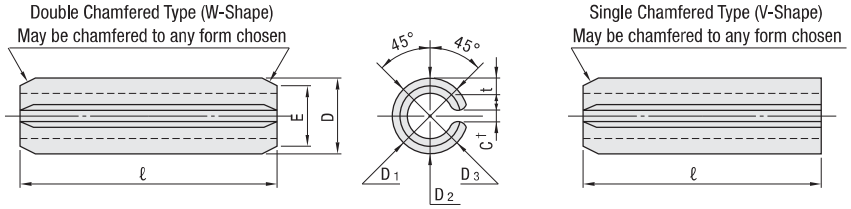
Shape and Dimensions of Spring Pins



*The size of Gap C should be able to avoid the contact between the spring pin and the hole in which the pin is to be inserted.

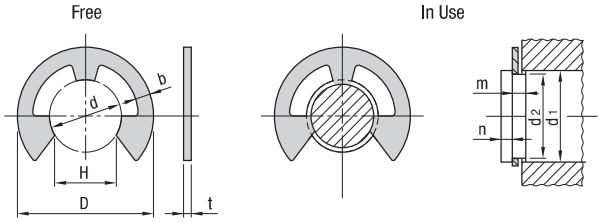
Unit: mm

Nominal Diameter			1	1.2	1.4	1.5	1.6	2	2.5	3	4	5	6	8	10	13
Spring Pins	D(1)	Max.	1.2	1.4	1.6	1.7	1.8	2.25	2.75	3.25	4.4	5.4	6.4	8.6	10.6	13.7
		Min.	1.1	1.3	1.5	1.6	1.7	2.15	2.65	3.15	4.2	5.2	6.2	8.3	10.3	13.4
	t (Reference)	For General Use	0.2	0.25	0.28	0.3	0.3	0.4	0.5	0.6	0.8	1	1.2	1.6	2	2.5
		Light Load	0.1	0.12	0.15	0.15	0.15	0.2	0.25	0.3	0.4	0.5	0.6	–	–	–
	E	(Max.)	0.9	1.1	1.3	1.4	1.5	1.9	2.4	2.9	3.9	4.8	5.8	7.8	9.8	12.7
	Double Shearing Load kN{kgf} Minimum Value	For General Use	0.69 {70}	1.02 {104}	1.35 {138}	1.55 {158}	1.68 {171}	2.76 {281}	4.31 {440}	6.20 {633}	10.80 {1130}	17.25 {1760}	24.83 {2532}	44.13 {4500}	68.94 {7030}	112.78 {11500}
		Light Load	0.38 {39}	0.56 {57}	0.80 {82}	0.87 {89}	0.93 {95}	1.55 {158}	2.42 {247}	3.49 {356}	6.21 {633}	9.70 {989}	13.96 {1424}	– –	– –	– –
Applicable Holes	Diameter		1	1.2	1.4	1.5	1.6	2	2.5	3	4	5	6	8	10	13
	Dimensional Tolerance		+0.08 0					+0.09 0			+0.12 0			+0.15 0		+0.2 0

ℓ	Dimensional Tolerance	Nominal Diameter 1	1.2	1.4	1.5	1.6	2	2.5	3	4	5	6	8	10	13
4	+0.5 0	0	0	0	0	0									
5		0	0	0	0	0	0	0							
6		0	0	0	0	0	0	0	0						
8		0	0	0	0	0	0	0	0	0					
10		0	0	0	0	0	0	0	0	0	0				
12	+1.0 0		0	0	0	0	0	0	0	0	0	0			
14				0	0	0	0	0	0	0	0	0			
16						0	0	0	0	0	0	0	0		
18							0	0	0	0	0	0	0	0	
20							0	0	0	0	0	0	0	0	
22								0	0	0	0	0	0	0	0
25								0	0	0	0	0	0	0	0
28									0	0	0	0	0	0	0
32									0	0	0	0	0	0	0
36										0	0	0	0	0	0
40										0	0	0	0	0	0
45											0	0	0	0	0
50											0	0	0	0	0
56	+1.5 0											0	0	0	0
63												0	0	0	0
70													0	0	0
80													0	0	0
90														0	0
100														0	0
110															0
125															0
140															0

Note(1): Maximum value for D is the maximum value on the pin's circumference, and the minimum value for D is the average of D_1, D_2 and D_3.
Reference: t is in accordance with JSMA (Japan Spring Manufactures Association Standard)No.6.

Shape and Dimensions of Retaining Ring-E Type



Reference: Typical shape is shown.

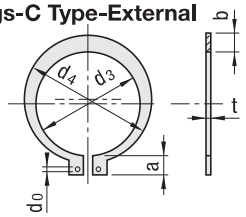
Unit: mm

Nominal	Retaining Rings d(1) Reference Dimension	d(1) Tolerance	D Reference Dimension	D Tolerance	H Reference Dimension	H Tolerance	t Reference Dimension	t Tolerance	b Approx.	Applicable Shaft (Reference) Classification of d_1 More than	or Less	d_2 Reference Dimension	d_2 Tolerance	m Reference Dimension	m Tolerance	n Min.
0.8	0.8	−0.08	2	±0.1	0.7		0.2	±0.02	0.3	1	1.4	0.8	+0.05	0.3		0.4
1.2	1.2		3		1		0.3	±0.025	0.4	1.4	2	1.2		0.4	+0.05 0	0.6
1.5	1.5	0 −0.09	4		1.3	0 −0.25	0.4	±0.03	0.6	2	2.5	1.5	+0.06 0	0.5		0.8
2	2		5		1.7		0.4		0.7	2.5	3.2	2				1
2.5	2.5		6		2.1		0.4		0.8	3.2	4	2.5				
3	3		7		2.6		0.6	±0.04	0.9	4	5	3		0.7		
4	4	0 −0.12	9	±0.2	3.5	0 −0.3	0.6		1.1	5	7	4	+0.075 0		+0.1 0	1.2
5	5		11		4.3		0.6		1.2	6	8	5				
6	6		12		5.2		0.8		1.4	7	9	6		0.9		
7	7	0 −0.15	14		6.1	0 −0.35	0.8		1.6	8	11	7	+0.09 0			1.5
8	8		16		6.9		0.8		1.8	9	12	8				1.8
9	9		18		7.8		0.8		2.0	10	14	9				2
10	10		20		8.7		1.0	±0.05	2.2	11	15	10		1.15		
12	12	0 −0.18	23	±0.3	10.4		1.0		2.4	13	18	12	+0.11 0		+0.14 0	2.5
15	15		29		13	0 −0.45	1.6(2)	±0.06	2.8	16	24	15		(2)		3
19	19	0 −0.21	37		16.5		1.6(2)		4.0	20	31	19	+0.13 0	1.75		3.5
24	24		44		20.8	−0.5	2.0	±0.07	5.0	25	38	24		2.2		4

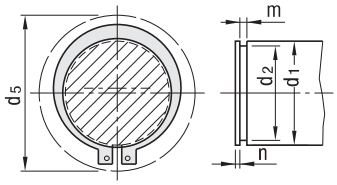
Note(1): d should be measured with a limit plug gauge.
Note(2): thickness(t)=1.6mm, may be kept at 1.5mm for the time being. m should be 1.65mm.
Reference: The recommended dimensions of the applicable shaft are given here for reference.

[Technical Data]
Retaining Rings C Type
Excerpts from JIS B 2804(2001)

1. Retaining Rings-C Type-External



The hole with diameter d_0 should be positioned to protrude out of the groove when the retaining ring is inserted in the shaft.



d_5 is the max. outer diameter when the retaining ring is fitted onto the shaft.

Retaining Rings-C Type-External

Unit: mm

Nominal(1)	Retaining Rings							Applicable Shaft (Reference)						
	d_3		t		b	a	d_0	d_5	d_1	d_2		m		n
	Reference Dimension	Tolerance	Reference Dimension	Tolerance	(Approx.)	(Approx.)	(Min.)			Reference Dimension	Tolerance	Reference Dimension	Tolerance	(Min.)
10	9.3	±0.15	1	±0.05	1.6	3	1.2	17	10	9.6	$^{0}_{-0.09}$	1.15	+0.14 0	1.5
(11)	10.2				1.8	3.1		18	11	10.5	0 −0.11			
12	11.1	±0.18			1.8	3.2	1.5	19	12	11.5				
(13)	12				1.8	3.3		20	13	12.4				
14	12.9				2	3.4	1.7	22	14	13.4				
15	13.8				2.1	3.5		23	15	14.3				
16	14.7				2.2	3.6		24	16	15.2				
17	15.7				2.2	3.7		25	17	16.2				
18	16.5		1.2	±0.06	2.6	3.8		26	18	17		1.35		
(19)	17.5				2.7	3.8	2	27	19	18				
20	18.5	±0.2			2.7	3.9		28	20	19	0 −0.21			
(21)	19.5				2.7	4		30	21	20				
22	20.5				2.7	4.1		31	22	21				
(24)	22.2				3.1	4.2		33	24	22.9				
25	23.2				3.1	4.3		34	25	23.9				
(26)	24.2				3.1	4.4		35	26	24.9				
28	25.9		1.6(2)		3.1	4.6		38	28	26.6		1.75		
(29)	26.9				3.5	4.7		39	29	27.6				
30	27.9				3.5	4.8		40	30	28.6				
32	29.6				3.5	5	2.5	43	32	30.3	0 − 0.25			
(34)	31.5	±0.25			4	5.3		45	34	32.3				
35	32.2				4	5.4		46	35	33				
(36)	33.2		1.8	±0.07	4	5.4		47	36	34		1.95		2
(38)	35.2				4.5	5.6		50	38	36				
40	37	±0.4			4.5	5.8		53	40	38				
(42)	38.5				4.5	6.2		55	42	39.5				
45	41.5				4.8	6.3		58	45	42.5				
(48)	44.5				4.8	6.5		62	48	45.5				
50	45.8		2		5	6.7		64	50	47		2.2		
(52)	47.8				5	6.8		66	52	49				
55	50.8	±0.45			5	7		70	55	52	0 −0.3			
(56)	51.8				5	7		71	56	53				
(58)	53.8				5.5	7.1		73	58	55				
60	55.8				5.5	7.2		75	60	57				
(62)	57.8				5.5	7.2		77	62	59				
(63)	58.8				5.5	7.3		78	63	60				
65	60.8		2.5	±0.08	6.4	7.4		81	65	62		2.7		2.5
(68)	63.5				6.4	7.8		84	68	65				
70	65.5				6.4	7.8		86	70	67				
(72)	67.5				7	7.9		88	72	69				
75	70.5				7	7.9		92	75	72				
(78)	73.5				7.4	8.1		95	78	75				
80	74.5				7.4	8.2		97	80	76.5				

Note(1): Priority should be given to values not in ( ). A value in ( ) may be used if necessary.

Note(2): Thickness(t)=1.6mm, may be kept at 1.5mm for the time being. m should be 1.65mm.

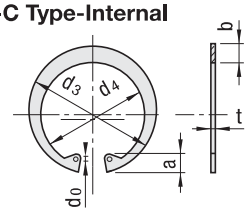
Reference: 1. The minimum width of the ring of the retaining ring should be less than the plate thickness t.

2. The recommended dimensions of the applicable shaft are given here for reference.

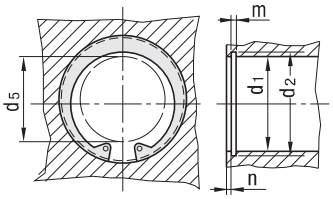
3. d_4 (mm) should preferably be equal to $d_4=d_3+(1.4\sim1.5)b$.

Reference: The thickness t, conforms to the Japan Spring Manufactures Association Standard, JSMA No. 6-1976 (steel belt for a spring).

2. Retaining Rings-C Type-Internal



The hole with diameter d0 should be positioned to protrude out of the groove when the retaining ring is inserted in the hole.



d5 is the minimum diameter of the internal circumference when the retaining ring is fitted.

Retaining Rings-C Type-Internal

Unit: mm

Nominal(1)	Retaining Rings							Applicable Shaft (Reference)						
	d3		t		b	a	d0	d5	d1	d2		m		n
	Reference Dimension	Tolerance	Reference Dimension	Tolerance	(Approx.)	(Approx.)	(Min.)			Reference Dimension	Tolerance	Reference Dimension	Tolerance	(Min.)
10	10.7	±0.18	1	±0.05	1.8	3.1	1.2	3	10	10.4	+0.11 0	1.15	+0.14 0	1.5
11	11.8				1.8	3.2		4	11	11.4				
12	13				1.8	3.3	1.5	5	12	12.5				
(13)	14.1				1.8	3.5		6	13	13.6				
14	15.1				2	3.6	1.7	7	14	14.6				
15	16.2				2	3.6		8	15	15.7				
16	17.3				2	3.7		8	16	16.8				
(17)	18.3	±0.2			2	3.8		9	17	17.8				
18	19.5				2.5	4		10	18	19	+0.21 0			
19	20.5				2.5	4	2	11	19	20				
20	21.5				2.5	4		12	20	21				
(21)	22.5				2.5	4.1		12	21	22				
22	23.5				2.5	4.1		13	22	23				
(24)	25.9		1.2	±0.06	2.5	4.3		15	24	25.2		1.35		
25	26.9				3	4.4		16	25	26.2				
(26)	27.9				3	4.6		16	26	27.2				
28	30.1	±0.25			3	4.6		18	28	29.4				
30	32.1				3	4.7		20	30	31.4	+0.25 0			
32	34.4				3.5	5.2	2.5	21	32	33.7				
(34)	36.5		1.6(2)		3.5	5.2		23	34	35.7		1.75		2
35	37.8				3.5	5.2		24	35	37				
(36)	38.8				3.5	5.2		25	36	38				
37	39.8				3.5	5.2		26	37	39				
(38)	40.8				4	5.3		27	38	40				
40	43.5	±0.4	1.8	±0.07	4	5.7		28	40	42.5		1.95		
42	45.5				4	5.8		30	42	44.5				
45	48.5				4.5	5.9		33	45	47.5				
47	50.5	±0.45			4.5	6.1		34	47	49.5				
(48)	51.5				4.5	6.2		35	48	50.5				
50	54.2		2		4.5	6.5		37	50	53	+0.3 0	2.2		
52	56.2				5.1	6.5		39	52	55				
55	59.2				5.1	6.5		41	55	58				
(56)	60.2				5.1	6.6		42	56	59				
(58)	62.2				5.1	6.8		44	58	61				
60	64.2				5.5	6.8		46	60	63				
62	66.2				5.5	6.9		48	62	65				
(63)	67.2				5.5	6.9		49	63	66				
(65)	69.2		2.5	±0.08	5.5	7		50	65	68		2.7		2.5
68	72.5				6	7.4		53	68	71				
(70)	74.5				6	7.4		55	70	73				
72	76.5				6.6	7.4		57	72	75				
75	79.5				6.6	7.8		60	75	78				
(78)	82.5	±0.55			6.6	8		62	78	81	+0.35 0			
80	85.5				7	8		64	80	83.5				

Note(1): Priority should be given to values not in( ). A value in( )may be used if necessary.

Note(2): Thickness(t)=1.6mm, may be kept at 1.5mm for the time being. m should be 1.65mm.

Reference: 1. The minimum width of the ring of the retaining ring should be less than the plate thickness t.

2. The recommended dimensions of the applicable shaft are given here for reference.

3. d4(mm)should preferably be equal to d4=d3−(1.4~1.5)b.

Reference: The thickness t, conforms to the Japan Spring Manufactures Association Standard, JSMA No. 6-1976 (steel belt for a spring).