, wide flats, dimensional tolerances, form tolerances.

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