UDC 621.887.6

April 1970

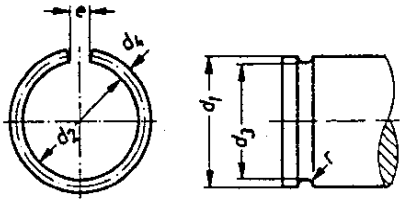
Round Wire Snap Rings and Snap Ring Grooves for Shafts and Bores

DIN 7993

Runddraht-Sprengringe und -Sprengringnuten für Wellen und Bohrungen

Dimensions in mm

Type A for shafts



Designation of a round wire snap ring Type A for shaft diameter d_1 = 20 mm:

Snap ring A 20 DIN 7993

Table 1

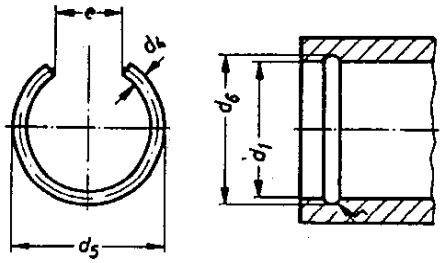
Shaft diameter d_1	d_2	perm. var.	d_3	perm. var.	d_4 [1]	e ≈	r	Loosening speed [2] U/min
4	3,1	0 −0,2	3,2	±0,05	0,8	1	0,5	175 000
5	4,1		4,2		0,8	1	0,5	112 000
6	5,1		5,2		0,8	1	0,5	77 000
7	6,1	0 −0,3	6,2	±0,05	0,8	2	0,5	57 000
8	7,1		7,2		0,8	2	0,5	44 000
10	9,1		9,2		0,8	2	0,5	28 000
12	10,8	0 −0,4	11	±0,05	1	3	0,6	24 000
14	12,8		13		1	3	0,6	17 800
16	14,2		14,4		1,6	3	0,9	22 000
18	16,2		16,4	±0,05	1,6	3	0,9	17 300
20	17,7	0 −0,5	18	±0,1	2	3	1,1	17 500
22	19,7		20		2	3	1,1	14 500
24	21,7	0 −0,5	22	±0,1	2	3	1,1	12 200
25	22,7		23		2	3	1,1	11 000
26	23,7		24		2	3	1,1	10 300
28	25,7	0 −0,5	26	±0,1	2	3	1,1	8 900
30	27,7		28		2	3	1,1	7 800
32	29,1	0 −0,6	29,5	±0,1	2,5	4	1,4	8 500
35	32,1		32,5		2,5	4	1,4	7 200
38	35,1		35,5		2,5	4	1,4	6 100
40	37,1		37,5		2,5	4	1,4	5 500
42	39	0 −0,8	39,5	±0,1	2,5	4	1,4	5 000
45	42		42,5		2,5	4	1,4	4 300
48	45		45,5		2,5	4	1,4	3 800
50	47	0 −0,8	47,5	±0,1	2,5	4	1,4	3 500
55	51,1		51,8	±0,15	3,2	4	1,8	3 700
60	56,1		56,8		3,2	4	1,8	3 100
65	61,1		61,8	±0,15	3,2	4	1,8	2 650
70	66	0 −1	66,8		3,2	5	1,8	2 300
75	71		71,8		3,2	5	1,8	2 000
80	76	0 −1	76,8	±0,15	3,2	5	1,8	1 750
85	81		81,8		3,2	5	1,8	1 550
90	86		86,8		3,2	5	1,8	1 380
95	91		91,8	±0,15	3,2	5	1,8	1 240
100	95,8	0 −1,2	96,8		3,2	5	1,8	1 120
105	100,8		101,8		3,2	5	1,8	1 030
110	105,8	0 −1,2	106,8	±0,15	3,2	5	1,8	930
115	110,8		111,8		3,2	5	1,8	850
120	115,8		116,8		3,2	5	1,8	780
125	120,8		121,8		3,2	5	1,8	720

[1]) Permissible variations for d_4 according to accuracy Class B DIN 2076

[2]) See also Explanations

Continued on page 2
Explanations on page 3

Type B for bores



Designation of a round wire snap ring Type B for bore diameter d_1 = 20 mm:

Snap ring B 20 DIN 7993

Table 2

Bore diameter d_1	d_4 [1]	d_5	perm. var.	d_6	perm. var.	e ≈	r
7	0,8	7,9	$+0,3$ 0	7,8	±0,05	4	0,5
8	0,8	8,9		8,8		4	0,5
10	0,8	10,9		10,8		4	0,5
12	1	13,2	$+0,4$ 0	13	±0,05	6	0,6
14	1	15,2		15		6	0,6
16	1,6	17,8		17,6		8	0,9
18	1,6	19,8	$+0,4$ 0	19,6	±0,05	8	0,9
20	2	22,3	$+0,5$ 0	22	±0,1	10	1,1
22	2	24,3		24		10	1,1
24	2	26,3	$+0,5$ 0	26	±0,1	10	1,1
25	2	27,3		27		10	1,1
26	2	28,3		28		10	1,1
28	2	30,3	$+0,5$ 0	30	±0,1	10	1,1
30	2	32,3		32		10	1,1
32	2,5	34,9	$+0,6$ 0	34,5		12	1,4
35	2,5	37,9	$+0,6$ 0	37,5	±0,1	12	1,4
38	2,5	40,9		40,5		12	1,4
40	2,5	42,9		42,5		12	1,4
42	2,5	45	$+0,8$ 0	44,5	±0,1	16	1,4
45	2,5	48		47,5		16	1,4
48	2,5	51		50,5		16	1,4
50	2,5	53	$+0,8$ 0	52,5	±0,1	16	1,4
55	3,2	58,9		58,2	±0,15	20	1,8
60	3,2	63,9		63,2		20	1,8
65	3,2	68,9	$+0,8$ 0	68,2	±0,15	20	1,8
70	3,2	74	$+1$ 0	73,2		25	1,8
75	3,2	79		78,2		25	1,8
80	3,2	84	$+1$ 0	83,2	±0,15	25	1,8
85	3,2	89		88,2		25	1,8
90	3,2	94		93,2		25	1,8
95	3,2	99	$+1$ 0	98,2	±0,15	25	1,8
100	3,2	104,2	$+1,2$ 0	103,2		32	1,8
105	3,2	109,2		108,2		32	1,8
110	3,2	114,2	$+1,2$ 0	113,2	±0,15	32	1,8
115	3,2	119,2		118,2		32	1,8
120	3,2	124,2		123,2		32	1,8
125	3,2	129,2		128,2		32	1,8

Material: Spring steel wire according to DIN 17223 Sheet 1

for snap rings up to d_4 = 1 mm: wire grade C
for snap rings with d_4 = 1.6 mm and upwards: wire grade B

Finish: oiled

free from burr in the axial direction and radially outwards
The lack of flatness (wind) of the snap rings must not exceed 1.5 × wire diameter d_4.

[1]) Permissible variations for d_4 according to accuracy Class B DIN 2076

Explanations

The standard DIN 9045 contains snap rings capable of use in like manner for external and internal retaining duty. This necessarily entails a gap between the two ends of the wire to permit installing as an internal retaining device, in other words when being fitted the snap ring must be capable of being compressed to the bore diameter. When used as an external retaining device the relatively large separation of the two ends of the wire means an unnecessary impairment of the retaining properties. This has proved unsatisfactory in practice. Furthermore it has been shown that the best retaining action can only be obtained when the ring cross-section is accommodated to 50 % in the shaft or bore, as the case may be.

The present Standard DIN 7993 separates round wire snap rings into

Type A for shafts, and
Type B for bores

The dimensions of the shaft and bore grooves are so specified that the 50 % contact of the ring in the groove referred to above is assured. This does not take account of any tolerances on the shaft and bore. No general provisions in respect of this can be made within the scope of the Standard. The designer must therefore check whether, depending on the position and size of the tolerances, other groove diameters may be needed in particular cases in order to ensure that the snap ring is correctly positioned.

At high rotational speeds the use of snap rings for shafts is limited by centrifugal forces. Therefore, loosening speeds have been included; these have been calculated by the following formula:

$$n = \frac{3\,500\,000 \cdot d_4}{d_1^2}$$

The nominal diameter range for snap rings of Type A and B (shaft and bore diameter) corresponds to that of DIN 9045. The correlation of wire diameters to shaft and bore diameters is also identical with the latter standard. The snap rings of Type A, however, are not interchangeable with those so far specified in DIN 9045. Nor are the snap ring grooves identical in the two standards. It is proposed to withdraw DIN 9045 after a suitable transition period and to replace it by DIN 7993.