UDC 669.14-422.11-122.4 November 1976

Steel Bars

Hot Rolled Round Steel for General Purposes

Dimensions, Permissible Variations for Dimension and Form

DIN 1013 Part 1

Stabstahl; Warmgewalzter Rundstahl für allgemeine Verwendung; Maße, zulässige Maß- und Formabweichungen

For connection with Recommendation ISO/R 1035/1-1969 issued by the International Organization for Standardization (ISO) and Euronorm 60 issued by the European Coal and Steel Community, see Explanations.

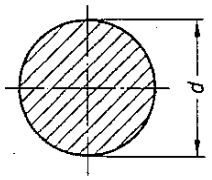
Dimensions in mm

1 Scope

This Standard applies to hot rolled round steel for general use in the form of straight bars of 8 to 200 mm diameter of the steel grades listed in Section 4.

Other dimension standards applying to hot rolled round steel are listed at the end of this Standard.

2 Designation



Designation of a hot rolled round steel of diameter d = 20 mm, with normal variations, of a steel with the code number USt 37-2 or material number 1.0036 *) according to DIN 17 100:

Round 20 DIN 1013 – USt 37-2
or Round 20 DIN 1013 – 1.0036

Designation of a hot rolled round steel of diameter d = 20 mm with precision variations (P), of a steel with the code number Ck 35 or material number 1.1181 according to DIN 17 200:

Round 20 P DIN 1013 – Ck 35
or Round 20 P DIN 1013 – 1.1181

Instead of the designation "round" the abbreviation "Rd" or the graphical symbol ∅ according to DIN 1353 Part 2 may be used.

*) New material number, which will be adopted in the successor issue of DIN 17 100 (formerly 1.0112)

3 Dimensions and permissible variations for dimension and form

3.1 Diameter

3.1.1 The diameters covered by this Standard are quoted in Table 1.

Series A contains the preferred diameters. Round steel in diameters of Series B should only be ordered if it is not possible to use a dimension from Series A.

3.1.2 The permissible variations for the nominal diameter (normal variations or precision variations) are also given in Table 1. If delivery with precision variations is required the code letter P should be quoted in the designation (see Section 2).

3.1.3 The difference between the largest and smallest diameter measured in the same cross-sectional plane, shall not exceed 80% of the permissible total variations for diameter according to Table 1 (e.g. maximum 0.8 mm for d = 20 mm).

Continued on pages 2 to 5
Explanations on page 5

Table 1. **Diameter, permissible variations, cross-section, weight and surface area**

Diameter d				Cross-section [3]	Weight [4]	Surface area
		Perm. var. [2]				
Series A [1]	Series B [1]	Normal variation	Precision variation (P)	cm^2	kg/m	cm^2/m
8		± 0,4	± 0,15	0,503	0,395	251
10				0,785	0,617	314
12			± 0,2	1,13	0,888	377
	13			1,33	1,04	408
14				1,54	1,21	440
	15			1,77	1,39	471
16		± 0,5		2,01	1,58	503
	17			2,27	1,78	534
18				2,54	2,00	565
	19			2,84	2,23	597
20				3,14	2,47	628
	21			3,46	2,72	660
22			± 0,25	3,80	2,98	691
	23			4,15	3,26	723
24				4,52	3,55	754
25				4,91	3,85	785
	26	± 0,6		5,31	4,17	817
27				5,73	4,49	848
28				6,16	4,83	880
30			± 0,3	7,07	5,55	942
31				7,55	5,92	974
32				8,04	6,31	1010
	34			9,08	7,13	1070
35				9,62	7,55	1100
	36	± 0,8		10,2	7,99	1130
37				10,8	8,44	1160
38				11,3	8,90	1190
40			± 0,4	12,6	9,86	1260
42				13,9	10,9	1320

[1] See Section 3.1.1.
[2] See Section 3.1.2.
[3] Cross-section = $\frac{d^2 \cdot \pi}{4} \approx 0.785 \cdot d^2$
[4] See Section 5.

Table 1. **Continued**

Diameter d				Cross-section [3]	Weight [4]	Surface area
		Perm. var. [2]				
Series A[1]	Series B[1]	Normal variation	Precision variation (P)	cm^2	kg/m	cm^2/m
44		± 0,8	± 0,4	15,2	11,9	1380
45				15,9	12,5	1410
	47			17,3	13,6	1480
	48			18,1	14,2	1510
50				19,6	15,4	1570
52		± 1		21,2	16,7	1630
	53			22,1	17,3	1670
55				23,8	18,7	1730
60				28,3	22,2	1880
	63			31,2	24,5	1980
65				33,2	26,0	2040
70				38,5	30,2	2200
75				44,2	34,7	2360
80				50,3	39,5	2510
	85	± 1,3		56,7	44,5	2670
90				63,6	49,9	2830
	95			70,9	55,6	2980
100				78,5	61,7	3140
110		± 1,5		95,0	74,6	3460
120				113	88,8	3770
	130	± 2		133	104	4080
140				154	121	4400
150				177	139	4710
160				201	158	5030
	170	± 2,5		227	178	5340
180				254	200	5650
	190			284	223	5970
200				314	247	6280

For 1) to 4) see page 2.

3.2 Straightness

Round steel according to this Standard shall be straight to within the permissible variations given in Table 2.

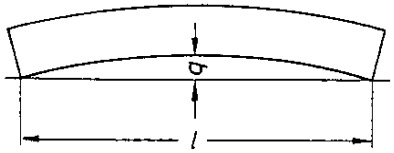


Table 2. **Permissible variations from straightness**

Diameter d Nominal value >	≦	Permissible variation q from straightness
–	25	not stipulated
25	80	$0{,}004 \cdot l$
80	200	$0{,}0025 \cdot l$

Any straightness requirements more stringent than these shall be agreed at the time of ordering.

4 Material

This Standard is applicable to all hot rolled steels. The required grade of steel shall be quoted in the designation.

5 Weight

The weight given in Table 1 has been calculated using a density of 7,85 kg/dm^3. For alloy steels, the density given in the relevant quality standards should be used for the weight calculation.

6 Mode of delivery

6.1 For delivery of hot rolled round steel according to this Standard, the information on lengths in Table 3 applies.

6.2 Where material is ordered by weight, the length may vary between the maximum and minimum dimensions quoted for manufacturing lengths.

6.3 Example of ordering

100 t of hot rolled round steel of diameter d = 20 mm with normal variations, of a steel with the Code number USt 37-2 or material number 1.0036 *) according to DIN 17 100 in manufacturing lengths:

100 t round 20 DIN 1013 – USt 37-2
or **100 t round 20 DIN 1013 – 1.0036**

7 Testing for accuracy to size

7.1 Extent of testing

The number of bars which shall be tested for accuracy to size by measurements at the manufacturer's works prior to dispatch, shall be agreed at the time of ordering.

7.2 Testing procedure

7.2.1 The diameter according to Section 3.1 shall be measured at a distance of at least 150 mm from the bar end in the case of delivery in manufacturing lengths, and at any point in the case of delivery in fixed or exact lengths.

7.2.2 When testing for straightness according to Section 3.2, the dimension q shall be measured over the full length of the bar.

Table 3. **Types of lengths and permissible length variations**

Type of length	Diameter d	Length: Range [1]	Length: Permissible variation	Length details to be given when ordering
Manufacturing length [2]	< 70 ≧ 70 < 120 ≧ 120 200	≧ 6 000 ≦ 12 000 ≧ 3 000 ≦ 9 000 ≧ 3 000 ≦ 6 000	See Section 6.2	None [2]
Fixed length	< 70 ≧ 70 < 120 ≧ 120 200	≧ 6 000 ≦ 12 000 ≧ 3 000 ≦ 9 000 ≧ 3 000 ≦ 6 000	± 100 [3]	Required fixed length in mm
Exact length	< 70 ≧ 70 < 120 ≧ 120 200	≧ 6 000 ≦ 12 000 ≧ 3 000 ≦ 9 000 ≧ 3 000 ≦ 6 000	< ± 100 Preferred: ± 50, ± 25; ± 10, ± 5 [3]	Required exact length and required permissible variation in mm

[1] The manufacturer should be asked about the possibility of supplying shorter or longer lengths.

[2] Round steel can also be supplied in limited manufacturing lengths falling within a range of length stipulated when ordering. The difference between the shortest and longest length in this range must be at least 2000 mm (e.g. 6000 to 8000).

[3] Subject to agreement when ordering, the total ranges for the permissible variations may be placed entirely on the plus side, e.g. $^{+\ 2}_{\ 0}$ 00 (instead of ± 100) for fixed lengths or $^{+\ 5}_{\ 0}$ 0 (instead of ± 25) for exact lengths.

*) See Page 1.

Other relevant standards

Dimension standards for hot rolled round steel

DIN 488 Part 2	Reinforcing steel, reinforcing steel bars; dimensions
DIN 1013 Part 2	Steel bars, hot rolled round steel for special purposes; dimensions, permissible variations for dimension and form
DIN 2077	Spring steel bars, round, rolled, for hot worked springs
DIN 59 130	Hot rolled round steel bars for bolts and rivets; dimensions, weights, permissible variations

Dimension standards for round wire rod

DIN 59 110	Steel wire rod; dimensions, permissible variations, weights
DIN 59 115	Steel wire rod for bolts, nuts and rivets; dimensions, permissible variations, weights

Explanations

In conjunction with the discussions on the revision of Euronorm 60 – Hot rolled round steel for general use – DIN 1013 (October 1963 issue) has also been revised. The main emphasis has been on efforts to reduce the number of standardized nominal diameters. The objective here was to find a compromise between the wishes of manufacturers and the needs of users. The discussion were based on statistics relating to quantities ordered and supplied in recent years and on the contents of international standards.

The scope of Euronorm 60 and also of ISO Recommendation R 1035/I (March 1969 issue) covers only hot rolled round steel for g e n e r a l use whilst DIN 1013 formerly covered a l l applications, i.e. it contained dimensions intended to cater for differing applications. In order to ensure comparability with international stipulations and to give customers a better idea of what could be supplied, the DIN standard has been sub-divided into a Part 1 – Hot rolled round steel for general purposes – and a Part 2 – Hot rolled round steel for special purposes (e.g. for further processing by drawing, for manufacture of chains etc.). DIN 1013 Part 1 is directly comparable with the international standards but there are as yet no international stipulations relating to round steel for special applications.

The October 1963 issue of DIN 1013 contains 123 nominal diameters. Of these 28 have been deleted. The diameter 30.5 mm has been newly added. Part 1 of the new issue contains 57 dimensions and Part 2 contains a further 39. The new issue of Euronorm 60 will contain 53 diameters.

In the revision, it was no longer necessary to provide for a number of previously standardized diameters in the lower dimension ranges because these are now mostly processed in the form of wire rod (in coils). In addition, diameters over 200 mm have been deleted because these are mostly ordered on the basis of special agreements and are supplied by only a few factories. In DIN 1013 Part 1, the dimensions – again on the basis of Euronorm 60 – have been divided into Series A and B. Preference should be given to diameters in Series A. The dimensions in Series B are used less widely and in some cases, they may involve long delivery dates. For Part 2, it did not appear necessary to make a division into a main series and a subsidiary series.

A fundamental innovation is the general introduction of a second tolerance class for nominal diameter, that of precision tolerances. The values correspond to those of the stipulations for screw and rivet steels according to DIN 59 130 and they can now be ordered for all grades of steel in diameters up to 50 mm, by using the code letter P. The discussions showed that for larger dimensions there was little demand for precision variations. Similarly, on the German side, it was not regarded as necessary to adopt in DIN 1013 Part 1 and Part 2 the further tolerance class with close tolerances (about 75 % of the values of the normal variations), as stipulated in Euronorm 93 and proposed for the ISO standards.

Both on the German side and internationally there was agreement that, in future, stipulations on permissible weight variations in the case of steel bar of simple cross-sectional shapes (e.g. round, square and flat steel) would be abandoned because these give no further technical information on the usability of these products. Correspondingly, in this new issue of DIN 1013 Part 1 and Part 2, all information on permissible weight variations has been deleted.