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Flat Steel Products
Hot Rolled Wide Flats
Dimensions, Permissible Variations on Dimensions, Form and Weight

DIN 59200

Flachzeug aus Stahl; Warmgewalzter Breitflachstahl,
Maße, zulässige Maß-, Form- und Gewichtabweichungen

For connection with Euronorm 91-70 issued by the European Coal and Steel Community, see Explanations.

Dimensions in mm

1 Scope

This Standard is applicable to hot rolled wide flats of thicknesses ≥ 4 mm and widths > 150 ≤ 1250 mm made of the steels listed in Section 5.

2 Definition

Wide flats are deemed to be flat products supplied in flat sheets or bars, of thicknesses ≥ 4 mm and widths > 150 ≤ 1250 mm, all four surfaces of which are rolled.

By agreement, wide flats can also be manufactured and supplied with cut or flame-cut edges.

3 Designation

3.1 For a complete designation, the following are to be stated in the order shown:

Denomination (wide flat),
thickness in mm (if necessary, accurate to 2 places of decimals),
width in mm,
length in mm (when ordering exact lengths; length range, if necessary, when ordering manufacturing lengths, see Sections 4.2 a) and 6.3),
code letter L when ordering extra straight wide flats (see Sections 4.2 b) and 6.5),
code letter S when ordering extra flat wide flats (see Sections 4.2 c) and 6.6),
DIN number of the dimension standard,
code number or material number of the steel grade.

3.1.1 The abbreviation "BrFl" or the graphical symbol according to DIN 1353 Part 2 may be used instead of the denomination "wide flats".

3.2 Examples

Designation of hot rolled wide flats of 10 mm thickness, 200 mm width, in manufacturing lengths without specification of a length range, normally straight, normally flat, of steel C 35 (material number 1.0501):

Wide flats 10 x 200 DIN 59200 - C 35
or
Wide flats 10 x 200 DIN 59200 - 1.0501

Designation of hot rolled wide flats of 15 mm thickness, 800 mm width, in exact lengths of 3500 mm, extra straight (L), extra flat (S), of steel C 35 (material number 1.0501):

Wide flats 15 x 800 x 3500 LS DIN 59200 - C 35
or
Wide flats 15 x 800 x 3500 LS DIN 59200 - 1.0501.

4 Mode of delivery

4.1 Hot rolled wide flats according to this Standard are supplied in sheets or bars in dimensions within the range stated in Section 1 (preferred dimensions see Sections 6.1.1 and 6.2.1).

4.2 Hot rolled wide flats according to Section 4.1 can also be supplied

a) in manufacturing lengths or in exact lengths (see Section 6.3),
b) normally straight or extra straight (L) (see Section 6.5),
c) normally flat or extra flat (S) (see Section 6.6).

4.3 Where there are special requirements on straightness and flatness, the corresponding code letters are to be quoted in the designation (see Section 3.1).

4.4 If the designation contains no details of the length and the mode of delivery, wide flats will be supplied in manufacturing lengths according to Section 6.3.1, normally straight and normally flat.

5 Material

Hot rolled wide flats according to this Standard are preferably supplied in steels according to DIN 17100, DIN 17135, DIN 17155 Part 1 and Part 2, DIN 17200, DIN 17210 and DIN 17221, also in steels according to the specifications of the Shipbuilding Classification Companies or in steels according to Stahl-Eisen Materials Sheet 089-70.

Other steel grades must be specially agreed when ordering.

The required steel grade is to be stated in the designation.

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6 Dimensions and permissible dimension and form variations

6.1 Thickness

6.1.1 The preferred nominal thicknesses are 5, 6, 8, 10, 12, 15, 20, 25, 30, 40, 50, 60 and 80 mm.

However, all other thicknesses ≥ 4 mm can also be supplied.

6.1.2 The permissible thickness variations are shown in Table 1 (see also Section 8.1). Smaller values must be specially agreed.

6.1.3 The difference in thickness across the width may not exceed the values shown in Table 2 (see also Section 8.2).

Table 2. Permissible difference in thickness across the width

Nominal thickness b		Permissible difference in thickness across width
above	up to	
150	500	0,5
500	1000	0,6
1000	1250	0,7

Table 1. Permissible thickness variations

Nominal thickness a		Permissible variations on nominal thickness	
from	to below	lower allowance	upper allowance
4	10	− 0,4	+ 0,6
10	20	− 0,4	+ 0,8
20	25	− 0,5	+ 0,9
25	30	− 0,6	+ 1,0
30	40	− 0,7	+ 1,1
40	50	− 0,9	+ 1,1
50	60	− 1,0	+ 1,2
60	80	− 1,0	+ 1,6
80	—	− 1,0	+ 3,0

6.2 Width

6.2.1 The preferred nominal widths are 160, 180, 200, 220, 240, 250, 260, 280, 300, 320, 340, 350, 360, 380, 400, 450, 500, 550, 600, 650, 700, 750, 800, 900, 1000, 1100 and 1200 mm.

However, all other widths in the range > 150 ≤ 1250 mm can also be supplied.

6.2.2 The permissible width variations are ±2 % of the nominal width, but with a maximum of ±10 mm (see also Section 8.3). Smaller values must be specially agreed.

6.3 Length

6.3.1 In the case of orders without details of length, wide flats will be supplied in manufacturing lengths between 2000 and 12000 mm, at manufacturer's choice.

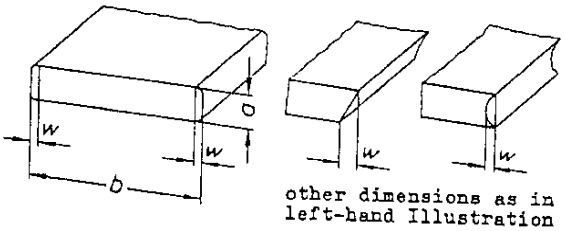
6.3.2 Wide flats can also be supplied in manufacturing lengths with a length range to be stated when ordering. In this case, the difference between the smallest and the greatest length in this range must be at least 500 mm (e.g. 3000 to 3500 mm).

6.3.3 When exact lengths are ordered (e.g. 3300 mm), it is permissible to exceed the nominal length by up to 200 mm. Smaller permissible excesses may be agreed, in which case values of 50 and 25 mm are to be preferred. It is not permissible to fall below the exact length ordered (see also Section 8.4).

6.4 Squareness of edges

The values for the permissible variation w from edge squareness (cf. Figure 1) are shown in Table 3.

Lower values than those according to Table 3 may be agreed for wide flats destined for further processing by cold drawing.



other dimensions as in left-hand Illustration

Figure 1. Possible forms of variation from edge squareness

Table 3. Squareness of edges

Nominal thickness a	Permissible variation w from edge squareness
≤ 13	2,0
> 13 ≤ 18	3,0
> 18	3,5

6.5 Straightness tolerance

6.5.1 The straightness tolerance q_1 (see Figure 2 and Section 8.6) is

0.0025 · l_1 for normally straight wide flats
0.00125 · l_1 for extra straight wide flats (L)

6.5.2 Over short distances, the straightness tolerance q_2 between two points at a distance l_2 (l_2 ≥ 1000 mm) apart may not exceed 0.0025 · l_2.

6.5.3 The values quoted in Sections 6.5.1 and 6.5.2 apply to wide flats of ≤ 50 mm thickness. For larger thicknesses, the straightness tolerance is to be agreed.

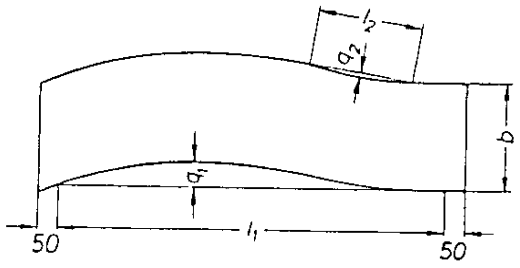


Figure 2.

6.6 Flatness tolerance

6.6.1 The flatness tolerance over the width (see Section 8.7.1) is 0.003 · b (b = nominal width) for wide flats of ≤ 50 mm thickness. For larger thicknesses, the values are to be agreed.

6.6.2 The flatness tolerances in the longitudinal direction, related to a gauge length of 1000 mm (see Sections 8.7 and 8.7.2), are

7 mm for normally flat
3 mm for extra flat (S).

6.6.3 The flatness tolerances over the whole length l_1 of the product in the longitudinal direction (see Sections 8.7 and 8.7.2) are

$0.007 \cdot l_1$, but with a maximum of 20 mm, for normally flat,
$0.003 \cdot l_1$, but with a maximum of 10 mm, for extra flat (S).

6.7 Squareness tolerance

The squareness tolerance u (see Figure 3) is

5 mm for widths b ≤ 500 mm,
0.01 · b for widths b > 500 mm

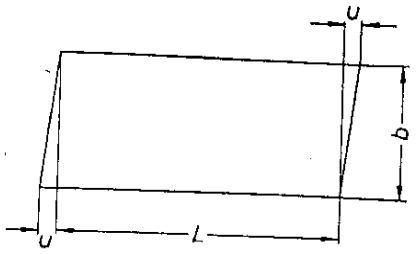


Figure 3.

7 Permissible weight variations

7.1 The values shown in Table 4 for permissible weight variations are applicable to deliveries of wide flats in exact lengths having the same nominal dimensions and made of the same steel grade.

In the case of delivered quantities over 50 t, the permissible weight variations may be specially agreed.

Table 4. Permissible weight variations

Quantity delivered t	Permissible weight variation %
< 5	+8 −4
≥ 5 ≤ 15	+8 −2
> 15	+6 −2

7.2 The weight variation is deemed to be the difference between the actual weight and the theoretical weight calculated from the nominal cross-section and the sum of the nominal lengths of the delivered products. The density values (7.85 kg/dm³ for unalloyed steels) shown in the appropriate quality standard for the steel grades are to be applied to the calculation of the theoretical weight.

8 Testing dimensional accuracy

8.1 The thickness may be measured at any point on the product at a distance of at least 20 mm from the longitudinal edge.

8.2 The difference in thickness across the width is to be determined on a line running at right angles to the longitudinal edges. The measuring points must be at a distance of at least 20 mm from the longitudinal edges and at least 100 mm from the ends of the sheet or bar.

8.3 The width may be measured at any point at right angles to the longitudinal axis of the product.

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

8.5 The permissible variation from edge squareness is to be determined according to Figure 1.

8.6 The straightness tolerance is deemed to be the greatest distance between a longitudinal edge and the straight line joining the two ends of the measuring distance. It is measured on the concave side. When determining the variation, a length of 50 mm at each end of the sheet or bar is to be disregarded (see also Figure 2).

8.7 For testing the flatness tolerance, the product should rest freely on a horizontal flat support. The variation is deemed to be the greatest distance between the product and this support or between the product and a 1000 mm long straightedge when testing according to Section 6.6.2.

8.7.1 The flatness tolerance over the width is to be determined on a line running at right angles to the longitudinal edges of the product; the measuring distance is taken as the width of the product.

8.7.2 Testing of the flatness tolerance in the longitudinal direction is effected on a line running parallel to the longitudinal edges at a distance of at least 400 mm from the ends of the product, in the case of normally flat, and of at least 200 mm in the case of extra flat.

8.8 The squareness tolerance is to be determined according to Figure 3.

Explanations

In the course of revision of all dimension standards for flat steel products, DIN 59200 has also been amended. In so doing, the aim was the greatest possible conformity to the specifications of Euronorm 91-70 - Hot rolled wide flats; permissible dimension and form variations - (June 1970), issued by the European Coal and Steel Community. The main changes, as compared with the previous September 1959 issue of the DIN standard, are described below.

1. The scope has been extended to include thicknesses of 4 to over 80 mm. The applicability of the Standard is no longer limited to general structural steels according to DIN 17100, but covers all unalloyed and alloyed steels in accordance with the quality standards and delivery specifications mentioned in Section 5.

2. The original intention was, as in Euronorm 91, to dispense entirely with the quoting of preferred dimensions for the thickness and width (see October 1973 draft of the new version of DIN 59200). However, representatives of users and of the trade considered such provisions to be useful, and at the same time recommended that dimensions be limited to a relatively small number. The previous table was accordingly replaced by the information contained in Sections 6.1.1 and 6.2.1. Manufacturers attached importance to a statement that it should be possible to order and supply wide flats in all other dimensions falling within the scope of the Standard.

3. During the concluding negotiations on the present version of the DIN standard, all concerned concurred in the view that the values laid down in Euronorm 91 for permissible thickness variations did not justify a breakdown into two classes of dimensional accuracy. Because the Shipbuilding Classification Companies required the tolerances listed in Table 1, which are allocated asymmetrically in terms of the nominal dimension, it was considered wise to retain only these values (which are designated as Class A in both the Euronorm and the draft of the new version of DIN 59200), and to omit Class B (permissible thickness variations allocated symmetrically in terms of the nominal dimension, while retaining the same overall range as in Class A for the tolerances).

As compared with the September 1959 issue, the values for the thickness tolerances have thus been reduced, in some cases, by more than 50 %. Testing of the thickness can be effected at any point at a distance of at least 20 mm (previously at least 40 mm) from the longitudinal edges.

4. The permissible width variations have been limited to a maximum of $\pm$10 mm. When exact lengths are ordered, it is now permissible to exceed only the nominal dimension for the length.

5. The information on permissible form variations has been supplemented by provisions regarding squareness of edges, straightness variations over shorter lengths, flatness variations in the longitudinal direction and squareness of the products.