UDC 669.14-422.42 June 1969

Bright Flat Steel
Dimensions, Permissible Variations, Weights

DIN 174

Blanker Flachstahl; Maße, zulässige Abweichungen, Gewichte

Dimensions in mm

1. Scope

This Standard applies to bright flat steel of rectangular cross-section in the dimensions indicated in Table 1 and in steel grades according to Section 5.

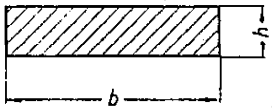
This Standard does n o t apply to bright key steel with rectangular cross-section (see DIN 6880)

2. Definition

Bright flat steel is descaled steel shaped by a cold, noncutting process imparting a smooth, bright finish and a correspondingly high standard of dimension accuracy.

By reason of the method of manufacture, a fully bright metallic finish is not obtainable on flat steel.

3. Designation



Designation of bright flat steel of width b = 16 mm and thickness h = 8 mm in the steel grade bearing the code number USt 37-1 K or the material number 1.0120.07:

Flat 16 x 8 DIN 174 - USt 37-1 K
or Flat 16 x 8 DIN 174 - 1.0120.07

In place of the denomination "flat" the abridged form "Fl" according to DIN 1353 Sheet 1 (at present still circulating as draft, August 1966 issue) may be used.

4. Dimensions and permissible dimension and form variations

4.1. Thickness and width

The thicknesses and widths in which bright flat steel is principally supplied according to this Standard, and the permissible variations on these dimensions, are indicated in Table 1.

4.2. Edge condition

Bright flat steel according to this Standard is supplied in widths up to 200 mm with sharp edges. In the case of widths over 120 mm, however, fully formed edges cannot be relied on, but the radiusing must not exceed 2 mm. If flat steel in this width range is to be supplied with sharp edges, this must be separately agreed when ordering.

4.3. Straightness

The bars are supplied straight as judged by the eye; any special requirements in regard to straightness are to be agreed when ordering (see Explanations).

5. Material

Bright flat steel according to this Standard is made mainly from USt 37-1 K according to DIN 1652; other grades of steel are to be specially agreed.

The desired grade of steel is to be stated when ordering.

6. Weight

The weight indicated in Table 1 has been calculated from the cross-section on the basis of a density of 7.85 kg/dm³.

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Table 1. Width, thickness and weight and permissible width and thickness variations

Width[1] b	Thickness h[1]																		
	(1,5)	1,6	2	2,5	3	4	5	6	8	10	12	(15)	16	20	25	(30)	32	40	50
permissible variation[2]	Permissible variation[2]																		
	−0,060					−0,075			−0,090		−0,110			−0,130			−0,250		
	Weight in kg/m																		
5	−0,075	—	—	0,079	0,098	0,118	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6		—	—	0,094	0,118	0,141	0,188	—	—	—	—	—	—	—	—	—	—	—	—	—
8	−0,090	(0,094)	0,100	0,126	0,157	0,188	0,251	0,314	0,377	—	—	—	—	—	—	—	—	—	—	—
10		(0,118)	0,126	0,157	0,196	0,236	0,314	0,393	0,471	—	—	—	—	—	—	—	—	—	—	—
12	−0,110	(0,141)	0,151	0,188	0,236	0,283	0,377	0,471	0,565	0,754	—	—	—	—	—	—	—	—	—	—
14		(0,165)	0,176	0,220	0,275	0,330	0,440	0,550	0,659	0,879	[1,10]	—	—	—	—	—	—	—	—	—
(15)		(0,177)	(0,188)	(0,236)	(0,294)	(0,353)	(0,471)	(0,589)	(0,707)	(0,942)	(1,18)	—	—	—	—	—	—	—	—	—
16		(0,188)	0,201	0,251	0,314	0,377	0,502	0,628	0,754	1,00	1,26	—	—	—	—	—	—	—	—	—
18		(0,212)	0,226	0,283	0,354	0,424	0,565	0,707	0,848	1,13	1,41	1,70	—	—	—	—	—	—	—	—
20	−0,130	(0,236)	0,251	0,314	0,393	0,471	0,628	0,785	0,942	1,26	1,57	1,88	[2,36]	2,51	—	—	—	—	—	—
22		—	—	0,345	—	0,518	0,691	0,864	1,04	1,38	1,73	2,07	—	—	—	—	—	—	—	—
25		—	—	0,393	0,491	0,589	0,785	0,981	1,18	1,57	1,96	2,36	(2,94)	3,14	3,93	—	—	—	—	—
28		—	—	0,440	—	0,659	0,879	1,10	1,32	1,76	2,20	2,64	—	3,52	4,40	—	—	—	—	—
(30)		—	—	(0,471)	(0,589)	(0,707)	(0,942)	(1,18)	(1,41)	(1,88)	(2,36)	(2,83)	[(3,53)]	(3,77)	(4,71)	[(5,89)]	—	—	—	—
32	−0,160	—	—	0,502	0,628	0,754	1,00	1,26	1,51	2,01	2,51	[3,01]	(3,77)	4,02	5,02	6,28*	—	—	—	—
(35)		—	—	(0,550)	(0,687)	(0,824)	(1,10)	(1,37)	(1,65)	(2,20)	(2,75)	(3,30)	(4,12)	(4,40)	(5,50)	(6,87)	—	—	—	—
36		—	—	0,565	0,707	0,848	1,13	1,41	1,70	[2,26]	2,83	3,39	(4,24)	[4,52]	5,65	—	—	—	—	—
40		—	—	0,628	—	0,942	1,26	1,57	1,88	2,51	3,14	3,77	(4,71)	5,02	6,28	7,85	(9,42)	10,0	—	—
45		—	—	0,707	—	1,06	1,41	1,77	2,12	2,83	3,53	(4,24)	(5,30)	5,65	7,07	8,83	[(10,6)]	11,3	—	—
50		—	—	0,785	—	1,18	1,57	1,96	2,36	3,14	3,93	4,71	(5,89)	6,28	7,85	9,81	(11,8)	12,6	—	—

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Width[1] b	permissible variation[2]	Thickness h[1]																		
		(1,5)	1,6	2	2,5	3	4	5	6	8	10	12	(15)	16	20	25	(30)	32	40	50
		permissible variation[2]																		
		−0,060					−0,075			−0,090		−0,110			−0,130			−0,250		
		Weight in kg/m																		
(55)	−0,190	—	—	—	—	(1,30)	(1,73)	(2,16)	—	(3,45)	(4,32)	(5,18)	(6,48)	(6,91)	(8,64)	—	—	—	—	—
56		—	—	—	—	1,32*	1,76*	2,20*	—	3,52*	4,40*	5,28*	(6,59)	7,03*	8,79*	11,0*	—	14,1	—	—
(60)		—	—	—	—	(1,41)	(1,88)	(2,36)	(2,83)	(3,77)	(4,71)	(5,65)	(7,07)	(7,54)	(9,42)	(11,8)	(14,1)	—	(18,8)	—
63		—	—	—	—	1,48	1,98	2,47	2,97	3,96	4,95	5,93	(7,42)	7,91*	9,89	12,4*	—	15,8	19,8*	—
(65)		—	—	—	—	—	(2,04)	(2,55)	(3,06)	—	—	—	—	—	—	—	—	—	—	—
70		—	—	—	—	—	2,20	2,75	3,30	[4,40]	5,50	6,59	(8,24)	8,79	11,0	13,7	(16,5)	—	22,0	—
80		—	—	—	—	—	—	3,14	3,77	[5,02]	6,28	7,54	(9,42)	10,0	12,6	15,7	(18,8)	—	[25,1]	[31,4]
90	−0,220	—	—	—	—	—	—	3,53	4,24	[5,65]	7,07	8,48	(10,6)	11,3	14,1	17,7	—	—	—	—
100		—	—	—	—	—	—	3,93	4,71	[6,28]	7,85	9,42	(11,8)	12,6	15,7	19,6	(23,6)	—	[31,4]	[39,3]
(120)	−2,0	—	—	—	—	—	—	—	(5,65)	[(7,54)]	(9,42)	(11,3)	(14,1)	(15,1)	(18,8)	(23,6)	(28,3)	—	—	—
125	−2,5	—	—	—	—	—	—	4,91*	5,89*	7,85*	9,81*	11,8*	—	15,7*	19,6*	24,5*	—	31,4*	39,3*	49,1*
(130)		—	—	—	—	—	—	—	(6,12)	[(8,16)]	(10,2)	(12,2)	(15,3)	—	—	—	—	—	—	—
140		—	—	—	—	—	—	—	6,59	[8,79]	11,0	13,2	(16,5)	—	—	—	—	—	—	—
(150)	±3,0	—	—	—	—	—	—	—	(7,07)	[(9,42)]	(11,8)	(14,1)	(17,7)	(18,8)	(23,6)	(29,4)	(35,3)	(37,7)	(47,1)	(58,9)
160		—	—	—	—	—	—	—	—	—	12,6	—	(18,8)	—	25,1	31,4	(37,7)	—	—	—
180	±4,0	—	—	—	—	—	—	—	—	—	14,1	—	(21,2)	—	28,3	35,3	(42,4)	—	—	—
200		—	—	—	—	—	—	—	—	—	15,7	—	(23,6)	—	31,4	39,3	[(47,1)]	50,2	[62,8]	78,5

Sizes for which the weights per unit length are shown in round brackets ( ) are not contained in the preferred number series R 10 and R 20 according to DIN 323 or are little used and therefore preferably avoided. It is intended to delete them in due course.

Sizes for which the weights per unit length are shown in square brackets [ ] should also be avoided where possible. Flat steel in these sizes, and also in other sizes for which no weights are indicated, can only be manufactured from the primary material by repeated drawing and must therefore be specially prepared.

Sizes for which the weights are identified by an asterisk (*) are contained in the preferred number series R 10 and R 20 according to DIN 323 and should therefore be ordered in preference to adjacent sizes in round brackets. Since there is little call for these sizes at the present time, however, it is advisable to make enquiries regarding delivery.

[1]) Apart from the dimensions indicated in the Table, flat steel is also available in widths of 250 and 300 mm and thicknesses of 10, 20, 32, 40 and 50 mm. Special agreement should be reached at the time of ordering regarding the condition of edges and side faces as well as permissible variations.

[2]) Corresponding to ISO tolerance zone h 11 for thicknesses from 1.5 to 30 mm and widths of 5 to 100 mm, corresponding to ISO tolerance zone h 12 for thicknesses over 30 mm. For widths over 100 cm special tolerances apply in view of the dimension accuracy of the hot rolled regular flats or wide flats from which these sizes have to be drawn.

7. Mode of delivery

7.1. For the delivery of bright flat steel in straight bars, the length particulars in Table 2 apply.

7.2. Bright flat steel in the smaller sizes can also be supplied in coils. Supply in this manner must be separately agreed when ordering and particulars of the required coil weights and sizes are to be stated.

7.3. Example of order

1000 kg of bright flat steel of width b = 16 mm and thickness h = 8 mm in the steel grade bearing the code number USt 37-1 K or material number 1.0120.07 in manufacturing lengths:

1000 kg flats 16 x 8 DIN 174 - USt 37-1 K
or 1000 kg flats 16 x 8 DIN 174 - 1.0120.07

8. Testing for dimension accuracy

8.1. Extent of testing

The number of bars or coils to be subjected to a check on dimension accuracy on dispatch from the manufacturer is to be agreed when ordering.

8.2. Test procedure

8.2.1. In the case of manufacturing lengths and stock lengths and on coils also, the thickness and width are always checked at a distance of 150 mm from the end. In the case of fixed lengths and accurate lengths, however, the thickness and width may be rechecked at a distance of 10 mm from the end of the bar.

8.2.2. When special requirements in respect of the straightness of bars are agreed, the method measuring straightness shall also be agreed.

Table 2.

Nature of length supplied	Length		Length specification when ordering
	Range	permissible variation	
Manufacturing length	6000 to 8000 [1]	anywhere between the limits stated for the length range; not more than 10 % of the delivered quantity may be supplied as short lengths up to half the lower limit.	none
Stock length	3000 to 4000	anywhere between the limits stated for the length range.	Stock length
Fixed length	1000 to 12 000	±100	desired fixed length in mm
Exact length	1000 to 12 000	less than ± 100 to ± 2; the following are preferred: ±50, ±25, ±10, ±5, ±2	desired exact length and desired permissible variation in mm

[1] When required, manufacturing lengths up to 15 000 mm are available.

Explanations

Through the new issue of DIN 1017 Sheet 2 "Hot rolled flat steel for special purpose (in bar drawing mills, bolt and screw factories etc.), dimensions, weights, permissible variations", which contains 172 flat steel sizes fewer than the June 1959 issue, the preparation of a new version of DIN 174 has also become necessary. The bright steel manufacturers called for the deletion of 60 sizes for which in recent years, according to the suppliers' statistics, demand was non-existent or only on a small scale, and for which the standard bar steel sizes were for the most part missing in the new issue of DIN 1017 Sheet 2.

In the course of the enquiries made and discussions held, support for this step was given by the majority of users. Consequently, 48 sizes in the range of cross-sections from 14 mm × 12 mm up to 140 mm × 50 mm ceased to be included in the new version of the standard. Fundamental objections were, however, raised against the deletion of sizes corresponding to the preferred number series R 10 and R 20 according to DIN 323. It was pointed out that in discussions on international specifications, e.g. ISO Recommendations, agreement was most likely to be reached on sizes corresponding to these preferred number series. For this reason it was desirable to leave them in DIN 174 also and to seek to ensure their use in new designs in preference to adjacent sizes not contained in the preferred number series. A solution which takes into account the present-day position with regard to orders and deliveries of bright flat steel whilst at the same time providing opportunities for increased future use of sizes conforming to the preferred number series has been adopted; this takes the form of an asterisk (*) placed behind the weight data in Table 1 to identify the sizes in question. These are the sizes which should be ordered preferentially. Since DIN 1017 Sheet 2 does not give any suitable primary material for these sizes, however, the question of availability should be raised each time with the bright steel manufacturers. The weights per unit length of some of the sizes have been placed in square brackets, since these sizes can only be made from the standard primary material by repeated drawing.

The following further amendments should be noted compared with the May 1959 issue of DIN 174.

Section 4.2 gives full particulars regarding e d g e c o n d i t i o n . These correspond with existing delivery practice for bright flat steel. Edge radii for widths over 120 mm have been limited to 2 mm max.; the sharp-edged condition must be specially agreed in this width range.

It was intended originally for Table 1 to be extended to cover s i z e s with widths of 250 and 300 mm. In these sizes, however, the edges and side faces are affected only slightly by cold drawing and the cross-section corresponds more or less to that of the hot rolled steel used as the starting material. Since it is not yet possible to lay down a general specification guaranteeing maximum values for permissible edge radiusing and width variation, reference to availability has been included only in the form of a Footnote to Table 1. The requirements to be met by flat steel in these widths are to be agreed when ordering.

In view of the dimension accuracy of the hot rolled primary material according to DIN 1017 Sheet 2, it has been necessary to widen the p e r m i s s i b l e d i m e n s i o n v a r i a t i o n s for widths from 120 to 140 mm. With regard to the mode of delivery, the range has been supplemented by bars of exact length.

The provisions regarding permissible variations on s t r a i g h t n e s s in Section 4.3 are to be regarded as only provisional. It is intended that the next issue of DIN 174 shall take account of the demand by users for accurate figures like those specified, for example, for drawn flat bars of copper and copper wrought alloys in DIN 1759.

The Committee for Iron and Steel invites comments and the submission of test data which will form the basis for supplementing the standard on this point at a later date.

It has not yet proved possible to accede to the wishes of users for the inclusion of detailed provisions regarding the s u r f a c e r o u g h n e s s of bright flat steel. On this point also, users are invited to submit test results and proposals for future specifications.