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October 1981

Bright steel shafts

Dimensions Permissible deviations
according to ISO tolerance zone h9

DIN
669

Blanke Stahlwellen; Masse, zulässige Abweichungen nach ISO-Toleranzfeld h9

Supersedes 05.59 edition

As it is current practice in standards published by the International Organization for Standardization (ISO), the comma has been used throughout as a decimal marker.

Dimensions in mm

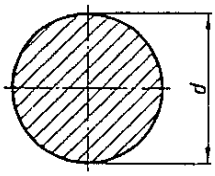
1 Field of application

This standard applies to bright steel shafts of nominal diameters from 5 to 200 mm, made of the steels listed in clause 5. Details as to finish and lengths to be delivered are given in clause 6.

2 Concept

The term bright steel shaft applies to a product of circular cross section which, as a result of descaling and non-cutting cold working or of a metal-cutting machining operation and subsequent polishing, has acquired a smooth bright surface and exhibits properly finished end faces.

3 Designation



3.1 For the standard designation the following must be indicated in the order stated:

- term;
- DIN number of the dimensional standard;
- code number or material number of the steel grade;
- code letters or identification numbers of the finish (see subclause 6.1) and, where appropriate, of the heat treatment;
- nominal diameter.

Examples:

Designation of a bright steel shaft of St 50-2 K steel (cold drawn and polished) in accordance with DIN 1652 of nominal diameter d = 20 mm:

Round DIN 669 — St 50-2 K — 20

or Round DIN 669 — 1.0533.07 — 20

Designation of a bright steel shaft of Ck 35 SH steel (peeled and polished) in accordance with DIN 1652 of nominal diameter d = 50 mm:

Round DIN 669 — Ck 35 SH — 50

or Round DIN 669 — 1.1181 SH — 50

3.2 The term "round" may be replaced by the abbreviation "Rd" in accordance with DIN 1353 Part 2.

4 Dimensions, permissible dimensional deviations and deviations of form

4.1 Diameter

4.1.1 Table 1 lists the nominal diameters which can be supplied.

4.1.2 The permissible deviations from the nominal diameter corresponding to ISO tolerance zone h9 (see also DIN 7160) are given in table 1.

4.1.3 The difference between the maximum and minimum diameter in the same cross-sectional plane must not exceed 50 % of the permissible range allowed for the deviation in diameter (e.g. a maximum of 0,026 mm for d = 20 mm).

Continued on pages 2 to 5

Table 1. **Diameters, permissible deviations, cross sections and weights of bright steel shafts**

Diameter d [1]	per. dev.	Cross section mm²	Weight kg/m
5	0 −0,030	19,63	0,154
5,5		23,76	0,187
6		28,27	0,222
6,5	0 −0,036	33,18	0,260
7		38,48	0,302
7,5		44,18	0,347
8		50,27	0,395
8,5		56,75	0,445
9		63,62	0,499
9,5		70,88	0,556
10		78,54	0,617
11	0 −0,043	95,03	0,746
12		113,1	0,888
13		132,7	1,04
14		153,9	1,21
15		176,7	1,39
16		201,1	1,58
17		227,0	1,78
18		254,5	2,00
19	0 −0,052	283,5	2,23
20		314,2	2,47
21		346,4	2,72
22		380,1	2,98
23		415,5	3,26
24		452,4	3,55
25		490,0	3,85
26		530,9	4,17
27		572,6	4,49
28		615,8	4,83
29		660,5	5,19
30		706,9	5,55
32	0 −0,062	804,2	6,31
34		907,9	7,13
35		962,1	7,55
36		1 018	7,99
38		1 134	8,90
40		1 257	9,86
42		1 385	10,9
45		1 590	12,5
48		1 810	14,2
50		1 963	15,4
52	0 −0,074	2 124	16,7
55		2 376	18,7
58		2 642	20,7
60		2 827	22,2
63		3 117	24,5
65		3 318	26,0
70		3 848	30,2
75		4 418	34,7
80		5 027	39,5
85	0 −0,087	5 675	44,5
90		6 362	49,9
100		7 854	61,7
110		9 503	74,6
120		11 310	88,8
125	0 −0,100	12 270	96,3
130		13 270	104
140		15 390	121
150		17 670	139
160		20 110	158
180		25 450	200
200	0 −0,115	31 420	247

[1] By agreement, other nominal diameters can also be supplied. In such cases, the weight (in kg/m) can be calculated from the product $0{,}00617 \cdot d^2$ (d in mm) on the basis of a density of 7,85 kg/dm³.

4.2 Straightness

Shafts are supplied straightened. Special requirements regarding straightness must be agreed on ordering.

5 Material

Bright steel shafts in accordance with this standard are preferably supplied in steel grades according to DIN 1651, DIN 1652, DIN 17 100, DIN 17 200, DIN 17 210 and DIN 17 440. Other steel grades can be supplied on agreement.

The required steel grade must be stated in the designation (see clause 3).

6 Finish and lengths to be delivered

6.1 Finish

6.1.1 Bright steel shafts in accordance with this standard are supplied either cold drawn (K) or peeled (SH), and in both cases subsequently polished.

6.1.2 The usual finishes are

cold drawn (K) and polished for diameters < 45 mm,

peeled (SH) and polished for diameters $\geqq 45 \leqq 150$ mm.

Shafts of diameters > 150 mm are normally supplied only with a peeled and polished finish.

6.1.3 The code letters for the required finish must be quoted in the designation (see clause 3). In the absence of the appropriate information, the choice of finish is left to the manufacturer.

6.2 Lengths to be delivered

6.2.1 Bright steel shafts in accordance with this standard are usually supplied in the types of length and the permissible deviations in length listed in table 2.

6.2.2 When ordered in manufacturing lengths or in stock lengths, the length may vary between the maximum and minimum dimensions listed in table 2. Shafts of a total weight not exceeding 10 % of the quantity supplied may fall below the lower limit shown for the length range, but the length must be at least 50 % of this lower limit.

6.2.3 In the case of diameters < 30 mm, shafts must be sheared off or separated at both ends, and for diameters $\geqq 30$ mm cut off or sawn off.

6.2.4 Examples for odering

a) 5000 kg bright steel shafts of St 50-2 K steel (cold drawn and polished) of diameter $d = 20$ mm in manufacturing lengths

5000 kg round DIN 669 – St 50-2 K – 20

or

5000 kg round DIN 669 – 1.0533.07 – 20

b) 3000 kg bright steel shafts of Ck 35 SH steel (peeled and polished) of diameter $d = 45$ mm in stock lengths 3000 to 4000 mm:

3000 kg round DIN 669 – Ck 35 SH – 45
stock length 3000 to 4000

or

3000 kg round DIN 669 – 1.1181 SH – 45
stock length 3000 to 4000

c) 1000 kg bright steel shafts of Ck 35 K steel (cold drawn and polished) of diameter $d = 10$ mm in exact lengths of 3500 mm with a permissible deviation in length of ± 10 mm:

1000 kg round DIN 669 – Ck 35 K – 10 x 3500 ± 10

or

1000 kg round DIN 669 – 1.1181.07 – 10 x 3500 ± 10

Table 2. **Types of length and permissible deviations in length**

Type of length	Length		Details for the length to be indicated on ordering
	Range	Permissible deviation	
Manufacturing length	3000 [1] to 12000	See subclause 6.2.2	None
Stock length	3000 to 4000 6000 to 7000	See subclause 6.2.2	"Stock length" and required length range
Exact length	1000 to 12000	To be indicated on ordering [2]	Required exact length and required permissible deviation [2] in mm

[1] For high-grade steel, 2000 to 12 000 mm

[2] The minimum deviations in length which may be ordered are

± 2 mm for exact lengths $\leqq 4000$ mm

± 5 mm for exact lengths > 4000 mm

7 Testing

7.1 Extent of testing

If acceptance testing has been agreed, the number of shafts to be tested for dimensional accuracy by the manufacturer must also be agreed.

7.2 Test procedure

7.2.1 In the case of shafts in manufacturing or stock lengths, the diameter must be measured at a distance of at least 100 mm from the end of the product. In the case of shafts in exact lengths with an agreed permissible deviation in length of less than ± 100 mm, testing must be carried out at a distance of at least 10 mm from the ends.

7.2.2 Checking of the specifications in subclauses 4.1.1 to 4.1.3 may be carried out by any suitable method (limit gap gauge, micrometer callipers, three-point measuring devices etc.). Testing must be carried out at room temperature.

Standards referred to

DIN	1353 Part 2	Abbreviations of terms for semi-finished products
DIN	1651	Free cutting steels; technical conditions of delivery
DIN	1652	Bright unalloyed steel; technical conditions of delivery
DIN	7160	ISO allowances for external dimensions (shafts) for nominal dimensions from 1 to 500 mm
DIN	17 100	Steels for general structural purposes; quality standard
DIN	17 200	Quenched and tempered steels; quality specifications
DIN	17 210	Case hardening steels; quality specifications
DIN	17 440	Stainless steels; quality specifications

Further standards

DIN	175	Polished round steel; dimensions, permissible deviations according to ISO tolerance zone h9
DIN	668	Bright round steel; dimensions, permissible deviations according to ISO tolerance zone h11
DIN	670	Bright round steel; dimensions, permissible deviations according to ISO tolerance zone h8
DIN	671	Bright round steel; dimensions, permissible deviations according to ISO tolerance h9
DIN	59 360	Ground and polished round steel; dimensions, permissible deviations according to ISO tolerance zone h7
DIN	59 361	Ground and polished round steel; dimensions, permissible deviations according to ISO tolerance zone h6

Previous editions

DIN 669: 10.23, 09.30, 05.59x

Amendments

As compared with the May 1959 edition, the following amendments have been made:

a) The stipulations regarding the designation of the products have been adapted to the rules laid down in DIN 820 Part 27 (clause 3 and subclause 6.2.4).

b) The number of nominal diameters listed in table 1 has been reduced.

c) Details on the materials concerned have been expanded (clause 5).

d) The stipulations on finish and lengths of the products to be delivered have been adapted to the present state of the art and to current ordering practices (clause 6 and table 2). (See also Explanations).

Explanations

The existing subsequent editions of dimensional standards on bright round steel (DIN 175, DIN 668, DIN 669, DIN 670, DIN 671, DIN 59360 and DIN 59361) are the outcome of discussions within a technical committee consisting of equal numbers of manufacturers and users. The proposal discussed therein, that all stipulations for the products in question be brought together in o n e standard, met with no support, especially from the representatives of the users, on the grounds of the numerous amendments to order documents, drawings, parts lists, etc., which this would entail. Accordingly, the previous splitting remained in principle unchanged for the time being, with the result that the following standards, listed in order of increasing dimensional accuracy, apply to the individual ISO tolerance zones:

h11: DIN 668

h9: DIN 175 (polished round steel),
DIN 671 (drawn or peeled round steel),
DIN 669 (bright steel shafts)

h8: DIN 670

h7: DIN 59360

h6: DIN 59361

The suggestion that these standards be combined may, if it is thought appropriate, be put into effect at a later revision provided that this proceeding will be adopted in the planned version of an international delivery condition for bright round steel.

The major amendments, as compared with previous editions of the DIN Standards, are explained once more below:

a) The range of nominal diameters covered has been reduced in some cases and extended in others. Details are given in the "Amendments" clause of the relevant standard.

b) Those nominal diameters which were not listed as preferred dimensions have been deleted from table 1 with a view to concentrating orders on a smaller number of nominal dimensions. In DIN 175 preferred dimensions are not mentioned, because, in practice, any nominal diameter in the range from 1 to 30 mm will be supplied when ordered.

c) The permissible deviations from the nominal diameter in the individual tolerance zones conform to DIN 7160 and thus to the stipulations of ISO/R 286 – 1962. As compared with the earlier editions of the dimensional standards, amendments have only been made in the diameter range from 1 to 1,6 mm, for which the same permissible dimensional deviations apply in DIN 7160 as for the range over 1,6 up to 3 mm.

d) With the approval of all parties concerned, concrete numerical values for the permissible deviations from straightness were dispensed with again, especially as no real objections were raised to this point. At the request of users, the words "to the eye" have been deleted from the stipulation "straight to the eye" because these words do not furnish any additional proof in cases of complaint. Manufacturers would have rather retained the previous stipulation, because, in their view, it had proved useful in practice and must be regarded as the strictest possible requirement on straightness.

e) The specifications for the appropriate materials (clause 5), finishes and lengths to be delivered (clause 6) have been adapted to the present state of the art. Otherwise, the contents of the standard remained factually almost unchanged.