

Fig. A

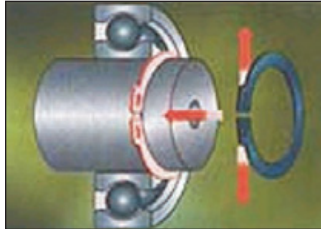


Fig. B

Overview

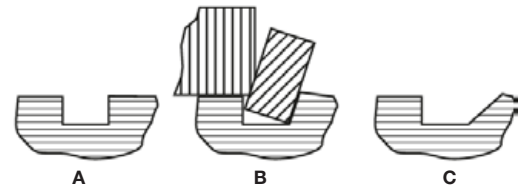
Retaining rings act as an artificial shoulder to retain an object in a housing (internal ring, Fig. A), or on a shaft (external ring, Fig. B). They replace pins, washers, threaded sections, collars and machine shoulders.

Retaining Ring Size

Selecting an improper retaining ring for an application can result not only in ring failure, but also complete system failure.

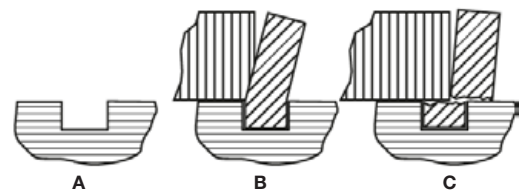
Retaining Ring Failure

Groove deformation is the most common type of retaining ring failure and can occur when the housing material is softer than the ring material. Groove failure can also occur if the ring is taken above its thrust load capacity. An example of groove failure is shown in the diagram at the right.

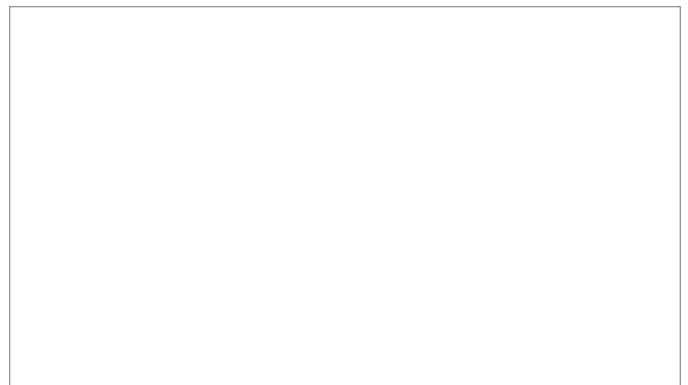


- A** Groove profile before loading
- B** Localized yielding of retained part and groove under load
- C** Groove profile after loading beyond thrust load capacity

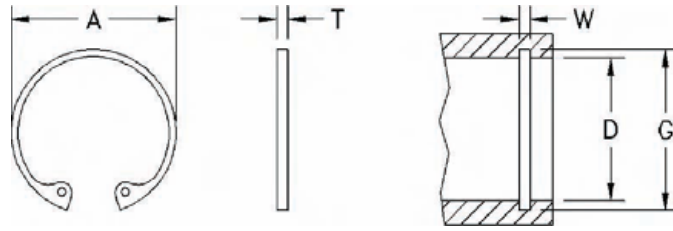
Ring shear is the second type of retaining ring failure. This happens when the shaft or housing material is hardened above the ring hardness. Because the groove material resists deformation, the ring is subject to shear.



- A** Groove profile before loading
- B** Localized yielding of retained part and groove under load
- C** Ring shear due to hardness of shaft.



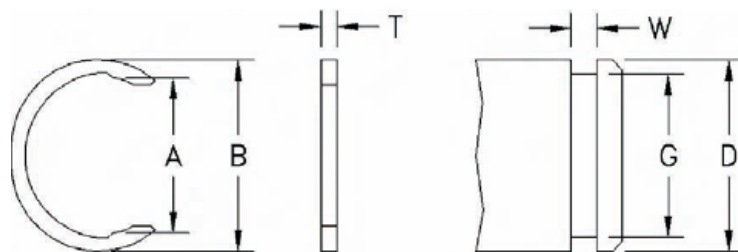
**Inch Series
Internal Retaining Rings**



Housing Dia. D	Dia. A	Thickness T	Groove Dia. G	Groove Width W	Housing Dia. D	Dia. A	Thickness T	Groove Dia. G	Groove Width W
0.250	0.280	0.015	0.268	0.018	1.500	1.660	0.050	1.594	0.056
0.312	0.346	0.015	0.330	0.018	1.562	1.734	0.062	1.658	0.068
0.375	0.415	0.025	0.397	0.029	1.625	1.804	0.062	1.725	0.068
0.438	0.482	0.025	0.461	0.029	1.688	1.874	0.062	1.792	0.068
0.500	0.548	0.035	0.530	0.039	1.750	1.942	0.062	1.858	0.068
0.562	0.620	0.035	0.596	0.039	1.812	2.012	0.062	1.922	0.068
0.625	0.694	0.035	0.665	0.039	1.875	2.054	0.062	1.989	0.068
0.688	0.763	0.035	0.732	0.039	1.938	2.141	0.062	2.056	0.068
0.750	0.831	0.035	0.796	0.039	2.000	2.210	0.062	2.122	0.068
0.812	0.901	0.042	0.862	0.046	2.062	2.280	0.078	2.186	0.086
0.875	0.971	0.042	0.931	0.046	2.125	2.350	0.078	2.251	0.086
0.938	1.041	0.042	1.000	0.046	2.250	2.490	0.078	2.382	0.086
1.000	1.111	0.042	1.066	0.046	2.312	2.560	0.078	2.450	0.086
1.062	1.180	0.050	1.130	0.056	2.375	2.630	0.078	2.517	0.086
1.125	1.249	0.050	1.197	0.056	2.440	2.702	0.078	2.584	0.086
1.188	1.139	0.050	1.262	0.056	2.500	2.775	0.078	2.648	0.086
1.250	1.388	0.050	1.330	0.056	2.625	2.910	0.093	2.781	0.103
1.312	1.456	0.050	1.396	0.056	2.750	3.050	0.093	2.914	0.103
1.375	1.526	0.050	1.461	0.056	2.825	3.191	0.093	3.051	0.103
1.438	1.596	0.050	1.528	0.056	3.000	3.325	0.093	3.182	0.103

(Ring dimensions are in inches.)

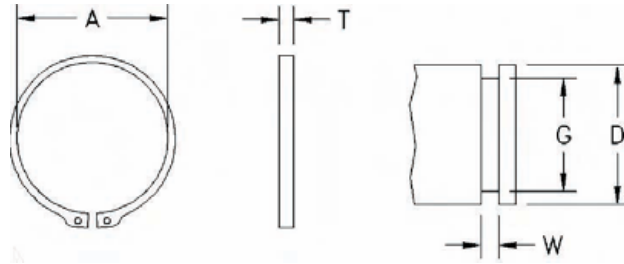
**Inch Series
External Crescent
Retaining Rings**



Shaft Dia. D	Free Dia. A	Thickness T	Dia. B	Groove Dia. G	Groove Width W	Static Thrust Load (Lb.)	
						Ring	Groove
7/32	0.187	0.025	0.275	0.193	0.029	260	100
3/8	0.328	0.025	0.448	0.335	0.029	440	265
1/2	0.441	0.035	0.851	0.450	0.039	825	440
5/8	0.553	0.035	0.715	0.563	0.039	1.030	690

(Ring dimensions are in inches.)

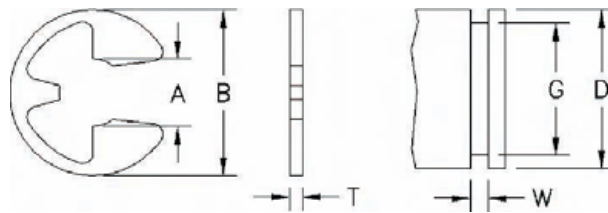
Metric Series External Retaining Rings



Shaft Dia. D	Groove		Ring		Thrust Load		RPM Limits
	Dia G	Width W	Thickness T	Free Dia. A	Ring (kN)	Groove (kN)	
4	3.80	0.50	0.40	3.70	0.50	0.20	211,000
6	5.70	0.80	0.70	5.60	1.45	0.40	114,000
8	7.60	0.90	0.80	7.40	3.00	0.80	96,000
10	9.60	1.10	1.00	9.30	4.00	1.00	84,000
12	11.50	1.10	1.00	11.00	5.00	1.50	75,000
14	13.40	1.10	1.00	12.90	6.40	2.10	58,000
15	14.30	1.10	1.00	13.80	6.90	2.60	50,000
16	15.20	1.10	1.00	14.70	7.40	3.20	45,000
18	17.00	1.30	1.20	16.50	17.00	4.50	39,000
20	19.00	1.30	1.20	18.50	17.10	5.00	32,000
22	21.00	1.30	1.20	20.50	16.90	5.60	27,000
25	23.90	1.30	1.20	23.20	16.20	7.00	25,000
28	26.60	1.60	1.50	25.90	32.10	10.00	21,200
29	27.60	1.60	1.50	26.90	31.80	10.30	20,000
30	28.60	1.60	1.50	27.90	32.10	10.70	18,900
32	30.30	1.60	1.50	29.60	31.20	13.80	16,900
36	33.00	1.60	1.50	32.20	30.80	17.80	15,500
38	36.00	1.85	1.75	35.20	49.50	19.30	13,600

(Ring dimensions are in millimeters.)

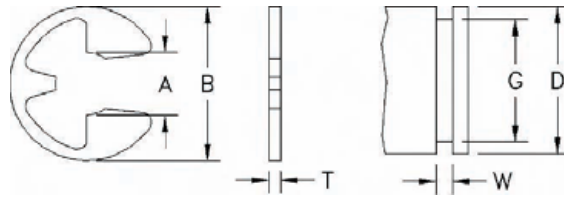
Metric Series External "E" Type Retaining Rings



Shaft Dia. D	Groove		Ring		Thrust Load		RPM Limits
	Dia G	Width W	Thickness T	Free Dia. A	Ring (kN)	Groove (kN)	
1.70	1.20	0.34	0.30	2.90	0.12	0.04	47,000
2.25	1.50	0.44	0.40	3.90	0.22	0.07	42,000
2.75	1.90	0.54	0.50	4.40	0.35	0.10	40,000
3.50	2.30	0.64	0.60	5.90	0.50	0.15	38,000
4.50	3.20	0.64	0.60	6.90	0.65	0.22	35,000
6.00	4.00	0.74	0.70	8.85	0.95	0.25	32,000
7.00	5.00	0.74	0.70	10.85	1.15	0.90	28,000
8.00	6.00	0.74	0.70	11.80	1.35	1.10	25,000
9.50	7.00	0.94	0.90	13.80	1.80	1.25	22,000
10.50	8.00	1.05	1.00	15.75	2.50	1.42	20,000
12.00	9.00	1.15	1.10	18.20	3.00	1.60	17,000
13.00	10.00	1.25	1.20	19.70	3.50	1.70	15,000
15.50	12.00	1.35	1.30	22.70	4.70	3.10	13,000
20.00	15.00	1.55	1.50	28.70	7.80	7.00	11,000
25.50	19.00	1.80	1.75	36.50	11.00	10.00	7,600

(Ring dimensions are in millimeters.)

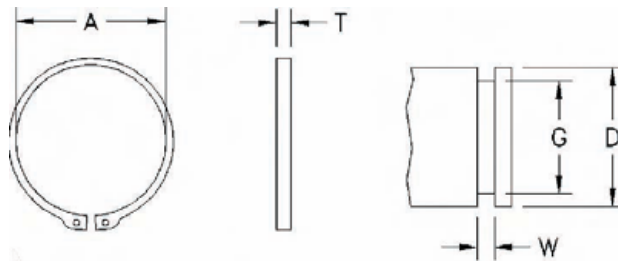
**Inch Series External
“E” Type Retaining Rings**



Shaft Dia. D	Ring Free Dia. A	Ring Thickness T	Ring Dia. B	Groove Dia. G	Groove Width W	Static Thrust Load (Lb.)	
						Ring	Groove
7/64	0.076	0.015	0.375	0.079	0.018	55	40
1/8	0.094	0.015	0.230	0.095	0.018	65	45
5/32	0.114	0.025	0.282	0.116	0.029	165	70
3/16	0.145	0.025	0.335	0.147	0.029	195	90
3/16	0.122	0.025	0.375	0.125	0.029	195	135
7/32	0.185	0.025	0.437	0.188	0.029	225	75
1/4	0.207	0.025	0.527	0.210	0.029	260	115
5/16	0.243	0.025	0.500	0.250	0.029	325	225
3/8	0.300	0.035	0.660	0.303	0.039	685	315
7/16	0.337	0.035	0.687	0.343	0.039	800	485
1/2	0.392	0.042	0.800	0.396	0.046	1,100	600
5/8	0.480	0.042	0.940	0.485	0.046	1,370	1,040
3/4	0.616	0.050	1.000	0.625	0.056	1,960	1,100
7/8	0.668	0.050	1.300	0.675	0.056	2,200	2,050
1	0.822	0.050	1.500	0.835	0.056	2,620	1,900

(Ring dimensions are in inches.)

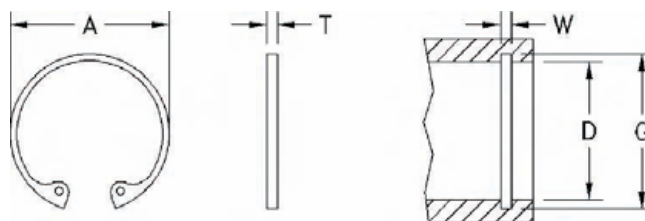
**Inch Series External
Retaining Rings**



Shaft Dia. D	Ring Dia. A	Ring Thickness T	Groove Dia. G	Groove Width W	Shaft Dia. D	Ring Dia. A	Ring Thickness T	Groove Dia. G	Groove Width W
0.125	0.112	0.010	0.117	0.012	1.250	1.156	0.050	1.176	0.056
0.156	0.142	0.010	0.146	0.012	1.312	1.214	0.050	1.232	0.056
0.188	0.168	0.015	0.175	0.018	1.375	1.272	0.050	1.291	0.056
0.250	0.225	0.025	0.230	0.029	1.438	1.333	0.050	1.350	0.056
0.281	0.256	0.025	0.261	0.029	1.500	1.387	0.050	1.406	0.056
0.312	0.281	0.025	0.290	0.029	1.562	1.446	0.062	1.468	0.068
0.375	0.338	0.025	0.352	0.029	1.625	1.503	0.062	1.529	0.068
0.438	0.396	0.025	0.412	0.029	1.750	1.618	0.062	1.650	0.068
0.500	0.461	0.035	0.468	0.039	1.812	1.675	0.062	1.708	0.068
0.551	0.509	0.035	0.519	0.039	1.875	1.735	0.062	1.769	0.068
0.562	0.521	0.035	0.530	0.039	2.000	1.850	0.062	1.886	0.068
0.625	0.579	0.035	0.588	0.039	2.062	1.906	0.078	1.946	0.086
0.688	0.635	0.042	0.646	0.046	2.125	1.964	0.078	2.003	0.086
0.750	0.693	0.042	0.704	0.046	2.250	2.081	0.078	2.120	0.086
0.781	0.722	0.042	0.733	0.046	2.312	2.139	0.078	2.178	0.086
0.812	0.751	0.042	0.762	0.046	2.375	2.197	0.078	2.239	0.086
0.844	0.780	0.042	0.791	0.046	2.438	2.255	0.078	2.299	0.086
0.875	0.810	0.042	0.821	0.046	2.500	2.313	0.078	2.360	0.086
0.938	0.867	0.042	0.882	0.046	2.625	2.428	0.078	2.481	0.086
1.000	0.925	0.042	0.940	0.046	2.750	2.543	0.083	2.602	0.103
1.062	0.982	0.050	0.998	0.056	2.875	2.659	0.093	2.721	0.103
1.125	1.098	0.050	1.118	0.056	3.000	2.775	0.093	2.838	0.103
1.188	1.098	0.050	1.118	0.056					

(Ring dimensions are in inches.)

**Metric Series
 Internal Retaining Rings**



Shaft Dia. D	Groove		Ring		Thrust Load	
	Dia G	Width W	Thickness T	Free Dia. A	Ring (kN)	Groove (kN)
10	10.40	1.10	1.00	10.80	4.00	1.08
12	12.50	1.10	1.00	13.00	4.00	1.60
14	14.60	1.10	1.00	15.10	4.50	2.25
15	15.70	1.10	1.00	16.20	5.00	2.80
16	16.80	1.10	1.00	17.30	5.50	3.40
18	19.00	1.10	1.00	19.50	6.50	4.80
19	20.00	1.10	1.00	20.50	6.80	5.10
20	21.00	1.10	1.00	21.50	7.20	5.40
22	23.00	1.10	1.00	23.50	8.00	5.90
24	25.20	1.30	1.20	25.90	13.90	7.70
25	26.20	1.30	1.20	26.90	14.60	8.00
27	28.40	1.30	1.20	29.10	13.30	10.10
28	29.40	1.30	1.20	30.10	13.30	10.50
29	30.40	1.30	1.20	31.10	13.60	10.90
30	31.40	1.30	1.20	32.10	13.70	11.30
32	33.70	1.30	1.20	34.40	13.80	14.60
35	37.00	1.60	1.50	37.80	26.90	18.80
38	40.00	1.60	1.50	40.80	28.20	22.50
40	42.50	1.85	1.75	43.50	44.60	27.00

(Ring dimensions are in millimeters.)