




























RETAINING RING MANUFACTURERS CROSS REFERENCE BY SERIES

	ARCON	WALDES	I.R.R.	ROTOR CLIP	MILITARY STANDARD
	N1300	N5000	3000	HO	MS16625**
	1400	5100	3100	SH	MS16624**
	1308	5008	4000	HOI	MS16627**
	1408	5108	4100	SHI	MS16626**
	1460	5160	7200	SHR	MS 3217**
	5560*	5560*	5560*	SHM	—
	1540	5144	1200	RE	MS 3215**
	1500	5133	1000	E	MS16633**
	1800	5103	2000	C	MS16632**
	5107	5107	5107	LC	MS90708**
	5304	5304	5304	PO	—
	T5304	T5304	T5304	POL	—
	1501	5131	1001	BE	MS16634**
	1301	N5001	3001	BHO	MS16629**
	1401	5101	3101	BSH	MS16628**
	N1302	N5002	N5002	VHO	MS16631**
	1402	5102	5102	VSH	MS16630**
	1440	5555	7100	SHF	MS90707**
	1465	5115	5115	TX	—
	1405	5105	6100	TY	—
	5590*	5590*	5590*	not offered	—
	5900*	5900*	5900*	not offered	—
	1305	5005	5005	TI	—
DIN METRIC RETAINING RINGS					
	ARCON	WALDES	DIN	ROTOR CLIP	SEGER
	D1300	D1300	472	DHO	J
	D1400	D1400	471	DSH	A
	D1500	D1500	6799	DE	RA
	M1465	M1465	M1465	DTX	ZA

* Available on Special Order Only.

** Military Standard References have a four digit dash number.
 The first digit identifies the material and finish.
 The last three digits indicate the size of the ring.

eg:MS 16625 -1025=1300-25 CD (Carbon Steel, Cadmium Dichromate) (We no longer supply)
 2025=1300-25 ZD (Carbon Steel, Zinc Dichromate)
 3025=1300-25 PP (Carbon Steel, Standard Phosphate)
 4025=1300-25 AS (Stainless Steel, Passivate)
 5025=1300-25 C (Beryllium Copper)

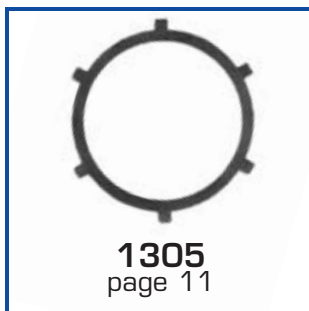
CONTENTS - Stamped & Metric Rings



**STANDARD
INTERNAL**



**BEVELED
INTERNAL**



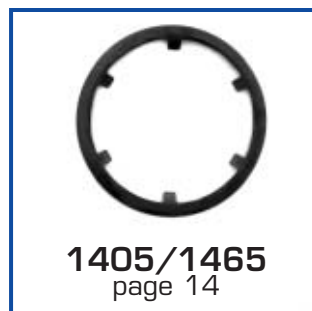
**PUSH-ON
INTERNAL**



**BALANCED LUG
INTERNAL**



**STANDARD
EXTERNAL**



**PUSH-ON/HEAVY
DUTY PUSH-ON
EXTERNAL**



**GRIP RING/ HEAVY
DUTY GRIP RING
EXTERNAL**



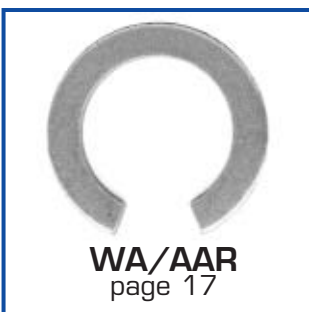
**E-RING
EXTERNAL**



**REINFORCED
E-RING EXTERNAL**



**C-RING
EXTERNAL**

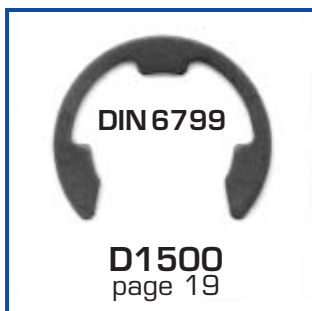


CRIMP RING



**KLIPRING®
EXTERNAL**

METRIC CIRCLIPS



**METRIC "E"
EXTERNAL**



**METRIC
EXTERNAL**



**METRIC
INTERNAL**

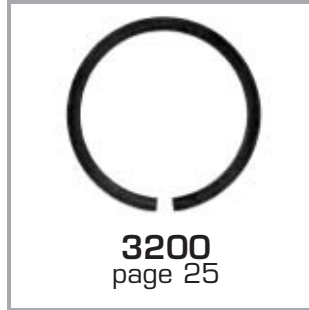
Wire / Specialty Rings - CONTENTS



ROUND SECTION



PLAIN WIRE RING



BEARING SNAP RING



ROUND SECTION EXTERNAL



SQUARE SECTION EXTERNAL



SPIRAL RINGS



RECTANGULAR SECTION EXTERNAL



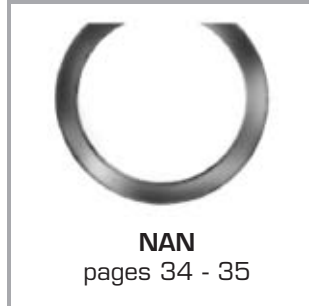
EXTERNAL NOTCHED RINGS



EXTERNAL RETAINING RINGS



EXTERNAL RETAINING RINGS



INTERNAL RETAINING RINGS



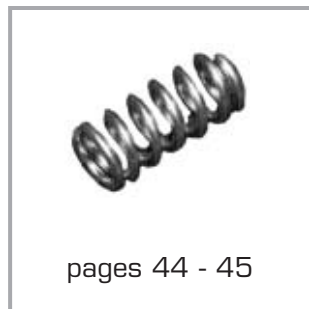
INTERNAL NOTCHED RINGS



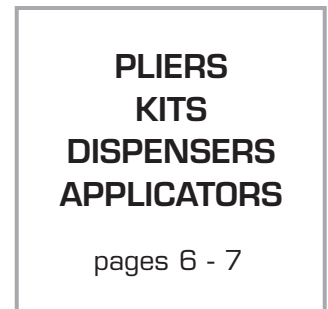
INTERNAL RETAINING RINGS (METRIC)



INTERNAL RETAINING RINGS



SPRINGS/ MISC



MATERIALS AND FINISHES

Material	Availability	Interchangeability Code			
		Anderton	Truarc	IRR	Rotor Clip
Carbon Steel (SAE1060-1090) Austempered for maximum performance. Maximum recommended operating temperatures for rings: 480°F (300°F under severe stress).	All rings except 1400 sizes 12 thru 23 1500 size 4 Series 500 thru 1000 (hard drawn carbon steel, work hardened and stress relieved)	S	S	ST	ST
Stainless Steel* PH 15-7 Mo (Armco) Precipitation hardened. Withstands all dilute non-acidic chemicals. The most effective material for long term resistance to industrial atmospheres. Maximum recommended operating temperatures for rings: 1000°F (850°F under severe stress).	N1300 sizes 25 thru 150 1308 sizes 75 thru 150 1400 sizes 25 thru 200 1408 sizes 50 thru 200 1440 all sizes 1460 sizes 39 thru 66 1500 all sizes except 4 1501, 1540, 1800 all sizes Other series & sizes on application	AS	H	SS2	SS2
Beryllium Copper* Alloy 25 Precipitation hardened. Poor resistance to industrial atmospheres but widely used in marine applications. Maximum recommended operating temperatures for rings: 660°F for limited period of time.	N1300 sizes 25 thru 150 1308 sizes 75 thru 150 1400 sizes 12 thru 200 1408 sizes 50 thru 200 1440 all sizes 1460 sizes 39 thru 66 1500, 1501, 1540, 1800 all sizes Other series & sizes on application	BC	C	BC	BC

*Not all sizes in Stainless Steel and Beryllium Copper in stock — inquire for availability.

Finish	Suitability	Interchangeability Code			
		Anderton	Truarc	IRR	Rotor Clip
Phosphate	Zinc-based coating sealed with lanolin-based oil. Provides added shelf-life plus a measure of protection in corrosive environments. Used as the standard finish for several PP series of rings. Coating weight in excess of 1000 mg/ft ² .	PP	PP	PA	PA
Bright Zinc*	Forms a barrier between the steel substrate and the corrosive environment. It is preferentially attacked, forming sacrificial anodes in the circuit made by its contact with the steel. Superior to Cadmium in general industrial use and considerably less expensive. Should not be used in conjunction with alkaline solutions, hot water or steam. Though not as toxic as Cadmium, it is not recommended for use where prolonged contact with foodstuffs is involved.	ZP	Z	ZB	ZF
Zinc Dichromate**		ZD	ZD	ZD	ZD

*Bright finish rings are clear passivated to improve resistance to finger stains and normal darkening during storage.

**Dichromate is a post-plating process, improving corrosion resistance and restricting the formation of "white rust" on Zinc plated surfaces under humid conditions. It has a yellowing effect on the finish.



THRUST LOAD CALCULATIONS

Special Materials

If circlips or grooves are produced in materials other than those shown in the catalog, then thrust load figures must be adjusted accordingly.

Groove

Groove materials may, in practice, vary considerably from our accepted norm of 'MILD STEEL.' The adjacent table shows typical figures for other common materials.

Multiply the catalog figure by conversion factor to obtain the modified groove thrust capacity:
 $T_g' = T_g \times C_{fg}$

For intermediate materials, groove capacity may be obtained by ratio method.

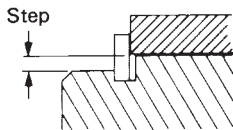
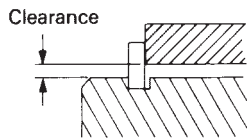
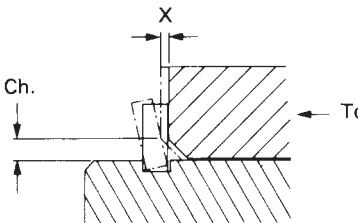
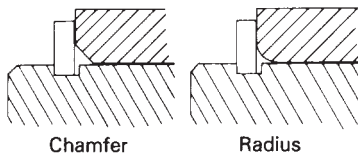
i.e. $T_c' = \frac{T_c \times Y'}{Y}$ (Actual)
 (Catalog)

Circlip

Conversion factors are listed in adjacent table for special circlip materials. Multiply the catalog figure by conversion factor to obtain modified thrust capacity:
 $T_c' = T_c \times C_{fc}$

Material	Code	Conversion Factor-Circlip Cfc
Stainless	RS	0.95
	AS	0.95
	SS	0.85
Beryllium Copper	BC	0.6
Phosphor Bronze	PB	0.4

Groove Material	Ultimate Tensile Strength Kg/mm ²	Yield Strength			Approx. Hardness BHN	Conversion Factor-Groove Cfg
		ib/in ²	Kg/mm ²	N/mm ²		
Hardened Steel	125	145,000	100	980	360	3.25
Mild Steel	47	45,000	31.5	300	125	1.0
Cast Iron	32	32,000	22.5	220	85	0.73
Brass (cold rolled)	47	60,000	43.0	420	125	1.4
Brass (soft)	35	18,500	13.0	130	110	0.43
Zinc Alloy	30	21,500	15.0	147	80	0.47
Aluminum	20	18,000	12.7	125	65	0.42



Radiused, Chamfered Abutment

Where possible, radiused or chamfered abutment should be avoided since the load bearing capacity will be significantly reduced.

If chamfered or radiused parts must be used, then the allowable thrust load will be reduced in proportion to the chamfer depth or radius.

The thrust load for a given corner break may be calculated as follows:

$$T_c = \frac{X \cdot \pi \cdot E \cdot t^3 \ln\left(1 + \frac{2b}{c}\right)}{6 \cdot L^2}$$

Where:

- X=Acceptable component deflection
- L=Ch+0.05mm OR 0.75R=0.05mm
- ln=Natural log.

Elastic Modulus:

E=204100 N/mm² for Carbon Spring Steel

Note that where there is a larger clearance between shaft/bore and retained part or a step in the shaft/bore, then these situations should be treated in the same way as the chamfered abutment.

Impact Loading

The maximum acceptable impact load for a circlip assembly may be determined by the use of the following formula:

Circlip

$$T_{ci} = \frac{T_c \cdot t}{2} \text{ N.m. (ft.lb)}$$

Groove

$$T_{gi} = \frac{T_g \cdot d}{2} \text{ N.m. (ft.lb)}$$

T_c =Catalog thrust load circlip N (lb)

T_g =Catalog thrust load groove N (lb)

t =Circlip thickness converted to meters (feet)

d =Groove depth converted to meters (feet)

- Internal
- External
- E-Style
- Metric



KITS

**CUSTOM PACKAGING,
LABELING, & BARCODING
AVAILABLE UPON REQUEST**

- Single Rod
- Double Rod



DISPENSERS

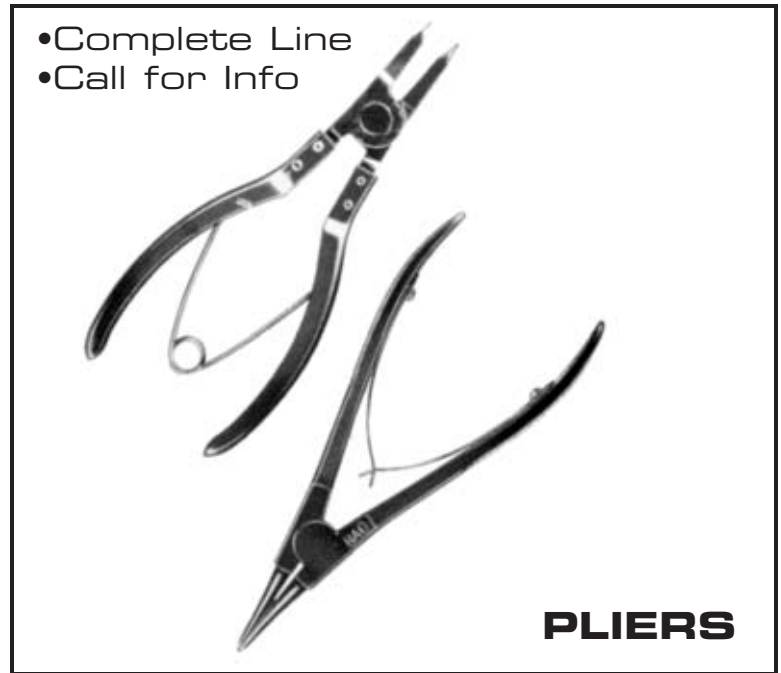
- Straight Tip
- 45° Tip




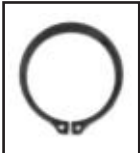
APPLICATORS

WE STOCK:

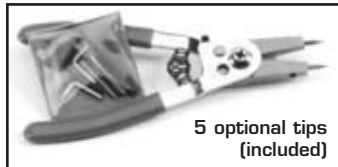
- Fixed Tip Internal Pliers
- Fixed Tip External Pliers
- Fixed Tip Convertible Pliers
- E And C Ring Style Applicators



INTERNAL EXTERNAL

THESE PLIERS CONVERT FROM  TO  USE WITH THE PUSH OF TWO BUTTONS

1/8 " - 1"
3mm - 25 mm



1/4 " - 2"
10mm - 48 mm



1 1/2 " - 4"
31mm - 100 mm



Ring Plier Set



FOR REMOVAL OF WIRE FORMED SNAP RINGS (EXTERNALLY APPLIED)





N1300

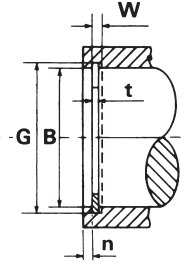
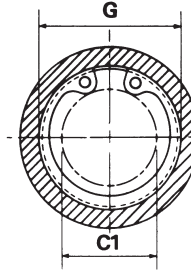
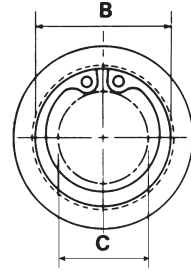
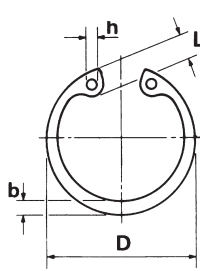
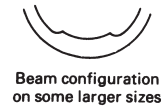
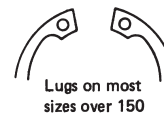
**STANDARD
INTERNAL**

0.250" to 10.00"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

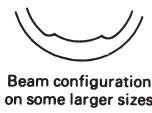
MS 16625



When Sprung into Bore When Sprung into Groove

PART NUMBER	BORE			RING								GROOVE					APPROX Wt. LB / 1000 PCS.	THRUST LOAD (LBS)	PLIER No.	
	DIAMETER B			THICKNESS		FREE DIAMETER		C	C1	L (max)	b ~	h (min)	DIAMETER		WIDTH					n (min)
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches						G inches	Tol. inches	W inches	Tol. inches					n (min)
N1300-25	1/4	.250	-	.015		.280		.11	.13	.068	.025	.029	.268		.018	+.002	.027	.08	420	
N1300-31	5/16	.312	-	.015		.346		.17	.19	.069	.033	.029	.330	±.001	.018	-.000	.027	.11	520	
N1300-37	3/8	.375	-	.025		.415		.20	.22	.085	.040	.039	.397		.029		.033	.25	1050	
N1300-43	7/16	.438	-	.025		.482		.23	.25	.101	.049	.039	.461		.029		.036	.37	1220	
N1300-45	29/64	.453	-	.025		.498		.25	.27	.101	.050	.045	.477		.029		.036	.43	1280	
N1300-50	1/2	.500	-	.035		.548	+.010	.26	.29	.117	.053	.045	.530		.039		.045	.70	1980	
N1300-51	-	.512	13	.035		.560	-.005	.27	.30	.119	.053	.045	.542	±.002	.039		.045	.77	2030	
N1300-56	9/16	.562	-	.035		.620		.28	.32	.137	.053	.045	.596		.039		.051	.86	2220	
N1300-62	5/8	.625	-	.035		.694		.34	.39	.137	.060	.060	.665		.039		.060	1.0	2460	
N1300-68	11/16	.688	-	.035		.763		.40	.45	.137	.063	.060	.732		.039	+.003	.066	1.2	2690	Std.1
N1300-75	3/4	.750	19	.035		.831		.45	.50	.147	.070	.060	.796		.039	-.000	.069	1.3	3000	
N1300-77	-	.777	19.7	.042		.859		.48	.52	.151	.074	.060	.825		.046		.072	1.7	4550	
N1300-81	13/16	.812	-	.042		.901		.49	.53	.160	.077	.060	.862		.046		.075	1.9	4800	
N1300-86	-	.866	22	.042		.961		.54	.59	.160	.081	.060	.920		.046		.081	2.0	5100	
N1300-87	7/8	.875	-	.042	±.002	.971		.55	.60	.160	.084	.060	.931	±.003	.046		.084	2.1	5150	
N1300-90	-	.901	22.9	.042		1.000	+.015	.57	.63	.160	.087	.060	.959		.046		.087	2.2	5350	
N1300-93	15/16	.938	-	.042		1.041	-.010	.61	.67	.160	.091	.060	1.000		.046		.093	2.4	5600	
N1300-100	1	1.000	-	.042		1.111		.67	.74	.160	.104	.060	1.066		.046		.099	2.7	6000	
N1300-102	-	1.023	26	.042		1.136		.69	.76	.160	.106	.060	1.091		.046		.102	2.8	6050	
N1300-106	1 1/16	1.062	27	.050		1.180		.69	.75	.185	.110	.076	1.130		.056		.102	3.7	7500	
N1300-112	1 1/8	1.125	-	.050		1.249		.75	.82	.185	.116	.076	1.197		.056		.108	4.0	7900	
N1300-118	-	1.181	30	.050		1.319		.79	.86	.185	.120	.076	1.255		.056		.111	4.3	8400	
N1300-118	1 3/16	1.188	-	.050		1.319		.80	.87	.185	.120	.076	1.262		.056		.111	4.4	8400	
N1300-125	1 1/4	1.250	-	.050		1.388		.87	.96	.185	.124	.076	1.330		.056		.120	4.8	8800	
N1300-125	-	1.259	32	.050		1.388	+.025	.88	.97	.185	.124	.076	1.339	±.004	.056		.120	4.8	8800	
N1300-131	1 5/16	1.312	-	.050		1.456	-.020	.93	1.01	.185	.130	.076	1.396		.056		.126	5.0	9300	
N1300-137	1 3/8	1.375	-	.050		1.526		.99	1.07	.185	.130	.076	1.461		.056		.129	5.1	9700	
N1300-137	-	1.378	35	.050		1.526		.99	1.07	.185	.130	.076	1.464		.056	+.004	.129	5.1	9700	Std.3
N1300-143	1 7/16	1.438	-	.050		1.596		1.06	1.15	.185	.133	.076	1.528		.056	-.000	.135	5.8	10200	
N1300-145	-	1.456	37	.050		1.616		1.08	1.17	.185	.133	.076	1.548		.056		.138	6.4	10300	
N1300-150	1 1/2	1.500	-	.050		1.660		1.12	1.21	.185	.133	.076	1.594		.056		.141	6.5	10550	
N1300-156	1 9/16	1.562	-	.062		1.734		1.14	1.23	.205	.157	.076	1.658		.068		.144	8.9	13700	
N1300-156	-	1.575	40	.062		1.734		1.15	1.24	.205	.157	.076	1.671		.068		.144	8.9	13700	
N1300-162	1 5/8	1.625	-	.062		1.804		1.15	1.25	.205	.160	.076	1.725		.068		.150	10.0	14200	
N1300-165	-	1.653	42	.062		1.835		1.17	1.27	.205	.167	.076	1.755		.068		.153	10.4	14500	
N1300-168	1 11/16	1.688	-	.062		1.874		1.23	1.33	.205	.170	.076	1.792		.068		.156	10.8	14800	
N1300-175	1 3/4	1.750	-	.062		1.942	+.035	1.26	1.36	.205	.175	.076	1.858	±.005	.068		.162	10.3	15300	
N1300-181	1 13/16	1.812	-	.062		2.012	-.025	1.32	1.43	.205	.170	.091	1.922		.068		.165	11.5	15900	
N1300-185	-	1.850	47	.062		2.054		1.34	1.45	.205	.170	.091	1.962		.068		.168	12.8	16200	
N1300-187	1 7/8	1.875	-	.062		2.072		1.37	1.48	.205	.170	.091	1.989		.068		.171	12.8	16450	
N1300-193	1 15/16	1.938	-	.062		2.141		1.44	1.56	.205	.165	.091	2.056		.068		.177	13.3	17000	
N1300-200	2	2.000	-	.062		2.210		1.50	1.62	.205	.170	.091	2.122		.068		.183	14.0	17500	
N1300-206	-	2.047	52	.078	±.003	2.280		1.52	1.64	.225	.186	.091	2.171		.086		.186	18.0	22700	
N1300-206	2 1/16	2.062	-	.078		2.280		1.54	1.66	.225	.186	.091	2.186		.086		.186	18.0	22750	
N1300-212	2 1/8	2.125	-	.078		2.350		1.58	1.70	.236	.195	.091	2.251		.086		.189	19.4	23400	
N1300-218	-	2.165	55	.078		2.415		1.61	1.74	.236	.199	.091	2.295		.086		.195	19.6	24100	
N1300-218	2 3/16	2.188	-	.078		2.415		1.64	1.77	.236	.199	.091	2.318		.086		.195	19.6	24200	
N1300-225	2 1/4	2.250	-	.078		2.490		1.69	1.82	.236	.203	.091	2.382		.086	+.005	.198	21.8	24850	Std.5
N1300-231	2 5/16	2.312	-	.078		2.560		1.75	1.88	.236	.205	.091	2.450		.086	-.000	.207	22.6	25400	
N1300-237	2 3/8	2.375	-	.078		2.630		1.81	1.95	.236	.207	.091	2.517	±.006	.086		.213	23.2	26150	
N1300-244	2 7/16	2.438	-	.078		2.702	+.040	1.86	2.00	.236	.205	.108	2.584		.086		.216	25.4	26900	
N1300-250	2 1/2	2.500	-	.078		2.775	-.030	1.91	2.05	.236	.210	.108	2.648		.086		.222	25.5	27600	
N1300-250	2 17/32	2.531	-	.078		2.775		1.94	2.09	.236	.210	.108	2.681		.086		.222	25.5	27650	
N1300-256	2 9/16	2.562	-	.093		2.844		1.95	2.10	.268	.222	.108	2.714		.103		.228	34.0	33700	
N1300-262	2 5/8	2.625	-	.093		2.910		2.02	2.17	.268	.226	.108	2.781		.103		.234	34.5	34500	





0.250" to 10.00"

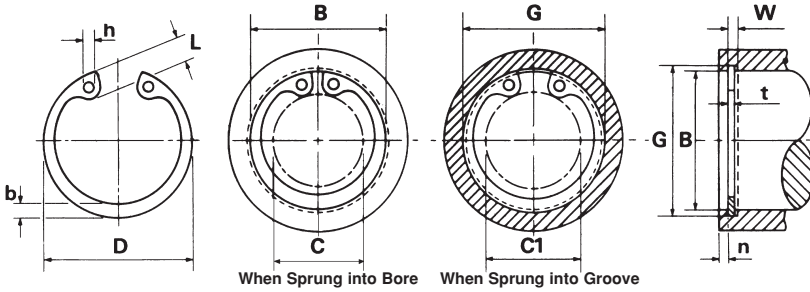
Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

MS 16625



**STANDARD
INTERNAL**



PART NUMBER	BORE			RING								GROOVE				APPROX Wt. LB / 1000 PCS.	THRUST LOAD (LBS)	PLIER No.		
	DIAMETER B			THICKNESS		FREE DIAMETER						DIAMETER		WIDTH						
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	L (max)	b ~	h (min)	G inches	Tol. inches	W inches				Tol. inches	n (min)
N1300-268	-	2.677	68	.093		2.980		2.05	2.21	.268	.236	.108	2.837		.103		.240	35.0	35400	
N1300-268	2 ¹¹ / ₁₆	2.688	-	.093		2.980	+040	2.06	2.22	.268	.236	.108	2.848		.103		.240	35.0	35400	
N1300-275	2 ³ / ₄	2.750	-	.093		3.050	-030	2.12	2.28	.284	.234	.108	2.914		.103		.252	36.0	36900	
N1300-281	2 ¹³ / ₁₆	2.812	-	.093		3.121		2.18	2.34	.284	.230	.108	2.980		.103		.252	36.0	36900	
N1300-281	-	2.835	72	.093		3.121		2.21	2.38	.284	.230	.108	3.006		.103		.252	36.0	36950	
N1300-287	2 ⁷ / ₈	2.875	-	.093		3.191		2.22	2.39	.284	.240	.108	3.051		.103		.264	41.0	37800	
N1300-300	-	2.953	75	.093		3.325		2.30	2.48	.284	.250	.108	3.135		.103		.273	42.5	39500	Std. 5
N1300-300	3	3.000	-	.093		3.325		2.35	2.53	.284	.250	.108	3.182		.103		.273	42.5	39500	
N1300-306	3 ¹ / ₁₆	3.062	-	.109		3.418		2.41	2.59	.299	.254	.123	3.248		.120		.279	53.0	47100	
N1300-312	3 ¹ / ₈	3.125	-	.109		3.488		2.47	2.66	.299	.260	.123	3.315		.120		.285	56.0	48000	
N1300-315	-	3.150	80	.109		3.523		2.49	2.68	.299	.260	.123	3.341		.120		.288	57.0	48600	
N1300-315	3 ⁵ / ₃₂	3.156	-	.109		3.523		2.50	2.69	.299	.260	.123	3.348		.120		.288	57.0	48600	
N1300-325	3 ¹ / ₄	3.250	-	.109		3.623		2.54	2.73	.299	.269	.123	3.446		.120	+005	.294	60.0	50000	
N1300-334	3 ¹¹ / ₃₂	3.346	-	.109		3.734	±055	2.63	2.83	.323	.276	.123	3.546		.120	-000	.300	65.0	51600	
N1300-347	3 ¹⁵ / ₃₂	3.469	-	.109		3.857		2.76	2.96	.350	.294	.123	3.675	±006	.120		.309	69.0	53400	
N1300-350	3 ¹ / ₂	3.500	-	.109	±003	3.890		2.79	3.00	.350	.294	.123	3.710		.120		.315	71.0	53900	
N1300-354	-	3.543	90	.109		3.936		2.83	3.04	.350	.292	.123	3.755		.120		.321	72.0	54600	
N1300-354	3 ⁹ / ₁₆	3.562	-	.109		3.936		2.85	3.06	.350	.292	.123	3.776		.120		.321	72.0	54650	
N1300-362	3 ⁵ / ₈	3.625	-	.109		4.024		2.91	3.12	.350	.305	.123	3.841		.120		.324	73.0	55900	
N1300-375	-	3.740	95	.109		4.157		3.02	3.24	.350	.309	.123	3.964		.120		.336	78.0	57700	
N1300-375	3 ³ / ₄	3.750	-	.109		4.157		3.03	3.25	.350	.309	.123	3.974		.120		.336	78.0	57700	
N1300-387	3 ⁷ / ₈	3.875	-	.109		4.291		3.11	3.34	.350	.312	.123	4.107		.120		.348	87.0	59600	
N1300-393	3 ¹⁵ / ₁₆	3.938	-	.109		4.358		3.17	3.40	.350	.319	.123	4.174		.120		.354	88.0	60700	
N1300-400	4	4.000	-	.109		4.424		3.23	3.47	.378	.330	.123	4.240		.120		.360	93.0	61700	
N1300-412	4 ¹ / ₈	4.125	-	.109		4.558		3.36	3.60	.378	.330	.123	4.365		.120		.360	97.0	63600	
N1300-425	4 ¹ / ₄	4.250	-	.109		4.691		3.48	3.72	.378	.335	.123	4.490		.120		.360	101.0	65500	
N1300-433	-	4.331	110	.109		4.756	±065	3.50	3.74	.413	.338	.151	4.571		.120		.360	105.0	66600	
N1300-450	4 ¹ / ₂	4.500	-	.109		4.940		3.66	3.90	.413	.351	.151	4.740		.120		.360	111.0	69300	
N1300-462	4 ⁵ / ₈	4.625	-	.109		5.076		3.79	4.03	.413	.350	.151	4.865		.120		.360	117.0	71300	
N1300-475	-	4.724	120	.109		5.213		3.88	4.12	.413	.358	.151	4.969		.120		.366	124.0	73200	
N1300-475	4 ³ / ₄	4.750	-	.109		5.213		3.90	4.14	.413	.358	.151	4.995		.120		.366	124.0	73200	
N1300-500	5	5.000	127	.109		5.485		4.08	4.34	.445	.385	.151	5.260		.120		.405	136.0	77000	
N1300-525	5 ¹ / ₄	5.250	-	.125		5.770		4.31	4.58	.465	.408	.151	5.520		.139		.405	174.0	92700	
N1300-537	5 ³ / ₈	5.375	-	.125		5.910		4.41	4.68	.465	.408	.151	5.650		.139		.405	179.0	94900	Major 77
N1300-550	5 ¹ / ₂	5.500	-	.125	±004	6.066		4.53	4.80	.465	.408	.151	5.770	±007	.139	+006	.405	183.0	97200	
N1300-575	5 ³ / ₄	5.750	146	.125		6.336		4.78	5.05	.465	.408	.151	6.020		.139	-000	.405	192.0	101600	
N1300-600	6	6.000	-	.125		6.620		5.03	5.30	.465	.416	.151	6.270		.139		.405	201.0	105900	
N1300-625	6 ¹ / ₄	6.250	-	.156		6.895		5.24	5.52	.454	.441	.182	6.530		.174		.420	266.0	137700	
N1300-650	6 ¹ / ₂	6.500	165	.156		7.170		5.49	5.78	.454	.441	.182	6.790		.174		.435	281.0	143300	
N1300-662	6 ⁵ / ₈	6.625	-	.156		7.308	±080	5.60	5.90	.454	.441	.182	6.925		.174		.450	305.0	146000	
N1300-675	6 ³ / ₄	6.750	-	.156		7.445		5.65	5.95	.508	.456	.182	7.055		.174		.456	325.0	148800	
N1300-700	7	7.000	-	.156		7.720		5.88	6.19	.540	.474	.182	7.315		.174		.471	344.0	154000	
N1300-725	7 ¹ / ₄	7.250	-	.187		7.995		6.08	6.40	.570	.490	.182	7.575		.209		.486	428.0	191500	
N1300-750	7 ¹ / ₂	7.500	-	.187		8.270		6.33	6.67	.570	.507	.182	7.840		.209		.510	485.0	198200	
N1300-775	7 ³ / ₄	7.750	-	.187	±005	8.545		6.58	6.93	.560	.500	.182	8.100		.209		.525	520.0	204800	
N1300-800	8	8.000	-	.187		8.820		6.75	7.11	.600	.530	.182	8.360	±008	.209	+008	.540	555.0	211400	
N1300-825	8 ¹ / ₄	8.250	-	.187		9.095		7.00	7.37	.600	.548	.182	8.620		.209	-000	.555	603.0	218000	
N1300-850	8 ¹ / ₂	8.500	-	.187		9.285		7.13	7.51	.632	.573	.182	8.880		.209		.570	634.0	224600	
N1300-875	8 ³ / ₄	8.750	-	.187		9.558	±090	7.38	7.77	.632	.576	.182	9.145		.209		.591	653.0	230400	
N1300-900	9	9.000	-	.187		9.830		7.63	8.03	.632	.592	.182	9.405		.209		.606	732.0	237800	
N1300-925	9 ¹ / ₄	9.250	235	.187		10.102		7.88	8.30	.632	.622	.182	9.668		.209		.627	767.0	244000	
N1300-950	9 ¹ / ₂	9.500	-	.187		10.375		7.98	8.41	.632	.622	.182	9.930		.209		.645	803.0	251000	
N1300-975	9 ³ / ₄	9.750	-	.187		10.648		8.23	8.67	No	.622	.182	10.190		.209		.660	833.0	257600	
N1300-1000	10	10.000	-	.187		10.920		8.48	8.93	Lug	.622	.182	10.450		.209		.675	863.0	264200	



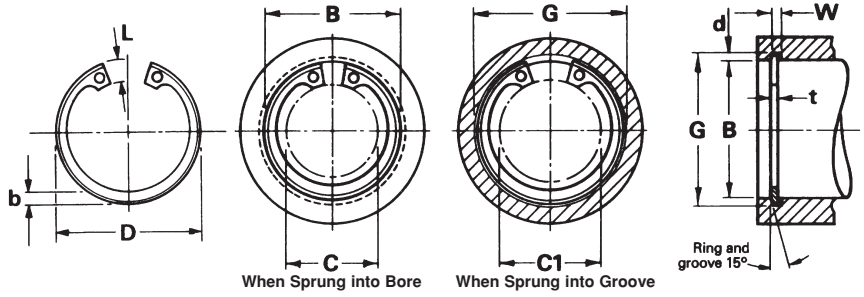
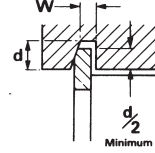
1.00" to 10.00"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

MS 16631

**BEVELED
INTERNAL**



Sizes up to 10" available

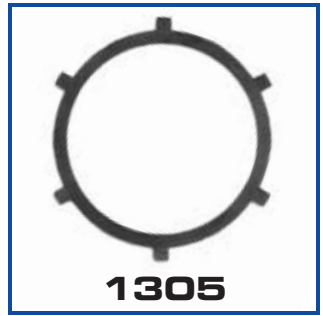
E = Maximum end play take up capability
† Thrust load calculations see page 5

PART NUMBER	BORE		RING									GROOVE					Tc † (lb.f)	Tg † (lb.f)
	DIAMETER B		THICKNESS		FREE DIAMETER		C	C1	L (max)	b ~	E	DIAMETER		WIDTH		d		
	Frac. inch	Dec. inch	t inches	Tol. inches	D inches	Tol. inches						G inches	Tol. inches	W inches	Tol. inches			
N1302-100	1	1.000	.042		1.111	+0.15	.665	.70	.155	.104	.005	1.076	+0.03	.036		.038	6039	1600
N1302-102	-	1.023	.042		1.136	-.010	.69	.725	.155	.106	.005	1.101	-.000	.036		.039	6141	1700
N1302-106	1 1/16	1.062	.050		1.180		.685	.72	.180	.110	.005	1.138		.044		.038	7562	1700
N1302-112	1 1/8	1.125	.050		1.249		.745	.78	.180	.116	.005	1.205		.043		.040	8019	1900
N1302-118	-	1.181	.050		1.319		.79	.83	.180	.120	.005	1.265		.043		.042	8526	2100
N1302-118	1 3/16	1.188	.050		1.319		.80	.835	.180	.120	.005	1.272		.043		.042	8526	2100
N1302-125	1 1/4	1.250	.050		1.388		.875	.92	.180	.124	.006	1.342	+0.04	.042		.046	8932	2400
N1302-125	-	1.259	.050	±.002	1.388	+0.025	.885	.93	.180	.124	.006	1.351	-.000	.042		.046	8932	2400
N1302-131	1 5/16	1.312	.050		1.456	-.020	.93	.97	.180	.130	.006	1.408		.042		.048	9440	2650
N1302-137	1 3/8	1.375	.050		1.526		.99	1.03	.180	.130	.006	1.475		.041		.050	9846	2900
N1302-137	-	1.378	.050		1.526		.99	1.03	.180	.130	.006	1.478		.041		.050	9846	2900
N1302-143	1 7/16	1.438	.050		1.596		1.06	1.11	.180	.133	.007	1.542		.040	+0.001	.052	10353	3100
N1302-145	-	1.456	.050		1.616		1.08	1.13	.180	.133	.007	1.562		.040	-.000	.053	10455	3250
N1302-150	1 1/2	1.500	.050		1.660		1.12	1.17	.180	.133	.007	1.604		.040		.052	10708	3300
N1302-156	1 9/16	1.562	.062		1.734		1.10	1.15	.220	.157	.007	1.674		.052		.056	11400	2560
N1302-156	-	1.575	.062		1.734		1.11	1.16	.220	.157	.007	1.687		.052		.056	11400	2560
N1302-162	1 5/8	1.625	.062		1.804		1.16	1.22	.220	.164	.008	1.743		.051		.059	11800	2800
N1302-165	-	1.653	.062		1.835		1.17	1.22	.227	.167	.008	1.773		.051		.060	12000	2900
N1302-168	1 11/16	1.688	.062		1.874		1.23	1.29	.220	.170	.008	1.810		.050		.061	12300	3010
N1302-175	1 3/4	1.750	.062		1.942	+0.035	1.26	1.31	.240	.171	.008	1.878	+0.005	.050		.064	12700	3260
N1302-181	1 13/16	1.812	.062		2.012	-.025	1.32	1.38	.240	.170	.009	1.944	-.000	.050		.066	13200	3480
N1302-185	-	1.850	.062		2.054		1.35	1.42	.240	.170	.009	1.984		.050		.067	13500	3610
N1302-187	1 7/8	1.875	.062		2.072		1.37	1.44	.240	.170	.009	2.011		.050		.068	13700	3710
N1302-193	1 15/16	1.938	.062		2.141		1.44	1.51	.240	.170	.009	2.082		.049		.072	14100	4050
N1302-200	2	2.000	.062		2.210		1.50	1.57	.240	.170	.009	2.144		.048		.072	14600	4180
N1302-206	2 1/16	2.062	.078		2.280		1.54	1.61	.250	.186	.009	2.210		.065		.074	18900	4490
N1302-212	2 1/8	2.125	.078		2.350		1.58	1.65	.260	.195	.010	2.279		.065		.077	19500	4800
N1302-218	2 3/16	2.188	.078		2.415		1.64	1.72	.260	.199	.010	2.350		.064		.081	20100	5200
N1302-225	2 1/4	2.250	.078		2.490		1.69	1.77	.270	.203	.010	2.420		.064		.085	20700	5600
N1302-231	2 5/16	2.312	.078		2.560		1.75	1.82	.270	.209	.011	2.484		.063	+0.0015	.086	21200	5820
N1302-237	2 3/8	2.375	.078		2.630		1.81	1.89	.270	.207	.011	2.552		.063	-.000	.089	21800	6110
N1302-244	2 7/16	2.440	.078		2.702		1.86	1.94	.280	.209	.012	2.618		.062		.089	22400	6350
N1302-250	2 1/2	2.500	.078		2.775	+0.040	1.91	2.00	.280	.210	.012	2.684		.062		.092	23000	6710
N1302-256	2 9/16	2.562	.093		2.844	-.030	1.95	2.04	.290	.210	.012	2.750		.078		.094	28000	7020
N1302-262	2 5/8	2.625	.093		2.910		2.02	2.11	.290	.222	.013	2.820		.077		.097	28700	7420
N1302-268	2 11/16	2.688	.093		2.980		2.06	2.16	.300	.226	.013	2.887		.077		.099	29400	7750
N1302-275	2 3/4	2.750	.093		3.050		2.12	2.21	.300	.230	.014	2.955		.076		.102	30100	8160
N1302-281	2 13/16	2.812	.093		3.121		2.18	2.27	.300	.234	.014	3.020		.076		.104	30800	8510
N1302-287	2 7/8	2.875	.093	±.003	3.191		2.22	2.32	.310	.230	.014	3.085		.076		.105	31500	8780
N1302-300	3	3.000	.093		3.325		2.35	2.46	.310	.250	.015	3.225		.074		.112	32800	9750
N1302-306	3 1/16	3.062	.109		3.418		2.41	2.51	.310	.254	.015	3.290	+0.006	.089		.114	39300	10100
N1302-312	3 1/8	3.125	.109		3.488		2.47	2.58	.310	.259	.015	3.355	-.000	.089		.115	40100	10400
N1302-315	3 5/32	3.156	.109		3.523		2.50	2.61	.310	.262	.015	3.388		.089		.116	40500	10600
N1302-325	3 1/4	3.250	.109		3.623		2.54	2.65	.342	.269	.016	3.489		.089		.119	41700	11200
N1302-334	3 11/32	3.346	.109		3.734	±.055	2.63	2.74	.342	.276	.016	3.591		.089		.122	42900	11800
N1302-347	3 13/32	3.469	.109		3.857		2.76	2.88	.342	.286	.017	3.726		.089		.128	44500	12800
N1302-350	3 1/2	3.500	.109		3.890		2.79	2.91	.342	.289	.017	3.760		.089	+0.002	.130	44900	13200
N1302-354	3 9/16	3.543	.109		3.936		2.85	2.97	.342	.292	.018	3.806		.089	-.000	.134	45700	13800
N1302-362	3 5/8	3.625	.109		4.024		2.91	3.03	.342	.299	.018	3.900		.089		.137	46500	14300
N1302-375	3 3/4	3.750	.109		4.157		3.03	3.17	.342	.309	.019	4.040		.089		.145	48100	15700
N1302-387	3 7/8	3.875	.109		4.291		3.11	3.25	.370	.319	.020	4.171		.089		.148	49700	16500
N1302-393	3 15/16	3.938	.109		4.358		3.17	3.31	.370	.324	.020	4.236		.089		.149	50500	16900
N1302-400	4	4.000	.109		4.424		3.23	3.37	.370	.330	.020	4.302		.089		.151	51300	17400

0.311" to 2.002"

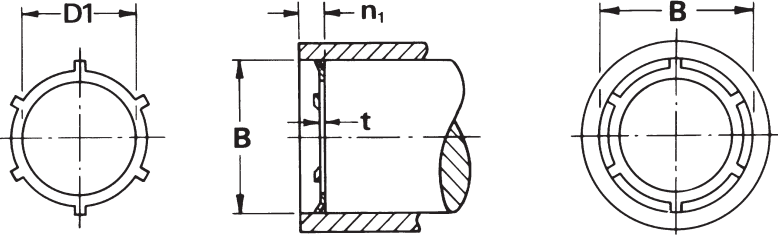
Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil



1305

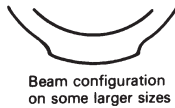
"PUSH-ON"
INTERNAL



† Thrust load calculations see page 5

PART NUMBER	BORE			RING				n ₁ (min)	APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)
	DIAMETER B			INSIDE DIAMETER		THICKNESS				
	min. (inch)	max. (inch)	fraction ~	D1 inches	Tol. inches	t inches	Tol. inches			
1305-31	.311	.313	5/16	.136		.010		.040	0.11	80
1305-37	.374	.376	3/8	.175	±.005	.010		.040	0.15	75
1305-43	.437	.439	7/16	.237		.010	±.001	.040	0.20	70
1305-50	.498	.502	1/2	.258		.010		.040	0.24	60
1305-56	.560	.564	9/16	.312		.010		.040	0.29	50
1305-62	.623	.627	5/8	.390		.010		.040	0.31	45
1305-75	.748	.752	3/4	.500		.015		.060	0.62	75
1305-87	.873	.877	7/8	.625	±.010	.015	±.002	.060	0.75	70
1305-93	.936	.940	15/16	.687		.015		.060	0.86	70

PART NUMBER	BORE			RING				n ₁ (min)	APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)
	DIAMETER B			INSIDE DIAMETER		THICKNESS				
	min. (inch)	max. (inch)	fraction ~	D1 inches	Tol. inches	t inches	Tol. inches			
1305-100	.998	1.002	1	.750		.015		.060	0.90	75
1305-112	1.123	1.127	1 1/8	.813		.015		.060	1.30	60
1305-125	1.248	1.252	1 1/4	.938		.015	±.002	.060	1.50	60
1305-143	1.435	1.439	1 7/16	1.125	±.010	.015		.060	1.69	60
1305-150	1.498	1.502	1 1/2	1.188		.015		.060	1.80	60
1305-175	1.748	1.752	1 3/4	1.438		.015		.060	2.09	55
1305-200	1.998	2.002	2	1.600		.015		.060	2.99	55



Beam configuration on some larger sizes

0.625" to 1.562"

Standard Material
Carbon Spring Steel

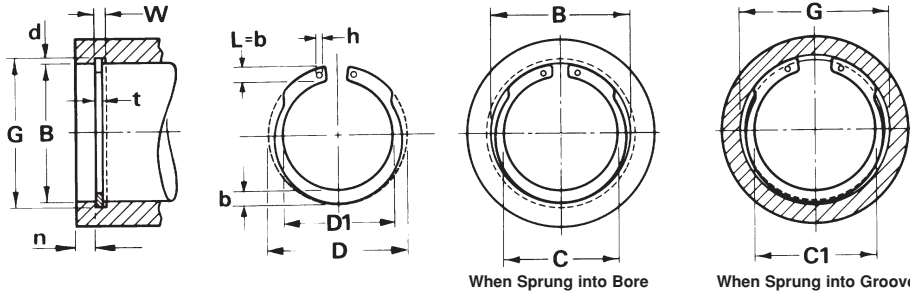
Standard Finish
Phosphate and oil

MS 16627



1308

BALANCED
LUG
INTERNAL

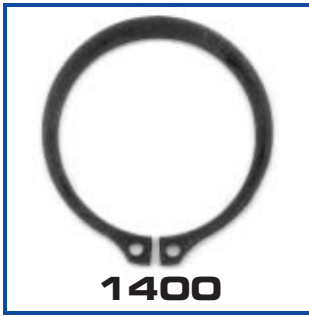


When Sprung into Bore

When Sprung into Groove

† Thrust load calculations see page 5

PART NUMBER	BORE		THICKNESS		RING							GROOVE					Tc (lb.f)	Tg (lb.f)		
	Frac. inch	Dec. inch	t inches	Tol. inches	D inches	Tol. inches	D1	C	C1 (max)	L ~	b (min)	h	G inches	Tol. inches	W inches	Tol. inches			n (min)	d ~
N1308-62	5/8	.625	.025		.675		.54	.47	.51	.076	.072	.028	.665	±.002	.029		.060	.020	1100	353
N1308-75	3/4	.750	.035		.808		.63	.56	.61	.089	.085	.040	.796		.039		.070	.023	1850	201
N1308-81	13/16	.812	.042		.877	+0.010	.69	.61	.66	.097	.092	.040	.862		.046	+0.003	.075	.025	2410	574
N1308-87	7/8	.875	.042		.944	-0.005	.75	.66	.72	.104	.099	.040	.931	±.003	.046	-0.000	.085	.028	2600	693
N1308-93	15/16	.938	.042		1.015		.81	.70	.77	.111	.106	.040	1.000		.046		.095	.031	2780	820
N1308-100	1	1.000	.042		1.081		.85	.75	.83	.118	.113	.040	1.066		.046		.100	.033	2970	933
N1308-106	1 1/16	1.062	.050		1.150		.91	.80	.87	.126	.120	.048	1.130		.056		.100	.034	3750	1020
N1308-112	1 1/8	1.125	.050	±.002	1.217		.97	.85	.93	.129	.123	.048	1.197		.056		.110	.036	3980	1140
N1308-118	1 3/16	1.188	.050		1.283		1.03	.91	.99	.132	.126	.048	1.262		.056		.110	.037	4200	1240
N1308-125	1 1/4	1.250	.050		1.351	+0.015	1.10	.96	1.06	.135	.129	.048	1.330	±.004	.056	+0.004	.120	.040	4410	1410
N1308-131	1 3/8	1.312	.050		1.418	-0.010	1.15	1.02	1.12	.138	.132	.048	1.396		.056	-0.000	.125	.042	4640	1560
N1308-137	1 3/8	1.375	.050		1.486		1.22	1.08	1.17	.141	.135	.048	1.461		.056		.130	.043	4860	1670
N1308-143	1 7/16	1.438	.050		1.552		1.26	1.13	1.24	.150	.144	.074	1.528		.056		.135	.045	5080	1830
N1308-150	1 1/2	1.500	.050		1.622		1.32	1.18	1.28	.154	.148	.074	1.594		.056		.140	.047	5300	1990
N1308-156	1 9/16	1.562	.062	±.003	1.688	+0.020 -0.013	1.37	1.22	1.32	.165	.158	.074	1.658		.068		.145	.048	5700	2120



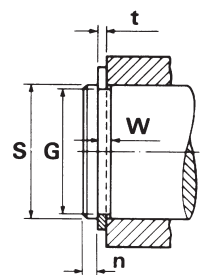
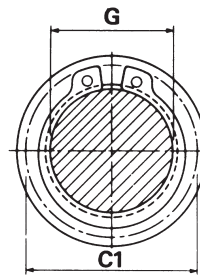
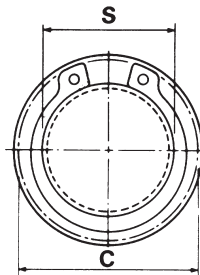
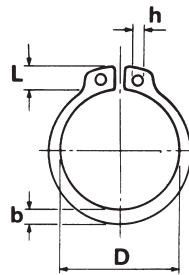
0.125" to 10.00"

Standard Material
 12 to 23 Beryllium Copper
 25 up Carbon Spring Steel

Standard Finish
 12 to 23 Self Finish
 25 up Phosphate

MS 16624

**STANDARD
 EXTERNAL**



When Sprung onto Shaft

When Sprung into Groove

PART NUMBER	SHAFT			RING									GROOVE					APPROX Wt. LB / 1000 PCS.	THRUST LOAD (LBS)	PLIER No.
	DIAMETER S			THICKNESS		FREE DIAMETER		RING			DIAMETER		WIDTH							
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	L (max)	b ~	h (min)	G inches	Tol. inches	W inches	Tol. inches	n (min)			
1400-12	1/8	.125	-	.010	±.001	.112		.222	.214	.048	.018	.024	.117		.012		.014	.018	110	
1400-15	5/32	.156	-	.010		.142	+0.02	.270	.260	.056	.026	.024	.146		.012		.017	.037	130	
1400-18	3/16	.188	-	.015		.168	-0.04	.298	.286	.052	.025	.023	.175	±.0015	.018	+0.02	.022	.059	240	Mini A
1400-19	-	.197	5	.015		.179		.319	.307	.058	.026	.024	.185		.018	-0.000	.020	.063	250	
1400-21	7/32	.219	-	.015		.196		.338	.324	.058	.028	.024	.205		.018		.023	.074	280	
1400-23	15/64	.236	-	.015		.215		.355	.341	.058	.030	.024	.222		.018		.023	.086	310	
1400-25	1/4	.250	-	.025		.225		.45	.43	.083	.035	.039	.230		.029		.032	.21	700	
1400-27	-	.276	7	.025		.250		.48	.46	.084	.035	.039	.255		.029		.035	.23	770	
1400-28	9/32	.281	-	.025		.256		.49	.47	.083	.038	.039	.261		.029		.033	.24	785	Mini B
1400-31	5/16	.312	-	.025		.281		.54	.52	.090	.040	.039	.290		.029		.036	.27	940	
1400-34	11/32	.344	-	.025		.309		.57	.55	.090	.042	.039	.321		.029		.038	.31	960	
1400-35	-	.354	9	.025		.320	+0.02	.59	.57	.090	.046	.039	.330		.029		.038	.35	990	
1400-37	3/8	.375	-	.025		.338	-0.05	.61	.59	.091	.050	.039	.352	±.002	.029		.038	.39	1050	
1400-39	-	.394	10	.025		.354		.62	.60	.090	.052	.039	.369		.029		.041	.42	1100	
1400-40	13/32	.406	-	.025		.366		.63	.61	.090	.054	.039	.382		.029		.039	.43	1180	
1400-43	7/16	.438	-	.025		.395		.66	.64	.091	.055	.039	.412		.029		.042	.50	1220	
1400-46	15/32	.469	-	.025		.428		.68	.66	.091	.060	.039	.443		.029		.042	.54	1300	
1400-50	1/2	.500	-	.035		.461		.77	.74	.111	.065	.045	.468		.039		.051	.91	1980	
1400-55	-	.551	14	.035		.509		.81	.78	.111	.053	.045	.519		.039	+0.03	.051	.90	2180	
1400-56	9/16	.562	-	.035		.521		.82	.79	.111	.072	.045	.530		.039	-0.000	.051	1.1	2220	Std. 2
1400-59	19/32	.594	-	.035	±.002	.550		.86	.83	.112	.076	.045	.559		.039		.057	1.2	2350	
1400-62	5/8	.625	-	.035		.579		.90	.87	.113	.080	.045	.588		.039		.060	1.3	2460	
1400-66	-	.669	17	.035		.621		.93	.89	.113	.082	.045	.629		.039		.066	1.4	2650	
1400-66	43/64	.672	-	.035		.621		.93	.89	.113	.082	.045	.631		.039		.066	1.4	2650	
1400-68	11/16	.688	-	.042		.635	+0.05	1.01	.97	.140	.084	.050	.646		.046		.068	1.8	4050	
1400-75	3/4	.750	-	.042		.693	-0.10	1.09	1.05	.140	.092	.050	.704	±.003	.046		.074	2.1	4420	
1400-78	25/32	.781	-	.042		.722		1.12	1.08	.140	.094	.050	.733		.046		.076	2.2	4600	
1400-81	13/16	.812	-	.042		.751		1.15	1.10	.140	.096	.050	.762		.046		.080	2.5	4800	
1400-87	7/8	.875	-	.042		.810		1.21	1.16	.141	.104	.050	.821		.046		.085	2.8	5150	
1400-93	15/16	.938	-	.042		.867		1.34	1.29	.170	.110	.076	.882		.046		.088	3.1	5600	
1400-98	63/64	.984	25	.042		.910		1.39	1.34	.171	.114	.076	.926		.046		.091	3.5	5800	
1400-100	1	1.000	-	.042		.925		1.41	1.35	.171	.116	.076	.940		.046		.094	3.6	6000	
1400-102	-	1.023	26	.042		.946		1.43	1.37	.172	.118	.076	.961		.046		.097	3.9	6050	
1400-106	11/16	1.062	-	.050		.982		1.50	1.44	.185	.122	.076	.998		.056		.102	4.8	7500	
1400-112	11/8	1.125	-	.050		1.041		1.55	1.49	.186	.128	.076	1.059		.056		.105	5.1	7900	Std. 4
1400-118	13/16	1.118	-	.050		1.098		1.61	1.54	.186	.132	.076	1.118		.056		.111	5.6	8400	
1400-125	11/4	1.250	-	.050		1.156	+0.10	1.69	1.62	.187	.140	.076	1.176		.056		.117	5.9	8800	
1400-131	15/16	1.312	-	.050		1.214	-0.15	1.75	1.67	.187	.146	.076	1.232	±.004	.056		.126	6.8	9300	
1400-137	13/8	1.375	-	.050		1.272		1.80	1.72	.188	.152	.076	1.291		.056		.132	7.2	9700	
1400-143	17/16	1.438	-	.050		1.333		1.87	1.79	.188	.160	.076	1.350		.056		.138	8.1	10200	
1400-150	11/2	1.500	-	.050		1.387		1.99	1.90	.210	.168	.118	1.406		.056	+0.04	.147	9.0	10550	
1400-156	19/16	1.562	-	.062		1.446		2.10	2.01	.189	.180	.123	1.468		.068	-0.000	.148	12.4	13700	
1400-162	15/8	1.625	-	.062		1.503		2.17	2.08	.239	.180	.123	1.529		.068		.151	13.2	14200	
1400-168	111/16	1.688	-	.062		1.560		2.24	2.15	.205	.197	.123	1.589		.068		.156	14.8	14800	Std. 6
1400-175	13/4	1.750	-	.062	±.003	1.618	+0.13	2.31	2.21	.205	.197	.123	1.650		.068		.157	15.3	15300	
1400-177	-	1.772	45	.062		1.637	-0.20	2.33	2.23	.205	.197	.123	1.669	±.005	.068		.162	15.4	15500	
1400-181	113/16	1.812	-	.062		1.675		2.38	2.28	.205	.197	.123	1.708		.068		.163	16.2	15850	
1400-187	17/8	1.875	-	.062		1.735		2.44	2.34	.205	.197	.123	1.769		.068		.166	17.3	16400	
1400-196	-	1.968	50	.062		1.819		2.54	2.43	.205	.197	.123	1.857	±.006	.068		.174	18.0	16900	



0.125" to 10.00"

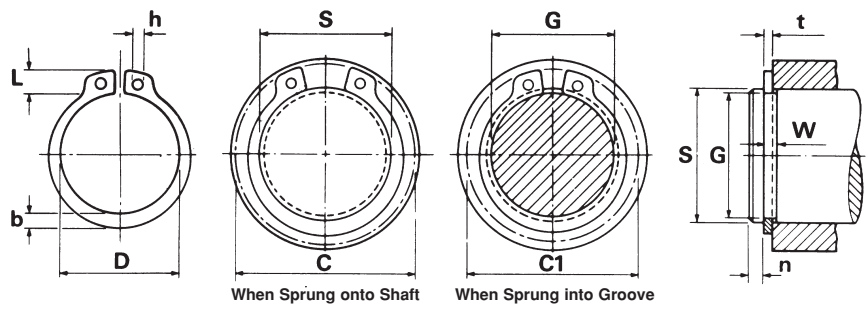
Standard Material
12 to 23 Beryllium Copper
25 up Carbon Spring Steel

Standard Finish
12 to 23 Self Finish
25 up Phosphate

MS 16624

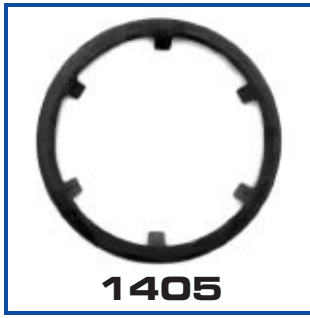


STANDARD EXTERNAL



PART NUMBER	SHAFT			RING									GROOVE					APPROX Wt. LB / 1000 PCS.	THRUST LOAD (LBS)	PLIER No.
	DIAMETER S			THICKNESS		FREE DIAMETER			DIAMETER			DIAMETER		WIDTH						
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	L (max)	b ~	h (min)	G inches	Tol. inches	W inches	Tol. inches	n (min)			
1400-200	2	2.000	-	.062		1.850	+0.013 -.020	2.55	2.44	.232	.224	.123	1.886		.068	+0.004 -.000	.178	19.0	17500	
1400-206	2 1/16	2.062	-	.078		1.906		2.68	2.57	.225	.217	.123	1.946		.086		.183	25.0	22750	
1400-212	2 1/8	2.125	-	.078		1.964		2.75	2.63	.236	.228	.123	2.003		.086		.192	26.1	23400	
1400-215	2 5/32	2.156	-	.078		1.993		2.78	2.66	.225	.217	.123	2.032		.086		.195	26.3	23800	
1400-225	2 1/4	2.250	-	.078		2.081	+0.015	2.87	2.74	.272	.220	.123	2.120		.086		.204	27.7	24800	
1400-231	2 5/16	2.312	-	.078		2.139	-.025	2.94	2.81	.272	.222	.123	2.178		.086		.210	28.0	25400	
1400-237	2 3/8	2.375	-	.078		2.197		3.01	2.88	.236	.228	.123	2.239		.086		.213	29.2	26150	
1400-243	2 7/16	2.438	-	.078		2.255		3.07	2.94	.236	.228	.123	2.299		.086		.217	29.5	26900	
1400-250	2 1/2	2.500	-	.078		2.313		3.12	2.98	.236	.228	.123	2.360		.086		.219	29.7	27600	
1400-255	-	2.559	65	.078		2.377		3.18	3.04	.258	.250	.123	2.419		.086		.219	33.9	28200	
1400-262	2 5/8	2.625	-	.078		2.428		3.25	3.11	.236	.228	.123	2.481		.086		.225	35.0	29000	
1400-268	2 11/16	2.688	-	.078		2.485		3.32	3.18	.273	.246	.123	2.541		.086		.230	36.0	29600	
1400-275	2 3/4	2.750	-	.093		2.543		3.45	3.31	.284	.275	.123	2.602		.103		.231	42.5	36100	Std. 6
1400-287	2 7/8	2.875	-	.093		2.659		3.57	3.42	.268	.260	.123	2.721		.103		.240	48.5	37800	
1400-293	2 15/16	2.938	-	.093	±0.003	2.717		3.64	3.49	.268	.260	.123	2.779		.103		.247	50.0	38700	
1400-300	3	3.000	-	.093		2.775		3.69	3.53	.268	.260	.123	2.838		.103		.252	52.0	39500	
1400-306	3 1/16	3.062	-	.093		2.832		3.74	3.58	.268	.260	.123	2.898	±0.006	.103	+0.005	.255	47.5	40300	
1400-312	3 1/8	3.125	-	.093		2.892		3.82	3.66	.305	.272	.123	2.957		.103	-.000	.261	58.0	41100	
1400-315	3 5/32	3.156	-	.093		2.920		3.85	3.68	.284	.276	.123	2.986		.103		.264	59.0	41500	
1400-325	3 1/4	3.250	-	.093		3.006		3.95	3.78	.284	.276	.123	3.076		.103		.270	62.0	42800	
1400-334	3 11/32	3.346	85	.093		3.092	+0.020	4.04	3.87	.284	.276	.123	3.166		.103		.279	64.0	44000	
1400-343	3 7/16	3.438	-	.093		3.179	-.030	4.14	3.96	.284	.276	.123	3.257		.103		.280	66.0	45300	
1400-350	3 1/2	3.500	-	.109		3.237		4.25	4.07	.320	.285	.123	3.316		.120		.285	72.0	53900	
1400-354	-	3.543	90	.109		3.277		4.29	4.11	.320	.288	.123	3.357		.120		.288	73.0	54650	
1400-362	3 5/8	3.625	-	.109		3.352		4.37	4.18	.323	.315	.123	3.435		.120		.294	76.0	55900	
1400-368	3 11/16	3.688	-	.109		3.410		4.43	4.24	.335	.302	.123	3.493		.120		.301	80.0	56800	
1400-375	3 3/4	3.750	-	.109		3.468		4.50	4.31	.337	.310	.123	3.552		.120		.306	83.0	57700	
1400-387	3 7/8	3.875	-	.109		3.584		4.60	4.40	.335	.318	.123	3.673		.120		.312	88.0	59600	
1400-393	3 15/16	3.938	100	.109		3.642		4.70	4.50	.323	.318	.123	3.734		.120		.315	95.0	60700	
1400-400	4	4.000	-	.109		3.700		4.78	4.58	.352	.344	.123	3.792		.120		.321	101.0	61700	
1400-425	4 1/4	4.250	-	.109		3.989		5.09	4.91	.323	.318	.123	4.065		.120		.287	112.0	65500	
1400-437	4 3/8	4.375	-	.109		4.106		5.22	5.04	.323	.318	.123	4.190		.120		.287	115.0	67400	
1400-450	4 1/2	4.500	-	.109		4.223		5.37	5.18	.323	.285	.123	4.310		.120		.294	121.0	69300	
1400-475	4 3/4	4.750	-	.109		4.458		5.67	5.47	.352	.303	.123	4.550		.120		.309	133.0	73200	
1400-500	5	5.000	127	.109		4.692		5.96	5.75	.352	.344	.151	4.790		.120		.324	149.0	77000	Major
1400-525	5 1/4	5.250	-	.125		4.927		6.27	6.05	.457	.372	.151	5.030		.139		.339	190.0	92700	
1400-550	5 1/2	5.500	-	.125	±0.004	5.162	+0.020	6.57	6.34	.457	.390	.151	5.265	±0.007	.139	+0.006	.363	202.0	97200	
1400-575	5 3/4	5.750	-	.125		5.396	-.040	6.86	6.62	.457	.408	.151	5.505		.139	-.000	.378	220.0	101600	
1400-600	6	6.000	-	.125		5.631		7.16	6.91	.457	.381	.151	5.745		.139		.393	240.0	105900	
1400-625	6 1/4	6.250	-	.156		5.866		7.46	7.20	.508	.396	.151	5.985		.174		.409	282.0	137700	
1400-650	6 1/2	6.500	-	.156		6.100	+0.020	7.87	7.60	.508	.438	.151	6.225		.174		.425	330.0	143300	
1400-675	6 3/4	6.750	-	.156		6.335	-.030	8.06	7.78	.508	.458	.182	6.465		.174		.440	356.0	148800	
1400-700	7	7.000	-	.156	±0.005	6.570		8.15	8.07	.508	.460	.182	6.705	±0.008	.174	+0.008	.455	388.0	154000	
1400-750	7 1/2	7.500	-	.187		7.009		8.96	8.64	.632	.507	.182	7.180		.209	-.000	.492	584.0	198200	
1400-800	8	8.000	-	.187		7.478		9.60	9.26	.632	.540	.182	7.660		.209		.522	640.0	211400	
1400-850	8 1/2	8.500	-	.187		7.947	+0.020	10.10	9.74	.632	.573	.182	8.140		.209		.562	692.0	224600	
1400-900	9	9.000	-	.187		8.415	-.030	10.60	10.22	.632	.609	.182	8.620		.209		.582	737.0	237800	
1400-950	9 1/2	9.500	-	.187		8.885		11.10	10.70	.632	.625	.182	9.100		.209		.612	785.0	251000	
1400-1000	10	10.000	254	.187		9.355		11.60	11.20	.632	.625	.182	9.575		.209		.650	910.0	264200	

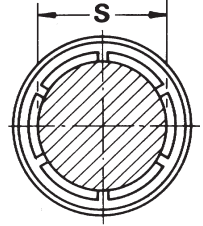
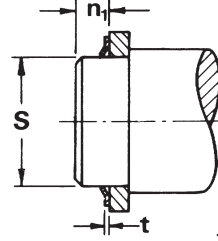
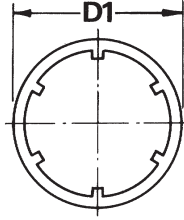




0.093" to 1.002"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

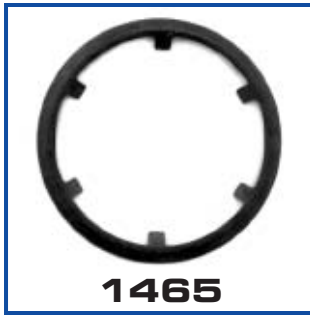


**"PUSH-ON"
EXTERNAL**

† Thrust load calculations see page 5

PART NUMBER	SHAFT			RING				APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)	
	DIAMETER S			OUTSIDE DIAMETER		THICKNESS				
	min. (inch)	max. (inch)	fraction ~	D1 inches	Tol. inches	t inches	Tol. inches			n1 (min)
1405-9	.093	0.095	3/32	0.250		.010		.040	0.09	13
1405-12	.124	0.126	1/8	0.325		.010		.040	0.14	20
1405-15	.155	0.157	5/32	0.356		.010	±.001	.040	0.17	25
1405-18	.187	0.189	3/16	0.387		.010		.040	0.20	35
1405-21	.218	0.220	7/32	0.418		.010		.040	0.21	35
1405-24	.239	0.241	-	0.460	±.005	.015	±.002	.060	0.35	40
1405-25	.249	0.251	1/4	0.450		.010		.040	0.23	40
1405-31	.311	0.313	5/16	0.512		.010	±.001	.040	0.26	45

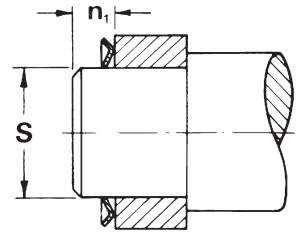
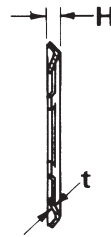
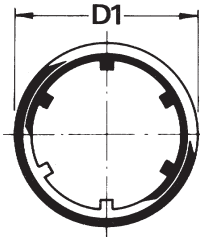
PART NUMBER	SHAFT			RING				APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)	
	DIAMETER S			OUTSIDE DIAMETER		THICKNESS				
	min. (inch)	max. (inch)	fraction ~	D1 inches	Tol. inches	t inches	Tol. inches			n1 (min)
1405-37	.374	0.376	3/8	0.575		.010	±.001	.040	0.27	45
1405-43	.437	0.439	7/16	0.638	±.005	.015		.060	0.47	50
1405-50	.498	0.502	1/2	0.750		.015		.060	0.72	50
1405-56	.560	0.564	9/16	0.812		.015		.060	0.75	50
1405-62	.623	0.627	5/8	0.875		.015	±.002	.060	0.82	50
1405-75	.748	0.752	3/4	1.000	±.010	.015		.060	0.97	55
1405-87	.873	0.877	7/8	1.125		.015		.060	1.10	60
1405-100	.998	1.002	1	1.250		.015		.060	1.20	65



0.091" to 1.005"

Standard Material
Carbon Spring Steel

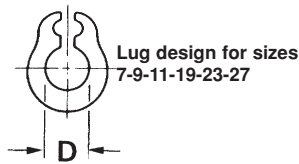
Standard Finish
Phosphate and oil



**"PUSH-ON"
EXTERNAL
HEAVY DUTY**

† Thrust load calculations see page 5

PART NUMBER	SHAFT			RING				APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)			
	DIAMETER S			OUTSIDE DIAMETER		RING HEIGHT				THICKNESS		
	min. (inch)	max. (inch)	fraction ~	D1 inches	Tol. inches	H inches	Tol. inches			t inches	Tol. inches	n1 (min)
1465-9	.091	.097	3/32	.326		.029	±.005	.010		.058	0.15	27
1465-12	.121	.129	1/8	.366		.029		.010		.058	0.20	38
1465-15	.152	.160	5/32	.397		.043	±.009	.010		.058	0.22	45
1465-18	.184	.192	3/16	.444	±.005	.031	±.007	.010	±.001	.062	0.26	55
1465-25	.246	.254	1/4	.522		.037		.010		.074	0.39	58
1465-31	.308	.316	5/16	.584		.037	±.008	.010		.074	0.44	60
1465-37	.371	.379	3/8	.645		.037		.010		.074	0.48	65
1465-43	.432	.442	7/16	.737		.045	±.009	.015		.090	0.97	120
1465-50	.495	.505	1/2	.828		.054		.015		.108	0.74	120
1465-56	.557	.567	9/16	.889		.054		.015		.108	1.39	125
1465-62	.620	.630	5/8	.951	±.010	.054		.015	±.002	.108	1.47	135
1465-75	.745	.755	3/4	1.076		.054	±.010	.015		.108	1.65	140
1465-87	.870	.880	7/8	1.203		.054		.015		.108	1.96	140
1465-100	.995	1.005	1	1.327		.054		.015		.108	2.23	140



0.077" to .755"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

MS 90707

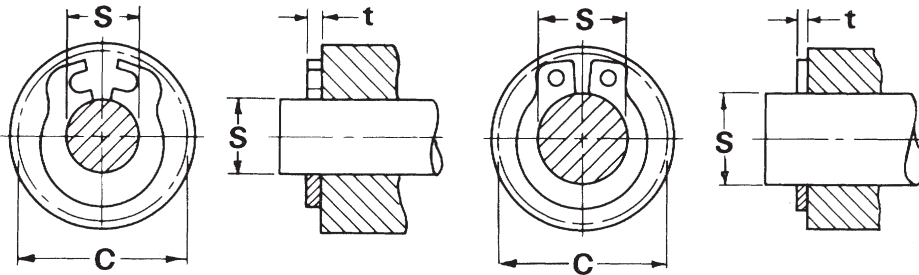


1440

**GRIP RING
EXTERNAL**

May be used without grooves

† Thrust load calculations see page 5



PART NO.	SHAFT				RING				C	APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)
	DIAMETER S				FREE DIAMETER		THICKNESS				
	min. (inch)	max. (inch)	fraction	mm	D inches	Tol. inches	t inches	Tol. inches			
1440-7	.077	.081	5/64	2.0	.074		.024		.25	.08	11
1440-9	.092	.096	3/32	2.4	.089		.025		.26	.10	11
1440-11	.116	.120	-	3.0	.112	+0.002	.024		.29	.14	16
1440-12	.123	.127	1/8	3.2	.120	-0.003	.025	±0.002	.33	.24	20
1440-13	.134	.138	-	3.5	.130		.025		.31	.27	20
1440-15	.154	.158	5/32	4.0	.150	+0.002	.025		.36	.30	23
1440-18	.185	.189	3/16	4.8	.181	-0.004	.035		.44	.55	25
1440-19	.194	.200	-	5.0	.187		.032		.44	.45	30
1440-23	.234	.239	15/64	6.0	.224	±0.003	.039	±0.003	.50	.85	35
1440-25	.247	.253	1/4	6.3	.238	+0.002	.035		.50	.74	35
1440-27	.274	.278	-	7.0	.264	±0.004	.039		.54	.93	40

PART NUMBER	SHAFT				RING				C	APPROX Wt. LB / 1000 PCS.	Tc+ (lb.f)
	DIAMETER S				FREE DIAMETER		THICKNESS				
	min. (inch)	max. (inch)	fraction	mm	D inches	Tol. inches	t inches	Tol. inches			
1440-31	.310	.317	5/16	8.0	.298	+0.003	.042		.67	1.39	44
1440-35	.351	.357	-	9.0	.341	±0.004	.047		.74	1.76	50
1440-37	.372	.379	3/8	9.5	.354	+0.003	.042	±0.003	.73	1.72	60
1440-39	.391	.397	-	10.0	.380	±0.004	.047		.76	2.08	60
1440-43	.434	.440	7/16	11.0	.412	+0.003	.050		.80	2.61	61
1440-50	.496	.505	1/2	12.7	.470	-0.005	.050		.90	2.91	65
1440-55	.550	.556	-	14.0	.531		.059		.99	5.40	76
1440-59	.587	.593	19/32	15.0	.571	+0.004	.059		1.06	6.16	81
1440-62	.620	.631	5/8	16.0	.593	-0.006	.062	±0.004	1.06	5.70	85
1440-75	.745	.755	3/4	19.0	.706		.062		1.30	6.88	91

0.394" to 2.00"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

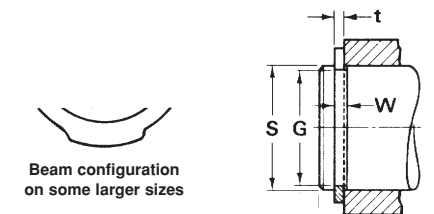
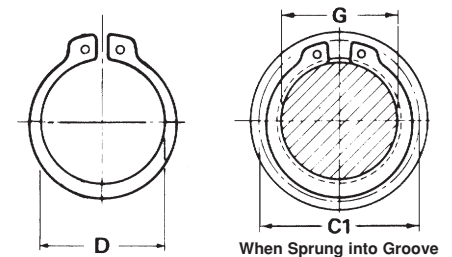
MS 3217



1460

**HEAVY DUTY
EXTERNAL**

PART NO.	SHAFT			RING				GROOVE				APPROX Wt. LB / 1000 PCS.	THRUST LOAD (LBS)	
	DIAMETER S			THICKNESS		FREE DIAMETER		DIAMETER		WIDTH				
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C1	G inches	Tol. inches	W inches			Tol. inches
1460-39	-	.394	10.0	.035		.362	+0.003	.58	.368		.039		.70	2000
1460-42	-	.428	10.9	.035		.394	-0.008	.62	.402	+0.01	.039	+0.003	.86	2300
1460-47	-	.473	12.0	.042		.435		.66	.444	-0.02	.046	-0.000	1.4	3000
1460-50	1/2	.500	12.7	.050	±0.002	.460		.72	.468		.056		1.6	3900
1460-59	-	.591	15.0	.050		.543		.83	.555		.056		2.2	4500
1460-62	5/8	.625	15.9	.050		.575		.86	.588		.056	+0.004	2.3	4800
1460-66	-	.669	17.0	.050		.616	+0.005	.90	.629		.056	-0.000	2.6	5200
1460-75	3/4	.750	19.0	.078		.689	-0.010	1.08	.704	+0.01	.086		5.6	9000
1460-75	-	.787	20.0	.078		.689		1.12	.740	-0.03	.086		5.6	9000
1460-87	7/8	.875	22.2	.078		.804		1.20	.821		.086		7.5	10400
1460-98	63/64	.984	25.0	.078		.906		1.30	.925		.086		7.8	11500
1460-98	1	1.000	25.4	.078		.906		1.31	.938		.086		7.8	11500
1460-106	11/16	1.062	27.0	.093		.978		1.46	.998		.103		11.5	15000
1460-112	11/8	1.125	28.6	.093		1.036		1.52	1.059		.103		12.5	16000
1460-118	-	1.181	30.0	.093		1.087		1.57	1.111		.103		13.5	16500
1460-118	13/16	1.188	30.2	.093	±0.003	1.087	+0.010	1.57	1.111		.103	+0.005	13.5	16500
1460-125	11/4	1.250	31.7	.093		1.150	-0.015	1.63	1.174	+0.02	.103	-0.000	14.9	17500
1460-131	15/16	1.312	33.3	.093		1.208		1.69	1.234	-0.04	.103		16.0	18000
1460-137	13/8	1.375	34.9	.093		1.268		1.75	1.291		.103		17.8	19500
1460-137	-	1.378	35.0	.093		1.268		1.75	1.291		.103		17.8	19500
1460-150	11/2	1.500	38.1	.109		1.380		1.98	1.406		.120		27.0	24500
1460-156	19/16	1.562	39.7	.109		1.437		2.05	1.468		.120		31.0	26000
1460-156	-	1.575	40.0	.109		1.43		2.06	1.480		.120		31.0	26000
1460-175	13/4	1.750	44.4	.109		1.608	+0.013	2.25	1.650	+0.03	.120		33.4	29000
1460-175	-	1.772	45.0	.109		1.608	.020	2.27	1.669	-0.04	.120		33.4	29000
1460-193	115/16	1.938	49.2	.125		1.782		2.48	1.826		.139		48.6	37000
1460-193	131/32	1.969	50.0	.125	±0.004	1.782		2.50	1.850		.139	+0.006	48.6	37000
1460-200	2	2.000	50.8	.125		1.840		2.53	1.880		.139	-0.000	50.6	38000





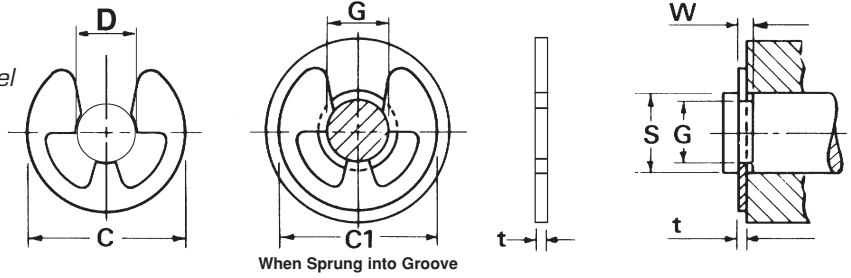
1500

.040" to 1.375"

Standard Material
4 Beryllium Copper
X6 up Carbon Spring Steel
Standard Finish
4 Self Finish
X6 up Phosphate

MS 16633

**STANDARD E-RING
EXTERNAL**



PART NUMBER	SHAFT			RING						GROOVE				APPROX Wt. LB / 1000 PCS.	PERMISSIBLE THRUST LOAD (LBS)	ASSEMBLY TOOLS	
	DIAMETER S			THICKNESS		FREE DIAMETER				DIAMETER		WIDTH				APPLICATOR No.	DISPENSER No.
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	G inches	Tol. inches	W inches	Tol. inches				
1500-4	-	.040	1	.010	±.001	.025		.079	.090	.026	+0.02	.012		.009	13	AM 1	-
1500-X6	1/16	.062	1.5	.010		.051	+0.001	.140	.150	.052	-0.00	.012		.028	20	AM 2	SF 2
1500-Y6	1/16	.062	1.6	.020	±.002	.051	-0.003	.187	.200	.052	±.002	.023	+0.02	.094	40	-	-
1500-6	1/16	.062	1.5	.010	±.001	.051		.156	.165	.052		.012	-0.00	.030	20	AM 3	SF 3
1500-X9	3/32	.094	2.4	.015		.069	+0.002	.230	.245	.074		.020		.100	45	AM 4	SF 4
1500-9	3/32	.094	2.4	.015		.073	-0.003	.187	.200	.074		.020		.058	45	AM 5	SF 5
1500-X11	7/64	.110	2.8	.015		.076		.375	.390	.079		.020		.310	60	AM 6	SF 6
1500-12	1/8	.125	3.2	.015		.094		.230	.240	.095	+0.02	.020		.087	65	AM 7	SF 7
1500-X14	9/64	.140	3.6	.015		.100		.203	.215	.102	-0.00	.020		.060	75	AM 8	SF 8
1500-Y14	9/64	.140	3.6	.015		.108		.250	.265	.110		.020		.10	75	AM 9	SF 9
1500-14	9/64	.140	3.6	.025		.102	+0.001	.270	.285	.105		.029		.21	170	AM 10	SF 10
1500-15	5/32	.156	4.0	.025		.114	-0.003	.282	.295	.116		.029		.21	175	AM 11	SF 11
1500-X17	11/64	.172	4.4	.025		.125		.312	.325	.127		.029		.24	180	AM 12	SF 12
1500-X18	3/16	.188	4.8	.025		.122		.375	.390	.125		.029		.45	200	AM 13	SF 13
1500-18	3/16	.188	4.8	.025		.145		.335	.350	.147		.029		.29	190	AM 14	SF 14
1500-X21	7/32	.219	5.6	.025	±.002	.185		.437	.450	.188		.029		.47	225	AM 15	SF 15
1500-25	1/4	.250	6.3	.025		.207		.527	.540	.210		.029		.76	255	AM 16	SF 16
1500-X31	5/16	.312	7.9	.025		.243		.500	.520	.250		.029		.57	325	AM 17	SF 17
1500-37	3/8	.375	9.5	.035		.300		.660	.680	.303		.039	+0.003	1.5	690	AM 18	SF 18
1500-43	7/16	.438	11.1	.035		.337	+0.002	.687	.710	.343		.039	-0.00	1.5	830	AM 19	SF 19
1500-X43	7/16	.438	11.1	.035		.375	-0.004	.600	.620	.380		.039		1.0	800	AM 20	SF 20
1500-50	1/2	.500	12.7	.042		.392		.800	.820	.396	+0.003	.046		2.5	1110	AM 21	SF 21
1500-62	5/8	.625	15.9	.042		.480		.940	.960	.485	-0.00	.046		3.2	1420	AM 22	SF 22
1500-X74	3/4	.744	19.0	.050		.616	+0.003	1.000	1.02	.625		.056		4.3	1950	AM 23	SF 23
1500-75	3/4	.750	19.0	.050		.574	-0.005	1.120	1.14	.580		.056		5.8	2000	AM 24	SF 24
1500-87	7/8	.875	22.2	.050		.668		1.300	1.32	.675		.056		7.6	2350	AM 25	SF 25
1500-X98	1	.984	25.0	.050		.822		1.500	1.53	.835		.056		9.2	2650	AM 26	SF 26
1500-X118	1 3/16	1.188	30.2	.062		1.066	+0.006	1.626	1.670	1.079		.068	+0.004	11.3	3450	AM 28	SF 28
1500-X137	1 3/8	1.375	34.9	.062	±.003	1.213	-0.010	1.875	1.920	1.230		.068	-0.00	15.4	4100	-	-



1540

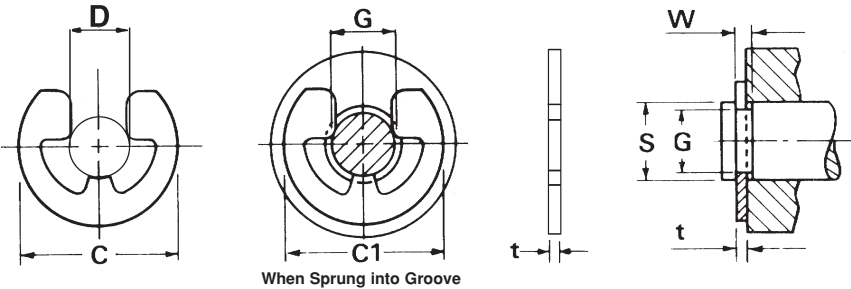
.094" to .562"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

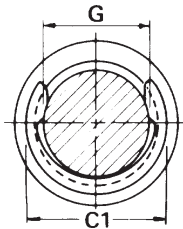
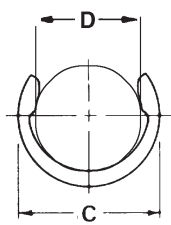
MS 3215

**REINFORCED E-RING
EXTERNAL**

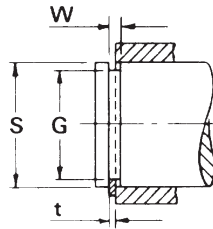
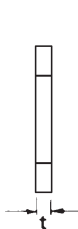


PART NUMBER	SHAFT			RING						GROOVE				APPROX Wt. LB / 1000 PCS.	PERMISSIBLE THRUST LOAD (LBS)	ASSEMBLY TOOLS	
	DIAMETER S			THICKNESS		FREE DIAMETER				DIAMETER		WIDTH				APPLICATOR No.	DISPENSER No.
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	G inches	Tol. inches	W inches	Tol. inches				
1540-9	3/32	.094	2.4	.015		.072	+0.001	.206	.219	.074		.018	+0.002	.07	50	AM 30	SF 30
1540-12	1/8	.125	3.2	.015		.093	-0.003	.270	.283	.095	+0.002	.018	-0.00	.13	75	AM 31	SF 31
1540-15	5/32	.156	4.0	.025		.113	+0.002	.335	.35	.116	-0.00	.029		.31	150	AM 32	SF 32
1540-18	3/16	.188	4.8	.025		.143		.375	.39	.147		.029		.39	180	AM 33	SF 33
1540-21	7/32	.219	5.6	.025		.182	±.003	.446	.46	.188		.029		.54	220	AM 34	SF 34
1540-25	1/4	.250	6.3	.025	±.002	.204		.516	.53	.210	±.002	.029		.71	250	AM 35	SF 35
1540-31	5/16	.312	7.9	.025		.242		.588	.61	.250		.039	+0.003	1.2	420	AM 36	SF 36
1540-37	3/8	.375	9.5	.035		.292		.660	.68	.303		.039	-0.00	1.5	520	AM 37	SF 37
1540-43	7/16	.438	11.1	.035		.332	±.004	.746	.77	.343	±.003	.039		1.9	600	AM 38	SF 38
1540-50	1/2	.500	12.7	.042		.385		.810	.83	.396		.046		3.2	820	AM 39	SF 39
1540-56	9/16	.562	14.3	.042		.430		.870	.89	.437		.046		3.5	930	AM 40	SF 40





When Sprung into Groove



.125" to 2.00"

Standard Material
Carbon Spring Steel

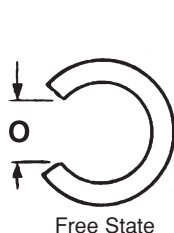
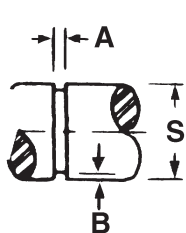
Standard Finish
Phosphate and oil

MS 16632

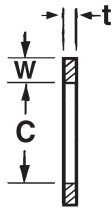


**STANDARD C-RING
EXTERNAL**

PART NUMBER	SHAFT			RING						GROOVE				APPROX Wt. LB / 1000 PCS.	PERMISSIBLE THRUST LOAD (LBS)	ASSEMBLY TOOLS	
	DIAMETER S			THICKNESS		FREE DIAMETER				DIAMETER		WIDTH				APPLICATOR No.	DISPENSER No.
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	G inches	Tol. inches	W inches	Tol. inches				
1800-12	1/8	.125	3.2	.015		.102		.165	.18	.106		.020		.030	85	AM 50	SF 50
1800-15	5/32	.156	4.0	.015		.131	+0.02	.205	.22	.135		.020	+0.02	.052	100	AM 8	SF 51
1800-18	3/16	.188	4.8	.015		.161	-.004	.244	.25	.165	±.0015	.020	-.000	.062	130	AM 10	SF 52
1800-21	7/32	.219	5.6	.025		.187		.275	.29	.193		.029		.120	260	AM 53	SF 53
1800-23	15/64	.236	6.0	.025		.203		.295	.31	.208		.029		.150	280	AM 54	SF 54
1800-25	1/4	.250	6.4	.025		.211		.311	.33	.220		.029		.157	290	AM 12	SF 55
1800-28	9/32	.281	7.1	.025		.242	+0.003	.346	.36	.247		.029		.190	330	AM 56	SF 56
1800-31	5/16	.312	7.9	.025		.270	-.005	.376	.39	.276		.029		.226	370	AM 13	SF 57
1800-37	3/8	.375	9.5	.025	±.002	.328		.448	.47	.335	±.002	.029		.300	440	AM 58	SF 58
1800-40	13/32	.406	10.3	.025		.359		.486	.50	.364		.029	+0.003	.352	480	AM 59	SF 59
1800-43	7/16	.438	11.1	.025		.386		.517	.53	.393		.029	-.000	.359	520	AM 16	SF 60
1800-50	1/2	.500	12.7	.035		.441		.581	.60	.450		.039		.671	830	AM 61	SF 61
1800-56	9/16	.562	14.3	.035		.497		.653	.67	.507		.039		.710	930	AM 18	SF 62
1800-62	5/8	.625	15.9	.035		.553	±.006	.715	.74	.563		.039		.937	1030	AM 63	SF 63
1800-68	11/16	.688	17.5	.042		.612		.784	.80	.619	±.003	.046		1.3	1700	AM 64	SF 64
1800-75	3/4	.750	19.0	.042		.665		.845	.87	.676		.046		1.5	1850	AM 65	SF 65
1800-81	13/16	.812	20.6	.042		.721		.915	.915	.732		.046		1.7	2010	AM 66	SF 66
1800-87	7/8	.875	22.2	.042		.777	±.007	.991	.991	.789		.046		2.0	2170	AM 67	SF 67
1800-93	15/16	.938	23.8	.042		.830		1.058	1.058	.843		.046		2.3	2320	AM 68	SF 68
1800-100	1	1.000	25.4	.042		.887		1.130	1.130	.900		.046		2.7	2480	AM 69	SF 69
1800-112	1 1/8	1.125	28.6	.050		.997		1.267	1.267	1.013		.056		4.0	3320	-	-
1800-125	1 1/4	1.250	31.7	.050		1.110		1.415	1.415	1.126		.056		5.1	3680	-	-
1800-137	1 3/8	1.375	34.9	.050		1.220	±.008	1.555	1.555	1.237		.056	+0.04	6.1	4050	-	-
1800-150	1 1/2	1.500	38.1	.050		1.331		1.691	1.691	1.350	±.004	.056	-.000	7.6	4420	-	-
1800-175	1 3/4	1.750	44.4	.062	±.003	1.555	±.010	1.975	1.975	1.576		.068		12.9	6430	-	-
1800-200	2	2.000	50.8	.062		1.777		2.257	2.257	1.800	±.005	.068		16.2	7300	-	-



Free State



Installed State

0.188" to 1.00"

C1008 - 1010

Obtainable in
Stainless Steel



GAP: Gap furnished in open position and butted when closed into groove

PART NUMBER	REFERENCE NUMBER	SHAFT		RING			GROOVE DIMENSIONS		APPROX Wt. LB/ 1000 PCS.		
		DIAMETER S		THICKNESS	WIDTH	C	C1	O		A Width	B Depth
		Frac. inch	Dec. inch	t inches	W inches						
WA-510	AAR-316	3/16	.188	.031	.062	.174	.125	.125	.034	.031	.32
WA-512	AAR-732	7/32	.219	.031	.046	.230	.173	.143	.034	.023	.25
WA-514	AAR-14	1/4	.250	.031	.062	.260	.187	.182	.034	.031	.42
WA-516	AAR-516	5/16	.312	.039	.079	.328	.251	.191	.043	.031	.94
WA-518	AAR-38	3/8	.375	.047	.094	.394	.313	.264	.052	.031	1.65
WA-520	AAR-716	7/16	.438	.055	.109	.459	.376	.203	.060	.031	2.61
WA-522	AAR-12	1/2	.500	.063	.125	.525	.438	.233	.069	.031	3.92
WA-524	AAR-916	9/16	.562	.070	.141	.591	.493	.241	.077	.035	5.53
WA-526	AAR-58	5/8	.625	.078	.156	.656	.547	.253	.086	.039	7.57
WA-528	AAR-1116	11/16	.688	.086	.172	.722	.602	.278	.094	.043	10.13
WA-530	AAR-34	3/4	.750	.094	.188	.788	.656	.310	.103	.047	13.20
WA-532	AAR-1316	13/16	.812	.102	.203	.853	.711	.331	.112	.051	16.74
WA-534	AAR-78	7/8	.875	.109	.219	.919	.765	.357	.120	.055	20.80
WA-536	AAR-1516	15/16	.938	.117	.234	.984	.820	.387	.129	.059	25.53
WA-538	AAR-1	1	1.000	.125	.250	1.050	.874	.423	.138	.063	31.10

**WA/AAR
RINGS
"Crimp Ring"**

TOLERANCES:
Tolerances on "C" dimensions are minus as follows:
3/16" to 5/16" sizes 4%
3/8" to 1" sizes 3%
Tolerances on "O" dimensions are plus as follows:
3/16" to 5/16" sizes 4%
3/8" to 1" sizes 4%
Tolerance on "t" (thickness) dimension are as follows:
.031 to .039 sizes ±.002
.047 to .125 sizes +.000 and -.004



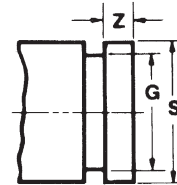
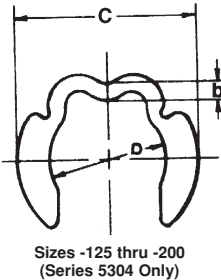
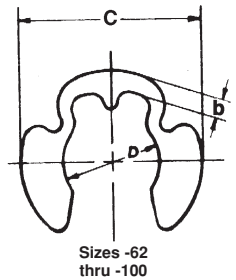
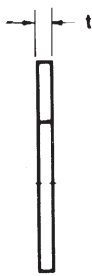
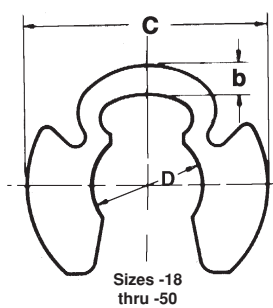
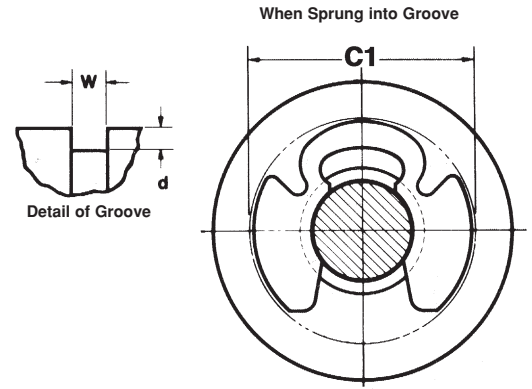
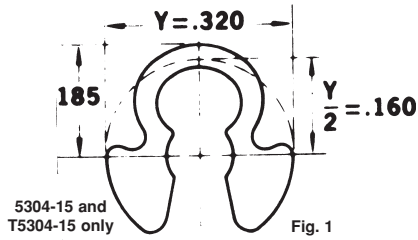


0.156" to 2.00"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate

**KLIPRING®
EXTERNAL**

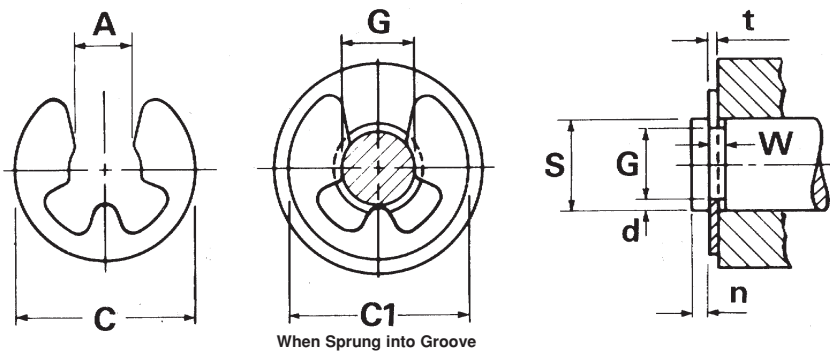


PART NUMBER	SHAFT			RING							GROOVE			EDGE MARGIN Z min	APPROX Wt. LB / 1000 PCS.		
	DIAMETER S			THICKNESS		FREE DIAMETER			DIAMETER		WIDTH		DEPTH				
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	b nom	G inches	Tol. inches	W inches			Tol. inches	d ref
5304-15	5/32	.156	4.0	.035		.110		see fig.1	.39	.042	.120	±.004	.039		.018	.036	.42
5304-18	3/16	.188	4.8	.035		.140		.400	.42	.048	.148	±.005	.039		.020	.040	.63
5304-25	1/4	.250	6.4	.035		.188	±.003	.482	.52	.056	.210		.039		.020	.040	.84
5304-31	5/16	.312	7.9	.042		.250		.588	.63	.074	.272	±.006	.046		.020	.040	1.46
5304-37	3/8	.375	9.5	.042	±.002	.312		.680	.72	.081	.331		.046	+0.006	.022	.044	1.92
5304-43	7/16	.438	11.1	.050		.375	±.004	.752	.79	.081	.390		.056		.024	.048	2.66
5304-50	1/2	.500	12.7	.050		.406		.826	.89	.097	.440	±.008	.056		.030	.060	3.30
5304-62	5/8	.625	15.9	.050		.500	±.005	.966	1.03	.086	.531		.056		.047	.094	4.65
5304-75	3/4	.750	19.0	.062		.594		1.095	1.17	.095	.632		.068		.059	.118	7.48
5304-100	1	1.000	25.4	.078	±.003	.812	±.006	1.415	1.51	.115	.860	±.010	.086	+0.008	.070	.140	13.8
5304-125	1 1/4	1.250	31.8	.093		1.032		1.800	1.90	.180	1.090		.103		.080	.160	29.0
5304-150	1 1/2	1.500	38.1	.109		1.250	±.008	2.050	2.18	.208	1.317		.120		.091	.182	37.1
5304-175	1 3/4	1.750	44.4	.125		1.406	±.010	2.300	1.45	.235	1.480	±.015	.139	+0.010	.135	.270	58.6
5304-200	2	2.000	50.8	.125	±.004	1.625	±.011	2.650	1.83	.250	1.730		.139		.135	.270	59.2

PART NUMBER	SHAFT			RING							GROOVE			EDGE MARGIN Z min	APPROX Wt. LB / 1000 PCS.		
	DIAMETER S			THICKNESS		FREE DIAMETER			DIAMETER		WIDTH		DEPTH				
	Frac. inch	Dec. inch	mm	t inches	Tol. inches	D inches	Tol. inches	C	C1	b nom	G inches	Tol. inches	W inches			Tol. inches	d ref
T5304-15	5/32	.156	4.0	.025		.110		see fig.1	.39	.042	.120	±.004	.029		.018	.036	.30
T5304-18	3/16	.188	4.8	.025		.140		.400	.42	.048	.148	±.005	.029		.020	.040	.45
T5304-25	1/4	.250	6.4	.025		.188	±.003	.482	.52	.056	.210		.029		.020	.040	.60
T5304-31	5/16	.312	7.9	.025		.250		.588	.63	.074	.272	±.006	.029		.020	.040	.87
T5304-37	3/8	.375	9.5	.035	±.002	.312		.680	.72	.081	.331		.039	+0.006	.022	.044	1.60
T5304-43	7/16	.438	11.1	.035		.375	±.004	.752	.79	.081	.390		.039		.024	.048	1.86
T5304-50	1/2	.500	12.7	.042		.406		.826	.89	.097	.440	±.008	.046		.030	.060	2.77
T5304-62	5/8	.625	15.9	.042		.500	±.005	.966	1.03	.086	.531		.046		.047	.094	3.91
T5304-75	3/4	.750	19.0	.050		.594		1.095	1.17	.095	.632		.056	+0.008	.059	.118	6.03
T5304-100	1	1.000	25.4	.050		.812	±.006	1.415	1.51	.115	.860	±.010	.056		.070	.140	8.8



Metric Circlips



1.2mm to 31.5mm

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

DIN 6799



STANDARD METRIC "E" EXTERNAL

† Thrust load calculations see page 5

PART NUMBER	SHAFT		RING						GROOVE						Tc† (N)	Tg† (N)	ASSEMBLY TOOLS	
	DIAMETER		THICKNESS		DIAMETER				DIAMETER		WIDTH		n (min)	d Nom			APPLICATOR No.	DISPENSER No.
	S mm	Tol. mm	t mm	Tol. mm	C mm	C1 mm	A	Tol.	G mm	Tol. mm	W mm	Tol. mm						
D1500-8	1.20	±0.20	0.20		1.95	2.25	0.58		0.8	+0.00	0.24	+0.04	0.4	1.20	63	30	-	-
D1500-1.2	1.70	±0.30	0.30		2.90	3.25	1.01		1.2	-0.04	0.34	-0.00	0.6	0.25	203	53	28	DR 44
D1500-1.5	2.25	±0.25	0.40		3.85	4.25	1.28	±0.04	1.5	+0.00	0.44		0.8	0.38	358	105	21 A	DR 56
D1500-1.9	2.75		0.50		4.40	4.8	1.61		1.9	-0.06	0.54		1.0	0.43	546	145	22	DR 72
D1500-2.3	3.50	±0.50	0.60	±0.02	5.90	6.3	1.94		2.3		0.64		1.0	0.60	835	260	3 C	DR 87
D1500-3.2	4.50		0.60		6.80	7.3	2.70		3.2		0.64		1.0	0.65	1070	365	30	DR 123
D1500-4	6.00		0.70		8.80	9.3	3.34		4.0	+0.00	0.74	+0.05	1.2	1.00	1670	745	23 B	DR 154
D1500-5	7.00	±1.00	0.70		10.75	11.3	4.11	±0.048	5.0	-0.075	0.74	-0.00	1.2	1.00	1950	870	7 B	DR 194
D1500-6	8.00		0.70		11.75	12.3	5.26		6.0		0.74		1.2	1.00	2220	995	24	DR 232
D1500-7	9.50	±1.50	0.90		13.80	14.3	5.84		7.0		0.94		1.5	1.25	3400	1480	15	FR 273
D1500-8	10.50		1.00		15.60	16.3	6.52		8.0	+0.00	1.05		1.8	1.25	4170	1630	16 C	FR 311
D1500-9	12.00	±2.00	1.10		18.20	18.8	7.63	±0.058	9.0	-0.09	1.15		2.0	1.50	5250	2240	25	FR 350
D1500-10	13.00		1.20		19.65	20.4	8.32		10.0		1.25		2.0	1.50	6200	2430	26	FR 389
D1500-12	15.50	±2.50	1.30	±0.03	22.65	23.4	10.45		12.0	+0.00	1.35	+0.08	2.5	1.75	8010	3370	27	FR 468
D1500-15	20.00	±4.00	1.50		28.60	29.4	12.61	±0.07	15.0	-0.11	1.55	-0.00	3.0	2.50	11900	6220	20 B	FR 586
D1500-19	25.50	±5.50	1.75		36.70	37.6	15.92		19.0	+0.00	1.85		3.5	3.25	17700	10300	32 A	FR 743
D1500-24	31.50	±6.50	2.00		43.65	44.6	21.88	±0.084	24.0	-0.13	2.05		4.0	3.75	25000	14700	-	-



3 mm to 400 mm

Standard Material
 3 Beryllium Copper
 4 up Carbon Spring Steel

Standard Finish
 3 Self Finish and oil
 4 up Phosphate and oil

DIN 471



Lug for sizes 3 to 9 mm



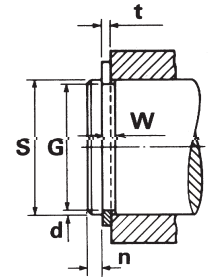
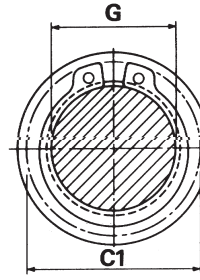
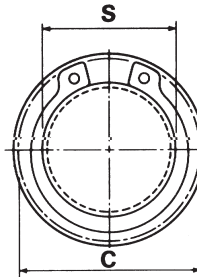
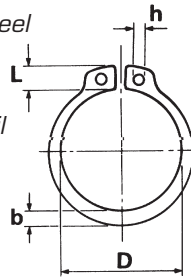
Alternative lug for sizes 4-8 mm



Most sizes over 185 mm are without lugs



Beam configuration on some larger sizes



When Sprung onto Shaft

When Sprung into Groove

STANDARD METRIC EXTERNAL

† Thrust load calculations see page 5

PART NUMBER	SHAFT S mm	THICKNESS			FREE DIAMETER			CIRCLIP					GROOVE					APPROX Wt. KG / 1000 PCS.	Tc (N)	Tg (N)	PLIER No.
		t mm	Tol. mm	D mm	Tol. mm	C	C1	L (max)	b ~	h (min)	G mm	Tol. mm	W mm	Tol. mm	n (min)	d ~					
D1400-3	3	0.40		2.7		7.2	6.6	1.9	0.8	1.0	2.8		0.50		0.3	0.10	0.02	1100	110	Mini A	
D1400-4	4	0.40		3.7		8.8	8.2	2.2	0.9	1.0	3.8	+0.00	0.50		0.3	0.10	0.03	1600	150	Mini B	
D1400-5	5	0.60	+0.00	4.7	+0.075	10.7	9.8	2.5	1.1	1.0	4.8	-0.075	0.70		0.3	0.10	0.08	2000	180		
D1400-6	6	0.70	-0.04	5.6	-0.15	12.2	11.1	2.7	1.3	1.1	5.7		0.80		0.5	0.15	0.13	4100	330		
D1400-7	7	0.80		6.5		13.8	12.9	3.1	1.4	1.2	6.7	+0.00	0.90		0.5	0.15	0.18	5500	390	Mini C	
D1400-8	8	0.80		7.4	+0.09	15.2	14.0	3.2	1.5	1.2	7.6	-0.09	0.90		0.6	0.20	0.20	6200	590		
D1400-9	9	1.00		8.4	-0.18	16.4	15.2	3.3	1.7	1.2	8.6		1.10		0.6	0.20	0.32	8800	660		
D1400-10	10	1.00		9.3		17.6	16.2	3.3	1.8	1.5	9.6		1.10		0.6	0.20	0.40	9700	740		
D1400-11	11	1.00		10.2		18.6	17.1	3.3	1.8	1.5	10.5		1.10		0.8	0.25	0.41	10700	1010		
D1400-12	12	1.00		11.0		19.6	18.1	3.3	1.8	1.7	11.5	+0.00	1.10		0.8	0.25	0.45	11700	1110		
D1400-13	13	1.00		11.9		20.8	19.2	3.4	2.0	1.7	12.4	-0.11	1.10		0.9	0.30	0.52	12700	1440		
D1400-14	14	1.00		12.9		22.0	20.4	3.5	2.1	1.7	13.4		1.10		0.9	0.30	0.56	13600	1550		
D1400-15	15	1.00		13.8	+0.18	23.2	21.5	3.6	2.2	1.7	14.3		1.10		1.1	0.35	0.62	14600	1930	HA 1	
D1400-16	16	1.00		14.7	-0.36	24.4	22.6	3.7	2.2	1.7	15.2		1.10		1.2	0.40	0.69	15600	2350	or HB 1	
D1400-17	17	1.00		15.7		25.6	23.8	3.8	2.3	1.7	16.2		1.10		1.2	0.40	0.77	16600	2500		
D1400-18	18	1.20		16.5		26.8	24.8	3.9	2.4	2.0	17.0		1.30		1.5	0.50	0.99	21000	3300		
D1400-19	19	1.20		17.5		27.8	25.8	3.9	2.5	2.0	18.0		1.30		1.5	0.50	1.10	22200	3490		
D1400-20	20	1.20		18.5		29.0	27.0	4.0	2.6	2.0	19.0		1.30		1.5	0.50	1.18	23400	3680		
D1400-21	21	1.20		19.5		30.2	28.2	4.1	2.7	2.0	20.0		1.30		1.5	0.50	1.26	24500	3860		
D1400-22	22	1.20		20.5		31.4	29.4	4.2	2.8	2.0	21.0		1.30		1.5	0.50	1.39	25700	4050		
D1400-23	23	1.20		21.5		32.6	30.6	4.3	2.9	2.0	22.0	+0.00	1.30		1.5	0.50	1.54	26900	4240		
D1400-24	24	1.20		22.2		33.8	31.7	4.4	3.0	2.0	22.9	-0.21	1.30		1.7	0.55	1.52	28000	4860		
D1400-25	25	1.20		23.2		34.8	32.7	4.4	3.0	2.0	23.9		1.30		1.7	0.55	1.70	29200	5070		
D1400-26	26	1.20		24.2	+0.21	36.0	33.9	4.5	3.1	2.0	24.9		1.30		1.7	0.55	1.75	30400	5280		
D1400-27	27	1.20		24.9	-0.42	37.2	34.8	4.6	3.1	2.0	25.6		1.30		2.1	0.70	1.89	31600	6940	HA 2	
D1400-28	28	1.50		25.9		38.4	36.0	4.7	3.2	2.0	26.6		1.60		2.1	0.70	2.47	40900	7200	or HB 2	
D1400-29	29	1.50	+0.00	26.9		36.6	37.2	4.8	3.4	2.0	27.6		1.60		2.1	0.70	2.75	42400	7470		
D1400-30	30	1.50	-0.06	27.9		41.0	38.6	5.0	3.5	2.0	28.6		1.60		2.1	0.70	2.93	43800	7730		
D1400-32	32	1.50		29.6		43.4	40.7	5.2	3.6	2.5	30.3		1.60		2.6	0.85	3.02	46700	9980		
D1400-33	33	1.50		30.5		44.4	41.7	5.2	3.7	2.5	31.3		1.60	+0.14	2.6	0.85	3.30	48200	10300		
D1400-34	34	1.50		31.5		45.8	43.1	5.4	3.8	2.5	32.3		1.60	-0.00	2.6	0.85	3.72	49700	10600		
D1400-35	35	1.50		32.2	+0.25	47.2	44.2	5.6	3.9	2.5	33.0		1.60		3.0	1.00	3.78	51100	12800		
D1400-36	36	1.75		33.2	-0.50	48.2	45.2	5.6	4.0	2.5	34.0		1.85		3.0	1.00	4.55	51400	13200		
D1400-38	38	1.75		35.2		50.6	47.6	5.8	4.2	2.5	36.0	+0.00	1.85		3.0	1.00	5.08	54800	14000		
D1400-40	40	1.75		36.5		53.0	49.5	6.0	4.4	2.5	37.5	-0.25	1.85		3.8	1.25	5.54	56600	18300		
D1400-42	42	1.75		38.5		56.0	52.5	6.5	4.5	2.5	39.5		1.85		3.8	1.25	5.99	59500	19200		
D1400-45	45	1.75		41.5		59.4	55.9	6.7	4.7	2.5	42.5		1.85		3.8	1.25	6.75	63700	20600		
D1400-46	46	1.75		42.5		60.4	56.9	6.7	4.8	2.5	43.5		1.85		3.8	1.25	7.24	65100	21100		
D1400-47	47	1.75		43.5	+0.39	61.6	58.1	6.8	4.9	2.5	44.5		1.85		3.8	1.25	7.30	66500	21600		
D1400-48	48	1.75		44.5	-0.90	62.8	59.3	6.9	5.0	2.5	45.5		1.85		3.8	1.25	7.51	67900	22000		
D1400-50	50	2.00		45.8		64.8	60.8	6.9	5.1	2.5	47.0		2.15		4.5	1.50	9.88	80900	27400	HA 3	
D1400-52	52	2.00		47.8		67.0	63.0	7.0	5.2	2.5	49.0		2.15		4.5	1.50	9.5	84100	28600	or HB 3	
D1400-54	54	2.00		49.8		69.2	65.2	7.1	5.3	2.5	51.0		2.15		4.5	1.50	10.30	87400	29700		
D1400-55	55	2.00		50.8		70.4	66.4	7.2	5.4	2.5	52.0		2.15		4.5	1.50	10.41	89000	30300		
D1400-56	56	2.00		51.8		71.6	67.6	7.3	5.5	2.5	53.0		2.15		4.5	1.50	10.50	90600	30800		
D1400-58	58	2.00		53.8	+0.46	73.6	69.6	7.3	5.6	2.5	55.0		2.15		4.5	1.50	12.47	93800	32000		
D1400-60	60	2.00		55.8	-1.10	75.8	71.8	7.4	5.8	2.5	57.0	+0.00	2.15		4.5	1.50	13.69	97100	33100		
D1400-62	62	2.00		57.8		78.0	74.0	7.5	6.0	2.5	59.0	-0.30	2.15		4.5	1.50	12.36	100000	34200		
D1400-63	63	2.00		58.8		79.2	75.2	7.6	6.2	2.5	60.0		2.15		4.5	1.50	13.10	102000	34800		
D1400-65	65	2.50		60.8		81.6	77.6	7.8	6.3	3.0	62.0		2.65		4.5	1.50	20.44	131000	35900		
D1400-67	67	2.50		62.5		83.8	79.8	7.9	6.4	3.0	64.0		2.65		4.5	1.50	20.43	135000	37000		
D1400-68	68	2.50		63.5		85.0	81.0	8.0	6.5	3.0	65.0		2.65		4.5	1.50	19.55	138000	37600		
D1400-70	70	2.50		65.5		87.2	83.2	8.1	6.6	3.0	67.0		2.65		4.5	1.50	22.13	142000	38700		
D1400-72	72	2.50		67.5		89.4	85.4	8.2	6.8	3.0	69.0		2.65		4.5	1.50	21.60	146000	39900		





Lug for sizes 3 to 9 mm



Alternative lug for sizes 4-8 mm



Most sizes over 185 mm are without lugs



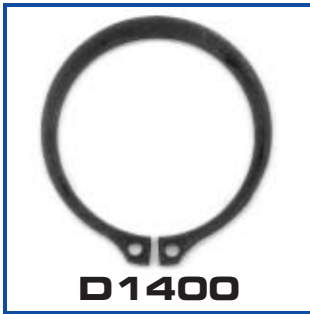
Beam configuration on some larger sizes

3 mm to 400 mm

Standard Material
3 Beryllium Copper
4 up Carbon Spring Steel

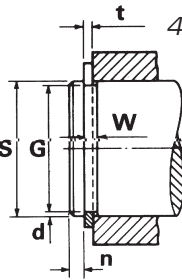
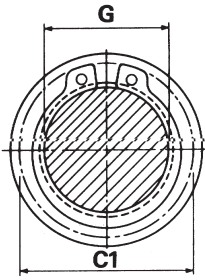
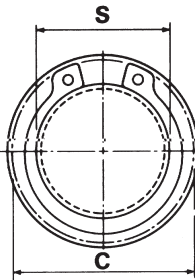
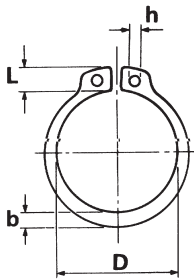
Standard Finish
3 Self Finish and oil
4 up Phosphate and oil

DIN 471



D1400

STANDARD
METRIC
EXTERNAL



When Sprung onto Shaft

When Sprung into Groove

† Thrust load calculations see page 5

PART NUMBER	SHAFT S mm	THICKNESS		FREE DIAMETER		CIRCLIP					GROOVE						APPROX WT. KG / 1000 PCS.	Tc (N)	Tg (N)	PLIER No.	
		t mm	Tol. mm	D mm	Tol. mm	C	C1	L (max)	b ~	h (min)	G mm	Tol. mm	W mm	Tol. mm	n (min)	d ~					
D1400-75	75	2.50		70.5	+0.46	92.8	88.8	8.4	7.0	3.0	72.0		2.65			4.5	1.50	24.65	152000	41600	
D1400-77	77	2.50		-	-1.10	95.0	91.0	8.5	7.2	3.0	74.0		2.65	+0.14		4.5	1.50	24.26	156000	42700	
D1400-78	78	2.50	+0.00	73.5		96.2	92.2	8.6	7.3	3.0	75.0		2.65	-0.00		4.5	1.50	28.10	158000	43300	
D1400-80	80	2.50	-0.06	74.5		98.2	93.7	8.6	7.4	3.0	76.5	+0.00	2.65			5.3	1.75	26.68	162000	51600	HA 3
D1400-82	82	2.50		76.5		101.0	95.9	8.7	7.6	3.0	78.5	-0.30	2.65			5.3	1.75	28.35	166000	53000	or
D1400-85	85	3.00		79.5		104.0	98.9	8.7	7.8	3.5	81.5		3.15			5.3	1.75	35.40	206000	54900	HB 3
D1400-88	88	3.00		82.5		107.0	102.0	8.8	8.0	3.5	84.5		3.15			5.3	1.75	39.85	214000	56900	
D1400-90	90	3.00		84.5		109.0	104.0	8.8	8.2	3.5	86.5	+0.00	3.15			5.3	1.75	38.89	218000	58200	
D1400-95	95	3.00		89.5		115.0	110.0	9.4	8.6	3.5	91.5	-0.35	3.15			5.3	1.75	42.39	231000	61500	
D1400-98	98	3.00		92.5		119.0	113.0	9.5	9.0	3.5	94.5		3.15			5.3	1.75	54.00	238000	63500	
D1400-100	100	3.00		94.5		121.0	116.0	9.6	9.0	3.5	96.5		3.15			5.3	1.75	48.86	243000	64800	
D1400-102	102	4.00		95.0	+0.54	123.0	117.0	9.7	9.2	3.5	98.0		4.15			6.0	2.00	68.73	330000	75400	
D1400-105	105	4.00		98.0	-1.30	126.0	121.0	9.9	9.3	3.5	101.0		4.15			6.0	2.00	73.16	340000	77700	
D1400-108	108	4.00		-		130.0	124.0	10.0	9.5	3.5	104.0	+0.00	4.15			6.0	2.00	83.45	349000	79900	
D1400-110	110	4.00		103.0		132.0	126.0	10.1	9.6	3.5	106.0	-0.54	4.15			6.0	2.00	75.24	356000	81400	
D1400-115	115	4.00		108.0		138.0	132.0	10.6	9.8	3.5	111.0		4.15			6.0	2.00	78.65	372000	85200	
D1400-120	120	4.00		113.0		143.0	138.0	11.0	10.2	3.5	116.0		4.15			6.0	2.00	85.58	388000	89000	
D1400-125	125	4.00		118.0		149.0	144.0	11.4	10.4	4.0	121.0		4.15			6.0	2.00	99.62	404000	62800	
D1400-130	130	4.00		123.0		155.0	149.0	11.6	10.7	4.0	126.0		4.15			6.0	2.00	98.10	421000	96500	
D1400-135	135	4.00		128.0		160.0	155.0	11.8	11.0	4.0	131.0		4.15			6.0	2.00	113.40	437000	100000	
D1400-140	140	4.00		133.0		165.0	160.0	12.0	11.2	4.0	136.0		4.15			6.0	2.00	119.18	453000	104000	
D1400-145	145	4.00		138.0		171.0	165.0	12.2	11.5	4.0	141.0		4.15			6.0	2.00	128.53	470000	108000	
D1400-150	150	4.00		142.0		177.0	171.0	13.0	11.8	4.0	145.0		4.15			7.5	2.50	132.80	485000	139000	
D1400-155	155	4.00		146.0	+0.63	182.0	176.0	13.0	12.0	4.0	150.0	+0.00	4.15	+0.18		7.5	2.50	136.06	501000	144000	
D1400-160	160	4.00		151.0	-1.50	188.0	182.0	13.3	12.2	4.0	155.0	-0.63	4.15	-0.00		7.5	2.50	137.50	518000	148000	
D1400-165	165	4.00	+0.00	155.5		193.0	187.0	13.5	12.5	4.0	160.0		4.15			7.5	2.50	151.96	534000	153000	MAJOR
D1400-170	170	4.00	-0.075	160.5		197.0	191.0	13.5	12.9	4.0	165.0		4.15			7.5	2.50	169.00	550000	158000	88
D1400-175	175	4.00		165.5		202.0	196.0	13.5	12.9	4.0	170.0		4.15			7.5	2.50	173.70	566000	163000	
D1400-180	180	4.00		170.5		208.0	202.0	14.2	13.5	4.0	175.0		4.15			7.5	2.50	188.00	582000	167000	
D1400-185	185	4.00		175.5		213.0	207.0	14.2	13.5	4.0	180.0		4.15			7.5	2.50	193.00	598000	172000	
D1400-190	190	4.00		180.5		219.0	213.0	14.2	14.0	4.0	185.0		4.15			7.5	2.50	203.00	615000	177000	
D1400-195	195	4.00		185.5		224.0	218.0	14.2	14.0	4.0	190.0		4.15			7.5	2.50	209.50	631000	181000	
D1400-200	200	4.00		190.5		229.0	223.0	14.2	14.0	4.0	195.0		4.15			7.5	2.50	214.00	647000	186000	
D1400-205	205	5.00		193.0		234.0	227.0	14.2	14.0	4.0	199.0	+0.00	5.15			9.0	3.00	278.00	721000	228000	
D1400-210	210	5.00		198.0	+0.72	239.0	232.0	14.2	14.0	4.0	204.0	-0.72	5.15			9.0	3.00	285.00	739000	234000	
D1400-220	220	5.00		208.0	-1.70	249.0	242.0	14.2	14.0	4.0	214.0		5.15			9.0	3.00	298.50	775000	345000	
D1400-230	230	5.00		218.0		259.0	252.0	14.2	14.0	4.0	224.0		5.15			9.0	3.00	312.00	809000	257000	
D1400-240	240	5.00		228.0		269.0	262.0	14.2	14.0	4.0	234.0		5.15			9.0	3.00	326.00	844000	268000	
D1400-250	250	5.00		238.0		279.0	272.0	14.2	14.0	4.0	244.0		5.15			9.0	3.00	340.00	880000	279000	
D1400-260	260	5.00		245.0		293.0	284.0	16.2	16.0	5.0	252.0		5.15			12.0	4.00	414.00	915000	386000	
D1400-270	270	5.00		255.0		303.0	294.0	16.2	16.0	5.0	262.0		5.15			12.0	4.00	430.50	950000	401000	
D1400-280	280	5.00		265.0	+0.81	313.0	304.0	16.2	16.0	5.0	272.0		5.15			12.0	4.00	446.50	985000	416200	
D1400-290	290	5.00		275.0	-2.00	323.0	314.0	16.2	16.0	5.0	282.0	+0.00	5.15			12.0	4.00	463.00	1020000	431200	
D1400-300	300	5.00		285.0		333.0	324.0	16.2	16.0	5.0	292.0	-0.81	5.15			12.0	4.00	479.00	1056000	446300	
D1400-310	310	6.00		293.0		349.0	340.0	20.2	20.0	6.0	300.0		6.20			15.0	5.00	710.50	1308920	575000	
D1400-320	320	6.00		303.0		359.0	350.0	20.2	20.0	6.0	310.0		6.20			15.0	5.00	734.00	1351000	593800	
D1400-330	330	6.00		313.0		369.0	360.0	20.2	20.0	6.0	320.0		6.20			15.0	5.00	757.00	1393000	612600	
D1400-340	340	6.00		323.0		379.0	370.0	20.2	20.0	6.0	330.0		6.20			15.0	5.00	780.00	1436000	631500	MAJOR
D1400-350	350	6.00	+0.00	333.0	+1.00	389.0	380.0	20.2	20.0	6.0	340.0		6.20	+0.22		15.0	5.00	805.00	1478000	650300	X 88
D1400-360	360	6.00	-0.18	343.0	-2.20	399.0	390.0	20.2	20.0	6.0	350.0	+0.00	6.20	-0.00		15.0	5.00	827.00	1520000	669000	
D1400-370	370	6.00		353.0		409.0	400.0	20.2	20.0	6.0	360.0	-0.89	6.20			15.0	5.00	850.00	1562000	688000	
D1400-380	380	6.00		363.0		419.0	410.0	20.2	20.0	6.0	370.0		6.20			15.0	5.00	873.00	1604000	706900	
D1400-390	390	6.00		373.0		429.0	420.0	20.2	20.0	6.0	380.0		6.20			15.0	5.00	896.00	1646000	725700	
D1400-400	400	6.00		383.0		439.0	430.0	20.2	20.0	6.0	390.0		6.20			15.0	5.00	919.00	1689000	744600	



D 1300

**STANDARD
METRIC
INTERNAL**

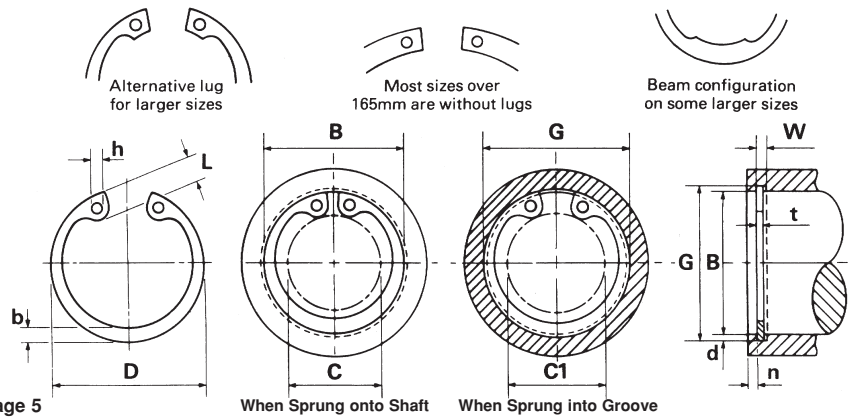
8 mm to 400 mm

Standard Material
Carbon Spring Steel

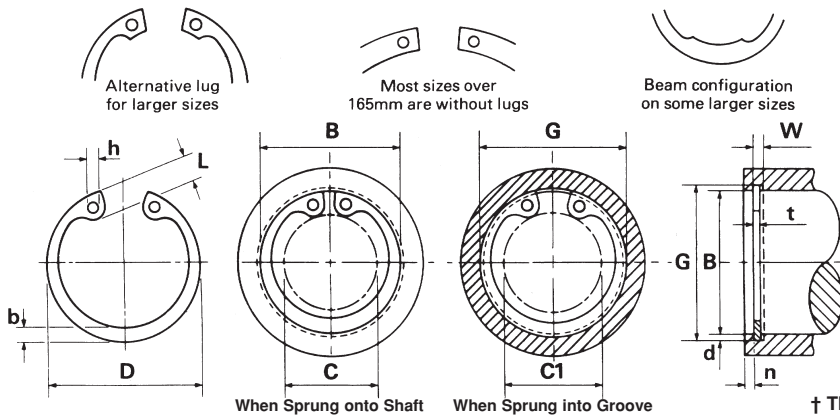
Standard Finish
Phosphate and oil

DIN 472

† Thrust load calculations see page 5



PART NUMBER	BORE		CIRCLIP							GROOVE						APPROX Wt. KG / 1000 PCS.	Tc (N)	Tg (N)	PLIER No.	
	B mm	t mm	Tol. mm	D mm	Tol. mm	C	C1	L (max)	b ~	h (min)	G mm	Tol. mm	W mm	Tol. mm	n (min)					d ~
D1300-8	8	0.80		8.7		2.8	3.6	2.4	1.1	1.0	8.4	+0.09	0.90		0.6	0.20	0.11	6200	620	
D1300-9	9	0.80		9.8		3.5	4.4	2.5	1.3	1.0	9.4	-0.00	0.90		0.6	0.20	0.17	7000	690	
D1300-9.5	9.5	1.00		10.3		3.5	3.9	3.0	1.4	1.2	9.9		1.10		0.6	0.20	0.22	9300	730	HC 1
D1300-10	10	1.00		10.8		3.1	4.0	3.2	1.4	1.2	10.4		1.10		0.6	0.20	0.24	9700	770	or
D1300-11	11	1.00		11.8	+0.36	3.9	4.8	3.3	1.5	1.2	11.4		1.10		0.6	0.20	0.30	10700	840	HD 1
D1300-12	12	1.00		13.0	-0.18	4.7	5.7	3.4	1.7	1.5	12.5		1.10		0.8	0.30	0.34	11700	1150	
D1300-13	13	1.00		14.1		5.3	6.4	3.6	1.8	1.5	13.6	+0.11	1.10		0.9	0.30	0.39	12700	1500	
D1300-14	14	1.00		15.1		6.0	7.2	3.7	1.9	1.7	14.6	-0.00	1.10		0.9	0.30	0.45	13600	1620	
D1300-15	15	1.00		16.2		7.0	8.3	3.7	2.0	1.7	15.7		1.10		1.1	0.40	0.48	14600	2030	
D1300-16	16	1.00		17.3		7.7	9.2	3.8	2.0	1.7	16.8		1.10		1.2	0.40	0.54	15600	2470	
D1300-17	17	1.00		18.3		8.4	10.0	3.9	2.1	1.7	17.8		1.10		1.2	0.40	0.59	16600	2620	
D1300-18	18	1.00		19.5		8.9	10.8	4.1	2.2	2.0	19.0		1.10		1.5	0.50	0.61	17500	3490	
D1300-19	19	1.00		20.5		9.8	11.8	4.1	2.2	2.0	20.0		1.10		1.5	0.50	0.72	18500	3680	
D1300-20	20	1.00		21.5		10.6	12.6	4.2	2.3	2.0	21.0		1.10		1.5	0.50	0.75	19500	3860	
D1300-21	21	1.00		22.5	+0.42	11.6	13.6	4.2	2.4	2.0	22.0		1.10		1.5	0.50	0.84	20400	4050	
D1300-22	22	1.00		23.5	-0.21	12.6	14.6	4.2	2.5	2.0	23.0		1.10		1.5	0.50	0.86	21400	4240	
D1300-23	23	1.20		24.6		13.6	15.7	4.2	2.5	2.0	24.1	+0.21	1.30		1.7	0.60	1.20	26900	4880	
D1300-24	24	1.20		25.9		14.2	16.4	4.4	2.6	2.0	25.2	-0.00	1.30		1.8	0.60	1.21	28000	5560	
D1300-25	25	1.20		26.9		15.0	17.2	4.5	2.7	2.0	26.2		1.30		1.8	0.60	1.33	29200	5790	
D1300-26	26	1.20		27.9		15.6	17.8	4.7	2.8	2.0	27.2		1.30		1.8	0.60	1.35	30400	6020	
D1300-27	27	1.20		29.1		16.6	19.0	4.7	2.9	2.0	28.4		1.30		2.1	0.70	1.55	31600	7310	
D1300-28	28	1.20		30.1		17.4	19.8	4.8	2.9	2.0	29.4		1.30		2.1	0.70	1.64	32700	7570	
D1300-29	29	1.20		31.1		18.4	20.8	4.8	3.0	2.0	30.4		1.30		2.1	0.70	1.74	33900	7840	HC 2
D1300-30	30	1.20		32.1		19.4	21.8	4.8	3.0	2.0	31.4		1.30		2.1	0.70	1.87	35100	8100	or
D1300-31	31	1.20	+0.00	33.4		19.6	22.3	5.2	3.2	2.5	32.7		1.30		2.6	0.90	2.20	36250	9900	HD 2
D1300-32	32	1.20	-0.06	34.4	+0.50	20.2	22.9	5.2	3.2	2.5	33.7		1.30		2.6	0.90	1.98	37400	10500	
D1300-33	33	1.20		35.5	-0.25	21.2	23.9	5.4	3.3	2.5	34.7		1.30		2.6	0.90	2.13	38600	10900	
D1300-34	34	1.50		36.5		22.2	24.9	5.4	3.3	2.5	35.7		1.60		2.6	0.90	2.88	49700	11200	
D1300-35	35	1.50		37.8		23.2	26.2	5.4	3.4	2.5	37.0		1.60	+0.14	3.0	1.00	2.93	51100	13600	
D1300-36	36	1.50		38.8		24.2	27.2	5.4	4.0	2.5	38.0	+0.25	1.60	-0.00	3.0	1.00	3.23	52600	14000	
D1300-37	37	1.50		39.8		25.0	28.0	5.5	3.2	2.5	39.0	-0.00	1.60		3.0	1.00	2.98	54100	14300	
D1300-38	38	1.50		40.8		26.0	29.0	5.5	3.7	2.5	40.0		1.60		3.0	1.00	3.54	55500	14700	
D1300-40	40	1.75		43.5		27.4	30.9	5.8	3.9	2.5	42.5		1.85		3.8	1.30	4.63	56600	19400	
D1300-41	41	1.75		44.5	+0.90	28.2	31.7	5.9	4.0	2.5	43.5		1.85		3.8	1.30	5.37	58100	19900	
D1300-42	42	1.75		45.5	-0.39	29.2	32.7	5.9	4.1	2.5	44.5		1.85		3.8	1.30	5.21	59500	20400	
D1300-45	45	1.75		48.5		31.6	35.1	6.2	4.3	2.5	47.5		1.85		3.8	1.30	5.88	63700	21800	
D1300-47	47	1.75		50.5		33.2	36.7	6.4	4.4	2.5	49.5		1.85		3.8	1.30	6.13	66600	22700	
D1300-48	48	1.75		51.5		34.6	37.7	6.4	4.5	2.5	50.5		1.85		3.8	1.30	6.31	68000	23200	
D1300-50	50	2.00		54.2		36.0	40.0	6.5	4.6	2.5	53.0		2.15		4.5	1.50	8.01	80900	29100	
D1300-51	51	2.00		55.2		37.0	41.0	6.5	4.7	2.5	54.0		2.15		4.5	1.50	8.72	82500	29700	
D1300-52	52	2.00		56.2		37.6	41.6	6.7	4.7	2.5	55.0		2.15		4.5	1.50	8.91	84100	30300	
D1300-55	55	2.00		59.2		40.4	44.4	6.8	5.0	2.5	58.0		2.15		4.5	1.50	9.44	89000	32000	
D1300-56	56	2.00		60.2		41.4	45.4	6.8	5.1	2.5	59.0		2.15		4.5	1.50	9.75	90600	32500	
D1300-57	57	2.00		62.2		42.4	46.4	6.8	5.1	2.5	60.0		2.15		4.5	1.50	10.36	92200	33100	
D1300-58	58	2.00		62.2		43.2	47.2	6.9	5.2	2.5	61.0		2.15		4.5	1.50	9.56	93900	33700	
D1300-60	60	2.00		64.2	+1.10	44.4	48.4	7.3	5.4	2.5	63.0		2.15		4.5	1.50	11.15	97100	34800	
D1300-62	62	2.00		66.2	-0.46	46.4	50.4	7.3	5.5	2.5	65.0	+0.30	2.15		4.5	1.50	11.59	100000	35900	
D1300-63	63	2.00		67.2		47.4	51.4	7.3	5.6	2.5	66.0	-0.00	2.15		4.5	1.50	11.78	102000	36800	
D1300-65	65	2.50		69.2		48.0	52.8	7.6	5.8	3.0	68.0		2.65		4.5	1.50	16.80	131000	37600	
D1300-67	67	2.50		72.0		50.6	54.6	7.7	6.0	3.0	70.0		2.65		4.5	1.50	17.71	136000	38700	
D1300-68	68	2.50		72.2		51.4	55.4	7.8	6.1	3.0	71.0		2.65		4.5	1.50	17.72	138000	39300	HA 3
D1300-70	70	2.50		74.5		53.4	57.4	7.8	6.2	3.0	73.0		2.65		4.5	1.50	17.65	142000	40400	or
D1300-72	72	2.50		76.5		55.4	59.4	7.8	6.4	3.0	75.0		2.65		4.5	1.50	19.70	146000	41600	HB 3
D1300-75	75	2.50		79.5		58.4	62.4	7.8	6.6	3.0	78.0		2.65		4.5	1.50	20.62	152000	43300	
D1300-76	76	2.50		80.7		59.4	63.4	7.9	6.7	3.0	79.0		2.65		4.5	1.50	22.68	154000	43800	



8 mm to 400 mm

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

DIN 472

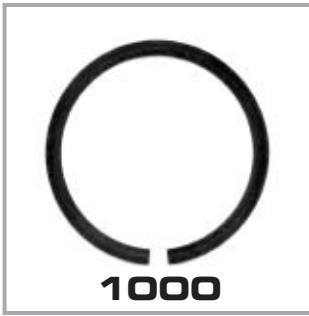


D1300

**STANDARD
METRIC
INTERNAL**

† Thrust load calculations see page 5

PART NUMBER	BORE B mm	THICKNESS		FREE DIAMETER		CIRCLIP					GROOVE					APPROX Wt. kg / 1000 PCS.	Tc (N)	Tg (N)	PLIER No.	
		t mm	Tol. mm	D mm	Tol. mm	C	C1	L (max)	b ~	h (min)	G mm	Tol. mm	WIDTH		n (min)					d ~
D1300-78	78	2.50		82.5		60.0	64.0	8.5	6.8	3.0	81.0		2.65	+0.14	4.5	1.50	22.46	158000	45000	HC 3
D1300-80	80	2.50	+0.00	85.5		62.0	66.5	8.5	7.0	3.0	83.5		2.65	-0.00	5.3	1.80	21.38	162000	53900	or
D1300-82	82	2.50	-0.06	87.5		64.0	68.5	8.5	7.0	3.0	85.5		2.65		5.3	1.80	22.27	166000	55300	HD 3
D1300-85	85	3.00		90.5		66.8	71.3	8.6	7.2	3.5	88.5		3.15		5.3	1.80	31.78	206000	57200	
D1300-88	88	3.00		93.5		69.8	74.3	8.6	7.4	3.5	91.5		3.15		5.3	1.80	32.94	214000	59200	
D1300-90	90	3.00		95.5	+1.30	71.8	76.3	8.6	7.6	3.5	93.5	+0.35	3.15		5.3	1.80	33.35	218000	60500	
D1300-92	92	3.00		97.5	-0.54	73.6	78.1	8.7	7.8	3.5	95.5		3.15		5.3	1.80	35.72	223000	61900	HC 4
D1300-95	95	3.00		100.5		76.4	80.9	8.8	8.1	3.5	98.5		3.15		5.3	1.80	38.88	231000	63800	or
D1300-98	98	3.00		103.5		79.0	83.5	9.0	8.3	3.5	101.5		3.15		5.3	1.80	42.16	238000	65800	HD 4
D1300-100	100	3.00		105.5		81.0	85.5	9.0	8.4	3.5	103.5		3.15		5.3	1.80	43.41	243000	67100	
D1300-102	102	4.00		108.0		82.6	87.6	9.2	8.5	3.5	106.0		4.15		6.0	2.00	55.20	330000	78400	
D1300-105	105	4.00		112.0		85.6	90.6	9.2	8.7	3.5	109.0		4.15		6.0	2.00	59.20	340000	80700	
D1300-108	108	4.00		115.0		88.0	93.0	9.5	8.9	3.5	112.0	+0.54	4.15		6.0	2.00	62.60	350000	83000	
D1300-110	110	4.00		117.0		88.2	93.2	10.4	9.0	3.5	114.0	-0.00	4.15		6.0	2.00	71.75	356000	84500	
D1300-112	112	4.00		119.0		90.0	95.0	10.5	9.1	3.5	116.0		4.15		6.0	2.00	70.68	362000	86000	
D1300-115	115	4.00		122.0		93.0	98.0	10.5	9.3	3.5	119.0		4.15		6.0	2.00	73.16	372000	88200	
D1300-120	120	4.00		127.0		97.0	102.0	11.0	9.7	3.5	124.0		4.15		6.0	2.00	80.40	388000	92000	
D1300-125	125	4.00		132.0		102.0	107.0	11.0	10.0	4.0	129.0		4.15		6.0	2.00	81.20	405000	95800	
D1300-127	127	4.00		135.0		104.0	109.0	11.0	10.1	4.0	131.0		4.15		6.0	2.00	80.80	411000	97300	
D1300-130	130	4.00		137.0		107.0	112.0	11.0	10.2	4.0	134.0		4.15		6.0	2.00	85.13	421000	99500	
D1300-135	135	4.00		142.0	+1.50	112.0	116.0	11.2	10.5	4.0	139.0		4.15		6.0	2.00	94.79	437000	103000	
D1300-140	140	4.00		147.0	-0.63	117.0	121.0	11.2	10.7	4.0	144.0	+0.63	4.15		6.0	2.00	98.61	453000	107000	
D1300-145	145	4.00		152.0		122.0	126.0	11.4	10.9	4.0	149.0	-0.00	4.15	+0.18	6.0	2.00	106.50	496000	111000	
D1300-150	150	4.00		158.0		125.0	131.0	12.0	11.2	4.0	155.0		4.15	-0.00	7.5	2.50	106.80	485000	144000	
D1300-155	155	4.00	+0.00	164.0		130.0	136.0	12.0	11.4	4.0	160.0		4.15		7.5	2.50	128.00	502000	148000	
D1300-160	160	4.00	-0.075	169.0		133.0	139.0	13.0	11.6	4.0	165.0		4.15		7.5	2.50	130.50	518000	153000	MAJOR
D1300-165	165	4.00		174.5		138.0	144.0	13.0	11.8	4.0	170.0		4.15		7.5	2.50	132.00	534000	158000	77
D1300-170	170	4.00		179.5		145.0	150.0	13.5	12.2	4.0	175.0		4.15		7.5	2.50	149.50	550000	163000	
D1300-175	175	4.00		184.5		149.0	155.0	13.5	12.7	4.0	180.0		4.15		7.5	2.50	158.50	566000	167000	
D1300-180	180	4.00		189.5		153.0	158.0	14.2	13.2	4.0	185.0		4.15		7.5	2.50	168.00	583000	172000	
D1300-185	185	4.00		194.5		157.0	162.0	14.2	13.7	4.0	190.0		4.15		7.5	2.50	177.50	599000	177000	
D1300-190	190	4.00		199.5	+1.70	162.0	167.0	14.3	13.8	4.0	195.0		4.15		7.5	2.50	184.00	615000	181000	
D1300-195	195	4.00		204.5	-0.72	167.0	172.0	14.2	13.8	4.0	200.0	+0.72	4.15		7.5	2.50	189.60	631000	186000	
D1300-200	200	4.00		209.5		171.0	177.0	14.3	14.0	4.0	205.0	-0.00	4.15		7.5	2.50	196.00	647000	191000	
D1300-210	210	5.00		222.0		181.0	188.0	14.2	14.0	4.0	216.0		5.15		9.0	3.00	263.00	739000	241000	
D1300-220	220	5.00		232.0		191.0	198.0	14.2	14.0	4.0	226.0		5.15		9.0	3.00	276.00	774000	252000	
D1300-230	230	5.00		242.0		201.0	208.0	14.2	14.0	4.0	236.0		5.15		9.0	3.00	291.00	809000	264000	
D1300-240	240	5.00		252.0		211.0	218.0	14.2	14.0	4.0	246.0		5.15		9.0	3.00	304.00	845000	275000	
D1300-250	250	5.00		262.0		221.0	228.0	14.2	14.0	4.0	256.0		5.15		9.0	3.00	318.50	880000	286000	
D1300-260	260	5.00		275.0	+2.00	227.0	236.0	16.2	16.0	5.0	268.0		5.15		12.0	4.00	385.00	915000	398000	
D1300-270	270	5.00		285.0	-0.81	237.0	246.0	16.2	16.0	5.0	278.0	+0.81	5.15		12.0	4.00	401.50	950000	413000	
D1300-280	280	5.00		295.0		247.0	256.0	16.2	16.0	5.0	288.0	-0.00	5.15		12.0	4.00	417.50	985000	428000	
D1300-290	290	5.00		305.0		257.0	266.0	16.2	16.0	5.0	298.0		5.15		12.0	4.00	433.40	1020000	443000	
D1300-300	300	5.00		315.0		267.0	276.0	16.2	16.0	5.0	308.0		5.15		12.0	4.00	446.00	1060000	458000	
D1300-310	310	6.00		327.0		271.0	282.0	20.2	20.0	6.0	320.0		6.20		15.0	5.00	658.50	1310000	594000	
D1300-320	320	6.00		337.0		281.0	292.0	20.2	20.0	6.0	330.0		6.20		15.0	5.00	682.00	1350000	613000	
D1300-330	330	6.00		347.0		291.0	302.0	20.2	20.0	6.0	340.0		6.20		15.0	5.00	705.00	1390000	632000	MAJOR
D1300-340	340	6.00		357.0		301.0	312.0	20.2	20.0	6.0	350.0		6.20		15.0	5.00	729.00	1440000	650000	X 77
D1300-350	350	6.00		367.0	+2.20	311.0	322.0	20.2	20.0	6.0	360.0	+0.89	6.20	+0.22	15.0	5.00	752.50	1480000	669000	
D1300-360	360	6.00	+0.00	377.0	-1.00	321.0	332.0	20.2	20.0	6.0	370.0	-0.00	6.20	-0.00	15.0	5.00	769.00	1520000	688000	
D1300-370	370	6.00	-0.18	387.0		331.0	342.0	20.2	20.0	6.0	380.0		6.20		15.0	5.00	793.00	1560000	707000	
D1300-380	380	6.00		397.0		341.0	352.0	20.2	20.0	6.0	390.0		6.20		15.0	5.00	817.00	1690000	726000	
D1300-390	390	6.00		407.0		351.0	362.0	20.2	20.0	6.0	400.0		6.20		15.0	5.00	838.50	1646000	745000	
D1300-400	400	6.00		417.0		361.0	372.0	20.2	20.0	6.0	410.0		6.20		15.0	5.00	862.50	1689000	764000	



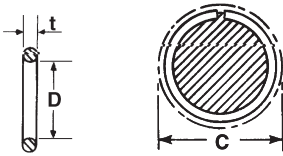
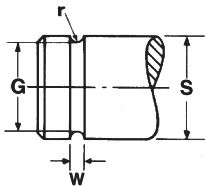
1000

ROUND SECTION

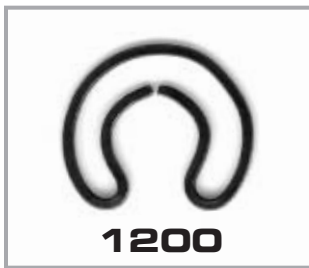
0.062" to 3.00"

Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil



PART NUMBER	SHAFT		RING			GROOVE				
	DIAMETER S		MATERIAL DIAM.	MAX. FREE DIAM.	MIN. RING CLEAR.	DIAMETER		WIDTH		RADIUS
	Frac. inch	Dec. inch	t inches	D inches	C inches	G inches	Tol. inches	W inches	Tol. inches	r inches
1000-6	1/16	0.062	0.0092	0.051	0.090	0.052		0.010		0.0050
1000-8	1/12	0.083	0.0092	0.072	0.111	0.073		0.010		0.0050
1000-9	3/32	0.094	0.0108	0.080	0.125	0.082		0.011		0.0055
1000-10	1/10	0.100	0.0108	0.087	0.132	0.089		0.011		0.0055
1000-12	1/8	0.125	0.0124	0.110	0.151	0.113		0.013		0.0065
1000-15	5/32	0.156	0.0124	0.138	0.191	0.143		0.013		0.0065
1000-18	3/16	0.187	0.0124	0.169	0.222	0.174		0.013		0.0065
1000-21	7/32	0.219	0.0148	0.198	0.258	0.204	+0.003	0.015	+0.003	0.0075
1000-25	1/4	0.250	0.0220	0.221	0.304	0.228	-0.000	0.023	-0.000	0.0115
1000-28	9/32	0.281	0.0220	0.251	0.346	0.259		0.023		0.0115
1000-31	5/16	0.312	0.0220	0.281	0.367	0.290		0.023		0.0115
1000-34	11/32	0.344	0.0220	0.312	0.400	0.322		0.023		0.0115
1000-37	3/8	0.375	0.0360	0.329	0.457	0.339		0.038		0.0187
1000-40	13/32	0.406	0.0360	0.359	0.489	0.370		0.038		0.0187
1000-43	7/16	0.438	0.0360	0.390	0.520	0.402		0.038		0.0187
1000-46	15/32	0.469	0.0360	0.420	0.552	0.433		0.038		0.0187
1000-50	1/2	0.500	0.0480	0.438	0.606	0.452		0.050		0.0250
1000-56	9/16	0.562	0.0480	0.498	0.668	0.514		0.050		0.0250
1000-62	5/8	0.625	0.0480	0.560	0.731	0.577		0.050		0.0250
1000-68	11/16	0.688	0.0480	0.621	0.794	0.640		0.050		0.0250
1000-75	3/4	0.750	0.0640	0.665	0.888	0.686	+0.004	0.067	+0.004	0.0335
1000-81	13/16	0.812	0.0640	0.726	0.950	0.748	-0.000	0.067	-0.000	0.0335
1000-87	7/8	0.875	0.0640	0.786	1.013	0.811		0.067		0.0335
1000-93	15/16	0.938	0.0640	0.848	1.076	0.874		0.067		0.0335
1000-100	1	1.000	0.0640	0.908	1.138	0.936		0.067		0.0335
1000-106	1 1/16	1.062	0.0800	0.953	1.232	0.982		0.083		0.0415
1000-112	1 1/8	1.125	0.0800	1.012	1.295	1.045		0.083		0.0415
1000-125	1 1/4	1.250	0.0800	1.135	1.420	1.170		0.083		0.0415
1000-137	1 3/8	1.375	0.0800	1.258	1.545	1.295		0.083		0.0415
1000-150	1 1/2	1.500	0.0800	1.380	1.670	1.420	+0.005	0.083	+0.005	0.0415
1000-162	1 5/8	1.625	0.0800	1.500	1.795	1.545	-0.000	0.083	-0.000	0.0415
1000-175	1 3/4	1.750	0.0800	1.621	1.920	1.670		0.083		0.0415
1000-187	1 7/8	1.875	0.1040	1.720	2.093	1.771		0.109		0.0545
1000-200	2	2.000	0.1040	1.840	2.218	1.896		0.109		0.0545
1000-212	2 1/8	2.125	0.1040	1.960	2.343	2.021		0.109		0.0545
1000-225	2 1/4	2.250	0.1040	2.082	2.468	2.146		0.109		0.0545
1000-237	2 3/8	2.375	0.1040	2.203	2.593	2.271		0.109		0.0545
1000-250	2 1/2	2.500	0.1040	2.324	2.718	2.396	+0.007	0.109	+0.007	0.0545
1000-262	2 5/8	2.625	0.1280	2.425	2.891	2.497	-0.000	0.133	-0.000	0.0665
1000-275	2 3/4	2.750	0.1280	2.543	3.016	2.622		0.133		0.0665
1000-287	2 7/8	2.875	0.1280	2.664	3.141	2.747		0.133		0.0665
1000-300	3	3.000	0.1280	2.785	3.266	2.872		0.133		0.0665



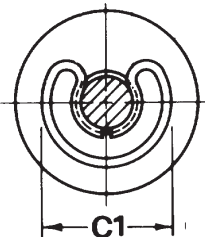
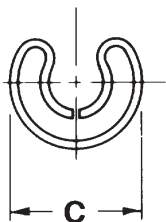
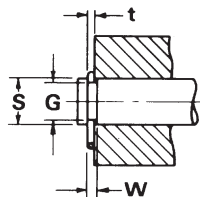
1200

PLAIN WIRE RING

.125" to .625"

Standard Material **† Thrust load calculations see page 5**
Carbon Spring Steel

Standard Finish
Self Finish and oil

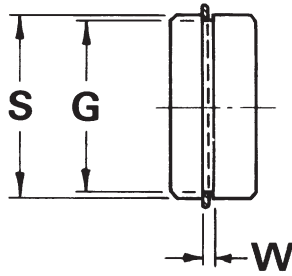


When Sprung into Groove

PART NUMBER	SHAFT			RING				GROOVE				Tc † (lb.f)	Tg † (lb.f)	APPLI-CATOR
	DIAMETER S			THICKNESS		C		DIAMETER		WIDTH				
	Frac. inches	Dec. inches	Tol. inches	t inches	Tol. inches	C	C1	G inches	Tol. inches	W inches	Tol. inches			
1200-7	1/8	.125		032dia		.31	.34	.075	+0.005	.036		338	70	40
1200-11	5/32	.156		032sq		.36	.39	.115	-0.000	.036		434	63	41
1200-13	3/16	.188		036dia		.45	.49	.130		.040		603	139	42
1200-14	3/16	.188		032sq		.40	.44	.140		.036		532	84	43
1200-15	7/32	.219	+0.005	048sq		.51	.55	.150		.052		962	190	44
1200-15R	7/32	.219	-0.015	048dia		.51	.55	.150		.052		962	190	45
1200-17	7/32	.219		032sq		.48	.53	.170		.036	+0.003	600	104	46
1200-19	1/4	.250		040sq		.48	.54	.195	+0.010	.044	-0.000	915	150	47
1200-21	1/4	.250		032sq		.48	.54	.200	-0.005	.036		723	125	47
1200-21R	1/4	.250		032dia	±0.002	.48	.54	.200		.036		700	125	48
1200-22	17/64	.266		040sq		.54	.59	.210		.044		978	165	49
1200-23	9/32	.281	+0.010	048dia		.56	.61	.220		.052		1200	203	50
1200-25	5/16	.313	-0.015	040sq		.57	.63	.255		.044		1160	209	51
1200-34	3/8	.375		040sq		.69	.74	.330		.044		1400	153	51
1200-43	1/2	.500		056sq		.87	.94	.435		.060		2680	411	52
1200-52	9/16	.563	-0.015	064sq		1.03	1.1	.500	+0.015	.068	+0.004	3480	383	53A
1200-57	5/8	.625		064sq		1.12	1.2	.560	-0.010	.068	-0.000	3880	452	54A

* It is recommended that the tolerance on Groove Diameter is restricted, where necessary, to maintain the minimum groove depth quoted when using shafts smaller than nominal.





30mm to 240mm

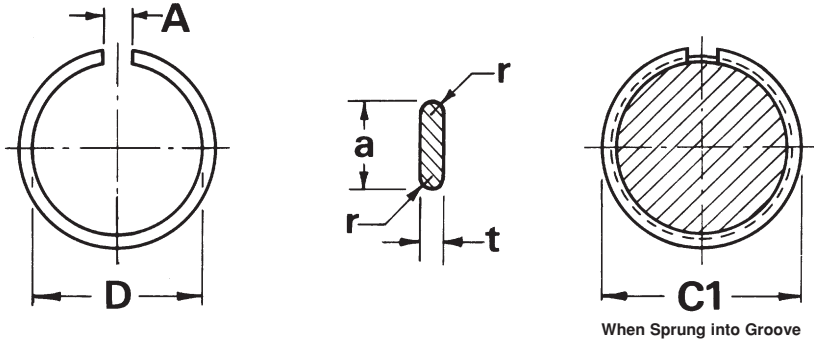
Standard Material
Carbon Spring Steel

Standard Finish
Phosphate and oil

DIN 5417



WIRE EXTERNAL RINGS FOR BEARING RETENTION



When Sprung into Groove

† Thrust load calculations see page 5

PART NUMBER	BEARING	CIRCLIP									GROOVE				Tc † (N)	BEARING NO.			
		S mm	THICKNESS		FREE DIAMETER		a	Tol.	C1	A	r (min)	DIAMETER		WIDTH		LIGHT	MEDIUM	HEAVY	
			t mm	Tol. mm	D mm	Tol. mm						G mm	Tol. mm	W mm					Tol. mm
3200-30	30	1.12		27.4		3.25		34.7	3	0.4	28.17		1.35		23000	6200	-	-	
3200-32	32	1.12		29.4		3.25		36.7	3	0.4	30.15		1.35		24500	6201	-	-	
3200-35	35	1.12		32.4	+0.40	3.25		39.7	3	0.4	33.17		1.35		26800	6202	6300	-	
3200-37	37	1.12		34.0	-0.00	3.25		41.3	3	0.4	34.77		1.35		28300	-	6301	-	
3200-40	40	1.12		37.3		3.25		44.6	3	0.4	38.10		1.35		30600	6203	-	-	
3200-42	42	1.12		38.9		3.25		46.3	3	0.4	39.75		1.35		32100	-	6302	-	
3200-44	44	1.12		40.9		3.25		48.3	3	0.4	41.75	+0.00	1.35		33700	-	-	-	
3200-47	47	1.12		43.7	+0.50	4.04		52.7	4	0.4	44.60	-0.25	1.35		36000	6204	6303	-	
3200-50	50	1.12		46.7	-0.00	4.04		55.7	4	0.4	47.60		1.35		38300	-	-	-	
3200-52	52	1.12		48.8		4.04		57.9	4	0.4	49.73		1.35		40000	6205	6304	-	
3200-55	55	1.12		51.7		4.04		60.7	4	0.4	52.60		1.35		42100	-	-	-	
3200-56	56	1.12		52.4		4.04		61.7	4	0.4	53.60		1.35		42900	-	-	-	
3200-58	58	1.12		54.4		4.04		63.7	4	0.4	55.60		1.35		44400	-	-	-	
3200-62	62	1.70		58.2		4.04		67.7	4	0.6	59.61		1.90		72000	6206	6305	6403	
3200-65	65	1.70		61.2		4.04		70.7	4	0.6	62.60		1.90		75500	-	-	-	
3200-68	68	1.70		63.4		4.85		74.6	5	0.6	64.82		1.90		79000	-	-	-	
3200-72	72	1.70		67.4	+0.80	4.85		78.6	5	0.6	68.81		1.90		83600	6207	6306	6404	
3200-75	75	1.70		70.4	-0.00	4.85		81.6	5	0.6	71.83		1.90		87100	-	-	-	
3200-80	80	1.70		75.4		4.85		86.6	5	0.6	76.81		1.90	+0.30	93000	6208	6307	6405	
3200-85	85	1.70	+0.00	80.4		4.85	+0.00	91.6	5	0.6	81.81		1.90	-0.00	98700	6209	-	-	
3200-90	90	2.46	-0.10	85.4		4.85	-0.15	96.5	5	0.7	86.79		2.70		151000	6210	6308	6406	
3200-95	95	2.46		90.4		4.85		101.6	5	0.7	91.82		2.70		160000	-	-	-	
3200-100	100	2.46		95.2		4.85		106.5	5	0.7	96.80		2.70		168000	6211	6309	6407	
3200-110	110	2.46		105.2		4.85		116.6	5	0.7	106.81		2.70		150000	6212	6310	6408	
3200-115	115	2.46		110.2	+1.00	4.85		121.6	5	0.7	111.81	+0.00	2.70		193000	-	-	-	
3200-120	120	2.82		113.6	-0.00	7.21		129.7	7	0.7	115.21	-0.50	3.10		231000	6213	6311	6409	
3200-125	125	2.82		118.6		7.21		134.7	7	0.7	120.22		3.10		241000	6214	-	-	
3200-130	130	2.82		123.6		7.21		139.7	7	0.7	125.22		3.10		250000	6215	6312	6410	
3200-140	140	2.82		133.0		7.21		149.7	7	0.7	135.23		3.10		270000	6216	6313	6411	
3200-145	145	2.82		138.0		7.21		154.7	7	0.7	140.23		3.10		279000	-	-	-	
3200-150	150	2.82		142.9	+1.60	7.21		159.7	7	0.7	145.24		3.10		289000	6217	6314	6412	
3200-160	160	2.82		152.9	-0.00	7.21		169.7	7	0.7	155.22		3.10		308000	6218	6315	6413	
3200-170	170	3.10		161.3		9.60		182.9	10	0.7	163.65		3.50		360000	6219	6316	-	
3200-180	180	3.10		171.2		9.60		192.9	10	0.7	173.66		3.50		381000	6220	6317	6414	
3200-190	190	3.10		181.0		9.60		202.9	10	0.7	183.64		3.50		402000	6221	6318	6415	
3200-200	200	3.10		191.0		9.60		212.9	10	0.7	193.65		3.50		424000	6222	6319	6416	
3200-210	210	3.10		200.9		9.60		222.8	10	1.2	203.60		3.50		445000	-	-	64517	
3200-215	215	3.10		205.9	+1.80	9.60		227.8	10	1.2	208.60		3.50		455000	6224	6320	-	
3200-225	225	3.50		214.3	-0.00	10.00		237.0	10	1.2	217.00		4.50		538000	-	6321	6418	
3200-230	230	3.50		219.2		10.00		242.0	10	1.2	222.00		4.50	+0.40	550000	6226	-	-	
3200-240	240	3.50		229.2		10.00		252.0	10	1.2	232.00		4.50	-0.00	574000	-	6322	-	

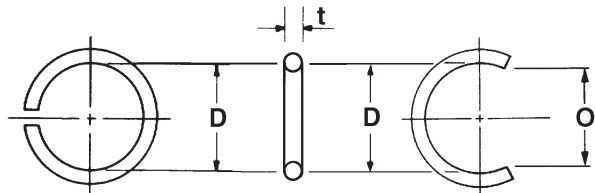
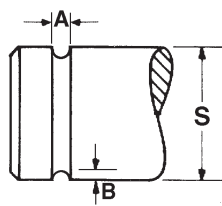


**ROUND
SECTION
EXTERNAL**

0.125" to 3.00"

Standard Material
Carbon Spring Steel

Obtainable in
Bronze, Beryllium Copper,
and Stainless Steel



CLOSED TYPE XRC								OPEN TYPE XRO				
PART NUMBER	SHAFT DIAMETER		RING DIMENSIONS		GROOVE DIMENSIONS		APPROX Wt. Lb/ 1000 PCS.	PART NUMBER	STANDARD GAP O dimension	RING DIMENSIONS		APPROX Wt. Lb/ 1000 PCS.
	S (frac)	S (dec)	D	t	A Width	B Depth				D	t	
XRC 311	1/8	.125	.110	.022	.024	.007	.04	XRO 411	.097	.110	.022	.03
XRC 312	5/32	.156	.140	.022	.024	.007	.05	XRO 412	.123	.140	.022	.04
XRC 313	3/16	.188	.172	.022	.024	.007	.07	XRO 413	.152	.172	.022	.05
XRC 314	7/32	.219	.202	.022	.024	.007	.09	XRO 414	.178	.202	.022	.06
XRC 315	1/4	.250	.230	.029	.031	.009	.15	XRO 415	.203	.230	.029	.10
XRC 3155	9/32	.281	.260	.029	.031	.009	.17	XRO 4155	.229	.260	.029	.12
XRC 316	5/16	.312	.296	.022	.024	.007	.11	XRO 416	.261	.296	.022	.07
XRC 317	5/16	.312	.288	.035	.037	.011	.27	XRO 417	.254	.288	.035	.18
XRC 318	3/8	.375	.353	.029	.031	.009	.22	XRO 418	.322	.353	.029	.14
XRC 319	3/8	.375	.345	.043	.045	.013	.50	XRO 419	.304	.345	.043	.33
XRC 320	7/16	.438	.412	.035	.037	.011	.38	XRO 420	.363	.412	.035	.26
XRC 321	7/16	.438	.402	.051	.053	.016	.82	XRO 421	.355	.402	.051	.53
XRC 322	1/2	.500	.468	.043	.045	.013	.66	XRO 422	.412	.468	.043	.44
XRC 323	1/2	.500	.458	.059	.061	.018	1.25	XRO 423	.404	.458	.059	.82
XRC 324	9/16	.562	.529	.045	.047	.014	.81	XRO 424	.467	.529	.045	.53
XRC 325	9/16	.562	.518	.062	.064	.019	1.55	XRO 425	.457	.518	.062	1.02
XRC 326	5/8	.625	.587	.051	.053	.016	1.15	XRO 426	.518	.587	.051	.75
XRC 327	5/8	.625	.575	.071	.073	.022	2.26	XRO 427	.507	.575	.071	1.48
XRC 328	11/16	.688	.649	.051	.053	.016	1.27	XRO 428	.572	.649	.051	.83
XRC 329	11/16	.688	.637	.071	.073	.022	2.48	XRO 429	.562	.637	.071	1.68
XRC 330	3/4	.750	.706	.059	.061	.018	1.85	XRO 430	.623	.706	.059	1.21
XRC 331	3/4	.750	.690	.085	.087	.026	3.89	XRO 431	.609	.690	.085	2.55
XRC 332	13/16	.812	.769	.059	.061	.018	2.00	XRO 432	.678	.769	.059	1.31
XRC 333	13/16	.812	.753	.085	.087	.026	4.21	XRO 433	.664	.753	.085	2.76
XRC 334	7/8	.875	.823	.071	.073	.022	3.13	XRO 434	.726	.823	.071	2.05
XRC 335	7/8	.875	.804	.100	.102	.031	6.28	XRO 435	.709	.804	.100	4.12
XRC 336	15/16	.938	.885	.071	.073	.022	3.35	XRO 436	.780	.885	.071	2.20
XRC 337	15/16	.938	.867	.100	.102	.031	6.72	XRO 437	.764	.867	.100	4.31
XRC 338	1	1.000	.938	.085	.087	.026	5.26	XRO 438	.827	.938	.085	3.45
XRC 339	1	1.000	.917	.118	.120	.037	10.01	XRO 439	.809	.917	.118	6.57
XRC 340	1 1/16	1.063	1.000	.085	.087	.026	6.86	XRO 440	.882	1.000	.085	4.50
XRC 341	1 1/16	1.063	.979	.118	.120	.037	10.61	XRO 441	.863	.979	.118	6.96
XRC 342	1 1/8	1.125	1.051	.100	.102	.031	8.00	XRO 442	.927	1.051	.100	5.25
XRC 343	1 1/8	1.125	1.034	.130	.132	.040	13.67	XRO 443	.912	1.034	.130	8.97
XRC 344	1 3/16	1.188	1.114	.100	.102	.031	8.44	XRO 444	.983	1.114	.100	5.54
XRC 345	1 3/16	1.188	1.096	.130	.132	.040	14.40	XRO 445	.967	1.096	.130	9.45
XRC 346	1 1/4	1.250	1.164	.118	.120	.037	12.40	XRO 446	1.027	1.164	.118	7.77
XRC 347	1 1/4	1.250	1.150	.140	.142	.044	17.57	XRO 447	1.014	1.150	.140	11.53
XRC 348	1 5/16	1.312	1.226	.118	.120	.037	13.00	XRO 448	1.081	1.226	.118	8.53
XRC 349	1 5/16	1.312	1.212	.140	.142	.044	18.41	XRO 449	1.069	1.212	.140	12.08
XRC 350	1 3/8	1.375	1.281	.130	.132	.040	16.56	XRO 450	1.130	1.281	.130	10.87
XRC 351	1 3/8	1.375	1.264	.156	.158	.049	24.01	XRO 451	1.115	1.264	.156	15.75
XRC 352	1 7/16	1.438	1.344	.130	.132	.040	17.31	XRO 452	1.185	1.344	.130	18.36
XRC 353	1 7/16	1.438	1.326	.156	.158	.049	25.06	XRO 453	1.170	1.326	.156	16.43
XRC 354	1 1/2	1.500	1.398	.140	.142	.044	20.95	XRO 454	1.233	1.398	.140	13.75
XRC 355	1 1/2	1.500	1.378	.172	.174	.054	31.86	XRO 455	1.215	1.378	.172	20.91
XRC 356	1 5/8	1.625	1.522	.140	.142	.044	22.63	XRO 456	1.342	1.522	.140	14.85
XRC 357	1 5/8	1.625	1.502	.172	.174	.054	34.41	XRO 457	1.325	1.502	.172	22.58
XRC 358	1 3/4	1.750	1.626	.172	.174	.054	36.96	XRO 458	1.434	1.626	.172	24.25
XRC 359	1 3/4	1.750	1.608	.203	.205	.063	51.85	XRO 459	1.418	1.608	.203	34.04
XRC 360	2	2.000	1.855	.203	.205	.063	58.93	XRO 460	1.636	1.855	.203	38.67
XRC 361	2	2.000	1.837	.232	.234	.072	77.38	XRO 461	1.620	1.837	.232	50.79
XRC 362	2 1/4	2.250	2.103	.203	.205	.063	66.03	XRO 462	1.855	2.103	.203	43.34
XRC 363	2 1/4	2.250	2.085	.232	.234	.072	86.65	XRO 463	1.839	2.085	.232	56.88
XRC 364	2 1/2	2.500	2.332	.232	.234	.072	95.89	XRO 464	2.057	2.332	.232	62.89
XRC 365	2 1/2	2.500	2.321	.250	.252	.078	111.60	XRO 465	2.047	2.321	.250	73.22
XRC 366	3	3.000	2.827	.232	.234	.072	114.40	XRO 466	2.494	2.827	.232	75.09
XRC 367	3	3.000	2.816	.250	.252	.078	133.20	XRO 467	2.483	2.816	.250	87.32

TOLERANCES:

Tolerances on "D" and "O" dimensions are minus as follows:

1/8" to 3/8" sizes 6%

7/16" to 1" sizes 5%

1 1/16" to 3" sizes 4%

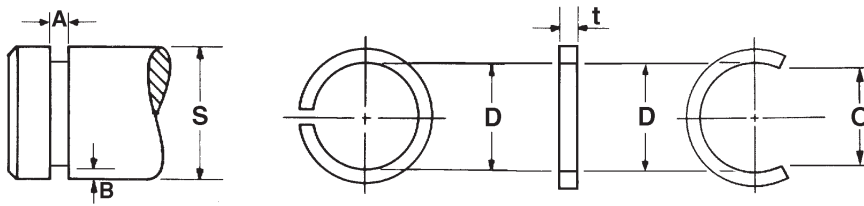
of respective "D" dimension.

Tolerance on "t" (thickness)

dimensions are as follows:

.022 to .250 sizes ± .002





SQUARE SECTION EXTERNAL

0.125" to 3.00"

Standard Material
Carbon Spring Steel

Obtainable in
Bronze, Beryllium Copper,
and Stainless Steel

CLOSED TYPE XSC							OPEN TYPE XSO					
PART NUMBER	SHAFT DIAMETER		RING DIMENSIONS		GROOVE DIMENSIONS		APPROX Wt. Lb/ 1000 PCS.	PART NUMBER	STANDARD GAP O dimension	RING DIMENSIONS		APPROX Wt. Lb/ 1000 PCS.
	S (frac)	S (dec)	D	t	A Width	B Depth				D	t	
XSC 111	1/8	.125	.114	.020	.024	.005	.05	XSO 211	.101	.114	.020	.03
XSC 1125	5/32	.156	.145	.020	.024	.005	.06	XSO 2125	.128	.145	.020	.04
XSC 112	3/16	.188	.175	.020	.024	.005	.07	XSO 212	.154	.175	.020	.05
XSC 113	3/16	.188	.173	.025	.029	.006	.11	XSO 213	.153	.173	.025	.07
XSC 1135	7/32	.219	.203	.025	.029	.006	.12	XSO 2135	.179	.203	.025	.08
XSC 114	1/4	.250	.236	.025	.030	.006	.14	XSO 214	.208	.236	.025	.09
XSC 115	1/4	.250	.232	.031	.036	.008	.22	XSO 215	.205	.232	.031	.14
XSC 1155	9/32	.281	.261	.031	.036	.008	.24	XSO 2155	.230	.261	.031	.16
XSC 116	5/16	.312	.293	.031	.036	.008	.28	XSO 216	.258	.293	.031	.18
XSC 117	5/16	.312	.289	.039	.045	.010	.44	XSO 217	.255	.289	.039	.29
XSC 118	3/8	.375	.353	.035	.041	.009	.42	XSO 218	.311	.353	.035	.28
XSC 119	3/8	.375	.347	.046	.052	.012	.74	XSO 219	.305	.347	.046	.49
XSC 120	7/16	.438	.413	.039	.045	.010	.51	XSO 220	.364	.413	.039	.33
XSC 121	7/16	.438	.405	.055	.062	.014	1.23	XSO 221	.357	.405	.055	.81
XSC 122	1/2	.500	.471	.046	.052	.012	.97	XSO 222	.414	.471	.046	.64
XSC 123	1/2	.500	.463	.062	.069	.016	1.79	XSO 223	.408	.463	.062	1.18
XSC 124	9/16	.562	.525	.062	.069	.016	2.00	XSO 224	.463	.525	.062	1.31
XSC 125	9/16	.562	.521	.071	.078	.018	2.64	XSO 225	.460	.521	.071	1.73
XSC 126	5/8	.625	.591	.055	.062	.014	1.73	XSO 226	.521	.591	.055	1.14
XSC 127	5/8	.625	.579	.078	.085	.020	3.54	XSO 227	.511	.579	.078	2.32
XSC 128	11/16	.688	.653	.055	.062	.014	1.89	XSO 228	.576	.653	.055	1.24
XSC 129	11/16	.688	.641	.078	.085	.020	3.87	XSO 229	.565	.641	.078	2.54
XSC 130	3/4	.750	.712	.062	.069	.016	2.63	XSO 230	.628	.712	.062	1.77
XSC 131	3/4	.750	.697	.093	.100	.023	6.04	XSO 231	.615	.697	.093	3.96
XSC 132	13/16	.812	.773	.062	.069	.016	2.84	XSO 232	.682	.773	.062	1.86
XSC 133	13/16	.812	.759	.093	.100	.023	6.52	XSO 233	.669	.759	.093	4.28
XSC 134	7/8	.875	.831	.071	.078	.018	4.02	XSO 234	.732	.831	.071	2.64
XSC 135	7/8	.875	.813	.109	.117	.027	9.69	XSO 235	.717	.813	.109	6.36
XSC 136	15/16	.938	.893	.071	.078	.018	4.30	XSO 236	.787	.893	.071	2.82
XSC 137	15/16	.938	.875	.109	.117	.027	10.34	XSO 237	.771	.875	.109	6.79
XSC 138	1	1.000	.950	.078	.085	.020	5.53	XSO 238	.838	.950	.078	3.63
XSC 139	1	1.000	.929	.125	.133	.031	14.55	XSO 239	.819	.929	.125	9.55
XSC 140	11/16	1.063	1.012	.078	.085	.020	5.87	XSO 240	.893	1.012	.078	3.85
XSC 141	11/16	1.063	.990	.125	.133	.031	15.41	XSO 241	.873	.990	.125	10.10
XSC 142	11/8	1.125	1.068	.093	.100	.023	8.88	XSO 242	.940	1.068	.093	5.84
XSC 143	11/8	1.125	1.044	.140	.148	.035	20.53	XSO 243	.921	1.044	.140	13.47
XSC 144	13/16	1.188	1.130	.093	.100	.023	9.36	XSO 244	.997	1.130	.093	6.14
XSC 145	13/16	1.188	1.106	.140	.148	.035	21.61	XSO 245	.975	1.106	.140	14.18
XSC 146	11/4	1.250	1.184	.109	.117	.027	13.59	XSO 246	1.044	1.184	.109	8.92
XSC 147	11/4	1.250	1.160	.156	.164	.039	28.34	XSO 247	1.023	1.160	.156	18.60
XSC 148	15/16	1.312	1.246	.109	.117	.027	14.28	XSO 248	1.099	1.246	.109	9.37
XSC 149	15/16	1.312	1.222	.156	.164	.039	29.67	XSO 249	1.078	1.222	.156	18.81
XSC 150	13/8	1.375	1.304	.120	.128	.030	18.56	XSO 250	1.150	1.304	.120	12.18
XSC 151	13/8	1.375	1.276	.172	.180	.043	37.89	XSO 251	1.125	1.276	.172	24.87
XSC 152	17/16	1.438	1.364	.120	.128	.030	18.90	XSO 252	1.203	1.364	.120	12.40
XSC 153	17/16	1.438	1.338	.172	.180	.043	39.51	XSO 253	1.180	1.338	.172	25.93
XSC 154	11/2	1.500	1.424	.125	.133	.031	21.40	XSO 254	1.256	1.424	.125	14.04
XSC 155	11/2	1.500	1.392	.187	.195	.047	48.85	XSO 255	1.228	1.392	.187	32.05
XSC 156	15/8	1.625	1.547	.125	.133	.031	23.12	XSO 256	1.364	1.547	.125	15.18
XSC 157	15/8	1.625	1.516	.187	.195	.047	52.68	XSO 257	1.337	1.516	.187	34.52
XSC 158	13/4	1.750	1.657	.156	.164	.039	39.04	XSO 258	1.461	1.657	.156	25.63
XSC 159	13/4	1.750	1.624	.218	.227	.055	77.44	XSO 259	1.432	1.624	.218	50.83
XSC 160	2	2.000	1.887	.187	.195	.047	64.16	XSO 260	1.664	1.887	.187	42.12
XSC 161	2	2.000	1.855	.250	.260	.063	116.40	XSO 261	1.636	1.855	.250	76.41
XSC 162	21/4	2.250	2.134	.187	.195	.047	71.81	XSO 262	1.882	2.134	.187	47.12
XSC 163	21/4	2.250	2.103	.250	.260	.063	130.10	XSO 263	1.855	2.103	.250	85.40
XSC 164	21/2	2.500	2.350	.250	.265	.063	143.80	XSO 264	2.073	2.350	.250	94.31
XSC 165	21/2	2.500	2.321	.312	.327	.078	227.60	XSO 265	2.047	2.321	.312	149.40
XSC 166	3	3.000	2.845	.250	.265	.063	171.10	XSO 266	2.510	2.845	.250	112.30
XSC 167	3	3.000	2.816	.312	.327	.078	270.30	XSO 267	2.483	2.816	.312	177.40

TOLERANCES:
Tolerances on "D" and "O" dimensions are minus as follows:
1/8" to 3/8" sizes 6%
7/16" to 1" sizes 5%
1 1/16" to 3" sizes 4%
of respective "D" dimension.
Tolerance on "t" (thickness) dimensions are as follows:
.020 to .025 sizes +.003
-.002
.031 to .046 sizes +.005
-.004
.055 to .312 sizes +.006
-.004



Rectangle Wire

"Constant Section Rings"



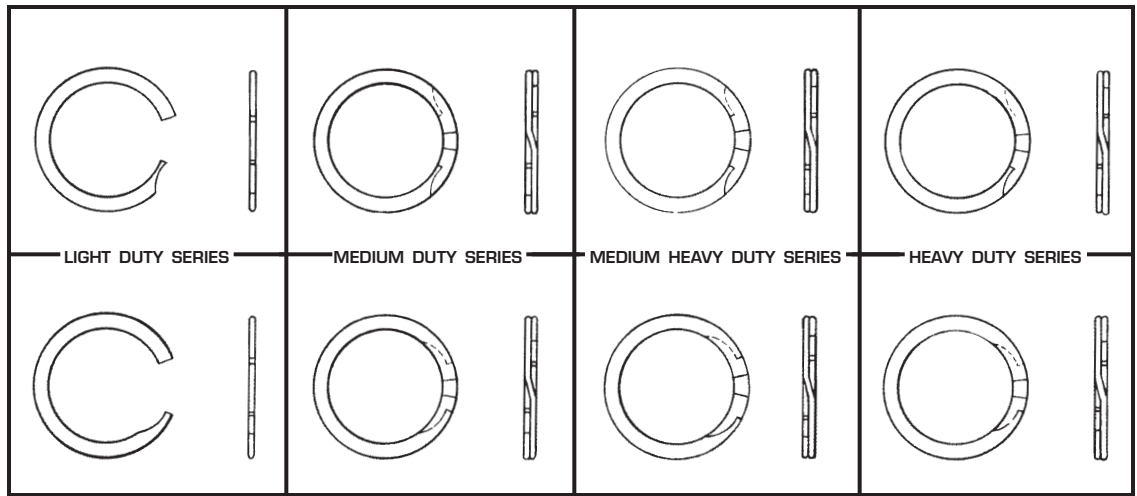
SPIRAL RINGS

0.500" to 16.00"

Standard Material
Carbon Spring Steel

Obtainable in
302,316 Stainless Steel

INTERNAL RINGS



EXTERNAL RINGS

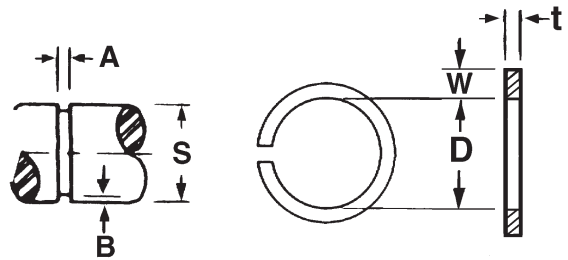


TRC

0.188" to 1.00"

Standard Material
Carbon Spring Steel

Obtainable in
Bronze, Beryllium Copper,
and Stainless Steel



RECTANGULAR SECTION EXTERNAL

SECTION:

On request, listed sections may be coiled to meet any shaft or housing diameter requirements. eg. (1" shaft dia.(s) X .045 x .025 section (w-t). 4" limit on "O" diameter

GAP:

(Trc type) butted to approximately 1/2 wire section dimension.

TOLERANCES:

Tolerances on "D" dimensions are minus as follows:

3/16" to 3/8" sizes 6%

13/32" to 1" sizes 5%

Tolerances on "t" (thickness) dimension are as follows:

.015 to .025 sizes ±5%

.035 to .042 sizes ±4%

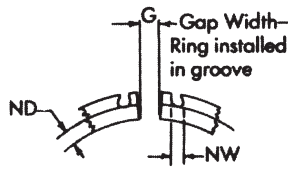
PART NUMBER	SHAFT		RING				GROOVE DIMENSIONS		APPROX Wt. Lb/ 1000 PCS.
	DIAMETER S		DIAMETER		WIDTH	THICKNESS	A Width	B Depth	
	Frac. inch	Dec. inch	INSIDE D	Outside O	W inches	t inches			
TRC 813	3/16	.188	.176	.226	.025	.015	.017	.007	.07
TRC 814	7/32	.219	.205	.255	.025	.015	.017	.007	.08
TRC 815	1/4	.250	.230	.300	.035	.025	.028	.010	.20
TRC 816	9/32	.281	.261	.331	.035	.025	.028	.010	.23
TRC 817	5/16	.312	.290	.370	.040	.025	.028	.011	.29
TRC 818	11/32	.344	.322	.402	.040	.025	.028	.011	.32
TRC 819	3/8	.375	.351	.431	.040	.025	.028	.012	.35
TRC 820	13/32	.406	.382	.472	.045	.025	.028	.012	.42
TRC 821	7/16	.438	.412	.502	.045	.025	.028	.013	.45
TRC 822	15/32	.469	.443	.533	.045	.025	.028	.013	.48
TRC 823	1/2	.500	.474	.570	.048	.035	.039	.013	.78
TRC 824	9/16	.562	.534	.630	.048	.035	.039	.014	.90
TRC 825	19/32	.594	.565	.685	.060	.035	.039	.0145	1.20
TRC 826	5/8	.625	.596	.716	.060	.035	.039	.0145	1.30
TRC 827	11/16	.688	.656	.776	.060	.042	.046	.016	1.70
TRC 828	3/4	.750	.715	.855	.070	.042	.046	.0175	2.10
TRC 829	13/16	.812	.776	.916	.070	.042	.046	.018	2.20
TRC 830	7/8	.875	.833	.973	.070	.042	.046	.021	2.30
TRC 831	15/16	.938	.896	1.058	.081	.042	.046	.021	2.90
TRC 832	1	1.000	.955	1.117	.081	.042	.046	.0225	3.00

**Applicable Shaft
2.062" to 5.00"**

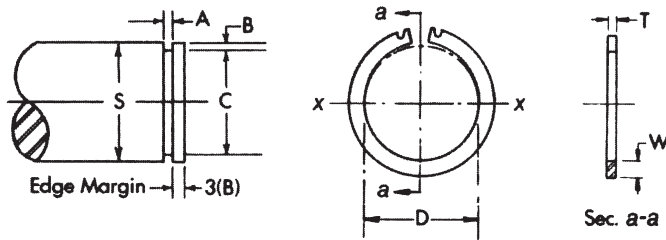
Standard Material
Carbon Spring Steel



**EXTERNAL
NOTCHED
RINGS**



Notch Dimensions



Material—Steel SAE 1060/1075 Hardness R/C47-53

Diameter "D" to be measured across horizontal centerline X-X

Performance: Rings to be heat treated to R/c 47-53 to meet assembly conditions specified below. Ring must expand to pass over shaft Dia. "S" and spring back less than groove Dia. "C".

PART NUMBER	SHAFT			RING				GROOVE			GAP G ToL. ±1/16"	NOTCH		SAFE WORKING THRUST LOAD
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA. C	WIDTH A	NOM. DEPTH B		DEPTH ND +.000 -0.030	WIDTH NW Ref.	
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002							
EN206	21/16	2.062	52.37	1.926				1.946		.058			5400	
EN212	21/8	2.125	53.98	1.983		.187		2.003		.061		.093	5530	
EN215	25/32	2.156	54.76	2.012				2.032		.062			5680	
EN225	21/4	2.250	57.15	2.100				2.120		.065			6200	
EN231	25/16	2.312	58.73	2.158	+0.000	.203		2.178	.086	.067		.100	6580	
EN237	23/8	2.375	60.33	2.219	-0.060		.078	2.239	+0.005 -0.000	.068	.375		6870	
EN243	27/16	2.438	61.93	2.279				2.299		.069			7130	
EN250	21/2	2.500	63.50	2.340				2.360		.070			7430	
EN255	-	2.559	65.00	2.399				2.419		.070			7590	
EN262	25/8	2.625	66.68	2.461				2.481		.072			8020	
EN268	211/16	2.688	68.28	2.521				2.541		.073			8320	
EN275	23/4	2.750	69.85	2.577		.218		2.602		.074		.110	8650	
EN287	27/8	2.875	73.03	2.696				2.721		.077			9330	
EN293	215/16	2.938	74.63	2.754				2.779		.079			9840	
EN300	3	3.000	76.20	2.813				2.838		.081			10310	
EN306	31/16	3.062	77.77	2.873			.093	2.898	.103	.082			10530	
EN312	31/8	3.125	79.38	2.932				2.957	+0.005 -0.000	.084		.125	11170	
EN315	35/32	3.156	80.16	2.961	+0.000			2.986		.085	.500		11370	
EN325	31/4	3.250	82.55	3.051	-0.080			3.076		.087			12000	
EN334	311/32	3.346	85.00	3.141				3.166		.090			12810	
EN343	37/16	3.438	87.33	3.232		.250		3.257		.090		.125	13100	
EN350	31/2	3.500	88.90	3.286				3.316		.092			13640	
EN354	-	3.543	90.00	3.327				3.357		.093			14000	
EN362	35/8	3.625	92.08	3.405				3.435		.095			14580	
EN368	311/16	3.688	93.68	3.463				3.493		.097			14650	
EN375	33/4	3.750	95.25	3.522				3.552		.099			15800	
EN387	37/8	3.875	98.43	3.643				3.673	.120	.101	.562		16600	
EN393	315/16	3.938	100.03	3.704		.281	.109	3.734	+0.005 -0.000	.102		.150	17040	
EN400	4	4.000	101.60	3.762	+0.000			3.792		.104			17640	
EN425	41/4	4.250	107.95	4.025	-0.093			4.065		.092			16600	
EN437	43/8	4.375	111.13	4.150				4.190		.092			17100	
EN450	41/2	4.500	114.30	4.270				4.310		.095	.625		18230	
EN475	43/4	4.750	120.65	4.510		.312		4.550		.100		.180	19160	
EN500	5	5.000	127.00	4.750				4.790		.105			22280	



XAN

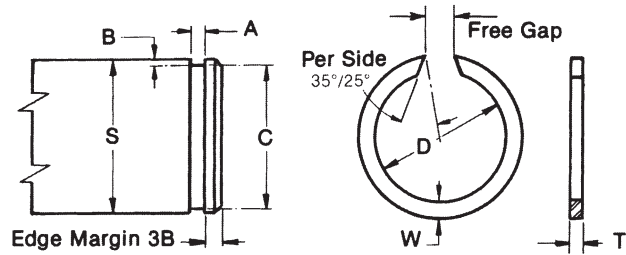
**EXTERNAL
RETAINING
RINGS**

**Applicable Shaft
0.312" to 1.875"**

Standard Material
Carbon Spring Steel



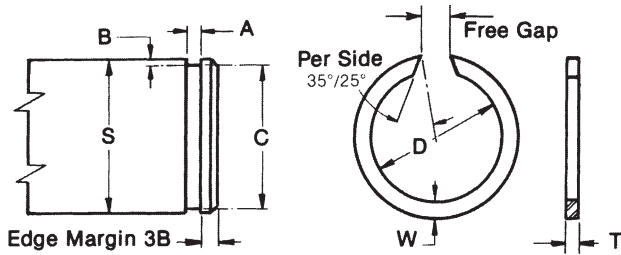
**THIS STYLE ONLY
ON XAN 31 THRU XAN 43**



Material Steel SAE 1060 to 1075 Hardness R/C42-53

PART NUMBER	SHAFT			RING				GROOVE			FREE GAP		RING THRUST CAPACITY LBS.	
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA.		WIDTH A	NOM. DEPTH B	MIN.		MAX.
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002	C	Tol.					
XAN31	5/16	.312	7.92	.281				.290			.011			180
XAN34	11/32	.344	8.74	.312	+0.00			.322						190
XAN35	-	.354	8.99	.320	-.015			.330						210
XAN37	3/8	.375	9.53	.341		.040	.025	.351		.028	.012	.031	.156	230
XAN39	-	.393	9.98	.359		±.003		.369		+0.003 -.000				260
XAN40	13/32	.406	10.31	.372	+0.00			.382						280
XAN43	7/16	.438	11.13	.402	-.020			.412			.013			300
XAN46	15/32	.469	11.91	.433				.443						320
XAN50	1/2	.500	12.70	.464				.474	±.002					460
XAN55	-	.551	14.00	.514		.048		.524						480
XAN56	9/16	.562	14.27	.524		±.003	.035	.534		.039				490
XAN59	19/32	.594	15.09	.555				.566		+0.003 -.000	.014			510
XAN62	5/8	.625	15.88	.586	+0.00			.597				.062	.218	520
XAN66	-	.669	17.00	.630	-.025			.640			.015			570
XAN68	11/16	.688	17.48	.644		.062		.656			.016			700
XAN75	3/4	.750	19.05	.703		±.003		.716			.017			820
XAN78	25/32	.781	19.84	.733				.745			.018			950
XAN81	13/16	.812	20.62	.764				.776		.046				1010
XAN87	7/8	.875	22.23	.820		.078	.042	.835		+0.003 -.000	.020			1100
XAN93	15/16	.938	23.83	.881		±.003		.896			.021	.093	.250	1130
XAN98	63/64	.984	25.00	.925				.940			.022			1170
XAN100	1	1.000	25.40	.941				.956	±.003					1200
XAN102	-	1.023	25.98	.962				.977			.023			1300
XAN106	11/16	1.062	26.97	1.000	+0.00	.093		1.016						1600
XAN112	1 1/8	1.125	28.58	1.060	-.031	±.003		1.075		.056	.025			1880
XAN118	13/16	1.188	30.18	1.121				1.136		+0.004 -.000	.026	.156	.312	1990
XAN125	1 1/4	1.250	31.75	1.179				1.194			.028			2090
XAN131	15/16	1.312	33.32	1.232			.050	1.250			.031			2100
XAN137	13/8	1.375	34.93	1.291		.109		1.309			.033			2300
XAN143	17/16	1.438	36.53	1.351		±.003		1.370			.034			2460
XAN150	1 1/2	1.500	38.10	1.408				1.430			.035			2500
XAN156	19/16	1.562	39.67	1.467				1.490	±.004		.036			3060
XAN162	15/8	1.625	41.28	1.527		.125		1.551			.037			3190
XAN168	1 11/16	1.687	42.85	1.581	+0.00	±.005		1.611		.068	.038			3370
XAN175	13/4	1.750	44.45	1.640	-.046		.062	1.670		+0.004 -.000	.040	.156	.375	3510
XAN177	-	1.771	44.98	1.657		.141		1.687			.042			3550
XAN181	1 13/16	1.812	46.02	1.698		±.005		1.728			.042			3640
XAN187	1 7/8	1.875	47.63	1.759		±.005		1.789			.043			3760

**Applicable Shaft
1.969" to 10.00"**



Standard Material
Carbon Spring Steel



THIS STYLE ONLY
ON XAN 31 THRU XAN 43

Material Steel SAE 1060 to 1075 Hardness R/C42-53

**EXTERNAL
RETAINING
RINGS**

PART NUMBER	SHAFT			RING				GROOVE			FREE GAP		RING THRUST CAPACITY Lbs.	
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA.		WIDTH A	NOM. DEPTH B	MIN.		MAX.
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002	C	Tol.					
XAN196	1 ³¹ / ₃₂	1.969	48.99	1.849			.062	1.879		.068	.045			3940
XAN200	2	2.000	50.80	1.880				1.910		.068	.045			4010
XAN206	2 ¹ / ₁₆	2.062	52.37	1.936		.156		1.966		.068	.048			5350
XAN212	2 ¹ / ₈	2.125	53.98	1.997		±.005		2.027		.068	.049			5470
XAN215	2 ⁵ / ₃₂	2.156	54.76	2.026				2.056		.068	.050			5680
XAN225	2 ¹ / ₄	2.250	57.15	2.116	+.000			2.146		.068	.052			5790
XAN231	2 ⁵ / ₁₆	2.312	58.72	2.174	.046			2.204		.086	.054	.156	.375	6300
XAN237	2 ³ / ₈	2.375	60.33	2.235			.078	2.265		.086	.055			6400
XAN243	2 ⁷ / ₁₆	2.437	61.90	2.295				2.325		.086	.056			6500
XAN250	2 ¹ / ₂	2.500	63.50	2.356				2.386		.086	.057			6600
XAN255	-	2.559	65.00	2.413		.187		2.443		.086	.058			6700
XAN262	2 ⁵ / ₈	2.625	66.68	2.475		±.005		2.505		.086	.060			6800
XAN268	2 ¹¹ / ₁₆	2.687	68.25	2.535				2.565		.086	.061			6900
XAN275	2 ³ / ₄	2.750	69.85	2.594				2.624		.086	.063			8460
XAN287	2 ⁷ / ₈	2.875	73.03	2.713				2.743		.086	.066			8840
XAN293	2 ¹⁵ / ₁₆	2.937	74.60	2.771				2.801		.086	.068			9030
XAN300	3	3.000	76.20	2.830				2.860		.103	.070			9230
XAN306	3 ¹ / ₁₆	3.062	77.77	2.890	+.000	.218	.093	2.920		.103	.071	.187	.437	9420
XAN312	3 ¹ / ₈	3.125	79.38	2.951	-.062	±.005		2.981		.103	.072			9630
XAN315	3 ⁵ / ₃₂	3.156	80.16	2.980				3.010		.103	.073			9800
XAN325	3 ¹ / ₄	3.250	82.55	3.070				3.100	±.006	.103	.075			10000
XAN334	3 ¹¹ / ₃₂	3.344	84.94	3.160				3.190		.103	.077			10290
XAN343	3 ⁷ / ₁₆	3.437	87.30	3.251				3.281		.103	.078			10570
XAN350	3 ¹ / ₂	3.500	88.90	3.305		.250		3.340		.103	.080			11970
XAN354	-	3.543	90.00	3.346		±.005		3.381		.103	.081			12120
XAN362	3 ⁵ / ₈	3.625	92.08	3.423	+.000			3.458		.103	.083			12300
XAN368	3 ¹¹ / ₁₆	3.687	93.65	3.482	-.078			3.517		.103	.085	.250	.562	12600
XAN375	3 ³ / ₄	3.750	95.25	3.541				3.576		.103	.087			12800
XAN387	3 ⁷ / ₈	3.875	98.43	3.657				3.697		.120	.089			13200
XAN393	3 ¹⁵ / ₁₆	3.938	100.02	3.713		.281	.109	3.758		.120	.090			13470
XAN400	4	4.000	101.60	3.771		±.005		3.816		.120	.092			13650
XAN425	4 ¹ / ₄	4.250	107.95	4.016				4.066		.120	.092			15000
XAN437	4 ³ / ₈	4.375	111.13	4.141	+.000			4.191		.120	.092			15500
XAN450	4 ¹ / ₂	4.500	114.30	4.255	-.093	.312		4.310		.120	.095	.250	.656	16200
XAN475	4 ³ / ₄	4.750	120.65	4.495		±.005		4.550		.120	.100			16480
XAN500	5	5.000	127.00	4.730				4.790		.120	.105			17110
XAN525	5 ¹ / ₄	5.250	133.35	4.970				5.030		.120	.110			20590
XAN550	5 ¹ / ₂	5.500	139.70	5.206	+.000	.375		5.266		.139	.117			21790
XAN575	5 ³ / ₄	5.750	146.05	5.446	-.125	±.005	.125	5.506		.139	.122	.250	.750	23010
XAN590	-	5.900	149.86	5.600				5.656		.139	.122			23625
XAN600	6	6.000	152.40	5.687				5.746		.139	.127			24000
XAN625	6 ¹ / ₄	6.250	158.75	5.916				5.986		.139	.132			30310
XAN650	6 ¹ / ₂	6.500	165.10	6.151	+.000	.437	.156	6.226		.174	.137	.250	.750	33760
XAN675	6 ³ / ₄	6.750	171.45	6.386	-.125	±.005		6.466		.174	.142			36840
XAN700	7	7.000	177.80	6.621				6.706		.174	.147			39920
XAN725	7 ¹ / ₄	7.250	184.15	6.840				6.930		.174	.160			43100
XAN750	7 ¹ / ₂	7.500	190.50	7.090				7.180	±.008	.174	.160			44500
XAN800	8	8.000	203.20	7.560				7.660		.209	.160			45500
XAN850	8 ¹ / ₂	8.500	215.90	8.050	+.000	.500	.187	8.160		.209	.160	.250	.875	46700
XAN900	9	9.000	228.60	8.545	-.156	±.005		8.660		.209	.170			49900
XAN925	9 ¹ / ₄	9.250	234.95	8.800				8.910		.209	.170			51000
XAN950	9 ¹ / ₂	9.500	241.30	9.040				9.160		.209	.170			52590
XAN1000	10	10.000	254.00	9.535				9.660		.209	.170			55600

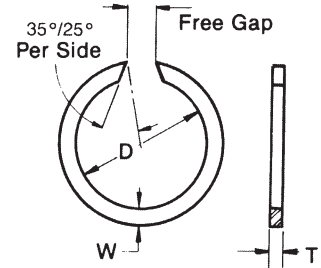
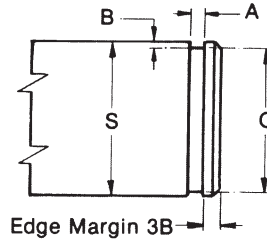
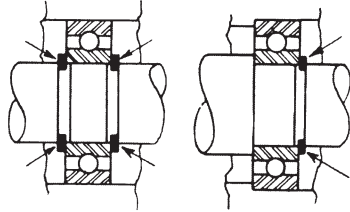


**Applicable Shaft
0.4724" to 4.3307"**

Standard Material
Carbon Spring Steel

Method of using snap rings to retain bearings on shafts.
Snap rings are used in place of shoulder or lock nuts.

**EXTERNAL
RETAINING
RINGS**



Material Steel SAE 1060 to 1075 Hardness R/C42-52

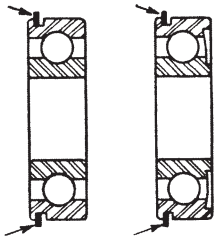
PART NUMBER	BASIC BEARING NUMBER			S SHAFT DIA. OR BEARING BORE		RING DIMENSIONS			GROOVE			FREE GAP			
						FREE DIAMETER		WIDTH W ±.003	THICK T ±.002	DIA.		WIDTH A	NOM. DEPTH B	MIN.	MAX.
						D inches	Tol. inches			C	Tol.				
584	201	301		.4724	12.00	.421	$^{+.000}_{-.020}$	.062 ±.003	.042	.436		.046 $^{+.003}_{-.000}$	.018	.062	.187
594	202	302		.5906	15.00	.538	+0.000	.078	.047	.550		.053	.020		
614	203	303	403	.6693	17.00	.616	-.025	±.003		.629	±.002	$^{+.004}_{-.000}$		.078	.218
639R	204	304	404	.7874	20.00	.710		$^{+.003}_{-.003}$	.062	.731		.068	.028		
698R	205	305	405	.9843	25.00	.910		$^{+.004}_{-.000}$	.0924	.924		$^{+.004}_{-.000}$	.030	.156	.312
740R	206	306	406	1.1811	30.00	1.093	+0.000	$^{+.125}_{-.005}$	.075	1.111		$^{+.004}_{-.000}$	.035		
823	207	307	407	1.3780	35.00	1.265	-.031	.156		1.288	±.004	.108	.045	.250	.406
916R	208	308	408	1.5748	40.00	1.452		±.005	.093	1.465		.108	.055		
974R	209	309	409	1.7717	45.00	1.625		.188		1.648		$^{+.005}_{-.000}$	.062		
1065R	210	310	410	1.9685	50.00	1.820	+0.000	±.005		1.844		$^{+.005}_{-.000}$			
1129R	211	311	411	2.1654	55.00	1.995	-.046	.218	.109	2.015		.120	.075	.250	.468
1185	212	312	412	2.3622	60.00	2.187		±.005		2.212		$^{+.005}_{-.000}$			
1258	213	313	413	2.5591	65.00	2.359				2.389					
1308R	214	314	414	2.7559	70.00	2.556		.250		2.586					
1378	215	315	415	2.9528	75.00	2.750	+0.000	±.005		2.783		.139	.085	.250	.500
1407R	216	316	416	3.1496	80.00	2.946	-.062		.125	2.979	±.006	$^{+.006}_{-.000}$			
1468R	217	317	417	3.3465	85.00	3.139				3.176					
1517R	218	318	418	3.5433	90.00	3.308	+0.000			3.343					
1551R	219	319	419	3.7402	95.00	3.500	-.078	.312		3.540				.312	.625
1572R	220	320	420	3.9370	100.00	3.697		±.005		3.737		.174	.100		
2919R	221	321	421	4.1339	105.00	3.888	+0.000		.156	3.934		$^{+.008}_{-.000}$		.312	.687
1625R	222	322	422	4.3307	110.00	4.080	-.093			4.131					

**Applicable Shaft
0.8661" to 9.4488"**

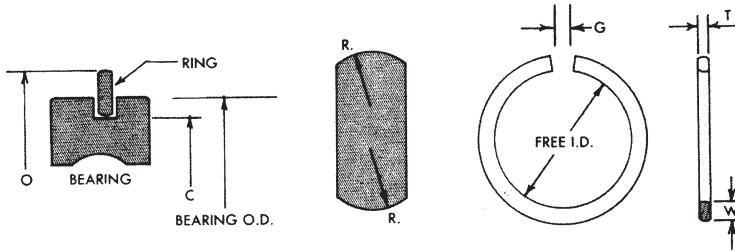
Standard Material
Carbon Spring Steel



**EXTERNAL
RETAINING
RINGS**



Conventional method of mounting and use of snap rings on open and shielded type bearings.



Material Steel SAE 1065 Tensile Strength 200 M to 250 M P.S.I. R/C 40-50

XX Gap "G" dimension applies when ring diameter is held to dimension under column marked I.D. Measurement is the straight line distance between nearest gap edges on inner periphery of ring.

PART NUMBER	BEARING NUMBER				BEARING O.D.		RING DIMENSIONS—FREE			GROOVE DIA. C	ASSEMBLED O.D. O	GAP XX G	RADIUS MAX R	WEIGHT PER M
	Extra Light	Light	Med.	Heavy	(M.M.) D	Inches D	FREE I.D.		THICK T ±.002					
							I.D.	Tol.						
1957		37-38			22	.8661	.799	+ ^{.000} _{.015}	.094		.8125	1.000		2.7
743-4		200			30	1.1811	1.094				1.109	1.359		5.6
781-2	102	201			32	1.2598	1.172		.125		1.187	1.437	3/32	6.0
2046	103	202	300		35	1.3780	1.291	+0.000		.042	1.306	1.547	±	6.6
2976-1		301			37	1.4567	1.354	-.020			1.369	1.609	1/32	7.0
939-2		203			40	1.5748	1.485				1.500	1.750		7.8
954	104		302		42	1.6535	1.550				1.565	1.812		7.8
1039	105	204	303		47	1.8504	1.741		.156		1.756	2.062		11.0
1117-2		205	304		52	2.0472	1.943				1.958	2.265		12.1
3918-1	106				55	2.1654	2.056	+0.000			2.071	2.375	1/8	12.8
1245-6	107	206	305	403	62	2.4409	2.322	-.030			2.347	2.656	±	21.9
2261	108				68	2.6772	2.527			.065	2.552	2.922	1/32	29.1
1356-7		207	306	404	72	2.8346	2.684				2.709	3.078		30.8
3919-1	109				75	2.9528	2.803				2.828	3.203		32.1
1438-5	110	208	307	405	80	3.1496	2.999		.188		3.024	3.406		34.2
1490-5		209			85	3.3465	3.196	+0.000			3.221	3.594	5/32	36.7
1534-4	111	210	308	406	90	3.5433	3.392	-.046			3.417	3.797	±	56.5
3920-1	112				95	3.7402	3.590			.095	3.615	3.984	3/64	59.7
1598-1	113	211	309	407	100	3.9370	3.786				3.811	4.187		62.1
1642-3	114	212	310	408	110	4.3307	4.180				4.205	4.578		68.7
3126	115				115	4.5276	4.377	+0.000			4.402	4.781	3/16	72.2
1675-4		213	311	409	120	4.7244	4.506	-.062			4.536	5.094	±	128.8
1693	116	214			125	4.9213	4.703		.281		4.733	5.297	1/16	136.0
1706-3	117	215	312	410	130	5.1181	4.900			.109	4.930	5.500		139.5
1730-5	118	216	313	411	140	5.5118	5.294				5.324	5.890	9/32	150.4
3921-1	119				145	5.7087	5.491	+0.000			5.521	6.078	±	155.0
1744-5	120	217	314	412	150	5.9055	5.688	-.093			5.718	6.281	1/16	160.9
1764-1	121	218	315	413	160	6.2992	6.081				6.111	6.672		171.7
1773-2	122	219	316		170	6.6929	6.413				6.443	7.187		267.4
1787-1	124	220	317	414	180	7.0866	6.807				6.837	7.594	3/8	284.4
1849-1		221	318	415	190	7.4803	7.200	+0.000			7.230	7.984	±	300.1
2165-2	126	222	319	416	200	7.8740	7.594	-.125	.375	.120	7.624	8.375	1/16	309.1
3922-1	128			417	210	8.2677	7.987				8.018	8.766		319.0
3923-1		224	320		215	8.4646	8.184				8.215	8.969		338.4
3924-1	1 30		321	418	225	8.8583	8.578	+0.000			8.6083	9.328	15/32	349.0
3925-1		226			230	9.0551	8.775	-.156			8.8051	9.562	±	362.0
3926-1	1 32		322		240	9.4488	9.168				9.1988	9.953	3/32	375.4

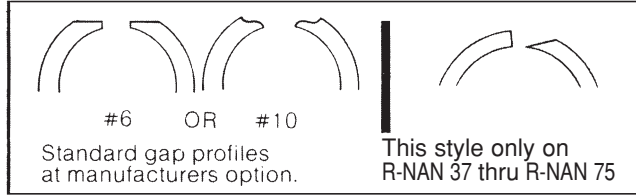
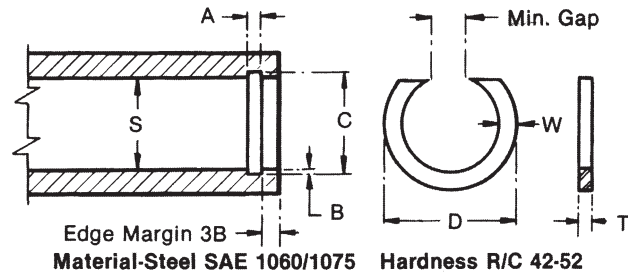


NAN

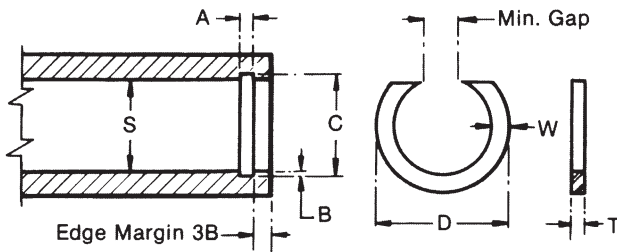
**INTERNAL
RETAINING
RINGS**

**Applicable Housing
0.375" to 2.688"**

Standard Material
Carbon Spring Steel



PART NUMBER	HOUSING			RING				GROOVE				FREE GAP		RING THRUST CAPACITY LBS.
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA.		WIDTH A	NOM. DEPTH B	MIN.	MAX.	
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002	C	Tol.					
NAN37	3/8	.375	9.53	.400	+.020	.035	.025	.395		.028	.010	.125	.218	250
NAN43	7/16	.438	11.12	.467	-.000	±.003		.462		+003 -.000				300
NAN50	1/2	.500	12.70	.530		.040		.524			.012			470
NAN51	-	.512	13.00	.542		±.003		.536						480
NAN56	9/16	.562	14.27	.600			.035	.590		.039	.014			510
NAN62	5/8	.625	15.88	.670	+.025	.048		.657		+003 -.000	.016	.187	.344	620
NAN68	11/16	.688	17.48	.733	-.000	±.003		.720	±.003					700
NAN75	3/4	.750	19.05	.799				.786			.018			750
NAN77	-	.777	19.74	.827		.062		.813						1020
NAN81	13/16	.812	20.62	.867		±.003		.852			.020			1090
NAN87	7/8	.875	22.23	.934				.919		.046	.022			1130
NAN90	-	.901	22.88	.961		.078	.042	.945		+003 -.000				1260
NAN93	15/16	.938	23.82	1.003		±.003		.986			.024	.281	.438	1360
NAN100	1	1.000	25.40	1.070				1.052						1470
NAN102	-	1.023	25.98	1.094				1.075			.026			1500
NAN106	11/16	1.062	26.97	1.134		.093		1.114						1780
NAN112	1 1/8	1.125	28.58	1.202	+.031	±.003		1.181			.028			1880
NAN118	1 3/16	1.188	30.17	1.270	-.000			1.248			.030			1990
NAN125	1 1/4	1.250	31.75	1.337		.109		1.314		.056	.032			2090
NAN131	1 5/16	1.312	33.32	1.404		±.003	.050	1.380		+003 -.000	.034	.375	.562	2200
NAN137	1 3/8	1.375	34.93	1.472				1.447			.036			2300
NAN143	1 7/16	1.438	36.52	1.535				1.510						2460
NAN145	-	1.456	36.08	1.557		.125		1.532			.038			2490
NAN150	1 1/2	1.500	38.10	1.607		±.005		1.576	±.005					2560
NAN156	1 9/16	1.562	39.67	1.668				1.642			.040			3060
NAN162	1 5/8	1.625	41.28	1.736		.141		1.709			.042			3190
NAN165	-	1.653	41.99	1.765		±.005		1.737						3240
NAN168	1 11/16	1.688	42.87	1.804				1.776			.044	.437	.687	3370
NAN175	1 3/4	1.750	44.45	1.870				1.842		.068	.046			3510
NAN181	1 13/16	1.812	46.02	1.933			.062	1.904		+004 -.000				3640
NAN185	-	1.850	47.00	1.975				1.946			.048			3710
NAN187	1 7/8	1.875	47.63	2.000		.156		1.971						3760
NAN193	1 15/16	1.938	49.22	2.068		±.005		2.038						3870
NAN196	1 31/32	1.968	49.99	2.098				2.068			.050			3935
NAN200	2	2.000	50.80	2.131	+.046			2.100						4000
NAN206	2 1/16	2.062	52.37	2.197	-.000			2.166			.052			4380
NAN212	2 1/8	2.125	53.98	2.260				2.229						5140
NAN218	2 3/16	2.188	55.55	2.331				2.296			.054	.500	.750	5470
NAN225	2 1/4	2.250	57.15	2.393		.171		2.358		.086				5630
NAN231	2 5/16	2.312	58.72	2.459		±.005	.078	2.424		+005 -.000	.056			5790
NAN237	2 3/8	2.375	60.33	2.523				2.487	±.006					5950
NAN244	-	2.440	61.98	2.592				2.556			.058			6270
NAN250	2 1/2	2.500	63.50	2.653				2.616						6350
NAN253	2 17/32	2.531	64.28	2.688		.187		2.651			.060			6510
NAN256	2 9/16	2.562	65.07	2.726		±.005		2.686		.103				8400
NAN262	2 5/8	2.625	66.67	2.790			.093	2.750		+005 -.000	.062	.562	.812	8650
NAN268	2 11/16	2.688	68.27	2.856				2.816						8800



**Applicable Housing
2.717" to 10.000"**

Standard Material
Carbon Spring Steel



NAN

**INTERNAL
RETAINING
RINGS**

**Material-
Steel SAE 1060/1075
Hardness
R/C 42-52**



#6 OR #10

Standard gap profiles
at manufacturers option.

PART NUMBER	HOUSING			RING				GROOVE			FREE GAP		RING THRUST CAPACITY LBS.	
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA.		WIDTH A	NOM. DEPTH B	MIN.		MAX.
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002	C	Tol.					
NAN271	-	2.717	68.83	2.882	+0.046 -.000			2.842			.064	.562	.812	8875
NAN275	23/4	2.750	69.85	2.918				2.878		.103				8950
NAN281	213/16	2.813	71.45	2.985		.187	.093	2.945		+0.005 -.000	.066			9100
NAN283	-	2.834	72.00	3.006				2.966						9250
NAN287	27/8	2.875	73.00	3.056				3.011			.068			9400
NAN300	3	3.000	76.20	3.181	+0.062			3.136				.625	.875	9550
NAN306	33/16	3.062	77.78	3.247	-.000			3.202						10470
NAN312	31/8	3.125	79.38	3.311				3.265			.070			10690
NAN315	35/32	3.156	80.16	3.342		.218		3.296						10800
NAN325	31/4	3.250	82.55	3.442				3.394						11120
NAN334	-	3.346	85.00	3.539				3.490			.072			11450
NAN346	315/32	3.469	88.00	3.663				3.613						11870
NAN350	31/2	3.500	88.90	3.700				3.648						11970
NAN354	-	3.543	90.00	3.745				3.691	±.006		.074	.718	1.062	12120
NAN356	39/16	3.562	90.47	3.766	+0.078			3.710						12190
NAN362	35/8	3.625	92.08	3.831	-.000			3.773		.120				12380
NAN375	33/4	3.750	95.25	3.962			.109	3.902		+0.005 -.000	.076			12600
NAN387	37/8	3.875	98.42	4.089				4.027			.078			12820
NAN393	315/16	3.938	100.00	4.156		.250		4.094						13230
NAN400	4	4.000	101.60	4.221				4.156						13690
NAN412	41/8	4.125	104.77	4.355				4.285						14110
NAN425	41/4	4.250	107.95	4.485				4.410			.080			14540
NAN433	-	4.330	110.00	4.565	+0.093			4.490						14960
NAN443	47/16	4.436	112.69	4.670	-.000			4.596				.875	1.312	15170
NAN450	41/2	4.500	114.30	4.744				4.664			.082			15390
NAN462	45/8	4.625	117.48	4.875				4.795			.085			15830
NAN475	43/4	4.750	120.65	5.011		.281		4.926			.088			16250
NAN500	5	5.000	127.00	5.265				5.180			.090			17110
NAN525	51/4	5.250	133.35	5.530				5.435			.092			20590
NAN537	53/8	5.375	136.53	5.660				5.565		.139	.095			21110
NAN550	51/2	5.500	140.00	5.796	+0.125	.312	.125	5.696	±.007	+0.006 -.000	.098	1.000	1.500	21790
NAN575	53/4	5.750	146.05	6.050	-.000			5.950			.100			22570
NAN600	6	6.000	152.40	6.309				6.204			.102			23550
NAN625	61/4	6.250	158.75	6.568				6.458			.104			29420
NAN650	61/2	6.500	165.00	6.832				6.712		.174	.106			30610
NAN662	65/8	6.625	168.27	6.975	+0.156	.343	.156	6.845		+0.006 -.000	.110	1.125	1.812	31400
NAN675	63/4	6.750	171.45	7.100	-.000			6.970						32640
NAN700	7	7.000	177.80	7.350				7.220						34850
NAN725	71/4	7.250	184.15	7.630				7.500						38060
NAN750	71/2	7.500	190.50	7.890		.375		7.750			.125	1.375	2.250	39450
NAN800	8	8.000	203.20	8.400				8.250	±.008					41960
NAN825	81/4	8.250	209.55	8.665		.437		8.540			.145			43320
NAN850	81/2	8.500	215.90	8.915	+0.187			8.790		.209		1.625	2.500	44710
NAN875	83/4	8.750	222.25	9.205	-.000	.187		9.080						48900
NAN900	9	9.000	228.60	9.455				9.330		+0.006 -.000				49740
NAN905	-	9.055	230.00	9.509		.500		9.384			.165			50050
NAN950	91/2	9.500	241.30	9.955				9.830				1.750	2.625	52520
NAN984	927/32	9.840	250.00	10.295				10.170						53780
NAN1000	10	10.000	254.00	10.455				10.330						55400

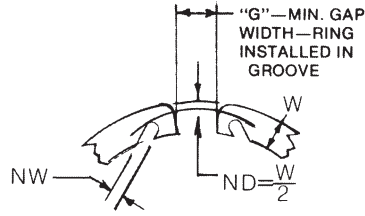


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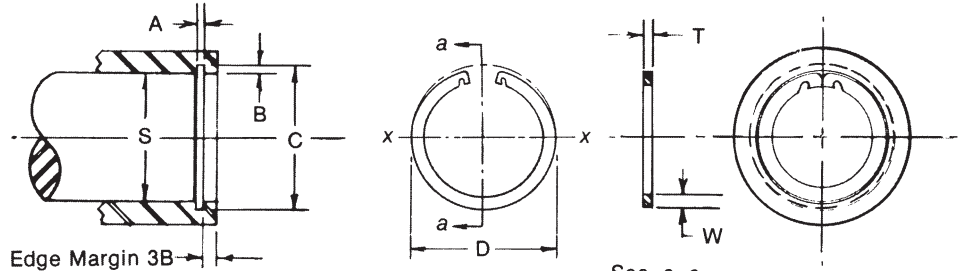
INTERNAL NOTCHED RINGS

**Applicable Housing
1.750" to 3.625"**

Standard Material
Carbon Spring Steel



Notch Dimensions

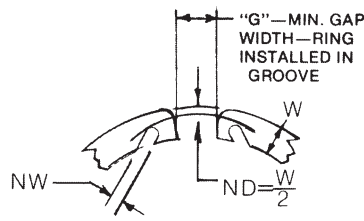


Diameter "D" to be measured across horizontal centerline x-x

**Material-Steel SAE 1060/1075
Hardness R/C 45-52**

PART NUMBER	HOUSING			RING				GROOVE			GAP G Min.	NOTCH		THRUST LOAD Lbs.	
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA.		WIDTH A		NOM. DEPTH B	DEPTH ND +.000 -0.030		WIDTH NW Ref.
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002	C	Tol.						
IN175	1 ³ / ₄	1.750	44.45	1.878				1.858			.054			4100	
IN181	1 ¹³ / ₁₆	1.812	46.02	1.942				1.922			.055	.370		4280	
IN185	-	1.850	47.00	1.982		.156	.062	1.962	±.005	.068	.056	.400	.078	4380	
IN187	1 ⁷ / ₈	1.875	47.63	2.014				1.989			.057			4650	
IN193	1 ¹⁵ / ₁₆	1.938	49.20	2.081				2.056		.004 -.000	.059			5000	
IN200	2	2.000	50.80	2.147				2.122			.061	.420		5350	
IN206	2 ³ / ₆₄	2.047	52.00	2.201	+.070			2.171			.062			6490	
IN206	2 ¹ / ₁₆	2.062	52.37	2.201	-.000			2.186				.450		6490	
IN212	2 ¹ / ₈	2.125	53.98	2.271				2.251			.063			6810	
IN218	-	2.165	55.00	2.338		.171		2.295			.065	.430	.085	7240	
IN218	2 ³ / ₁₆	2.188	55.55	2.338				2.318		.086		.470		7240	
IN225	2 ¹ / ₄	2.250	57.15	2.402			.078	2.382			.066	.450		7560	
IN231	2 ⁵ / ₁₆	2.312	58.72	2.470				2.450		.005 -.000	.069			8120	
IN237	2 ³ / ₈	2.375	60.33	2.537				2.517			.071		.093	8580	
IN244	-	2.440	61.98	2.604				2.584			.072	.470		8940	
IN250	2 ¹ / ₂	2.500	63.50	2.673				2.648			.074			9410	
IN253	2 ¹⁷ / ₃₂	2.531	64.29	2.706				2.681			.075			9660	
IN256	2 ⁹ / ₁₆	2.562	65.07	2.739				2.714			.076			9910	
IN262	2 ⁵ / ₈	2.625	66.68	2.806		.188		2.781			.078	.530	.093	10420	
IN268	-	2.677	68.00	2.868				2.837			.080			10900	
IN268	2 ¹¹ / ₁₆	2.688	68.25	2.868	+.080			2.848		.103		.560		10900	
IN275	2 ³ / ₄	2.750	69.85	2.944	-.000		.093	2.914	±.006	.005 -.000	.082	.590		11470	
IN281	2 ¹³ / ₁₆	2.812	71.42	3.025				2.980			.084			12200	
IN281	-	2.835	72.00	3.025				3.005			.085	.660		12200	
IN287	2 ⁷ / ₈	2.875	73.03	3.086				3.051			.088			12870	
IN295	-	2.953	75.00	3.175		.203		3.135			.091	.620	.100	13480	
IN300	3	3.000	76.20	3.222				3.182			.091			13890	
IN306	3 ¹ / ₁₆	3.062	77.77	3.288				3.248			.093			14490	
IN312	3 ¹ / ₈	3.125	79.38	3.353				3.315			.095	.650		15110	
IN315	-	3.149	79.98	3.388		.218		3.341			.096		.109	15420	
IN315	3 ⁵ / ₃₂	3.156	80.16	3.388				3.348						15420	
IN325	3 ¹ / ₄	3.250	82.55	3.488	+.100			3.446		.120	.098	.680		16210	
IN334	3 ¹¹ / ₃₂	3.346	84.99	3.590	-.000		.109	3.546		.005 -.000	.100		.125	17030	
IN347	3 ¹⁵ / ₃₂	3.469	88.11	3.721				3.675			.103	.710		18190	
IN350	3 ¹ / ₂	3.500	88.90	3.760				3.710			.105			18700	
IN354	-	3.543	90.00	3.805		.234		3.755			.106	.740	.120	19400	
IN354	3 ⁹ / ₁₆	3.562	90.47	3.805				3.776			.107	.810		19400	
IN362	3 ⁵ / ₈	3.625	92.08	3.895				3.841			.108	.740		19930	





Notch Dimensions

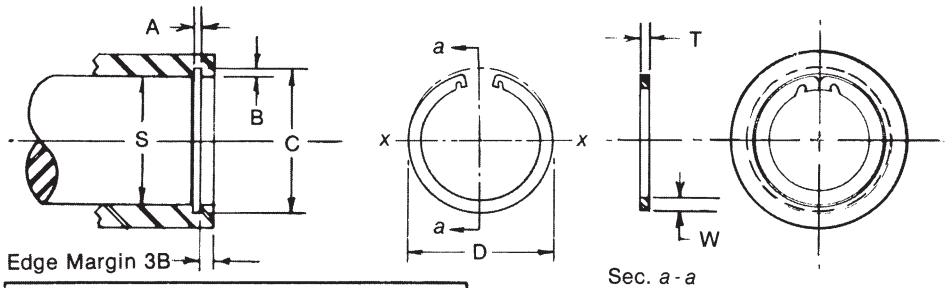
Applicable Housing
3.740" to 10.000"

Standard Material
Carbon Spring Steel



IN

**INTERNAL
NOTCHED
RINGS**



Diameter "D" to be measured across horizontal centerline X-X

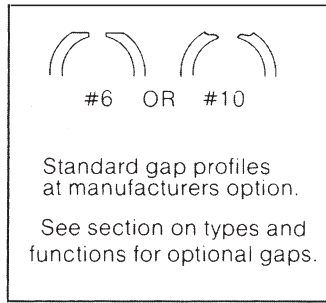
Material-Steel SAE 1060/1075
Hardness R/C 45-52

PART NUMBER	HOUSING			RING				GROOVE			GAP G Min.	NOTCH		THRUST LOAD Lbs.
	DIAMETER S			FREE DIAMETER D inches	WIRE SECTION		DIA.		WIDTH A	NOM. DEPTH B		DEPTH ND +.000 -0.030	WIDTH NW Ref.	
	Frac. inch	Dec. inch	mm		Tol. inches	W ±.005	T ±.002	C							Tol.
IN375	-	3.740	95.00	4.030				3.964			.112	.740	.125	21380
IN375	3/4	3.750	95.25	4.030				3.974				.780	.125	21380
IN387	37/8	3.875	98.43	4.165				4.107			.116		.125	22880
IN393	315/16	3.938	100.00	4.234		.250		4.174			.118		.125	23650
IN400	4	4.000	101.60	4.300				4.240					.125	24430
IN412	4 1/8	4.125	104.78	4.430	+100			4.365		.120		.810	.125	25190
IN425	4 1/4	4.250	107.95	4.555	-000		.109	4.490	±.006	+005 -000	.120		.125	25960
IN433	-	4.331	110.00	4.641				4.571					.125	26450
IN450	4 1/2	4.500	114.30	4.815				4.740					.156	27490
IN462	4 5/8	4.625	117.48	4.940				4.865				.840	.156	28250
IN475	-	4.724	120.00	5.070		.281		4.969			.122		.140	29000
IN475	4 3/4	4.750	120.65	5.070				4.995				.910	.156	29000
IN500	5	5.000	127.00	5.340				5.260			.130	.930	.156	33100
IN525	5 1/4	5.250	133.35	5.600				5.520					.156	36070
IN537	5 3/8	5.375	136.53	5.735	+120			5.650					.156	36930
IN550	5 1/2	5.500	139.70	5.860	-000	.312	.125	5.770	±.007	.139	.135	1.000	.156	37790
IN575	5 3/4	5.750	146.05	6.120				6.020		+006 -000			.156	39500
IN600	6	6.000	152.40	6.380				6.270					.156	41220
IN625	6 1/4	6.250	158.75	6.640				6.530			.140	1.030	.156	44530
IN650	6 1/2	6.500	165.10	6.905	+150			6.790		.174	.145	1.090	.156	47970
IN662	6 5/8	6.625	168.28	7.045	-000	.343	.156	6.925		+008 -000	.150	1.120	.171	50580
IN675	6 3/4	6.750	171.45	7.180				7.055			.152	1.130	.156	52220
IN700	7	7.000	177.80	7.445				7.315			.157	1.140	.156	55930
IN725	7 1/4	7.250	184.15	7.705	+180			7.575			.162		.187	59700
IN750	7 1/2	7.500	190.50	7.975	-000	.375		7.840			.170	1.150	.187	64900
IN775	7 3/4	7.750	196.85	8.240				8.100			.175	1.160	.187	68700
IN800	8	8.000	203.20	8.505				8.360	±.008		.180	1.200	.187	72900
IN825	8 1/4	8.250	209.55	8.770				8.620			.185	1.230	.187	77600
IN850	8 1/2	8.500	215.90	9.035		.437	.187	8.880		.209	.190	1.270	.218	81800
IN875	8 3/4	8.750	222.25	9.305	+220			9.144		+008 -000	.197	1.320	.187	87300
IN900	9	9.000	228.60	9.564	-000			9.404			.202	1.370	.187	92400
IN925	9 1/4	9.250	234.95	9.833				9.668			.209	1.400	.187	98000
IN950	9 1/2	9.500	241.30	10.100		.500		9.930			.215	1.500	.250	103900
IN975	9 3/4	9.750	247.65	10.365				10.190			.220	1.620	.187	109000
IN1000	10	10.000	254.00	10.630				10.450			.225	1.750	.187	114600

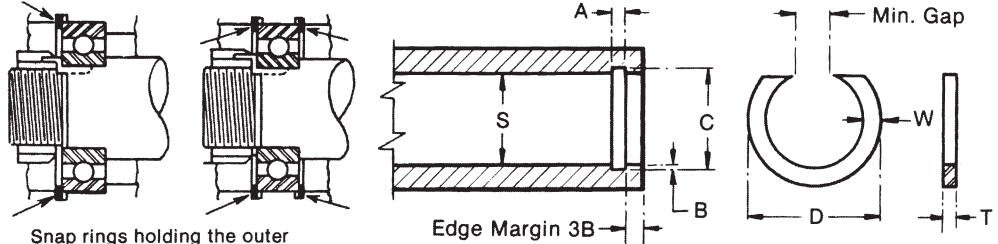


**Applicable Housing
1.1811" to 3.5433"**

Standard Material
Carbon Spring Steel



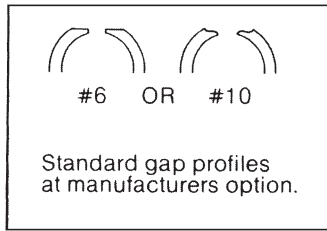
**INTERNAL
RETAINING
RINGS
(METRIC)**



Snap rings holding the outer race of bearings against thrust.
Also application where snap ring holds the outer race against thrust loads in either direction.

Material Steel SAE 1060 to 1075 Hardness R/C42-52

PART NUMBER	BASIC BEARING NO.			HOUSING		RING				GROOVE			GAP AT MIN. Free O.D.	
	Lt.	Med.	Hvy.	DIAMETER S		FREE DIAMETER		WIRE SECTION		Dia.		WIDTH A +.004/-0.000		Nom. DEPTH B
				Frac. inch	mm	D inches	Tol. inches	W ±.003	T ±.002	C	Tol.			
738-1	200			1.1811	29.93	1.265		.100*	.031	1.243		.035	.031	
721-1				1.1811	29.93	1.265		.125	.042	1.253		.046	.036	
725-1R				1.1811	29.93	1.271		.109*	.062	1.251		.068	.035	
775	201			1.2598	31.93	1.349		.100*	.031	1.321		.035	.031	
744				1.2598	31.93	1.343	+0.031	.125	.042	1.331		.046	.036	
2884-R				1.2598	31.93	1.365	-0.000	.109*	.062	1.329		.068	.035	.375
837	202			1.3780	34.92	1.468		.100*	.031	1.440		.035	.031	+.080 -0.000
801		300		1.3780	34.92			.125	.042	1.450		.046	.036	
793-R				1.3780	34.92	1.486		.140	.062	1.458		.068	.040	
866				1.4567	36.92	1.546		.100*	.031	1.518		.035	.031	
846-1		301		1.4567	36.92			.125	.042	1.528	±.005	.046	.036	
836-R				1.4567	36.92	1.564		.140	.062	1.536		.068	.040	
913-1	203			1.5748	39.91	1.687		.125	.042	1.654		.046		
886				1.5748	39.91	1.703		.156		1.668			.047	
887				1.5748	39.91			.156	.062			.068		
1880-4				1.6535	41.90	1.765		.125	.042	1.733		.046	.040	
932-1		302		1.6535	41.90	1.781		.156		1.747			.047	
3068-1				1.6535	41.90			.156	.062			.062		
1026-1	204			1.8504	46.89	1.968	+0.046	.125	.042	1.930		.046	.040	
992-1		303		1.8504	46.89		-0.000	.156		1.944			.047	.437
981-R				1.8504	46.89	1.976		.172	.062	1.951		.068	.050	
1080-2	205			2.0472	51.88	2.171		.156	.042	2.137		.046	.045	+.093 -0.000
1080-2		304		2.0472	51.88			.156		2.141			.047	
1069-R				2.0472	51.88	2.179		.172		2.148		.068	.050	
1208-1	206			2.4409	61.86	2.562		.156	.062	2.530			.045	
1208-1		305		2.4409	61.86					2.544			.052	
1198			403	2.4409	61.86	2.593		.187	.093	2.565		.103	.062	
1343-3	207			2.8346	71.83	2.968		.156	.062	2.934		.068	.050	
1331		306		2.8346	71.83	2.984		.187		2.959			.062	
1336			404	2.8346	71.83	3.000			.093		±.006	.103		
1433-1	208			3.1496	79.82	3.281	+0.062	.156	.062	3.249		.068	.050	.562
1410		307		3.1496	79.82	3.296	-0.000	.187		3.274			.062	+.093 -0.000
1415-R			405	3.1496	79.82	3.312		.218	.093			.103		
1483-1	209			3.3465	84.81	3.484		.156	.062	3.446		.068	.050	
1469-2				3.3465	84.81	3.500		.187		3.471			.062	
1472-5R				3.3465	84.81	3.500		.218		3.471				
1526-1	210			3.5433	89.79	3.687	+0.093	.156	.093	3.643		.103	.050	.687
1521		308		3.5433	89.79	3.703	-0.000	.187		3.668			.062	+.093 -0.000
1504			406	3.5433	89.79	3.750		.250	.125	3.713		.139	.085	

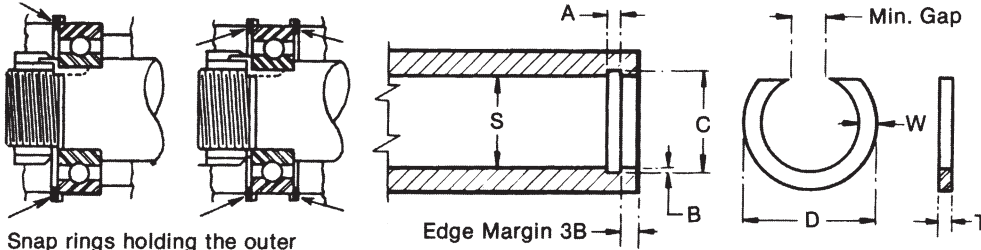


**Applicable Housing
3.9370" to 7.8740"**

Standard Material
Carbon Spring Steel



**INTERNAL
RETAINING
RINGS
(METRIC)**



Snap rings holding the outer race of bearings against thrust. Also application where snap ring holds the outer race against thrust loads in either direction.

**Material Steel SAE 1060 to 1075
Hardness R/C42-52**

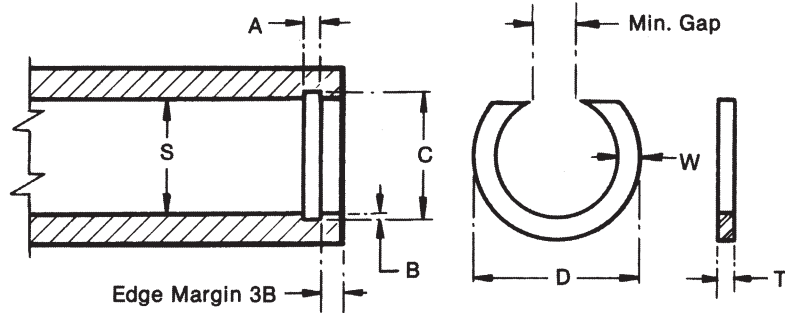
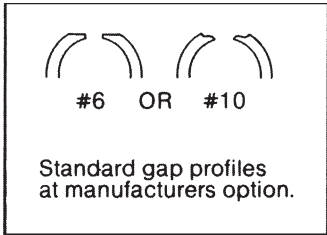
PART NUMBER	BASIC BEARING NO.			HOUSING		RING				GROOVE			GAP AT MIN. Free O.D.	
	Lt.	Med.	Hvy.	DIAMETER S		FREE DIAMETER		WIRE SECTION		Dia. C	Tol.	WIDTH A +.004/-0.000		Nom. DEPTH B
				Frac. inch	mm	D inches	Tol. inches	W ±.005	T ±.002					
1581-5	211			3.9370	100.00	4.093		.187	.093	4.062		.103	.062	.687
1573-1		309		3.9370	100.00	4.140		.250		4.107			.085	
2230			407	3.9370	100.00			.250	.125			.139		
1634-3	212			4.3307	110.00	4.500		.187	.093	4.455		.103	.062	+.093 -.000
1626-3		310		4.3307	110.00	4.531		.250		4.500			.085	
1627-2			408	4.3307	110.00		+.093		.125		±.006	.139		
2104	213			4.7244	120.00	4.937	-.000	.250	.109	4.884		.120	.080	
1661		311		4.7244	120.00	4.953		.281		4.912			.094	
2103			409	4.7244	120.00	4.937		.250	.125	4.894		.139	.085	
1924	214			4.9213	125.00	5.125			.109	5.081		.120	.080	
1683-2				4.9213	125.00	5.156		.281		5.109			.094	
1678-1				4.9213	125.00	5.151		.312	.156	5.121		.174	.100	
1701-1	215			5.1181	130.00	5.312		.250	.109	5.278		.120	.080	
1699-2		312		5.1181	130.00	5.343		.281		5.306			.094	
2008			410	5.1181	130.00	5.355		.312	.156	5.318		.174	.100	
1720	216			5.5118	140.00	5.703		.250	.109	5.671		.120	.080	.875
1719		313		5.5118	140.00	5.750		.281		5.699			.094	
3033-1			411	5.5118	140.00		+.125	.312	.156	5.711	±.007	.174	.100	
2790-1	217			5.9055	150.00	6.093	-.000	.250	.109	6.065		.120	.080	
1739		314		5.9055	150.00	6.125		.281		6.093			.094	
2013			412	5.9055	150.00	6.156		.312	.156	6.105		.174	.100	
1759-1	218			6.2992	160.00	6.500		.250	.109	6.459		.120	.080	
1754-2		315		6.2992	160.00	6.550		.281		6.497			.094	
2117-2			413	6.2992	160.00	6.550		.312	.156	6.500		.174	.100	
2656-1	219			6.6929	170.00	6.937			.125	6.892		.139		
1767-2		316		6.6929	170.00	6.982		.375		6.942			.125	
2581				6.6929	170.00	6.937		.312	.156	6.892		.174	.100	
1956	220			7.0866	180.00	7.343			.125	7.286		.139		
3222		317		7.0866	180.00	7.380		.375		7.336			.125	
4570			414	7.0866	180.00	7.380	+.187	.187	.187	7.336	±.008	.209		
2331-1	221			7.4803	190.00	7.718	-.000	.312	.125	7.680		.139	.100	1.125
3960-2		318		7.4803	190.00	7.781		.375		7.730			.125	
2246-2				7.4803	190.00	7.782			.187	7.730		.209		
2034-6	222			7.8740	200.00	8.125		.312	.125	8.074		.139	.100	
1801		319		7.8740	200.00	8.187		.375		8.125			.125	
2127-1			416	7.8740	200.00				.187			.209		



**INTERNAL
RETAINING
RINGS**

**Applicable Housing
1.125" to 8.000"**

Standard Material
Carbon Spring Steel



Material Steel SAE 1060 to 1075 Hardness R/C42-52

PART NUMBER	HOUSING			RING				GROOVE			FREE GAP		RING THRUST CAPACITY Lbs.	
	DIAMETER S			FREE DIAMETER		WIRE SECTION		DIA.		WIDTH A	NOM. DEPTH B	MIN.		MAX.
	Frac. inch	Dec. inch	mm	D inches	Tol. inches	W ±.005	T ±.002	C	Tol.					
ND112	1 1/8	1.125	28.58	1.196		.093		1.181			.028			1100
ND125	1 1/4	1.250	31.75	1.330	+.031	±.003		1.310			.030	.375	.562	1360
ND137	1 3/8	1.375	34.93	1.460	-.000			1.435						1600
ND150	1 1/2	1.500	38.10	1.600		.125		1.580	±.005					1900
ND162	1 5/8	1.625	41.28	1.725		±.005		1.705			.040			1930
NDI75	1 3/4	1.750	44.45	1.855				1.830		.046				1960
ND187	1 7/8	1.875	47.63	1.990			.042	1.965		+.003 -.000				2090
ND200	2	2.000	50.80	2.115	+.062			2.090						2200
ND206	2 1/16	2.062	52.37	2.177	-.000	.156		2.152				.437	.750	2340
ND218	2 3/16	2.187	55.55	2.302		±.005		2.277			.045			2700
ND231	2 5/16	2.312	58.72	2.432				2.402						2900
ND243	2 7/16	2.437	61.90	2.557				2.527						3000
ND256	2 9/16	2.562	65.07	2.682				2.652						3200
ND300	3	3.000	76.20	3.154				3.124						6250
ND325	3 1/4	3.250	82.55	3.404	+.078	.187		3.374	±.006	.068				6500
ND350	3 1/2	3.500	88.90	3.654	-.000	±.005	.062	3.624		+.004 -.000	.062	.562	.938	6700
ND375	3 3/4	3.750	95.25	3.904				3.874						6100
ND400	4	4.000	101.60	4.155				4.125						7000
ND425	4 1/4	4.250	107.95	4.429				4.394						9100
ND450	4 1/2	4.500	114.30	4.679				4.644						9400
ND475	4 3/4	4.750	120.65	4.929	+.093	.218	.078	4.894		.086	.072	.625	1.062	9200
ND500	5	5.000	127.00	5.184	-.000	±.005		5.144		+.005 -.000				9000
ND525	5 1/4	5.250	133.35	5.434				5.394						8800
ND575	5 3/4	5.750	146.05	5.934				5.894	±.007					8950
ND600	6	6.000	152.40	6.220				6.160						9000
ND650	6 1/2	6.500	165.10	6.730	-.000			6.660				.875	1.437	7500
ND700	7	7.000	177.80	7.240		.250	.093	7.160		.103	.080			6200
ND725	7 1/4	7.250	184.15	7.500	+.187	±.005		7.410	±.008	+.005 -.000		1.000	1.750	6100
ND750	7 1/2	7.500	190.50	7.760	-.000			7.660						6000
ND800	8	8.000	203.20	8.285				8.160						5700

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WIRE RETAINING RING QUOTE FORM

Fill this space in with your part number and revision so we may reference it on your quotation.

What quantities would you like us to quote on?:

1. _____ 2. _____ 3. _____ 4. _____

Choose one of the following options:

- Internal Ring
- External Ring

Choose one of the following options:

- Dimensions in free state
- Dimensions in assembled state

Choose one of the following options:

- Material is round
- Material is square
- Material is rectangular

1.) Material Size and Tolerance? _____

2.) Material

- Carbon Spring Steel
- Music Wire
- Stainless Steel
 - 302
 - 316
 - 17-7
- Brass
- Copper
- Beryllium Copper
- Other _____

Flatness Requirement? _____

Rockwell? _____

Finish Requirement? (i.e., passivate, oil, plating) _____

Stress Relieve? _____

Special Requirements? _____

Please provide the following contact information:

Name _____

Title _____

Distributor Manufacturer

Organization _____

Street Address _____

Address (cont.) _____

City _____

State/Province _____

ZIP/Postal Code _____

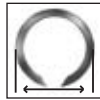
Country _____

Work Phone _____

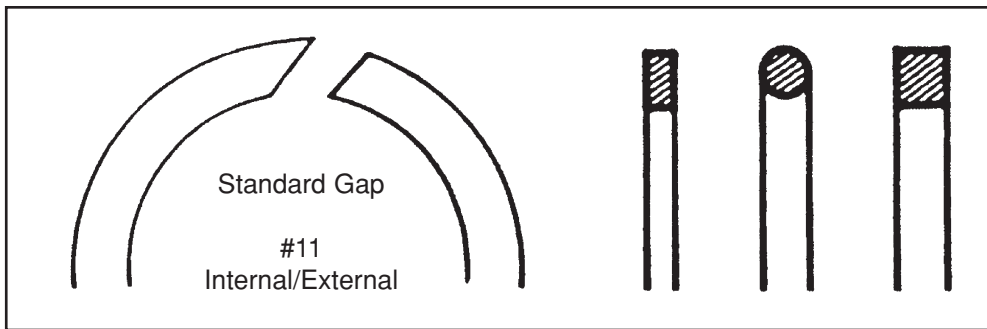
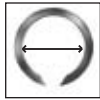
Fax _____

E-mail _____

Outer Diameter (O.D.)?

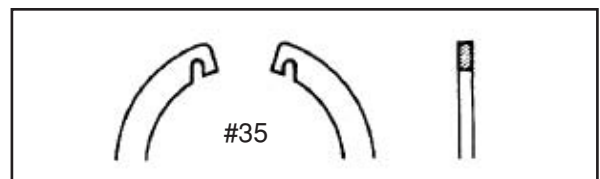
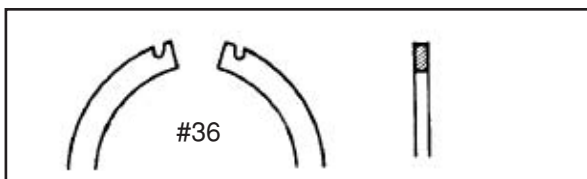
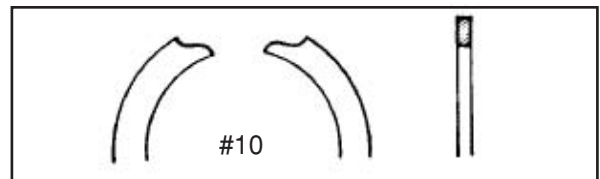
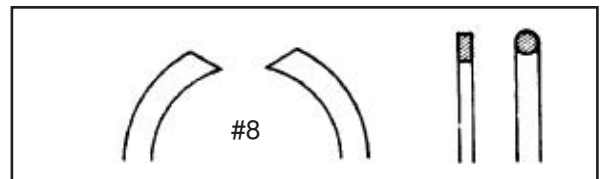
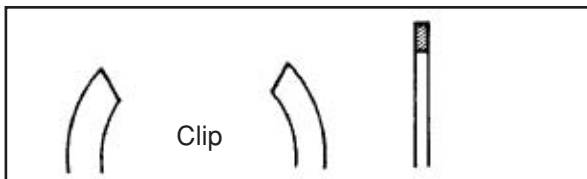
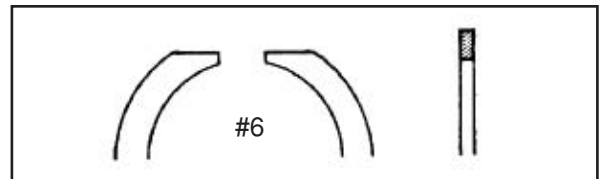
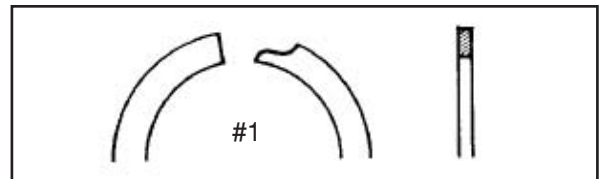
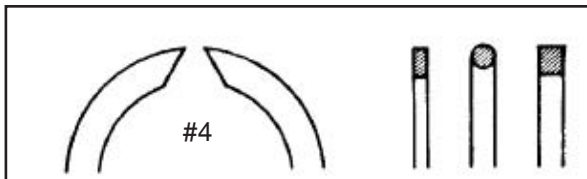


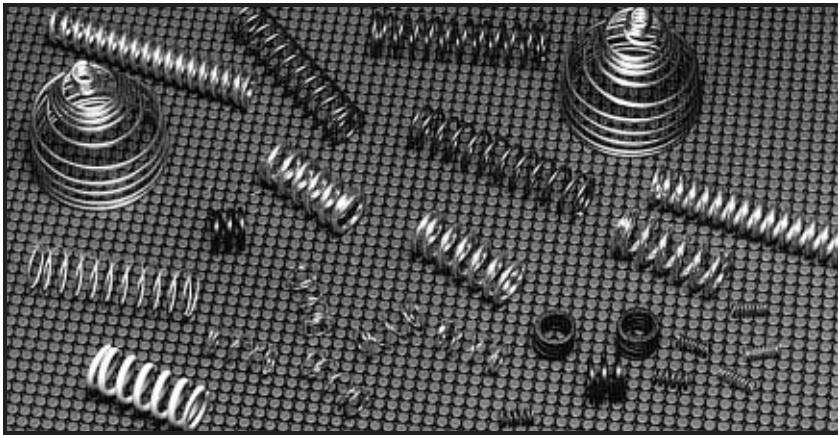
Inner Diameter (I.D.)?



EXTERNAL GAPS

INTERNAL GAPS

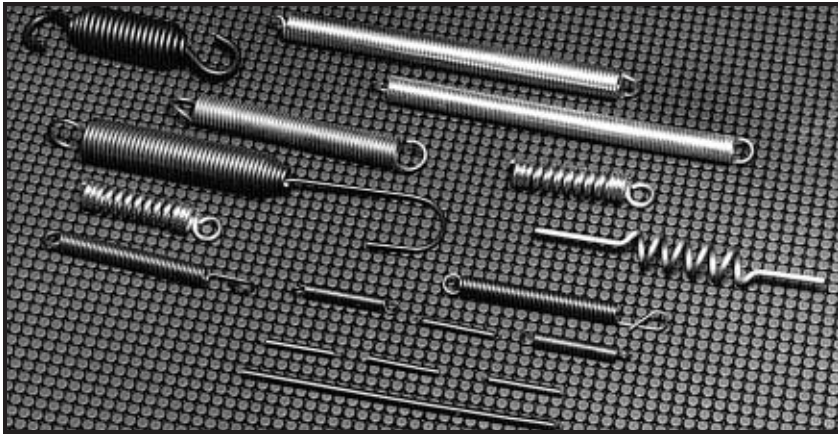




COMPRESSION SPRINGS

Manufactured from round, square or rectangular material, ferrous or non-ferrous, furnished with ground or unground ends.

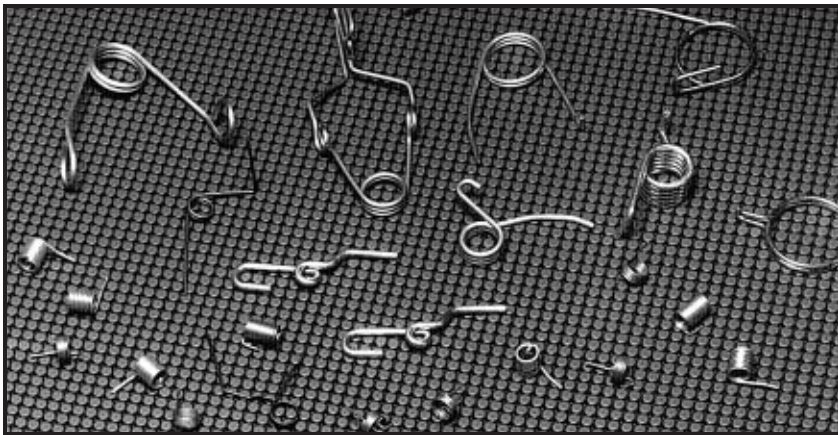
(Wire size: Min. = 0.005"
Max. = 0.207")



EXTENSION SPRINGS

Types of ends include machine half and full loops, full loops over center or on the side, double twisted, crossover swivel, or extended loops to specifications.

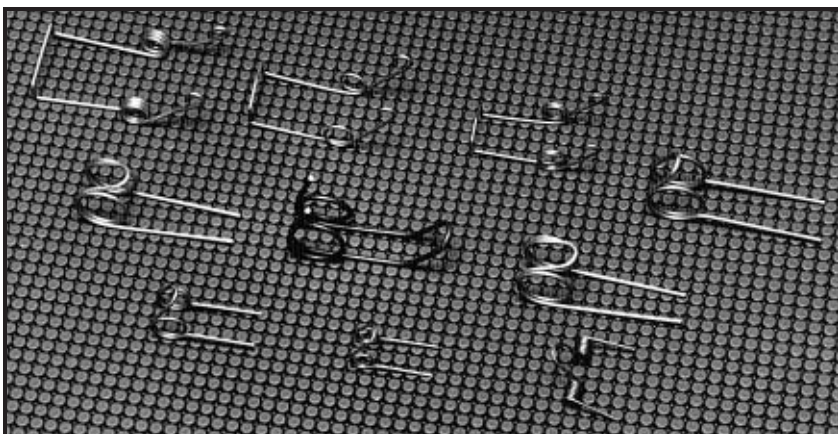
(Wire size: Min. = 0.010"
Max. = 0.207")



TORSION SPRINGS

Unlimited end configurations are achievable with the use of multi-directional forming slides.

(Wire size: Min. = 0.008"
Max. = 0.250")



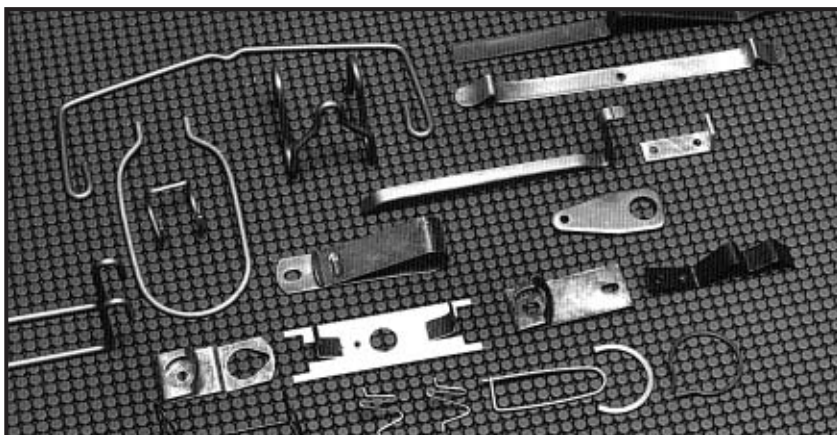
DOUBLE TORSION SPRINGS

Automatic coiling assures accuracy and cost savings. Straight torsion ends or ends formed to your exact requirements.

(Wire size: Min. = 0.005"
Max. = 0.207")

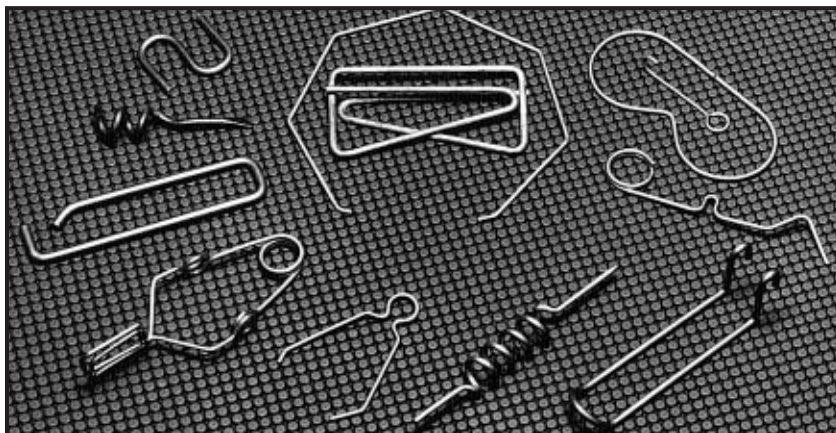
FOURSLIDE WIRE AND STRIP FORMING

Complete in-house tooling assures on time delivery at highly competitive pricing. Fabrication from strip 0.005" to 0.125" thick and from 0.025" to 2.000" wide or wire up to 0.187" in diameter.



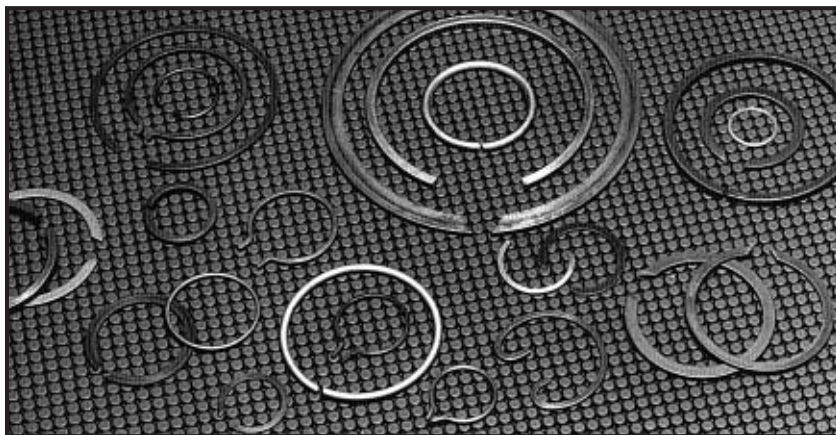
WIRE FORMS

The thousands of wire forms made through the years provide a fund of practical shortcuts and improvisations which are frequently time and money-saving. Parts can be fabricated from 0.008" through 0.250" diameter wire in any temper.



RETAINING / SNAP RINGS

Retaining rings are precision engineered components which, applied on shafts or in bores, provide a shoulder that accurately positions, locates, or retains other parts on an assembly. Round, square or rectangular materials. Minimum inside diameters of 0.093" to outside diameters to 24.0". (Wire sizes: 0.008" to 0.250")



METAL STAMPINGS

Our wide array of specialized equipment with stamping pressures to 60 tons can effectively handle all your requirements. Blanking and forming, plus secondary operations on material up to 5/32" thick.

