DIN 471-2011
Retaining rings for shafts-Normal type and hervy type

The designs shown in Figure 1 are for illustrative purposes only; however, the dimensions of retaining rings and grooves shall be as specified in Tables 1 and 2. The tolerances specified relate to retaining rings in their ; Unstressed Shape of ring at manufacturer's discretion uncoated condition; For other unspecified technical requirements, refer to DIN471-2011.

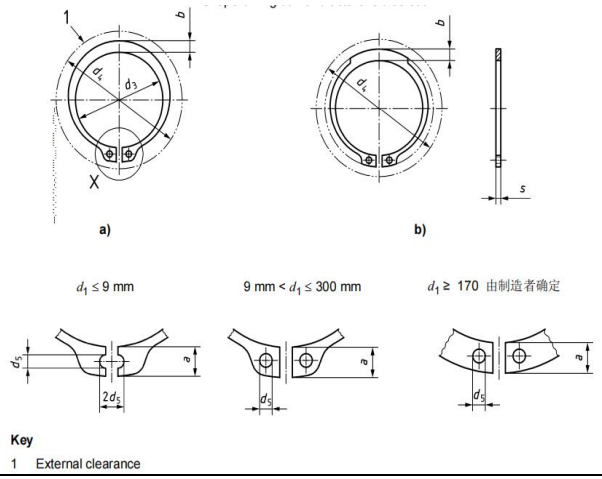

Figure 1 — Dimensions of

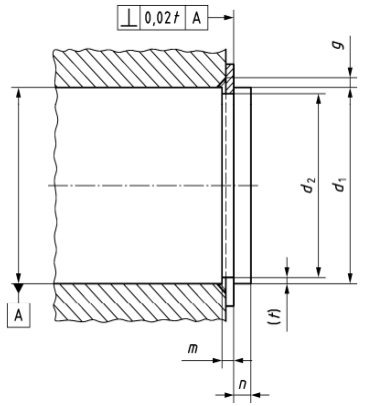

Figure 2 — Example of installation

Table 1 — Normal type Dimensions in millimetres

Nominal size d1	Ring							Groove		Supplementary datad			Performance and other tests						
	s	s perm. dev.	d3	d_3 perm. dev.	a max	b① ≈	d5 min	d_2	d_2 perm. dev.	d4	Fn kN	Fr kN	Testing the spiral flatness	Hardness	Testing the conical deformation		The outer diameter has contracted three consecutive times to (d3 *		nabl min-1
													d1≤100:s×1.5 d1＞100:s×1.8	HRC（HV）	Force F N ± 5 %	h-s Max	$d_6$②	d3≯d_2 min	
3	0.4	0 -0.05	2.7	0.04 -0.15	1.9	0.8	1.0	2.8	0 -0.04	7.0	0.15	0.47	0.6	470-580HV	30	0.024	3.03	2.76	360000
4	0.4		3.7		2.2	0.9	1.0	3.8	0 -0.05	8.6	0.20	0.50	0.6	470-580HV	30	0.027	4.04	3.75	211000
5	0.6		4.7		2.5	1.1	1.0	4.8		10.3	0.26	1.00	0.9	470-580HV	30	0.033	5.05	4.75	154000
6	0.7		5.6		2.7	1.3	1.2	5.7		11.7	0.46	1.45	1.05	470-580HV	30	0.039	6.06	5.65	114000
7	0.8		6.5	0.06 -0.18	3.1	1.4	1.2	6.7	0 -0.06	13.5	0.54	2.60	1.2	470-580HV	30	0.042	7.07	6.64	121000
8	0.8		7.4		3.2	1.5	1.2	7.6		14.7	0.81	3.00	1.2	470-580HV	30	0.045	8.08	7.54	96000

9	1.0		8.4		3.3	1.7	1.2	8.6		16.0	0.92	3.50	1.5	470-580HV	30	0.051	9.09	8.49	85000
10	1.0		9.3		3.3	1.8	1.5	9.6		17.0	1.01	4.00	1.5	470-580HV	30	0.054	10.1	9.49	84000
11	1.0		10.2		3.3	1.8	1.5	10.5		18.0	1.40	4.50	1.5	470-580HV	30	0.054	11.11	10.39	70000
12	1.0		11.0		3.3	1.8	1.7	11.5		19.0	1.53	5.00	1.5	470-580HV	30	0.054	12.12	11.39	75000
13	1.0		11.9		3.4	2.0	1.7	12.4		20.2	2.00	5.80	1.5	470-580HV	30	0.06	13.13	12.29	66000
14	1.0		12.9	0.10	3.5	2.1	1.7	13.4	0	21.4	2.15	6.35	1.5	470-580HV	30	0.063	14.14	13.29	58000
15	1.0		13.8	-0.36	3.6	2.2	1.7	14.3	-0.11	22.6	2.66	6.90	1.5	470-580HV	30	0.066	15.15	14.19	50000
16	1.0		14.7		3.7	2.2	1.7	15.2		23.8	3.26	7.40	1.5	470-580HV	30	0.066	16.16	15.09	45000
17	1.0		15.7		3.8	2.3	1.7	16.2		25.0	3.46	8.00	1.5	470-580HV	30	0.069	17.17	16.09	41000
18	1.2		16.5		3.9	2.4	2.0	17.0		26.2	4.58	17	1.8	47-54	30	0.072	18.18	16.89	39000
19	1.2		17.5		3.9	2.5	2.0	18.0		27.2	4.58	17	1.8	47-54	30	0.075	19.19	17.89	35000
20	1.2		18.5		4.0	2.6	2.0	19.0		28.4	5.06	17.1	1.8	47-54	30	0.078	20.2	18.87	32000
21	1.2		19.5	0.13	4.1	2.7	2.0	20.0	0	29.6	5.36	16.8	1.8	47-54	30	0.081	21.21	19.87	29000
22	1.2		20.5	-0.42	4.2	2.8	2.0	21.0	-0.13	30.8	5.65	16.9	1.8	47-54	30	0.084	22.22	20.87	27000
24	1.2	0	22.2		4.4	3.0	2.0	22.9		33.2	6.75	16.1	1.8	47-54	40	0.09	24.24	22.69	27000
25	1.2	-0.06	23.2		4.4	3.0	2.0	23.9		34.2	7.05	16.2	1.8	47-54	40	0.09	25.25	23.69	25000
26	1.2		24.2		4.5	3.1	2.0	24.9		35.5	7.34	16.1	1.8	47-54	40	0.093	26.26	24.69	24000
28	1.5		25.9	0.21	4.7	3.2	2.0	26.6	0	37.9	10.00	32.1	2.25	47-54	40	0.096	28.28	26.39	21200
29	1.5		26.9	-0.42	4.8	3.4	2.0	27.6	-0.21	39.1	10.37	31.8	2.25	47-54	40	0.102	29.29	27.39	20000
30	1.5		27.9		5.0	3.5	2.0	28.6		40.5	10.73	32.1	2.25	47-54	40	0.105	30.3	28.39	18900
32	1.5		29.6		5.2	3.6	2.5	30.3		43.0	13.85	31.2	2.25	47-54	40	0.108	32.32	30.05	16900
34	1.5		31.5		5.4	3.8	2.5	32.3		45.4	14.72	31.3	2.25	47-54	40	0.114	34.34	32.05	16100
35	1.5		32.2	0.25	5.6	3.9	2.5	33.0		46.8	17.80	30.8	2.25	47-54	40	0.117	35.35	32.75	15500
36	1.75		33.2	-0.5	5.6	4.0	2.5	34.0		47.8	18.33	49.4	2.625	47-54	40	0.12	36.36	33.75	14500
38	1.75		35.2		5.8	4.2	2.5	36.0		50.2	19.30	49.5	2.625	47-54	40	0.126	38.38	35.75	13600
40	1.75		36.5		6.0	4.4	2.5	37.5	0	52.6	25.30	51.0	2.625	47-54	60	0.132	40.4	37.25	14300
42	1.75		38.5		6.5	4.5	2.5	39.5	-0.25	55.7	26.70	50.0	2.625	44-51	60	0.135	42.42	39.25	13000
45	1.75		41.5	0.39	6.7	4.7	2.5	42.5		59.1	28.60	49.0	2.625	44-51	60	0.141	45.45	42.25	11400
48	1.75		44.5	-0.9	6.9	5.0	2.5	45.5		62.5	30.70	49.4	2.625	44-51	62	0.15	48.48	45.25	10300
50	2.0		45.8		6.9	5.1	2.5	47.0		64.5	38.00	73.3	3	44-51	63	0.153	50.5	46.75	10500

52	2.0		47.8		7.0	5.2	2.5	49.0		66.7	39.70	73.1	3	44-51	64	0.156	52.52	48.75	9850
55	2.0		50.8		7.2	5.4	2.5	52.0		70.2	42.00	71.4	3	44-51	65	0.162	55.55	51.70	8960
56	2.0		51.8		7.3	5.5	2.5	53.0		71.6	42.80	70.8	3	44-51	66	0.165	56.56	52.70	8670
58	2.0		53.8		7.3	5.6	2.5	55.0		73.6	44.30	71.1	3	44-51	67	0.168	58.58	54.70	8200
60	2.0		55.8		7.4	5.8	2.5	57.0		75.6	46.00	69.2	3	44-51	68	0.174	60.6	56.70	7620
62	2.0		57.8	0.46	7.5	6.0	2.5	59.0		77.8	47.50	69.3	3	44-51	69	0.18	62.62	58.70	7240
63	2.0	0	58.8	-1.1	7.6	6.2	2.5	60.0		79.0	48.30	70.2	3	44-51	70	0.186	63.63	59.70	7050
65	2.5	-0.07	60.8		7.8	6.3	3.0	62.0	0	81.4	49.80	135.6	3.75	44-51	71	0.189	65.65	61.70	6640
68	2.5		63.5		8.0	6.5	3.0	65.0	-0.30	84.8	52.20	135.9	3.75	44-51	72	0.195	68.68	64.70	6910
70	2.5		65.5		8.1	6.6	3.0	67.0		87.0	53.80	134.2	3.75	44-51	73	0.198	70.7	66.70	6530
72	2.5		67.5		8.2	6.8	3.0	69.0		89.2	55.30	131.8	3.75	44-51	74	0.204	72.72	68.70	6190
75	2.5		70.5		8.4	7.0	3.0	72.0		92.7	57.60	130.0	3.75	44-51	75	0.21	75.75	71.70	5740
78	2.5		73.5		8.6	7.3	3.0	75.0		96.1	60.00	131.3	3.75	44-51	76	0.219	78.78	74.70	5450
80	2.5		74.5		8.6	7.4	3.0	76.5		98.1	71.60	128.4	3.75	44-51	77	0.222	80.8	76.20	6100
82	2.5		76.5		8.7	7.6	3.0	78.5		100.3	73.50	128.0	3.75	44-51	60	0.228	82.82	78.20	5860
85	3.0		79.5		8.7	7.8	3.5	81.5		103.3	76.20	215.4	4.5	44-51	80	0.2	85.85	80.96	5710
88	3.0		82.5		8.8	8.0	3.5	84.5		106.5	79.00	221.8	4.5	44-51	80	0.2	88.88	83.96	5200
90	3.0	0	84.5	0.54	8.8	8.2	3.5	86.5		108.5	80.80	217.2	4.5	44-51	80	0.2	90.9	85.96	4980
95	3.0	-0.08	89.5	-1.3	9.4	8.6	3.5	91.5		114.8	85.50	212.2	4.5	44-51	80	0.2	95.95	90.96	4550
100	3.0		94.5		9.6	9.0	3.5	96.5	0	120.2	90.00	206.4	4.5	44-51	80	0.2	101	95.96	4180
105	4.0		98.0		9.9	9.3	3.5	101.0	-0.54	125.8	107.60	471.8	7.2	44-51	80	0.2	106.05	100.46	4740
110	4.0		103.0		10.1	9.6	3.5	106.0		131.2	113.00	457.0	7.2	44-51	80	0.2	111.1	105.46	4340
115	4.0		108.0		10.6	9.8	3.5	111.0		137.3	118.20	438.6	7.2	44-51	80	0.2	116.15	110.46	3970
120	4.0		113.0		11.0	10.2	3.5	116.0		143.1	123.50	424.6	7.2	44-51	80	0.2	121.2	115.46	3685
125	4.0		118.0		11.4	10.4	4.0	121.0		149.0	128.70	411.5	7.2	44-51	80	0.2	126.25	120.37	3420
130	4.0		123.0		11.6	10.7	4.0	126.0		154.4	134.00	395.5	7.2	44-51	80	0.2	131.3	125.37	3180
135	4.0		128.0		11.8	11.0	4.0	131.0		159.8	139.20	389.5	7.2	44-51	80	0.2	136.35	130.37	2950
140	4.0		133.0		12.0	11.2	4.0	136.0		165.2	144.5	376.5	7.2	44-51	80	0.2	141.4	135.37	2760
145	4.0		138.0		12.2	11.5	4.0	141.0		170.6	149.6	367.0	7.2	44-51	80	0.2	146.45	140.37	2600
150	4.0	0	142.0		13.0	11.8	4.0	145.0		177.3	193.0	357.5	7.2	44-51	80	0.2	151.5	144.37	2480

155	4.0	-0.1	146.0	0.63 -1.5	13.0	12.0	4.0	150.0	0 -0.63	182.3	199.6	352.9	7.2	44-51	150	0.2	156.55	149.37	2710
160	4.0		151.0		13.3	12.2	4.0	155.0		188.0	206.1	349.2	7.2	44-51	150	0.2	161.6	154.37	2540
165	4.0		155.5		13.5	12.5	4.0	160.0		193.4	212.5	345.3	7.2	44-51	150	0.3	166.65	159.37	2520
170	4.0		160.5		13.5	12.9	4.0	165.0		198.4	219.1	349.2	7.2	44-51	150	0.3	171.7	164.37	2440
175	4.0		165.5		13.5	12.9	4.0	170.0		203.4	225.5	340.1	7.2	44-51	150	0.3	176.75	169.37	2300
180	4.0		170.4		14.2	13.5	4.0	175.0		210	232.2	345.3	7.2	44-51	150	0.3	181.8	174.37	2180
185	4.0		175.5		14.2	13.5	4.0	180.0		215	238.6	336.7	7.2	44-51	150	0.3	186.85	179.37	2070
190	4.0		180.5		14.2	14.0	4.0	185.0		220	245.1	333.8	7.2	44-51	150	0.3	191.9	184.3	1970
195	4.0		185.5		14.2	14.0	4.0	190.0		225	251.8	325.4	7.2	44-51	150	0.3	196.95	189.3	1835
200	4.0		190.5		14.2	14.0	4.0	195.0		230	258.3	319.2	7.2	44-51	150	0.3	202	194.3	1770
210	5.0		198.0		14.2	14.0	4.0	204.0		240	325.1	598.2	9	40-47	150	0.3	212.1	203.3	1835
220	5.0		208.0	0.72 -1.7	14.2	14.0	4.0	214.0	0 -0.72	250	340.8	572.4	9	40-47	150	0.3	222.2	213.3	1620
230	5.0		218.0		14.2	14.0	4.0	224.0		260	356.6	548.9	9	40-47	150	0.3	232.3	223.3	1445
240	5.0		228.0		14.2	14.0	4.0	234.0		270	372.6	530.3	9	40-47	150	0.3	242.4	233.3	1305
250	5.0	0 -0.12	238.0		14.2	14.0	4.0	244.0		280	388.3	504.3	9	40-47	150	0.3	252.5	243.3	1180
260	5.0		245.0		16.2	16.0	5.0	252.0		294	535.8	540.6	9	40-47	150	0.3	262.6	251.19	1320
270	5.0		255.0		16.2	16.0	5.0	262.0		304	556.6	525.3	9	40-47	150	0.3	272.7	261.19	1215
280	5.0		265.0	0.81 -2	16.2	16.0	5.0	272.0	0 -0.81	314	576.6	508.2	9	40-47	150	0.3	282.8	271.19	1100
290	5.0		275.0		16.2	16.0	5.0	282.0		324	599.1	490.8	9	40-47	150	0.3	292.9	281.19	1005
300	5.0		285.0		16.2	16.0	5.0	292.0		334	619.1	475.0	9	40-47	150	0.3	303	291.19	930

①：Dimension b shall not exceed dimension a max.
②:Elasticity test to measure the dimension of the contracted outer diameter

Table 2 — Heavy type Dimensions in millimetres

Nominal size d1	Ring							Groove		Supplementary datad			Performance and other tests						
	s	s perm. dev.	d3	d_3 perm. dev.	a max	b① ≈	d5 min	d_2	d_2 perm. dev.	d4	Fn kN	Fr kN	Testing the spiral flatness	Hardness	Testing the conical deformation		The outer diameter has contracted three consecutive times to (d3 *		nabl min-1
													d1≤100:s×1.5 d1＞100:s×1.8	HRC（HV）	Force F N ± 5 %	h-s Max	$d_6$②	d3≯d_2 min	
15	1.50		13.8		4.8	2.4	2.0	14.3		25.1	2.66	15.5	1.0	47-54	60	0.07	15.2	6.40	57000
16	1.50		14.7	0.10	5.0	2.5	2.0	15.2	0	26.5	3.26	16.6	1.0	47-54	60	0.08	16.2	6.35	44000

17	1.50	0 -0.06	15.7	-0.36	5.0	2.6	2.0	16.2	-0.11	27.5	3.46	18.0	1.0	47-54	60	0.08	17.2	6.70	46000
18	1.50		16.5		5.1	2.7	2.0	17.0		28.7	4.58	26.6	1.5	47-54	60	0.08	18.2	5.85	42750
20	1.75		18.5	0.13 -0.42	5.5	3.0	2.0	19.0	0 -0.13	31.6	5.06	36.3	1.5	47-54	60	0.09	20.2	8.20	36000
22	1.75		20.5		6.0	3.1	2.0	21.0		34.6	5.65	36.0	1.5	47-54	60	0.09	22.2	8.10	29000
24	1.75		22.2	0.21 -0.42	6.3	3.2	2.0	22.9	0 -0.21	37.3	6.75	34.2	1.5	47-54	80	0.10	24.2	7.60	29200
25	2.0	0 -0.07	23.2		6.4	3.4	2.0	23.9		38.5	7.05	45.0	1.5	47-54	80	0.10	25.3	10.30	25000
28	2.0		25.9		6.5	3.5	2.0	26.6		41.7	10.00	57.0	1.5	47-54	80	0.11	28.3	13.40	22200
30	2.0		27.9		6.5	4.1	2.0	28.6		43.7	10.70	57.0	1.5	47-54	80	0.12	30.3	13.60	21100
32	2.0		29.6		6.5	4.1	2.5	30.3	0 -0.25	45.7	13.80	55.5	2.0	47-54	80	0.12	32.3	10.00	18400
34	2.5		31.5	0.25 -0.5	6.6	4.2	2.5	32.3		47.9	14.70	87.0	2.0	47-54	80	0.13	34.3	15.60	17800
35	2.5		32.2		6.7	4.2	2.5	33.0		49.1	17.80	86.0	2.0	47-54	80	0.13	35.4	15.40	16500
38	2.5		35.2		6.8	4.3	2.5	36.0		52.3	19.30	101.0	2.0	47-54	80	0.13	38.4	18.60	14500
40	2.5		36.5	0.39 -0.9	7.0	4.4	2.5	37.5		54.7	25.30	104.0	2.0	47-54	120	0.13	40.4	19.30	14300
42	2.5		38.5		7.2	4.5	2.5	39.5		57.2	26.70	102.0	2.0	47-54	120	0.14	42.4	19.20	13000
45	2.5		41.5		7.5	4.7	2.5	42.5		60.8	28.6	100.0	2.0	47-54	120	0.14	45.5	19.1	11400
48	2.5		44.5		7.8	5.0	2.5	45.5		64.4	30.7	101.0	2.0	47-54	120	0.15	48.5	19.5	10300
50	3.0	0 -0.08	45.8		8.0	5.1	2.5	47.0		66.8	38.0	165.0	2.0	44-51	120	0.15	50.5	32.4	10500
52	3.0		47.8		8.2	5.2	2.5	49.0		69.3	39.7	165.0	2.5	44-51	120	0.16	52.5	26.0	9850
55	3.0		50.8	0.46 -1.1	8.5	5.4	2.5	52.0	0 -0.30	72.9	42.0	161.0	2.5	44-51	120	0.16	55.6	25.6	8960
58	3.0		53.8		8.8	5.6	2.5	55.0		76.5	44.3	160.0	2.5	44-51	120	0.17	58.6	26.0	8200
60	3.0		55.8		9.0	5.8	2.5	57.0		78.9	46.0	156.0	2.5	44-51	120	0.17	60.6	25.4	7620
65	4.0	0 -0.1	60.8		9.3	6.3	3.0	62.0		84.6	49.8	346.0	2.5	44-51	120	0.19	65.7	58.0	6640
70	4.0		65.5		9.5	6.6	3.0	67.0		90.0	53.8	343.0	2.5	44-51	120	0.20	70.7	59.0	6530
75	4.0		70.5		9.7	7.0	3.0	72.0		95.4	57.6	333.0	2.5	44-51	120	0.21	75.8	58.0	5740
80	4.0		74.5		9.8	7.4	3.0	76.5		100.6	71.6	328.0	3.0	44-51	120	0.22	80.8	50.0	6100
85	4.0		79.5		10.0	7.8	3.5	81.5	0 -0.35	106.0	76.2	383.0	3.0	44-51	16	0.16	85.9	59.4	5710
90	4.0		84.5	0.54 -1.3	10.2	8.2	3.5	86.5		111.5	80.8	386.0	3.0	44-51	160	0.16	90.9	61.0	5980
100	4.0		94.5		10.5	9.0	3.5	96.5		122.1	90.0	368.0	3.5	44-51	160	0.18	101.0	51.6	4180

①：Dimension b shall not exceed dimension a max.
②:Elasticity test to measure the dimension of the contracted outer diameter