UDC 621.882.54

DEUTSCHE NORMEN

June 1966

No guarantee can be given in respect of this translation
In all cases the latest German-language version of this standard shall be taken as authoritative

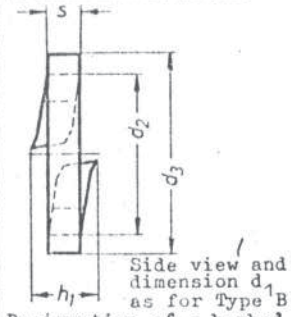
Spring Washers with Safety Ring

DIN 6913

Federringe mit Schutzmantel

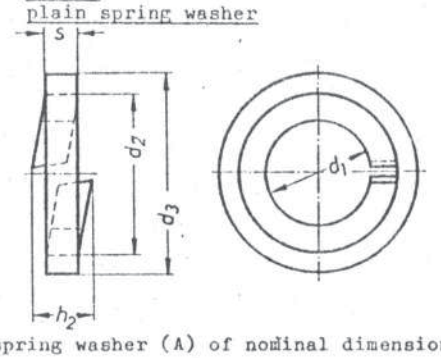
Dimensions in mm

Type A
barbed spring washer

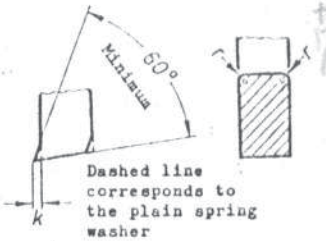


Side view and dimension d_1 as for Type B

Type B
plain spring washer



Form of barb for Type A
Spring washer shown without safety ring



Dashed line corresponds to the plain spring washer

Designation of a barbed spring washer (A) of nominal dimension 16, in spring steel 55 Si 7, with safety ring in St[1]):

Spring washer A 16 DIN 6913 - 55 Si 7 - St

Nominal dimension	d_1 Minimum	d_2	d_3	h_1	perm. var.	h_2	perm. var.	k[2])	r	s	Weight (7,85 kg/dm³) kg/1000 pieces ≈	for screws with thread
3	3,1	5,4	7 – 0,3	2,5	± 0,5	2,5	± 0,5	—	0,2	1,25	0,30	M 3
4	4,1	6,7	9 – 0,3	3,5	± 0,7	3,2	± 0,7	0,15	0,4	1,75	0,88	M 4
5	5,1	8,25	11 – 0,4	4	± 0,8	3,7	± 0,8	0,15	0,4	2	1,18	M 5
6	6,1	9,5	12 – 0,4	4,5	± 0,9	4,1	± 0,9	0,2	0,5	2,25	1,49	M 6
8	8,2	12,5	16 – 0,4	5,5	± 1,1	4,9	± 1,1	0,3	0,8	2,75	3,18	M 8
10	10,2	15	19 – 0,5	6	± 1,2	5,4	± 1,2	0,3	0,8	3	4,70	M 10
12	12,2	17,5	22 – 0,5	7	± 1,4	6,2	± 1,4	0,4	1,2	3,5	7,28	M 12
(14)	14,2	21	27 – 0,5	9	± 1,8	8,2	± 1,8	0,4	1,2	4,5	14,5	M 14
16	16,2	24	30 – 0,5	10	± 2	9,2	± 2	0,4	1,2	5	19,8	M 16
(18)	18,2	27	34 – 0,5	11	± 2,2	10,2	± 2,2	0,4	1,2	5,5	27,6	M 18
20	20,2	30	38 – 0,8	12,2	± 2,4	11,4	± 2,4	0,4	1,2	6,1	38,3	M 20
(22)	22,5	34	42 – 0,8	13,2	± 2,6	12,4	± 2,6	0,4	1,2	6,6	46,6	M 22
24	24,5	34	42 – 0,8	14,2	± 2,8	13,2	± 2,8	0,5	2	7,1	46,1	M 24
(27)	27,5	39	48 – 0,8	14,2	± 2,8	13,2	± 2,8	0,5	2	7,1	67,4	M 27
30	30,5	42	52 – 1	14,2	± 2,8	12,6	± 2,8	0,8	2	7,1	76,3	M 30
(33)	33,5	48	58 – 1	16,2	± 3,2	14,6	± 3,2	0,8	2	8,1	105	M 33
36	36,5	52	62 – 1	18,2	± 3,6	16,6	± 3,6	0,8	2	9,1	141	M 36
(39)	39,5	56	70 – 1	20,2	± 4	18,6	± 4	0,8	2	10,1	208	M 39
42	42,5	60	75 – 1	22,2	± 4,4	20,6	± 4,4	0,8	2	11,1	269	M 42

The bracketed sizes should be avoided where possible.

Material (to be stated when ordering): Spring washer: 55 Si 7 according to DIN 17221 or equivalent spring steel
SnBz8 according to DIN 17662 (only up to nominal diameter 22)

Safety ring: St = steel
Ms = brass

For finish and technical conditions of delivery, see page 2

Technical conditions of delivery

1. General condition

The surface of the spring washer and of the safety ring must be smooth and free from scale and burr.

The spring washers must be coiled with constant pitch and without any kinks (with the exception of the barbing of the ends). The ends of the spring washer which bite into the parent material must be sharp. The outer edges are generally square, but may also be lightly rounded. The bevelled ends must not expand the spring washer when the latter is compressed without the safety ring. The spring washers must not drop out of the safety ring.

[1]) When used for left-hand threads the designation reads, for example, as follows:
Spring washer A 16 left-hand DIN 6913 - 55 Si 7 - St

[2]) The barb k must be formed without any kinking in the final tenth of the spring washer circumference.

Continued on page 2

Nachdruck, auch auszugsweise, nur mit Genehmigung des DIN Deutsches Institut für Normung e. V., Berlin 30, gestattet.

Translation
Fachtechnisches Übersetzungsinstitut
Henry G. Freeman, Düsseldorf

2. Material and properties of material

2.1. Spring washers of spring steel

The material to be used for spring washers is spring steel 55 Si 7 according to DIN 17221 (Preliminary Standard) or an equivalent spring steel. In the normalized condition the spring steel shall exhibit a tensile strength of not less than 70 kp/mm^2 and an elongation of not less than 15 % as determined on the long proportional bar (δ_{10}).

Hardened and tempered spring washers in spring steel must have an HRC hardness of 45 to 52. According to DIN 50150 (Preliminary Standard) this corresponds to a Vickers hardness HV(p ≙ 5 kp) = 450 to 560 kp/mm^2.

2.2. Spring washers of spring bronze

The material to be used for spring washers is spring bronze SnBz8 according to DIN 17662. The spring bronze must have an elastic bending limit according to DIN 50151 of at least 40 kp/mm^2. The Vickers hardness (p ≙ 5 kp) of the spring washers must be 190 to 220 kp/mm^2.

3. Finish

3.1. Spring washers of spring steel

Spring washers of spring steel are supplied black whilst the steel safety rings are blued. Subject to special order they may also be supplied phosphated, nickel-plated, tinned, galvanized, copper-plated, cadmium-plated etc. The surface protection applied must not impair the properties of the material.

3.2. Spring washers of spring bronze

Spring washers of spring bronze are supplied bright.

4. Quality testing

4.1. Sampling and acceptance

When spring washers with safety ring are ordered from the trade or from a manufacturer in quantities up to 4000 washers, the customer is allowed to test some pieces selected at random.

When spring washers with safety ring are ordered from the manufacturer in quantities exceeding 4000 washers, they may be accepted in the manufacturer's works by the customer. Agreement shall be reached regarding the quantity to be tested (lot size) and on the testing of the material (wire rod).

If defective items are found, two substitute specimens may be taken for each specimen that fails, and each of these substitute specimens must prove satisfactory, otherwise the lot may be rejected.

Nominal dimension mm		Load kp
over	up to	≈
—	3	10
3	4	20
4	6	50
6	12	100
12	22	200
22	27	300
27	—	500

4.2. Loading test

4.2.1. S h o r t - t e r m l o a d i n g

After removal of the safety rings, the spring washers are to be subjected for about 3 minutes to the loads indicated below:

Following this, the free heights h_1 or h_2 are measured and these should lie within the permissible variation.

Next, the spring washers are subjected ten times more to the same load. After this loading test likewise the free height h_1 or h_2 must be within the permissible variation.

The spring washers only meet the conditions required in this Standard if after undergoing this testing they do not exhibit any fracture or incipient cracking.

4.2.2. L o n g - t e r m l o a d i n g

Ten spring washers separated from each other by flat washers are threaded on to a bolt and screwed up until fully compressed (solid height). When the pressure is released after 192 hours the washers must not fracture nor exhibit a free height below the minimum allowed for h_1 or h_2.

4.3. Hardness testing

The Rockwell hardness HRC shall be determined according to DIN 50103. The Vickers hardness test is covered by DIN 50133.

4.4. Torsion test

The spring washer must not fracture when twisted through 90° (see Fig. 1).

The washer must be bent open slowly and steadily (not jerkily) and precautions must be taken in case the ends fly off. For this test the clamping jaws shall be about 0.5 d_2 (d_2 = outside diameter of spring washer) apart (see Fig. 2).

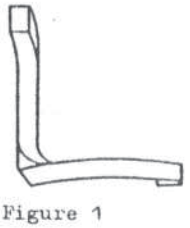


Figure 1

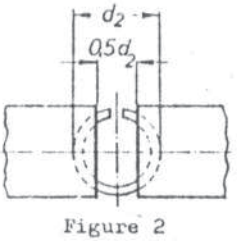


Figure 2

4.5. Fracture surface

The spring washer is notched and then fractured. The fracture surface shall have a fine-grained appearance and must not exhibit cracks.

5. Packing

Packages of spring washers with safety ring must bear the inscription "DIN 6913" and must be provided with clearly marked particulars of quantity, type, nominal dimension, material and origin of the washers.