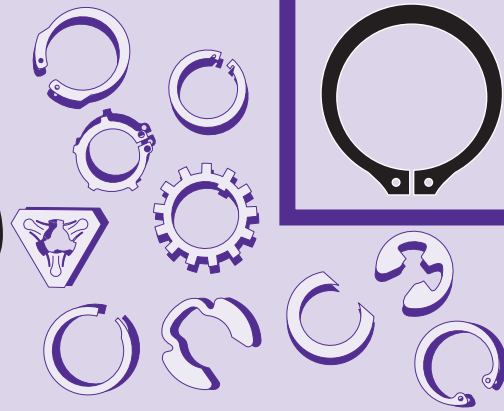




785.392.3017
FAX 785.392.2845

Box 232, Exit 49 G.L. Huyett Expy • Minneapolis, KS • 67467



WWW.HUYETT.COM



RETAINING RINGS

Featuring the World's Most Complete Inventory

CALL NOW FOR FAST SERVICE AND LOW PRICES!!!



SNAP RINGS

PAGES 4 - 23 *Most popular series that incorporates a tapered design in axial installations.*



CLIPS

PAGES 24-33 *Many styles of this popular series. Well suited to automated radial-type assemblies.*



SPIRAL RINGS

PAGES 34-65 *Coiled from wire. Increasingly popular in large size and short run applications.*



EATON™-STYLE RINGS

PAGES 66-77 *All types and styles in all forms.*



WIRE RINGS

PAGES 78-89 *We offer a complete line of this "hard to find," "hard to install" series.*



PUSH-ON RINGS

PAGES 90-101 *Excellent grooveless retainers used primarily in lighter-duty applications.*



WIRE FORMS

PAGES 102-107 *Used only in specialized and unique applications.*



SPRINGS

PAGES 108-125 *From Belleville washers to coil-formed compression springs, we have it all.*



ASSEMBLY COMPONENTS

PAGES 126-149 *Heaviest duty for machine tools and race cars.*



METRIC

PAGES 150-221 *All sizes and flavors, including stainless steel and zinc plated.*



ASSORTMENTS

PAGES 222-229 *Sell "by the box" or "from the box" to minimize inventory and increase profits.*



TOOLS

PAGES 222-235 *All types and styles. Improve your service and bottom line by offering tools to your OEM accounts.*

ABOUT THIS SECTION...

G.L. HUYETT is a low overhead manufacturing company centrally located in the great plains of Kansas. We have invested in state of the art technology to bring you the highest quality available, and have carefully selected retaining ring suppliers from all over the world so as to yield the lowest prices. Our machine shop is well equipped to manufacture your short runs and specials. Call for a quote!

We have searched the world over to bring you the most comprehensive and complete inventory in America.

"THE PROGRAM"

- We will beat any published distributor price on parts with equal quality
- Friendly people from Kansas answer the phone
- In stock items ship next business day
- \$2.00 line minimum (\$10.00 small order handling fee on orders under \$50.00)

OVER TEN MILLION PARTS IN STOCK !!!





BOX 232 • MINNEAPOLIS, KS • 67467

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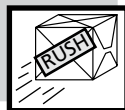
HOW TO USE THIS CATALOG

One of the basic principles of our literature is to make information "User Friendly." We believe that our catalog should be an educational tool that assists distributors in the sale of our products. OEMs may use this guide in order to construct, refine, or confirm component selection. Look for this catalog on the World Wide Web and CD-ROM in the near future!

FOR THE TABLE OF CONTENTS FOR THIS CATALOG, SEE PAGES 2-3.



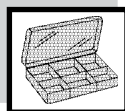
Our part numbers are listed in the far left column on each page; however, feel free to order by the same part numbers you use now. We can cross-reference to most industry nomenclatures, including Rotor Clip™; Waldes Truarc™; IRR™; Anderton™; Spirolox™; Smalley™; Eaton™; and Bossard™. A complete manufacturer cross reference is located on pages 236-237.



Special orders and short runs are gladly welcomed. We have a complete machine shop. Use the back cover to make special order requests. We pledge to return most quotes on a "same day" or "next day" basis. Our parts will be on time and competitively priced.



Metric sizes are on pages 150-221. We are aggressively expanding our metric manufacturing capabilities. Call if you need a commodity that is not listed.



Assortments begin on page 222. We can put together custom arrangements if needed. All products can be shipped in a standard container or with bar codes.



Most parts are available from stock. In stock items ship next business day. There are a myriad of possibilities with tolerance, material, and finish, thus there will be times when we will run your parts to order. Please call in advance when in a crisis situation.



We offer to beat published prices in all of our product groups. We offer low prices to minimize your costs in time, phone, and fax charges. Competition can always "cherry pick" this type of pricing. We hope you consider the cost advantages of doing business with us on a low cost basis all the time, versus the "trick and cherry pick" approach.

This is our statement to you that we will offer the best prices and service available.

We hope your experience with us is pleasant and efficient. G.L. Huyett wants the sale of retaining rings to be more profitable for you. We hope we have accomplished this task.



MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

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ABOUT THE COMPANY

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WHO WE ARE



G.L. HUYETT IS A LOW OVERHEAD
MANUFACTURER AND DISTRIBUTOR
LOCATED IN A WHEAT FIELD IN

MINNEAPOLIS, KANSAS

*Just a Few Miles from the
Geographic Center of the U.S.*

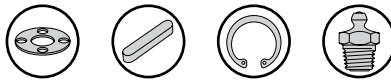
FOUNDED IN 1896

WE HAVE A LONG HISTORY OF **HARDWORKING,**
FRIENDLY FOLKS WITH A **CAN DO**
COMPANY CULTURE.

WHAT WE SELL



WASHERS • KEYSTOCK • NON-THREADED FASTENERS • GREASE FITTINGS



Parts that are **HARD TO MANUFACTURE,**
Short Runs - Odd Configurations - No Tooling.

Parts that are **HARD TO FIND,**
Metric - Stainless Steel - Big or Little Sizes.

Parts that are made by manufacturers that are
HARD TO DO BUSINESS WITH.

"We are your LOW COST LEADER!"

HOW WE SELL IT



NO ORDER MINIMUM.
(\$10.00 order fee on any orders under \$50.00)



IN STOCK items ship next
business day.



LOW COST.



MULTIPLE COMMODITIES
(so you can consolidate vendors.)



PACKAGED and sold in the
QUANTITY YOU WANT.



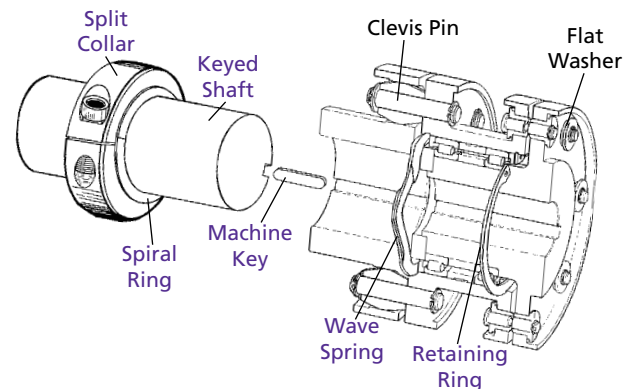
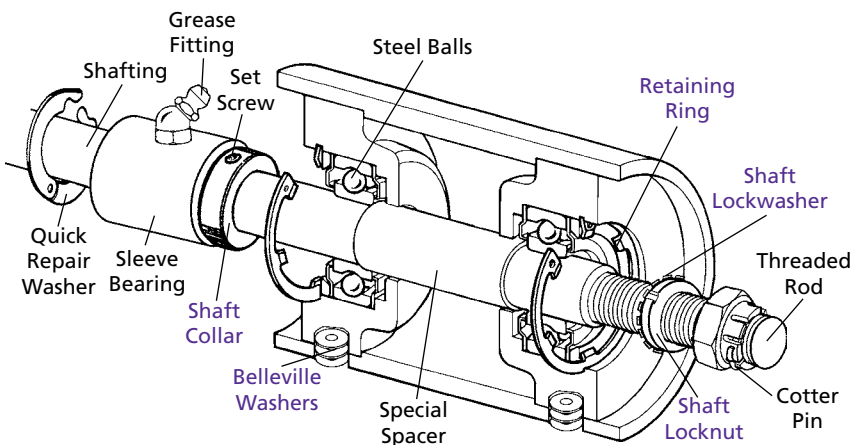
by **FRIENDLY PEOPLE.**

ITEMS IN THIS CATALOG

- | | |
|-----------------|--------------------|
| Retaining Rings | Belleville Washers |
| Shaft Locknuts | Keyed Shafts |
| Lockwashers | Machine Keys |
| Wave Springs | Shaft Collars |
| Spiral Rings | Split Collars |

ITEMS IN OUR OTHER CATALOGS

- | | |
|-----------------|--------------|
| Flat Washers | Keystock |
| Clevis Pins | Shafting |
| Grease Fittings | Cotter Pins |
| Steel Balls | Shims |
| Sleeve Bearings | Threaded Rod |



FOR THE TABLE OF CONTENTS FOR THIS CATALOG, TURN THE PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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METRIC SIZES BEGIN ON PAGE 190.

EATON™ RINGS








BEGINS PAGE 66.

USC PAGE 68 Basic External	XD PAGE 70 Light-Duty External	USH PAGE 71 Notched External
UHB PAGE 72 Basic Internal	ND PAGE 74 Light-Duty Internal	UHO PAGE 76 Notched Internal

METRIC SIZES BEGIN ON PAGE 198.

WIRE RINGS

BEGINS PAGE 78.













BEGINS PAGE 78.		WIRE RINGS					
							
XSO PAGE 80	Square External (Radial)	XSC PAGE 82	Square External (Axial)	XRO PAGE 84	Round External (Radial)	XRC PAGE 86	Round External (Axial)
							
A10 PAGE 87	Round External Light Duty	TRC PAGE 88	Rectangular External	AAR PAGE 88	Crimped		
METRIC SIZES BEGIN ON PAGE 202							

METRIC SIZES BEGIN ON PAGE 202.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS





PUSH-ON RINGS

BEGINS PAGE 90.

					
TY PAGE 92	TX PAGE 92	TI PAGE 93	ITR PAGE 94	STR PAGE 96	WRR PAGE 96
Basic External	Reinforced External	Basic Internal	Internal Toothed	High Speed Strip	Wide Rim Slotted
					
TR PAGE 97	NTR PAGE 97	NPR PAGE 98	NPO PAGE 99	BRR PAGE 100	T99 PAGE 101
Triangle Push-On	Triangle Screw-On	Basic Rectangular	Basic Round	Internal Toothed	Basic Grooveless

METRIC SIZES BEGIN ON PAGE 212.











WIRE FORMS

	
A12 PAGE 104	D25 PAGE 104
External "C" Style	Internal "D" Style
	
S Series PAGE 105	BPXZ PAGE 106
Piston Rings	Hair Pin Type

BEGINS PAGE 102.

SPRINGS

BEGINS PAGE 108.

				
BW PAGE 110	PSW PAGE 112	FS PAGE 112	WSE PAGE 114	WSI PAGE 115
Disc Spring	Shoulder Washer	Finger Washer	External Wave Spring	Internal Wave Spring
				
WSG PAGE 116	WSN PAGE 118	CML PAGE 120	CMM PAGE 122	CMH PAGE 124
Standard Gap Style	Narrow Section - Split	Compression Light Duty	Compression Medium Duty	Compression Heavy Duty



METRIC SIZES BEGIN ON PAGE 214.

ASSORTMENTS


DISP PAGE 224
Kits & Special Packs

BEGINS PAGE 222.





















TOOLS

	
PR PAGE 226	RRA PAGE 232
Pliers	Applicators

BEGINS PAGE 222.

ASSEMBLY COMPONENTS

BEGINS PAGE 126.

							
SC PAGE 128	SC1 PAGE 129	SC2 PAGE 129	N/AN PAGE 132	NH PAGE 133	NI PAGE 134	NL PAGE 135	NT PAGE 136
Solid Collar	Single Split Collar	Double Split Collar	Standard Locknut	Heavy Duty Locknut	Fine Thread Locknut	Left Hand Locknut	Thin Section Locknut
							
30/70 PAGE 138	KF PAGE 140	W PAGE 141	WS PAGE 142	WH PAGE 143	WI PAGE 144	WT PAGE 144	ETR PAGE 145
Machine Keys	Keyed Shafts	Standard Lockwasher	Stainless Lockwasher	Heavy Duty Lockwasher	Fine Thread Lockwasher	Thin Section Lockwasher	External Tooth Retainer
				<div> <p>METRIC TABLE OF CONTENTS ON PAGE 150.</p> <p>PART # INDEX ON PAGE 236.</p> </div>			
SS PAGE 146	PS PAGE 147	TW PAGE 148	SR PAGE 149				
Support Washer DIN 988	Shim Ring DIN 988	Thrust Washer	Slitted Shim				

METRIC SIZES BEGIN ON PAGE 218.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

SNAP RINGS

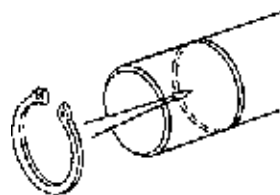
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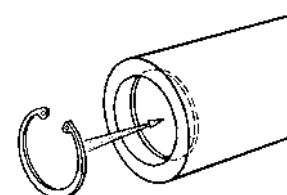


TOOLS Pages: 226-229

	SH	BASIC	
		IMPERIAL	METRIC
		Pgs: 6-8	Pgs: 152-157
		ANSI	Pg: 178
	SHR	HEAVY DUTY	
		IMPERIAL	METRIC
		Pg: 9	Pgs: 158-159
		ANSI	Pg: 179
	SHI	INVERTED	
		IMPERIAL	METRIC
		Pg: 10	Pg: 160
	BSH	BOWED	
		IMPERIAL	METRIC
		Pg: 11	Pg: 161
	AK	TABBED	
		IMPERIAL	METRIC
		N/A	Pg: 162
	AL	BOWED TABBED	
		IMPERIAL	METRIC
		N/A	Pg: 163
	VSH	BEVELED	
		IMPERIAL	METRIC
		Pgs: 12-13	N/A
	SHF	GROOVELESS	
		IMPERIAL	METRIC
		Pg: 14	Pg: 164
	SHX	OPEN LUG	
		IMPERIAL	METRIC
		Pg: 14	Pg: 165
	SHM	TAMPER PROOF	
		IMPERIAL	METRIC
		Pg: 15	N/A

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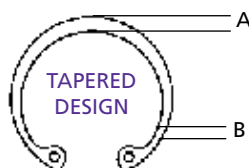
USING
A PAIR OF
PLIERS



TOOLS Pages: 226-229

	HO	BASIC	
		IMPERIAL	METRIC
		Pgs: 16-18	Pgs: 166-170
		ANSI	Pgs: 180-181
	HOR	HEAVY DUTY	
		IMPERIAL	METRIC
		N/A	Pg: 171
	HOI	INVERTED	
		IMPERIAL	METRIC
		Pg: 19	Pg: 172
	BHO	BOWED	
		IMPERIAL	METRIC
		Pg: 20	Pg: 173
	JK	TABBED	
		IMPERIAL	METRIC
		N/A	Pgs: 175-176
	JL	BOWED TABBED	
		IMPERIAL	METRIC
		N/A	Pg: 177
	VVH	DOUBLE BEVELED	
		IMPERIAL	METRIC
		Pg: 21	N/A
	VHO	BEVELED	
		IMPERIAL	METRIC
		Pgs: 22-23	Pg: 174

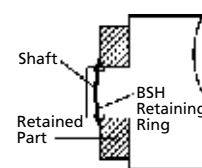
All metric numbers begin with "D," and all ANSI numbers begin with "M."



Notice that wire width decreases from A to B...



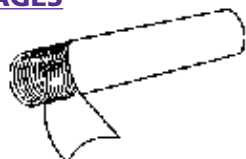
... which causes the ring to remain circular when installed...



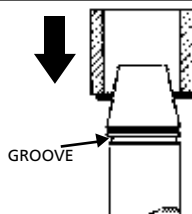
... such that a high strength rigid shoulder forms to retain parts like in the external example above!

AUTOMATED INSTALLATION

STACKED ROLL PACKAGES



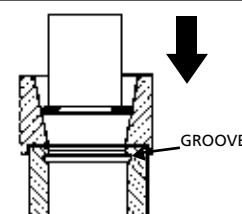
These packages reduce handling costs, especially on internal rings which tend to link together in bulk form.



EXTERNAL

Using mandrel and pressure sleeve.

Installation of snap rings can be automated using 6° tapered mandrels and mounting fixtures. In these instances, the ring is "snapped" into place using axial force.



INTERNAL

Using tapered mandrel and pressure sleeve.

LET OUR SHOP MAKE A FIXTURE FOR YOU!

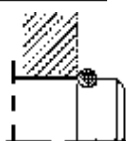
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PRODUCT COMPARISONS

SNAP RING



**ROUND SECTION
WIRE RING**



"Which one looks stronger?"

Nearly all retaining rings provide design and engineering benefits versus other fasteners. In particular, retaining rings replace the high cost of machining shoulders, the labor intensive installation of cotter pins and washers, and the uncertainty of collar and screw designs in a vibrating environment. In most cases, machining a groove is cheaper and more resilient than turning threads and using a "nuts and bolts" approach.

"HOW DO SNAP RINGS COMPARE TO OTHER TYPES OF RETAINING RINGS?"

Part of the answer to the question lies in how retaining rings are made. Snap rings are usually stamped or laser cut from coil or strip, while spiral rings are coiled from wire. The differences in manufacturing techniques yield differences in costs and product features. In particular, coiling is slower than stamping, yet coiling does not require high cost tooling. In addition, no material is wasted in coiling as it is with the "break out" on the inside diameter of a stamping. Generally, stamped rings are cheaper than coiled rings on smaller sizes. Snap rings are also in wider distribution and are supported with a full line of automated installation equipment.

THRUST LOAD COMPARISON SNAP RINGS VS. OTHER STYLES

CARBON SPRING STEEL

EXTERNAL	SNAP		SPIRAL WOUND		EATON™ STYLE	
	SH	Pg 6	RS	Pg 38	RSN	Pg 44
	USC	Pg 68				
	Thrust Load	Thrust Load	Thrust Load	Thrust Load	Thrust Load	Thrust Load
	SHAFT SIZE					
1"	2100		2150		2950	1200
2"	8050		7110		11,420	4010
5"	37,100		36,050		52,580	17,110
7"	72,700		63,790		103,400	39,920

INTERNAL	SNAP		SPIRAL WOUND		EATON™ STYLE	
	HO	Pg 16	RR	Pg 52	RRN	Pg 58
	UHB	Pg 72				
	Thrust Load	Thrust Load	Thrust Load	Thrust Load	Thrust Load	Thrust Load
	BORE SIZE					
1"	2800		1910		2310	1470
2"	10,300		7090		10,040	4000
5"	55,000		36,050		65,095	17,110
7"	93,100		63,790		110,410	34,850

Thrust loads are expressed in pounds, based on groove shear with a safety factor of two (2).
 Eaton™-style ring thrust loads are based on load times 0.60 when the ring distortion is .005 or greater from bending axially.
 Actual results will be based on individual circumstances. These values are for reference only.

MATERIAL

**CARBON
SPRING STEEL**
 SAE 1060-1090
 (STANDARD)

Temperature Limits
 500°F Max
 -100°F Min

**PH15-7 MO
STAINLESS STEEL**
 AISI 632/AMS 5520
 (STANDARD ON
 MOST SIZES)

Temperature Limits
 900°F Max
 -100°F Min

**BERYLLIUM
COPPER**
 ALLOY #25/CDA #172
 (STANDARD ON
 SMALL SIZES)

Temperature Limits
 650°F Max
 -300°F Min

OTHER MATERIALS AVAILABLE ON REQUEST.

See page 33 for material comparisons.

FINISHES

**PHOSPHATE
COATING**
 (STANDARD)

Inhibits rust
 during storage.

**MECHANICAL
ZINC YELLOW**
 (STANDARD)

96 hour salt spray.

**ZINC YELLOW
WITH LACQUER**
 (SPECIAL ORDER)

250 hour salt spray.

OTHER FINISHES, INCLUDING CADMIUM, AVAILABLE ON REQUEST.

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EXTERNAL SNAP RINGS

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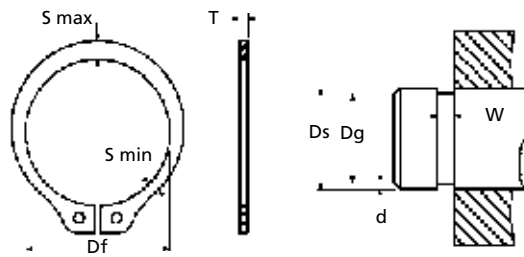


BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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Anderton	N1400	IRR	3100	Waldes	5100
Ellison	9100	Rotor Clip	SH	Military	16624



SH	SHAFT		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min Max		Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
SH-012*	.125	1/8	.112	+.002/- .004	.011	.018	.117	.004	.012	0.0018			-E023-S
-015*	.156	5/32	.142		.016	.026	.146	.005	.012	0.0037			-E023-M
-018*	.188	3/16	.168		.016	.025	.175	.006	.018	0.0059			-E023-L
-019*	.197	5mm	.179		.016	.026	.185	.006		0.0063			
-021*	.219	7/32	.196		.017	.028	.205	.007		0.0074			
-023*	.236	15/64	.215		.019	.030	.222	.007		0.0086			
-025	.250	1/4	.225	+.002/- .005	.025	.035	.230	.010	.029	0.0210			
-027	.276	7mm	.250		.024	.035	.255	.010		0.0230			
-028	.281	9/32	.256		.025	.038	.261	.010		0.0240			
-031	.312	5/16	.281		.026	.040	.290	.011		0.0270			
-034	.344	11/32	.309		.0265	.042	.321	.011		0.0310			
-035	.354	9mm	.320		.029	.046	.330	.012		0.0350			
-037	.375	3/8	.338		.0305	.050	.352	.012		0.0390			-E038
-039	.394	10mm	.354		.031	.052	.369	.012		0.0420			
-040	.406	13/32	.366		.033	.054	.382	.012		0.0430			
-043	.438	7/16	.395		.033	.055	.412	.013		0.0500			
-046	.469	15/32	.428	+.005/- .010	.035	.060	.443	.013	.039	0.0540			
-050	.500	1/2	.461		.040	.065	.468	.016		0.0910			
-055	.551	14mm	.509		.036	.053	.519	.016		0.0900			
-056	.562	9/16	.521		.041	.072	.530	.016		0.1100			
-059	.594	19/32	.550		.043	.076	.559	.017		0.1200			
-062	.625	5/8	.579		.045	.080	.588	.018		0.1300			-E047
-066	.672	43/64	.621		.043	.082	.631	.020		0.1400			
-068	.688	11/16	.635		.048	.084	.646	.021		0.1800			
-075	.750	3/4	.693		.051	.092	.704	.023		0.2100			
-078	.781	25/32	.722		.052	.094	.733	.024		0.2200			
-081	.812	13/16	.751	+.005/- .010	.054	.096	.762	.025	.046	0.2500			-E070
-084	.844	21.4mm	.780		.057	.100	.791	.026		0.2700			
-087	.875	7/8	.810		.057	.104	.821	.027		0.2800			
-093	.938	15/16	.867		.063	.110	.882	.028		0.3100			
-098	.984	63/64	.910		.064	.114	.926	.029		0.3500			
-100	1.000	1	.925		.065	.116	.940	.030		0.3600			
-102	1.023	26mm	.946		.066	.118	.961	.031		0.3900			
SH-106	1.062	1-1/16	.982		.069	.122	.998	.032	.056	0.4800			

*May be beryllium copper instead of carbon steel.

SH	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC / YELLOW
	Tapered-design ring that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft. AXIAL ASSEMBLY	1. Measure the shaft diameter (Ds). 2. Determine the ring thickness (T). 3. Measure the maximum (S max) and minimum (S min) cross section of the ring. 4. Find the part in the chart above. If it is too thick, see "SHR" on page 9.	 COMMON	 STACKED/ROLL PACK NOT AVAILABLE
<p align="center">GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>SH ↔ SHI (Page 10) ↔ RSN (Page 44) ↔ USH (Page 71) ↔ SSN (Page 49)</p> <p align="center">PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				



SH CONTINUED NEXT PAGE.

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BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	N1400	IRR	3100	Waldes	5100
Ellison	9100	Rotor Clip	SH	Military	16624



SH	SHAFT		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL 					
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min Max		Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"						
SH-112	1.125	1-1/8	1.041	+.010/- .015	.071	.128	.050	+/- .002	1.059	+.004	.033	.056	+.000	0.5100			-E070	
-118	1.188	1-3/16	1.098		.072	.132			1.118		.035			0.5600				
-125	1.250	1-1/4	1.156		.076	.140			1.176		.037			0.5900				
-131	1.312	1-5/16	1.214		.076	.146			1.232		.040			0.6800				
-137	1.375	1-3/8	1.272		.082	.152			1.291		.042			0.7200				
-143	1.438	1-7/16	1.333	+.013/- .020	.086	.160	.062	+/- .005	1.350	+.004/- .000	.044	.068	0.8100					
-150	1.500	1-1/2	1.387		.091	.168			1.406		.047		0.9000					
-156	1.562	1-9/16	1.446		.093	.172			1.468		.047		1.2400					
-162	1.625	1-5/8	1.503		.097	.180			1.529		.048		1.3200					
-168	1.688	1-11/16	1.560		.099	.184			1.589		.049		1.4800					
-175	1.750	1-3/4	1.618	+.015/- .025	.101	.188	.078	+/- .003	1.650	+.005/- .000	.050	.086	1.5300					
-177	1.772	45mm	1.637		.102	.190			1.669		.051		1.5400					
-181	1.812	1-13/16	1.675		.102	.192			1.708		.052		1.6200					
-187	1.875	1-7/8	1.735		.104	.196			1.769		.053		1.7300					
-196	1.969	1-31/32	1.819		.106	.200			1.857		.056		1.8000					
-200	2.000	2	1.850	+.020/- .030	.108	.204	.093	+/- .006	1.886	+.005/- .000	.057	.103	1.9000					
-206	2.062	2-1/16	1.906		.111	.208			1.946		.058		2.5000					
-212	2.125	2-1/8	1.964		.113	.212			2.003		.061		2.6100					
-215	2.156	2-5/32	1.993		.113	.212			2.032		.062		2.6300					
-225	2.250	2-1/4	2.081		.116	.220			2.120		.065		2.7700					
-231	2.312	2-5/16	2.139	+.015/- .025	.118	.222	.078	+/- .003	2.178	+.005/- .000	.067	.086	2.8000					-E115
-237	2.375	2-3/8	2.197		.119	.224			2.239		.068		2.9200					
-243	2.438	2-7/16	2.255		.120	.228			2.299		.069		2.9500					
-250	2.500	2-1/2	2.313		.122	.232			2.360		.070		2.9700					
-255	2.559	65mm	2.377		.125	.238			2.419		.070		3.3900					
-262	2.625	2-5/8	2.428	+.020/- .030	.127	.242	.093	+/- .006	2.481	+.005/- .000	.072	.103	3.5000					
-268	2.688	2-11/16	2.485		.129	.246			3.541		.073		3.6000					
-275	2.750	2-3/4	2.543		.131	.248			2.602		.074		4.2500					
-287	2.875	2-7/8	2.659		.133	.256			2.721		.077		4.8500					
-293	2.938	2-15/16	2.717		.136	.260			2.779		.079		5.0000					
-300	3.000	3	2.775	+.015/- .025	.138	.264	.093	+/- .006	2.838	+.005/- .000	.081	.103	5.2000					
-306	3.062	3-1/16	2.832		.131	.252			2.898		.082		4.7500					
-312	3.125	3-1/8	2.892		.141	.272			2.957		.084		5.8000					
-315	3.156	3-5/32	2.920		.143	.274			2.986		.085		5.9000					
SH-325	3.250	3-1/4	3.006		.145	.300			3.076		.087		6.2000					

TOOL DESCRIPTIONS ON PAGES 226, 228 & 229.

SH	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Tapered-design ring that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.	<ol style="list-style-type: none"> 1. Measure the shaft diameter (Ds). 2. Determine the ring thickness (T). 3. Measure the maximum (S max) and minimum (S min) cross section of the ring. 4. Find the part in the chart above. If it is too thick, see "SHR" on page 9. 	 COMMON	
AXIAL ASSEMBLY				
GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.				
SH	SHI (Page 10)	RSN (Page 44)	USH (Page 71)	SSN (Page 49)
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.				



SH CONTINUED NEXT PAGE.

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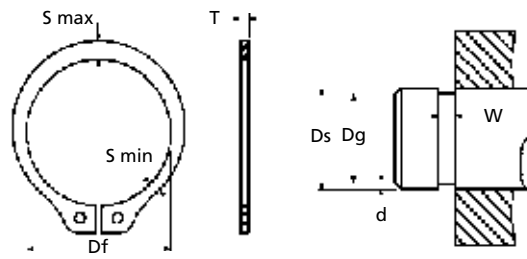
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BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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Anderton	N1400	IRR	3100	Waldes	5100
Ellison	9100	Rotor Clip	SH	Military	16624

SH	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "SS"	
SH-334	3.346	3-11/32	3.092	.147	.300	.093	3.166	.090	.103	6.4000		-E115
-343	3.438	3-7/16	3.179	.148	.292		3.257	.090		6.6000		
-350	3.500	3-1/2	3.237	.148	.285		3.316	.092		7.2000		
-354	3.543	90mm	3.277	.149	.288		3.357	.093		7.3000		
-362	3.625	3-5/8	3.352	.153	.296		3.435	.095		7.6000		
-368	3.688	3-11/16	3.410	.156	.302		3.493	.097		8.0000		
-375	3.750	3-3/4	3.468	.160	.310		3.552	.099		8.3000		
-387	3.875	3-7/8	3.584	.163	.318		3.673	.101		8.8000		
-393	3.938	3-15/16	3.642	.163	.318	.109	3.734	.102	.120	9.5000		
-400	4.000	4	3.700	.163	.318		3.792	.104		10.1000		-E120-X
-425	4.250	4-1/4	3.989	.176	.342		4.065	.092		11.2000		
-437	4.375	4-3/8	4.106	.181	.318		4.190	.092		11.5000		
-450	4.500	4-1/2	4.223	.185	.405		4.310	.095		13.2000		
-475	4.750	4-3/4	4.458	.136	.303		4.550	.100		11.3000		
-500	5.000	5	4.692	.194	.360		4.790	.105		14.9000		
-525	5.250	5-1/4	4.927	.211	.372		5.030	.110		19.0000		
-550	5.500	5-1/2	5.162	.209	.390	.125	5.265	.117	.139	20.2500		
-575	5.750	5-3/4	5.396	.220	.408		5.505	.122		22.0000		
-600	6.000	6	5.631	.171	.381		5.745	.127		21.0000		-E170
-625	6.250	6-1/4	5.866	.176	.396		5.985	.132		28.2000		
-650	6.500	6-1/2	6.100	.236	.438	.156	6.225	.137	.174	33.0000		
-675	6.750	6-3/4	6.335	.246	.456		6.465	.142		35.6000		
-700	7.000	7	6.570	.256	.474		6.705	.147		37.1000		
-725	7.250	7-1/4	6.775	.267	.490		6.942	.154		51.0000		
-750	7.500	7-1/2	7.009	.277	.507		7.180	.160		53.4000		
-775	7.750	7-3/4	7.243	.285	.523		7.420	.165		54.5000		
-800	8.000	8	7.478	.294	.540		7.660	.170		64.0000		
-825	8.250	8-1/4	7.712	.304	.556	.187	7.900	.175	.209	66.5000		
-850	8.500	8-1/2	7.947	.314	.573		8.140	.180		69.2000		-E035 -E045
-875	8.750	8-3/4	8.181	.322	.591		8.380	.185		71.2000		
-900	9.000	9	8.415	.333	.609		8.620	.190		73.7000		
-925	9.250	9-1/4	8.650	.341	.625		8.860	.195		76.0000		
-950	9.500	9-1/2	8.885	.350	.642		9.100	.200		78.5000		
-975	9.750	9-3/4	9.120	.358	.658		9.338	.206		84.5000		
SH-1000	10.000	10	9.355	.367	.675		9.575	.212		91.0000		

TOOL DESCRIPTIONS ON PAGES 226, 228 & 229.

SH	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC / YELLOW
	Tapered-design ring that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft. AXIAL ASSEMBLY	1. Measure the shaft diameter (Ds). 2. Determine the ring thickness (T). 3. Measure the maximum (S max) and minimum (S min) cross section of the ring. 4. Find the part in the chart above. If it is too thick, see "SHR" on page 9.	 COMMON	 STACKED / ROLL PACK NOT AVAILABLE
<p align="center">GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>SH ↔ SHI (Page 10) ↔ RSN (Page 44) ↔ USH (Page 71) ↔ SSN (Page 49)</p> <p align="center">PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				



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THICKER THAN SH

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HEAVY-DUTY EXTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	N1460	Rotor Clip	SHR	Military	3217
IRR	7200	Waldes	5160		



SHR	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall Min	Radial Wall Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "SS"	
SHR-039	.394	10mm	.362	.039	.068	.035	.368	.013	.039	0.0700		
-042	.428	10.9mm	.394	.043	.076	.042	.402	.013	.039	0.0860		-E038
-047	.473	12mm	.435	.053	.088	.042	.444	.015	.046	0.1400		
-050	.500	1/2	.460	.050	.090	.050	.468	.016	.056	0.1600		
-059	.591	15mm	.543	.057	.102	.050	.555	.018	.056	0.2200		-E047
-062	.625	5/8	.575	.059	.106	.050	.588	.019	.056	0.2300		
-066	.669	17mm	.616	.062	.112	.078	.629	.020	.086	0.2600		
-075	.750	3/4	.689	.077	.127	.078	.704	.023	.103	0.5600		
-075	.787	20mm	.689	.077	.127	.078	.740	.024	.103	0.5600		-E070
-087	.875	7/8	.804	.083	.148	.093	.821	.027	.120	0.7500		
-098	.984	63/64	.906	.084	.151	.093	.925	.030	.139	0.7800		
-098	1.000	1	.906	.084	.151	.093	.938	.031	.139	0.7800		
-106	1.062	1-1/16	.978	.090	.161	.109	.998	.032	.139	1.1500		
-112	1.125	1-1/8	1.036	.095	.169	.109	1.059	.033	.139	1.2500		
-118	1.181	30mm	1.087	.098	.176	.109	1.111	.035	.139	1.3500		
-118	1.188	1-3/16	1.087	.098	.176	.109	1.111	.038	.139	1.3500		-E093
-125	1.250	1-1/4	1.150	.103	.185	.109	1.174	.038	.139	1.4900		
-131	1.312	1-5/16	1.208	.106	.192	.109	1.234	.039	.139	1.6000		
-137	1.375	1-3/8	1.268	.110	.200	.109	1.291	.042	.139	1.7800		
-137	1.378	35mm	1.268	.110	.200	.109	1.291	.044	.139	1.7800		
-150	1.500	1-1/2	1.380	.123	.218	.125	1.406	.047	.139	2.7000		
-156	1.562	1-9/16	1.437	.127	.228	.125	1.468	.047	.139	3.1000		-E108
-156	1.575	40mm	1.437	.127	.228	.125	1.480	.048	.139	3.1000		
-175	1.750	1-3/4	1.608	.140	.254	.125	1.650	.050	.139	3.3400		
-175	1.772	45mm	1.608	.140	.254	.125	1.669	.052	.139	3.3400		
-193	1.938	1-15/16	1.782	.154	.280	.125	1.826	.056	.139	4.8000		
-193	1.969	1-31/32	1.782	.154	.280	.125	1.850	.060	.139	4.8000		-E120-X
SHR-200	2.000	2	1.840	.160	.290	.125	1.880	.060	.139	5.0600		

TOOL DESCRIPTIONS ON PAGES 226, 228 & 229.

SHR
DESCRIPTION

Extra-thick version of the SH that is stronger and yields higher thrust loads. Installed axially using the same tools. Note that the SHR will require a wider groove than the SH.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum (S max) and minimum (S min) cross section of the ring.
4. Find the part in the chart above. If it is too thin, see "SH" beginning on page 6.


COMMON
ZINC/YELLOW

STACKED/ROLL PACK

 NOT
AVAILABLE

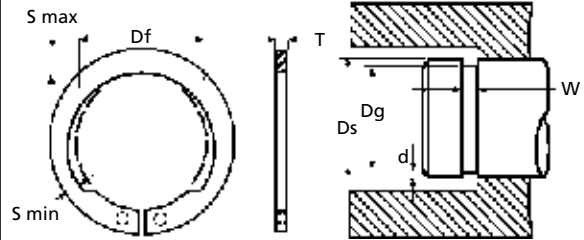
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INVERTED LUGS




INVERTED EXTERNAL


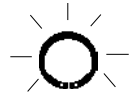
MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	N1408	Rotor Clip	SHI	Military	16626
IRR	4100	Waldes	5108		

SHI	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL 
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "SS"	
SHI-050	.500	1/2	.461	.041	.080	.035	.468	.016	.039	+0.003/-0.000		-E038
-056	.562	9/16	.521	.043	.088		.530	.016				
-059	.594	19/32	.550	.046	.092		.559	.017				
-062	.625	5/8	.579	.048	.096		.588	.018				
-068	.688	11/16	.635	.052	.104		.646	.021				
-075	.750	3/4	.693	.056	.112		.704	.023				
-078	.781	25/32	.722	.057	.116		.733	.024				
-081	.812	13/16	.751	.060	.120		.762	.025				
-087	.875	7/8	.810	.064	.128		.821	.027				
-093	.938	15/16	.867	.068	.136		.882	.028				
-100	.984	63/64	.925	.072	.144		.926	.029				
-100	1.000	1	.925	.072	.144		.940	.030				
-106	1.062	1-1/16	.982	.073	.147		.998	.032				
-112	1.125	1-1/8	1.041	.075	.150		1.059	.033				
-118	1.188	1-3/16	1.098	.076	.153		1.118	.035				
-125	1.250	1-1/4	1.156	.079	.157		1.176	.037				
-131	1.312	1-5/16	1.214	.080	.161		1.232	.040				
-137	1.375	1-3/8	1.272	.082	.165		1.291	.042				
-143	1.438	1-7/16	1.333	.085	.169		1.350	.044				
-150	1.500	1-1/2	1.387	.086	.173		1.406	.047				
-156	1.562	1-9/16	1.446	.089	.178		1.468	.047				
-162	1.625	1-5/8	1.503	.092	.183		1.529	.048				
-177	1.750	1-3/4	1.637	.098	.196		1.650	.050				
-177	1.772	45mm	1.637	.098	.196		1.669	.051				
-181	1.812	1-13/16	1.675	.100	.199		1.708	.052				
-196	1.969	1-31/32	1.819	.106	.212		1.857	.056				
-200	2.000	2	1.850	.108	.216		1.886	.057				
-215	2.125	2-1/8	1.993	.117	.229		2.003	.061				
-215	2.156	2-5/32	1.993	.117	.229		2.032	.062				
-250	2.500	2-1/2	2.313	.130	.250		2.360	.070				
-275	2.750	2-3/4	2.543	.140	.280		2.602	.074				
-287	2.875	2-7/8	2.659	.145	.290		2.721	.077				
-315	3.156	3-5/32	2.920	.159	.316		2.986	.085				
-325	3.250	3-1/4	3.006	.162	.324		3.076	.087				
-350	3.500	3-1/2	3.237	.173	.345		3.316	.092				
-393	3.938	3-15/16	3.642	.183	.368		3.734	.102				
SHI-400	4.000	4	3.700	.185	.371		3.792	---				

TOOL DESCRIPTIONS ON PAGES 226, 228 & 229.

SHI	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC / YELLOW
	Tapered section ring similar to the SH, except the lugs are inverted (on the ID) to allow use in tight areas with minimal clearance. Less thrust load than SH. Installed axially using pliers.	<ol style="list-style-type: none"> 1. Measure the shaft diameter (Ds). 2. Determine the ring thickness (T). 3. Measure the maximum (S max) and minimum (S min) cross section of the ring. 4. Find the part in the chart above. 	 COMMON	 STACKED / ROLL PACK NOT AVAILABLE
<p>AXIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>SHI ← SH (Page 6) ← RSN (Page 44) ← USH (Page 71) ← SSN (Page 49)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				



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CURVED SHAPE

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BOWED EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

IRR	3101	Waldes	5101
Rotor Clip	BSH	Military	16628



BSH	SHAFT		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL 				
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min Max		Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"					
BSH-018*	.188	3/16	.168	+.002/- .004	.016	.025	.015	+/- .0015	.175	.006	.030	+.002/- -.000	0.0059			-E023-L	
-021*	.219	7/32	.196		.017	.028			.205	.007			0.0079				
-023*	.236	15/64	.215		.019	.030			.222	.007			0.0086				
-025	.250	1/4	.225		.025	.035			.230	.010			0.0210				
-027	.276	7mm	.250		.024	.035			.255	.010			0.0230				
-028	.281	9/32	.256	+.002/- .005	.0255	.038	.025	+/- .002	.261	.010	.040	+.003/- .000	0.0240			-E038	
-031	.312	5/16	.281		.026	.040			.290	.011			0.0270				
-034	.344	11/32	.309		.0265	.042			.321	.011			0.0310				
-035	.354	9mm	.320		.029	.046			.330	.012			0.0350				
-037	.375	3/8	.338		.0305	.050			.352	.012			0.0390				
-039	.394	10mm	.354	+.005/- .010	.031	.052	.035	+/- .003	.369	.012	.055	+.003/- .000	0.0420				-E047
-040	.406	13/32	.366		.033	.054			.382	.012			0.0430				
-043	.438	7/16	.395		.033	.055			.412	.013			0.0500				
-046	.469	15/32	.428		.035	.060			.443	.013			0.0540				
-050	.500	1/2	.461		.040	.065			.468	.016			0.0910				
-055	.551	14mm	.509	+.010/- .015	.036	.053	.042	+/- .004	.519	.016	.062	+.005/- -.000	0.0900	-E070			
-056	.562	9/16	.521		.041	.072			.530	.016			0.1100				
-059	.594	19/32	.550		.043	.076			.559	.017			0.1200				
-062	.625	5/8	.579		.045	.080			.588	.018			0.1300				
-066	.669	17mm	.621		.043	.082			.629	.020			0.1400				
-068	.688	11/16	.635	+.010/- .015	.048	.084	.050	+/- .004	.646	.021	.070	+.005/- -.000	0.1800		-E115		
-075	.750	3/4	.693		.051	.092			.704	.023			0.2100				
-078	.781	25/32	.722		.052	.094			.733	.024			0.2200				
-081	.812	13/16	.751		.054	.096			.762	.025			0.2500				
-087	.875	7/8	.810		.057	.104			.821	.027			0.2800				
-093	.938	15/16	.867	+.013/- -.020	.063	.110	.062	+/- .005	.882	.028	.096	+.005/- -.000	0.3100	-E115			
-098	.984	63/64	.910		.0645	.114			.926	.029			0.3500				
-100	1.000	1	.925		.065	.116			.940	.030			0.3600				
-102	1.023	26mm	.946		.066	.118			.961	.031			0.3900				
-106	1.062	1-1/16	.982		.069	.122			.998	.032			0.4800				
-112	1.125	1-1/8	1.041	+.013/- -.020	.071	.128	.050	+/- .004	1.059	.033	.070	+.005/- -.000	0.5100		-E115		
-118	1.188	1-3/16	1.098		.072	.132			1.118	.035			0.5600				
-125	1.250	1-1/4	1.156		.076	.140			1.176	.037			0.5900				
-131	1.312	1-5/16	1.214		.0765	.146			1.232	.040			0.6800				
-137	1.375	1-3/8	1.272		.082	.152			1.291	.042			0.7200				
-150	1.500	1-1/2	1.387	+.013/- -.020	.091	.168	.062	+/- .003	1.406	.047	.096	+.005/- -.000	0.9000	-E115			
-162	1.625	1-5/8	1.503		.097	.180			1.529	.048			1.3200				
BSH-175	1.750	1-3/4	1.618		.101	.188			1.650	.050			1.5300				

* May be beryllium copper instead of carbon steel.

BSH

DESCRIPTION
Curved design for resilient end-play take-up of rattling in linkages. Provides tension on adjusting screws. Also used to salvage assemblies where grooves have been cut too wide. Install with the convex surface abutting the part.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bowed-shape side profile.
2. Measure the shaft diameter (Ds).
3. Determine the ring thickness (T).
4. Measure the maximum (S max) and minimum (S min) cross section of the ring.
5. Find the part in the chart above.

GENERAL USE



UNCOMMON

ZINC/YELLOW



STACKED/ROLL PACK

NOT
AVAILABLE

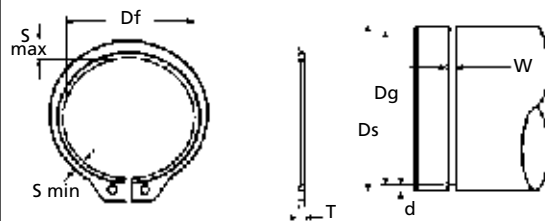
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WEDGES INTO GROOVE




BEVELED EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	1402	Waldes	5102
Rotor Clip	VSH	Military	16630

VSH	SHAFT		RING				Wall Thick- ness (T)		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	TOOL 				
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)		Diameter (Dg)			Depth (d)	Width (W)								
				Min	Max													
VSH-100	1.000	1	.925	+.005/- -.010	.065	.116	.042	+/- .002	.930	+.000/- -.003	.035	.037	+ .000/- .000		-E070			
-102	1.023	26mm	.946		.066	.118			.951		.036	.036				0.3600	0.3900	
-106	1.062	1-1/16	.982		.069	.122			.992		.035	.044				0.4800	0.5100	
-112	1.125	1-1/8	1.041		.071	.128			1.051		.037	.044				0.5600	0.5900	
-118	1.188	1-3/16	1.098		.072	.132			1.108		.040	.044				0.6800	0.7200	
-125	1.250	1-1/4	1.156		.076	.140			1.166		.042	.043				0.8100	0.9000	
-131	1.312	1-5/16	1.214		.0765	.146			1.224		.044	.042				1.2400	1.3200	
-137	1.375	1-3/8	1.272		.082	.152			1.282		.046	.042				1.4800	1.5300	
-143	1.438	1-7/16	1.333		.086	.160			1.343		.047	.042				1.5400	1.6200	
-150	1.500	1-1/2	1.387		.091	.168			1.397		.051	.041				1.7300	1.8000	
-156	1.562	1-9/16	1.446	+.013/- .020	.093	.172	.062	+/- .003	1.459	+.000/- .005	.051	.053	+ .002/- .000		-E115			
-162	1.625	1-5/8	1.503		.097	.180			1.516		.054	.053				1.2400	1.3200	
-168	1.688	1-11/16	1.560		.099	.184			1.573		.057	.052				1.4800	1.5300	
-175	1.750	1-3/4	1.618		.101	.188			1.631		.059	.052				1.5400	1.6200	
-177	1.772	45mm	1.637		.102	.190			1.650		.061	.052				1.7300	1.8000	
-181	1.812	1-13/16	1.675		.102	.192			1.688		.062	.052				1.8000	1.9000	
-187	1.875	1-7/8	1.735		.104	.196			1.748		.063	.052				2.5000	2.6100	
-196	1.969	1-31/32	1.819		.106	.200			1.832		.068	.051				2.6300	2.7700	
-200	2.000	2	1.850		.108	.204			1.863		.068	.051				2.8000	2.9200	
-206	2.062	2-1/16	1.906		+.015/- .025	.111			.208		.078	+/- .003				1.921	+.000/- .006	.070	.067	+ .0025/- .000
-212	2.125	2-1/8	1.964	.113		.212	1.979	.073	.067	2.9500			2.9700					
-215	2.156	2-5/32	1.993	.113		.212	2.008	.074	.067	3.3900			3.5000					
-225	2.250	2-1/4	2.081	.116		.220	2.096	.077	.066	3.6000			4.7000					
-231	2.312	2-5/16	2.139	.118		.222	2.154	.079	.065	4.8500			5.0000					
-237	2.375	2-3/8	2.197	.119		.224	2.212	.081	.065									
-243	2.438	2-7/16	2.255	.120		.228	2.270	.084	.065									
-250	2.500	2-1/2	2.313	.122		.232	2.328	.086	.064									
-255	2.559	65mm	2.377	+.020/- .030		.125	.238	2.397	.081	.064								
-262	2.625	2-5/8	2.428			.127	.242	2.448	.088	.064								
-268	2.688	2-11/16	2.485		.129	.246	2.505	.091	.064									
-275	2.750	2-3/4	2.543		.131	.248	2.563	.093	.079									
-287	2.875	2-7/8	2.659		.133	.256	2.679	.098	.078									
-293	2.938	2-15/16	2.717		.136	.260	2.737	.100	.078									
VSH-300	3.000	3	2.775		.138	.264	2.795	.102	.077									

TOOL DESCRIPTIONS ON PAGES 226, 228 & 229.

VSH

DESCRIPTION

A 15° bevel on the inside diameter, when fitted to a 15° bevel on the load-bearing groove wall, yields rigid end-play take-up of manufacturing tolerances or wear on the retained part. Used in greasy and oily environments.

AXIAL ASSEMBLY

HOW TO IDENTIFY

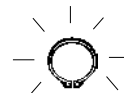
1. Verify the presence of a bevel along the outside diameter of the part.
2. Measure the shaft diameter (Ds).
3. Determine the ring thickness (T).
4. Measure the maximum (S max) and minimum (S min) cross section of the ring.
5. Find the part in the chart above.

GENERAL USE



COMMON

ZINC/YELLOW



STACKED/ROLL PACK

NOT
AVAILABLE

VSH CONTINUED NEXT PAGE.

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BEVELED EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	1402	Waldes	5102
Rotor Clip	VSH	Military	16630



VSH	SHAFT		RING		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min Max	Wall Thick- ness (T)	Diameter (Dg)	Depth (d)	Width (W)		
VSH-306	3.062	3-1/16	2.832	.131 .252	.093	2.852	.105	.077	4.7000	-E115
-312	3.125	3-1/8	2.892	.141 .272		2.912	.106	.076		
-315	3.156	3-5/32	2.920	.143 .274		2.940	.108	.076		
-325	3.250	3-1/4	3.006	.145 .280		3.026	.112	.076		
-334	3.346	3-11/32	3.092	.147 .300		3.112	.117	.075		
-343	3.438	3-7/16	3.179	.148 .292		3.199	.119	.075		
-350	3.500	3-1/2	3.237	.148 .285		3.257	.121	.091		
-354	3.543	90mm	3.277	.149 .288		3.297	.123	.091		
-362	3.625	3-5/8	3.352	.153 .296		3.372	.126	.090		
-368	3.688	3-11/16	3.410	.156 .302		3.430	.129	.090		
-375	3.750	3-3/4	3.468	.160 .310	.109	3.488	.131	.089	8.0000	-E120-X
-387	3.875	3-7/8	3.584	.163 .318		3.604	.135	.089		
-393	3.938	3-15/16	3.642	.163 .318		3.662	.138	.088		
-400	4.000	4	3.700	.163 .318		3.720	.140	.088		
-425	4.250	4-1/4	3.989	.176 .318		4.009	.120	.094		
-437	4.375	4-3/8	4.106	.181 .318		4.126	.124	.094		
-450	4.500	4-1/2	4.223	.185 .405		4.243	.128	.094		
-475	4.750	4-3/4	4.458	.136 .303		4.478	.136	.092		
-500	5.000	5	4.692	.194 .360		4.712	.144	.091		
-525	5.250	5-1/4	4.927	.211 .372	.125	4.947	.151	.105	19.0000	-E170
-550	5.500	5-1/2	5.162	.209 .390		5.182	.159	.104		
-575	5.750	5-3/4	5.396	.220 .408		5.416	.167	.103		
-600	6.000	6	5.631	.171 .381		5.651	.174	.102		
-625	6.250	6-1/4	5.866	.176 .396		5.886	.182	.132		
-650	6.500	6-1/2	6.100	.236 .438	.156	6.120	.190	.131		
-675	6.750	6-3/4	6.335	.246 .456		6.355	.197	.130		
-700	7.000	7	6.570	.256 .474		6.590	.205	.129		
-750	7.500	7-1/2	7.039	.277 .507		7.059	.220	.158		
-800	8.000	8	7.508	.294 .540		7.528	.236	.157		
-850	8.500	8-1/2	7.977	.314 .573	.187	7.997	.251	.154		
-900	9.000	9	8.445	.333 .609		8.465	.267	.153		
-950	9.500	9-1/2	8.915	.350 .642		8.935	.282	.150		
VSH-1000	10.000	10	9.385	.367 .675		9.405	.297	.148		

VSH

A 15° bevel on the inside diameter, when fitted to a 15° bevel on the load-bearing groove wall, yields rigid end-play take-up of manufacturing tolerances or wear on the retained part. Used in greasy and oily environments.

AXIAL ASSEMBLY

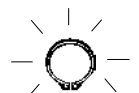
HOW TO IDENTIFY

1. Verify the presence of a bevel along the outside diameter of the part.
2. Measure the shaft diameter (Ds).
3. Determine the ring thickness (T).
4. Measure the maximum (S max) and minimum (S min) cross section of the ring.
5. Find the part in the chart above.



COMMON

ZINC/YELLOW



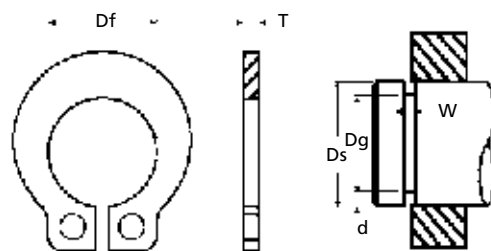
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ADJUSTABLE AND REMOVABLE



GROOVELESS

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	N1440	Rotor Clip	SHF	Military
IRR	7100	Waldes	5555	

SHF	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	From (Ds)	To (Ds)	Free Inside Dia. (Df)	Assembled Diameter	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
SHF-006	.058	.060	.055	.21	.015	Not recommended for use with grooves.			0.0030			-E034
-007	.078	.080	.074	.24	.025				0.0080			
-009	.092	.096	.089	.26	.025				0.0100			
-011	.116	.120	.112	.29	.024				-			
-012	.123	.127	.120	.33	.025				0.0240			-E040
-015	.154	.158	.150	.36	.025				0.0300			
-018	.185	.189	.181	.44	.035				0.0550			-E047-X
-019	.195	.199	.187	.43	.032				0.0450			
-023	.234	.238	.224	.48	.035	.228	.004	.041	0.0760			
-025	.248	.252	.238	.49	.035	.240	.005	.041	0.0740			
-027	.274	.278	.264	.55	.039	-	-	-	-			-E070-X
-031	.310	.316	.298	.68	.042	.303	.005	.048	0.1390			
-037	.373	.379	.354	.74	.042	.361	.007	.048	0.1720			
-043	.434	.440	.412	.81	.050	.419	.009	.056	0.2610			
-050	.497	.503	.470	.90	.050	.478	.011	.056	0.2910			
-059	.587	.593	.570	1.03	.059	-	-	-	-			
-062	.622	.628	.593	1.06	.062	.599	.013	.069	0.5700			
SHF-075	.745	.755	.706	1.32	.062	.718	.016	.069	0.6880			

SHF

DESCRIPTION

Reusable tapered section ring for grooveless shafts like plastics, tubes, and castings, or where adjustable ring placement is desired (like progressively tightening a compression spring). Installed using pliers. See page 91.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Find the part in the chart above.

GENERAL USE



COMMON

ZINC/YELLOW



STACKED/ROLL PACK

NOT
AVAILABLE

GROOVELESS

USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.

SHF ← RG (Page 27) ← TX (Page 92) ← TY (Page 92) ← T99 (Page 101)

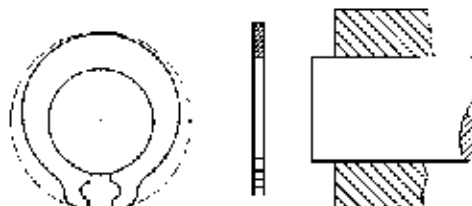
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

DSHF



METRIC
Page 164

AVAILABLE AS A SPECIAL ORDER



GROOVELESS - OPEN LUG

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	M1440	Rotor Clip	SHF
IRR	7100	Waldes	5555

SEE PAGE 165.

DSHX



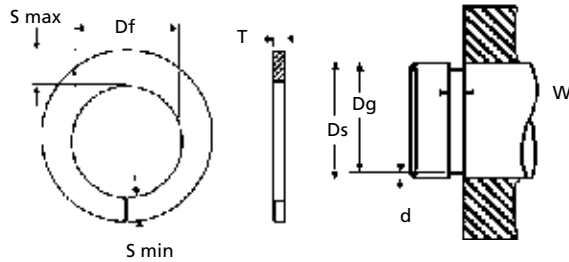
METRIC
Page 165

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TAMPER-PROOF

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236

Rotor Clip	SHM
Waldes	5560



SHM	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "-SS"	
SHM-010	.101	-	.090	.017	.027	.020	.093	.004	.024	+.002/- .000		SEE BE- LOW
-012	.125	1/8	.112	.018	.028		.115	.005				
-013	.134	-	.120	.019	.029	.025	.124	.006	.029	+.002/- .000		
-015	.156	5/32	.140	.027	.045		.144	.007				
-018	.188	3/16	.168	.032	.052	.035	.174	.009	.039	+.003/- .000		
-020	.203	13/64	.180	.030	.046		.189	.010				
-022	.219	7/32	.200	.036	.058	.042	.205	.012	.046	+.003/- .000		
-025	.250	1/4	.224	.037	.063		.232	.015				
-026	.266	17/64	.240	.037	.065	.035	.248	.010	.039	+.003/- .000		
-031	.312	5/16	.284	.050	.078		.292	.012				
-032	.328	21/64	.300	.050	.080	.042	.308	.012	.046	+.003/- .000		
SHM-037	.375	3/8	.340	.058	.090		.351	.012				

SHM

DESCRIPTION

Miniature tapered section ring without lugs that provides a tamper-proof shoulder. Also known as the "wedding ring," SHM's must be destroyed for removal. Thick cross section.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum (S max) and minimum (S min) cross section of the ring.
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

ZINC/YELLOW



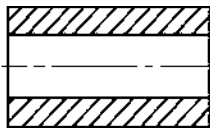
STACKED/ROLL PACK

NOT
AVAILABLE

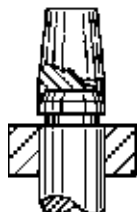
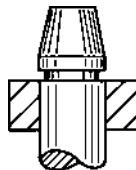
SHM INSTALLATION



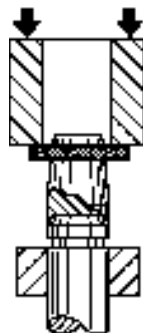
Start with a hollowed taper pin and sleeve . . .



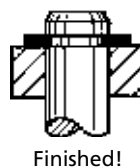
. . . or design a taper into the assembly.



Place taper pin over end with assembly mounted in work piece . . .



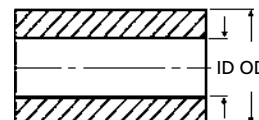
. . . install part using sleeve.



Finished!

LET OUR SHOP MANUFACTURE A BUSHING AND TAPERED PIN FOR YOU!

SHM	SLEEVE		TAPERED PIN		
	Inside Dia. (ID)	Outside Dia. (OD)	Pin Dia. (A)	Tip Dia. Ref. (B)	Length (C)
-010	.104	3/8	.102	.036	.750
-012	.128		.126	.059	
-013	.137	1/2	.135	.069	.875
-015	.159		.157	.078	
-018	.191		.189	.110	
-020	.206		.204	.125	
-022	.223	5/8	.221	.129	1.000
-025	.254		.252	.101	
-026	.270		.268	.176	
-031	.316		.314	.223	
-032	.332		.330	.238	
-037	.379		.377	.286	



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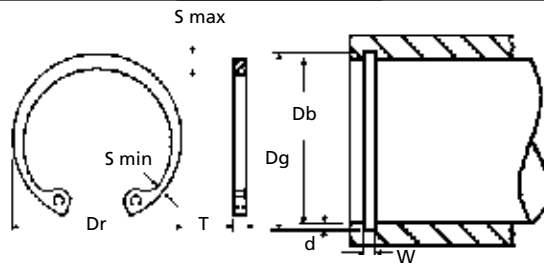


BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Anderton	N1300	IRR	3000	Waldes	N5000
Ellison	9000	Rotor Clip	HO	Military	16625



HO	BORE		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
HO-025	.250	1/4	.280	.015	.025	.015	.268	.009	.020	0.0080			-1025
-031	.312	5/16	.346	.018	.033		.330	.009		0.0110			
-037	.375	3/8	.415	.028	.040		.397	.011		0.0250			-1038
-043	.438	7/16	.482	.029	.049	.025	.461	.012	.029	0.0370			
-045	.453	29/64	.498	.030	.050		.477	.012		0.0430			
-050	.500	1/2	.548	.035	.053		.530	.015		0.0700			
-051	.512	13mm	.560	.035	.053		.542	.015		0.0770			-1047
-056	.562	9/16	.620	.035	.053	.035	.596	.017	.039	0.0860			
-062	.625	5/8	.694	.035	.060		.665	.020		0.1000			
-068	.688	11/16	.763	.036	.063		.732	.022		0.1200			
-075	.750	3/4	.831	.040	.070		.796	.023		0.1300			
-077	.777	19.7mm	.859	.044	.074		.825	.024		0.1700			
-081	.812	13/16	.901	.044	.077		.862	.025		0.1900			
-086	.866	22mm	.961	.045	.081		.920	.027		0.2000			
-087	.875	7/8	.971	.045	.084	.042	.931	.028	.046	0.2100			
-090	.901	22.9mm	1.000	.047	.087		.959	.029		0.2200			
-093	.938	15/16	1.041	.050	.091		1.000	.031		0.2400			-1070
-100	1.000	1	1.111	.052	.104		1.066	.033		0.2700			
-102	1.023	26mm	1.136	.054	.106		1.091	.034		0.2800			
-106	1.062	1-1/16	1.180	.055	.110		1.130	.034		0.3700			
-112	1.125	1-1/8	1.249	.057	.116		1.197	.036		0.4000			
-118	1.181	30mm	1.319	.058	.120		1.255	.037		0.4300			
-118	1.188	1-3/16	1.319	.058	.120		1.262	.037		0.4300			
-125	1.250	1-1/4	1.388	.062	.124		1.330	.040		0.4800			
-125	1.259	32mm	1.388	.062	.124	.050	1.339	.040	.056	0.4800			
-131	1.312	1-5/16	1.456	.062	.130		1.396	.042		0.5000			
-137	1.375	1-3/8	1.526	.063	.130		1.461	.043		0.5100			
-137	1.378	35mm	1.526	.063	.130		1.464	.043		0.5100			
-143	1.438	1-7/16	1.596	.065	.133		1.528	.045		0.5800			
-145	1.456	37mm	1.616	.065	.133		1.548	.046		0.6400			
-150	1.500	1-1/2	1.660	.066	.133		1.594	.047		0.6500			
-156	1.562	1-9/16	1.734	.078	.157		1.658	.048		0.8900			-1070
-156	1.575	40mm	1.734	.078	.157		1.671	.048		0.8900			
-162	1.625	1-5/8	1.804	.082	.164	.062	1.725	.050	.068	1.0000			
-165	1.653	42mm	1.835	.083	.167		1.755	.051		1.0400			
HO-168	1.688	1-11/16	1.874	.085	.170		1.792	.052		1.0800			

TOOL DESCRIPTIONS ON PAGES 227, 228 & 229

HO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Tapered section ring that is installed axially with pliers into a housing or bore. High thrust load rating. Stacked roll pack prevents tangling for ease in handling.	<ol style="list-style-type: none"> 1. Measure the bore diameter (Db). 2. Determine the ring thickness (T). 3. Measure the maximum (S max) and minimum (S min) cross section of the ring. 4. Find the part in the chart above. 	 COMMON	 STACKED/ROLL PACK
<p>AXIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>HO ↔ HOI (Page 19) ↔ RRN (Page 58) ↔ UHO (Page 76) ↔ SRN (Page 63)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				



HO CONTINUED NEXT PAGE.

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BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	N1300	IRR	3000	Waldes	N5000
Ellison	9000	Rotor Clip	HO	Military	16625



HO	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "SS"	
HO-175	1.750	1-3/4	1.942	.083	.171	.062	1.858	.054	.068	+0.004/-0.000	1.0300	-1070
-181	1.812	1-13/16	2.012	.084	.170		1.922	.055				
-185	1.850	47mm	2.054	.085	.170		1.962	.056				
-187	1.875	1-7/8	2.072	.085	.170		1.989	.057				
-193	1.938	1-15/16	2.141	.085	.170		2.056	.059				
-200	2.000	2	2.210	.085	.170	.078	2.122	.061	.086	+0.004/-0.000	1.4000	-1090
-206	2.047	52mm	2.280	.091	.186		2.171	.062				
-206	2.062	2-1/16	2.280	.091	.186		2.186	.062				
-212	2.125	2-1/8	2.350	.096	.195		2.251	.063				
-218	2.165	55mm	2.415	.098	.199		2.295	.065				
-218	2.188	2-3/16	2.415	.098	.199	.093	2.318	.065	.103	+0.005/-0.000	1.9600	-1108
-225	2.250	2-1/4	2.490	.099	.203		2.382	.066				
-231	2.312	2-5/16	2.535	.100	.206		2.450	.069				
-237	2.375	2-3/8	2.630	.102	.207		2.517	.071				
-244	2.440	2-7/16	2.702	.103	.209		2.584	.072				
-250	2.500	2-1/2	2.775	.103	.210	.109	2.648	.074	.120	+0.005/-0.000	2.5500	-1120
-250	2.531	2-17/32	2.775	.103	.210		2.681	.075				
-256	2.562	2-9/16	2.844	.109	.222		2.714	.076				
-262	2.625	2-5/8	2.910	.111	.226		2.781	.078				
-268	2.677	68mm	2.980	.113	.230		2.837	.080				
-268	2.688	2-11/16	2.980	.113	.230	.109	2.848	.080	.120	+0.005/-0.000	3.5000	-1120
-275	2.750	2-3/4	3.050	.115	.234		2.914	.082				
-281	2.812	2-13/16	3.121	.115	.230		2.980	.084				
-281	2.835	72mm	3.121	.115	.230		3.006	.085				
-287	2.875	2-7/8	3.191	.120	.240		3.051	.088				
-300	2.953	75mm	3.325	.122	.250	.109	3.135	.091	.120	+0.005/-0.000	4.2500	-1120
-300	3.000	3	3.325	.122	.250		3.182	.091				
-306	3.062	3-1/16	3.418	.126	.254		3.248	.093				
-312	3.125	3-1/8	3.488	.129	.259		3.315	.095				
-315	3.149	80mm	3.523	.129	.262		3.341	.096				
-315	3.156	3-5/32	3.523	.129	.262	.109	3.348	.096	.120	+0.005/-0.000	5.7000	-1120
-325	3.250	3-1/4	3.623	.135	.269		3.446	.098				
-334	3.346	3-11/32	3.734	.140	.276		3.546	.100				
-347	3.469	3-15/32	3.857	.144	.286		3.675	.103				
-350	3.500	3-1/2	3.890	.142	.289		3.710	.105				
HO-354	3.543	90mm	3.936	.142	.292		3.755	.106			7.2000	

TOOL DESCRIPTIONS ON PAGES 227, 228 & 229.

HO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Tapered section ring that is installed axially with pliers into a housing or bore. High thrust load rating. Stacked roll pack prevents tangling for ease in handling.	<ol style="list-style-type: none"> 1. Measure the bore diameter (Db). 2. Determine the ring thickness (T). 3. Measure the maximum (S max) and minimum (S min) cross section of the ring. 4. Find the part in the chart above. 	 COMMON	 STACKED / ROLL PACK
<p>AXIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>HO ↔ HOI (Page 19) ↔ RRN (Page 58) ↔ UHO (Page 76) ↔ SRN (Page 63)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				



HO CONTINUED NEXT PAGE.

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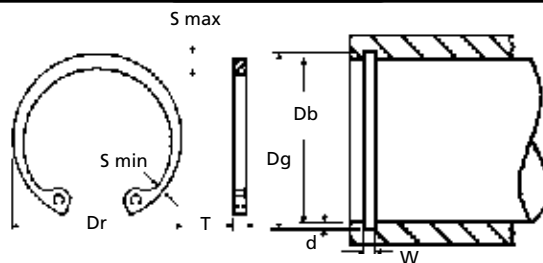
All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

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MOST POPULAR



BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Anderton	N1300	IRR	3000	Waldes	N5000
Ellison	9000	Rotor Clip	HO	Military	16625

HO	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "SS"	
HO-354	3.562	3-9/16	3.936	.142	.292		3.776	.107		7.2000		-1120
-362	3.625	3-5/8	4.024	.150	.299		3.841	.108		7.3000		
-375	3.740	95mm	4.157	.155	.309		3.964	.112		7.8000		
-375	3.750	3-3/4	4.157	.155	.309		3.974	.112		7.8000		
-387	3.875	3-7/8	4.291	.160	.319		4.107	.116		8.7000		
-393	3.938	3-15/16	4.358	.161	.324		4.174	.118		8.8000		
-400	4.000	4	4.424	.166	.330		4.240	.120		9.3000		
-412	4.125	4-1/8	4.558	.171	.330	.109	4.365	.120	.120	9.7000		
-425	4.250	4-1/4	4.691	.180	.335		4.490	.120		10.1000		
-433	4.331	110mm	4.756	.180	.343		4.571	.120		10.5000		
-450	4.500	4-1/2	4.940	.181	.351		4.740	.120		11.1000		-1120-X
-462	4.625	4-5/8	5.076	.183	.360		4.865	.120		11.7000		
-475	4.724	120mm	5.213	.183	.370		4.969	.122		12.4000		
-475	4.750	4-3/4	5.213	.183	.370		4.995	.122		12.4000		
-500	5.000	5	5.485	.186	.390		5.260	.130		13.6000		
-525	5.250	5-1/4	5.770	.198	.408		5.520	.135		17.4000		
-537	5.375	5-3/8	5.910	.198	.408		5.650	.135		17.9000		
-550	5.500	5-1/2	6.066	.198	.408	.125	5.770	.135	.139	18.3000		
-575	5.750	5-3/4	6.336	.198	.408		6.020	.135		19.2000		
-600	6.000	6	6.620	.198	.435		6.270	.135		20.2100		
-625	6.250	6-1/4	6.895	.211	.423		6.530	.140		26.6000		-1150
-650	6.500	6-1/2	7.170	.219	.438		6.790	.145		28.1000		
-662	6.625	6-5/8	7.308	.221	.447	.156	6.925	.150	.174	30.5000		
-675	6.750	6-3/4	7.445	.224	.456		7.055	.152		32.5000		
-700	7.000	7	7.720	.232	.474		7.315	.157		34.4000		
-725	7.250	7-1/4	7.995	.238	.489		7.575	.162		42.8000		
-750	7.500	7-1/2	8.270	.247	.507		7.840	.170		48.5000		
-775	7.750	7-3/4	8.545	.255	.523		8.100	.175		52.0000		
-800	8.000	8	8.820	.262	.540		8.360	.180		55.5000		
-825	8.250	8-1/4	9.095	.270	.558		8.620	.185		60.3000		
-850	8.500	8-1/2	9.285	.277	.573	.187	8.880	.190	.209	63.4000		
-875	8.750	8-3/4	9.558	.286	.591		9.145	.197		65.3000		
-900	9.000	9	9.830	.294	.609		9.405	.202		73.2000		
-925	9.250	9-1/4	10.102	.299	.625		9.668	.109		76.7000		
-950	9.500	9-1/2	10.375	.304	.642		9.930	.215		80.3000		
-975	9.750	9-3/4	10.648	.309	.658		10.190	.220		83.3000		
HO-1000	10.000	10	10.920	.315	.675		10.450	.225		86.3000		

TOOL DESCRIPTIONS ON PAGES 227, 228 & 229

HO

DESCRIPTION

Tapered section ring that is installed axially with pliers into a housing or bore. High thrust load rating. Stacked roll pack prevents tangling for ease in handling.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the bore diameter (Db).
2. Determine the ring thickness (T).
3. Measure the maximum (S max) and minimum (S min) cross section of the ring.
4. Find the part in the chart above.

GENERAL USE



COMMON

ZINC/YELLOW



STACKED/ROLL PACK

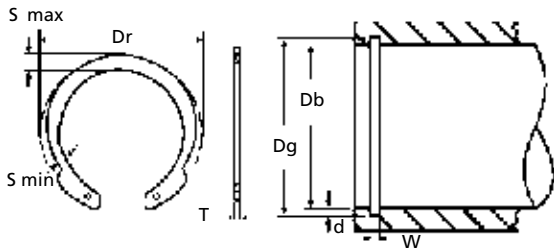


HO ↔ HOI (Page 19) ↔ RRN (Page 58) ↔ UHO (Page 76) ↔ SRN (Page 63)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

INVERTED LUGS



BOX 232 • MINNEAPOLIS, KS • 67467



INVERTED INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	N1308	Rotor Clip	HOI	Military	16627
IRR	4000	Waldes	5008		



HOI	BORE		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
HOI-062	.625	5/8	.675	.036	.072	.025	.665	.020	.029	0.0700			-1025
-075	.750	3/4	.808	.042	.085	.035	.796	.023	.039	0.1300			
-081	.812	13/16	.877	.044	.092		.862	.025		0.2000			
-087	.875	7/8	.944	.047	.099		.931	.028		0.2200			-1038
-093	.938	15/16	1.015	.051	.106	.042	1.000	.031	.046	0.2800			
-100	1.000	1	1.081	.054	.113		1.066	.033		0.2900			
-106	1.062	1-1/16	1.150	.057	.120		1.130	.034		0.3800			
-112	1.125	1-1/8	1.217	.059	.123		1.197	.036		0.4400			
-118	1.188	1-3/16	1.283	.060	.126		1.262	.037		0.4900			-1047
-125	1.250	1-1/4	1.351	.061	.129	.050	1.330	.040	.056	0.5000			
-131	1.312	1-5/16	1.418	.063	.132		1.396	.042		0.5300			
-137	1.375	1-3/8	1.486	.065	.135		1.461	.043		0.5900			
-143	1.438	1-7/16	1.552	.069	.144		1.528	.045		0.6300			
-150	1.500	1-1/2	1.622	.070	.148		1.594	.047		0.6800			
-156	1.562	1-9/16	1.688	.074	.158		1.658	.048		0.8900			
-162	1.625	1-5/8	1.756	.077	.162		1.725	.050		1.0400			-1070
-168	1.688	1-11/16	1.823	.079	.166		1.792	.052		1.1900			
-175	1.750	1-3/4	1.891	.082	.170	.062	1.858	.054	.068	1.1800			
-187	1.875	1-7/8	2.025	.090	.188		1.989	.057		1.4800			
-200	2.000	2	2.160	.100	.208		2.122	.061		1.7400			
-206	2.062	2-1/16	2.224	.106	.218		2.186	.062		2.3200			
-212	2.125	2-1/8	2.295	.108	.223		2.251	.063		2.4300			-1090
-237	2.375	2-3/8	2.567	.115	.243	.078	2.517	.071	.086	2.8600			
-243	2.438	2-7/16	2.634	.117	.248		2.584	.072		3.0600			
-250	2.500	2-1/2	2.700	.120	.254		2.648	.074		3.2100			
-262	2.625	2-5/8	2.840	.128	.266		2.781	.078		4.5600			
-275	2.750	2-3/4	2.975	.134	.278		2.914	.082		4.7800			
-283	2.812	2-13/16	3.063	.139	.286	.093	2.980	.084	.103	4.9500			-1108
-283	2.835	72mm	3.063	.139	.286		3.006	.086		4.9500			
-287	2.875	2-7/8	3.105	.139	.290		3.051	.088		5.0100			
-300	3.000	3	3.245	.143	.302		3.182	.091		5.2600			
-315	3.156	3-5/32	3.408	.149	.314		3.348	.096		6.9400			
-325	3.250	3-1/4	3.509	.151	.318		3.446	.098		7.2600			
-334	3.346	3-11/32	3.611	.155	.321	.109	3.546	.100	.120	7.5600			-1120
-350	3.500	3-1/2	3.780	.154	.324		3.710	.105		8.0200			
-356	3.562	3-9/16	3.850	.155	.326		3.776	.107		8.2400			
HOI-400	4.000	4	4.350	.161	.338		4.240	.120		9.7400			

TOOL DESCRIPTIONS ON PAGES 227, 228 & 229.

HOI

DESCRIPTION

Inverted lugs seat into the groove for better clearance and a cleaner appearance. Good for shielded bearings that pass tightly through the bore or housing. Installed axially using pliers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the bore diameter (Db).
2. Determine the ring thickness (T).
3. Measure the maximum (S max) and minimum (S min) cross section of the ring.
4. Find the part in the chart above.

GENERAL USE

COMMON

ZINC/YELLOW

STACKED/ROLL PACK

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

HOI ↔ HO (Page 19) ↔ RRN (Page 58) ↔ UHO (Page 76) ↔ SRN (Page 63)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

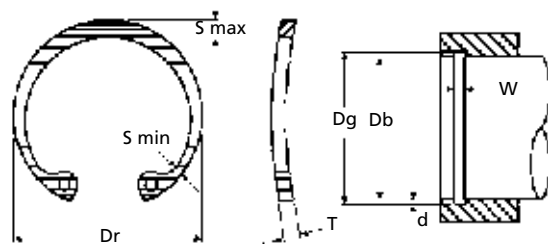
All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

INTERNAL SNAP RINGS

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CURVED SHAPE




BOWED INTERNAL

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

IRR	3001	Waldes	N5001
Rotor Clip	BHO	Military	16629

BHO	BORE		RING				GROOVE				WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL 	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min | Max		Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel		Stainless "-SS"			
BHO-025	.250	1/4	.280	+/- .010	.015 .025	.015	.268	+/- .001	.009	.030	+ .002/- .000	0.0080			-1025
-031	.312	5/16	.346		.018 .033		.330		.009			0.0110			
-037	.375	3/8	.415		.028 .040		.397		.011			0.0250			
-043	.438	7/16	.482		.029 .049		.461		.012			0.0370			
-045	.453	29/64	.498		.030 .050		.477		.012			0.0430			
-050	.500	1/2	.548		.035 .053		.530		.015			0.0700			-1038
-051	.512	13mm	.560		.035 .053		.542		.015			0.0770			
-056	.562	9/16	.620		.035 .053		.596		.017			0.0860			
-062	.625	5/8	.694		.035 .060		.665		.020			0.1000			
-068	.688	11/16	.763		.036 .063		.732		.022			0.1200			
-075	.750	3/4	.831	.040 .070	.796	.023	0.1300	-1047							
-077	.777	19.7mm	.859	.044 .074	.825	.024	0.1700								
-081	.812	13/16	.901	.044 .077	.862	.025	0.1900								
-086	.866	22mm	.961	.045 .081	.920	.027	0.2000								
-087	.875	7/8	.971	.045 .084	.931	.028	0.2100								
-090	.901	22.9mm	1.000	.047 .087	.959	.029	0.2200								
-093	.938	15/16	1.041	.050 .091	1.000	.031	0.2400								
-100	1.000	1	1.111	.052 .104	1.066	.033	0.2700								
-102	1.023	26mm	1.136	.054 .106	1.091	.034	0.2800		-1070						
-106	1.062	1-1/16	1.180	.055 .110	1.130	.034	0.3700								
-112	1.125	1-1/8	1.249	.057 .116	1.197	.036	0.4000								
-118	1.181	30mm	1.319	.058 .120	1.255	.037	0.4300								
-118	1.188	1-3/16	1.319	.058 .120	1.262	.037	0.4300								
-125	1.250	1-1/4	1.388	.062 .124	1.330	.040	0.4800								
-125	1.259	32mm	1.388	.062 .124	1.339	.040	0.4800								
-131	1.312	1-5/16	1.456	.062 .130	1.396	.042	0.5000								
-137	1.375	1-3/8	1.526	.063 .130	1.461	.043	0.5100								
-137	1.378	35mm	1.526	.063 .130	1.464	.043	0.5100								
-143	1.438	1-7/16	1.596	.065 .133	1.528	.045	0.5800								
-145	1.456	37mm	1.616	.065 .133	1.548	.046	0.6400								
-150	1.500	1-1/2	1.660	.066 .133	1.594	.047	0.6500								
-156	1.562	1-9/16	1.734	+ .035/- .025	.078 .157	.062	1.658	.048	0.8900						
-156	1.575	40mm	1.734		.078 .157		1.671	.048	0.8900						
-162	1.625	1-5/8	1.804		.082 .164		1.725	.050	1.0000						
BHO-175	1.750	1-3/4	1.942		.083 .171		1.858	.054	1.0300						

BHO

DESCRIPTION

Curved design for resilient end-play take-up of rattling in linkages. Provides tension on adjusting screws. Also used to salvage assemblies where grooves have been cut too wide. Install with the convex surface abutting the part.

AXIAL ASSEMBLY

HOW TO IDENTIFY

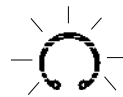
1. Verify bowed-shape side profile.
2. Measure the bore diameter (Db).
3. Determine the ring thickness (T).
4. Measure the maximum (S max) and minimum (S min) cross section of the ring.
5. Find the part in the chart above.

GENERAL USE



UNCOMMON

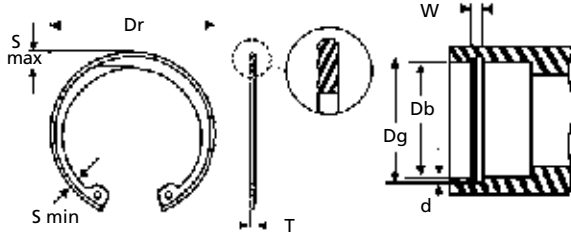
ZINC / YELLOW



MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

NO ORIENTATION NEEDED DURING ASSEMBLY

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DOUBLE BEVELED INTERNAL

MANUFACTURER CROSS-REFERENCE

Waldes N5003

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PAGE 236.



VVH	BORE		RING					GROOVE					WEIGHT	MATERIAL	TOOL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)		Wall Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Lbs. per 100 Pieces	Spring Steel					
				Min	Max											
VVH-156	1.562	1-9/16	1.734	+.035/- .025	.078	.157	.053	+/- .003	1.674	+.005/- .000	.056	.052	+.005/- .000	0.7600		-1070
-162	1.625	1-5/8	1.804		.082	.164			1.743		.059			0.8500		
-165	1.653	42mm	1.835		.083	.167			1.773		.060			0.8900		
-168	1.688	1-11/16	1.874		.085	.170			1.810		.061			0.9200		
-175	1.750	1-3/4	1.942		.083	.171			1.878		.064			0.8600		
-181	1.812	1-13/16	2.012		.084	.170			1.944		.066			0.9600		
-187	1.850	47mm	2.054		.085	.170			1.984		.067			1.0700		
-187	1.875	1-7/8	2.054		.085	.170			2.011		.068			1.0700		
-193	1.938	1-15/16	2.141		.085	.170			2.082		.072			1.1200		
-200	2.000	2	2.210		.085	.170			2.144		.072			1.1700		
-206	2.062	2-1/16	2.280	+.040/- .030	.091	.186	.068	+/- .004	2.210	+.006/- .000	.074	.065	+.006/- .000	1.5700		-1090
-212	2.125	2-1/8	2.350		.096	.195			2.279		.077			1.6900		
-218	2.188	2-3/16	2.415		.098	.199			2.350		.081			1.7100		
-225	2.250	2-1/4	2.490		.099	.203			2.420		.085			1.8900		
-231	2.312	2-5/16	2.535		.102	.209			2.484		.086			1.9600		
-237	2.375	2-3/8	2.630		.102	.207			2.552		.089			2.0100		
-244	2.440	2-7/16	2.702		.103	.209			2.618		.089			2.2000		
-250	2.500	2-1/2	2.775		.103	.210			2.684		.092			2.2100		
-250	2.531	2-17/32	2.775		.103	.210			2.717		.093			2.2100		
-256	2.562	2-9/16	2.844		.109	.222			2.750		.094			3.0000		
-262	2.625	2-5/8	2.910	+.004/- .003	.111	.226	2.820	.097	.076	3.0400						
-268	2.688	2-11/16	2.980		.113	.230	2.887	.099		3.0900						
-275	2.750	2-3/4	3.050		.115	.234	2.955	.102		3.1300						
VVH-281	2.812	2-13/16	3.121		.115	.230	3.020	.104		3.1700						

TOOL DESCRIPTIONS ON PAGE 227.

TOOL DESCRIPTIONS ON PAGE 227.

VVH

DESCRIPTION

Identical to the VHO (pages 22-23), except that the 15° bevel is located on *both sides* of the outside diameter. The double bevel eliminates the need for orienting the ring prior to assembly.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify that a bevel exists on both sides of the outside diameter of the part.
2. Measure the bore diameter (Db).
3. Determine the ring thickness (T).
4. Measure the maximum (S max) and minimum (S min) cross section of the ring.
5. Find the part in the chart above.

GENERAL USE



WEIRD

**SPECIAL
FINISHES AND
PACKAGING
AVAILABLE
UPON REQUEST.**

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

VVH

VHO (Page 22)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

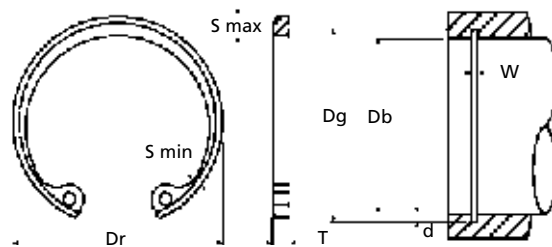
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WEDGES INTO GROOVE




BEVELED INTERNAL

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236

Anderton	N1302	Rotor Clip	VHO	Military	16631
Ellison	9002	Waldes	N5002		

VHO	BORE		RING			Wall Thickness (T)		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	TOOL 				
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min Max				Diameter (Dg)	Depth (d)	Width (W)							
VHO-100	1.000	1	1.111	+.015/ -.010	+.025/- .020	.042	+/- .002	1.076	+.003/ -.000	.038	.036	+/- .001/- .000	0.2700		-1047		
-102	1.023	26mm	1.136					.052		.104	1.101		.039			.036	0.2800
-106	1.062	1-1/16	1.180					.055		.110	1.138		.038			.044	0.3700
-112	1.125	1-1/8	1.249					.057		.116	1.205		.040			.043	0.4000
-118	1.181	30mm	1.319					.058		.120	1.265		.042			.043	0.4300
-118	1.188	1-3/16	1.319					.058		.120	1.272		.042			.043	0.4300
-125	1.250	1-1/4	1.388					.062		.124	1.342		.046			.042	0.4800
-125	1.259	32mm	1.388					.062		.124	1.351		.046			.042	0.4800
-131	1.312	1-5/16	1.456					.062		.130	1.408		.048			.042	0.5000
-137	1.375	1-3/8	1.526					.063		.130	1.475		.050			.041	0.5100
-137	1.378	35mm	1.526	.063	.130	1.478	.050	.041	0.5100								
-143	1.438	1-7/16	1.596	.065	.133	1.542	.052	.040	0.5800								
-145	1.456	37mm	1.616	.065	.133	1.562	.053	.040	0.6400								
-150	1.500	1-1/2	1.660	.066	.133	1.604	.052	.040	0.6500								
-156	1.562	1-9/16	1.734	+.035/- .025	.062	+/- .003	+.005/- .000	1.674	.056	.052	0.8900						
-156	1.575	40mm	1.734					.078	.157	1.687	.056	.052	0.8900				
-162	1.625	1-5/8	1.804					.082	.164	1.743	.059	.051	1.0000				
-165	1.653	42mm	1.835					.083	.167	1.773	.060	.051	1.0400				
-168	1.688	1-11/16	1.874					.085	.170	1.810	.061	.050	1.0800				
-175	1.750	1-3/4	1.942					.083	.171	1.878	.064	.050	1.0300				
-181	1.812	1-13/16	2.012					.084	.170	1.944	.066	.050	1.1500				
-185	1.850	47mm	2.054					.085	.170	1.984	.067	.050	1.2800				
-187	1.875	1-7/8	2.054					.085	.170	2.011	.068	.050	1.2800				
-193	1.938	1-15/16	2.141					.085	.170	2.082	.072	.049	1.3300				
-200	2.000	2	2.210	+.040/- .030	.078	+/- .006/- .000	+.0015/- .000	2.144	.072	.048	1.4000						
-206	2.047	52mm	2.280					.091	.186	2.195	.074	.065	1.8000				
-206	2.062	2-1/16	2.280					.091	.186	2.210	.074	.065	1.8000				
-212	2.125	2-1/8	2.350					.096	.195	2.279	.077	.065	1.9400				
-218	2.165	55mm	2.415					.098	.199	2.327	.081	.064	1.9600				
-218	2.188	2-3/16	2.415					.098	.199	2.350	.081	.064	1.9600				
-225	2.250	2-1/4	2.490					.099	.203	2.420	.085	.064	2.1800				
-231	2.312	2-5/16	2.535					.100	.206	2.484	.086	.063	2.2600				
-237	2.375	2-3/8	2.630					.102	.207	2.552	.089	.063	2.3200				
-244	2.440	2-7/16	2.702					.103	.209	2.618	.089	.062	2.5400				
-250	2.500	2-1/2	2.775	.103	.210	2.684	.092	.062	2.5500								
-250	2.531	2-17/32	2.775	.103	.210	2.717	.093	.062	2.5500								
VHO-256	2.562	2-9/16	2.844	.109	.222	.093	2.750	.094	.078	3.4000		-1108					

TOOL DESCRIPTIONS ON PAGES 227, 228 & 229

VHO

DESCRIPTION

A 15° bevel on the outside diameter, when fitted into a 15° bevel on the load-bearing groove wall, yields rigid end-play take-up of manufacturing tolerances or wear on the retained part. Used in greasy and oily environments.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify the presence of a bevel along the outside diameter of the part.
2. Measure the bore diameter (Db).
3. Determine the ring thickness (T).
4. Confirm the maximum (S max) and minimum (S min) cross section of the ring.
5. Find the part in the chart above.

GENERAL USE

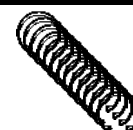


COMMON

ZINC/YELLOW



STACKED/ROLL PACK



GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

VHO

VVH (Page 21)

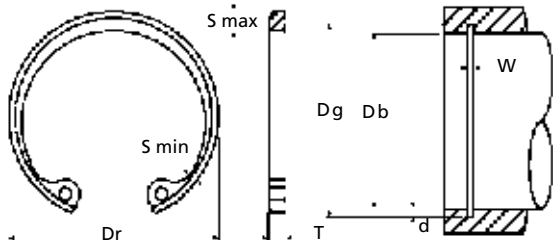
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.



METRIC
Page 174

VHO CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

WEDGES INTO GROOVE



BOX 232 • MINNEAPOLIS, KS • 67467


BEVELED INTERNAL
MANUFACTURER CROSS-REFERENCE

 INDEX
PAGE 236.

Anderton	N1302	Rotor Clip	VHO	Military	16631
Ellison	9002	Waldes	N5002		



VHO	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	TOOL 			
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S) Min | Max	Wall Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)						
VHO-262	2.625	2-5/8	2.910	+ .040/- .030	.111	.226	.093	+/- .003	2.820	.097	+ .0015/- .000	3.4500	-1108	
-268	2.677	68mm	2.980		.113	.230			2.876	.099		.077		3.5000
-268	2.688	2-11/16	2.980		.113	.230			2.887	.099		.076		3.5000
-275	2.750	2-3/4	3.050		.115	.234			2.955	.102				3.5500
-281	2.812	2-13/16	3.121		.115	.230			3.020	.104				3.6000
-281	2.835	72mm	3.121		.115	.230			3.043	.104				3.6000
-287	2.875	2-7/8	3.191		.120	.240			3.085	.105		.074		4.1000
-295	2.953	75mm	3.325		.122	.250			3.178	.112				4.2500
-300	3.000	3	3.325		.122	.250			3.225	.112		4.2500		
-306	3.062	3-1/16	3.418		.126	.254			3.290	.114		+ .002/- .000		5.3000
-312	3.125	3-1/8	3.488	.129	.259	3.355	.115	5.6000						
-315	3.149	80mm	3.523	.129	.262	3.381	.116	5.7000						
-315	3.156	3-5/32	3.523	.129	.262	3.388	.116	5.7000						
-325	3.250	3-1/4	3.623	.135	.269	3.489	.119	6.0000						
-334	3.346	3-11/32	3.734	.140	.276	3.591	.122	6.5000						
-347	3.469	3-15/32	3.857	.144	.286	3.726	.128	6.9000						
-350	3.500	3-1/2	3.890	.142	.289	3.760	.130	7.1000						
-354	3.543	90mm	3.936	.142	.292	3.806	.132	7.2000						
-354	3.562	3-9/16	3.936	.142	.292	3.830	.134	7.2000						
-362	3.625	3-5/8	4.024	.150	.299	3.900	.137	7.3000						
-375	3.740	95mm	4.157	.155	.309	4.030	.145	7.8000						
-375	3.750	3-3/4	4.157	.155	.309	4.040	.145	7.8000						
-387	3.875	3-7/8	4.291	.160	.319	4.171	.148	8.7000						
-393	3.938	3-15/16	4.358	.161	.324	4.236	.149	8.8000						
-400	4.000	4	4.424	.166	.330	4.302	.151	9.3000						
-412	4.125	4-1/8	4.558	.171	.330	4.433	.154	9.7000						
-425	4.250	4-1/4	4.691	.180	.335	4.562	.156	10.1000						
-433	4.331	110mm	4.756	.180	.343	4.647	.158	10.5000						
-450	4.500	4-1/2	4.940	.181	.351	4.824	.162	11.1000						
-462	4.625	4-5/8	5.076	.183	.360	4.955	.165	11.7000						
-475	4.724	120mm	5.213	.183	.370	5.060	.168	12.4000						
-475	4.750	4-3/4	5.213	.183	.370	5.086	.168	12.4000						
-500	5.000	5	5.485	.186	.390	5.346	.173	13.6000						
-525	5.250	5-1/4	5.770	.198	.408	5.612	.181	17.4000						
-537	5.375	5-3/8	5.910	.198	.408	5.739	.182	17.9000						
-550	5.500	5-1/2	6.066	.198	.408	5.864	.182	18.3000						
-575	5.750	5-3/4	6.336	.198	.408	6.120	.185	19.2000						
-600	6.000	6	6.620	.198	.435	6.374	.187	20.1000						
-625	6.250	6-1/4	6.895	.211	.423	6.642	.196	26.6000						
-650	6.500	6-1/2	7.170	.219	.438	6.908	.204	28.1000						
-662	6.625	6-5/8	7.308	.221	.447	7.042	.208	30.5000						
-675	6.750	6-3/4	7.445	.224	.456	7.174	.212	32.5000						
-700	7.000	7	7.720	.232	.474	7.441	.220	34.4000						
-725	7.250	7-1/4	7.995	.238	.489	7.708	.229	42.8000						
-750	7.500	7-1/2	8.270	.247	.507	7.974	.237	48.5000						
-775	7.750	7-3/4	8.545	.255	.523	8.240	.245	52.0000						
-800	8.000	8	8.820	.262	.540	8.507	.253	55.5000						
-825	8.250	8-1/4	9.095	.270	.558	8.773	.261	60.3000						
-850	8.500	8-1/2	9.285	.277	.573	9.040	.270	63.4000						
-875	8.750	8-3/4	9.558	.286	.591	9.307	.278	65.3000						
-900	9.000	9	9.830	.294	.609	9.573	.286	73.2000						
-925	9.250	9-1/4	10.102	.299	.625	9.838	.294	76.7000						
-950	9.500	9-1/2	10.375	.304	.642	10.106	.303	80.3000						
-975	9.750	9-3/4	10.648	.309	.658	10.372	.311	83.3000						
VHO-1000	10.000	10	10.920	.315	.675	10.639	.319	86.3000						

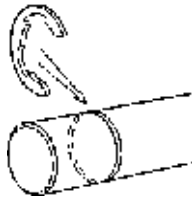
TOOL DESCRIPTIONS ON PAGES 227, 228 & 229.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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EXTERNAL

**INSTALLED
RADIALLY
ONTO A
SHAFT**



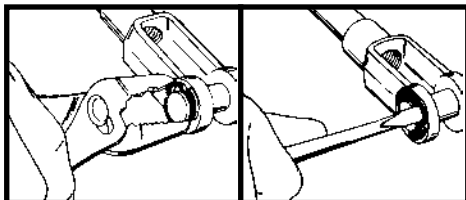
**USING
AN
APPLICATOR**



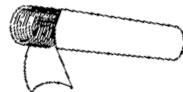
	E	BASIC E-CLIP			Most common clip. Large shoulder.
		<u>IMPERIAL</u> Pg: 26	<u>METRIC</u> Pg: 182	<u>ANSI</u> Pg: 188	
	RE	REINFORCED E-CLIP			Higher strength variation of the Basic E-Clip.
		<u>IMPERIAL</u> Pg: 27	<u>METRIC</u> Pg: 183	<u>ANSI</u> Pg: 188	
	RG	RADIAL GRIP RING			Grooveless for light duty applications.
		<u>IMPERIAL</u> Pg: 27	<u>METRIC</u> N/A		
	BE	BOWED E-CLIP			Bowed design for end-play take-up.
		<u>IMPERIAL</u> Pg: 28	<u>METRIC</u> N/A		
	A15	MUTANTS			Application specific by special order.
		<u>IMPERIAL</u> Pg: 29	<u>METRIC</u> N/A		
	PO	POODLE RING			Heavy duty with highest load ratings.
		<u>IMPERIAL</u> Pg: 30	<u>METRIC</u> N/A		
	POL	LIGHT DUTY POODLE RING			Fits in standard E-Clip grooves.
		<u>IMPERIAL</u> Pg: 30	<u>METRIC</u> N/A		
	ST	SLOTTED E-CLIP			For easy removal using a screwdriver.
		<u>IMPERIAL</u> N/A	<u>METRIC</u> Pg: 183		
	JE	JAPANESE E-CLIP			Japanese Industrial Specification (JIS).
		<u>IMPERIAL</u> N/A	<u>METRIC</u> Pg: 184		
	EBS	BRITISH STANDARD E-CLIP			British Specification.
		<u>IMPERIAL</u> N/A	<u>METRIC</u> Pg: 184		
	LC	INTERLOCKING			Two-piece balanced design for high rotational speeds.
		<u>IMPERIAL</u> Pg: 31	<u>METRIC</u> Pg: 187		
	C	BASIC C-CLIP			Low profile. Light duty.
		<u>IMPERIAL</u> Pg: 32	<u>METRIC</u> Pg: 186	<u>ANSI</u> Pg: 189	
	EL	PRONG LOCK			Hybrid design for end-play take-up and high rotational speeds.
		<u>IMPERIAL</u> Pg: 33	<u>METRIC</u> Pg: 187		

TOOLS Pages: 232-234

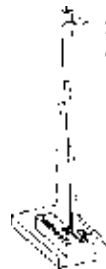
All metric numbers begin with "D" and all ANSI numbers begin with "M."

AUTOMATED INSTALLATIONAftermarket and short runs.

Use common items from your toolbox.

For original equipment manufacturing.

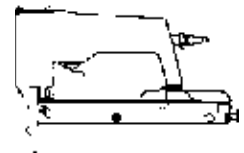
Most types available in a roll pack for **reduced handling costs**. For use with an applicator.



Slide roll pack on rail.

Remove label.

Ready to go!



Automated "staple gun" equipment is available as a special order.

CONTACT PLANT FOR DESIGN AND INSTALLATION ASSISTANCE.**MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS**

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PRODUCT COMPARISONS

There are no radially-assembled versions of spiral rings, thus in comparing clips to other retaining rings, only wire rings and Eaton™-style rings compare. Radial rings are generally easier to install, complete with market-ready automatic installation options. Clips use tapered sections that tend to maintain circularity or that possess toothlike grip points that yield greater thrust load ratings versus the constant section wire type rings.

Installed C-clip and E-clip with tapered section



Deep toothlike "grip points."

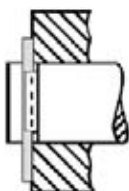
Installed constant section wire ring



Shallow and inconsistent groove contact.

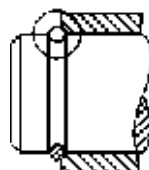
Note that in the above examples, the clips dig into deeper grooves than the wire ring. Note also how the E-clip "wraps" around the shaft 320° or so, while the wire ring wraps no more than 240°. From a side view, you can see that the high shoulder and rectangular cross-section of the E-clip provide more rigidity than the round wire ring shown.

Installed E-Clip



High collar . . . high thrust load.

Installed round wire ring.



Low profile . . . less thrust load.

Wire rings are made using a coiling technique, while clips are stamped. The stamping process is much faster. As a result, clips tend to be cheaper and more readily available in the marketplace. Finally, wire rings are a pain to install and remove because they have no lug holes or market-ready installation accessories.

Clip Removal



Wire Ring Removal



THRUST LOAD COMPARISON CLIPS VS. OTHER STYLES

CARBON SPRING STEEL

SHAFT SIZE	CLIPS		WIRE RINGS	
	E	C	XSO	
	Pg 26	Pg 32	Pg 80	
	Thrust Load	Thrust Load	Thrust Load	
1/4"	115	130	120	
1/2"	600	450	640	
3/4"	1500	1000	1390	

Thrust loads are expressed in pounds, based on groove shear with a safety factor of two (2). Eaton™-style ring thrust loads are based on load times 0.60 when the groove distortion is .005 or greater from bending axially. Actual results will be based on individual circumstances. These values are for reference only.

MATERIAL

**CARBON
SPRING STEEL**
 SAE 1060-1090
 (STANDARD)

Temperature Limits
 500°F Max
 -100°F Min

**PH15-7 MO
STAINLESS STEEL**
 AISI 632/AMS 5520
 (STANDARD ON
 MOST SIZES)

Temperature Limits
 900°F Max
 -100°F Min

**BERYLLIUM
COPPER**
 ALLOY #25/CDA #172
 (STANDARD ON
 SMALL SIZES)

Temperature Limits
 650°F Max
 -300°F Min

OTHER MATERIALS AVAILABLE ON REQUEST.

See page 33 for material comparisons.

FINISHES

**PHOSPHATE
COATING**
 (STANDARD)

Inhibits rust
 during storage.

**MECHANICAL
ZINC YELLOW**
 (STANDARD)

96 hour salt spray.

**ZINC YELLOW
WITH LACQUER**
 (SPECIAL ORDER)

250 hour salt spray.

OTHER FINISHES, INCLUDING CADMIUM, AVAILABLE ON REQUEST.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

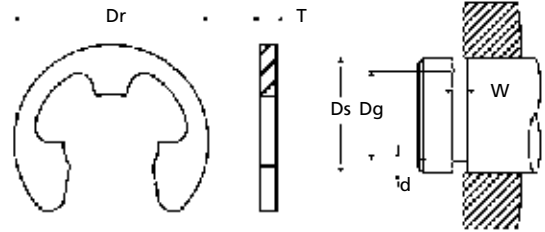


BASIC E-CLIP

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	N1500	IRR	1000	Waldes	5133
Ellison	E	Rotor Clip	E	Military	16633



E	SHAFT		RING		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"	
E-004*	.040	1mm	.079	.010	.026	.007	.012	0.0009			-010
E-006	.062	1/16	.156		.052	.005		0.0030			-040
SE-006	.062	1/16	.140		.052	.005		0.0028			-020
YE-006	.062	1/16	.187		.052	.005		0.0094			-030
SE-009	.094	3/32	.230		.074	.010		0.0100			-050
E-009	.094	3/32	.187		.074	.010		0.0058			-510
SE-011	.110	7/64	.375		.079	.015		0.0310			-060
SE-012	.125	1/8	.214		.095	.015		0.0120			-
E-012	.125	1/8	.230		.095	.015		0.0087			-050
SE-014	.140	9/64	.203		.102	.019		0.0060			-080
YE-014	.140	9/64	.250	.015	.110	.015	.020	0.0100			-090
E-014	.140	9/64	.270		.105	.017		0.0210			-070
SE-015	.156	5/32	.375		.118	.019		0.0760			-
E-015	.156	5/32	.282		.116	.020		0.0210			-100
SE-017	.172	11/64	.312		.127	.022		0.0240			-110
SE-018	.188	3/16	.375		.125	.031		0.0450			-130
YE-018	.188	3/16	.470		.147	.020		0.0700			-
ZE-018	.188	3/16	.550		.125	.031		0.1050			-
E-018	.188	3/16	.335		.147	.020		0.0290			-120
SE-021	.219	7/32	.437		.188	.015	.029	0.0470			-140
E-025	.250	1/4	.527	.025	.210	.020		0.0760			-150
SE-031	.312	5/16	.500		.250	.031		0.0570			-160
YE-031	.312	5/16	.670		.250	.031		0.1220			-
SE-037	.375	3/8	.567		.306	.034		0.1050			-290
E-037	.375	3/8	.660		.303	.036		0.1500			-170
E-043	.438	7/16	.687		.343	.047	.039	0.1500			-180
SE-043	.438	7/16	.600		.380	.029		0.1000			-190
E-050	.500	1/2	.800		.396	.052		0.2500			-200
E-062	.625	5/8	.940		.485	.070		0.3200			-210
SE-074	.750	3/4	1.000		.625	.062		0.4300			-220
E-075	.750	3/4	1.120		.580	.085		0.5800			-230
E-087	.875	7/8	1.300		.675	.100	.056	0.7600			-240
SE-098	.984	63/64	1.500		.835	.074		0.9200			-250
SE-098	1.000	1	1.500		.835	.082		0.9200			-250
SE-118	1.188	1-3/16	1.626	.062	1.079	.054		1.1300			-260
SE-137	1.375	1-3/8	1.875		1.230	.072		1.5400			-

* May be beryllium copper instead of carbon steel.

E RE	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Stamped clips for deep grooves with three prongs that yield high thrust load capacity. RE rings are heavier duty for higher thrust loads and 50% higher RPM's.	<ol style="list-style-type: none"> Determine if you have an E or RE based on shoulder design and appearance. Confirm the diameter of the shaft (Ds). Measure the outside diameter (Dr) of the ring. Determine the ring thickness (T). Find the part in the charts. 	 COMMON	 STACKED/ROLL PACK
<p>RADIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>E POL (Page 30)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				

HEAVY DUTY

BOX 232 • MINNEAPOLIS, KS • 67467



REINFORCED E-CLIP

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

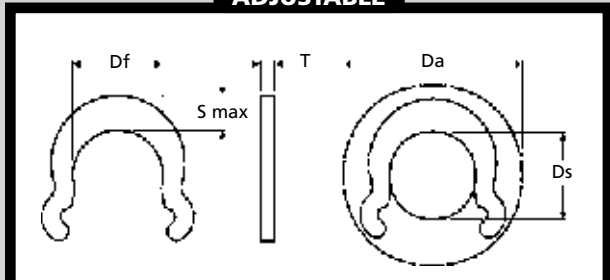
Anderton	N1540	Rotor Clip	RE	Military	3215
IRR	1200	Waldes	5144		



RE	SHAFT		RING		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
RE-009	.094	3/32	.206	.015	.074	.010	.020	0.0070			-080
-012	.125	1/8	.270		.095	.015		0.0130			-520
-015	.156	5/32	.335		.116	.020		0.0310			-120
-018	.188	3/16	.375		.147	.020		0.0390			-130
-021	.219	7/32	.446		.188	.015	.029	0.0540			-140
-025	.250	1/4	.516	.025	.210	.020		0.0710			-160
-031	.312	5/16	.588		.250	.031		0.0850			-500
-031A	.312	5/16	.588		.250	.031		0.0850			-TC-2
-037	.375	3/8	.660		.303	.036	.039	0.1500			-170
-043	.438	7/16	.746	.035	.343	.047		0.1900			-270
-050	.500	1/2	.810		.396	.052		0.3200			-200
RE-056	.562	9/16	.870		.437	.062		0.3500			-280

TOOL DESCRIPTIONS ON PAGE 232.

ADJUSTABLE



RADIAL GRIP RING

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Rotor Clip	RG	
Waldes	5135	



RG	SHAFT			RING		WEIGHT		MATERIAL	TOOL
	From (Ds)	To (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Thickness (T)	Max. Radial Wall Width (S)	Assembled Outside Dia. (Da)		
RG-009	.092	.096	3/32	.089	.025	.045	.300	0.0140	-RG009
-012	.123	.127	1/8	.119		.054	.340	0.0190	-RG012
-015	.154	.158	5/32	.149		.078	.380	0.0270	-RG015
-018	.185	.189	3/16	.179		.085	.440	0.0450	-RG018
-025	.248	.252	1/4	.238		.100	.540	0.0740	-RG025
-031	.310	.316	5/16	.298	.042	.114	.660	0.1100	-RG031
RG-037	.373	.379	3/8	.356		.130	.760	0.1500	-RG037

RG

DESCRIPTION

Grip rings are stamped grooveless retainers that are radially applied using an applicator. Because there is no groove, the part may be adjusted on the shaft to take up end-play. Load capacity will be reduced if the part is reused.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm the diameter of the shaft (Ds).
2. Measure the free inside diameter (Df) of the part.
3. Calculate the ring thickness (T).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

ZINC/YELLOW



STACKED/ROLL PACK



RG

SHF (Page 14)

TX (Page 92)

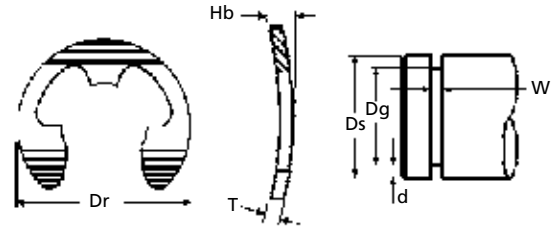
TY (Page 92)

T99 (Page 101)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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CURVED SHAPE



BOWED E-CLIP

MANUFACTURER CROSS-REFERENCE

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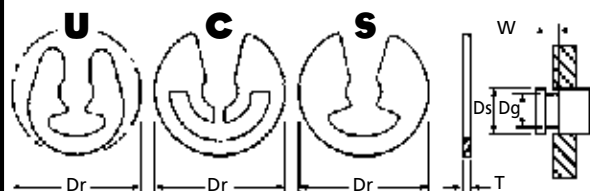
Anderton	N1501	Rotor Clip	BE	Military	16634
IRR	1001	Waldes	5131		

BE	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Outside Dia. (Dr)	Bow Height (Hb) Min	Max	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "SS"	
BE-009	.094	3/32	-	.025	.035	.020	.074	-	.045	-	-	-
BSE-011	.110	7/64	.375	.025	.035	.010	.079	.015	.022	0.0020	-	-550
BE-012	.125	1/8	.230	.025	.035	.010	.095	.015	.022	0.0060	-	-551
BSE-014	.140	9/64	.203	.022	.032	.015	.102	.019	.019	0.0040	-	-553
BE-014	.140	9/64	.270	.028	.038	.015	.105	.017	.025	0.0130	-	-552
BE-015	.156	5/32	.282	.030	.040	.015	.116	.020	.027	0.0130	-	-554
BSE-017	.172	11/64	.312	.032	.042	.015	.127	.022	.029	0.0160	-	-555
BE-018	.188	3/16	.335	.033	.043	.015	.147	.020	.030	0.0170	-	-556
BSE-018	.188	3/16	.375	.038	.048	.015	.125	.031	.035	0.0270	-	-557
BSE-021	.219	7/32	.437	.043	.058	.025	.188	.015	.040	0.0280	-	-558
BE-025	.250	1/4	.527	.050	.065	.025	.210	.020	.047	0.0760	-	-559
BSE-031	.312	5/16	.500	.050	.065	.035	.250	.031	.047	0.0570	-	-560
BE-037	.375	3/8	.660	.060	.076	.035	.303	.036	.060	0.1500	-	-561
BE-043	.438	7/16	.687	.060	.076	.035	.343	.047	.060	0.1500	-	-562
BSE-043	.438	7/16	.600	.060	.076	.042	.380	.029	.057	0.1000	-	-563
BE-050	.500	1/2	.800	.075	.093	.042	.396	.052	.073	0.2500	-	-564
BE-062	.625	5/8	.940	.080	.098	.050	.485	.070	.077	0.3200	-	-565
BSE-074	.744	18.9mm	1.000	.090	.110	.050	.625	.060	.085	0.4300	-	-566
BSE-074	.750	3/4	1.000	.090	.110	.050	.625	.062	.085	0.4300	-	-566
BE-075	.750	3/4	1.120	.090	.110	.050	.580	.085	.085	0.5800	-	-567
BE-087	.875	7/8	1.300	.090	.110	.050	.675	.100	.085	0.7600	-	-568
BSE-098	.984	63/64	1.500	.088	.112	.062	.835	.074	.085	0.9380	-	-569
BSE-098	1.000	1	1.500	.088	.112	.062	.835	-	.085	0.9380	-	-569
BSE-118	1.812	1-3/16	1.626	.109	.139	.062	1.079	-	.107	1.0500	-	-
BSE-137	1.375	1-3/8	1.875	.109	.139	.062	1.230	-	.107	1.5200	-	-

TOOL DESCRIPTIONS ON PAGE 233.

BE	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Curved shape for resilient end-play take-up. Install with the <i>concave</i> surface abutting the part. BE's are not recommended for use as a shoulder against rotating parts. For such applications, use the prong-locked EL's on page 33. RADIAL ASSEMBLY	<ol style="list-style-type: none"> 1. Verify bowed shape side profile. 2. Measure the diameter of the shaft (Ds). 3. Measure the outside diameter (Dr) of the ring. Determine the ring thickness (T). 4. Find the part in the chart above. 	 UNCOMMON	

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MUTANT E-CLIPS

MANUFACTURER CROSS-REFERENCE

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Anderton

A1500



A15U	SHAFT		RING		Thickness (T)	GROOVE		MATERIAL	TOOL
	Decimal (Ds)		Free Outside Dia. (Dr)	Installed Outside Diameter		Diameter (Dg)	Width (W)		
A15U-078	.110	+.040/- .000	.426	.430	.020 +/- .0015	.078	.023 +.002/- .000	Spring Steel	-80
-095	.125		.374	.380		.095			-4B
-125	.172	+.100/- .000	.500	.510		.125			-6B
-187	.218		.688	.700		.187			-29
A15U-281	.343		.780	.790		.281			-10A

A15C	SHAFT		RING		Thickness (T)	GROOVE		MATERIAL	TOOL
	Decimal (Ds)		Free Outside Dia. (Dr)	Installed Outside Diameter		Diameter (Dg)	Width (W)		
A15C-086	.110	+.040/- .000	.282	.297	.022	.086	.025	Spring Steel	-413
-120	.156		.320	.336	.024	.120	.027		-120
-124	.156		.406	.422	.015	.124	.017		-7A
-175	.218		.500	.517	.015	.175	.017		-9A
-181	.218		.430	.447	.028	.181	.031		-140
A15C-249	.312	+.100/- .000	.625	.642	.015	.249	.017		-16A

A15S	SHAFT		RING		Thickness (T)	GROOVE		MATERIAL	TOOL
	Decimal (Ds)		Free Outside Dia. (Dr)	Installed Outside Diameter		Diameter (Dg)	Width (W)		
A15S-052	.078	+.030/- .000	.250	.265	.015	.052	.017	Spring Steel	-090
-062	.078		.295	.305	.025	.062	.028		-100
-091	.125		.281	.291	.022	.091	.025		-4B
-102	.125		.376	.391	.025	.102	.017		-060
-120	.156		.310	.336	.024	.120	.027		-120
-126	.188	+.075/- .000	.350	.365	.024	.126	.027		-AM56
A15S-389	.468		.687	.705	.028	.389	.031		-12A

A15U A15C A15S	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	SPECIAL FINISHES AND PACKAGING AVAILABLE UPON REQUEST.
	Standard E-clips subjected to radioactive waste at a secret government test site that alters the genetic make-up in ways that cause the parts to grow extra limbs and teeth. These extras yield design characteristics that only a mutant engineer can understand. RADIAL ASSEMBLY	<ol style="list-style-type: none"> Look at the silhouette of the part and decide if you have a "C", "U", or "S" version. Get it? It spells CUS. Measure the free outside diameter (Dr). Find the part in the charts above. Verify the correct material thickness. 	 WEIRD	

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POL REPLACES E-CLIPS

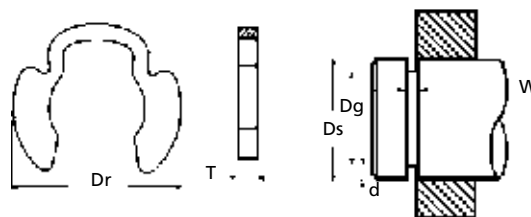


POODLE CLIP RING

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Rotor Clip	PO/POL
Waldes	5304/T5304



PO	SHAFT		RING		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"	
PO-015	.156	5/32	.320	.035	.120 +/- .004	.018	.039	0.0420			-815
-018	.188	3/16	.400	.035	.148 +/- .005	.020	.039	0.0630			-818
-025	.250	1/4	.482	.035	.210 +/- .006	.020	.039	0.0840			-825
-031	.312	5/16	.588	.042	.272 +/- .006	.020	.046	0.1460			-831
-037	.375	3/8	.680	.042	.331 +/- .008	.022	.046	0.1920			-837
-043	.438	7/16	.752	.050	.390 +/- .008	.024	.056	0.2660			-843
-050	.500	1/2	.826	.050	.440 +/- .010	.030	.056	0.3300			-850
-062	.625	5/8	.966	.050	.531 +/- .010	.047	.056	0.4650			-
-075	.750	3/4	1.095	.062	.632 +/- .010	.059	.068	0.6350			-
-100	1.000	1	1.415	.078	.860 +/- .015	.070	.086	1.2650			-
-125	1.250	1-1/4	1.800	.093	1.090 +/- .015	.080	.103	2.5200			-
-150	1.500	1-1/2	2.050	.109	1.317 +/- .015	.091	.120	3.6300			-
-175	1.750	1-3/4	2.300	.125	1.480 +/- .015	.135	.139	5.3000			-
PO-200	2.000	2	2.650	.125	1.730 +/- .015	.135	.139	6.9200			-

POL	SHAFT		RING		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"	
POL-015	.156	5/32	-	.025	.120 +/- .004	.018	.029	0.0300			-915
-018	.188	3/16	.400	.025	.148 +/- .005	.020	.029	0.0450			-918
-025	.250	1/4	.482	.025	.210 +/- .006	.020	.029	0.0600			-925
-031	.312	5/16	.588	.035	.272 +/- .006	.020	.039	0.0870			-931
-037	.375	3/8	.680	.035	.331 +/- .008	.022	.039	0.1600			-937
-043	.438	7/16	.752	.042	.390 +/- .008	.024	.046	0.1860			-943
-050	.500	1/2	.826	.042	.440 +/- .010	.030	.046	0.2770			-950
-062	.625	5/8	.966	.050	.531 +/- .010	.047	.056	0.3650			-
-075	.750	3/4	1.095	.050	.632 +/- .010	.059	.056	0.5350			-
POL-100	1.000	1	1.415	.050	.860 +/- .015	.070	.056	0.8600			-

PO POL	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Radially-assembled heavy duty ring with large shoulders ("ears") and thicker material than E-clips. Install using an applicator or standard pliers and screwdriver. The POL will interchange into standard E-clip grooves.	1. Note that the POL is thinner than the PO. 2. Measure the diameter of the shaft (Ds). 3. Measure the outside diameter (Dr) of the ring. Determine the ring thickness (T). 4. Find the part in the charts above.	 UNCOMMON	
<p>RADIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>POL ← → E (Page 26)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				
				STACKED/ROLL PACK

PO/POL ASSEMBLY

PO and POL rings can be assembled quickly and economically with a variety of tools, including the applicators shown on page 233.



The rings can be installed easily with a pair of pliers . . .

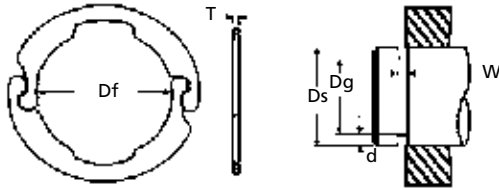


. . . and removed quickly with a screwdriver. The ring is reusable after disassembly.

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INTERLOCKING RING
MANUFACTURER CROSS-REFERENCE

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PAGE 236.


Rotor Clip

LC



Waldes

5107



LC	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	TOOL 
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Thickness (T)	Assembled Outside Diameter	Diameter (Dg)	Depth (d)	Width (W)			
LC-046	.469	15/32	.414	.035	+.002	.640	.419	.025	.039	+.003/- .000	0.1360
-050	.500	1/2	.459			.680	.464	.018			
-059	.594	19/32	.538	.042	+.002	.766	.544	.025	.046	+.003/- .000	0.1740
-062	.625	5/8	.569			.797	.575				
-066	.669	17mm	.593	.050	+.002	.886	.599		.056	+.004/- .000	0.3100
-075	.750	3/4	.673			.967	.680				
-078	.781	25/32	.703	.062	+.003	.998	.711	.035	.068	+.005/- .000	0.3500
-087	.875	7/8	.796			1.092	.805				
-098	.984	63/64	.863	.078	+.003	1.273	.872	.056	.086	+.005/- .000	0.3600
-098	1.000	1	.863			1.273	.872	.064			
-112	1.125	1-1/8	1.002	.093	+.003	1.420	1.013		.103	+.005/- .000	0.7300
-118	1.188	1-3/16	1.064			1.480	1.075				
-125	1.250	1-1/4	1.126	.109	+.003	1.540	1.138	.056	.103	+.005/- .000	0.7900
-137	1.375	1-3/8	1.250			1.670	1.263				
-150	1.500	1-1/2	1.374	.109	+.003	1.790	1.388		.120	+.005/- .000	0.8500
-156	1.562	1-9/16	1.412			1.910	1.427				
-162	1.625	1-5/8	1.474	.062	+.005	1.970	1.489	.068	.068	+.004/- .000	0.8900
-175	1.750	1-3/4	1.597			2.100	1.614				
-175	1.772	45mm	1.597	.078	+.006	2.100	1.614	.078	.086	+.005/- .000	0.9600
-187	1.875	1-7/8	1.721			2.220	1.739	.068			
-196	1.969	1-31/32	1.779	.093	+.006	2.370	1.797	.086	.103	+.005/- .000	1.0600
-200	2.000	2	1.809			2.400	1.828				
-212	2.125	2-1/8	1.933	.109	+.006	2.520	1.953	.086	.103	+.005/- .000	1.6400
-212	2.156	2-5/32	1.933			2.520	1.953	.101			
-225	2.250	2-1/4	2.057	.062	+.006	2.650	2.078		.103	+.005/- .000	1.7500
-237	2.375	2-3/8	2.180			2.770	2.203				
-250	2.500	2-1/2	2.304	.078	+.006	2.900	2.328	.086	.103	+.005/- .000	1.8400
-262	2.625	2-5/8	2.428			3.020	2.453				
-275	2.750	2-3/4	2.518	.093	+.006	3.250	2.544		.103	+.005/- .000	1.8400
-287	2.875	2-7/8	2.642			3.370	2.669				
-300	3.000	3	2.754	.109	+.006	3.500	2.794	.103	.120	+.005/- .000	2.0800
-325	3.250	3-1/4	3.013			3.750	3.044				
LC-337	3.375	3-3/8	3.114			3.990	3.145	.115	.120		3.1000

 SEE
PAGE
32.

LC	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Two-part radially-assembled ring with semicircular halves held together by interlocking prongs. Symmetrical shape "balances" the part to withstand high rotational speeds. Attractive appearance for exposed applications. RADIAL ASSEMBLY	1. Confirm the diameter of the shaft (Ds). 2. Measure the free diameter (Df). 3. Determine the thickness (T). 4. Find the part in the chart above.	 UNCOMMON	 STACKED/ROLL PACK NOT AVAILABLE



LC INSTALLATION ON PAGE 32.

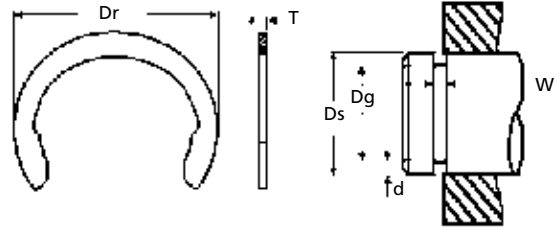
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LOW PROFILE



BASIC C-CLIP

MANUFACTURER CROSS-REFERENCE

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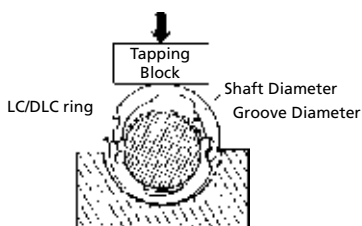
Anderton	N1800	IRR	2000	Waldes	5103
Ellison	9103	Rotor Clip	C	Military	16632

C	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL		TOOL
	Decimal (Ds)	Fraction (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Assembled Outside Diameter	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
C-012	.125	1/8	.165	.015	.18	.106	+.000/- .0015	.0095	0.0030			-300
-015	.156	5/32	.205		.22	.135		.0105	0.0052			-080
-018	.188	3/16	.244		.25	.165		.011	0.0062			-090
-021	.219	7/32	.275		.29	.193		.013	0.0120			-310
-023	.236	15/64	.295		.31	.208		.014	0.0150			-320
-025	.250	1/4	.311	.025	.33	.220	+.000/- .002	.015	0.0157			-330
-028	.281	9/32	.346		.36	.247		.017	0.0190			-340
-031	.312	5/16	.376		.39	.276		.018	0.0226			-350
-037	.375	3/8	.448		.47	.335		.020	0.0300			-360
-040	.406	13/32	.486		.50	.364		.021	0.0352			-370
-043	.438	7/16	.517	.035	.53	.393	+.000/- .003	.022	0.0359			-380
-050	.500	1/2	.581		.60	.450		.025	0.0671			-290
-056	.562	9/16	.653		.67	.507		.028	0.0710			-390
-062	.625	5/8	.715		.74	.563		.031	0.0937			-400
-068	.688	11/16	.784		.80	.619		.034	0.1300			-410
-075	.750	3/4	.845	.042	.87	.676	+.000/- .004	.037	0.1500			-280
-081	.812	13/16	.915		.94	.732		.040	0.1700			-420
-087	.875	7/8	.991		1.01	.789		.043	0.2000			-430
-093	.938	15/16	1.058		1.08	.843		.047	0.2300			-440
-100	1.000	1	1.130		1.15	.900		.050	0.2700			-450
-112	1.125	1-1/8	1.267	.050	1.30	1.013	+.000/- .005	.056	0.4000			-460
-125	1.250	1-1/4	1.415		1.44	1.126		.062	0.5100			-470
-137	1.375	1-3/8	1.555		1.58	1.237		.069	0.6100			-480
-150	1.500	1-1/2	1.691		1.72	1.350		.075	0.7600			-490
-162	1.625	1-5/8	1.853		1.88	1.483		.071	1.1000			-
-175	1.750	1-3/4	1.975	.062	2.01	1.576		.087	1.2900			-
C-200	2.000	2	2.257		2.30	1.800		.100	1.6200			-

TOOL DESCRIPTIONS ON PAGE 232.

C	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC / YELLOW
	Radially-assembled part that uses circular deformation for retention. Narrow section height provides good clearance capabilities. Absence of teeth and deep set means lower thrust load ratings than E-clips. Install using an applicator. RADIAL ASSEMBLY	1. Confirm the diameter of the shaft (Ds). 2. Measure the outside diameter (Dr) of the ring. 3. Determine the ring thickness (T). 4. Find the part in the chart above.	 COMMON	 STACKED / ROLL PACK

LC/DLC INSTALLATION



Make LC installation easier by building a V-block fixture like the one at the left, or let our shop build a fixture for you!

CONTINUED FROM PAGE 31.

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FOR ROTATING PARTS

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PRONG LOCKED E-CLIP

MANUFACTURER CROSS-REFERENCE

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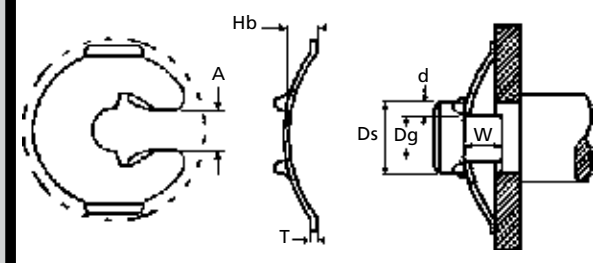


Rotor Clip

EL

Waldes

5139



EL	SHAFT		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	TOOL
	Decimal (Ds)	Fraction (Ds)	Gap (A)	Thickness (T)	Bow Height (Hb)		Diameter (Dg)	Depth (d)	Width (W)			
EL-009	.092	3/32	.063	.010	.050		.061	.016	.035	0.0230		-091
-012	.125	1/8	.086		.050		.082	.021	.035	0.0190		-112
-015	.156	5/32	.108		.055		.104	.026	.040	-		-115
-018	.188	3/16	.130		.060		.124	.032	.045	0.0470		-118
-025	.250	1/4	.172	.015	.070		.165	.042	.055	0.0770		-125
-031	.312	5/16	.234		.095		.228	.042	.080	0.1300		-131
-037	.375	3/8	.280		.130		.270	.052	.095	0.2200		-371
EL-043	.438	7/16	.340	.020	.130		.327	.055	.105	-		-143

EL

DESCRIPTION

Radially-installed part functions as both a shoulder and spring due to its curved shape and prongs. High thrust load capacity and unique design make this a good retainer against rotating parts. Install using an applicator or screwdriver.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the diameter of the shaft (Ds).
2. Determine the gap size (A).
3. Measure the thickness (T) and bow height (Hb).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

ZINC/YELLOW



HOW TO DETERMINE IF A PART IS SPRING STEEL OR STAINLESS STEEL

The way dorks do it . . .

Place a drop of 20% nitric acid solution on a cleaned portion of the ring.



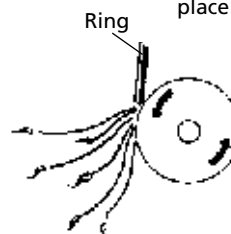
Stainless steel will remain unstained.



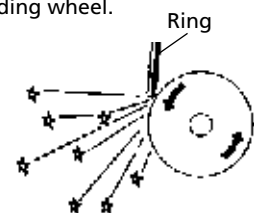
Spring steel will turn dark.

The fun way . . .

Hold the part with a pliers and place it on a grinding wheel.



Stainless steel will make curved tails.



Spring steel will look like fireworks.



WARNING: PLEASE PERFORM THESE TESTS WHILE UNDER ADULT SUPERVISION!

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SPIRAL RINGS

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EXTERNAL

INSTALLED
AXIALLY
ONTO A
SHAFT



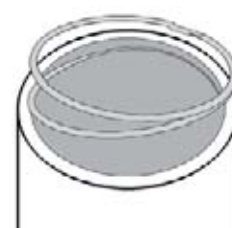
BY WINDING
THE PART INTO
A GROOVE.

	US LIGHT DUTY
	RS MEDIUM DUTY
	RST MEDIUM HEAVY
	RSN HEAVY DUTY
	KS SELF-LOCKING
	MS DISHED
	SSN TABBED
	AS METRIC AEROSPACE

IMPERIAL Pgs: 36-37	METRIC Pgs: N/A
IMPERIAL Pgs: 38-41	METRIC Pgs: N/A
IMPERIAL Pgs: 42-43	METRIC Pgs: N/A
IMPERIAL Pgs: 44-46	METRIC Pgs: N/A
IMPERIAL Pg: 47	METRIC N/A
IMPERIAL Pg: 48	METRIC N/A
IMPERIAL Pg: 49	METRIC N/A
IMPERIAL N/A	METRIC Pgs: 192-193

INTERNAL

INSTALLED
AXIALLY
INTO A
BORE



BY WINDING
THE PART INTO
A GROOVE.

	UR LIGHT DUTY
	RR MEDIUM DUTY
	RRT MEDIUM HEAVY
	RRN HEAVY DUTY
	KR SELF-LOCKING
	MR DISHED
	SRN TABBED
	BR BALANCED
	AH METRIC AEROSPACE

IMPERIAL Pgs: 50-51	METRIC Pgs: N/A
IMPERIAL Pgs: 52-55	METRIC Pgs: N/A
IMPERIAL Pgs: 56-57	METRIC Pgs: N/A
IMPERIAL Pgs: 58-60	METRIC Pgs: N/A
IMPERIAL Pg: 61	METRIC N/A
IMPERIAL Pg: 62	METRIC N/A
IMPERIAL Pg: 63	METRIC N/A
IMPERIAL Pgs: 64-65	METRIC N/A
IMPERIAL N/A	METRIC Pgs: 196-197

All metric numbers begin with "D".



Spiral rings are coiled from wire with minimal wasted material and using less expensive dies...



... vs. snap rings which are stamped from a sheet using special dies and tooling...

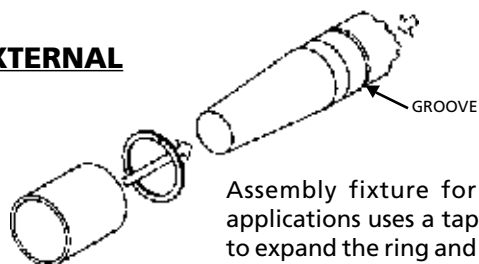
... which means that spiral rings have a



circular grain structure for high strength with lower tooling costs.

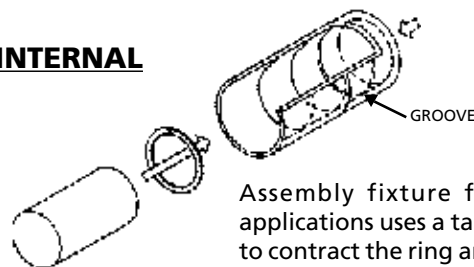
AUTOMATED INSTALLATION

EXTERNAL



Assembly fixture for external applications uses a tapered plug to expand the ring and a plunger to push the ring into position.

INTERNAL



Assembly fixture for internal applications uses a tapered sleeve to contract the ring and a plunger to push the ring into position.

LET OUR SHOP MAKE A FIXTURE FOR YOU!

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PRODUCT COMPARISONS



LOW PROFILE / HIGH STRENGTH





Retaining rings provide design and engineering benefits versus other fasteners. Spiral rings, in particular, use standard tools and are easier to install than cotter pins and washers. With a 360° abutment, spiral rings are more resilient in vibrating environments than standard threaded fastener combinations. With no lugs, spiral rings achieve these results while maintaining a low profile, such as in the drawing at the left.





"HOW DO SPIRAL RINGS STACK UP AGAINST OTHER RETAINING RING DESIGNS?"

An important element to the answer lies in how spiral rings are made. Spiral rings are coiled from wire, which means that there is no wasted "break out" like you have in stampings. More importantly, there is no special tooling. Each ring is precision cut, end-to end, using dies that are used on many different sizes, thus the cost is amortized over a much wider product line. In short, spiral rings possess cost advantages on large diameter and special material parts and prototypes. While not as common as snap rings, they offer some technical benefits that warrant consideration. The chart below compares an assortment of stainless steel retaining rings.

THRUST LOAD COMPARISON SPIRAL RINGS VERSUS OTHER TYPES

STAINLESS STEEL

EXTERNAL	SHAFT SIZE	SPIRAL RINGS		SNAP RING		EATON™ RING			
			RS		RSN		SH		USC
		Pg 38	Pg 44	Pg 6	Pg 68				
		Thrust Load		Thrust Load		Thrust Load		Thrust Load	
		1"	2150	2950	2100	1200			
2"	7110	11,470	8050	4010					
5"	36,050	52,560	37,100	17,110					
7"	63,790	103,400	72,700	39,920					

INTERNAL	BORE SIZE	SPIRAL RINGS		SNAP RING		EATON™ RING			
			RR		RRN		HO		UHB
		Pg 52	Pg 58	Pg 16	Pg 72				
		Thrust Load		Thrust Load		Thrust Load		Thrust Load	
		1"	1910	2310	2800	1470			
2"	7090	10,040	10,300	4000					
5"	36,050	65,095	55,000	17,110					
7"	63,790	110,410	93,100	34,950					

CARBON SPRING STEEL COMPARISON ON PAGE 5

CARBON SPRING STEEL COMPARISON ON PAGE 5.

Thrust loads are expressed in pounds, based on groove shear with a safety factor of two (2).
 Eaton™-style ring thrust loads are based on load times 0.60 when the ring distortion is .005 or greater from bending axially.
 Actual results will be based on individual circumstances. These values are for reference only.

MATERIAL

CARBON STEEL	STAINLESS STEEL 302	STAINLESS STEEL 316	BERYLLIUM COPPER	INCONEL X-75°	ALLOY A-286
(STANDARD)	(STANDARD)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)

OTHER MATERIALS AVAILABLE ON REQUEST.

See page 33 for material comparisons.

FINISHES

OIL DIPPED	BLACK OXIDE	CADMIUM	PHOSPHATE	PASSIVATE
(STANDARD)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)

OTHER FINISHES AVAILABLE ON REQUEST.

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EXTERNAL SPIRAL RINGS

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SINGLE TURN

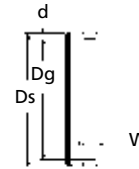
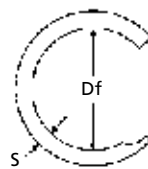


EXTERNAL LIGHT DUTY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Assoc. Spring	CE	Smalley	VS
Ramsey	US	Spirolox	US



US	SHAFT		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL															
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"														
US-050	.500	1/2	.467	.045	+.000/- .013	.018	+.0015	.472	.014	.022	+.002/- .000	0.0320														
-056	.562	9/16	.529					.534				0.0360														
-062	.625	5/8	.591					.597				0.0400														
-068	.687	11/16	.652					.659				0.0440														
-075	.750	3/4	.715					.722				0.0480														
-081	.812	13/16	.762					.770				0.0900														
-087	.875	7/8	.825	.065		.021		+.0015	.833	.021		.026			+.002/- .000	0.0980										
-093	.937	15/16	.886						.895							0.1050										
-100	1.000	1	.949						.958							0.1120										
-106	1.062	1-1/16	1.008						1.018							0.1940										
-112	1.125	1-1/8	1.071						1.081							0.2060										
-118	1.187	1-3/16	1.132						1.143							0.2170										
-125	1.250	1-1/4	1.194	.088	+.000/- .015	.025	+.004		.022	.031	+.002/- .000	0.2290														
-131	1.312	1-5/16	1.255									1.268								0.2410						
-137	1.375	1-3/8	1.318									1.331								0.2520						
-143	1.437	1-7/16	1.379									1.393								0.2640						
-150	1.500	1-1/2	1.442									1.456								0.2760						
-156	1.562	1-9/16	1.488									1.505								0.4860						
-162	1.625	1-5/8	1.550	.118		+.000/- .020		.029	+.005	.029		+.003/- .000			0.5060											
-168	1.687	1-11/16	1.612												1.630							0.5250				
-175	1.750	1-3/4	1.674												1.693							0.5450				
-181	1.812	1-13/16	1.736												1.755							0.5640				
-187	1.875	1-7/8	1.798												1.818							0.5840				
-193	1.937	1-15/16	1.859												1.880							0.6030				
-200	2.000	2	1.922	.031	+.002		.038	+.006		.039	+.003/- .000				0.6230											
-206	2.062	2-1/16	1.963												1.986									0.8600		
-212	2.125	2-1/8	2.026												2.049									0.8860		
-218	2.187	2-3/16	2.087												2.111									0.9120		
-225	2.250	2-1/4	2.149												2.174									0.9380		
-231	2.312	2-5/16	2.211												2.236									0.9640		
-237	2.375	2-3/8	2.273	.158		+.000/- .025	.038		+.006	.039		+.003/- .000			0.9900											
-243	2.437	2-7/16	2.335												2.361											1.0170
-250	2.500	2-1/2	2.397												2.424											1.0430
US-256	2.562	2-9/16	2.458												2.486											1.0680

US

DESCRIPTION

Light-duty single turn rings used in low clearance applications. Also used as a positioning point for light loads. Radius notch on one end for removal. Narrow radial wall yields moderate thrust loads.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure the free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

**NO TOOLS
NEEDED
TO INSTALL.**

RADIUS REMOVAL
NOTCH ON END.



US CONTINUED NEXT PAGE.

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SINGLE TURN

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EXTERNAL LIGHT DUTY
MANUFACTURER CROSS-REFERENCE

 INDEX
PAGE 236.

Assoc. Spring

CE

Smalley

VS

Ramsey

US

Spirolox

US



US	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
US-262	2.625	2-5/8	2.521	.158	.031	2.549	.038	.039	1.0950		
-268	2.687	2-11/16	2.582			2.611			1.1210		
-275	2.750	2-3/4	2.644			2.674			1.1470		
-281	2.812	2-13/16	2.706			2.736			1.1730		
-287	2.875	2-7/8	2.768			2.799			1.1990		
-293	2.937	2-15/16	2.830	.188	.039	2.861	.046	.044	1.2250		
-300	3.000	3	2.892			2.924			1.2510		
-306	3.062	3-1/16	2.938			2.970			1.9340		
-312	3.125	3-1/8	3.001			3.033			1.9750		
-318	3.187	3-3/16	3.062			3.095			2.0130		
-325	3.250	3-1/4	3.125			3.158			2.0530		
-331	3.312	3-5/16	3.186			3.220			2.0920		
-337	3.375	3-3/8	3.248			3.283			2.1310		
-343	3.437	3-7/16	3.310			3.345			2.1710		
-350	3.500	3-1/2	3.372			3.408			2.2100		
-356	3.562	3-9/16	3.433	.225	.046	3.470	.055	.052	2.2490		
-362	3.625	3-5/8	3.496			3.533			2.2890		
-368	3.687	3-11/16	3.557			3.595			2.3280		
-375	3.750	3-3/4	3.620			3.658			2.3680		
-381	3.812	3-13/16	3.681			3.720			2.4060		
-387	3.875	3-7/8	3.743			3.783			2.4460		
-393	3.937	3-15/16	3.805			3.845			2.4850		
-400	4.000	4	3.867			3.908			2.5240		
-412	4.125	4-1/8	3.973			4.015			3.7070		
-425	4.250	4-1/4	4.097			4.140			3.8180		
-437	4.375	4-3/8	4.221	.265	.061	4.265	.067	.067	3.9300		
-450	4.500	4-1/2	4.345			4.390			4.0420		
-462	4.625	4-5/8	4.468			4.515			4.1530		
-475	4.750	4-3/4	4.592			4.640			4.2640		
-487	4.875	4-7/8	4.715			4.765			4.3750		
-500	5.000	5	4.839			4.890			4.4860		
-525	5.250	5-1/4	5.067			5.119	.072	.067	6.2550		
-550	5.500	5-1/2	5.309			5.363			6.5460		
-575	5.750	5-3/4	5.550			5.606			6.8350		
-600	6.000	6	5.792			5.850			7.1260		
-625	6.250	6-1/4	6.033			6.094			8.7900		
-650	6.500	6-1/2	6.275			6.338			9.1320		
-675	6.750	6-3/4	6.515			6.581			9.4710		
-700	7.000	7	6.757			6.825			9.8140		
-725	7.250	7-1/4	6.998	.300	.061	7.069	.091	.067	11.5510		
-750	7.500	7-1/2	7.240			7.313			11.9380		
-775	7.750	7-3/4	7.480			7.556			12.3230		
-800	8.000	8	7.722			7.800			12.7100		
-825	8.250	8-1/4	7.964			8.044			19.1840		
-850	8.500	8-1/2	8.205			8.288			19.7440		
-875	8.750	8-3/4	8.446			8.531			20.3070		
-900	9.000	9	8.687			8.775			20.8690		
-925	9.250	9-1/4	8.929			9.019	.113	.082	21.4330		
-950	9.500	9-1/2	9.170			9.263			21.9960		
-975	9.750	9-3/4	9.411			9.506			22.5570		
US-1000	10.000	10	9.653			9.750			23.1210		

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EXTERNAL SPIRAL RINGS

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MOST POPULAR

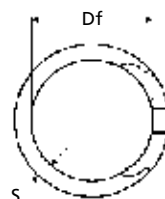


EXTERNAL MEDIUM DUTY

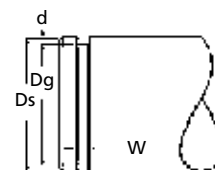
MANUFACTURER CROSS-REFERENCE

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Assoc. Spring	AE	Smalley	WS	Aerospace	AS3218
Ramsey	RS	Spirolox	RS	Military	MIL-R-27426A1




RS-050/
RS-150



RS-156
and up

RS	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
RS-050	.500	1/2	.467	.045	.025	.474	.013	.030	0.0440		
-053	.531	17/32	.498			.505			0.0480		
-055	.551	14mm	.518			.525			0.0500		
-056	.562	9/16	.529			.536			0.0510		
-059	.594	19/32	.561			.569			0.0540		
-062	.625	5/8	.585			.594			0.0700		
-065	.656	21/32	.617			.625			0.0740		
-066	.669	17mm	.629			.638			0.0750		
-068	.687	11/16	.647			.656			0.0770		
-071	.718	23/32	.679			.687			0.0810		
-075	.750	3/4	.710	.055	.031	.719	.016	.036	0.1270		
-078	.781	25/32	.741			.750			0.1320		
-081	.812	13/16	.771			.781			0.1380		
-084	.843	27/32	.803			.812			0.1430		
-087	.875	7/8	.828			.838			0.1480		
-090	.906	29/32	.860			.869			0.1530		
-093	.937	15/16	.889			.900			0.1570		
-096	.968	31/32	.916			.925			0.2260		
-098	.984	63/64	.930			.941			0.2310		
-100	1.000	1	.946			.957			0.2340		
-102	1.023	26mm	.968	.075	.037	.980	.021	.042	0.2390		
-103	1.031	1-1/32	.978			.988			0.2410		
-106	1.062	1-1/16	1.007			1.020			0.2480		
-109	1.093	1-3/32	1.040			1.051			0.2560		
-112	1.125	1-1/8	1.070			1.083			0.2640		
-115	1.156	1-5/32	1.102			1.114			0.2710		
-118	1.188	1-3/16	1.127			1.140			0.3520		
-121	1.218	1-7/32	1.159			1.170			0.3620		
-125	1.250	1-1/4	1.188			1.202			0.3710		
-128	1.281	1-9/32	1.221			1.233			0.3800		
-131	1.312	1-5/16	1.251	1.264	0.4350						
-134	1.343	1-11/32	1.282	1.295	0.4460						
-137	1.375	1-3/8	1.308	.043	1.323	.026	.048	0.4550			
-140	1.406	1-13/32	1.340		1.354			0.4660			
-143	1.437	1-7/16	1.370		1.385			0.4760			
-146	1.468	1-15/32	1.402		1.416			0.4870			
RS-150	1.500	1-1/2	1.433		1.448			0.4970			

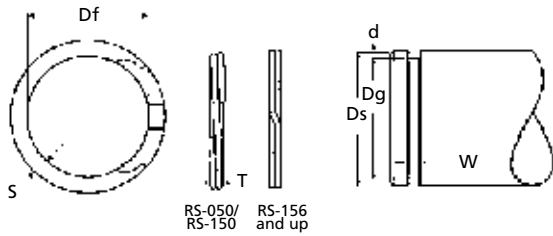
RS	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ROUGHLY TWICE THE THRUST CAPABILITY OF "US" SERIES AND TWO-THIRDS OF "RST" SERIES.
	Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.	<div><div>1. Verify shaft diameter (Ds).</div><div>2. Measure free inside diameter (Df) of the ring.</div><div>3. Determine the ring thickness (T) and radial wall (S).</div></div>	<div> COMMON</div>	
	<div><div>AXIAL ASSEMBLY</div><div><div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div></div><div><div>RS</div><div>KS (Page 47)</div></div></div></div>			

RS CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

MOST POPULAR

BOX 232 • MINNEAPOLIS, KS • 67467



RS-050/
RS-150

RS-156
and up

EXTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Assoc. Spring	AE	Smalley	WS	Aerospace	AS3218
Ramsey	RS	Spirolox	RS	Military	MIL-R-27426A1



RS	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
RS-156	1.562	1-9/16	1.490	.108		1.507	.028		0.7110		
-157	1.575	40mm	1.503			1.520			0.7170		
-162	1.625	1-5/8	1.549			1.566			0.7380		
-168	1.687	1-11/16	1.610			1.628			0.8420		
-175	1.750	1-3/4	1.673			1.691			0.8740		
-177	1.771	44.9mm	1.690			1.708			0.8820		
-181	1.813	1-13/16	1.730			1.749			0.9020		
-187	1.875	1-7/8	1.789			1.808			1.0170		
-193	1.938	1-15/16	1.844			1.861			1.0410		
-196	1.969	1-31/32	1.882			1.902			1.0620		
-200	2.000	2	1.909	.128		1.929	.035		1.0770		
-206	2.062	2-1/16	1.971			1.992			1.1110		
-212	2.125	2-1/8	2.029			2.051			1.1420		
-215	2.156	2-5/32	2.060			2.082			1.2550		
-216	2.165	55mm	2.070			2.091			1.2610		
-218	2.188	1-3/16	2.092			2.113			1.2740		
-225	2.250	2-1/4	2.153			2.176			1.3100		
-231	2.312	2-5/16	2.211			2.234			1.3450		
-236	2.362	59.9mm	2.261			2.284			1.3740		
-237	2.375	2-3/8	2.273			2.297			1.3810		
-243	2.437	2-7/16	2.331	.148		2.355	.041		1.5250		
-250	2.500	2-1/2	2.394			2.418			1.5640		
-255	2.559	64.9mm	2.449			2.473			1.5990		
-256	2.562	2-9/16	2.452			2.476			1.5970		
-262	2.625	2-5/8	2.514			2.539			1.6370		
-268	2.688	2-11/16	2.572			2.597			1.7930		
-275	2.750	2-3/4	2.635			2.660			1.8360		
-281	2.813	2-13/16	2.696			2.722			2.0030		
-287	2.875	2-7/8	2.755			2.781			2.0450		
-293	2.937	2-15/16	2.817			2.843			2.0900		
-295	2.952	74.9mm	2.831	.168		2.858	.047		2.1000		
-300	3.000	3	2.877			2.904			2.6660		
-306	3.062	3-1/16	2.938			2.966			2.7210		
-312	3.125	3-1/8	3.000			3.027			2.9510		
-314	3.149	79.9mm	3.023			3.051			2.9720		
-318	3.187	3-3/16	3.061			3.089			3.0090		
RS-325	3.250	3-1/4	3.121			3.150			3.0660		

DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	METRIC AEROSPACE ON PAGE 192.
RS Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.	1. Verify shaft diameter (Ds). 2. Measure free inside diameter (Df) of the ring. 3. Determine the ring thickness (T) and radial wall (S).	 COMMON	ASSORTMENTS PAGE 225
AXIAL ASSEMBLY			
GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.			
RS		KS (Page 47)	
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.			

RS CONTINUED NEXT PAGE.

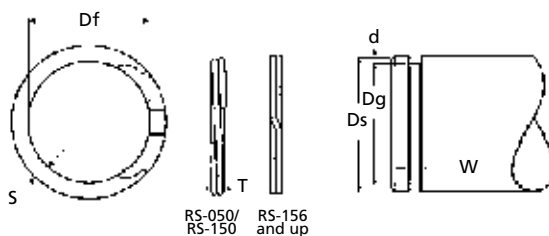
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MOST POPULAR



EXTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

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Assoc. Spring	AE	Smalley	WS	Aerospace	AS3218
Ramsey	RS	Spirolox	RS	Military	MIL-R-27426A1

RS	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
RS-331	3.312	3-5/16	3.180	.188	.061	3.208	.052	.068	3.3070		
-334	3.343	3-11/32	3.210			3.239			3.3270		
-337	3.375	3-3/8	3.242			3.271			3.3590		
-343	3.437	3-7/16	3.301			3.331			3.4180		
-350	3.500	3-1/2	3.363			3.394			3.4800		
-354	3.543	89.9mm	3.402	.198	.061	3.433	.055	.068	3.7180		
-356	3.562	3-9/16	3.422			3.452			3.7390		
-362	3.625	3-5/8	3.483			3.515			3.8030		
-368	3.687	3-11/16	3.543			3.575			3.8670		
-374	3.740	95.0mm	3.597			3.628			3.9240		
-375	3.750	3-3/4	3.606	.208	.061	3.638	.056	.068	3.9330		
-381	3.812	3-13/16	3.668			3.700			3.9990		
-387	3.875	3-7/8	3.724			3.757			4.2740		
-393	3.938	3-15/16	3.784			3.820			4.3400		
-400	4.000	4	3.842			3.876			4.6280		
-406	4.063	4-1/16	3.906	.218	.061	3.939	.062	.068	4.7030		
-412	4.125	4-1/8	3.967			4.000			4.7620		
-413	4.134	105.0mm	3.975			4.010			4.7710		
-418	4.188	4-3/16	4.030			4.058			4.8350		
-425	4.250	4-1/4	4.084			4.120			5.1350		
-431	4.312	4-5/16	4.147	.228	.061	4.182	.065	.068	5.2120		
-433	4.331	110.0mm	4.164			4.200			5.2320		
-437	4.375	4-3/8	4.208			4.245			5.2860		
-443	4.437	4-7/16	4.271			4.307			5.3620		
-450	4.500	4-1/2	4.326			4.364			5.6800		
-456	4.562	4-9/16	4.384	.238	.061	4.422	.070	.079	7.0700		
-462	4.625	4-5/8	4.447			4.485			7.1680		
-468	4.687	4-11/16	4.508			4.547			7.2630		
-472	4.724	120.0mm	4.546			4.584			7.3220		
-475	4.750	4-3/4	4.571			4.610			7.3610		
-481	4.812	4-13/16	4.633	.250	.072	4.672	.072	.079	7.4570		
-487	4.875	4-7/8	4.695			4.735			7.5380		
-493	4.937	4-15/16	4.757			4.797			7.6350		
-500	5.000	5	4.820			4.856			7.7320		
-511	5.118	130.0mm	4.934			4.974			7.9100		
-512	5.125	5-1/8	4.939	.250	.072	4.981	.072	.079	7.9180		
RS-525	5.250	5-1/4	5.064			5.107			8.1130		

RS

DESCRIPTION

Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

METRIC
AEROSPACE
ON PAGE 192.



RS

KS (Page 47)

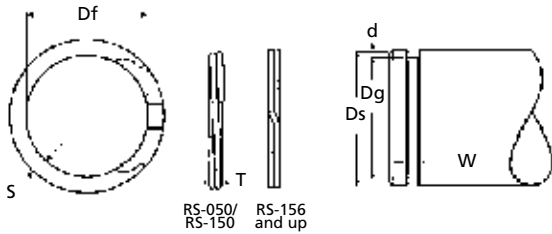
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

RS CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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RS-050/
RS-150

RS-156
and up

EXTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Assoc. Spring	AE	Smalley	WS	Aerospace	AS3218
Ramsey	RS	Spirolox	RS	Military	MIL-R-27426A1



RS	SHAFT		RING				GROOVE				WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "-S02"			
RS-537	5.375	5-3/8	5.187	.250	+.005	.072	+/- .007	.079	+.005/- .000	8.3040			
-550	5.500	5-1/2	5.308							5.353			8.4920
-551	5.511	140.0mm	5.320							5.364			8.5100
-562	5.625	5-5/8	5.433							5.478			8.6940
-575	5.750	5-3/4	5.550							5.597			8.8690
-587	5.875	5-7/8	5.674							5.722			9.0610
-590	5.905	150.0mm	5.705							5.752			9.1100
-600	6.000	6	5.798							5.847			9.2540
-612	6.125	6-1/8	5.903							5.953			14.2490
-625	6.250	6-1/4	6.026							6.078			14.4460
-629	6.299	158.8mm	6.076	.312	+.006	.086	+/- .008	.094	+ .006/- .000	14.5640			
-637	6.375	6-3/8	6.152							6.127			14.7400
-650	6.500	6-1/2	6.274							6.203			15.0240
-662	6.625	6-5/8	6.390							6.328			15.2930
-675	6.750	6-3/4	6.513							6.443			15.5800
-687	6.875	6-7/8	6.638							6.568			15.8700
-700	7.000	7	6.761							6.693			16.1560
-712	7.125	7-1/8	6.877							6.818			16.4720
-725	7.250	7-1/4	6.999							6.933			16.7560
-737	7.375	7-3/8	7.125							7.058			17.0500
-750	7.500	7-1/2	7.250	7.183	17.3410								
-762	7.625	7-5/8	7.363	.086	+/- .004	.091	+/- .008	.094	+ .006/- .000	17.6040			
-775	7.750	7-3/4	7.486							7.423			17.8910
-787	7.875	7-7/8	7.611							7.548			18.1820
-800	8.000	8	7.734							7.673			18.3760
-825	8.250	8-1/4	7.972							7.798			18.7130
-850	8.500	8-1/2	8.220							8.038			22.9290
-875	8.750	8-3/4	8.459							8.288			23.6240
-900	9.000	9	8.707							8.528			24.2930
-925	9.250	9-1/4	8.945							8.778			24.9880
-950	9.500	9-1/2	9.194							9.018			25.6540
-975	9.750	9-3/4	9.432	.375	+.006	.106	+/- .008	.094	+ .006/- .000	26.3510			
-1000	10.000	10	9.680							9.268			27.0180
-1025	10.250	10-1/4	9.918							9.508			27.7130
-1050	10.500	10-1/2	10.166							9.758			28.3790
-1075	10.750	10-3/4	10.405							9.998			29.0730
RS-1100	11.000	11	10.653							10.248			29.7440
										10.488	30.4380		
										10.738			

DESCRIPTION	HOW TO IDENTIFY	GENERAL USE
<p>RS</p> <p>Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.</p> <p>AXIAL ASSEMBLY</p>	<ol style="list-style-type: none"> 1. Verify shaft diameter (Ds). 2. Measure free inside diameter (Df) of the ring. 3. Determine the ring thickness (T) and radial wall (S). 4. Find the part in the chart above. 	<p>COMMON</p>
<p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>RS ← → KS (Page 47)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>		

**ROUGHLY
TWICE THE
THRUST
CAPABILITY
OF "US"
SERIES AND
TWO-THIRDS
OF "RST"
SERIES.**

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All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

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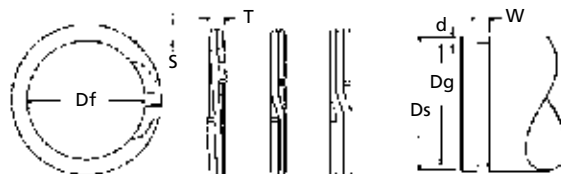


EXTERNAL MEDIUM HEAVY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Assoc. Spring	AME	Smalley	WST
Ramsey	RST	Spirolox	RST



RST-046/ RST-156/
RST-150 RST-600
RST-625
& up

RST	SHAFT		RING			GROOVE			WEIGHT	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Lbs. per 100 Pieces	Spring Steel	Stainless "S02"
RST-046	.469	15/32	.436	.045	.024	.443	.013	.028	0.0420		
-050	.500	1/2	.469			.474	.013		0.0640		
-055	.551	14.0mm	.518			.524	.014		0.0710		
-056	.562	9/16	.529		.035	.535	.014	.039	0.0720		
-059	.594	19/32	.559			.565	.015		0.0760		
-062	.625	5/8	.590			.596	.015		0.1000		
-066	.669	17.0mm	.630			.638	.016		0.1070		
-068	.688	11/16	.648			.655	.017	.046	0.1550		
-075	.750	3/4	.708			.715	.018		0.1690		
-078	.781	25/32	.738			.745	.018		0.1760		
-081	.812	13/16	.768		.042	.776	.018		0.1830		
-087	.875	7/8	.827			.835	.020		0.2280		
-093	.938	15/16	.886			.894	.022		0.2440		
-098	.984	63/64	.934			.940	.022	.056	0.2560		
-100	1.000	1	.947			.955	.023		0.2600		
-102	1.023	26.0mm	.969		.050	.977	.023		0.2660		
-106	1.062	1-1/16	1.005			1.015	.024		0.3930		
-112	1.125	1-1/8	1.064			1.075	.025	.068	0.4150		
-118	1.188	1-3/16	1.126			1.135	.027		0.4380		
-125	1.250	1-1/4	1.184		.062	1.195	.028		0.4880		
-131	1.312	1-5/16	1.240			1.250	.031		0.5400		
-137	1.375	1-3/8	1.298			1.310	.033	.086	0.5950		
-143	1.438	1-7/16	1.359			1.370	.034		0.6180		
-150	1.500	1-1/2	1.419		.078	1.430	.035		0.6460		
-156	1.562	1-9/16	1.476			1.490	.036		0.8800		
-162	1.625	1-5/8	1.537			1.550	.038	.106	1.0070		
-168	1.687	1-11/16	1.598			1.610	.039		1.0450		
-175	1.750	1-3/4	1.657		.062	1.670	.040		1.0820		
-177	1.771	44.9mm	1.676			1.689	.041	.068	1.1440		
-181	1.812	1-13/16	1.714			1.730	.041		1.1690		
-187	1.875	1-7/8	1.774			1.790	.043		1.2080		
-196	1.969	1-31/32	1.864			1.879	.045		1.2670		
-200	2.000	2	1.894			1.910	.045		1.3430		
-206	2.062	2-1/16	1.955		.078	1.970	.046		1.9350		
RST-212	2.125	2-1/8	2.012			2.027	.049	.086	1.9890		

RST

DESCRIPTION

Originally designed to fit NAS 50-51 grooves, RST is a common OEM specification. Two and three turn designs are easier to install than the RSN because of multiple turn design.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure the free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

FITS
NAS 50-51
GROOVES.

ASSORTMENTS



PAGE 225

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RST

USC (Page 68)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

RST CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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 RST-046/ RST-156/ RST-625
 RST-150 RST-600 & up

EXTERNAL MEDIUM HEAVY

MANUFACTURER CROSS-REFERENCE

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 PAGE 236.

Assoc. Spring

AME

Smalley

WST

Ramsey

RST

Spirolox

RST



RST	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
RST-215	2.156	2-5/32	2.041	.141	.078	2.057	.050	.086	2.0160		
-225	2.250	2-1/4	2.129			2.145	.053		2.1000		
-231	2.312	2-5/16	2.188			2.205	.054		2.1570		
-237	2.375	2-3/8	2.248			2.265	.055		2.2140		
-243	2.437	2-7/16	2.307			2.325	.056		2.2700		
-250	2.500	2-1/2	2.366			2.385	.058		3.1610		
-255	2.559	64.9mm	2.432			2.451	.058		3.2450		
-262	2.625	2-5/8	2.485			2.505	.060		3.3130		
-268	2.687	2-11/16	2.545			2.565	.061		3.3890		
-275	2.750	2-3/4	2.604			2.625	.063		4.0790		
-287	2.875	2-7/8	2.722	.188	.093	2.742	.067	.103	4.2570		
-293	2.937	2-15/16	2.780			2.801	.068		4.3440		
-300	3.000	3	2.838			2.860	.070		4.4310		
-306	3.062	3-1/16	2.897			2.920	.071		4.5200		
-312	3.125	3-1/8	2.957			2.980	.073		4.6100		
-315	3.156	3-5/32	2.986			3.010	.073		4.6540		
-325	3.250	3-1/4	3.075			3.100	.075		4.7880		
-334	3.344	3-11/32	3.164			3.190	.077		4.9220		
-343	3.437	3-7/16	3.254			3.280	.079		5.0570		
-350	3.500	3-1/2	3.315			3.340	.080	.120	8.3660		
-354	3.543	89.9mm	3.356	.250	.111	3.381	.081		8.4400		
-362	3.625	3-5/8	3.433			3.458	.084		8.6250		
-368	3.687	3-11/16	3.483			3.517	.085		8.7450		
-375	3.750	3-3/4	3.550			3.577	.087		8.9060		
-387	3.875	3-7/8	3.670			3.696	.090		9.1940		
-393	3.938	3-15/16	3.730			3.756	.091		9.3380		
-400	4.000	4	3.787			3.815	.093		9.4750		
-425	4.250	4-1/4	4.037			4.065	.093		10.0750		
-437	4.375	4-3/8	4.162			4.190	.093		10.3750		
-450	4.500	4-1/2	4.280	.375	.127	4.310	.095	.139	10.6580		
-475	4.750	4-3/4	4.515			4.550	.100		11.2230		
-500	5.000	5	4.755			4.790	.105		11.7260		
-525	5.250	5-1/4	4.995			5.030	.110	.174	21.7050		
-550	5.500	5-1/2	5.229			5.265	.118		22.6730		
-575	5.750	5-3/4	5.466			5.505	.123		23.6520		
-600	6.000	6	5.705			5.745	.128		24.6410		
-625	6.250	6-1/4	5.938			5.985	.133		26.5930		
-650	6.500	6-1/2	6.182			6.225	.138		27.6940		
-675	6.750	6-3/4	6.420			6.465	.143		28.7680		
-700	7.000	7	6.658			6.705	.148	.209	29.8420		
-725	7.250	7-1/4	6.894			6.942	.154		37.4870		
-750	7.500	7-1/2	7.130			7.180	.160		44.5090		
-775	7.750	7-3/4	7.368	.312	.165	7.420	.165		45.9880		
-800	8.000	8	7.607			7.660	.170		47.4740		
-825	8.250	8-1/4	7.845			7.900	.175		48.9540		
-850	8.500	8-1/2	8.083			8.140	.180		50.4330		
-875	8.750	8-3/4	8.321			8.383	.184		51.9100		
-900	9.000	9	8.560			8.620	.190		53.3950		
-925	9.250	9-1/4	8.798			8.860	.195		54.8730		
-950	9.500	9-1/2	9.036			9.100	.200		56.3510		
-975	9.750	9-3/4	9.273			9.338	.206		57.8220		
RST-1000	10.000	10	9.508			9.575	.213		59.2810		

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

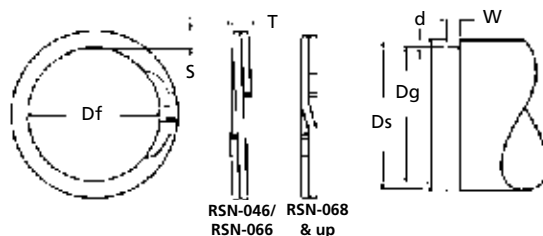
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EXTERNAL SPIRAL RINGS

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INTERCHANGEABLE WITH SNAP RINGS



RSN-046/ RSN-068
RSN-066 & up



EXTERNAL HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

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Assoc. Spring	AHE	Smalley	WSM	Aerospace	AS3216
Ramsey	RSN	Spirolox	RSN	Military	MIL-R-27426A2

RSN	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
RSN-046	.469	15/32	.439	.045	.025	.443	.013	.029	0.0420		
-050	.500	1/2	.464			.468	.016		0.0710		
-055	.551	14.0mm	.514	.050		.519	.016		0.0780		
-056	.562	9/16	.525		.035	.530	.016	.039	0.0800		
-059	.594	19/32	.554			.559	.018		0.0850		
-062	.625	5/8	.583	.055		.588	.019		0.0990		
-066	.669	17.0mm	.623			.629	.020		0.1060		
-068	.688	11-16	.641			.646	.021		0.1530		
-075	.750	3/4	.698	.065		.704	.023		0.1660		
-078	.781	25/32	.727			.733	.024		0.1730		
-081	.812	13/16	.756		.042	.762	.025	.046	0.1800		
-087	.875	7/8	.814	.075		.821	.027		0.2240		
-093	.938	15/16	.875			.882	.028		0.2410		
-098	.984	63/64	.919	.085		.926	.029		0.2890		
-100	1.000	1	.932			.940	.030		0.2930		
-102	1.023	26.0mm	.953			.961	.031		0.2990		
-106	1.062	1-1/16	.986	.103		.998	.032		0.4580		
-112	1.125	1-1/8	1.047		.050	1.059	.033	.056	0.4850		
-118	1.188	1-3/16	1.105	.118		1.118	.035		0.5110		
-125	1.250	1-1/4	1.163			1.176	.037		0.5360		
-131	1.312	1-5/16	1.218			1.232	.040		0.6500		
-137	1.375	1-3/8	1.277	.128		1.291	.042		0.6790		
-143	1.438	1-7/16	1.336			1.350	.044		0.7040		
-150	1.500	1-1/2	1.385	.158		1.406	.047		0.7290		
-156	1.562	1-5/16	1.453			1.468	.047		1.0410		
-162	1.625	1-5/8	1.513			1.529	.048		1.0820		
-168	1.687	1-11/16	1.573	.128		1.589	.049		1.1230		
-175	1.750	1-3/4	1.633			1.650	.050		1.1640		
-177	1.771	44.9mm	1.651		.062	1.669	.051	.068	1.1770		
-181	1.812	1-13/16	1.690			1.708	.052		1.2030		
-187	1.875	1-7/8	1.751	.158		1.769	.053		1.5620		
-196	1.969	50mm	1.838			1.857	.056		1.6360		
-200	2.000	2	1.867			1.886	.057		1.6600		
-206	2.062	2-1/16	1.932	.168		1.946	.058	.086	2.3100		
-212	2.125	2-1/8	1.989		.078	2.003	.061		2.3740		
RSN-215	2.156	2-5/32	2.018			2.032	.062		2.4070		

RSN

DESCRIPTION

Heavy duty design for use in NAS 669-670 deep grooves in applications like double row and tapered roller bearings. Requires no tools for removal.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

FITS
INTO
THE SAME
GROOVE
AS SNAP
RINGS.



GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RSN SH (Page 6) SHI (Page 10) USH (Page 71) SSN (Page 49)

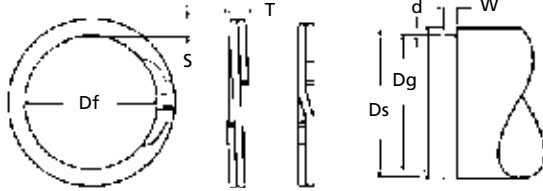
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

RSN CONTINUED NEXT PAGE.

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RSN-046/ RSN-068
RSN-066 & up

EXTERNAL HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Assoc. Spring	AHE	Smalley	WSM	Aerospace	AS3216
Ramsey	RSN	Spirolox	RSN	Military	MIL-R-27426A2



RSN	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
RSN-225	2.250	2-1/4	2.105	.168	.078	2.120	.065	.086	2.5060		
-231	2.312	2-5/16	2.163			2.178	.067		2.5720		
-237	2.375	2-3/8	2.223			2.239	.068		3.1860		
-243	2.437	2-7/16	2.283			2.299	.069		3.2670		
-250	2.500	2-1/2	2.343	.200	.078	2.360	.070		3.3490		
-255	2.559	64.9mm	2.402			2.419	.070		3.4280		
-262	2.625	2-5/8	2.464			2.481	.072		3.5120		
-268	2.687	2-11/16	2.523			2.541	.073		3.5920		
-275	2.750	2-3/4	2.584	.225	.093	2.602	.074	.103	4.9130		
-287	2.875	2-7/8	2.702			2.721	.077		5.1250		
-293	2.937	2-15/16	2.760			2.779	.079		5.2300		
-300	3.000	3	2.818			2.838	.081		5.3340		
-306	3.062	3-1/16	2.878	.270	.111	2.898	.082	.120	5.4420		
-312	3.125	3-1/8	2.936			2.957	.084		5.5470		
-315	3.156	3-5/32	2.965			2.986	.085		5.5990		
-325	3.250	3-1/4	3.054			3.076	.087		5.7590		
-334	3.344	3-11/32	3.144	.350	.127	3.166	.089	.139	5.9210		
-343	3.437	3-7/16	3.234			3.257	.090		6.0830		
-350	3.500	3-1/2	3.293			3.316	.092		9.0300		
-354	3.543	89.9mm	3.333			3.357	.093		9.1080		
-362	3.625	3-5/8	3.411	.418	.156	3.435	.095	.174	9.3100		
-368	3.687	3-11/16	3.469			3.493	.097		9.4600		
-375	3.750	3-3/4	3.527			3.552	.099		9.6100		
-387	3.875	3-7/8	3.647			3.673	.101		9.9220		
-393	3.938	3-15/16	3.708	.500	.200	3.734	.102	.250	10.0800		
-400	4.000	4	3.765			3.792	.104		10.2280		
-425	4.250	4-1/4	4.037			4.065	.093		10.9330		
-437	4.375	4-3/8	4.161			4.190	.093		11.2540		
-450	4.500	4-1/2	4.280	.550	.225	4.310	.095	.275	11.5630		
-475	4.750	4-3/4	4.518			4.550	.100		12.1800		
-500	5.000	5	4.756			4.790	.105		12.7190		
-525	5.250	5-1/4	4.995			5.030	.110		20.1620		
-550	5.500	5-1/2	5.228	.600	.250	5.265	.118	.300	21.0600		
-575	5.750	5-3/4	5.466			5.505	.123		21.9790		
-600	6.000	6	5.705			5.745	.128		22.9010		
RSN-625	6.250	6-1/4	5.938			5.985	.133		35.2260		

RSN

DESCRIPTION

Heavy duty design for use in NAS 669-670 deep grooves in applications like double row and tapered roller bearings. Requires no tools for removal.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

FITS
NAS 669-670
GROOVES.

ASSORTMENTS



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GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RSN SH (Page 6) SHI (Page 10) USH (Page 71) SSN (Page 49)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

RSN CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

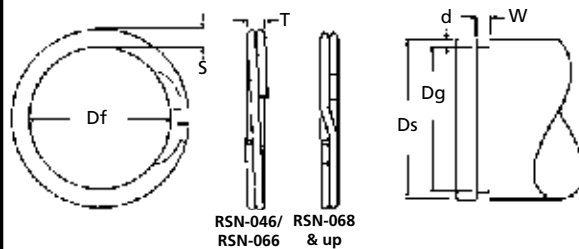
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EXTERNAL SPIRAL RINGS

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INTERCHANGEABLE WITH SNAP RINGS



RSN-046/ RSN-068
RSN-066 & up



EXTERNAL HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Assoc. Spring	AHE	Smalley	WSM	Aerospace	AS3216
Ramsey	RSN	Spirolox	RSN	Military	MIL-R-27426A2

RSN	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
RSN-650	6.500	6-1/2	6.181	.418	.156	6.225	.138	.174	36.5990		
-675	6.750	6-3/4	6.410			6.465	.143		37.8950		
-700	7.000	7	6.648			6.705	.148		39.2370		
-725	7.250	7-1/4	6.891			6.942	.154		42.4520		
-750	7.500	7-1/2	7.130			7.180	.160		53.0980		
-775	7.750	7-3/4	7.368	.437		7.420	.165		54.7990		
-800	8.000	8	7.606			7.660	.170		56.4990		
-825	8.250	8-1/4	7.845			7.900	.175		58.2080		
-850	8.500	8-1/2	8.083			8.140	.180		59.9090		
-875	8.750	8-3/4	8.324			8.383	.184		61.6330		
-900	9.000	9	8.560			8.620	.190		72.9660		
-925	9.250	9-1/4	8.798			8.860	.195		74.9110		
-950	9.500	9-1/2	9.036			9.100	.200		76.8570		
-975	9.750	9-3/4	9.275			9.338	.206		78.8140		
-1000	10.000	10	9.508			9.575	.213		80.7190		
-1025	10.250	10-1/4	9.745	.500		9.814	.218		82.0020		
-1050	10.500	10-1/2	9.984			10.054	.223		83.9590		
-1075	10.750	10-3/4	10.221			10.293	.229		85.8970		
-1100	11.000	11	10.459			10.533	.234		88.5790		
-1125	11.250	11-1/4	10.692			10.772	.239	.209	89.7470		
-1150	11.500	11-1/2	10.934			11.011	.245		103.6740		
-1175	11.750	11-3/4	11.171			11.250	.250		105.8520		
-1200	12.000	12	11.410			11.490	.255		108.0480		
-1225	12.250	12-1/4	11.647			11.729	.261		110.2290		
-1250	12.500	12-1/2	11.885	.562		11.969	.266		112.4200		
-1275	12.750	12-3/4	12.124			12.208	.271		114.2440		
-1300	13.000	13	12.361			12.448	.276		138.2250		
-1325	13.250	13-1/4	12.598			12.687	.282		140.7940		
-1350	13.500	13-1/2	12.837			12.927	.287		143.3790		
-1375	13.750	13-3/4	13.074	.662		13.166	.292		145.9450		
-1400	14.000	14	13.311			13.405	.298		148.5120		
-1425	14.250	14-1/4	13.548			13.644	.303		151.0810		
-1450	14.500	14-1/2	13.787			13.884	.308		175.1770		
-1475	14.750	14-3/4	14.024			14.123	.314		178.0840		
RSN-1500	15.000	15	14.262	.750		14.363	.319		181.0040		

RSN

DESCRIPTION

Heavy duty design for use in NAS 669-670 deep grooves in applications like double row and tapered roller bearings. Requires no tools for removal.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure the free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

FITS
INTO
THE SAME
GROOVE
AS SNAP
RINGS.



GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RSN ↔ SH (Page 6) ↔ SHI (Page 10) ↔ USH (Page 71) ↔ SSN (Page 49)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

TAB-LOCK SYSTEM

BOX 232 • MINNEAPOLIS, KS • 67467


EXTERNAL SELF-LOCKING
MANUFACTURER CROSS-REFERENCE

 INDEX
PAGE 236

Ramsey

KS

Spirolox

KS



KS	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
KS-200	2.000	2	1.915	.128	.049	1.929 $\pm .005$.035	.056	1.0800		
-212	2.125	2-1/8	2.037			2.051	.035		1.1460		
-225	2.250	2-1/4	2.161	.148	.049	2.176	.035	.056	1.2140		
-237	2.375	2-3/8	2.281			2.297	.039		1.2800		
-250	2.500	2-1/2	2.401	.158	.049	2.418	.041	.056	1.5090		
-262	2.625	2-5/8	2.521			2.539	.043		1.5830		
-275	2.750	2-3/4	2.641	.178	.049	2.660	.045	.056	1.6560		
-287	2.875	2-7/8	2.761			2.781	.047		1.9210		
-300	3.000	3	2.884	.198	.061	2.904	.048	.068	2.5040		
-312	3.125	3-1/8	3.006			3.027	.049		2.6080		
-325	3.250	3-1/4	3.127	.218	.061	3.150	.050	.068	3.0710		
-337	3.375	3-3/8	3.249			3.271	.052		3.1870		
-350	3.500	3-1/2	3.370	.250	.061	3.394	.052	.068	3.3020		
-362	3.625	3-5/8	3.490			3.515	.055		3.8210		
-375	3.750	3-3/4	3.613	.265	.061	3.638	.056	.068	3.9510		
-387	3.875	3-7/8	3.730			3.757	.059		4.0750		
-400	4.000	4	3.849	.312	.072	3.876	.062	.079	4.6480		
-412	4.125	4-1/8	3.972			4.000	.062		4.7910		
-425	4.250	4-1/4	4.091	.350	.086	4.120	.065	.094	4.9290		
-437	4.375	4-3/8	4.215			4.245	.065		5.0740		
-450	4.500	4-1/2	4.333	.350	.086	4.364	.068	.094	5.2110		
-462	4.625	4-5/8	4.454			4.484	.070		7.2100		
-475	4.750	4-3/4	4.578	.350	.086	4.610	.070	.094	7.4030		
-487	4.875	4-7/8	4.702			4.735	.070		7.5960		
-500	5.000	5	4.822	.350	.086	4.856	.072	.094	7.7830		
-512	5.125	5-1/8	4.946			4.981	.072		7.9750		
-525	5.250	5-1/4	5.071	.350	.086	5.107	.071	.094	9.0810		
-537	5.375	5-3/8	5.192			5.228	.073		9.2910		
-550	5.500	5-1/2	5.315	.350	.086	5.353	.073	.094	9.5030		
-562	5.625	5-5/8	5.438			5.478	.073		9.7160		
-575	5.750	5-3/4	5.558	.350	.086	5.597	.076	.094	9.9240		
-587	5.875	5-7/8	5.682			5.722	.076		10.1390		
-600	6.000	6	5.806	.350	.086	5.847	.076	.094	11.2140		
-612	6.125	6-1/8	5.911			5.953	.086		13.6920		
-625	6.250	6-1/4	6.035	.350	.086	6.078	.086	.094	13.9690		
-637	6.375	6-3/8	6.159			6.203	.086		15.6970		
-650	6.500	6-1/2	6.284	.350	.086	6.328	.086	.094	16.0050		
-675	6.750	6-3/4	6.522			6.568	.091		16.5920		
-700	7.000	7	6.770	.350	.086	6.818	.091	.094	18.8480		
KS-725	7.250	7-1/4	7.009			7.058	.096		19.4900		

KS
DESCRIPTION

Similar to the RS, except with tab and slot locking system. Used in unstable environments subject to vibration, shockwaves, or high centrifugal forces.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Confirm presence of tab and slot locking system in ring rim.
2. Verify shaft diameter (Ds).
3. Measure the free inside diameter (Df) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE


**TABS
LOCATED
ON ONE END
LOCK INTO
SLOTS ON
THE OTHER
END.**

KS

RS (Page 38)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

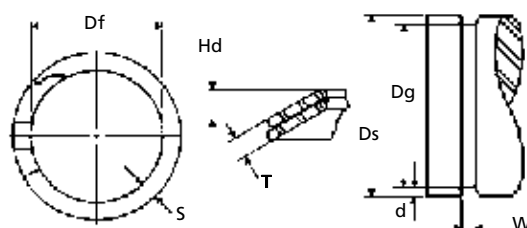
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EXTERNAL SPIRAL RINGS

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DISHED SHAPE FOR END-PLAY TAKE UP



EXTERNAL DISHED

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Ramsey

MS

Spirolox

MS

MS

SHAFT

Decimal
(Ds)

Fraction
(Ds)

RING

Free
Inside Dia.
(Df)

Radial
Wall
(S)

Thickness
(T)

Dish
Height
(Hd)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT
Lbs.
per 100
Pieces

MATERIAL

Spring
Steel

Stainless
"-S02"

MS	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Dish Height (Hd)	Diameter (Dg)	Depth (d)	Width (W)	WEIGHT Lbs. per 100 Pieces	Spring Steel	Stainless "-S02"
MS-100	1.000	1	.926	.095	.043	.020	.940	.030	.048	0.3360		
-112	1.125	1-1/8	1.043	.108		.020	1.059	.033		0.4920		
-125	1.250	1-1/4	1.158	.128		.027	1.176	.037		0.6200		
-137	1.375	1-3/8	1.271	.128	.050	.032	1.291	.042	.056	0.7070		
-150	1.500	1-1/2	1.385	.148		.037	1.406	.047		0.8590		
-162	1.625	1-5/8	1.506	.158		.045	1.529	.048		1.0020		
-175	1.750	1-3/4	1.625	.168		.042	1.650	.050		1.4810		
-187	1.875	1-7/8	1.742	.178		.044	1.769	.053		1.6900		
-200	2.000	2	1.858	.188		.047	1.886	.057		1.8960		
-212	2.125	2-1/8	1.973	.198		.057	2.003	.061		2.1180		
-225	2.250	2-1/4	2.088	.218		.055	2.120	.065		2.4770		
-237	2.375	2-3/8	2.183	.228	.062	.060	2.239	.068	.068	2.7050		
-250	2.500	2-1/2	2.300	.238		.065	2.360	.070		2.9720		
-262	2.625	2-5/8	2.419	.248		.065	2.481	.072		3.2540		
-275	2.750	2-3/4	2.537	.248		.070	2.602	.074		3.3960		
-287	2.875	2-7/8	2.653	.258		.070	2.721	.077		4.4360		
-300	3.000	3	2.790	.312		.098	2.838	.081		5.5610		
-312	3.125	3-1/8	2.905	.312	.072	.098	2.957	.084	.079	5.7640		
-325	3.250	3-1/4	3.020	.312		.105	3.076	.087		6.3480		
-337	3.375	3-3/8	3.135	.312		.105	3.192	.090		6.5630		
-350	3.500	3-1/2	3.255	.350		.086	3.316	.092		8.1730		
-362	3.625	3-5/8	3.372	.350		.085	3.435	.095		8.4360		
-375	3.750	3-3/4	3.487	.350		.096	3.552	.099		9.2730		
-387	3.875	3-7/8	3.606	.350		.096	3.673	.101		9.5570		
-400	4.000	4	3.723	.375	.086	.102	3.792	.104	.094	10.6080		
-412	4.125	4-1/8	3.848	.375		.102	3.919	.102		10.9290		
-425	4.250	4-1/4	3.991	.375		.119	4.065	.092		12.1290		
-450	4.500	4-1/2	4.232	.375		.119	4.310	.095		13.4190		
-475	4.750	4-3/4	4.468	.437		.117	4.550	.100		14.7940		
MS-500	5.000	5	4.704	.460		.120	4.790	.105		16.3900		

MS

DESCRIPTION

Standard ring formed into a conical shape that is designed to take up end-play. Best results occur when ring is installed in a non-loaded condition.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify conical shape of part.
2. Confirm shaft diameter (Ds).
3. Measure the free inside diameter (Df) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE



**CONICAL
SHAPE FOR
END-PLAY
TAKE-UP.**

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EASY TO REMOVE

BOX 232 • MINNEAPOLIS, KS • 67467



EXTERNAL TABBED

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Ramsey


SSN

Spirollox

SSN



SSN	SHAFT		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
SSN-200	2.000	2	1.867	.158	.062	1.886	.057	.068	1.6600		
-212	2.125	2-1/8	1.989	.168		2.003	.061		2.3740		
-225	2.250	2-1/4	2.105			2.120	.065		2.5060		
-237	2.375	2-3/8	2.223		.078	2.239	.068	.086	3.1860		
-250	2.500	2-1/2	2.343	.200		2.360	.070		3.3490		
-262	2.625	2-5/8	2.464			2.481	.072		3.5120		
-275	2.750	2-3/4	2.584			2.602	.074		4.9130		
-287	2.875	2-7/8	2.702			2.721	.077		5.1250		
-300	3.000	3	2.818	.225	.093	2.838	.081	.103	5.3340		
-312	3.125	3-1/8	2.936			2.957	.084		5.5470		
-325	3.250	3-1/4	3.054			3.076	.087		5.7590		
-350	3.500	3-1/2	3.293			3.316	.092		9.0300		
-362	3.625	3-5/8	3.411			3.435	.095		9.3100		
-375	3.750	3-3/4	3.572			3.552	.099		9.6100		
-387	3.875	3-7/8	3.647			3.673	.101		9.9220		
-400	4.000	4	3.765	.270	.111	3.792	.104	.120	10.2280		
-425	4.250	4-1/4	4.037			4.065	.092		10.9330		
-437	4.375	4-3/8	4.161			4.190	.092		11.2540		
-450	4.500	4-1/2	4.280			4.310	.095		11.5630		
-475	4.750	4-3/4	4.518			4.550	.100		12.1800		
SSN-500	5.000	5	4.756			4.790	.105		12.7190		

SSN	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	 WEIRD
	Standard RSN ring with a prong for easy removal using pliers or screwdriver, or for holding it with your teeth.	<ol style="list-style-type: none">1. Verify prong or finger protruding from the ring.2. Confirm shaft diameter (Ds).3. Measure the free inside diameter (Df) of the ring.4. Determine the ring thickness (T) and radial wall (S).5. Find the part in the chart above.		
	AXIAL ASSEMBLY			

<div><div></div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div><div></div></div>				
SSN	SH (Page 6)	SHI (Page 10)	RSN (Page 44)	USH (Page 71)
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.				

PROTRUDING TAB FOR REMOVAL.

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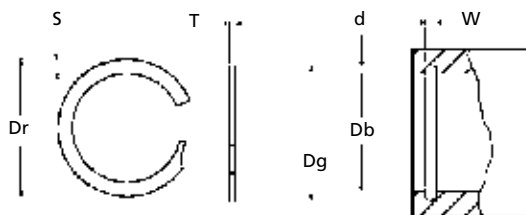
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SINGLE TURN



INTERNAL LIGHT DUTY

MANUFACTURER CROSS-REFERENCE

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Assoc. Spring

CI

Smalley

VH

Ramsey

UR

Spirolox

UR

UR

BORE

Decimal
(Db)

Fraction
(Db)

RING

Free
Outside
Dia. (Dr)

Radial
Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT
Lbs.
per 100
Pieces

MATERIAL

Spring
Steel

Stainless
"S02"

UR	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	WEIGHT Lbs. per 100 Pieces	Spring Steel	Stainless "S02"
UR-050	.500	1/2	.531	.045	.018	.528	.014	.022	0.0280		
-056	.562	9/16	.593			.590			0.0330		
-062	.625	5/8	.656			.653			0.0370		
-068	.687	11/16	.719			.715			0.0410		
-075	.750	3/4	.783			.779			0.0460		
-081	.812	13/16	.862			.854	.021	.026	0.0820		
-087	.875	7/8	.926			.917			0.0900		
-093	.937	15/16	.989			.979			0.0970		
-100	1.000	1	1.052			1.042			0.1040		
-106	1.062	1-1/16	1.117			1.106	.022	.031	0.1740		
-112	1.125	1-1/8	1.181			1.169			0.1860		
-118	1.187	1-3/16	1.242			1.231			0.1970		
-125	1.250	1-1/4	1.317			1.294			0.2110		
-131	1.312	1-5/16	1.369			1.356			0.2210		
-137	1.375	1-3/8	1.433			1.419			0.2330		
-143	1.437	1-7/16	1.496			1.481			0.2450		
-150	1.500	1-1/2	1.559			1.544			0.2570		
-156	1.562	1-9/16	1.637			1.619	.029		0.4400		
-162	1.625	1-5/8	1.701			1.682			0.4600		
-168	1.687	1-11/16	1.763			1.744			0.4790		
-175	1.750	1-3/4	1.827			1.807			0.5000		
-181	1.812	1-13/16	1.890			1.869			0.5190		
-187	1.875	1-7/8	1.953			1.932			0.5390		
-193	1.937	1-15/16	2.016			1.994			0.5590		
-200	2.000	2	2.079			2.057			0.5790		
-206	2.062	2-1/16	2.162			2.138	.038	.039	0.7760		
-212	2.125	2-1/2	2.226			2.201			0.8030		
-218	2.187	2-3/16	2.289			2.263			0.8300		
-225	2.250	2-1/4	2.352			2.326			0.8570		
-231	2.312	2-5/16	2.415			2.388			0.8830		
-237	2.375	2-3/8	2.478			2.451			0.9100		
-243	2.437	2-7/16	2.541			2.513			0.9360		
-250	2.500	2-1/2	2.605			2.576			0.9630		
UR-256	2.562	2-9/16	2.667			2.638			0.9890		

UR

DESCRIPTION

Light duty single turn rings used in low clearance applications. Also used as a positioning point for light loads. Radius notch on one end for removal. Narrow radial wall yields moderate thrust loads.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure free outside diameter (Dr) of part.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

**NO TOOLS
NEEDED
TO INSTALL.**

RADIUS REMOVAL
NOTCH ON END.



UR CONTINUED NEXT PAGE.

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SINGLE TURN

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INTERNAL LIGHT DUTY
MANUFACTURER CROSS-REFERENCE

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Assoc. Spring

CI

Smalley

VH

Ramsey

UR

Spirolox

UR



UR	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
UR-262	2.625	2-5/8	2.731	.158	.031	2.701	.038	.039	1.0160		
-268	2.687	2-11/16	2.794			2.763			1.0430		
-275	2.750	2-3/4	2.857			2.826			1.0700		
-281	2.812	2-13/16	2.920			2.888			1.0960		
-287	2.875	2-7/8	2.983			2.951			1.1220		
-293	2.937	2-15/16	3.046			3.013			1.1490		
-300	3.000	3	3.110			3.076			1.1760		
-306	3.062	3-1/16	3.187			3.154			1.7770		
-312	3.125	3-1/8	3.251			3.217			1.8180		
-318	3.187	3-3/16	3.314			3.279			1.8580		
-325	3.250	3-1/4	3.377	.188	.039	3.342	.046	.044	1.8980		
-331	3.312	3-5/16	3.440			3.404			1.9380		
-337	3.375	3-3/8	3.504			3.467			1.9790		
-343	3.437	3-7/16	3.566			3.529			2.0180		
-350	3.500	3-1/2	3.630			3.592			2.0580		
-356	3.562	3-9/16	3.692			3.654			2.0980		
-362	3.625	3-5/8	3.766			3.717			2.1450		
-368	3.687	3-11/16	3.819			3.779			2.1790		
-375	3.750	3-3/4	3.892			3.842			2.2250		
-381	3.812	3-13/16	3.945			3.904			2.5590		
-387	3.875	3-7/8	4.009	.225	.046	3.967	.055	.052	2.2980		
-393	3.937	3-15/16	4.071			4.029			2.3390		
-400	4.000	4	4.135			4.092			2.3800		
-412	4.125	4-1/8	4.279			4.235			3.4330		
-425	4.250	4-1/4	4.405			4.360			3.5460		
-437	4.375	4-3/8	4.531			4.485			3.6600		
-450	4.500	4-1/2	4.658			4.610			3.7740		
-462	4.625	4-5/8	4.784			4.735			3.8880		
-475	4.750	4-3/4	4.910			4.860			4.0010		
-487	4.875	4-7/8	5.036			4.985			4.1060		
-500	5.000	5	5.163	.265	.061	5.110	.066	.067	4.2290		
-525	5.250	5-1/4	5.435			5.381			5.8200		
-550	5.500	5-1/2	5.694			5.638			6.1310		
-575	5.750	5-3/4	5.953			5.894			6.4420		
-600	6.000	6	6.212			6.150			7.8970		
-625	6.250	6-1/4	6.470			6.406			8.2620		
-650	6.500	6-1/2	6.730			6.663			8.5150		
-675	6.750	6-3/4	6.988			6.919			8.8800		
-700	7.000	7	7.247			7.175			9.2470		
-725	7.250	7-1/4	7.505	.300	.076	7.431	.078	.082	9.6120		
-750	7.500	7-1/2	7.765			7.688			9.9790		
-775	7.750	7-3/4	8.023			7.944			11.5900		
-800	8.000	8	8.282			8.200			12.0050		
-825	8.250	8-1/4	8.541			8.456			12.4200		
-850	8.500	8-1/2	8.800			8.713			12.8340		
-875	8.750	8-3/4	9.059			8.969			19.1940		
-900	9.000	9	9.317			9.225			19.7020		
-925	9.250	9-1/4	9.576			9.481			20.3070		
-950	9.500	9-1/2	9.835	.345	.076	9.738			20.9100		
-975	9.750	9-3/4	10.094			9.994			21.5140		
UR-1000	10.000	10	10.353			10.250			22.1180		

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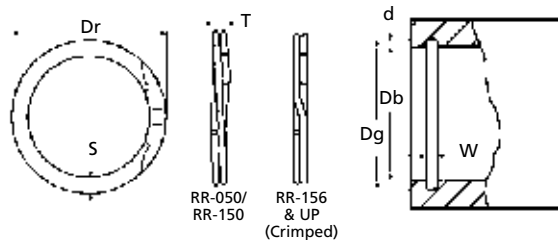
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MOST POPULAR




INTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Assoc. Spring	AI	Smalley	WH	Aerospace	AS3217
Ramsey	RR	Spirolox	RR	Military	MIL-R-27426B1

RR	BORE		RING				GROOVE				WEIGHT Lbs. per 100 Pieces	MATERIAL			
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)	Spring Steel		Stainless "-S02"			
RR-050	.500	1/2	.532	+.013/- .000	.045	.025	+.002	.526	.013	.030	+.003/- .000	0.0410			
-051	.512	13.0mm	.544									0.0420			
-053	.531	17/32	.564									0.0440			
-056	.562	9/16	.594									0.0460			
-059	.594	19/32	.626									0.0490			
-062	.625	5/8	.658									0.0520			
-065	.656	21/32	.689									0.0550			
068	.687	11/16	.720									0.0580			
-071	.718	23/32	.751									0.0610			
-075	.750	3/4	.790									0.1140			
-077	.777	19.7mm	.817	+.003	.031	+.002	.782	.016	.036	+.004/- .000	0.1190				
-078	.781	25/32	.821								0.1200				
-081	.812	13/16	.853								0.1250				
-084	.843	27/32	.889								0.1320				
-086	.866	22.0mm	.913								0.1350				
-087	.875	7/8	.922								0.1360				
-090	.906	29/32	.949								0.1410				
-093	.938	15/16	.986								0.1480				
-096	.968	31/32	1.025								0.2110				
-098	.987	25.0mm	1.041								+.004	.037			+.002
-100	1.000	1	1.054	0.2190											
-102	1.023	26.0mm	1.078	0.2240											
-103	1.031	1-1/32	1.084	0.2260											
-106	1.062	1-1/16	1.117	0.2320											
-109	1.093	1-3/32	1.147	0.2400											
-112	1.125	1-1/8	1.180	0.2480											
-115	1.156	1-5/32	1.210	0.2550											
-118	1.188	1-3/16	1.249	0.3460											
-121	1.218	1-7/32	1.278	+.015/- .000	.085	.043	+.004	.024	.048	+.004/- .000										0.3560
-125	1.250	1-1/4	1.312								0.3670				
-128	1.281	1-9/32	1.342								0.3760				
-131	1.312	1-5/16	1.374								0.3830				
-134	1.343	1-11/32	1.408								0.3930				
-137	1.375	1-3/8	1.442								0.4480				
-140	1.406	1-13/32	1.472								0.4590				
-143	1.437	1-7/16	1.504								0.4710				
-145	1.459	37.0mm	1.523								0.4770				
-146	1.468	1-15/32	1.535								0.4820				
-150	1.500	1-1/2	1.567	+.020/ -.000	.108	.049	+/- .003	1.617	+/- .005	.028	.056	+.004/- .000			0.4930
RR-156	1.562	1-9/16	1.634												0.6580

RR	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ROUGHLY TWICE THE THRUST CAPABILITY OF "UR" SERIES AND TWO-THIRDS OF "RRT" SERIES.
	Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.	<div><div>1. Verify bore diameter (Db).</div><div>2. Measure free outside diameter (Dr) of the ring.</div><div>3. Determine the ring thickness (T) and radial wall (S).</div><div>4. Find the part in the chart above.</div></div>	<div> COMMON</div>	
	AXIAL ASSEMBLY			

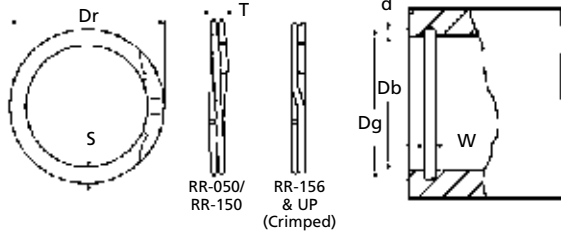
<div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div></div>		
RR	BR (Page 64)	KR (Page 61)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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RR-050/
RR-150

RR-156
& UP
(Crimped)

INTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236

Assoc. Spring	AI	Smalley	WH	Aerospace	AS3217
Ramsey	RR	Spirolox	RR	Military	MIL-R-27426B1



RR	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
RR-157	1.574	40.0mm	1.649	.108		1.633	.030		0.6650		
-162	1.625	1-5/8	1.701			1.684			0.6890		
-165	1.653	42.0mm	1.730			1.712			0.7020		
-168	1.687	1-11/16	1.768			1.750			0.7820		
-175	1.750	1-3/4	1.834			1.813			0.8150		
-181	1.813	46.0mm	1.894			1.875			0.8450		
-185	1.850	47.0mm	1.937			1.917			0.8670		
-187	1.875	1-7/8	1.960			1.942			0.8780		
-193	1.938	1-15/16	2.025			2.005			0.9120		
-200	2.000	2	2.091			2.071			1.0160		
-204	2.047	52.0mm	2.138	.128		2.118	.035		1.0420		
-206	2.062	2-1/16	2.154			2.132			1.0510		
-212	2.125	2-1/8	2.217			2.195			1.0860		
-216	2.165	55.0mm	2.260			2.239			1.1900		
-218	2.188	2-3/16	2.284			2.262			1.2040		
-225	2.250	2-1/4	2.347			2.324			1.2410		
-231	2.312	2-5/16	2.413			2.390			1.2740		
-237	2.375	2-3/8	2.476			2.453			1.3170		
-243	2.437	2-7/16	2.543			2.519			1.4490		
-244	2.440	62.0mm	2.546			2.522			1.4500		
-250	2.500	2-1/2	2.606	.148		2.582	.041		1.4690		
-253	2.531	2-17/32	2.641			2.617			1.4910		
-256	2.562	2-9/16	2.673			2.648			1.5110		
-262	2.625	2-5/8	2.736			2.711			1.5510		
-267	2.677	68.0mm	2.789			2.767			1.6850		
-268	2.688	2-11/16	2.803			2.778			1.6940		
-275	2.750	2-3/4	2.865			2.841			1.7360		
-281	2.813	2-13/16	2.929			2.903			1.7790		
-283	2.834	71.9mm	2.954			2.928			1.9030		
-287	2.875	2-7/8	2.995			2.969			1.9320		
-293	2.937	2-15/16	3.058	.168		3.031	.047		1.9780		
-295	2.952	75.0mm	3.073			3.046			1.9880		
-300	3.000	3	3.122			3.096			2.5300		
-306	3.062	3-1/16	3.186			3.158			2.5870		
-312	3.125	3-1/8	3.251			3.223			2.7930		
-314	3.149	80.0mm	3.276			3.247			2.7870		
-318	3.187	3-3/16	3.311			3.283			2.8200		
-325	3.250	3-1/4	3.379			3.350			2.8850		
-331	3.312	3-5/16	3.446			3.416			3.1050		
RR-334	3.346	84.9mm	3.479	.188		3.450	.052		3.1380		

RR

DESCRIPTION

Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE

COMMON

RR CONTINUED NEXT PAGE.

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RR ← BR (Page 64) → KR (Page 61)

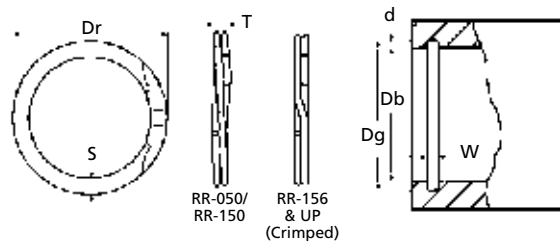
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MOST POPULAR



INTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Assoc. Spring	AI	Smalley	WH	Aerospace	AS3217
Ramsey	RR	Spirolox	RR	Military	MIL-R-27426B1

RR	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
RR-337	3.375	3-3/8	3.509	.188	.061	3.479	.052	.068	3.1680		
-343	3.437	3-7/16	3.574			3.543	.053		3.2330		
-350	3.500	3-1/2	3.636			3.606	.055		3.2950		
-354	3.543	89.9mm	3.684			3.653	.055		3.5100		
-356	3.562	3-9/16	3.703			3.672	.056		3.5310		
-362	3.625	3-5/8	3.769			3.737	.056		3.6010		
-368	3.687	3-11/16	3.832			3.799	.056		3.6670		
-374	3.740	95.0mm	3.885			3.852	.056		3.7230		
-375	3.750	3-3/4	3.894			3.862	.056		3.7330		
-381	3.812	3-13/16	3.963			3.930	.059		3.9870		
-387	3.875	3-7/8	4.025	.208	.061	3.993	.059	.068	4.0210		
-393	3.938	3-15/16	4.089			4.056	.059		4.0930		
-400	4.000	4	4.157			4.124	.062		4.3570		
-406	4.063	4-1/16	4.222			4.187	.062		4.4330		
-412	4.125	4-1/8	4.284			4.249	.062		4.5050		
-418	4.188	4-3/16	4.347			4.311	.062		4.5780		
-425	4.250	4-1/4	4.416			4.380	.065		4.8600		
-431	4.312	4-5/16	4.479			4.442	.065		4.9370		
-433	4.330	109.9mm	4.497			4.460	.065		4.9590		
-437	4.375	4-3/8	4.543			4.505	.065		5.0150		
-443	4.437	4-7/16	4.611	.238	.072	4.573	.068	.079	5.3090		
-450	4.500	4-1/2	4.674			4.636	.068		5.3890		
-452	4.527	115.0mm	4.701			4.663	.068		5.4230		
-456	4.562	4-9/16	4.737			4.698	.070		5.4690		
-462	4.625	4-5/8	4.803			4.765	.070		6.7860		
-468	4.687	4-11/16	4.867			7.827	.072		6.8050		
-472	4.724	120.0mm	4.903			4.864	.072		6.8610		
-475	4.750	4-3/4	4.930			4.890	.072		6.9030		
-481	4.812	4-13/16	4.993			4.952	.072		7.0010		
-487	4.875	4-7/8	5.055			5.015	.072		7.0980		
-492	4.921	125.0mm	5.102	.250	.072	5.061	.074	.079	7.1710		
-493	4.937	4-15/16	5.122			5.081	.074		7.2020		
-500	5.000	5	5.185			5.144	.074		7.3000		
-511	5.118	129.9mm	5.304			5.262	.074		7.4860		
-512	5.125	5-1/8	5.311			5.269	.074		7.4970		
-525	5.250	5-1/4	5.436			5.393	.074		7.6910		
-537	5.375	5-3/8	5.566			5.522	.074		7.8940		
-550	5.500	5-1/2	5.693			5.647	.074		8.0920		
-551	5.511	139.9mm	5.703			5.658	.074		8.1070		
RR-562	5.625	5-5/8	5.818			5.772	.074		8.2860		

RR

DESCRIPTION

Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

ASSORTMENTS



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NEXT PAGE.

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RR

BR (Page 64)

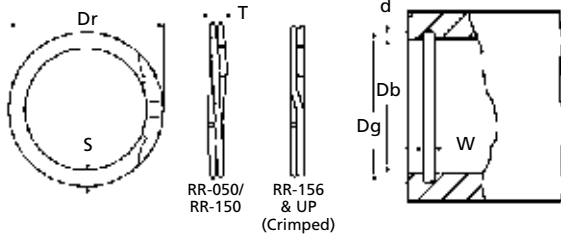
KR (Page 61)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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RR-050/
RR-150

RR-156
& UP
(Crimped)

INTERNAL MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Assoc. Spring	AI	Smalley	WH	Aerospace	AS3217
Ramsey	RR	Spirolox	RR	Military	MIL-R-27426B1



RR	BORE		RING				GROOVE				WEIGHT Lbs. per 100 Pieces	MATERIAL		
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "-S02"				
RR-570	5.708	145.0mm	5.909	.250	+.045/- .000	5.861	.077	.079	+.005/- .000	8.3630				
-575	5.750	5-3/4	5.950			5.903				8.4280				
-587	5.875	5-7/8	6.077			6.028				8.6250				
-590	5.905	149.9mm	6.106			6.058				8.6710				
-600	6.000	6	6.202			6.153				8.8200				
-612	6.125	6-1/8	6.349			6.297				13.4080				
-625	6.250	6-1/4	6.474			6.422				13.6990				
-629	6.299	160.0mm	6.524			.312	+.055/- .000			6.471			.086	13.8160
-637	6.375	6-3/8	6.601							6.547				13.9960
-650	6.500	6-1/2	6.726							6.672				14.2870
-662	6.625	6-5/8	6.863							6.807				14.6070
-669	6.692	170.0mm	6.931							6.874				14.7650
-675	6.750	6-3/4	6.987							6.932				14.8960
-687	6.875	6-7/8	7.114							7.057				15.1930
-700	7.000	7	7.239	7.182	15.4840									
-708	7.086	180.0mm	7.337	7.278	15.5440									
-712	7.125	7-1/8	7.376	7.317	15.6350									
-725	7.250	7-1/4	7.501	7.442	15.9260									
-737	7.375	7-3/8	7.628	7.567	16.2220									
-748	7.480	190.0mm	7.734	7.672	16.4700									
-750	7.500	7-1/2	7.754	7.692	16.5170									
-762	7.625	7-5/8	7.890	7.827	16.8310									
-775	7.750	7-3/4	8.014	7.952	.086	+.008	.094	+.006/- .000	17.1230					
-787	7.875	7-7/8	8.131	8.077					17.3960					
-800	8.000	8	8.266	8.202					17.7120					
-825	8.250	8-1/4	8.528	8.462					21.8450					
-826	8.267	210.0mm	8.546	8.479					21.8970					
-846	8.464	215.0mm	8.744	8.676					22.4510					
-850	8.500	8-1/2	8.780	8.712					22.5520					
-875	8.750	8-3/4	9.041	8.972					23.2840					
-885	8.858	225.0mm	9.151	9.080					23.3300					
-900	9.000	9	9.293	9.222					23.7280					
-905	9.055	230.0mm	9.359	9.287					23.9150					
-925	9.250	9-1/4	9.555	9.482					24.4640					
-944	9.448	240.0mm	9.755	9.680					.106	.111			25.0250	
-950	9.500	9-1/2	9.806	9.732									25.1680	
-975	9.750	9-3/4	10.068	9.992	25.9020									
-1000	10.000	10	10.320	10.242	.121	.126	26.6090							
-1050	10.500	10-1/2	10.834	10.752			28.0500							
RR-1100	11.000	11	11.347	11.262			29.4880							

DESCRIPTION	HOW TO IDENTIFY	GENERAL USE
RR Very popular series that will accommodate light and medium bearing series thrust loads. Available in military and aerospace specifications. AXIAL ASSEMBLY	1. Verify bore diameter (Db). 2. Measure free outside diameter (Dr) of the ring. 3. Determine the ring thickness (T) and radial wall (S). 4. Find the part in the chart above.	 COMMON
<p style="text-align: center;"> GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE. </p> <p style="text-align: center;"> RR ← BR (Page 64) → KR (Page 61) </p>		

**ROUGHLY
TWICE THE
THRUST
CAPABILITY
OF "UR"
SERIES AND
TWO-THIRDS
OF "RRT"
SERIES.**

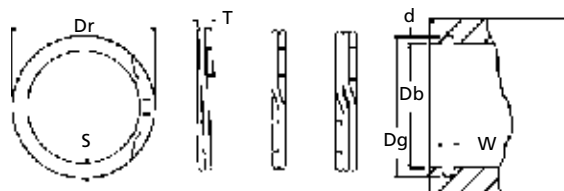
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RRT-150 RRT-156/
RRT-600 RRT-625
& UP
(Crimped) (Crimped)



INTERNAL MEDIUM HEAVY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Assoc. Spring

AMI

Smalley

WHT

Ramsey

RRT

Spirolox

RRT

RRT

BORE

Decimal
(Db)

Fraction
(Db)

RING

Free
Outside
Dia. (Dr)

Radial
Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT

Lbs.
per 100
Pieces

MATERIAL

Spring
Steel

Stainless
"S02"

RRT	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Lbs. per 100 Pieces	Spring Steel	Stainless "S02"
RRT-050	.500	1/2	.529	.045	.035	.524 +/- .002	.012	.039	0.0570		
-051	.512	13.0mm	.541			.536	.012		0.0590		
-056	.562	9/16	.597			.592	.015		0.0670		
-062	.625	5/8	.665			.659	.017		0.0760		
-068	.688	11/16	.730			.724	.018		0.1010		
-075	.750	3/4	.796			.790	.020		0.1120		
-077	.777	19.7mm	.825			.819	.021		0.1610		
-081	.812	13/16	.864			.857	.023		0.1700		
-086	.866	22.0mm	.919			.912	.023		0.1830		
-087	.875	7/8	.929			.922	.024		0.1850		
-090	.901	22.9mm	.957	.055	.042	.950	.025	.046	0.1910		
-093	.938	15/16	.997			.989	.026		0.2290		
-100	1.000	1	1.063			1.055	.028		0.2470		
-102	1.023	26.0mm	1.087			1.079	.028		0.2530		
-106	1.062	1-1/16	1.129			1.120	.029		0.3260		
-112	1.125	1-1/8	1.195			1.185	.030		0.3470		
-118	1.188	1-3/16	1.260			1.250	.031		0.3910		
-125	1.250	1-1/4	1.330			1.320	.035		0.4620		
-131	1.312	1-5/16	1.395			1.385	.037		0.4880		
-137	1.375	1-3/8	1.461			1.450	.038		0.5360		
-143	1.438	1-7/16	1.526	.062	.050	1.515	.039	.056	0.5890		
-145	1.456	37.0mm	1.546			1.535	.040		0.6250		
-150	1.500	1-1/2	1.591			1.580	.040		0.6460		
-156	1.562	1-9/16	1.659			1.647	.043		0.8760		
-162	1.625	1-5/8	1.727			1.715	.045		0.9170		
-165	1.653	42.0mm	1.757			1.745	.046		0.9740		
-168	1.688	1-11/16	1.793			1.780	.046		0.9970		
-175	1.750	1-3/4	1.853			1.845	.048		1.0340		
-181	1.812	1-13/16	1.923			1.910	.049		1.1210		
-185	1.850	47.0mm	1.963			1.949	.050		1.1330		
-187	1.875	1-7/8	1.984	.078	.062	1.975	.050	.068	1.1900		
-193	1.938	1-15/16	2.054			2.040	.051		1.2830		
-200	2.000	2	2.125			2.110	.055		1.3800		
-206	2.062	2-1/16	2.190			2.175	.027		1.8450		
-212	2.125	2-1/8	2.255			2.240	.058		1.9070		
-218	2.188	2-3/16	2.321			2.305	.059		1.9170		
-225	2.250	2-1/4	2.386			2.370	.060		2.0330		
-231	2.312	2-5/16	2.457			2.440	.064		2.7410		
-237	2.375	2-3/8	2.522			2.505	.065		2.8230		
RRT-244	2.440	61.9mm	2.588	.188	.078	2.570	.065	.086	2.9070		

RRT

DESCRIPTION

Originally designed to fit NAS 50-51 grooves, RRT is a common OEM specification. Two and three turn designs are easier to install than RRN because of multiple turn design.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

FITS
NAS 50-51
GROOVES.

ASSORTMENTS



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RRT

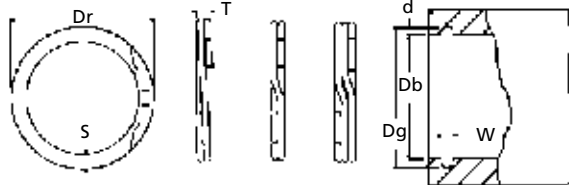
UHB (Page 72)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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RRT-050/ RRT-150
RRT-156/ RRT-600
RRT-625 & UP
(Crimped) (Crimped)

INTERNAL MEDIUM HEAVY

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Assoc. Spring

AMI

Smalley

WHT

Ramsey

RRT

Spirolox

RRT



RRT	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-502"
RRT-250	2.500	2-1/2	2.653	.188	.078	2.635	.068	.086	2.9500		
-253	2.531	2-17/32	2.687			2.668	.069		2.9930		
-256	2.562	2-9/16	2.720			2.700	.069		3.5940		
-262	2.625	2-5/8	2.785			2.765	.070		3.6930		
-268	2.688	2-11/16	2.855			2.834	.073		3.7980		
-275	2.750	2-3/4	2.921			2.900	.075		3.8980		
-281	2.813	2-13/16	2.987			2.965	.076		3.9970		
-283	2.834	71.9mm	3.009			2.987	.077		4.0300		
-287	2.875	2-7/8	3.053			3.030	.078		4.0960		
-300	3.000	3	3.188			3.165	.083		4.3000		
-306	3.062	3-1/16	3.257	.250	.093	3.230	.084	.103	6.8030		
-312	3.125	3-1/8	3.318			3.295	.085		6.9500		
-315	3.156	3-5/32	3.354			3.328	.086		7.0370		
-325	3.250	3-1/4	3.450			3.426	.088		7.2680		
-334	3.346	85.0mm	3.550			3.525	.090		7.5080		
-347	3.469	88.0mm	3.683			3.657	.093		7.8280		
-350	3.500	3-1/2	3.716			3.690	.095		7.9070		
-354	3.543	89.9mm	3.761			3.735	.096		8.0160		
-356	3.562	3-9/16	3.783			3.756	.097		8.0680		
-362	3.625	3-5/8	3.849			3.822	.099		8.2270		
-375	3.750	3-3/4	3.982	.312	.111	3.955	.103	.120	8.4460		
-387	3.875	3-7/8	4.115			4.087	.106		8.7660		
-393	3.938	3-15/16	4.178			4.150	.106		8.9170		
-400	4.000	4	4.248			4.220	.110		9.0860		
-412	4.125	4-1/8	4.368			4.339	.110		11.5140		
-425	4.250	4-1/4	4.500			4.470	.110		11.9100		
-433	4.330	109.9mm	4.586			4.556	.113		12.1670		
-450	4.500	4-1/2	4.768			4.735	.118		12.7140		
-462	4.625	4-5/8	4.897			4.865	.120		13.1010		
-475	4.750	4-3/4	5.028			4.995	.123		13.4940		
-500	5.000	5	5.295	.375	.127	5.260	.130	.139	14.3560		
-525	5.250	5-1/4	5.559			5.520	.135		20.6430		
-537	5.375	5-3/8	5.689			5.650	.135		21.1810		
-550	5.500	5-1/2	5.810			5.770	.135		21.6810		
-575	5.750	5-3/4	6.062			6.020	.135		22.7240		
-600	6.000	6	6.314			6.270	.135		23.7660		
-625	6.250	6-1/4	6.576			6.530	.140		26.6560		
-650	6.500	6-1/2	6.837			6.790	.145		27.8340		
-662	6.625	6-5/8	6.973			6.925	.150	.174	28.4480		
-675	6.750	6-3/4	7.104			7.055	.153		29.0390		
-700	7.000	7	7.366	.312	.165	7.315	.158		30.2210		
-725	7.250	7-1/4	7.628			7.575	.163		42.9420		
-750	7.500	7-1/2	7.895			7.840	.170		44.6020		
-775	7.750	7-3/4	8.156			8.100	.175		46.2250		
-800	8.000	8	8.418			8.360	.180		48.4750		
-825	8.250	8-1/4	8.680			8.620	.185		49.4810		
-850	8.500	8-1/2	8.942			8.880	.190		51.1090		
-875	8.750	8-3/4	9.209			9.145	.198	.209	52.7680		
-900	9.000	9	9.471			9.405	.203		54.3950		
-925	9.250	9-1/4	9.736			9.669	.210		56.0410		
-950	9.500	9-1/2	9.999			9.930	.215		57.6730		
-975	9.750	9-3/4	10.260	.375	.189	10.189	.220		59.2930		
-1000	10.000	10	10.552			10.450	.225		61.1050		
RRT-1050	10.500	10-1/2	11.036			10.970	.235		64.1090		

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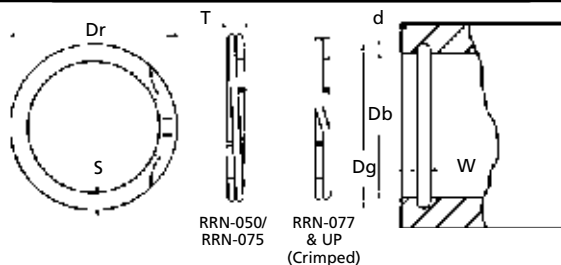
All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
Prices, materials, tolerances, and grades subject to change without notice.

INTERNAL SPIRAL RINGS

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INTERCHANGEABLE WITH SNAP RINGS



INTERNAL HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

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Assoc. Spring	AHI	Smalley	WHM	Aerospace	AS3215
Ramsey	RRN	Spirolox	RRN	Military	MIL-R-27426B2

RRN	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
RRN-050	.500	1/2	.538	.045	.035	.530	.015	.039	0.0570		
-051	.512	13.0mm	.550			.542	.015		0.0590		
-056	.562	9/16	.605			.596	.017		0.0800		
-062	.625	5/8	.675			.665	.020		0.0920		
-068	.688	11/16	.743	.065		.732	.022		0.1190		
-075	.750	3/4	.807			.796	.023		0.1320		
-077	.777	19.7mm	.836			.825	.024		0.1840		
-081	.812	13/16	.873		.075	.862	.025		0.1940		
-086	.866	22.0mm	.931			.920	.027		0.2100		
-087	.875	7/8	.943			.931	.028	.046	0.2390		
-090	.901	22.9mm	.972		.042	.959	.029		0.2470		
-093	.938	15/16	1.013			1.000	.031		0.2600		
-100	1.000	1	1.080	.085		1.066	.033		0.2790		
-102	1.023	26.0mm	1.105			1.091	.034		0.2860		
-106	1.062	1-1/16	1.138		.050	1.130	.034		0.4230		
-112	1.125	1-1/8	1.205			1.197	.036		0.4520		
-118	1.188	1-3/16	1.271	.103		1.262	.037		0.4820		
-125	1.250	1-1/4	1.339			1.330	.040	.056	0.5110		
-131	1.312	1-5/16	1.406			1.396	.042		0.6120		
-137	1.375	1-3/8	1.471			1.461	.043		0.6450		
-143	1.439	1-7/16	1.539	.118		1.528	.045		0.6740		
-145	1.456	37.0mm	1.559			1.548	.046		0.6840		
-150	1.500	1-1/2	1.605			1.594	.047		0.7070		
-156	1.562	1-9/16	1.675			1.658	.048		0.9860		
-162	1.625	1-5/8	1.742			1.725	.050		1.0320		
-165	1.653	42.0mm	1.772			1.755	.051		1.0520		
-168	1.688	1-11/16	1.810	.128		1.792	.052		1.0790		
-175	1.750	1-3/4	1.876			1.858	.054	.068	1.1240		
-181	1.812	1-13/16	1.940			1.922	.055		1.1670		
-185	1.850	47.0mm	1.981			1.962	.056		1.4500		
-187	1.875	1-7/8	2.008	.158		1.989	.057		1.4730		
-193	1.938	1-15/16	2.075			2.056	.059		1.5300		
-200	2.000	2	2.142			2.122	.061		1.5780		
-206	2.062	2-1/16	2.201			2.186	.062		2.1810		
-212	2.125	2-1/8	2.267			2.251	.063		2.2560		
-218	2.188	2-3/16	2.334	.168		2.318	.065	.086	2.3320		
-225	2.250	2-1/4	2.399			2.382	.066		2.4060		
RRN-231	2.312	2-5/16	2.467			2.450	.069		2.9130		

RRN

DESCRIPTION

Heavy-duty design for use in NAS 669-670 deep grooves in applications like double row and tapered roller bearings. Requires no tools for removal.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

FITS
NAS 669-670
GROOVES.

ASSORTMENTS



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GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RRN ↔ HO (Page 16) ↔ HOI (Page 19) ↔ UHO (Page 76) ↔ SRN (Page 63)

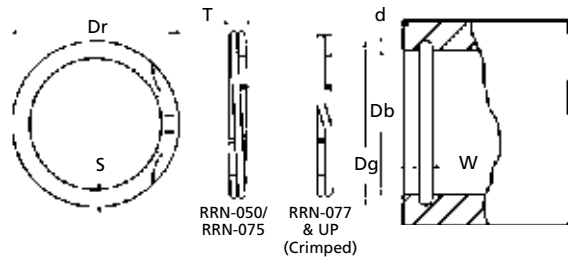
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

RRN CONTINUED NEXT PAGE.

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INTERCHANGEABLE WITH SNAP RINGS

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INTERNAL HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

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Assoc. Spring	AHI	Smalley	WHM	Aerospace	AS3215
Ramsey	RRN	Spirolox	RRN	Military	MIL-R-27426B2



RRN	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-502"
RRN-237	2.375	2-3/8	2.535	.200	.078	2.517	.071	.086	3.0050		
-244	2.440	61.9mm	2.602			2.584	.072		3.0960		
-250	2.500	2-1/2	2.667			2.648	.074		3.1410		
-253	2.531	2-17/32	2.700			2.681	.075		3.1860		
-256	2.562	2-9/16	2.733			2.714	.076		4.2590		
-262	2.625	2-5/8	2.801	.225	.093	2.781	.078	.103	4.3810		
-268	2.688	2-11/16	2.868			2.848	.080		4.5020		
-275	2.750	2-3/4	2.934			2.914	.082		4.6210		
-281	2.813	2-13/16	3.001			2.980	.084		4.7430		
-283	2.834	71.9mm	3.027			3.006	.086		4.7890		
-287	2.875	2-7/8	3.072	.281	.111	3.051	.088	.120	4.8700		
-300	3.000	3	3.204			3.182	.091		5.1080		
-306	3.062	3-1/16	3.271			3.248	.093		7.6010		
-312	3.125	3-1/4	3.338			3.315	.095		7.7820		
-315	3.157	3-5/32	3.371			3.348	.096		7.8710		
-325	3.250	3-1/4	3.470	.312	.111	3.446	.098	.120	8.1390		
-334	3.346	85.0mm	3.571			3.546	.100		8.4120		
-347	3.469	88.0mm	3.701			3.675	.105		8.7640		
-350	3.500	3-1/2	3.736			3.710	.105		8.8580		
-354	3.543	89.9mm	3.781			3.755	.106		8.9800		
-356	3.562	3-9/16	3.802	.350	.127	3.776	.107	.139	9.0370		
-362	3.625	3-5/8	3.868			3.841	.108		9.2150		
-375	3.750	3-3/4	4.002			3.974	.112		10.4140		
-387	3.875	3-7/8	4.136			4.107	.116		10.8170		
-393	3.938	3-15/16	4.203			4.174	.118		11.0180		
-400	4.000	4	4.270	.312	.111	4.240	.120	.120	11.2190		
-412	4.125	4-1/8	4.369			4.339	.120		11.5160		
-425	4.250	4-1/4	4.501			4.470	.120		11.9130		
-433	4.330	109.9mm	4.588			4.556	.120		12.1740		
-450	4.500	4-1/2	4.768			4.735	.120		12.7140		
-462	4.625	4-5/8	4.899	.350	.127	4.865	.120	.139	13.1070		
-475	4.750	4-3/4	5.030			4.995	.123		13.5000		
-500	5.000	5	5.297			5.260	.130		14.0490		
-525	5.250	5-1/4	5.559			5.520	.135		18.9630		
-537	5.375	5-3/8	5.690			5.650	.135		19.4690		
-550	5.500	5-1/2	5.810	.350	.127	5.770	.135	.139	19.9330		
-575	5.750	5-3/4	6.062			6.020	.135		20.9070		
RRN-600	6.000	6	6.314			6.270	.135		21.8820		

RRN

DESCRIPTION

Heavy-duty design for use in NAS 669-670 deep grooves in applications like double row and tapered roller bearings. Requires no tools for removal.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE

COMMON

FITS INTO THE SAME GROOVE AS SNAP RINGS.

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

RRN ← HO (Page 16) ← HOI (Page 19) ← UHO (Page 76) ← SRN (Page 63)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

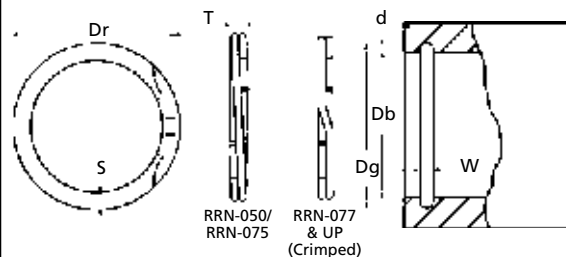
RRN CONTINUED NEXT PAGE.

INTERNAL SPIRAL RINGS

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INTERCHANGEABLE WITH SNAP RINGS



INTERNAL HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

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Assoc. Spring	AHI	Smalley	WHM	Aerospace	AS3215
Ramsey	RRN	Spirolox	RRN	Military	MIL-R-27426B2

RRN	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
RRN-625	6.250	6-1/4	6.576	.380	.156	6.530	.140	.174	30.3150		
-650	6.500	6-1/2	6.838			6.790	.145		31.6620		
-662	6.625	6-5/8	6.974			6.925	.150		32.3610		
-675	6.750	6-3/4	7.105			7.055	.153		33.0340		
-700	7.000	7	7.366			7.315	.158		33.7850		
-725	7.250	7-1/4	7.628	.418		7.575	.163		46.5240		
-750	7.500	7-1/2	7.895			7.840	.170		48.3530		
-775	7.750	7-3/4	8.157			8.100	.175		50.1480		
-800	8.000	8	8.419			8.360	.180		51.9440		
-825	8.250	8-1/4	8.680			8.620	.185		56.0380		
-850	8.500	8-1/2	8.942	.437		8.880	.190		57.9120		
-875	8.750	8-3/4	9.209			9.145	.198		59.8260		
-900	9.000	9	9.471			9.405	.203		61.7000		
-925	9.250	9-1/4	9.737			9.669	.210		63.6030		
-950	9.500	9-1/2	10.000			9.930	.215		73.7330		
-975	9.750	9-3/4	10.260	.500		10.189	.220		75.8620		
-1000	10.000	10	10.523			10.450	.225		78.0160		
-1025	10.250	10-1/4	10.786			10.711	.231		80.1720		
-1050	10.500	10-1/2	11.047			10.970	.235		82.3060		
-1075	10.750	10-3/4	11.313			11.234	.242		84.4890		
-1100	11.000	11	11.575	.562		11.495	.248		86.6320		
-1125	11.250	11-1/4	11.838			11.756	.253		88.7840		
-1150	11.500	11-1/2	12.102			12.018	.259		100.7020		
-1175	11.750	11-3/4	12.365			12.279	.265		103.1220		
-1200	12.000	12	12.628			12.540	.270		105.5430		
-1225	12.250	12-1/4	12.891	.662		12.801	.276		107.9650		
-1250	12.500	12-1/2	13.154			13.063	.282		110.3850		
-1275	12.750	12-3/4	13.417			13.324	.287		112.8060		
-1300	13.000	13	13.680			13.585	.293		134.6480		
-1325	13.250	13-1/4	13.943			13.846	.298		137.5010		
-1350	13.500	13-1/2	14.207	.750		14.108	.304		140.3640		
-1375	13.750	13-3/4	14.470			14.369	.310		143.2140		
-1400	14.000	14	14.732			14.630	.315		144.9290		
-1425	14.250	14-1/4	14.995			14.891	.321		147.7820		
-1450	14.500	14-1/2	15.259			15.153	.327		169.5900		
-1475	14.750	14-3/4	15.522			15.414	.332		172.8240		
RRN-1500	15.000	15	15.785			15.675	.338		176.0550		

RRN

DESCRIPTION

Heavy duty design for use in NAS 669-670 deep grooves in applications like double row and tapered roller bearings. Requires no tools for removal.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

FITS
NAS 669-670
GROOVES.



RRN ↔ HO (Page 16) ↔ HOI (Page 19) ↔ UHO (Page 76) ↔ SRN (Page 63)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

TAB-LOCK SYSTEM

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INTERNAL SELF-LOCKING
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Ramsey

KR

Spirolox

KR



KR	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL				
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless “-S02”			
KR-200	2.000	2	2.085	.128	.049	+/- .003	2.071	±.005	.035	.056	+.004/- .000	1.0130		
-212	2.125	2-1/8	2.209				2.195	.035	1.0810					
-225	2.250	2-1/4	2.339				2.324	.037	1.1520					
-237	2.375	2-3/8	2.468				2.453	.039	1.2230					
-250	2.500	2-1/2	2.599				2.582	.041	1.4370					
-262	2.625	2-5/8	2.729	.148		2.711	.043		1.5160					
-275	2.750	2-3/4	2.859			2.841	.045		1.5960					
-287	2.875	2-7/8	2.989			2.969	.047		1.8410					
-300	3.000	3	3.115			3.096	.048		2.4070					
-312	3.125	3-1/8	3.245			.178			3.223	.049		2.5170		
-325	3.250	3-1/4	3.373	3.350	.050			2.8800						
-337	3.375	3-3/8	3.502	3.479	.052			3.0020						
-350	3.500	3-1/2	3.629	3.606	.053			3.1230						
-362	3.625	3-5/8	3.762	3.737	.056			3.5930						
-375	3.750	3-3/4	3.887	.198	.061	+/- .006	3.862	.056	.068	3.7260				
-387	3.875	3-7/8	4.019				3.993	.059		3.8320				
-400	4.000	4	4.150				4.124	.062		4.3490				
-412	4.125	4-1/8	4.279				4.249	.062		4.5250				
-425	4.250	4-1/4	4.409				4.380	.065		4.6510				
-437	4.375	4-3/8	4.536	.218		4.505	.065		4.7980					
-450	4.500	4-1/2	4.667			4.636	.068		4.9510					
-462	4.625	4-5/8	4.796			4.765	.070		6.7750					
-475	4.750	4-3/4	4.923			4.890	.070		6.8920					
-487	4.875	4-7/8	5.048			5.015	.070		7.0870					
-500	5.000	5	5.183	.250		5.144	.072		7.2970					
-512	5.125	5-1/8	5.304			5.269	.072		7.4860					
-525	5.250	5-1/4	5.429			5.393	.071		8.4920					
-537	5.375	5-3/8	5.561			5.522	.074		8.7210					
-550	5.550	5-1/2	5.686			5.647	.073		8.9370					
-562	5.625	5-5/8	5.818	.265		5.772	.073		9.1660					
-575	5.750	5-1/2	5.942			5.903	.076		9.3090					
-587	5.875	5-7/8	6.069			6.028	.076		9.5290					
-600	6.000	6	6.194			6.153	.076		10.4760					
-612	6.125	6-1/8	6.340			6.297	.086		12.8980					
-625	6.250	6-1/4	6.465	.312		6.422	.086		13.1800					
-637	6.375	6-3/8	6.594			6.547	.086		14.7420					
-650	6.500	6-1/2	6.716			6.672	.086		15.0430					
-675	6.750	6-3/4	6.978			6.932	.091		15.6890					
-700	7.000	7	7.230			7.182	.091		17.7130					
KR-725	7.250	7-1/4	7.491	.350	.086	+/- .008	7.442	.096	.094	+.006/- .000	18.2200			

KR
DESCRIPTION

Similar to the RR, except with tab and slot locking system. Used in unstable environments subject to vibration, shockwaves, or high centrifugal forces.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Confirm presence of tab and slot locking system in ring rim.
2. Verify bore diameter (Db).
3. Measure the free outside diameter (Dr) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE


WEIRD

**TABS
LOCATED
ON ONE END
LOCK INTO
SLOTS ON
THE OTHER
END.**



KR

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BR (Page 64)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

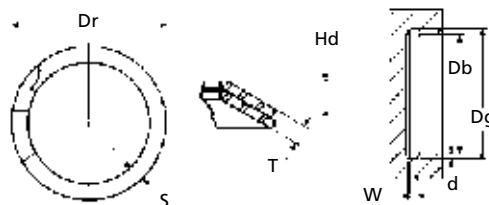
All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

INTERNAL SPIRAL RINGS

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DISHED SHAPE FOR END-PLAY TAKE UP



INTERNAL DISHED

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Ramsey

MR

Spirolox

MR

MR	BORE		RING					GROOVE			WEIGHT	MATERIAL					
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Dish Height (Hd)	Diameter (Dg)	Depth (d)	Width (W)	Lbs. per 100 Pieces	Spring Steel	Stainless "S02"					
MR-100	1.000	1	1.081	+013/-000	.095	.043	+/-002	.012	+/-003	1.066	+/-003	.033	.048	+004/-000	0.3160		
-112	1.125	1-1/8	1.215		.103			.015		1.197		.036			0.4420		
-125	1.250	1-1/4	1.349		.118	.050	.016	1.330	+/-004	.040		0.5400					
-137	1.375	1-3/8	1.482		.128		.018	1.461		.043	.056	0.6470					
-150	1.500	1-1/2	1.615		.148		.019	1.594		.047	0.8560						
-162	1.625	1-5/8	1.750	+020/-000	.148		.022	1.725	+/-005	.050		0.9190					
-175	1.750	1-3/4	1.884		.158	.020	1.858	.054		+/-005	1.3230						
-187	1.875	1-7/8	2.016		.178	.024	1.989	.057			1.5370						
-200	2.000	2	2.151	+020/-000	.188	.026	2.122	.061	1.7370								
-212	2.125	2-1/8	2.282	+025/-000	.198	.062	.029	2.251	+/-003	.063	+005/-000	1.9910					
-225	2.250	2-1/4	2.416		.198		.029	2.382		.066		2.1210					
-237	2.375	2-3/8	2.553		.208		.028	2.517		.071		2.3710					
-250	2.500	2-1/2	2.685		.218		.029	2.648		.074		2.6170					
-262	2.625	2-5/8	2.820		.228		.029	2.781		.078		2.8790					
-275	2.750	2-3/4	2.954		.238		.028	2.914		.082		3.1510					
-287	2.875	2-7/8	3.093		.248		.029	3.051		.088		3.4400					
-300	3.000	3	3.228		.248		.028	3.182		.091		4.2300					
-312	3.125	3-1/8	3.361		.265		.029	3.315		.095		4.6900					
-325	3.250	3-1/4	3.486		.265		.029	3.446		.098		5.1700					
-337	3.375	3-3/8	3.621	.265	.032	3.579	.102	5.4930									
-350	3.500	3-1/2	3.753	+030/-000	.312	.033	3.710	.105	+/-006	.108	+006/-000	5.8580					
-362	3.625	3-5/8	3.885		.312	.032	3.841	.108		6.2720							
-375	3.750	3-3/4	4.021		.312	.036	3.974	.112		7.9560							
-387	3.875	3-7/8	4.154		.350	.039	4.107	.116		8.6800							
-400	4.000	4	4.290	+035/-000	.350	.072	.039	4.240	+/-004	.120	+006/-000	8.9900					
-412	4.125	4-1/8	4.388		.350		.045	4.339		.107		9.7170					
-425	4.250	4-1/4	4.522		.350		.044	4.470		.110		10.0440					
-450	4.500	4-1/2	4.779		.375		.047	4.735		.117		11.4930					
-475	4.750	4-3/4	5.044		.375		.048	4.995		.122		12.1530					
MR-500	5.000	5	5.313		+045/-000		.375			.047		5.260		.130		12.8920	

MR

DESCRIPTION

Standard ring formed into a conical shape that is designed to take up end-play. Best results occur when ring is installed in a non-loaded condition.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm conical shape of part.
2. Verify bore diameter (Db).
3. Measure the free outside diameter (Dr) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE

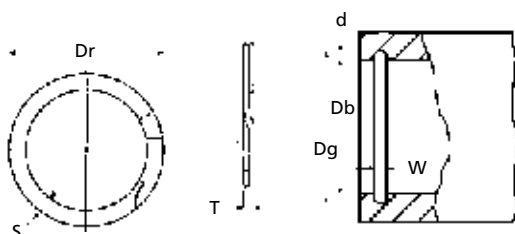


CONICAL
SHAPE FOR
END PLAY
TAKE-UP.

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EASY TO REMOVE

BOX 232 • MINNEAPOLIS, KS • 67467



INTERNAL TABBED

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Ramsey

SRN

Spirolox

SRN



SRN	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
SRN-200	2.000	2	2.142 $\pm .020 / - .000$	.158	.062	2.122 $\pm .005$	.061	.068 $\pm .004 / - .000$	1.5780		
-212	2.125	2-1/8	2.267	.168	.078	2.251	.063	.086	2.2560		
-225	2.250	2-1/4	2.399			2.382	.066		2.4060		
-237	2.375	2-3/8	2.535	.200		2.517	.071		3.0050		
-250	2.500	2-1/2	2.667			2.648	.074		3.1410		
-262	2.625	2-5/8	2.801			2.781	.078		4.3810		
-275	2.750	2-3/4	2.934	.225	.093	2.914	.082	.103	4.6210		
-287	2.875	2-7/8	3.072			3.051	.088		4.8700		
-300	3.000	3	3.204 $\pm .030 / - .000$			3.182	.091		5.1080		
-312	3.125	3-1/8	3.334			3.315	.095		7.7820		
-325	3.250	3-1/4	3.470	.281	.111	3.446	.098	.120 $\pm .005 / - .000$	8.1390		
-350	3.500	3-1/2	3.736			3.710	.105		8.8580		
-362	3.625	3-5/8	3.868			3.841	.108		9.2150		
-375	3.750	3-3/4	4.002			3.974	.112		10.4140		
-387	3.875	3-7/8	4.136			4.107	.116		10.8170		
-400	4.000	4	4.270 $\pm .035 / - .000$	.312		4.240	.120		11.2190		
-412	4.125	4-1/8	4.369			4.339	.107		11.5160		
-425	4.250	4-1/4	4.501			4.470	.110		11.9130		
-450	4.500	4-1/2	4.768			4.735	.117		12.7140		
-462	4.625	4-5/8	4.899			4.865	.120		13.1070		
-475	4.750	4-3/4	5.030			4.995	.122		13.5000		
SRN-500	5.000	5	5.297			5.260	.130		14.0490		

SRN

DESCRIPTION

Standard RSN ring with prong for easy removal using pliers or screwdriver, or for holding it with your teeth.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify prong or finger protruding from the ring.
2. Confirm bore diameter (Db).
3. Measure the free outside diameter (Dr) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE



WEIRD



PROTRUDING
TAB FOR
REMOVAL.

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

SRN

HO (Page 16)

HOI (Page 19)

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UHO (Page 76)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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TAB-LOCK SYSTEM



INTERNAL BALANCED

MANUFACTURER CROSS-REFERENCE

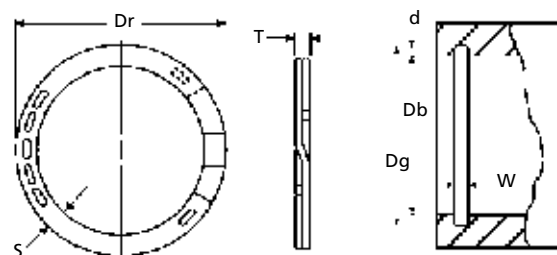
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Ramsey

BR

Spirolox

BR



BR	BORE		RING			GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "S02"
BR-200	2.000	2	2.091	.128	.049	2.071	.035	.056	0.9770		
-206	2.062	2-1/16	2.154			2.132			1.0110		
-212	2.125	2-1/8	2.217			2.195			1.0450		
-218	2.187	2-3/16	2.284			2.262			1.1670		
-225	2.250	2-1/4	2.347			2.324			1.2030		
-231	2.312	2-5/16	2.403			2.390			1.2420		
-237	2.375	2-3/8	2.476			2.453			1.2790		
-243	2.437	2-7/16	2.543			2.519			1.3990		
-250	2.500	2-1/2	2.606			2.582			1.4390		
-256	2.562	2-9/16	2.673			2.684			1.4810		
-262	2.625	2-5/8	2.736	.138	.049	2.711	.043	.056	1.5200		
-268	2.687	2-11/16	2.803			2.778			1.5680		
-275	2.750	2-3/4	2.865			2.841			1.7110		
-281	2.813	2-13/16	2.929			2.903			1.7530		
-287	2.875	2-7/8	2.995			2.969			1.8960		
-293	2.937	2-15/16	3.058			3.031			1.9400		
-300	3.000	3	3.122			3.096			2.4840		
-306	3.062	3-1/16	3.186			3.158			2.5390		
-312	3.125	3-1/8	3.251			3.223			2.7170		
-318	3.187	3-3/16	3.311			3.283			2.7740		
-325	3.250	3-1/4	3.379	.148	.061	3.350	.048	.068	2.8370		
-331	3.312	3-5/16	3.446			3.416			3.0630		
-337	3.375	3-3/8	3.509			3.479			3.1260		
-343	3.437	3-7/16	3.574			3.543			3.1900		
-350	3.500	3-1/2	3.636			3.606			3.2530		
-356	3.562	3-9/16	3.703			3.672			3.4950		
-362	3.625	3-5/8	3.769			3.737			3.5630		
-368	3.687	3-11/16	3.832			3.799			3.6290		
-375	3.750	3-3/4	3.894			3.862			3.6950		
-381	3.812	3-13/16	3.963			3.930			3.9550		
-387	3.875	3-7/8	4.025	.158	.061	3.993	.059	.068	4.0250		
-393	3.937	3-15/16	4.089			4.056			4.0950		
-400	4.000	4	4.157			4.124			4.3680		
-406	4.063	4-1/16	4.222			4.187			4.4410		
-412	4.125	4-1/8	4.284			4.249			4.5130		
-418	4.187	4-3/16	4.347			4.311			4.5850		
-425	4.250	4-1/4	4.416			4.380			4.8060		
-431	4.312	4-5/16	4.479			4.442			4.8820		
-437	4.375	4-3/8	4.543			4.505			4.9590		
BR-443	4.437	4-7/16	4.611	.238		4.573	.068		5.2600		

BR

DESCRIPTION

Similar to the RR, except a series of slots opposite the ring gap balance the part for high RPM applications. Tab and slot locking system provides locking benefits.

AXIAL ASSEMBLY

HOW TO IDENTIFY

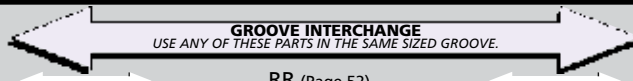
1. Confirm the presence of slots and tab lock system.
2. Verify bore diameter (Db).
3. Measure the free outside diameter (Dr) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE



WEIRD

CONTACT
US FOR
DESIGN
ASSISTANCE.



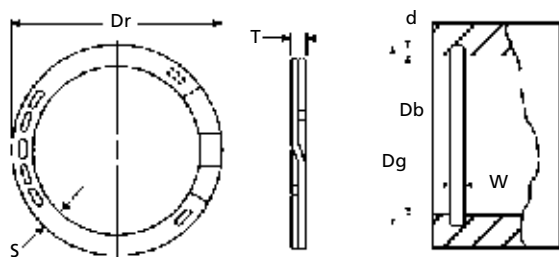
BR

RR (Page 52)

KR (Page 61)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

TAB-LOCK SYSTEM


BOX 232 • MINNEAPOLIS, KS • 67467


INTERNAL BALANCED
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Ramsey

BR

Spirolox

BR



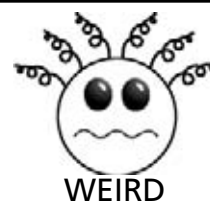
BR	BORE		RING				GROOVE				WEIGHT	MATERIAL						
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Lbs. per 100 Pieces	Spring Steel	Stainless "-S02"					
BR-450	4.500	4-1/2	4.674	.238	.061	+/- .003	4.636	.068	.068	+ .005/- .000	5.3400							
-456	4.562	4-9/16	4.737				4.698				5.4190							
-462	4.625	4-5/8	4.803				4.765				6.6930							
-468	4.687	4-11/16	4.867				4.827				6.7890							
-475	4.750	4-3/4	4.930				4.890				6.8870							
-481	4.812	4-13/16	4.993				4.952				6.9840							
-487	4.875	4-7/8	5.055				5.015				7.0810							
-493	4.937	4-15/16	5.122				5.081				7.1840							
-500	5.000	5	5.185				5.144				7.2820							
-512	5.125	5-1/8	5.311				5.269				7.4770							
-525	5.250	5-1/4	5.436	.250	.072	+/- .004	5.393	.079	+ .005/- .000	7.6700								
-537	5.375	5-3/8	5.566				5.522			7.8710								
-550	5.500	5-1/2	5.693				5.647			8.0650								
-562	5.625	5-5/8	5.818				5.772			8.2590								
-575	5.750	5-3/4	5.950				5.903			8.4630								
-587	5.875	5-7/8	6.077				6.028			8.6580								
-600	6.000	6	6.202				6.153			8.8520								
-612	6.125	6-1/8	6.349				6.297			13.4220								
-625	6.250	6-1/4	6.474				6.422			13.7130								
-637	6.375	6-3/8	6.601				6.547			14.0040								
-650	6.500	6-1/2	6.726	.312	.086	+/- .008	6.672	.091	+ .006/- .000	14.2960								
-662	6.625	6-5/8	6.863				6.807			14.6100								
-675	6.750	6-3/4	6.987				6.932			14.9010								
-687	6.875	6-7/8	7.114				7.057			15.1920								
-700	7.000	7	7.239				7.182			15.4840								
-712	7.125	7-1/8	7.376				7.317			15.7980								
-725	7.250	7-1/4	7.501				7.442			16.0900								
-737	7.375	7-3/8	7.628				7.567			16.3810								
-750	7.500	7-1/2	7.754				7.692			16.6730								
-762	7.625	7-5/8	7.890				7.827			16.9870								
-775	7.750	7-3/4	8.014	.375	.086	+/- .008	7.952	.096	+ .006/- .000	17.2780								
-787	7.875	7-7/8	8.131				8.077			17.5690								
-800	8.000	8	8.266				8.202			17.8600								
-825	8.250	8-1/4	8.528				8.462			21.8230								
-850	8.500	8-1/2	8.780				8.712			22.5220								
-900	9.000	9	9.293				9.222			23.9510								
-950	9.500	9-1/2	9.806				9.732			25.3790								
-1000	10.000	10	10.320				10.242			26.8080								
-1050	10.500	10-1/2	10.834				10.752			28.2360								
BR-1100	11.000	11	11.347				11.262			.131									29.6640

BR
DESCRIPTION

Similar to the RR, except a series of slots opposite the ring gap balance the part for high RPM applications. Tab and slot locking system provides locking benefits.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Confirm the presence of slots and tab lock system.
2. Verify bore diameter (Db).
3. Measure the free outside diameter (Dr) of the ring.
4. Determine the ring thickness (T) and radial wall (S).
5. Find the part in the chart above.

GENERAL USE


**BALANCED
AND LOCKED
INTO PLACE
FOR HIGH
RPM
APPLICATIONS.**

BR

RR (Page 52)

KR (Page 61)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

EATON™-STYLE RINGS

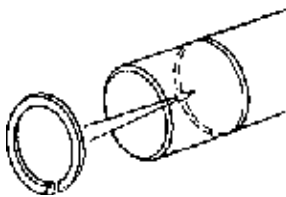
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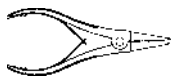


EXTERNAL

INSTALLED
AXIALLY
ONTO A
SHAFT



USING
PLIERS.



TOOLS Pages: 226-231

	USC	BASIC
	IMPERIAL Pgs: 68-69	METRIC Pg: 198
	XD	LIGHT DUTY
	IMPERIAL Pg: 70	METRIC N/A
	USH	NOTCHED
	IMPERIAL Pg: 71	METRIC N/A

STANDARD GAP STYLES

EXTERNAL



#4 gap
STANDARD



#36 gap
STANDARD
on "USH" rings

INTERNAL



#6 gap
STANDARD



#35 gap
STANDARD
on "UHO" rings

OPTIONAL GAP STYLES AVAILABLE AS A SPECIAL ORDER

EXTERNAL



#11 gap
OPTIONAL



#14 gap
OPTIONAL



#34 gap
OPTIONAL

INTERNAL



#34 gap
OPTIONAL



#14 gap
OPTIONAL



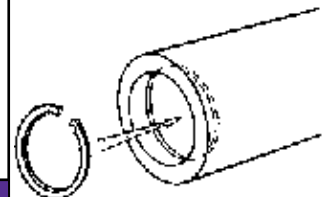
#1 gap
OPTIONAL



#11 gap
OPTIONAL

INTERNAL

INSTALLED
AXIALLY
INTO A
BORE

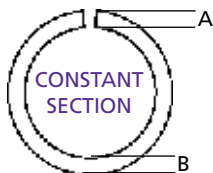


USING
PLIERS.



TOOLS Pages: 226-231

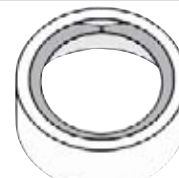
For special orders, see page 75.



Wire width is the same
at A and B ...



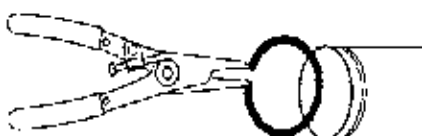
... which causes a **radial kink**
so that the part is "out of
round" after installation ...



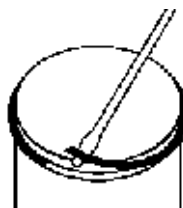
... but yields a **low profile** in the
groove versus lug-style snap rings.

AUTOMATED INSTALLATION

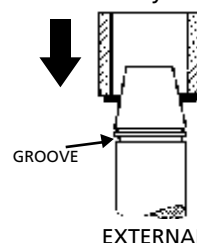
Use pliers ...



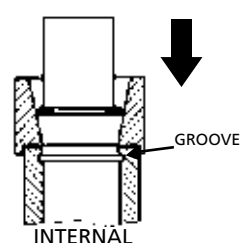
... a screwdriver ...



... or a tapered mandrel design depending on
your application.



EXTERNAL



INTERNAL

LET OUR SHOP MAKE A FIXTURE FOR YOU!

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

PRODUCT COMPARISONS



COILED FROM WIRE

Eaton™-style rings are a class of retaining rings popularized by the Eaton™ Corporation, a huge industrial conglomerate. These rings are wire formed and based on designs established by the automotive and industrial marketplace. Eaton™ began manufacturing these rings as an attempt at vertical consolidation. Because the ring business was such a small part of the company's total revenues, little attention was paid to marketing and distribution. As a result, these rings are very limited in supply, and prices for the parts tend to be high in comparison to thrust loads. Eaton™ has recently sold off their ring division to concentrate on other markets.

MOST OF THE RINGS IN THIS SECTION HAVE NOT BEEN MANUFACTURED BY THE EATON™ CORPORATION.

Eaton™-style rings are wire formed. Wire forming provides some product benefits on large and specialty rings because tooling costs are lower than for stamped snap rings, and there is minimal material waste from breakout. In addition, the grain of the material is circular, which provides excellent strength with a low profile.

THRUST LOAD COMPARISON EATON™-STYLE RINGS VS. OTHER RETAINING RINGS

CARBON SPRING STEEL

EXTERNAL	SHAFT SIZE	EATON™ RING	SNAP RING	SPIRAL RINGS	
		USC	SH	RS	RSN
		Pg 68	Pg 6	Pg 38	Pg 44
		Thrust Load	Thrust Load	Thrust Load	Thrust Load
	1"	1200	2100	2150	2950
	2"	4010	8050	7110	11,470
	5"	17,110	37,100	36,050	52,580
	7"	39,920	72,700	63,790	103,400

INTERNAL	BORE SIZE	EATON™ RING	SNAP RING	SPIRAL RINGS	
		UHB	HO	RR	RRN
		Pg 72	Pg 16	Pg 52	Pg 58
		Thrust Load	Thrust Load	Thrust Load	Thrust Load
	1"	1470	2800	1910	2310
	2"	4000	10,300	7090	10,040
	5"	17,110	55,000	36,050	65,095
	7"	34,850	93,100	63,790	110,410

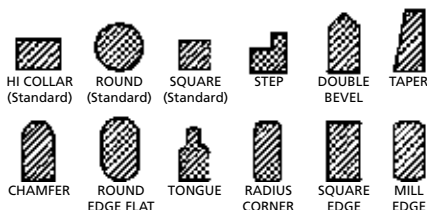
Thrust loads are expressed in pounds, based on groove shear with a safety factor of two (2).
 Eaton™-style ring thrust loads are based on load times 0.60 when the ring distortion is .005 or greater from bending axially.
 Actual results will be based on individual circumstances. These values are for reference only.

MATERIAL

CARBON SPRING STEEL
 SAE 1060-1090
 RC 42/53
 (STANDARD)

500°F Max
 100°F Min

OPTIONAL CROSS SECTIONS AS SPECIAL ORDER:



OTHER MATERIALS AVAILABLE ON REQUEST.

FINISHES

OIL DIPPED
 (STANDARD)

Inhibits rust
 during handling.

ZINC PLATE
 (STANDARD)

Up to 96 hours
 salt spray.

**OTHERS PER
QUOTE . . .**

BLACK OXIDE
 BRASS
 BRONZE
 CADMIUM
 CHROME
 COPPER
 PARKERIZE

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EXTERNAL EATON™-STYLE RINGS

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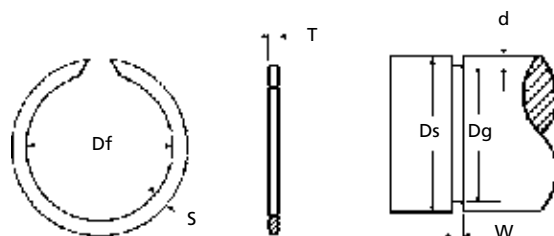
BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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Eaton
Rotor Clip

XAN
USC



USC	SHAFT		RING			GROOVE			MATERIAL	TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	
USC-031	.312	5/16	.281	.040	.025	.290	.011	.028		-E015R
-034	.344	11/32	.312			.322	.011			
-035	.354	8.99mm	.320			.330	.012			
-037	.375	3/8	.341			.351	.012			
-039	.393	9.98mm	.359			.369	.012			
-040	.406	13/32	.372	.048	.035	.382	.012	.039		
-043	.438	7/16	.402			.412	.013			
-046	.469	15/32	.433			.443	.013			
-050	.500	1/2	.464			.474	.013			
-055	.551	14mm	.514			.524	.013			
-056	.562	9/16	.524	.062	.042	.534	.014	.046		
-059	.594	19/32	.555			.566	.014			
-062	.625	5/8	.586			.597	.014			
-066	.669	17mm	.630			.640	.015			
-068	.688	11/16	.644			.656	.016			
-075	.750	3/4	.703	.078	.050	.716	.017	.056		
-078	.781	15/32	.733			.745	.018			
-081	.812	13/16	.764			.776	.018			
-087	.875	7/8	.820			.835	.020			
-093	.938	15/16	.881			.896	.021			
-098	.984	63/64	.925	.093	.062	.940	.022	.068		
-100	1.000	1	.941			.956	.022			
-102	1.023	25.98mm	.962			.977	.023			
-106	1.062	1-1/16	1.000			1.016	.023			
-112	1.125	1-1/8	1.060			1.075	.025			
-118	1.188	1-3/16	1.121	.109	.062	1.136	.026	.068		
-125	1.250	1-1/4	1.179			1.194	.028			
-131	1.312	1-5/16	1.232			1.250	.031			
-137	1.375	1-3/8	1.291			1.309	.033			
-143	1.438	1-7/16	1.351			1.370	.034			
-150	1.500	1-1/2	1.408	.125	.062	1.430	.035	.068		
-156	1.562	1-9/16	1.467			1.490	.036			
-162	1.625	1-5/8	1.527			1.551	.038			
-168	1.687	1-11/16	1.581			1.611	.038			
-175	1.750	1-3/4	1.640			1.670	.040			
-177	1.771	44.98mm	1.657	.141	.062	1.687	.042	.068		
-181	1.812	1-13/16	1.698			1.728	.042			
USC-187	1.875	1-7/8	1.759	.156		1.789	.043			

CONTACT PLANT FOR TOOL INFORMATION.

USC

DESCRIPTION

Wire formed spring steel ring installed using special pliers or with tapered plug and bushing (see page 66).

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm the shaft diameter (Ds).
2. Measure the free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE

COMMON

This style only on USC-031 through -043.

Standard #4 Gap

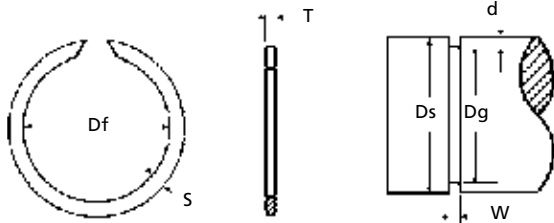
GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

USC ← → RST (Page 42)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

USC CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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Rotor ClipXAN
USC

USC	SHAFT		RING			GROOVE			MATERIAL	TOOL		
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel			
USC-196	1.969	1-31/32	1.849	.156	.062	1.879	.045	.068		-E047R		
-200	2.000	2	1.880			1.910	.045					
-206	2.062	2-1/16	1.936			1.966	.048					
-212	2.125	2-1/8	1.997			2.027	.049					
-215	2.156	2-5/32	2.026			2.056	.050					
-225	2.250	2-1/4	2.116			2.146	.052					
-231	2.312	2-5/16	2.174			2.204	.054					
-237	2.375	2-3/8	2.235			2.265	.055					
-243	2.437	2-7/16	2.295			2.325	.056					
-250	2.500	2-1/2	2.356			2.386	.057					
-255	2.559	65mm	2.413	.187	.078	2.443	.058	.086		-E047R		
-262	2.625	2-5/8	2.475			2.505	.060					
-268	2.687	2-11/16	2.535			2.565	.061					
-275	2.750	2-3/4	2.594			2.624	.063					
-287	2.875	2-7/8	2.713			2.743	.066					
-293	2.937	2-15/16	2.771			2.801	.068					
-300	3.000	3	2.830			2.860	.070					
-306	3.062	3-1/16	2.890		.093	2.920	.071	.103		-E047R		
-312	3.125	3-1/8	2.951			2.981	.072					
-315	3.156	3-5/32	2.980			3.010	.073					
-325	3.250	3-1/4	3.070			3.100	.075					
-334	3.344	3-11/32	3.160			3.190	.077					
-343	3.437	3-7/16	3.251			3.281	.078					
-350	3.500	3-1/2	3.305			3.340	.080					
-354	3.543	90mm	3.346		.250	3.381	.081	.120		-E601R		
-362	3.625	3-5/8	3.423			3.458	.083					
-368	3.687	3-11/16	3.482			3.517	.085					
-375	3.750	3-3/4	3.541			3.576	.087					
-387	3.875	3-7/8	3.657			3.697	.089					
-393	3.938	3-15/16	3.713			3.758	.090					
-400	4.000	4	3.771		.109	3.816	.092					
-425	4.250	4-1/4	4.016			4.066	.092					
-437	4.375	4-3/8	4.141			4.191	.092					
-450	4.500	4-1/2	4.255			4.310	.095					
-475	4.750	4-3/4	4.495			4.550	.100					
-500	5.000	5	4.730			4.790	.105					
-525	5.250	5-1/4	4.970		.125	5.030	.110	.139		-E602R		
-550	5.500	5-1/2	5.206			5.266	.117					
-575	5.750	5-3/4	5.446			5.506	.122					
-590	5.900	149.86mm	5.600			5.656	.122					
-600	6.000	6	5.687			5.746	.127					
-625	6.250	6-1/4	5.916			5.986	.132					
-650	6.500	6-1/2	6.151		.156	6.226	.137	.174				
-675	6.750	6-3/4	6.386			6.466	.142					
-700	7.000	7	6.621			6.706	.147					
-725	7.250	7-1/4	6.840			6.930	.160					
-750	7.500	7-1/2	7.090			7.180	.160					
-800	8.000	8	7.560			7.660	.170					
-850	8.500	8-1/2	8.050		.187	8.160	.170	.209		-		
-900	9.000	9	8.545			8.660	.170					
-925	9.250	9-1/4	8.800			8.910	.170					
-950	9.500	9-1/2	9.040			9.160	.170					
USC-1000	10.000	10	9.535			9.660	.170					

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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EXTERNAL EATON™-STYLE RINGS

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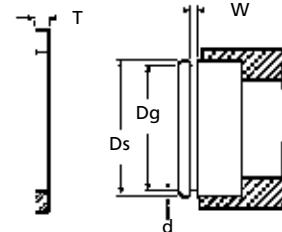
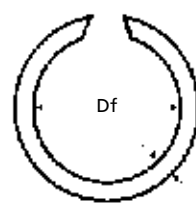
LIGHT-DUTY EXTERNAL


MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Eaton

XD



XD	SHAFT		RING				GROOVE			MATERIAL	TOOL	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel			
XD-050	.500	1/2	.465	+.000/- .025	.048	+.003	.035	.474	+.002	.013	.039	
-062	.625	5/8	.587		.062		.597	.014				
-075	.750	3/4	.704	+.003	.078	+.003	.716	.716	+.003	.017		
-087	.875	7/8	.823		.093		.833	.021				
-100	1.000	1	.944	+.000/- .031		+.004	.954	.023	+.003/- .000			
-112	1.125	1-1/8	1.065				1.077	.024				
-118	1.187	1-3/16	1.120	+.000/- .031		+.004	1.135	.026				
-125	1.250	1-1/4	1.179				1.194	.028				
-131	1.312	1-5/16	1.232	+.000/- .062		+.004	1.252	.030				
-137	1.375	1-3/8	1.289				1.309	.033				
-143	1.437	1-7/16	1.349	+.000/- .062		+.006	1.369	.034				
-150	1.500	1-1/2	1.410				1.430	.035				
-162	1.625	1-5/8	1.520	+.000/- .062		+.006	1.545					
-168	1.687	1-11/16	1.582				1.607					
-175	1.750	1-3/4	1.645	+.000/- .062		+.006	1.670					
-193	1.937	1-15/16	1.832				1.857					
-200	2.000	2	1.895	+.000/- .078		+.006	1.920	.040				
-218	2.187	2-3/16	2.082				2.107					
-225	2.250	2-1/4	2.145	+.000/- .078		+.006	2.170					
-237	2.375	2-3/8	2.270				2.295					
-250	2.500	2-1/2	2.390	+.000/- .078		+.006	2.420					
-275	2.750	2-3/4	2.596				2.626					
-293	2.937	2-15/16	2.783	+.000/- .078		+.006	2.813					
-300	3.000	3	2.846				2.876					
-312	3.125	3-1/8	2.965	+.000/- .093		+.006	3.000	.062				
-325	3.250	3-1/4	3.090				3.125					
-337	3.375	3-3/8	3.215	+.000/- .093		+.006	3.250					
-350	3.500	3-1/2	3.340				3.375					
-375	3.750	3-3/4	3.570	+.000/- .093		+.006	3.610					
-400	4.000	4	3.820				3.860					
-425	4.500	4-1/4	4.070	+.000/- .093		+.006	4.110	.070				
-450	4.500	4-1/2	4.320				4.360					
-475	4.750	4-3/4	4.560	+.000/- .125		+.008	4.610					
-500	5.000	5	4.800				4.860					
-550	5.500	5-1/2	5.280	+.000/- .125		+.008	5.340					
-600	6.000	6	5.775				5.840					
-650	6.500	6-1/2	6.270	+.000/- .125		+.008	6.340	.080				
-700	7.000	7	6.765				6.840					
-750	7.500	7-1/2	7.245	+.000/- .125		+.008	7.320					
XD-800	8.000	8	7.740				7.820					

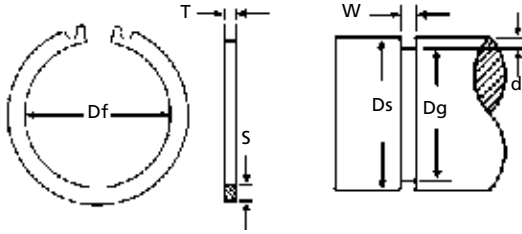
CONTACT PLANT FOR TOOL INFORMATION.

XD	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	
	Generally this part is thinner than the USC but has a wider radial wall. Used in needle bearings and other lighter-weight applications.	<ol style="list-style-type: none"> 1. Confirm the shaft diameter (Ds). 2. Measure the free inside diameter (Df) of the ring. 3. Determine the ring thickness (T) and radial wall (S). 4. Find the part in the chart above. 		
AXIAL ASSEMBLY				

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EASIER TO INSTALL

BOX 232 • MINNEAPOLIS, KS • 67467



NOTCHED EXTERNAL

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Eaton
Rotor Clip

EN
USH



USH	SHAFT		RING			GROOVE			MATERIAL	TOOL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	
USH-206	2.062	2-1/16	1.926	.187	.078	1.946	.058	.086		-E093
-212	2.125	2-1/8	1.983			2.003	.061			
-215	2.156	2-5/32	2.012			2.032	.062			
-225	2.250	2-1/4	2.100			2.120	.065			
-231	2.312	2-5/16	2.158			2.178	.067			
-237	2.375	2-3/8	2.219			2.239	.068			
-243	2.438	2-7/16	2.279			2.299	.069			
-250	2.500	2-1/2	2.340			2.360	.070			
-255	2.559	65mm	2.399			2.419	.070			
-262	2.625	2-5/8	2.461			2.481	.072			
-268	2.688	2-11/16	2.521	.203	.093	2.541	.073	.103		-E108
-275	2.750	2-3/4	2.577			2.602	.074			
-287	2.875	2-7/8	2.696			2.721	.077			
-293	2.938	2-15/16	2.754			2.779	.079			
-300	3.000	3	2.813			2.838	.081			
-306	3.062	3-1/16	2.873			2.898	.082			
-312	3.125	3-1/8	2.932			2.957	.084			
-315	3.156	3-5/32	2.961			2.986	.085			
-325	3.250	3-1/4	3.051			3.076	.087			
-334	3.346	3-11/32	3.141			3.166	.090			
-343	3.438	3-7/16	3.232	.218	.109	3.257	.090	.120		-E120X
-350	3.500	3-1/2	3.286			3.316	.092			
-354	3.543	90mm	3.327			3.357	.093			
-362	3.625	3-5/8	3.405			3.435	.095			
-368	3.688	3-11/16	3.463			3.493	.097			
-375	3.750	3-3/4	3.522			3.552	.099			
-387	3.875	3-7/8	3.643			3.673	.101			
-393	3.938	3-15/16	3.704			3.734	.102			
-400	4.000	4	3.762			3.792	.104			
-425	4.250	4-1/4	4.025			4.065	.092			
-437	4.375	4-3/8	4.150	.250		4.190	.092			-E170
-450	4.500	4-1/2	4.270			4.310	.095			
-475	4.750	4-3/4	4.510			4.550	.100			
USH-500	5.000	5	4.750			4.790	.105			

USH

DESCRIPTION

Low-profile wire formed ring with notches (instead of lugs) for installation pliers. This design requires no orientation during installation.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm the shaft diameter (Ds).
2. Measure the free inside diameter (Df) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



**NOTCHES
HELP PREVENT
RING FROM
FLYING OFF
THE PLIERS
DURING
INSTALLATION.**

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

USH

SH (Page 6)

SHI (Page 10)

RSN (Page 44)

SSN (Page 49)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

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BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

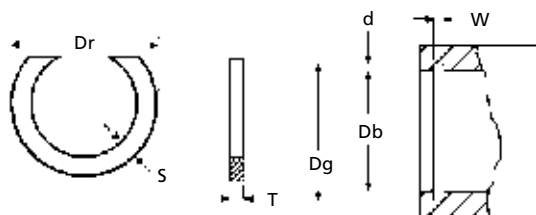
INDEX
PAGE 236.

Eaton

NAN

Rotor Clip

UHB



UHB	BORE		RING					GROOVE					MATERIAL
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel		
UHB-037	.375	3/8	.400	+.020/- .000	.035	+.003	.025	+.003	.395	.010	.028	Spring Steel	
-043	.438	7/16	.467						.462				.012
-050	.500	1/2	.530						.524				.012
-051	.512	13mm	.542						.536				.012
-056	.562	9/16	.600						.590				.014
-062	.625	5/8	.670						.657				.016
-068	.688	11/16	.733						.720				.016
-075	.750	3/4	.799						.786				.018
-077	.777	19.74mm	.827						.813				.018
-081	.812	13/16	.867						.852				.020
-087	.875	7/8	.934	.919	.022								
-090	.901	22.88mm	.961	.945	.022								
-093	.938	15/16	1.003	.986	.024								
-100	1.000	1	1.070	1.052	.024								
-102	1.023	25.98mm	1.094	1.075	.026								
-106	1.062	1-1/16	1.134	1.114	.026								
-112	1.125	1-1/8	1.202	1.181	.028								
-118	1.188	1-3/16	1.270	1.248	.030								
-125	1.250	1-1/4	1.337	1.314	.032								
-131	1.312	1-5/16	1.404	1.380	.034								
-137	1.375	1-3/8	1.472	1.447	.036								
-143	1.438	1-7/16	1.535	1.510	.036								
-145	1.456	36.08mm	1.557	1.532	.038								
-150	1.500	1-1/2	1.607	1.576	.038								
-156	1.562	1-9/16	1.668	1.642	.040								
-162	1.625	1-5/8	1.736	1.709	.042								
-165	1.653	41.99mm	1.765	1.737	.042								
-168	1.688	1-11/16	1.804	1.776	.044								
-175	1.750	1-3/4	1.870	1.842	.046								
-181	1.812	1-13/16	1.933	1.904	.046								
-185	1.850	47mm	1.975	1.946	.048								
-187	1.875	1-7/8	2.000	1.973	.048								
-193	1.938	1-15/16	2.068	2.038	.050								
-196	1.968	1-31/32	2.098	2.068	.050								
-200	2.000	2	2.131	2.100	.050								
-206	2.062	2-1/16	2.197	2.166	.052								
-212	2.125	2-1/8	2.260	2.229	.052								
-218	2.188	2-3/16	2.331	2.296	.054								
-225	2.250	2-1/4	2.393	2.358	.054								
UHB-231	2.312	2-5/16	2.459	2.424	.056								

UHB

DESCRIPTION

Wire formed spring steel ring installed using special pliers or with a plug and tapered bushing (see page 66).

AXIAL ASSEMBLY

HOW TO IDENTIFY

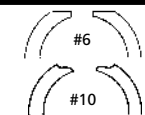
1. Confirm the bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



COMMON

This style only on UHB-037 through -075.



Standard Gap Profile at Manufacturer's option.

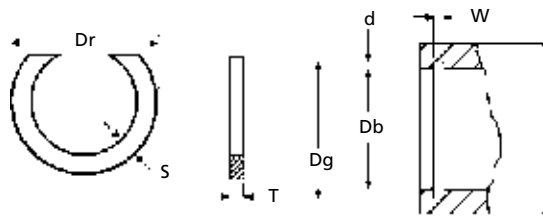
GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

UHB

RRT (Page 56)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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**BASIC INTERNAL****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Eaton

NAN

Rotor Clip

UHB



UHB	BORE		RING			GROOVE				MATERIAL				
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel					
UHB-237	2.375	2-3/8	2.523	+ .046/- .000	.171	.078	2.487	.056	.086	+ .005/- .000				
-244	2.440	61.98mm	2.592								.187	.093	2.556	.058
-250	2.500	2-1/2	2.653										2.616	.058
-253	2.531	2-17/32	2.688										2.651	.060
-256	2.562	2-9/16	2.726	2.686	.062	.103								
-262	2.625	2-5/8	2.790	2.750	.062									
-268	2.688	2-11/16	2.856	2.816	.062									
-271	2.717	68.83mm	2.882	2.842	.064									
-275	2.750	2-3/4	2.918	+ .062/- .000	.109	.093	2.878	.064	.120	+ .005/- .000				
-281	2.813	2-13/16	2.985				2.945	.066						
-283	2.834	72mm	3.006				2.966	.066						
-287	2.875	2-7/8	3.056				3.011	.068						
-300	3.000	3	3.181	+ .062/- .000	.218	.093	3.136	.068	.120	+ .005/- .000				
-306	3.062	3-1/16	3.247				3.202	.070						
-312	3.125	3-1/8	3.311				3.265	.070						
-315	3.156	3-5/32	3.342				3.296	.070						
-325	3.250	3-1/4	3.442	+ .078/- .000	.250	.109	3.394	.072	.120	+ .005/- .000				
-334	3.346	85mm	3.539				3.490	.072						
-346	3.469	3-15/32	3.663				3.613	.072						
-350	3.500	3-1/2	3.700				3.648	.074						
-354	3.543	90mm	3.745	+ .093/- .000	.281	.125	3.691	.074	.139	+ .006/- .000				
-356	3.562	3-9/16	3.766				3.710	.074						
-362	3.625	3-5/8	3.831				3.773	.074						
-375	3.750	3-3/4	3.962				3.902	.076						
-387	3.875	3-7/8	4.089	+ .093/- .000	.312	.156	4.027	.076	.174	+ .006/- .000				
-393	3.938	3-15/16	4.156				4.094	.078						
-400	4.000	4	4.221				4.156	.078						
-412	4.125	4-1/8	4.355				4.285	.080						
-425	4.250	4-1/4	4.485	+ .093/- .000	.343	.187	4.410	.080	.209	+ .006/- .000				
-433	4.330	110mm	4.565				4.490	.080						
-443	4.436	4-7/16	4.670				4.596	.080						
-450	4.500	4-1/2	4.744				4.664	.082						
-462	4.625	4-5/8	4.875	+ .156/- .000	.375	.156	4.795	.085	.209	+ .006/- .000				
-475	4.750	4-3/4	5.011				4.926	.088						
-500	5.000	5	5.265				5.180	.090						
-525	5.250	5-1/4	5.530				5.435	.092						
-537	5.375	5-3/8	5.660	+ .125/- .000	.437	.187	5.565	.095	.209	+ .006/- .000				
-550	5.500	5-1/2	5.796				5.696	.098						
-575	5.750	5-3/4	6.050				5.950	.100						
-600	6.000	6	6.309				6.204	.102						
-625	6.250	6-1/4	6.568	+ .187/- .000	.500	.187	6.458	.104	.209	+ .006/- .000				
-650	6.500	6-1/2	6.832				6.712	.106						
-662	6.625	6-5/8	6.975				6.845	.110						
-675	6.750	6-3/4	7.100				6.970	.110						
-700	7.000	7	7.350	+ .187/- .000	.500	.187	7.220	.110	.209	+ .006/- .000				
-725	7.250	7-1/4	7.630				7.500	.125						
-750	7.500	7-1/2	7.890				7.750	.125						
-800	8.000	8	8.400				8.250	.125						
-825	8.250	8-1/4	8.665	+ .187/- .000	.500	.187	8.540	.145	.209	+ .006/- .000				
-850	8.500	8-1/2	8.915				8.790	.145						
-875	8.750	8-3/4	9.205				9.080	.165						
-900	9.000	9	9.455				9.330	.165						
-905	9.055	230mm	9.509	+ .187/- .000	.500	.187	9.384	.165	.209	+ .006/- .000				
-950	9.500	9-1/2	9.955				9.830	.165						
-984	9.840	9-27/32	10.295				10.170	.165						
UHB-1000	10.000	10	10.455				10.330	.165						

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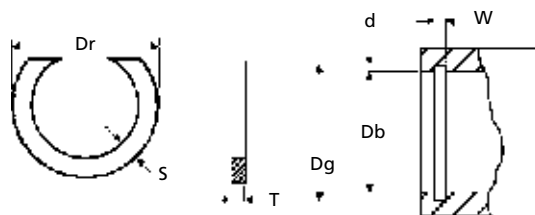
LIGHT-DUTY INTERNAL

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Eaton

ND



ND	BORE		RING			GROOVE			MATERIAL	
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	
ND-112	1.125	1-1/8	1.196	.093	+.003	.042	+.005	1.181	.028	+.003/- .000
-125	1.250	1-1/4	1.330					1.310	.030	
-137	1.375	1-3/8	1.460	.125	1.435	+.005	1.580	.040		
-150	1.500	1-1/2	1.600		1.705					
-162	1.625	1-5/8	1.725	.156	1.830	+.006	1.965	.046		
-175	1.750	1-3/4	1.855		2.090					
-187	1.875	1-7/8	1.990	.187	+.005	.062	2.152	.068		
-200	2.000	2	2.115				2.277			
-206	2.062	2-1/16	2.177	.218	.078	+.007	2.402	.086		
-218	2.187	2-3/16	2.302				2.527			
-231	2.312	2-5/16	2.432	.250	.093	+.008	2.652	.103		
-243	2.437	2-7/16	2.557				2.660			
-256	2.562	2-9/16	2.682	+.003/- .000	+.078/- .000	+.093/- .000	2.652	+.005/- .000		
-300	3.000	3	3.154				3.124			
-325	3.250	3-1/4	3.404	+.078/- .000	+.005	.062	3.374	+.004/- .000		
-350	3.500	3-1/2	3.654				3.624			
-375	3.750	3-3/4	3.904	+.093/- .000	.078	.072	3.874	+.005/- .000		
-400	4.000	4	4.155				4.125			
-425	4.250	4-1/4	4.429	+.093/- .000	.093	.080	4.394	+.005/- .000		
-450	4.500	4-1/2	4.679				4.644			
-475	4.750	4-3/4	4.929	+.125/- .000	.093	.080	4.894	+.005/- .000		
-500	5.000	5	5.184				5.144			
-525	5.250	5-1/4	5.434	+.187/- .000	.093	.080	5.394	+.005/- .000		
-575	5.750	5-3/4	5.934				5.894			
-600	6.000	6	6.220	+.187/- .000	.093	.080	6.160	+.005/- .000		
-650	6.500	6-1/2	6.730				6.660			
-700	7.000	7	7.240	+.187/- .000	.093	.080	7.160	+.005/- .000		
-725	7.250	7-1/4	7.500				7.410			
-750	7.500	7-1/2	7.760	+.187/- .000	.093	.080	7.660	+.005/- .000		
ND-800	8.000	8	8.285				8.160			

ND

DESCRIPTION

Generally this part is thinner than the UHB but has a wider radial wall. Used in needle bearings and other lighter-weight applications.

AXIAL ASSEMBLY

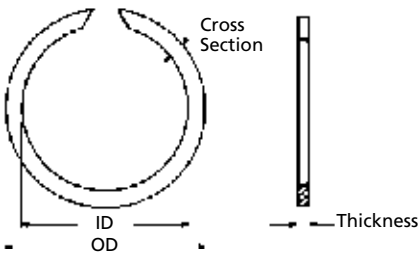
HOW TO IDENTIFY

1. Confirm the bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



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SPECIAL "EATON™-STYLE" RINGS

NAME: _____ COMPANY: _____
 PHONE: _____ FAX: _____
 ZODIAC SIGN: _____ NUMBER OF PETS: _____ ☐ SMOKER ☐ NONSMOKER

APPLICATION

To assist you, we are providing this "Copy and Fax" design sheet. Please fill this page out as completely as possible and fax it to our plant for quotation.

How is the part going to be used? _____

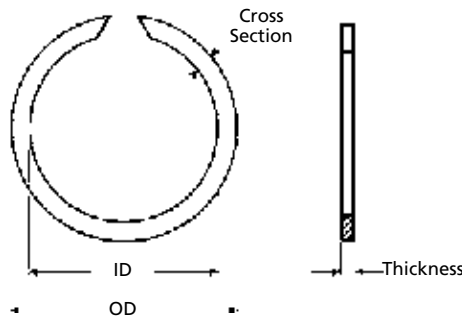
Quantity to Quote:

Q₁: _____
 Q₂: _____
 Q₃: _____
 Q₄: _____

RING

RING DIMENSIONS:

Inside Diameter: _____
 Outside Diameter: _____
 Cross Section: _____
 Thickness: _____



Will the ring be disassembled? ☐ Yes ☐ No

Required thrust load: _____

Rotational speed (RPM): _____

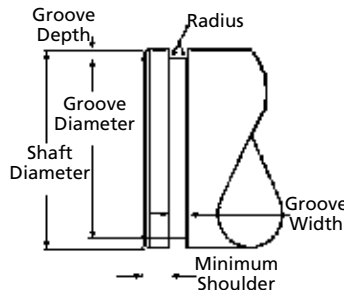
Are you currently using a retaining ring for this application? ☐ Yes ☐ No

If yes, what type? _____

GROOVE

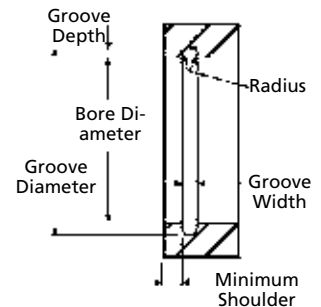
EXTERNAL:

Shaft Dia: _____
 Groove Dia: _____
 Groove Depth: _____
 Groove Width: _____
 Radius: _____
 Min. Shoulder: _____



INTERNAL:

Bore Dia: _____
 Groove Dia: _____
 Groove Depth: _____
 Groove Width: _____
 Radius: _____
 Min. Shoulder: _____



GAP

EXTERNAL:



☐ #4 gap



☐ #11 gap



☐ #14 gap



☐ #34 gap



☐ #36 gap

Check the box that applies.

INTERNAL:



☐ #1 gap



☐ #6 gap



☐ #11 gap



☐ #14 gap



☐ #34 gap



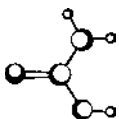
☐ #35 gap

MATERIAL

If you know...

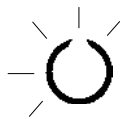
MATERIAL

- ☐ Spring Steel
☐ 302 Stainless Steel
☐ Inconel X-750
☐ 17-7 Ph/C Stainless
☐ 316 Stainless Steel
☐ Other: _____



FINISH

- ☐ Black Oxide
☐ Phosphate
☐ Zinc
☐ Other: _____



If you don't know, give us some information about the environment:

TEMPERATURE

_____ ° Maximum ☐ F ☐ C

ATMOSPHERE

- ☐ Corrosive
☐ Non-Corrosive



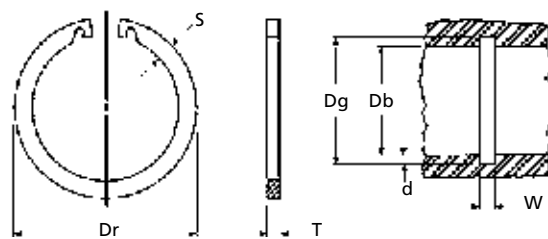
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EASIER TO INSTALL



NOTCHED INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Eaton

IN

Rotor Clip

UHO

UHO

BORE

Decimal
(Db)

Fraction
(Db)

RING

Free
Outside
Dia. (Dr)

Radial
Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

MATERIAL

Spring
Steel

TOOL

UHO	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	TOOL
UHO-175	1.750	1-3/4	1.878	.156	.062	1.858	.054	.068	+ .004/- .000	-1070
-181	1.812	1-13/16	1.942			1.922	.055			
-185	1.850	47mm	1.982			1.962	.056			
-187	1.875	1-7/8	2.014			1.989	.057			
-193	1.938	1-15/16	2.081			2.056	.059			
-200	2.000	2	2.147			2.122	.061			
-204	2.047	2-3/64	2.201			2.171	.062			
-206	2.062	2-1/16	2.201			2.186	.062			
-212	2.125	2-1/8	2.271			2.251	.063			
-216	2.165	55mm	2.338			2.295	.065			
-218	2.188	2-3/16	2.338	.171	.078	2.318	.065	.086	+ .005/- .000	-1090
-225	2.250	2-1/4	2.402			2.382	.066			
-231	2.312	2-5/16	2.470			2.450	.069			
-237	2.375	2-3/8	2.537			2.517	.071			
-244	2.440	61.98mm	2.604			2.584	.072			
-250	2.500	2-1/2	2.673			2.648	.074			
-253	2.531	2-17/32	2.706			2.681	.075			
-256	2.562	2-9/16	2.739			2.714	.076			
-262	2.625	2-5/8	2.806			2.781	.078			
-267	2.677	68mm	2.868			2.837	.080			
-268	2.688	2-11/16	2.868	.188	.093	2.848	.080	.103	+ .005/- .000	-1108
-275	2.750	2-3/4	2.944			2.914	.082			
-281	2.812	2-13/16	3.025			2.980	.084			
-283	2.835	72mm	3.025			3.005	.085			
-287	2.875	2-7/8	3.086			3.051	.088			
-295	2.953	75mm	3.175			3.135	.091			
-300	3.000	3	3.222			3.182	.091			
-306	3.062	3-1/16	3.288			3.248	.093			
-312	3.125	3-1/8	3.353			3.315	.095			
-314	3.149	79.98mm	3.388			3.341	.096			
-315	3.156	3-5/16	3.388	.203	.109	3.348	.096	.120	+ .005/- .000	-1120
-325	3.250	3-1/4	3.488			3.446	.098			
-334	3.346	3-11/32	3.590			3.546	.100			
-347	3.469	3-15/32	3.721			3.675	.103			
-350	3.500	3-1/2	3.760			3.710	.105			
-354	3.543	90mm	3.805			3.755	.106			
UHO-356	3.562	3-9/16	3.805			3.776	.107			

UHO

DESCRIPTION

Low-profile wire formed ring with notches (instead of lugs) for installation pliers. This design requires no orientation during installation.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm the bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

**NOTCHES
HELP PREVENT
RING FROM
FLYING OFF
THE PLIERS
DURING
INSTALLATION.**

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

UHO

HO (Page 16)

HOI (Page 19)

RRN (Page 58)

SRN (Page 63)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

UHO CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

EASIER TO INSTALL

BOX 232 • MINNEAPOLIS, KS • 67467


NOTCHED INTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Eaton


IN

Rotor Clip

UHO



UHO	BORE		RING			GROOVE			MATERIAL	TOOL
	Decimal (Db)	Fraction (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	
UHO-362	3.625	3-5/8	3.895	.234		3.841	.108			
-374	3.740	95mm	4.030			3.964	.112			
-375	3.750	3-3/4	4.030			3.974	.112			
-387	3.875	3-7/8	4.165			4.107	.116			
-393	3.938	3-15/16	4.234			4.174	.118			
-400	4.000	4	4.300			4.240	.120			
-412	4.125	4-1/8	4.430			4.365	.120			
-425	4.250	4-1/4	4.555			4.490	.120			
-433	4.331	110mm	4.641			4.571	.120			
-450	4.500	4-1/2	4.815			4.740	.120			
-462	4.625	4-5/8	4.940			4.865	.120			
-472	4.724	120mm	5.070			4.969	.122			
-475	4.750	4-3/4	5.070			4.995	.122			
-500	5.000	5	5.340			5.260	.130			
-525	5.250	5-1/4	5.600			5.520	.135			
-537	5.375	5-3/8	5.735			5.650	.130			
-550	5.500	5-1/2	5.860			5.770	.135			
-575	5.750	5-3/4	6.120			6.020	.135			
-600	6.000	6	6.380			6.270	.135			
-625	6.250	6-1/4	6.640			6.530	.140			
-650	6.500	6-1/2	6.905			6.790	.145			
-662	6.625	6-5/8	7.045			6.925	.150			
-675	6.750	6-3/4	7.180			7.055	.152			
-700	7.000	7	7.445			7.315	.157			
-725	7.250	7-1/4	7.705			7.575	.162			
-750	7.500	7-1/2	7.975			7.840	.170			
-775	7.750	7-3/4	8.240			8.100	.175			
-800	8.000	8	8.505			8.360	.180			
-825	8.250	8-1/4	8.770			8.620	.185			
-850	8.500	8-1/2	9.035			8.880	.190			
-875	8.750	8-3/4	9.305			9.144	.197			
-900	9.000	9	9.564			9.404	.202			
-925	9.250	9-1/4	9.833			9.668	.209			
-950	9.500	9-1/2	10.100			9.930	.215			
-975	9.750	9-3/4	10.365			10.190	.220			
UHO-1000	10.000	10	10.630			10.450	.225			

UHO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	GOOD INTERIOR CLEARANCE WITH NO PROTRUSIONS.
	Low-profile wire formed ring with notches (instead of lugs) for installation pliers. This design requires no orientation during installation.	<div><div>1. Confirm the bore diameter (Db).</div><div>2. Measure the free outside diameter (Dr) of the ring.</div><div>3. Determine the ring thickness (T) and radial wall (S).</div><div>4. Find the part in the chart above.</div></div>	<div><div>UNCOMMON</div></div>	
	AXIAL ASSEMBLY			

<div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div></div>				
UHO	HO (Page 16)	HOI (Page 19)	RRN (Page 58)	SRN (Page 63)
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.				

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
 Prices, materials, tolerances, and grades subject to change without notice.

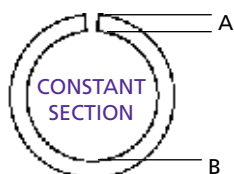
WIRE RINGS

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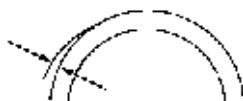
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TYPES

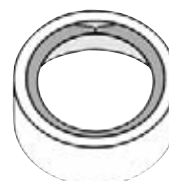
SQUARE SECTION			ROUND SECTION			RECTANGULAR SECTION		
	XSO	EXTERNAL (RADIAL) Pg: 80-81 Open gap for radial installation onto a shaft.		XRO	EXTERNAL (RADIAL) Pg: 84-85 Open gap for radial installation onto a shaft.		TRC	EXTERNAL (AXIAL) Pg: 88 Closed gap for axial installation onto a shaft.
	XSC	EXTERNAL (AXIAL) Pg: 82-83 Closed gap for axial installation onto a shaft.		XRC	EXTERNAL (AXIAL) Pg: 86 Closed gap for axial installation onto a shaft.		AAR	CRIMPED (AXIAL) Pg: 88 Ring is installed axially and "crimped" into position using a standard pliers.
AXIAL ASSEMBLY INSTALL AXIALLY ONTO A SHAFT USING PLIERS				A10	EXTERNAL (GALVANIZED) Pg: 87 Installed axially onto a shaft.		DSP	EXTERNAL (RADIUSED EDGE) Pg: 205 Installed axially onto a shaft. More common in European assemblies.
RADIAL ASSEMBLY INSTALL RADIALY ONTO A SHAFT USING AN APPLICATOR					DRP		EXTERNAL (AXIAL) Pg: 202 Installed axially onto a shaft. More common in European assemblies.		DSW	EXTERNAL (AXIAL) Pg: 206-207 Installed axially onto a shaft. Used for bearing retention.
				DRB	INTERNAL (AXIAL) Pg: 203 Installed axially into a bore. More common in European assemblies.		DSB	INTERNAL (AXIAL) Pg: 208-211 Open gap for installation onto a shaft. Used for bearing retention.
				D17	INTERNAL (AXIAL) Pg: 204 Installed axially into a bore. For gudgeon pin retention.			



CONSTANT SECTION
Wire width is the same at A and B ...



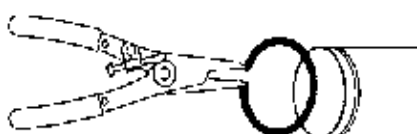
... which causes a radial kink so that the part is "out of round" after installation ...



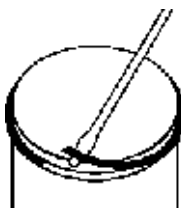
... but yields a low profile in the groove versus lug-style snap rings.

AUTOMATED INSTALLATION

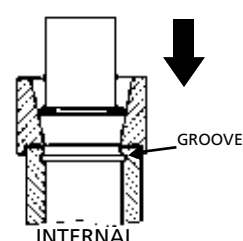
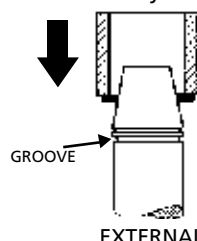
Use pliers ...



... a screwdriver ...



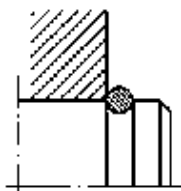
... or a tapered mandrel design depending on your application.



LET OUR SHOP MAKE A FIXTURE FOR YOU!

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PRODUCT COMPARISONS



LOW PROFILE

Shaft locknuts (see pages 132-137) were the dominant form of retaining devices in the early part of the century. Machined from steel and screwed onto shafts, locknuts provided high strength shoulders for heavy-duty and precision applications. Innovators like Henry Ford and Cyrus McCormick began to look for ways to automate the assembly of durable goods so that unit costs could drop to more affordable levels. The locking wire ring emerged as a retaining device during this time. Lock rings were mostly coiled from round cross-sections because mills were unable to roll and shape higher-strength forms that are used today.

During World War II, Allied troops captured a German tank which was disassembled. It was discovered that German engineers had perfected new and innovative ring designs using rectangular-shaped wire, complete with lug holes and curved shapes. These designs were reverse engineered, and production was organized to support the Allied War effort.

New engineering and designs resulted in the successful origination of today's retaining ring manufacturers, including Waldes and Rotor Clip in the United States and Anderton in the United Kingdom. Today's retaining rings have been transformed into "application specific" devices that are generations ahead of their predecessors.

"WHY ARE LOCK RINGS STILL USED?"

It is difficult to get engineers to change old habits. Some engineers continue to use old designs because of corporate inertia. Wire rings do possess a couple of advantages for some applications, including:

- Low profile for minimal clearance
- Less precise groove requirements
- Ready access to a multitude of different materials
- Permanent retention with no removability
- Automated assembly

Most wire rings are used in the automotive industry for internal engine and transmission components. Wire rings are found in pistons, on gudgeon pins, and in needle roller bearings where removability is not an important benefit. Automated installation and reduced piece cost prevail as engineering considerations. Upon installation, wire rings are difficult, if not impossible, to remove. Wire rings are not reusable and are difficult to identify because of deformation during use and removal.

G.L. Huyett has worked to assemble a broad inventory of the more popular styles. We regularly make special parts to print on request. Please feel free to forward your specifications.

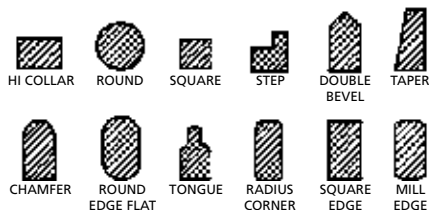
MATERIAL

CARBON SPRING STEEL

SAE 1060-1090
RC 42/53
(STANDARD)

500°F Max
100°F Min

OPTIONAL CROSS SECTIONS AS SPECIAL ORDER:



OTHER MATERIALS AVAILABLE ON REQUEST.

FINISHES

OIL DIPPED (STANDARD)

Inhibits rust
during handling.

ZINC PLATE (STANDARD)

Up to 96 hours
salt spray.

OTHERS PER QUOTE . . .

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OTHER FINISHES, INCLUDING CADMIUM, AVAILABLE ON REQUEST.

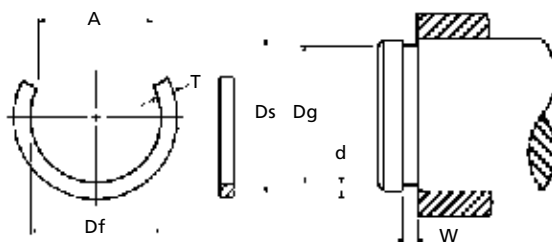
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OPEN STYLE



EXTERNAL (RADIAL)

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	A0600	Eaton	400 Series
Arcon National	XSO		

XSO

	SHAFT		RING				GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)	Gap (A)		Diameter (Dg)	Depth (d)	Width (W)		
XSO-211	.125	1/8	.114	.020	.101		.115	.005	.024	0.0030	
-2125	.156	5/32	.145	.020	.128		.146	.005	.024	0.0040	
-212	.188	3/16	.175	.020	.154		.178	.005	.024	0.0050	
-213	.219	7/32	.203	.025	.179		.176	.006	.029	0.0070	
-2135	.219	7/32	.203	.025	.179		.207	.006	.029	0.0080	
-214	.250	1/4	.236	.025	.208		.238	.006	.030	0.0090	
-215	.281	9/32	.232	.031	.205		.234	.008	.036	0.0140	
-2155	.281	9/32	.261	.031	.230		.265	.008	.036	0.0160	
-216	.312	5/16	.293	.031	.258		.296	.008	.036	0.0180	
-217	.312	5/16	.289	.039	.255		.292	.010	.045	0.0290	
-218	.375	3/8	.353	.035	.311		.357	.009	.041	0.0280	
-219	.375	3/8	.347	.046	.305		.351	.012	.052	0.0490	
-220	.438	7/16	.413	.039	.364		.417	.010	.045	0.0330	
-221	.438	7/16	.405	.055	.357		.409	.014	.062	0.0810	
-222	.500	1/2	.471	.046	.414		.476	.012	.052	0.0640	
-223	.500	1/2	.463	.062	.408		.468	.016	.069	0.1180	
-224	.562	9/16	.525	.062	.463		.530	.016	.069	0.1310	
-225	.562	9/16	.521	.071	.460		.526	.018	.078	0.1730	
-226	.625	5/8	.591	.055	.521		.597	.014	.062	0.1140	
-227	.625	5/8	.579	.078	.511		.585	.020	.085	0.2320	
-228	.688	11/16	.653	.055	.576		.659	.014	.062	0.1240	
-229	.688	11/16	.641	.078	.565		.647	.020	.085	0.2540	
-230	.750	3/4	.712	.062	.628		.718	.016	.069	0.1770	
-231	.750	3/4	.697	.093	.615		.704	.023	.100	0.3960	
-232	.812	13/16	.773	.062	.682		.780	.016	.069	0.1860	
-233	.812	13/16	.759	.093	.669		.766	.023	.100	0.4280	
-234	.875	7/8	.831	.071	.732		.839	.018	.078	0.2640	
-235	.875	7/8	.813	.109	.717		.821	.027	.117	0.6360	
-236	.938	15/16	.893	.071	.787		.901	.018	.078	0.2820	
XSO-237	.938	15/16	.875	.109	.771		.883	.027	.117	0.6790	

XSO

DESCRIPTION

Low clearance wire formed ring with limited range. Open gap style allows radial installation. Difficult to remove. Parts are sized for external shaft applications.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify square cross section and open gap style.
2. Measure the shaft diameter (Ds).
3. Determine the wire cross section (T).
4. Find the part in the chart above.

GENERAL USE



COMMON

**INSTALLATION
TOOLS
AVAILABLE
AS A SPECIAL
ORDER.**



GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

XSO

XSC (Page 82)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

XSO CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

OPEN STYLE

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EXTERNAL (RADIAL)

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	A0600	Eaton	400 Series
Arcon National	XSO		



XSO	SHAFT		RING				GROOVE			WEIGHT	MATERIAL
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)	Gap (A)		Diameter (Dg)	Depth (d)	Width (W)	Lbs. per 100 Pieces	Spring Steel
XSO-238	1.000	1	.950	.078	.838	+ .000/- .5%	.960	.020	.085	0.3630	
-239			.929	.125	.819		.938	.031	.133	0.9550	
-240	1.063	1-1/16	1.012	.078	.893	+ .000/- .5%	1.022	.020	.085	0.3850	
-241			.990	.125	.873		1.000	.031	.133	1.0100	
-242	1.125	1-1/8	1.068	.093	.940	+ .000/- .5%	1.079	.023	.100	0.5840	
-243			1.044	.140	.921		1.055	.035	.148	1.3470	
-244	1.188	1-3/16	1.130	.093	.997	+ .000/- .5%	1.141	.023	.100	0.6140	
-245			1.106	.140	.975		1.117	.035	.148	1.4180	
-246	1.250	1-1/4	1.184	.109	1.044	+ .000/- .5%	1.196	.027	.117	0.8920	
-247			1.160	.156	1.023		1.172	.039	.164	1.8600	
-248	1.312	1-5/16	1.246	.109	1.099	+ .000/- .5%	1.258	.027	.117	0.9370	
-249			1.222	.156	1.078		1.234	.039	.164	1.8810	
-250	1.375	1-3/8	1.304	.120	1.150	+ .000/- .5%	1.315	.030	.128	1.2180	
-251			1.276	.172	1.125		1.289	.043	.180	2.4870	
-252	1.438	1-7/16	1.364	.120	1.203	+ .000/- .5%	1.377	.030	.128	1.2400	
-253			1.338	.172	1.180		1.351	.043	.180	2.5930	
-254	1.500	1-1/2	1.424	.125	1.256	+ .000/- .5%	1.438	.031	.133	1.4040	
-255			1.392	.187	1.228		1.406	.047	.195	3.2050	
-256	1.625	1-5/8	1.547	.125	1.364	+ .000/- .5%	1.563	.031	.133	1.5180	
-257			1.516	.187	1.337		1.531	.047	.195	3.4520	
-258	1.750	1-3/4	1.657	.156	1.461	+ .000/- .5%	1.672	.039	.164	2.5630	
-259			1.624	.218	1.432		1.640	.055	.227	5.0830	
-260	2.000	2	1.887	.187	1.664	+ .000/- .5%	1.906	.047	.195	4.2120	
-261			1.855	.250	1.636		1.874	.063	.260	7.6410	
-262	2.250	2-1/4	2.134	.187	1.882	+ .000/- .5%	2.156	.047	.195	4.7120	
-263			2.103	.250	1.855		2.124	.063	.260	8.5400	
-264	2.500	2-1/2	2.350	.250	2.073	+ .000/- .5%	2.374	.063	.265	9.4310	
-265			2.321	.312	2.047		2.344	.078	.327	14.9400	
-266	3.000	3	2.845	.250	2.510	+ .000/- .5%	2.875	.063	.265	11.2300	
XSO-267			2.816	.312	2.483		2.844	.078	.327	17.7400	

XSO

DESCRIPTION

Low clearance wire formed ring with limited range. Open gap style allows radial installation. Difficult to remove. Parts are sized for external shaft applications.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify square cross section and open gap style.
2. Measure the shaft diameter (Ds).
3. Determine the wire cross section (T).
4. Find the part in the chart above.

GENERAL USE



COMMON

**AFTER
INSTALLATION
RING
WILL NOT
NECESSARILY
MAINTAIN
CONTACT IN
GROOVE DUE
TO UNEVEN
STRESSES.**

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

XSO

XSC (Page 82)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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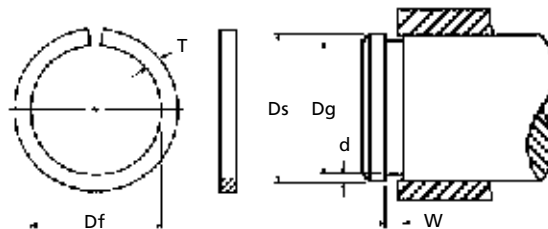
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SQUARE SECTION WIRE RINGS

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CLOSED STYLE



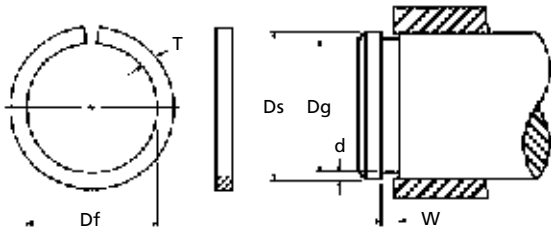
EXTERNAL (AXIAL)

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	A0700	Eaton	300 Series
Arcon National	XSC		

XSC	SHAFT		RING				GROOVE				WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)		Diameter (Dg)	Depth (d)	Width (W)					
XSC-111	.125	1/8	.114	+.000/- .020	.020	+.003/- .000	.115	+.003/- .003	.005	.024	+.002	0.0050	
-1125	.156	5/32	.145		.020		.146		.005	.024		0.0060	
-112	.188	3/16	.175		.020		.178		.005	.024		0.0070	
-113	.219	3/16	.173		.025		.176		.006	.029		0.0110	
-1135	.219	7/32	.203		.025		.207		.006	.029		0.0120	
-114	.250	1/4	.236		.025		.238		.006	.030		0.0140	
-115	.250	1/4	.232		.031		.234		.008	.036		0.0220	
-1155	.281	9/32	.261		.031		.265		.008	.036		0.0240	
-116	.312	5/16	.293		.031		.296		.008	.036		0.0280	
-117	.312	5/16	.289		.039		.292		.010	.045		0.0440	
-118	.375	3/8	.353	.035	.357	.009	.041	0.0420					
-119	.375	3/8	.347	.046	.351	.012	.052	0.0740					
-120	.438	7/16	.413	.039	.417	.010	.045	0.0510					
-121	.438	7/16	.405	.055	.409	.014	.062	0.1230					
-122	.500	1/2	.471	+.000/- .025	.046	+.003/- .003	.476	+.002	.012	.052		0.0970	
-123	.500	1/2	.463		.062		.468		.016	.069		0.1790	
-124	.562	9/16	.525		.062		.530		.016	.069		0.2000	
-125	.562	9/16	.521		.071		.526		.018	.078		0.2640	
-126	.625	5/8	.591		.055		.597		.014	.062		0.1730	
-127	.625	5/8	.579		.078		.585		.020	.085		0.3540	
-128	.688	11/16	.653		.055		.659		.014	.062		0.1890	
-129	.688	11/16	.641		.078		.647		.020	.085		0.3870	
-130	.750	3/4	.712		.062		.718		.016	.069		0.2630	
-131	.750	3/4	.697		.093		.704		.023	.100		0.6040	
-132	.812	13/16	.773	+.000/- .035	.062	+.003	.780		.016	.069		0.2840	
-133	.812	13/16	.759		.093		.766		.023	.100		0.6520	
-134	.875	7/8	.831		.071		.839		.018	.078		0.4020	
-135	.875	7/8	.813		.109		.821		.027	.117		0.9690	
-136	.938	15/16	.893		.071		.901		.018	.078		0.4300	
XSC-137	.938	15/16	.875		.109		.883		.027	.117		1.0340	

CLOSED STYLE


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EXTERNAL (AXIAL)
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	A0700	Eaton	300 Series
Arcon National	XSC		



XSC	SHAFT		RING		GROOVE			WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)	Diameter (Dg)	Depth (d)	Width (W)		
XSC-138	1.000	1	.950	.078	.960	.020	.085	0.5530	
-139			.929	.125	.938	.031	.133	1.4550	
-140	1.063	1-1/16	1.012	.078	1.022	.020	.085	0.5870	
-141			.990	.125	1.000	.031	.133	1.5410	
-142	1.125	1-1/8	1.068	.093	1.079	.023	.100	0.8880	
-143			1.044	.140	1.055	.035	.148	2.0530	
-144	1.188	1-3/16	1.130	.093	1.141	.023	.100	0.9360	
-145			1.106	.140	1.117	.035	.148	2.1610	
-146	1.250	1-1/4	1.184	.109	1.196	.027	.117	1.3590	
-147			1.160	.156	1.172	.039	.164	2.8340	
-148	1.312	1-5/16	1.246	.109	1.258	.027	.117	1.4280	
-149			1.222	.156	1.234	.039	.164	2.9670	
-150	1.375	1-3/8	1.304	.120	1.315	.030	.128	1.8560	
-151			1.276	.172	1.289	.043	.180	3.7890	
-152	1.438	1-7/16	1.364	.120	1.377	.030	.128	1.8900	
-153			1.338	.172	1.351	.043	.180	3.9510	
-154	1.500	1-1/2	1.424	.125	1.438	.031	.133	2.1400	
-155			1.392	.187	1.406	.047	.195	4.8850	
-156	1.625	1-5/8	1.547	.125	1.563	.031	.133	2.3120	
-157			1.516	.187	1.531	.047	.195	5.2680	
-158	1.750	1-3/4	1.657	.156	1.672	.039	.164	3.9040	
-159			1.624	.218	1.640	.055	.227	7.7440	
-160	2.000	2	1.887	.187	1.906	.047	.195	6.4160	
-161			1.855	.250	1.874	.063	.260	11.6400	
-162	2.250	2-1/4	2.134	.187	2.156	.047	.195	7.1810	
-163			2.103	.250	2.124	.063	.260	13.0100	
-164	2.500	2-1/2	2.350	.250	2.374	.063	.265	14.3800	
-165			2.321	.312	2.344	.078	.327	22.7600	
-166	3.000	3	2.845	.250	2.875	.063	.265	17.1100	
XSC-167			2.816	.312	2.844	.078	.327	27.0300	

XSC

Low clearance wire formed ring with limited range. Closed gap style requires axial assembly, with more contact and thrust load ratings versus open style.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Verify square cross section and closed gap style.
2. Measure the shaft diameter (Ds).
3. Determine the wire cross section (T).
4. Find the part in the chart above.

GENERAL USE


COMMON

**AFTER
INSTALLATION
RING
WILL NOT
NECESSARILY
MAINTAIN
CONTACT IN
GROOVE DUE
TO UNEVEN
STRESSES.**

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

XSC

XSO (Page 80)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

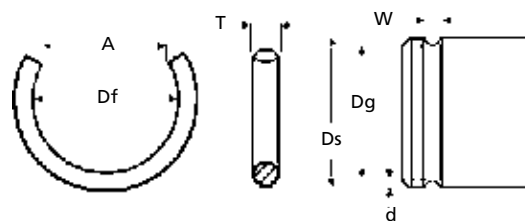
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ROUND SECTION WIRE RINGS

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OPEN STYLE



EXTERNAL (RADIAL)

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Eaton

200 Series

Arcon National

XRO

XRO

SHAFT

Decimal
(Ds)

Fraction
(Ds)

RING

Free
Inside Dia.
(Df)

Wire
Cross
Section (T)

Gap
(A)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT
Lbs. per
100
Pieces

MATERIAL
Spring
Steel

XRO	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)	Gap (A)	Diameter (Dg)	Depth (d)	Width (W)	WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel
XRO-411	.125	1/8	.110	.022	.097	.111	.007	.024	0.0030	
-412	.156	5/32	.140	.022	.123	.142	.007	.024	0.0040	
-413	.188	3/16	.172	.022	.152	.174	.007	.024	0.0050	
-414	.219	7/32	.202	.022	.178	.205	.007	.024	0.0060	
-415	.250	1/4	.230	.029	.203	.232	.009	.031	0.0100	
-4155	.281	9/32	.260	.029	.229	.263	.009	.031	0.0120	
-416	.312	5/16	.296	.022	.261	.298	.007	.024	0.0070	
-417			.288	.035	.254	.290	.011	.037	0.0180	
-418	.375	3/8	.353	.029	.322	.357	.009	.031	0.0140	
-419			.345	.043	.304	.349	.013	.045	0.0330	
-420			.412	.035	.363	.415	.011	.037	0.0260	
-421	.438	7/16	.402	.051	.355	.405	.016	.053	0.0530	
-422			.468	.043	.412	.474	.013	.045	0.0430	
-423	.500	1/2	.458	.059	.404	.464	.018	.061	0.0820	
-424			.529	.045	.467	.534	.014	.047	0.0530	
-425	.562	9/16	.518	.062	.457	.524	.019	.064	0.1020	
-426			.587	.051	.518	.593	.016	.053	0.0750	
-427	.625	5/8	.575	.071	.507	.581	.022	.073	0.1480	
-428			.649	.051	.572	.655	.016	.053	0.0830	
-429	.688	11/16	.637	.071	.562	.643	.022	.073	0.1680	
-430			.706	.059	.623	.714	.018	.061	0.1210	
-431	.750	3/4	.690	.085	.609	.698	.026	.087	0.2550	
-432			.769	.059	.678	.776	.018	.061	0.1310	
-433	.812	13/16	.753	.085	.664	.760	.026	.087	0.2760	
-434			.823	.071	.726	.831	.022	.073	0.2050	
-435	.875	7/8	.804	.100	.709	.813	.031	.102	0.4120	
-436			.885	.071	.780	.893	.022	.073	0.2200	
-437	.938	15/16	.867	.100	.764	.875	.031	.102	0.4310	
XRO-438	1.000	1	.938	.085	.827	.948	.026	.087	0.3450	

XRO

DESCRIPTION

Low clearance wire formed ring with limited range. Open gap style allows radial installation. Difficult to remove. Parts are sized for external shaft applications.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify round cross section and open gap style.
2. Measure the shaft diameter (Ds).
3. Determine the wire cross section (T).
4. Find the part in the chart above.

GENERAL USE



COMMON

**INSTALLATION
TOOLS
AVAILABLE
AS A SPECIAL
ORDER.**

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

XRO

XRC (Page 86)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

XRO CONTINUED NEXT PAGE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

OPEN STYLE

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EXTERNAL (RADIAL)

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Eaton


200 Series

Arcon National

XRO



XRO	SHAFT		RING				GROOVE			WEIGHT	MATERIAL			
	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)		Wire Cross Section (T)	Gap (A)		Diameter (Dg)	Depth (d)	Width (W)	Lbs. per 100 Pieces	Spring Steel		
XRO-439	1.000	1	.917	+.000/-5%	.118	+.000/-5%	.809	+.000/-5%	.926	+/- .003	.037	.120	0.6570	
-440	1.063	1-1/16	1.000		.085		.882		1.010		.026	.087	0.4500	
-441			.979		.118		.863		.988		.037	.120	0.6960	
-442	1.125	1-1/8	1.051		.100		.927		1.063		.031	.102	0.5250	
-443			1.034		.130		.912		1.045		.040	.132	0.8970	
-444	1.188	1-3/16	1.114		.100		.983		1.125		.031	.102	0.5540	
-445			1.096		.130		.967		1.107		.040	.132	0.9450	
-446	1.250	1-1/4	1.164		.118		1.027		1.176		.037	.120	0.7770	
-447			1.150		.140		1.014		1.162		.044	.142	1.1530	
-448	1.312	1-5/16	1.226		.118		1.081		1.238		.037	.120	0.8530	
-449			1.212		.140		1.069		1.224		.044	.142	1.2080	
-450	1.375	1-3/8	1.281		.130		1.130		1.295		.040	.132	1.0870	
-451			1.264		.156		1.115		1.277		.049	.158	1.5750	
-452	1.438	1-7/16	1.344		.130		1.185		1.357		.040	.132	1.1360	
-453			1.326		.156		1.170		1.339		.049	.158	1.6430	
-454	1.500	1-1/2	1.398		.140		1.233		1.412		.044	.142	1.3750	
-455			1.378		.172		1.215		1.392		.054	.174	2.0910	
-456	1.625	1-5/8	1.522		.140		1.342		1.537		.044	.142	1.4850	
-457			1.502		.172		1.325		1.517		.054	.174	2.2580	
-458	1.750	1-3/4	1.626		.172		1.434		1.642		.054	.174	2.4250	
-459			1.608	.203	1.418	1.624	.063	.205	3.4040					
-460	2.000	2	1.855	.203	1.636	1.874	.063	.205	3.8670					
-461			1.837	.232	1.620	1.856	.072	.234	5.0970					
-462	2.250	2-1/4	2.103	.203	1.855	2.124	.063	.205	4.3340					
-463			2.085	.232	1.839	2.106	.072	.234	5.6880					
-464	2.500	2-1/2	2.332	.232	2.057	2.356	.072	.234	6.2890					
-465			2.321	.250	2.047	2.344	.078	.252	7.3220					
-466	3.000	3	2.827	.232	2.494	2.856	.072	.234	7.5090					
XRO-467			2.816	.250	2.483	2.844	.078	.252	8.7320					

<div>XRO</div>	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	<div>AFTER INSTALLATION RING WILL NOT NECESSARILY MAINTAIN CONTACT IN GROOVE DUE TO UNEVEN STRESSES.</div>
	Low clearance wire formed ring with limited range. Open gap style allows radial installation. Difficult to remove. Parts are sized for external shaft applications.	<div><div>1. Verify round cross section and open gap style.</div><div>2. Measure the shaft diameter (Ds).</div><div>3. Determine the wire cross section (T).</div><div>4. Find the part in the chart above.</div></div>	<div><div>COMMON</div></div>	
	<div><div>RADIAL ASSEMBLY</div><div><div><div></div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div><div></div></div><div><div>XRO</div><div>XRC (Page 86)</div></div></div><div>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</div></div>			

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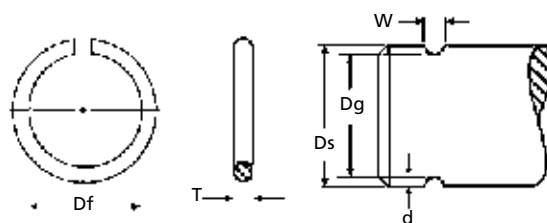
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ROUND SECTION WIRE RINGS

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CLOSED STYLE



EXTERNAL (AXIAL)

MANUFACTURER CROSS-REFERENCE

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Anderton	A0900	Eaton	100 Series
Arcon National	XRC		

XRC

SHAFT

Decimal
(Ds)

Fraction
(Ds)

RING

Free
Inside Dia.
(Df)

Wire
Cross
Section (T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT
Lbs. per
100
Pieces

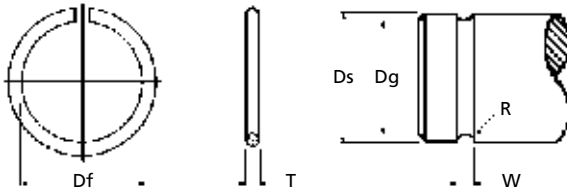
MATERIAL
Spring
Steel

XRC	Decimal (Ds)	Fraction (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)	Diameter (Dg)	Depth (d)	Width (W)	WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel
XRC-311	.125	1/8	.110	.022	.111	.007	.024	0.0040	
-312	.156	5/32	.140	.022	.142	.007	.024	0.0050	
-313	.188	3/16	.172	.022	.174	.007	.024	0.0070	
-314	.219	7/32	.202	.022	.205	.007	.024	0.0090	
-315	.250	1/4	.230	.029	.232	.009	.031	0.0150	
-3155	.281	9/32	.260	.029	.263	.009	.031	0.0170	
-316	.312	5/16	.296	.022	.298	.007	.024	0.0110	
-317	.312	5/16	.288	.035	.290	.011	.037	0.0270	
-318	.375	3/8	.353	.029	.357	.009	.031	0.0220	
-319	.375	3/8	.345	.043	.349	.013	.045	0.0500	
-320	.438	7/16	.412	.035	.415	.011	.037	0.0380	
-321	.438	7/16	.402	.051	.405	.016	.053	0.0820	
-322	.500	1/2	.468	.043	.474	.013	.045	0.0660	
-323	.500	1/2	.458	.059	.464	.018	.061	0.1250	
-324	.562	9/16	.529	.045	.534	.014	.017	0.0820	
-325	.562	9/16	.518	.062	.524	.019	.064	0.1550	
-326	.625	5/8	.587	.051	.593	.016	.063	0.1150	
-327	.625	5/8	.575	.071	.581	.022	.073	0.2260	
-328	.688	11/16	.649	.051	.655	.016	.053	0.1270	
-329	.688	11/16	.637	.071	.643	.022	.073	0.2480	
-330	.750	3/4	.706	.059	.714	.018	.061	0.1850	
-331	.750	3/4	.690	.085	.698	.026	.087	0.3890	
-332	.812	13/16	.769	.059	.776	.018	.061	0.2000	
-333	.812	13/16	.753	.085	.760	.026	.087	0.4210	
-334	.875	7/8	.823	.071	.831	.022	.073	0.3130	
-335	.875	7/8	.804	.100	.813	.031	.102	0.6280	
-336	.938	15/16	.885	.071	.893	.022	.073	0.3350	
-337	.938	15/16	.867	.100	.875	.031	.102	0.6720	
-338	1.000	1	.938	.085	.948	.026	.087	0.5260	
-339	1.000	1	.917	.118	.926	.037	.120	1.0010	
-340	1.063	1-1/16	1.000	.085	1.010	.026	.087	0.6860	
-341	1.063	1-1/16	.979	.118	.988	.037	.120	1.0610	
-342	1.125	1-1/8	1.051	.100	1.063	.031	.102	0.8000	
-343	1.125	1-1/8	1.034	.130	1.045	.040	.132	1.3670	
-344	1.188	1-3/16	1.114	.100	1.125	.031	.102	0.8440	
-345	1.188	1-3/16	1.096	.130	1.107	.040	.132	1.4400	
-346	1.250	1-1/4	1.164	.118	1.176	.037	.120	1.2400	
-347	1.250	1-1/4	1.150	.140	1.162	.044	.142	1.7570	
-348	1.312	1-5/16	1.226	.118	1.238	.037	.120	1.3000	
-349	1.312	1-5/16	1.212	.140	1.224	.044	.142	1.8410	
-350	1.375	1-3/8	1.281	.130	1.295	.040	.132	1.6560	
-351	1.375	1-3/8	1.264	.156	1.277	.049	.158	2.4010	
-352	1.438	1-7/16	1.344	.130	1.357	.040	.132	1.7310	
-353	1.438	1-7/16	1.326	.156	1.339	.049	.158	2.5060	
-354	1.500	1-1/2	1.398	.140	1.412	.044	.142	2.0950	
-355	1.500	1-1/2	1.378	.172	1.392	.054	.174	3.1860	
-356	1.625	1-5/8	1.522	.140	1.537	.044	.142	2.2630	
-357	1.625	1-5/8	1.502	.172	1.517	.054	.174	3.4410	
-358	1.750	1-3/4	1.626	.172	1.642	.054	.174	3.6960	
-359	1.750	1-3/4	1.608	.203	1.624	.063	.205	5.1850	
-361	2.000	2	1.837	.232	1.856	.072	.234	7.7380	
-363	2.250	2-1/4	2.085	.232	2.106	.072	.234	8.6650	
-365	2.500	2-1/2	2.321	.250	2.344	.078	.252	11.1600	
XRC-367	3.000	3	2.816	.250	2.844	.078	.252	13.3200	

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CLOSED STYLE


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EXTERNAL LIGHT DUTY
MANUFACTURER CROSS-REFERENCE

 INDEX
PAGE 236.

Anderton

A1000



A10	SHAFT		RING		GROOVE				MATERIAL		
	Decimal (Ds)	Fraction (Ds)	Free Inside Diameter (Df)	Wire Cross Section (T)	Diameter (Dg)	Radius (R)	Width (W)	Spring Steel			
A10-006	.062	1/16	.051	.0092	.052	.0050	.010	Spring Steel			
-008	.083	1/12	.072		.073						
-009	.094	3/32	.080		.0108				.082		
-010	.100	1/10	.087						.089		
-012	.125	1/8	.110	.0124	.113	.0065	.013				
-015	.156	5/32	.138		.143						
-018	.187	3/16	.169		.174						
-021	.219	7/32	.198		.204						
-025	.250	1/4	.221	.0148	.228	.0075	.015				
-028	.281	9/32	.251		.0220				.259	.0115	.023
-031	.312	5/16	.281						.290		
-034	.344	11/32	.312						.322		
-037	.375	3/8	.329	.0360		.339	.0187		.038		
-040	.406	13/32	.359		.370						
-043	.438	7/16	.390		.402						
-046	.469	15/32	.420		.433						
-050	.500	1/2	.438	.0480	.452	.0250	.050				
-056	.562	9/16	.498		.514						
-062	.625	5/8	.560		.577						
-068	.688	11/16	.621		.640						
-075	.750	3/4	.665	.0640	.686	.0335	.067				
-081	.812	13/16	.726		.748						
-087	.875	7/8	.786		.811						
-093	.938	15/16	.848		.874						
-100	1.000	1	.908	.0800	.936	.0415	.083				
-106	1.062	1-1/16	.953		.982						
-112	1.125	1-1/8	1.012		1.045						
-125	1.250	1-1/4	1.135		1.170						
-137	1.375	1-3/8	1.258	.1040	1.295	.0545	.109				
-150	1.500	1-1/2	1.380		1.420						
-162	1.625	1-5/8	1.500		1.545						
-175	1.750	1-3/4	1.621		1.670						
-187	1.875	1-7/8	1.720	.1280	1.771	.0665	.133				
-200	2.000	2	1.840		1.896						
-212	2.125	2-1/8	1.960		2.021						
-225	2.250	2-1/4	2.082		2.146						
-237	2.375	2-3/8	2.203	.1280	2.271	.0665	.133				
-250	2.500	2-1/2	2.324		2.396						
-275	2.750	2-3/4	2.543		2.622						
A10-300	3.000	3	2.785		2.872						

**XRC
A10**

Low clearance wire formed ring with limited range. Closed gap style requires axial assembly, with more contact and thrust load ratings versus open style. XRC is fairly common, while the A10 series is obsolete.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Verify round cross section and closed gap style.
2. Measure the shaft diameter (Ds).
3. Determine the wire cross section (T).
4. Find the part in the charts.

GENERAL USE


UNCOMMON

DIFFICULT TO REMOVE.


XRC

XRO (Page 84)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

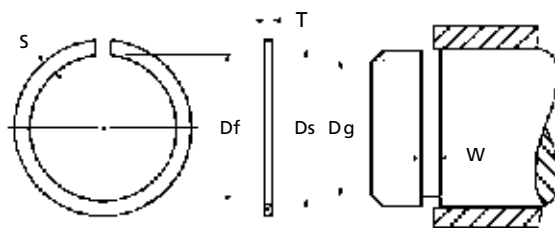
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RECTANGULAR WIRE RINGS

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CLOSED STYLE



EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton A0500
Arcon National TRC

TRC

SHAFT

Decimal
(Ds)

Fraction
(Ds)

RING

Free
Inside Dia.
(Df)

Radial Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Width
(W)

WEIGHT
Lbs. per
100
Pieces

MATERIAL
Spring
Steel

TRC-018	.188	3/16	.176	+.000/-6%	.025	.015	+/-5%	.226	.017	0.0070				
-021	.219	7/32	.205					.255		0.0080				
-025	.250	1/4	.230					.300		0.0200				
-028	.281	9/32	.261					.331		0.0230				
-031	.312	5/16	.290					.370		0.0290				
-034	.344	11/32	.322					.402		0.0320				
-037	.375	3/8	.351					.431		0.0350				
-040	.406	13/32	.382					.472		0.0420				
-043	.438	7/16	.412					.502		0.0450				
-046	.469	15/32	.443					.533		0.0480				
-050	.500	1/2	.474	+.000/-5%	.045	.035	+/-4%	.570	.039	0.0780				
-056	.562	9/16	.534					.630		0.0900				
-059	.594	19/32	.565					.685		0.1200				
-062	.625	5/8	.596					.716		0.1300				
-068	.688	11/16	.656					.776		0.1700				
-075	.750	3/4	.715					.855		0.2100				
-081	.812	13/16	.776					.916		0.2200				
-087	.875	7/8	.833					.973		0.2300				
-093	.938	15/16	.896					1.058		0.2900				
TRC-100	1.000	1	.955							.048		.042		1.117	.046	0.3000

TRC

DESCRIPTION

Rectangular section ring used in place of SH-style snap ring where space is very limited. Same groove width as SH. (See page 6 for SH rings.)

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify rectangular cross section and closed gap style.
2. Measure the shaft diameter (Ds).
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the chart above.

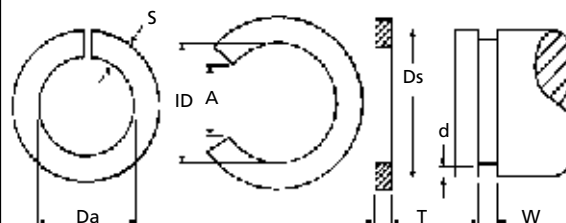
GENERAL USE



UNCOMMON

REMOVE
USING
PLASTIC
EXPLOSIVES.

AVAILABLE AS A SPECIAL ORDER



EXTERNAL CRIMPED

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Arcon National AAR

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS



SPECIAL WIRE RINGS

NAME: _____ COMPANY: _____
 PHONE: _____ FAX: _____
 ZODIAC SIGN: _____ NUMBER OF PETS: _____ ☐ SMOKER ☐ NONSMOKER

APPLICATION

To assist you, we are providing this "Copy and Fax" design sheet. Please fill this page out as completely as possible and fax it to our plant for quotation.

How is the part going to be used? _____

Quantity to Quote:

Q₁: _____

Q₂: _____

Q₃: _____

Q₄: _____

RING

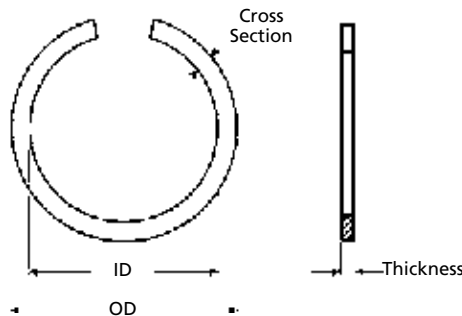
RING DIMENSIONS:

Inside Diameter: _____

Outside Diameter: _____

Cross Section: _____

Thickness: _____



Will the ring be disassembled? ☐ Yes ☐ No

Required thrust load: _____

Rotational speed (RPM): _____

Are you currently using a retaining ring for this application? ☐ Yes ☐ No

If yes, what type? _____

GROOVE

EXTERNAL:

Shaft Dia: _____

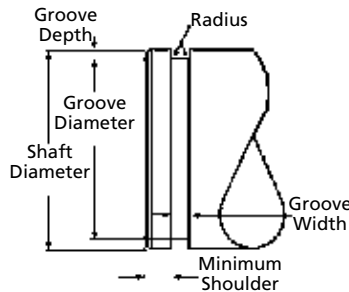
Groove Dia: _____

Groove Depth: _____

Groove Width: _____

Radius: _____

Min. Shoulder: _____



INTERNAL:

Bore Dia: _____

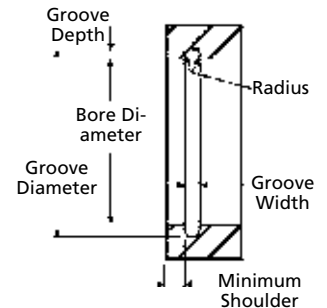
Groove Dia: _____

Groove Depth: _____

Groove Width: _____

Radius: _____

Min. Shoulder: _____



SECTION

MATERIAL CROSS SECTION:



☐ Square



☐ Round



☐ Rectangular



☐ Hi Collar



☐ Step



☐ Double Bevel



☐ Taper



☐ Chamfer



☐ Round Edge Flat



☐ Tongue



☐ Radius Corner



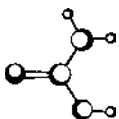
☐ Mill Edge

MATERIAL

If you know...

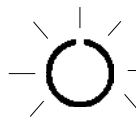
MATERIAL

- ☐ Spring Steel
☐ 302 Stainless Steel
☐ Inconel X-750
☐ 17-7 Ph/C Stainless
☐ 316 Stainless Steel
☐ Other: _____



FINISH

- ☐ Black Oxide
☐ Phosphate
☐ Zinc
☐ Other: _____



If you don't know, give us some information about the environment:

TEMPERATURE

_____ ° Maximum ☐ F ☐ C

ATMOSPHERE

- ☐ Corrosive
☐ Non-Corrosive



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PUSH-ON RINGS

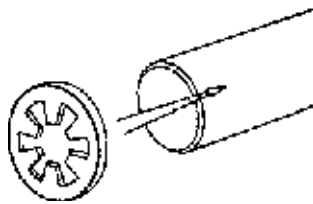
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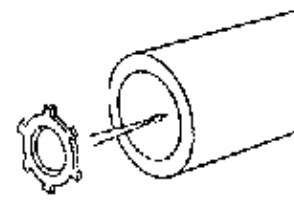


TYPES

	TY	BASIC EXTERNAL	Available in Spring Steel and Stainless Steel.		TR	TRIANGLE PUSH-ON	Heavy duty options available in many sizes.
	TX	REINFORCED EXTERNAL	Heavier-duty version. Available in metric sizes.		NTR	TRIANGLE SCREW-ON	Heavy duty options available in many sizes.
	TI	BASIC INTERNAL	Available in Spring Steel and Stainless Steel.		NPR	BASIC RECTANGULAR	Available in seven forms. Also in round version (NPO).
	ITR	INTERNAL TOOTHED	Bowed shape resists back-off pressure.		NPO	BASIC ROUND	Available in five forms. Also in rectangular version (NPR).
	STR	HIGH SPEED STRIP	Strip form for quick installation.		BRR	INTERNAL TOOTHED BEARING RETAINER	Allow for bearing rotation.
	WRR	WIDE RIM SLOTTED	Wide rim for increased peripheral abutment.		T99	BASIC GROOVELESS	Available in flat and Belleville styles.

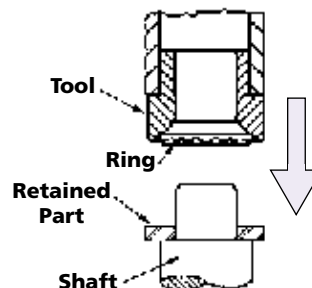


Installed in an axial direction on **grooveless** shafts or inside bores.

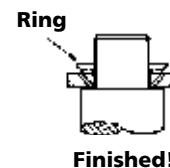


AUTOMATED INSTALLATION

Push-on rings are installed onto grooveless shafts by sliding the ring in an opposite direction from the prongs. The prongs provide resistance to removal by digging into the shaft material. The best way to automate production is to build fixtures that are size and depth preset to the installed product. Tubes work well in external applications, while plugs assist in internal installation.



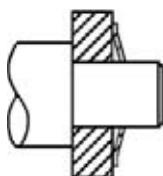
Place the ring in the tool and push down on the shaft as shown at the left.



LET OUR SHOP MAKE A FIXTURE FOR YOU!

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PRODUCT COMPARISONS



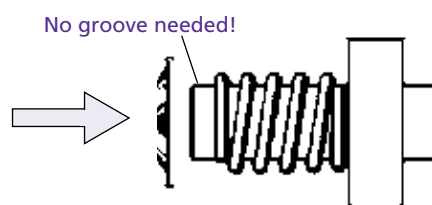
NO NEED TO CUT A GROOVE!

Push-on rings use prongs or teeth that, when installed, “dig” into the circumference of a shaft or inner wall of a bore. The major advantage of push-on rings is that they are grooveless. The cost and precision needed to machine a groove onto the shaft is avoided. In addition, because of the prong design, shaft tolerances can be much wider and less precise; therefore, these rings can be used in tubes and cast parts and on plastic shafts and wood dowels. Finally, push-on rings are adjustable. The ring can be moved progressively to adjust tension to desired levels.

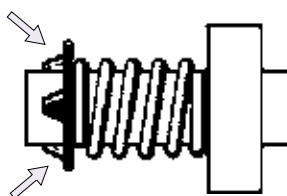
The downside of push-on rings is that with no groove, thrust ratings are lower. Because the ring uses friction to maintain force, anything that reduces friction will inhibit performance. Push-on rings in lubricated environments or on hardened shafts should be avoided. Push-on rings are commonly used in lighter-duty industries including toys, electrical components, housewares, and automotive panels, and are available in external sizes up to 1” and up to 2” for internal applications. Note that they possess excellent design features in miniature components, thus a wide array of small sizes are available down to 3/32”.

Most push-on rings are stamped from strip or sheet. Spiral and wire types manufactured from coil are not available. The prevailing features to consider when reviewing push-on rings are thrust load, outside profile, and shaft/bore size. Installation can be automated by manufacturing a tool like the one on page 90 or by using parts in a strip form, where parts are twisted for removal as they are installed.

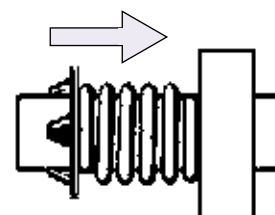
HOW GROOVELESS RINGS CAN WORK FOR YOU



Slide the ring on the shaft in an opposite direction from the prongs.



The prongs dig into the shaft material.



The spring can be progressively compressed by sliding the ring down the shaft.

MATERIAL

**CARBON
SPRING STEEL**
SAE 1060-1090
(STANDARD)

500°F Max
-100°F Min

**PH15-7 MO
STAINLESS STEEL**
AISI 632/AMS 5520
(STANDARD ON
MOST SIZES)

900°F Max
-300°F Min

**BERYLLIUM
COPPER**
ALLOY #25/CDA #172
(STANDARD ON
SMALL SIZES)

650°F Max
-300°F Min

OTHER MATERIALS AVAILABLE ON REQUEST.

FINISHES

**PHOSPHATE
COATING**
(STANDARD)

Inhibits rust
during storage.

**MECHANICAL
ZINC YELLOW**
(STANDARD)

96 hour salt spray.

**ZINC YELLOW
WITH LACQUER**
(SPECIAL ORDER)

250 hour salt spray.

OTHER FINISHES, INCLUDING CADMIUM, AVAILABLE ON REQUEST.

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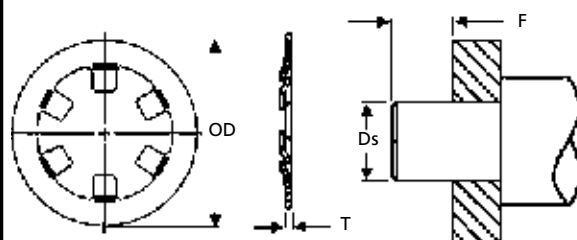


BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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IRR	6100	Waldes	5105
Rotor Clip	TY		



TY	SHAFT			RING				min Distance from face of part to end of shaft (F)	WEIGHT Lbs. per 100 Pieces	MATERIAL	
	From (Ds)	To (Ds)	Fraction (Ds)	Outside Diameter (OD)	Thickness (T)		No. of Prongs			Spring Steel	Stainless "-SS"
TY-009	.093	.095	3/32	.250	.010	+/- .001	3	.040	0.0090		
-012	.124	.126	1/8	.325			4		0.0140		
-015	.155	.157	5/32	.356					0.0170		
-018	.187	.189	3/16	.387					0.0200		
-021	.218	.220	7/32	.418					0.0210		
-024	.239	.241	6.1mm	.460	.015	+/- .002		.060	0.0350		
-025	.249	.251	1/4	.450					0.0230		
-031	.311	.313	5/16	.512			6		0.0260		
-037	.374	.376	3/8	.575					0.0270		
-043	.437	.439	7/16	.638					0.0470		
-050	.498	.502	1/2	.750	.015	+/- .002		.060	0.0720		
-056	.560	.564	9/16	.812					0.0750		
-062	.623	.627	5/8	.875			7		0.0820		
-075	.748	.752	3/4	1.000			8		0.0970		
-087	.873	.877	7/8	1.125			10		0.1100		
TY-100	.998	1.002	1	1.250					0.1200		

TY / TX TECHNICAL
INFORMATION NEXT PAGE.

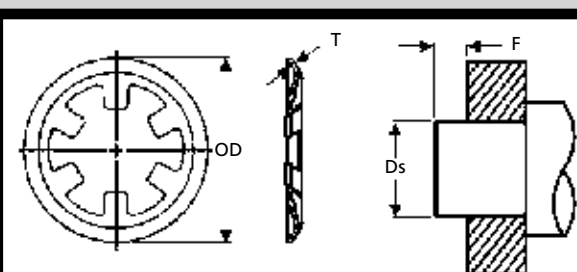


REINFORCED EXTERNAL

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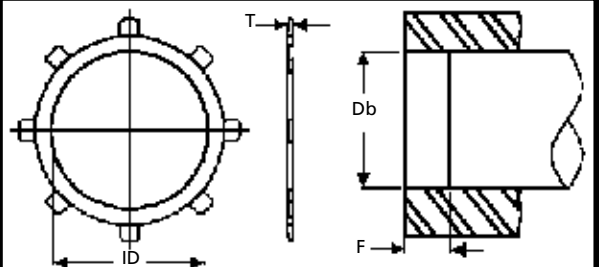
Anderton	N1465	Waldes	5115
Rotor Clip	TX		



TX	SHAFT			RING				min Distance from face of part to end of shaft (F)	WEIGHT Lbs. per 100 Pieces	MATERIAL	
	From (Ds)	To (Ds)	Fraction (Ds)	Outside Diameter (OD)	Thickness (T)		No. of Prongs			Spring Steel	Stainless "-SS"
TX-009	.091	.097	3/32	.326	.010	+/- .001	3	.058	0.0160		
-012	.121	.129	1/8	.366			4		0.0190		
-015	.152	.160	5/32	.397					0.0220		
-018	.184	.192	3/16	.444			6		0.0270		
-025	.246	.254	1/4	.522					0.0550		
-031	.308	.316	5/16	.584	.015	+/- .002	8	.074	0.0640		
-037	.371	.379	3/8	.645					0.0740		
-043	.432	.442	7/16	.737			10		0.0960		
-050	.495	.505	1/2	.828					0.1270		
-056	.557	.567	9/16	.889			12		0.1380		
-062	.620	.630	5/8	.951	.015	+/- .002	14	.108	0.1470		
-075	.745	.755	3/4	1.076			16		0.1650		
-087	.870	.880	7/8	1.203			18		0.1960		
TX-100	.995	1.005	1	1.327					0.2290		



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BASIC INTERNAL

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Anderton

N1305

Rotor Clip

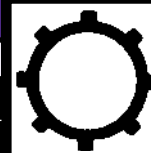
TI

IRR


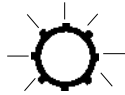
6000

Waldes


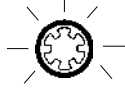

5005



TI	BORE			RING					WEIGHT	MATERIAL			
	From (Db)	To (Db)	Fraction (Db)	Inside Diameter (ID)	Thickness (T)		No. of Prongs	min Distance from face of part to end of bore (F)	Lbs. per 100 Pieces	Spring Steel	Stainless "-SS"		
TI-031	.311	.313	5/16	.136	+.005	.010	+/- .001	6	.040	0.0110			
-037	.374	.376	3/8	.175						0.0160			
-043	.437	.439	7/16	.237						0.0200			
-044	.440	.442	11.2mm	.258						0.0180			
-050	.498	.502	1/2	.258						0.0240			
-056	.560	.564	9/16	.312						0.0290			
-062	.623	.627	5/8	.390						0.0300			
-063	.638	.640	16.23	.390						0.0320			
-075	.748	.752	3/4	.500						0.0620			
-087	.873	.877	7/8	.625						0.0750			
-093	.936	.940	15/16	.687	+.010	.015	+/- .002	8	.060	0.0850			
-100	.998	1.002	1	.750						0.0910			
-112	1.123	1.127	1-1/8	.813						10			0.1300
-125	1.248	1.252	1-1/4	.938									0.1500
-137	1.371	1.379	1-3/8	1.050						16			0.2100
-143	1.436	1.440	1-7/16	1.117						12			0.1730
-150	1.498	1.502	1-1/2	1.188									0.1800
-175	1.748	1.752	1-3/4	1.438									0.2100
TI-200	1.998	2.002	2	1.600						14			0.3000

TI	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Internal self-locking ring for axial application into housings and bores. Low cost design with an easy grooveless installation using a plunger. Not reusable.	<ol style="list-style-type: none"> 1. Verify correct bore size (Db). 2. Measure the part thickness (T). 3. Count the number of prongs on the part. 4. Determine the inside diameter (ID) of the part. 5. Find the part in the chart above. 	 COMMON	 STACKED/ROLL PACK NOT AVAILABLE



TY TX (PAGE 92)	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC/YELLOW
	Axially-applied grooveless rings that provide good retention, particularly on parts with dimensional variations. Installed with a tube or plunger. The TX is a heavier-duty version, with a wider and thicker rim, and more prongs.	<ol style="list-style-type: none"> 1. Verify the correct shaft size (Ds). 2. Measure the part thickness (T). 3. Count the number of prongs on the part. 4. Determine the outside diameter (OD) of the part. 5. Find the part in the charts on the previous page. 	 COMMON	 



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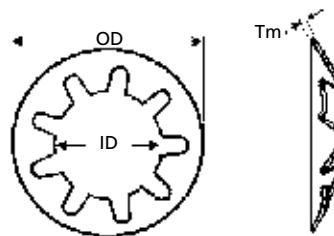
INTERNAL TOOTHED

MANUFACTURER CROSS-REFERENCE


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ITW Shakeproof

8063

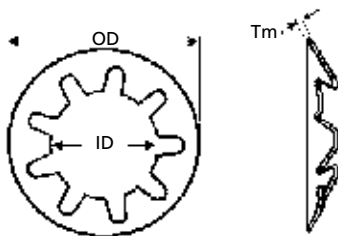


ITR	SHAFT		RING			MATERIAL
	Nominal Shaft		Outside Diameter Nominal (OD)	Inside Diameter (ID) Min. Max.	Material Thickness (Tm)	
ITR-00710	.0780	+/- .002	.2200	.0680 .0730	.0100	Spring Steel
-00812	.0870		.1800	.0770 .0800	.0120	
-00910	.0940		.1800	.0810 .0850	.0100	
-00910-01	.0940		.2650	.0810 .0860	.0100	
-00910-T	.0940		.3940	.0850 .0880	.0100	
-01110	.1120		.2580	.1020 .1070	.0100	
-01110-01	.1120		.2580	.1020 .1050	.0100	
-01210	.1200		.2650	.1100 .1150	.0100	
-01210-01	.1250		.2650	.1130 .1180	.0100	
-01310	.1350		.2630	.1220 .1270	.0100	
-01415	.1450		.2810	.1330 .1400	.0150	
-01510	.1560		.3320	.1460 .1510	.0100	
-01510-T	.1560		.3940	.1460 .1500	.0100	
-01512	.1560		.3320	.1460 .1510	.0120	
-01512-01	.1560		.3560	.1470 .1520	.0120	
-01610	.1620		.3320	.1520 .1570	.0100	
-01620	.1620		.3330	.1510 .1550	.0200	
-01710	.1750		.3320	.1640 .1660	.0100	
-01810	.1810		.3330	.1740 .1700	.0100	
-01810-01	.1870		.3320	.1760 .1800	.0100	
-01810-02	.1870		.3320	.1730 .1780	.0100	
-01815-T	.1870		.3940	.1770 .1810	.0150	
-02010	.2050		.3330	.1940 .1980	.0100	
-02113	.2180		.4020	.2020 .2070	.0130	
-02215	.2200		.5310	.2050 .2200	.0150	
-02314	.2360		.5310	.2200 .2260	.0140	
-02315	.2380		.4600	.2280 .2360	.0150	
-02315-01	.2380		.4750	.2280 .2360	.0150	
-02510	.2500		.4720	.2390 .2440	.0100	
-02510-01	.2500		.4730	.2340 .2390	.0100	
-02515-T	.2500		.4620	.2340 .2390	.0150	
-02515	.2500		.4720	.2390 .2440	.0150	
-02520	.2500		.5150	.2380 .2420	.0200	
-02520-01	.2500		.6250	.2390 .2440	.0200	
-02520-02	.2500		.7340	.2390 .2440	.0200	
-02525	.2500		.4720	.2350 .2400	.0250	
-02525-01	.2500		.4770	.2400 .2350	.0250	
-02606	.2650		.3890	.2440 .2500	.0060	
-02613	.2650		.4720	.2500 .2550	.0130	
-02615	.2650		.4720	.2440 .2500	.0150	
ITR-02712	.2760		.6200	.2650 .2700	.0120	

ITR	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	UNIQUE TO SPECIFIC APPLICATIONS.
	Grooveless external retainer for axial assembly. Slips over unthreaded shafts for lighter-duty uses like toys, housewares, and plastic applications.	1. Measure outside diameter (OD) of the part. 2. Verify shaft size. 3. Confirm material thickness (Tm). 4. Find the part in the charts above.	 COMMON	
	AXIAL ASSEMBLY			

<


MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

**INTERNAL TOOTHED****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

ITW Shakeproof 8063



ITR	SHAFT		RING				MATERIAL
	Nominal Shaft		Outside Diameter Nominal (OD)	Inside Diameter (ID)		Material Thickness (Tm)	
				Min.	Max.		
ITR-03120	.3110	+/- .002	.6260	.2950	.3010	.0200	
-03112	.3120		.4730	.2990	.3040	.0120	
-03115	.3120		.5100	.2950	.3050	.0150	
-03115-T	.3120		.5980	.2880	.2920	.0150	
-03115-01	.3120		.6030	.2990	.3040	.0150	
-03120	.3120		.5400	.2980	.3020	.0200	
-03125	.3120		.5980	.2880	.2920	.0250	
-03224	.3240		.6800	.3120	.3160	.0240	
-03313	.3300		.4720	.3180	.3230	.0130	
-03410	.3430		.6870	.3180	.3330	.0100	
-03715-T	.3750		.6800	.3280	.3550	.0150	
-03715	.3750		.6870	.3600	.3650	.0150	
-03715-01	.3750		.7800	.3340	.3420	.0150	
-04012	.4000		.7810	.3900	.3940	.0120	
-04014	.4030		.6250	.3900	.3940	.0140	
-04214-01	.4210		.7810	.4000	.4100	.0140	
-04310	.4370		.6870	.4270	.4320	.0100	
-04310-01	.4370		.7810	.4270	.4320	.0100	
-04717	.4750		.7810	.4670	.4620	.0170	
-04915	.4950		.6870	.4780	.4840	.0150	
-05010	.5000		.7810	.4930	.4980	.0100	
-05017-T	.5000		.7700	.4830	.4900	.0170	
-05520	.5520		1.0000	.5410	.5460	.0200	
-06215	.6250		.9510	.6100	.6140	.0150	
-06220	.6250		.9680	.6100	.6150	.0200	
-06220-01	.6250		1.0830	.6080	.6180	.0200	
-06240	.6250		.9680	.6100	.6150	.0400	
-06415	.6400		.8750	.6250	.6310	.0150	
-06520	.6590		1.0830	.6470	.6570	.0200	
-06618	.6690		1.0720	.6530	.6600	.0180	
-06729	.6750		1.2990	.6590	.6690	.0295	
-07013	.7030		1.0820	.6810	.6890	.0130	
-07029	.7030		1.2500	.6860	.6930	.0290	
-07510	.7500		.9650	.7350	.7400	.0100	
-07520	.7500		1.2500	.7350	.7400	.0200	
-08025	.8000		1.3750	.7800	.7900	.0250	
-08525	.8500		1.1920	.8350	.8400	.0250	
-10012	1.0000		1.6250	1.0400	1.0450	.0120	
-10015	1.0000		1.3750	.9700	.9800	.0150	
-11215	1.1250		2.0000	1.0750	1.0850	.0150	
ITR-11315	1.1350		1.5730	1.1200	1.1250	.0150	

ITR	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	MINIMUM PRODUCTION RUNS SOMETIMES NECESSARY.
	Grooveless external retainer for axial assembly. Slips over unthreaded shafts for lighter-duty uses like toys, housewares, and plastic applications.	<div>1. Measure outside diameter (OD) of the part.</div> <div>2. Verify shaft size.</div> <div>3. Confirm material thickness (Tm).</div> <div>4. Find the part in the charts above.</div>	<div></div> <div>COMMON</div>	
	AXIAL ASSEMBLY			
	<div><div><div><div>ITR</div><div>TX (Page 92)</div></div><div><div>TY (Page 92)</div><div>STR (Page 96)</div></div><div><div>WRR (Page 96)</div></div></div><div><div><div>GROOVELESS</div><div>USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.</div></div></div><div>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</div></div>			

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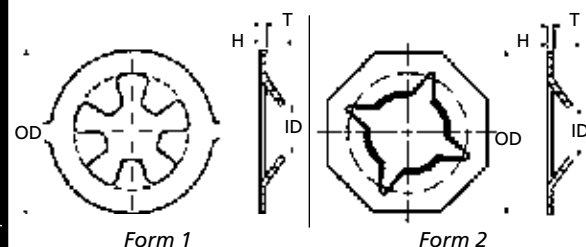
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HIGH SPEED STRIP

MANUFACTURER CROSS-REFERENCE

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STR

DESIGN

Shaft Size
Design

Form

PART DIMENSIONS

Outside
Diameter
(OD)

Inside
Diameter
(ID)

Height
(H)

Material
Thickness
(T)

STRIP

Strip
Length

Parts per
Strip

MATERIAL

Spring
Steel

STR-012

.125

1

.365

.116

.048 Ref.

.015

5.500

14

-018

.187

2

.500

.175

.051 Ref.

13.500

25

STR-025

.250

2

.500

.234

.063 Ref.

13.500

25

STR

USES

High speed installation in strip form using automated equipment. Individual parts are twisted or punched for removal.

HOW TO IDENTIFY

1. Confirm that the part is from a strip by finding the "breakout" on the outer rim.
2. Determine the shaft size design.
3. Find the part in the chart above.

GENERAL USE



AXIAL ASSEMBLY

**CUSTOM
SIZES
AVAILABLE
PER
QUOTE.**

GROOVELESS

USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.

STR

ITR (Page 94)

TX (Page 92)

TY (Page 92)

NPR (Page 98)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.



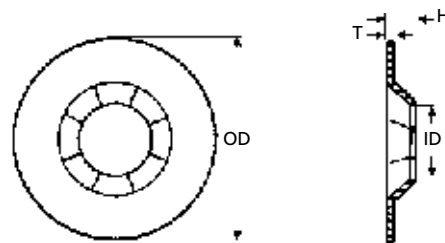
WIDE RIM SLOTTED

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

ITW Shakeproof

8065



WRR

SHAFT

Shaft Size
Design

RING

Outside
Diameter
(OD)

Inside Diameter
(ID)
Min. Max.

Height
(H)

Material
Thickness
(T)

MATERIAL

Spring
Steel

WRR-015

.158

.472

.142

.148

.055

.012

-023

.236

.531

.220

.226

.072

.017

WRR-031

.311

.626

.295

.301

.071

.020

WRR

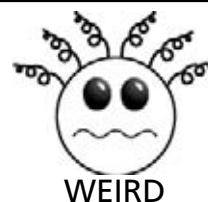
DESCRIPTION

Wide rim provides increased peripheral abutment. Large profile eases hand-installation and adjustment.

HOW TO IDENTIFY

1. Verify the size of the shaft that the part is used on.
2. Measure the material thickness (T).
3. Determine the outside diameter (OD).
4. Find the part in the chart above.

GENERAL USE



AXIAL ASSEMBLY

**HIGHER
PRODUCTION
MINIMUMS
SOMETIMES
REQUIRED.**

GROOVELESS

USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.

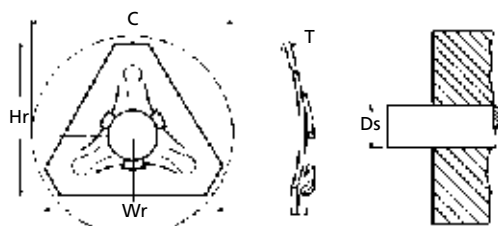
WRR

T99 (Page 101)

ITR (Page 94)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS



TRIANGLE PUSH-ON

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Waldes 5305



TR	SHAFT			RING				WEIGHT	MATERIAL
	From (Ds)	To (Ds)	Fraction (Ds)	Height (Hr)	Width (Wr)	Thickness (T)	Clearance (C)	Lbs. per 100 Pieces	
TR-006	.060	.064	1/16	.315	.363	.010	.40	0.0130	Spring Steel
-006-H						.015		0.0180	
-009	.092	.096	3/32			.010		0.0250	
-009-H						.015		0.0360	
-012	.122	.128	1/8	.376	.434	.010	.48	0.0250	
-012-H						.015		0.0360	
-013	.132	.138				.010		0.0250	
-013-H						.015		0.0360	
-014	.142	.148				.010		0.0320	
-014-H						.015		0.0460	
-015	.153	.159	5/32	.416	.481	.010	.52	0.0320	
-015-H						.015		0.0460	
-018	.185	.191	3/16	.467	.538	.015	.58	0.0540	
-025	.246	.254	1/4	.587	.677	.015	.73	0.0870	
-031	.308	.316	5/16	.640	.738	.015	.80	0.0920	
-037	.371	.379	3/8	.725	.835	.020	.89	0.1660	
-043	.434	.442	7/16	.804	.928	.025	.98	0.2320	
TR-043Hex						.025		0.2320	



If you really need one of these, a production minimum may apply.

TRIANGLE SCREW-ON

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Waldes 5300



NTR	THREAD	RING				WEIGHT	MATERIAL
	Thread Series	Height (Hr)	Width (Wr)	Thickness-Light Version (T)	Clearance (C)	Lbs. per 100 Pieces	
NTR-0632	6-32	.376	.434	.015	.38	0.0380	Spring Steel
-0632-H				.020	.53	0.0530	
-0832	8-32	.416	.481	.015	.46	0.0460	
-0832-H				.020	.64	0.0640	
-1024	10-24	.467	.538	.015	.58	0.0580	
-1024-H				.020	.81	0.0810	
-1420	1/4-20	.587	.677	.020	1.22	0.1220	
-1420-H				.025	1.49	0.1490	
-1032	10-32	.467	.538	.015	.58	0.0580	
-1032-H				.020	.81	0.0810	
-1428	1/4-28	.587	.677	.020	1.18	0.1180	
NTR-1428-H				.025	1.45	0.1450	

TR
NTR

DESCRIPTION

Large triangular shoulder grips better than round rings like the TX and TY. NTR is a push nut that is turned onto the shaft. Unusual shape has made the part nearly extinct. Last seen holding a leg tag onto a passenger pigeon.

AXIAL ASSEMBLY

HOW TO IDENTIFY

- Find one in existence.
- Determine if the ring is a push on (TR) or screw on (NTR).
- Locate the ring in the chart above based on thickness (T), shaft diameter (Ds), and height (Hr).

GENERAL USE



SEE TX AND TY SERIES ON PAGE 92 FOR MORE COMMON VARIATIONS.

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BASIC RECTANGULAR

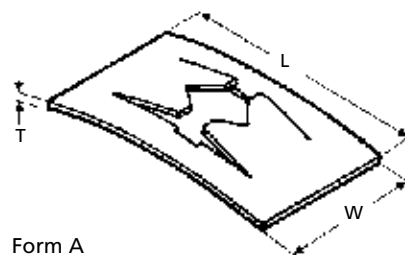
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

ITW Shakeproof

PO

Form A



NPR	STUD		RING			STYLE							MATERIAL Spring Steel
	Decimal	Fraction	Length (L)	Width (W)	Material Thickness (T)	Forms							
						A	B	C	D	E	F	G	
NPR-650375	.062	1/16	.391	.187	.012	•	•						
-650400	.062	1/16	.391	.219	.012	•							
-650402	.062	1/16	.391	.219	.018	•							
-650350	.062	1/16	.625	.375	.015	•			•				
-650401	.070	-	.875	.312	.015	•							
-658320	.080 x .250	-	.625	.250	.012	•							
-659850	.080 x .720	-	1.250	.562	.018	•					•		
-650500	.081	-	.391	.219	.018	•	•						
-650850	.081	-	.391	.219	.018	•		•		•			
-650896	.093	3/32	.453	.234	.012	•							
-650897	.093	3/32	.453	.234	.015	•							
-650900	.093	3/32	.453	.234	.018	•							
-650925	.093	3/32	.797	.334	.012	•		•		•			
-651002	.100	-	.453	.234	.015	•	•						
-651050	.100	-	.578	.250	.015	•	•						
-651000	.102	-	.453	.234	.015	•	•						
-651001	.107	-	.453	.234	.015	•	•						
-651410	.125	1/8	.312	.250	.012	•	•						
-651415	.125	1/8	.312	.250	.015	•	•						
-651400	.125	1/8	.906	.250	.015	•	•						
-651455	.125	1/8	.906	.312	.018	•							
-658300	.125	1/8	.578	.344	.012	•							
-651450	.125	1/8	.906	.500	.015	•							
-650365	.156	5/32	.562	.375	.012	•							
-650360	.156	5/32	.562	.375	.015	•			•				
-650361	.156	5/32	.562	.375	.012	•			•				
-652700	.187	3/16	.625	.375	.015	•		•					
-652701	.187	3/16	.625	.375	.022	•		•					
-652900	.187	3/16	.625	.375	.015	•			•				
-653399	.250	1/4	.625	.438	.010	•							
-653445	.250	1/4	.641	.438	.018	•							
-653410	.250	1/4	.984	.625	.018	•	•						
-653425	.250	1/4	1.000	.562	.012	•	•					•	
-653500	.271	-	.625	.438	.012	•	•						
-653550	.308	-	.625	.500	.012	•	•						
-653525	.312	5/16	1.000	.687	.018	•	•			•			
-653555	.365	-	.625	.500	.012	•	•						
-654100	.440	-	1.250	.875	.015	•	•						
-659475	.484	31/64	.922	.750	.012	•	•			•			
NPR-654105	.500	1/2	1.250	.875	.020	•	•						

NPR

DESCRIPTION

Push nuts engage an unthreaded shaft on two sides for greater strength. Notched prongs deflect providing a strut that resists back pressure.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Is the OD round (NPO) or rectangular (NPR)?
2. Confirm the form using the diagram on page 99.
3. Verify the stud size.
4. Find the part in the charts above using length (L) and width (W) dimensions.

GENERAL USE



UNCOMMON

**PRODUCTION
MINIMUMS
MAY APPLY.**

NPR/NPO



GROOVELESS

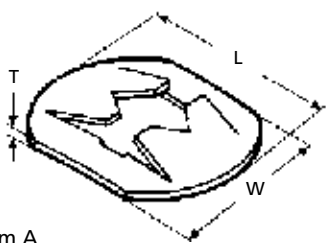
USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.

ITR (Page 94)

WRR (Page 96)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS



Form A

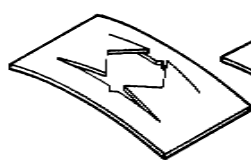
BASIC ROUND**MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

ITW Shakeproof

PO



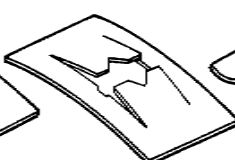
NPO	STUD		RING			STYLE							MATERIAL
	Decimal	Fraction	Length (L)	Width (W)	Material Thickness (T)	Forms							
						A	B	C	D	E	F	G	
NPO-659150	.050	-	.375	.344	.012	•			•				Spring Steel
-658947	.062	1/16	.500	-	.012	•			•				
-659151	.093	3/32	.500	.344	.012	•			•				
-655125	.093	3/32	.500	.344	.012	•	•						
-655100	.102	-	.281	-	.012	•							
-655920	.107	-	.375	.344	.012	•	•						
-655950	.122	-	.375	.344	.012	•	•						
-656000	.125	1/8	.375	.344	.012	•	•						
-656010	.125	1/8	.500	-	.018	•	•						
-656005	.148	-	.375	.344	.012		•						
-656250	.152	-	.375	.344	.012	•	•						
-656300	.164	-	.375	.344	.012	•	•						
-656325	.175	-	.562	-	.012	•	•						
-656440	.187	3/16	.500	-	.012	•	•						
-656442	.187	3/16	.500	-	.015	•	•						
-656800	.218	7/32	.500	-	.012	•	•						
-656450	.225	-	.562	-	.018	•	•						
-656850	.235	-	.562	.437	.012	•	•						
-656900	.250	1/4	.562	-	.012	•	•						
-656910	.250	1/4	.812	.563	.022	•							
-657000	.281	9/32	.875	-	.022	•	•				•		
-657075	.312	5/16	.750	.625	.018	•		•			•		
-657027	.312	5/16	.875	-	.012	•	•				•		
-657029	.312	5/16	.875	-	.018	•	•				•		
-659149	.375	3/8	.875	-	.018	•	•				•		
NPO-659460	.472	-	.906	.625	.012	•		•					



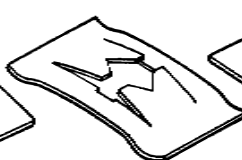
Form B



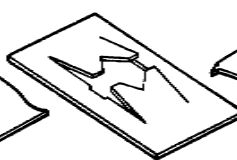
Form C



Form D



Form E




Form F



Form G

Note: The form applies to the tooth design on the inside of the part, as well as to ring curvature. If you are uncertain, please ask for a print or submit a sample.

NPO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	VERIFY STOCK PRIOR TO ORDER.
	Push nuts engage an unthreaded shaft on two sides for greater strength. Notched prongs deflect providing a strut that resists back pressure.	<div><div>1. Is the OD round (NPO) or rectangular (NPR)?</div><div>2. Confirm the form using the diagram on page 99.</div><div>3. Verify the stud size.</div><div>4. Find the part in the charts above using length (L) and width (W) dimensions.</div></div>	<div> UNCOMMON</div>	
	AXIAL ASSEMBLY			
<div><div><div>GROOVELESS</div><div>USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.</div></div><div><div>NPR/NPO</div><div>ITR (Page 94)</div><div>WRR (Page 96)</div></div></div> <div>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</div>				

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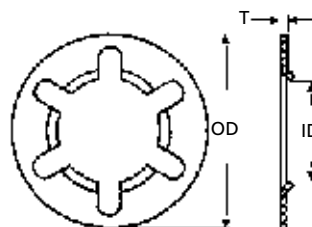
HEAVIER DUTY



INTERNAL TOOTHED

MANUFACTURER CROSS-REFERENCE

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PAGE 236



BRR	RING					MATERIAL
	Outside Diameter (OD)		Inside Diameter (ID)		Material Thickness (T)	
	Min.	Max.	Min.	Max.		Spring Steel
BRR-092218-1	.558	.568	.217	.221	.018	
-092312-1	.552	.573	.231	.237	.012	
-052406-2	.336	.340	.241	.250	.006	
-102811-2	.624	.628	.278 Ref.	.278 Ref.	.011	
-102808-2	.624	.628	.278 Ref.	.278 Ref.	.008	
-122812-1	.757	.763	.270	.280	.012	
-123210-2	.757	.763	.315	.325	.010	
-163110-1	.969	.975	.328 Ref.	.328 Ref.	.010	
-133410-1	.784	.788	.346 Ref.	.346 Ref.	.010	
-133815-2	.784	.788	.375 Ref.	.375 Ref.	.015	
-133815-1	.784	.788	.375 Ref.	.375 Ref.	.015	
-143815-1	.873	.877	.360	.390	.015	
-144115-1	.867	.870	.406	.410	.015	
-134216-1	.812	.812	.417	.423	.016	
-164515-1	.985	1.015	.465	.475	.015	
-165020-1	.985	.995	.485	.515	.020	
-145118-1	.700	.700	.509	.515	.018	
-187312-1	1.083	1.103	.732	.738	.012	
BRR-227525-1	1.375 Ref.	1.375 Ref.	.750 Ref.	.750 Ref.	.025	

BRR	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	MINIMUM PRODUCTION RUN MAY APPLY.
	AXIAL ASSEMBLY		UNCOMMON	
GROOVELESS				

Internal prongs and dished shape provide increased strength, yet allow the bearing to rotate on the shaft.

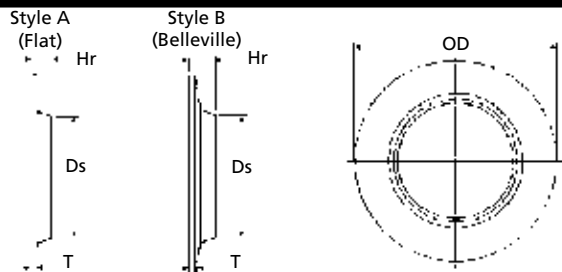
1. Verify the size of the shaft that the part is used on and the inside diameter (ID) of the part.
2. Measure the material thickness (T).
3. Determine the outside diameter (OD).
4. Find the part in the chart above.



UNCOMMON



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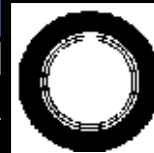
BASIC GROOVELESS

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Eaton

T99220



T99	SHAFT	RING				MATERIAL		T99	SHAFT	RING				MATERIAL					
	Decimal (Ds)	Outside Dia. (OD)	Height (Hr)	Thickness (T)	Style				Decimal (Ds)	Outside Dia. (OD)	Height (Hr)	Thickness (T)	Style						
T99-125-SS	.046	.088	.017	.006	A	Stainless Steel		T99-097-SS	.220	.325	.025	.008	A	Stainless Steel					
-110-SS	.050	.125	.020	.006				-079-SS	.234	.375	.020	.006							
-095-SS	.058	.125	.020	.006				-090-SS	.237	.437	.030	.010							
-156-SS	.060	.178	.020	.006				-144-SS	.248	.750	.030	.010							
-128-SS	.062	.150	.016	.006				-080-SS	.250	.312	.025	.006							
-105-SS	.076	.150	.025	.006				-082-SS	.250	.312	.025	.010							
-136-SS	.076	.375	.025	.006				-092-SS	.250	.395	.045	.010							
-093-SS	.078	.178	.025	.006				-104-SS	.250	.437	.050	.010							
-060-SS	.093	.218	.030	.008				-137-SS	.250	.625	.030	.010							
-075-SS	.093	.245	.030	.008				-147-SS	.265	.437	.030	.010							
-085-SS	.093	.250	.030	.008	B			-106-SS	.298	.437	.030	.010	A						
-087-SS	.093	.325	.025	.006				-118-SS	.300	.500	.060	.020							
-069-SS	.098	.218	.035	.008				-145-SS	.309	.437	.030	.008							
-165-SS	.117	.200	.030	.010				-064-SS	.312	.437	.030	.010							
-083-SS	.117	.245	.030	.010				-078-SS	.312	.437	.035	.015							
-067-SS	.117	.245	.030	.008				-158-SS	.312	.437	.040	.017							
-167-SS	.125	.194	.030	.012				-131-SS	.312	.500	.030	.010							
-094-SS	.125	.210	.025	.006				-141-SS	.312	.564	.035	.015							
-058-SS	.125	.245	.025	.006				-160-SS	.315	.562	.070	.031							
-096-SS	.125	.245	.025	.008	A			-161-SS	.315	.500	.035	.010							
-107-SS	.125	.250	.025	.008				-108-SS	.315	.625	.040	.010							
-103-SS	.125	.305	.025	.006				-134-SS	.318	.750	.045	.015							
-111-SS	.125	.312	.025	.010				-132-SS	.343	.562	.030	.010							
-074-SS	.125	.325	.025	.006				-114-SS	.372	.500	.035	.010							
-077-SS	.130	.245	.025	.006				-127-SS	.372	.625	.030	.010							
-123-SS	.130	.325	.025	.006				-115-SS	.375	.500	.030	.010							
-153-SS	.143	.260	.025	.008				-091-SS	.375	.625	.030	.010							
-066-SS	.156	.260	.025	.008				-152-SS	.375	.590	.030	.010							
-086-SS	.162	.437	.040	.015				-130-SS	.406	.625	.030	.010							
-146-SS	.173	.312	.025	.010	A			-122-SS	.430	.625	.030	.010							
-073-SS	.175	.312	.025	.008				-150-SS	.437	.655	.040	.020							
-089-SS	.175	.375	.025	.008				-101-SS	.446	.625	.030	.010							
-164-SS	.187	.2875	.025	.006				-139-SS	.451	.610	.030	.010							
-068-SS	.187	.315	.025	.006				-129-SS	.462	.625	.025	.010							
-072-SS	.187	.325	.025	.008				-088-SS	.462	.750	.025	.008							
-126-SS	.187	.375	.030	.012				-120-SS	.500	.750	.025	.010							
-121-SS	.187	.750	.025	.008				T99-100-SS	.624	.750	.045	.015							
T99-151-SS	.2168	.437	.030	.010															

T99

Large surface area for low cost reusable retention on steel, plastic, or ceramic shafts. Especially effective in limited access locations. Production minimum may apply.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify style "A" (Flat) or "B" (Belleville).
2. Confirm shaft size (Ds).
3. Find the part in the chart above based on outside diameter (OD), height (Hr), and thickness (T).

GENERAL USE



UNCOMMON

ALSO AVAILABLE IN COIL OR STRIP FORM FOR HIGH SPEED ASSEMBLY.



T99

TX (Page 92)

TY (Page 92)





ITR (Page 94)

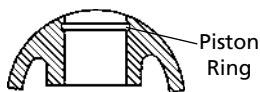
RG (Page 27)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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TYPES

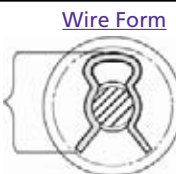
	A12	C-TYPE	EXTERNAL
		Tangle-free design for external radial application on shafts.	Pg: 104
	D25	D-TYPE	INTERNAL
		Tangle-free design for internal axial application in bores.	Pg: 104
	S Series	PISTON RING	INTERNAL
		Specialized form unique to automotive manufacturers. Meets DIN 73123 and 73130.	Pg: 105
	BPXZ	HAIR PIN	EXTERNAL
		Radially applied pin for external application on shafts in a wide array of sizes.	Pgs: 106-107



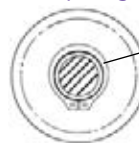
Piston Ring

May be custom formed for a specific application like in the piston above . . .

Increased abutment



Snap Ring



Requires more precise grooves

. . . or used to provide **increased abutment** using **less precise grooves**.

COMMONLY USED IN SHEAR PINS OR IN U-JOINTS.

AUTOMATED INSTALLATION

Use your hands . . .



. . . pliers . . .



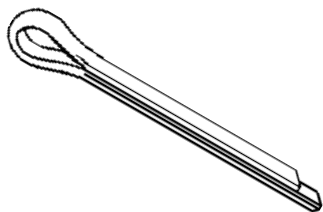
. . . or a screwdriver.



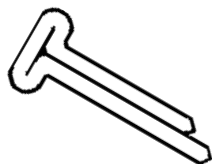
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OTHER WIRE FORMS

CONTACT OUR PLANT FOR QUOTATIONS ON OTHER TYPES OF WIRE FORMS.



COTTER PINS



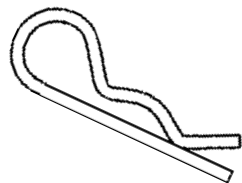
**TEE HEAD
COTTER PINS**



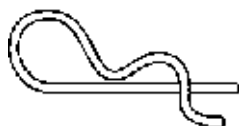
**HAMMER LOCK
COTTER PINS**



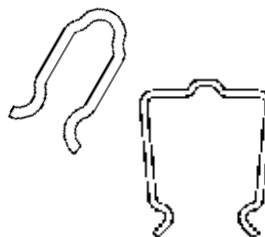
**SELF-LOCKING
COTTER PINS**



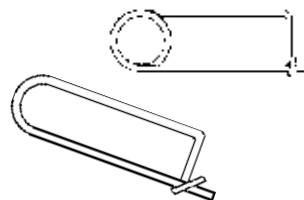
BRIDGE PINS



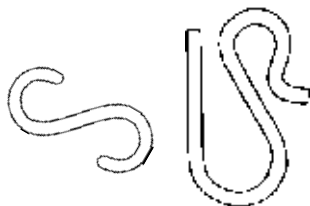
**SPECIAL
BRIDGE PINS**



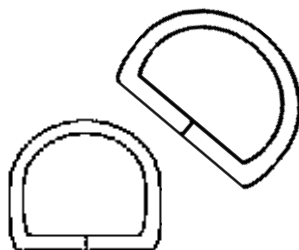
SPECIAL HAIR PINS



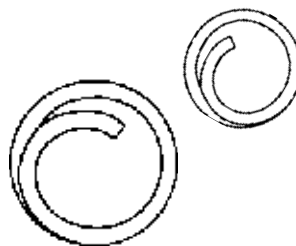
SAFETY PINS



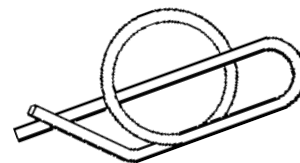
S-HOOKS



D-RINGS



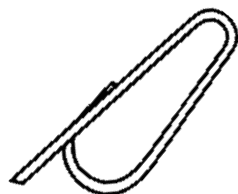
RING COTTERS



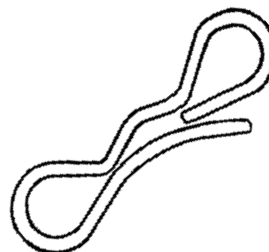
UNIQUE DESIGNS



NOSE RINGS



**SPECIAL
WIRE FORMS**



BOW COTTERS



EARRINGS



WE DO BODY PIERCING!

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TANGLE-FREE DESIGN



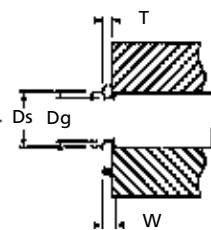
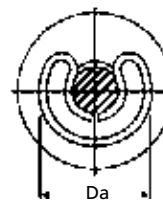
EXTERNAL "C" STYLE

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton

A1200



A12

SHAFT

Decimal
(Ds)

RING

Free Outside
Diameter
(approx.) (Dr)

Thickness
(T)

Assembled
Outside
Dia. (Da)

GROOVE

Diameter
(Dg)

Width
(W)

MATERIAL

Spring
Steel

TOOL

A12-007	.125	.310	.032 dia.	.340	.075	.036	-40
A12-011	.156	.360	.032 sq.	.390	.115	.036	-41
A12-013	.188	.450	.036 dia.	.490	.130	.040	-42
A12-014	.188	.400	.032 sq.	.440	.140	.036	-43
A12-015	.219	.510	.048 sq.	.550	.150	.052	-44
A12-015R	.219	.510	.048 dia.	.550	.150	.052	-44
A12-017	.219	.480	.032 sq.	.530	.170	.036	-45
A12-019	.250	.480	.040 sq.	.540	.195	.044	-46
A12-021	.250	.480	.032 sq.	.540	.200	.036	-47
A12-021R	.250	.480	.032 dia.	.540	.200	.036	-47
A12-022	.266	.540	.040 sq.	.590	.210	.044	-48
A12-023	.281	.560	.048 dia.	.610	.220	.052	-49
A12-025	.313	.570	.040 sq.	.630	.255	.044	-50
A12-034	.375	.690	.040 sq.	.740	.330	.044	-51
A12-043	.500	.870	.056 sq.	.940	.435	.060	-52
A12-052	.563	1.030	.064 sq.	1.100	.500	.068	-53A
A12-057	.625	1.120	.064 sq.	1.200	.560	.068	-54A



WIRE SECTION
VARIES BY
DIAMETER.

CONTACT PLANT FOR TOOL INFORMATION.



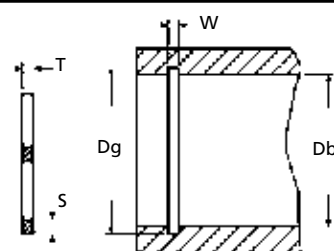
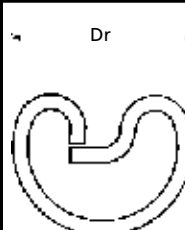
INTERNAL "D" STYLE

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton

M2500



D25

BORE

MM
(Db)

RING

Diameter
(approx.)
(Dr)

Radial Wall
(S)

Thickness
(T)

Height
(approx.)
(Hr)

GROOVE

Diameter
(Dg)

Width
(W)

MATERIAL

Spring
Steel

D25-024	24	26.3	2.0	1.5	21.5	25.2	1.6
D25-027	27	30.1	2.4	1.5	24.4	28.2	1.6
D25-030	30	32.7	2.4	1.5	27.0	31.2	1.6

A12 D25

DESCRIPTION

Lighter duty radially-installed external (A12) or axially-installed internal (D25) rings that tolerate wide groove tolerances. Easily fitted and removed using a standard hand tool or applicator.

RADIAL / AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Determine wire cross section (round, square, or rectangle).
2. Measure thickness (T).
3. Measure the ring diameter (Dr).
4. Find the part in the charts above.

GENERAL USE



WEIRD

GENERALLY
THESE RINGS
ARE INFERIOR IN
PERFORMANCE
TO THEIR
STAMPED
COUNTERPARTS
(SEE SH ON PAGE
6 AND HO ON
PAGE 16).

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PISTON RINGS

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Seeger

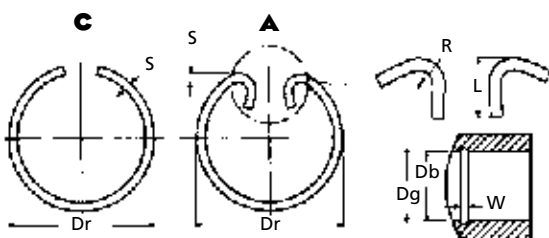
SRA, SRC

SKA, SKC


DIN

73123

73130

DIN
73123

S	BORE		RING					GROOVE				MATERIAL		
	MM (Db)	Free Outside Dia. (Dr)	Wire Cross-Section (S)		Radius Max. (R)	Lug Length (L)		Diameter (Dg)	Width (W)		Spring Steel			
SKA-010	10	11.3	+5/-0	.8	+/-01	1.2	3	+0/-1.0	10.8	+2/-0	.9	+1/-0		
-012	12	13.6							12.8					
-014	14	16.0		1.0	+/.015	1.3	5		15.1		1.1			
-015	15	17.1							16.1					
-018	18	20.5		1.3	+/-03	1.6	7		19.5		1.4			
-020	20	22.7	1.5	+/-02	21.7				1.6					
-022	22	24.8			23.7									
-024	24	27.2			25.7									
-025	25	28.2			26.7									
-026	26	29.4			27.7									
-028	28	31.4	2.0	+/-025	2.1	8	29.7		2.1					
-030	30	34.0					32.4							
-032	32	36.0					34.4							
SKA-035	35	39.0					37.4							
SRA-010	10	11.8					+5/-0				1.0		+/-015	1.3	3	11.1	1.1
-012	12	13.9	1.2	+/-015	5	13.2		1.3						
-015	15	17.2	1.6	+/-02		16.3								
SRA-025	25	27.8	+1.0/-0	1.6	+/-02	1.6	7	26.8	1.7					
SKC-010	10	11.3	+5/-0	.8	+/-01	-	-	10.8	+2/-0	.9	+1/-0			
-012	12	13.6		1.0	+/.015			12.8		1.1				
-014	14	16.0						15.1				1.4		
-015	15	17.1						16.1						
-018	18	20.5						19.5						
-020	20	22.7	21.7											
-022	22	24.8	1.5	+/-02	23.7			1.6						
-024	24	27.2			25.7									
-025	25	28.2			26.7									
-026	26	29.4			27.7									
-028	28	31.4			29.7									
-030	30	34.0	2.0	+/-025	-			-		32.4		2.1		
-032	32	36.0								34.4				
SKC-035	35	39.0								37.4				
SRC-010	10	11.8								+5/-0			1.0	+/-015	1.3	3	11.1	1.1
-012	12	13.9				1.2	+/-015		5		13.2		1.3	
-015	15	17.2	1.6	+/-02	16.3									
SRC-025	25	27.8	+1.0/-0	1.6	+/-02	1.6		26.8	1.7					

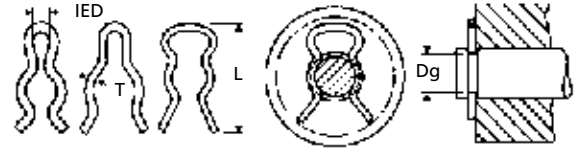
S SERIES	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	S SERIES	
	Unique wire-formed rings used in high volume automated assemblies. Generally found in the automotive industry only.	<ol style="list-style-type: none">1. Verify form (C or A).2. Determine wire section (S).3. Measure free outside diameter (Dr).4. Find the part in the chart above while paying particular attention to section (for SK or SR).	 WEIRD	WIRE	K: Standard
					R: Heavy
				FORM	C: Cut Ends
					A: Radiused Ends
"S" is for the series; "K" or "R" is the wire size; "C" or "A" shows end configuration; and the number gives you the bore size in mm. Example: SKA-018 is a standard duty wire with radiused ends for an 18mm bore.					

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HAIR PIN TYPE

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton

A1100

Hubbard

HPC

ITW

23 Series

BPXZ

GROOVE

Diameter
(Dg)

PIN DIMENSIONS

Wire
Cross-Section
(T)

Inside Eye
Diameter
(IED)

Length
(L)

WEIGHT
Lbs. per
100
Pieces

MATERIAL

Zinc Plated
"BPXZ."

Stainless
"BPXS."

BPXZ-415	.0938	.0260	.0625	.3750	.0130
-413	.0781	.0280	.0625	.2813	.0130
-418	.1250	.0280	.0938	.4375	.0330
-409	.0938	.0280	.0625	.5000	.0330
-2301	-	.0290	.0625	.3125	.0100
-2302	.1406	.0310	.1094	.5000	.0200
-2303	-	.0330	.1250	.6250	.0300
-401	.1536	.0350	.0938	.4688	.0250
-405	.1536	.0350	.1250	.5000	.0250
-411	.2188	.0350	.0938	.6250	.0380
-419	-	.0420	-	.7500	.0880
-406	.3125	.0460	.1875	.9375	.2330
-422	.1250	.0470	.0938	.4375	.0500
-420	.3125	.0470	-	.5625	.0750
-416	.1875	.0470	.1094	.5938	.0630
-421	.3750	.0470	-	.6250	.1000
-404	.2500	.0470	.1250	.8750	.1000
-408	.1875	.0470	.1250	1.3125	.1330
-2304	-	.0480	.1250	.7500	.0600
-2305	-	.0520	.1875	.9688	.1300
-2306	-	.0550	.2188	1.1250	.1900
-403	.2500	.0620	.1250	.6875	.1250
-412	.3125	.0620	.1563	.7500	.1380
-402	.3750	.0620	.1875	1.0000	.2000
-2307	-	.0640	.2500	1.1250	.2200
-2308	-	.0870	.3125	1.5000	.5600
-2309	-	.0930	.3750	1.8125	.7500
-407	.7813	.1050	.4375	2.0625	1.0750
-2310	-	.1050	.4375	2.0781	1.1300
-414	.7813	.1250	.4375	2.0625	1.5500
-2311	-	.1250	.5000	2.2813	2.0000
-410	.6875	.1770	.7500	2.7500	4.2000
-2312	-	.1860	.7960	3.0000	5.0000
BPXZ-417	.7500	.1870	.8750	2.8750	5.0000

BPXZ

DESCRIPTION

High shoulder design provides increased abutment. Will accommodate wide groove diameter variation. Reusable. Commonly used on clevis pins and shafts.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Find style from chart on page 107.
2. Measure wire cross section (T).
3. Determine the length (L) of the pin.
4. Find the part in the chart above.

GENERAL USE












COMMON

**EASILY FITTED
AND REMOVED
USING
A PLIERS OR
SCREWDRIVER.**










**OFTEN USED
TO RETAIN
WASHERS ON
HITCH PINS
AND SHAFTS.**

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

HAIR PIN DESIGNS

								
BPXZ-415	BPXZ-413	BPXZ-418	BPXZ-409	BPXZ-401	BPXZ-405	BPXZ-411	BPXZ-419	BPXZ-406

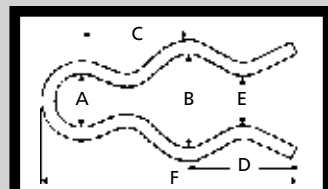
APPROXIMATE ACTUAL SIZE.

								
BPXZ-422	BPXZ-420	BPXZ-416	BPXZ-421	BPXZ-404	BPXZ-408	BPXZ-403	BPXZ-412	BPXZ-402

APPROXIMATE ACTUAL SIZE.

			
BPXZ-407	BPXZ-414	BPXZ-410	BPXZ-417

APPROXIMATE ACTUAL SIZE.














DIAGRAMS ARE
APPROXIMATE
ACTUAL SIZE.

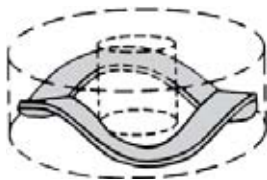
Part #	Shaft Size	Wire Diameter	A Eye Diameter	B	C	D	E	F Overall Length
BPXZ-2301	1/8	.029	1/16	5/64	1/8	1/8	1/32	.352
-2302	3/16	.031	7/64	9/64	7/32	7/32	1/16	.491
-2303	1/4	.033	1/8	7/32	1/4	1/4	1/8	.600
-2304	5/16	.048	1/8	1/4	5/16	5/16	5/32	.838
-2305	3/8	.052	3/16	5/16	3/8	3/8	5/32	.958
-2306	7/16	.055	7/32	3/8	7/16	1/2	3/16	1.140
-2307	1/2	.064	1/4	7/16	1/2	9/16	3/16	1.264
-2308	5/8	.087	5/16	17/32	5/8	5/8	9/32	1.525
-2309	3/4	.093	3/8	21/32	3/4	3/4	5/16	1.808
-2310	7/8	.105	7/16	25/32	7/8	7/8	13/32	2.006
-2311	1	.125	1/2	7/8	1	7/8	1/2	2.243
BPXZ-2312	1	.186	5/64	51/64	-	-	-	3.000

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

TYPES

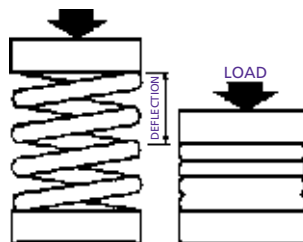
	BW	BELLEVILLE DISC SPRING		WSG	STANDARD GAP WAVE SPRING
	<u>IMPERIAL</u> Pgs: 110-111	<u>METRIC</u> Pgs: 214-215		<u>IMPERIAL</u> Pgs: 116-117	<u>METRIC</u> N/A
	PSW	SHOULDER WASHER		WSN	NARROW SECTION WAVE SPRING
	<u>IMPERIAL</u> Pg: 112	<u>METRIC</u> N/A		<u>IMPERIAL</u> Pg: 118	<u>METRIC</u> N/A
	FS	FINGER WASHER		CML	COMPRESSION SPRING LIGHT DUTY
	<u>IMPERIAL</u> Pg: 112	<u>METRIC</u> N/A		<u>IMPERIAL</u> Pgs: 120-121	<u>METRIC</u> N/A
	DWS	STANDARD METRIC WAVE SPRING		CMM	COMPRESSION SPRING MEDIUM DUTY
	<u>IMPERIAL</u> N/A	<u>METRIC</u> Pgs: 216-217		<u>IMPERIAL</u> Pgs: 122-123	<u>METRIC</u> N/A
	WSE	WAVE SPRING EXTERNAL		CMH	COMPRESSION SPRING HEAVY DUTY
	<u>IMPERIAL</u> Pg: 114	<u>METRIC</u> N/A		<u>IMPERIAL</u> Pgs: 124-125	<u>METRIC</u> N/A
	WSI	WAVE SPRING INTERNAL			
	<u>IMPERIAL</u> Pg: 115	<u>METRIC</u> N/A			

When selecting a spring, there are several design issues to consider:



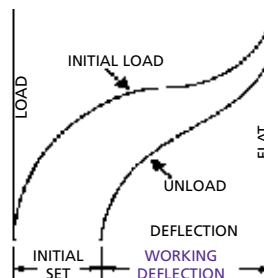
ENVELOPE

This is the "cylinder" of space within which the spring operates. Springs will tend to expand slightly as they compress.



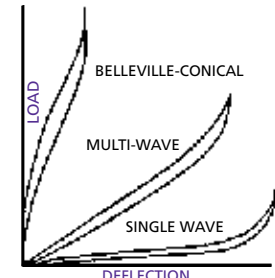
LOAD AND DEFLECTION

Load is the measurement of a spring when flattened, while deflection is the distance the spring compresses.



WORKING DEFLECTION

After initial set, a spring develops working deflection as it expends stored energy from heat and friction.



PERFORMANCE

Different styles of springs will yield different results over time.

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PRODUCT COMPARISONS






Spring washers include a broad range of components with similar but tangential performance characteristics to retaining rings. As a full line manufacturer and distributor of bearing and power transmission components, we are compelled to include springs in our product offering.

Common applications for spring washers include:

1. End-play take-up in assemblies due to cumulative manufacturing tolerances.
2. Compensation for dimensional changes in assemblies.
3. Elimination of rattle.
4. Maintenance of torque and "tightness" in fasteners.
5. Compensation for expansion and contraction in environments with extreme temperature fluctuation.
6. Shock absorption.

Listed below are performance comparisons for several types of springs. The table is designed to give generalized information and cannot be extrapolated to specific applications. The concept behind the table is to give you some ideas of load and work height between styles. See page 108 for additional explanation.

PERFORMANCE COMPARISONS FOR VARIOUS SPRING TYPES

S P R I N G S	BELLEVILLE WASHER		STANDARD GAP STYLE		COMPRESSION SPRINGS					
		BW		WSG		CML		CMM		CMH
		Pg 110		Pg 116		Pg 120		Pg 122		Pg 124
	Load	Work Height	Load	Work Height	Load	Work Height	Load	Work Height	Load	Work Height
5/8"	255-345 lbs.	.053	10 lbs.	.050	6 lbs.	.238	12 lbs.	.454	-	-
1"	573-777 lbs.	.082	18 lbs.	.062	12 lbs.	.710	18 lbs.	.720	25 lbs.	1.083
1-1/2"	1190-1610 lbs.	.121	26 lbs.	.078	20 lbs.	.866	35 lbs.	.835	60 lbs.	1.119
2"	2048-2772 lbs.	.160	34 lbs.	.093	25 lbs.	.490	50 lbs.	.800	90 lbs.	1.069

Actual results will be based on individual circumstances. These values are for reference only.

MATERIAL

CARBON STEEL	STAINLESS STEEL 302	STAINLESS STEEL 316	BERYLLIUM COPPER	INCONEL X-75®	ALLOY A-286
(STANDARD)	(STANDARD)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)

OTHER MATERIALS AVAILABLE ON REQUEST.

FINISHES

OIL DIPPED	BLACK OXIDE	CADMIUM	PHOSPHATE	PASSIVATE
(STANDARD)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)	(SPECIAL ORDER)

OTHER FINISHES AVAILABLE ON REQUEST.

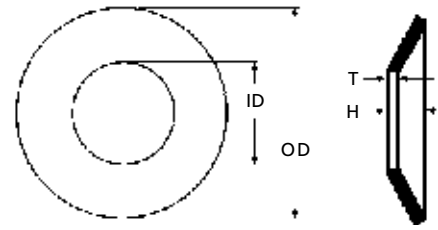
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DISC SPRINGS

785-392-3017 FAX 785.392.2845

REVISED 09-04
www.huyett.com

CONICAL SHAPE







BELLEVILLE DISC SPRING

MANUFACTURER CROSS-REFERENCE

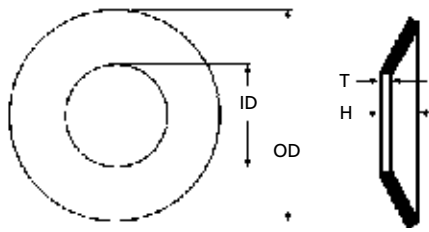
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PAGE 236.

* Hypothetical load based on part design.
Actual load cannot be guaranteed.

BW	FREE FIT		SPRING						MATERIAL	
	Over Shaft Fraction or Bolt Size	In Bore Fraction	Minimum Inside Dia. (ID)	Maximum Outside Dia. (OD)	Thickness (T)	Approx. Height (H)	Work Height	Load at Work Height*	Spring Steel	Stainless "S"
BW-0187-0H-007	3/32	3/16	.093	.187	.0065	.0130	.0100	6.1-7.5		
-0187-0H-010					.0100	.0130	.0125	13.7-16.9		
-0250-0G-009	1/8	1/4	.125	.250	.0086	.0172	.0130	10.5-12.9		
-0250-0G-013					.0133	.0200	.0170	23.6-29.0		
-0375-0G-019	#6	9/32	.138	.281	.0185	.0280	.0230	37-46		
-0281-0F-010					.0100	.0200	.0150	13.5-16.5		
-0281-0F-013	5/32	5/16	.156	.312	.0130	.0210	.0170	22-27		
-0281-0F-015					.0150	.0230	.0190	30-37		
-0312-0E-011	#8	11/32	.164	.343	.0108	.0216	0.160	16.7-20.5		
-0312-0E-017					.0166	.0250	0.021	37.2-45.6		
-0343-0D-013	3/16	3/8	.190	.375	.0130	.0240	.0180	22.5-27.5		
-0343-0D-016					.0160	.0260	.0210	32-40		
-0343-0D-019	#10	37/64	.220	.437	.0185	.0280	.0230	45-65		
-0375-0C-015					.0150	.0270	.0210	31.5-38.5		
-0375-0C-018	#12	7/16	.258	.813	.0175	.0280	.0230	45-51		
-0375-0C-020					.0200	.0300	.0250	54-66		
-0563-0B-043	1/4	1/2	.255	.500	.0430	.0560	-	-		
-0437-0A-016					.0160	.0310	.0230	36-44		
-0500-A-018	5/16	5/8	.317	.625	.0180	.0340	.0260	40.5-49.5		
-0500-A-022					.0215	.0360	.0290	60-74		
-0500-A-025	3/8	3/4	.380	.750	.0250	.0380	.0310	85-105		
-0500-A-038					.0380	.0470	.0430	161-219		
-0637-A-032	7/16	7/8	.442	.875	.0320	.0480	.0400	106-130		
-0813-A-062					.0320	.0480	.0400	106-130		
-0625-B-022	1/2	1	.505	1.000	.0620	.0850	-	-		
-0625-B-032					.0220	.0420	.0320	63-77		
-0625-B-032	5/16	15/16	.937	1.937	.0320	.0480	.0400	130-160		
-0625-B-047					.0470	.0590	.0530	255-345		
-0937-B-030	3/8	1-1/8	1.125	2.125	.0300	.0600	.0450	99-121		
-0937-B-045					.0450	.0670	.0560	196-240		
-0750-C-028	7/16	1-5/64	1.063	2.063	.0280	.0510	.0390	99-121		
-0750-C-034					.0340	.0550	.0440	149-183		
-0750-C-040	1/2	1-13/64	1.188	2.188	.0400	.0590	.0490	211-259		
-0750-C-056					.0560	.0700	.0630	365-495		
-1125-C-053	5/8	1-1/2	1.500	2.500	.0530	.0800	.0660	269-329		
-1125-C-078					.0780	.0970	.0880	515-697		
-0875-D-031	3/4	1-3/4	1.750	2.750	.0310	.0590	.0450	121-149		
-0875-D-045					.0450	.0670	.0560	243-297		
-1063-D-082	7/8	1-7/8	1.875	2.875	.0820	.1080	-	-		
-1188-D-091					.0910	.1220	-	-		
BW-1000-E-035	1/2	1	.505	1.000	.0350	.0670	.0510	157-193		

BW	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	STACK IN SERIES
	Very common spring with high load capacity but limited deflection. Will take an initial set when loaded to flat. Also known as conical washers or spring washers.	1. Measure inside diameter (ID), outside diameter (OD), thickness (T), and height (H). 2. Find the part in the charts above. 3. Fax a quote request if the part is not a standard.	 COMMON	 OR PARALLEL 
AXIAL ASSEMBLY				
			DBW  METRIC Page 214	TO INCREASE LOAD AND DEFLECTION.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

CONICAL SHAPE


BOX 232 • MINNEAPOLIS, KS • 67467


BELLEVILLE DISC SPRING
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

 * Hypothetical load based on part design.
Actual load cannot be guaranteed.


BW	FREE FIT		SPRING						MATERIAL		
	Over Shaft Fraction or Bolt Size	In Bore Fraction	Minimum Inside Dia. (ID)	Maximum Outside Dia. (OD)	Thickness (T)	Approx. Height (H)	Work Height	Load at Work Height*	Spring Steel	Stainless "S"	
BW-1000-E-043	1/2	1	0.505	1.000	.0430	.0710	.0570	225-275			
-1000-E-050					.0500	.0750	.0620	306-374			
-1000-E-073					.0730	.0910	.0820	573-777			
-1000-E-082					.0820	.0980	-	-			
-1262-E-060		1-17/64		1.262	.0600	.0910	.0750	368-450			
-1500-E-070		1-1/2		1.500	.0700	.1040	.0870	445-544			
-1125-F-038	9/16	1-1/8	0.567	1.125	.0380	.0730	.0550	175.0-215			
-1125-F-056					.0560	.0840	.0700	364-446.0			
-1250-G-040	5/8	1-1/4	0.630	1.250	.0400	.0820	.0610	207-253			
-1250-G-062					.0620	.0920	.0770	427-523			
-1250-G-089					.0890	.1110	.1000	833-1127			
-1875-G-057		1-7/8		1.875	.0570	.1150	.0850	333-407			
-1875-G-086					.0860	.1290	.1070	657-804			
-1875-G-127					.1270	.1580	.1420	1399-1893			
-1375-H-044	11/16	1-3/8	0.692	1.375	.0440	.0880	.0650	283-292			
-1500-I-045	3/4	1-1/2	0.755	1.500	.0450	.0930	.0690	255-313			
-1500-I-060					.0600	.1020	.0810	409-501			
-1500-I-072					.0720	.1070	.0890	598-732			
-1500-I-107					.1070	.1340	.1210	1190-1610			
-2250-I-068		2-1/4		2.250	.0680	.1370	.1030	463-553			
-2250-I-102					.1020	.1530	.1270	910-1113			
-2250-I-150					.1500	.1880	.1690	1853-2509			
-1750-J-057	7/8	1-3/4	0.880	1.750	.0570	.1140	.0850	405-495			
-1750-J-085					.0850	.1280	.1060	819-1001			
-2000-K-065					1	2	1.000	2.000			.0650	.1300	.0980	531-649
-2000-K-084	.0840	.1360	.1100	769-941							
-2000-K-097	.0970	.1450	.1210	1062-1298							
-2000-K-142	.1420	.1770	.1600	2048-2772							
-3000-K-135	3	3.000	.1350	.2020							.1680	1548-1893
-2250-L-073	1-1/8	2-1/4	1.125	2.250	.0730	.1480	.1130	657-803			
-2250-L-159					.1590	.1980	.1790	2250-3460			
-2500-M-080	1-1/4	2-1/2	1.250	2.500	.0800	.1600	.1200	783-957			
-2500-M-120		3-3/4			3.750	.1200	.1800	.1500			1584-1936
-3750-M-168						.1680	.2510	.2090			2348-2870
-2750-N-087	1-3/8	2-3/4	1.375	2.750	.0870	.1730	.1320	864-1056			
-2750-N-132					.1320	.1960	.1650	1755-2145			
-4000-S-125		2		4	2.000	4.000	.1250	.2500			.1870	1809-2211
-4250-S-318	4-1/4		4.250	.3180			.4120	-			-
BW-4500-S-356	4-1/2		4.500	.3560			.4560	-			-

SPECIAL ORDER DISC SPRINGS

BWS	SERRATED	BWT	TOOTHED	BWO	OFFSET	DBW	METRIC (Page 214)
VIBRATION RESISTANT		SHIFT RESISTANT		SECONDARY SPRING SYSTEM		DIN 2093	

CONTACT PLANT FOR QUOTE.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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SPRING WASHERS

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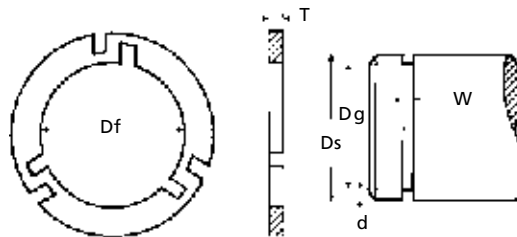
SHOULDER WASHER

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Waldes

5590



PSW

SHAFT

Decimal
(Ds)

Fraction
(Ds)

RING

Free
Inside Dia.
(Df)

Thickness
(T)

GROOVE

Diameter
(Dg)

Width
at Top
(W)

Depth
(d)

MATERIAL

Spring
Steel

TOOL

CONTACT
PLANT

PSW-025

.250

1/4

.254

+/- .003

.050

+/- .002

.204

+/- .003

.053

+/- .002

.023

-037

.375

3/8

.380

+/- .003

.050

+/- .002

.321

+/- .003

.053

+/- .002

.027

-050

.500

1/2

.505

+/- .003

.062

+/- .003

.434

+/- .003

.065

+/- .002

.033

PSW-062

.625

5/8

.630

+/- .003

.062

+/- .003

.547

+/- .003

.065

+/- .002

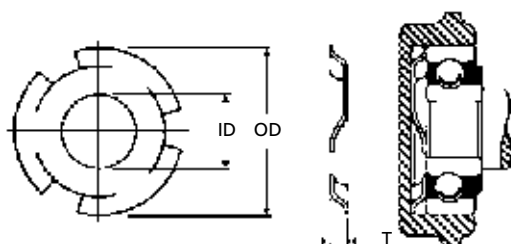
.039



FINGER WASHER

MANUFACTURER CROSS-REFERENCE

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FS

OUTSIDE DIAMETER

Decimal
(OD)

MM
(OD)

INSIDE DIAMETER

Decimal
(ID)

MM
(ID)

LOAD

Load at
Height of
.062"

Load at
Height of
1.57mm

Material
Thickness
(T)

For use with
Bearing OD
Decimal

MM

MATERIAL

Spring
Steel

FS-0595-010

.595

15.11

.312

7.92

0.3 to 1.0

1.33-4.45

.010

.6299

16.0

-0728-006

.728

18.49

.344

7.74

4 to 8

17.79-35.6

.006

.7480

19.0

-0846-006

.846

21.49

.453

11.51

3 to 7

13.34-31.1

.006

.8661

22.0

-0846-008

.846

21.49

.453

11.51

9 to 13

40.0-57.8

.008

.8661

22.0

-0926-007

.926

23.52

.453

11.51

6 to 10

26.7-44.5

.007

.9449

24.0

-0926-010

.926

23.52

.344

8.74

22 to 28

97.9-124.6

.010

.9449

24.0

-1004-006

1.004

25.50

.516

13.11

5 to 9

22.2-40.0

.006

1.0236

26.0

-1004-007

1.004

25.50

.516

13.11

8 to 12

35.6-53.4

.007

1.0236

26.0

-1164-009

1.164

29.57

.688

17.48

9 to 13

40.0-57.8

.009

1.1811

30.0

-1164-010

1.164

29.57

.406

10.31

15 to 21

66.7-93.4

.010

1.1811

30.0

-1164-018

1.164

29.57

.688

17.48

60 to 75

267-334

.018

1.1811

30.0

-1240-008

1.240

31.50

.688

17.48

10 to 14

44.5-62.3

.008

1.2598

32.0

-1240-009

1.240

31.50

.563

14.30

15 to 21

66.7-93.4

.009

1.2598

32.0

-1240-010

1.240

31.50

.688

17.48

15 to 21

66.7-93.4

.010

1.2598

32.0

-1360-011

1.360

34.54

.814

20.68

11 to 15

48.93-66.72

.011

1.3780

35.0

-1360-014

1.360

34.54

.814

20.68

17 to 25

75.6-111.2

.014

1.3780

35.0

-1555-014

1.555

39.50

.971

24.66

15 to 21

66.7-93.4

.014

1.5748

40.0

-1555-018

1.555

39.50

1.000

25.40

31 to 39

138-174

.018

1.5748

40.0

-1830-016

1.830

46.48

1.189

30.20

17 to 23

75.6-102

.016

1.8504

47.0

FS-2022-019

2.022

51.36

1.359

34.52

17 to 23

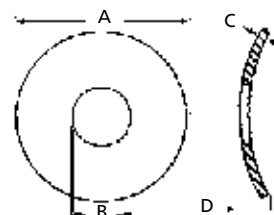
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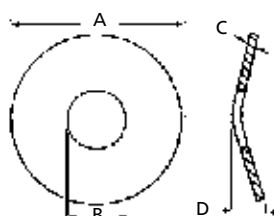
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COPY & FAX

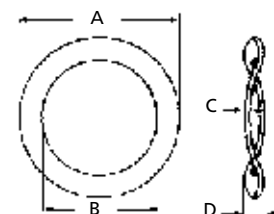
	<div style="background-color: #4a4a8a; color: white; padding: 5px; display: inline-block;">CW</div> <div style="margin-left: 10px;"> <h2 style="margin: 0;">CURVED WASHER</h2> </div>										
	TO QUOTE, ENTER THE INFORMATION BELOW:										
	MATERIAL:										
OD (A)	FROM	TO	ID (B)	FROM	TO	Thick (C)	FROM	TO	H (D)	FROM	TO
Most commonly used stamped spring washer. Provides the greatest amount of spring action for its size and gauge compared to any other type. Used as take-up spring for large tolerance variations, anti-rattle applications, play eliminators (electric motors), and for cushioning light loads.											



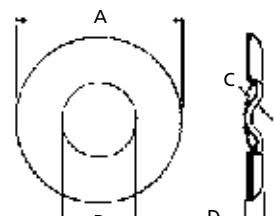
	<div style="background-color: #4a4a8a; color: white; padding: 5px; display: inline-block;">VW</div> <div style="margin-left: 10px;"> <h2 style="margin: 0;">"V" WASHER</h2> </div>										
	TO QUOTE, ENTER THE INFORMATION BELOW:										
	MATERIAL:										
OD (A)	FROM	TO	ID (B)	FROM	TO	Thick (C)	FROM	TO	H (D)	FROM	TO
For general use. The "V" form increases load-carrying capacity but reduces spring resilience when compared to CW.											



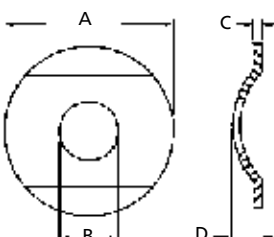
	<div style="background-color: #4a4a8a; color: white; padding: 5px; display: inline-block;">WW3</div> <div style="margin-left: 10px;"> <h2 style="margin: 0;">WAVE WASHER</h2> <div style="font-size: small; margin-top: 5px;">THREE WAVES</div> </div>										
	TO QUOTE, ENTER THE INFORMATION BELOW:										
	MATERIAL:										
OD (A)	FROM	TO	ID (B)	FROM	TO	Thick (C)	FROM	TO	H (D)	FROM	TO
Provides greater load-bearing capability because of its three-point contact and sharper curves or waves. Used as a take-up spring for a wide range of load-bearing requirements. Popular sizes available from stock in spring steel.											



	<div style="background-color: #4a4a8a; color: white; padding: 5px; display: inline-block;">WW4</div> <div style="margin-left: 10px;"> <h2 style="margin: 0;">WAVE WASHER</h2> <div style="font-size: small; margin-top: 5px;">FOUR WAVES</div> </div>										
	TO QUOTE, ENTER THE INFORMATION BELOW:										
	MATERIAL:										
OD (A)	FROM	TO	ID (B)	FROM	TO	Thick (C)	FROM	TO	H (D)	FROM	TO
Four waves in this washer rim further increase its load-bearing capabilities. The function of the WW4 is similar to the WW3 or CW but under heavier load conditions and with some loss of resiliency.											



	<div style="background-color: #4a4a8a; color: white; padding: 5px; display: inline-block;">RW</div> <div style="margin-left: 10px;"> <h2 style="margin: 0;">RIM WASHER</h2> </div>										
	TO QUOTE, ENTER THE INFORMATION BELOW:										
	MATERIAL:										
OD (A)	FROM	TO	ID (B)	FROM	TO	Thick (C)	FROM	TO	H (D)	FROM	TO
Provides flat contact to eliminate surface scoring. Characteristics similar to CW, but flat rim carries more load with same material thickness.											


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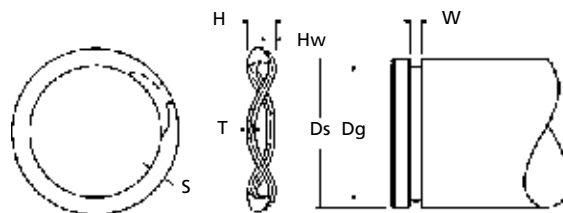
WAVE SPRING - EXTERNAL

MANUFACTURER CROSS-REFERENCE

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WSW



WSE	SHAFT	SPRING						GROOVE		MATERIAL		
	Decimal (Ds)	Max. Free Height (H)	Radial Wall (S)	Thickness (T)	Number of Waves	Load at Work Height (Hw)		Theoretical Spring Rate	Diameter (Dg)	Width Min. (W)	Spring Steel	Stainless "-SS"
WSE-075	.750	.115	.065	.042	3	25	@ .085	1250	.704	.120		
-087	.875	.131	.075			30		1304	.821	.136		
-100	1.000	.129	.085			34		1172	.940	.134		
-112	1.125	.137	.128	.050		38	@ .100	1727	1.059	.142		
-125	1.250	.145				40		4000	1.176	.150		
-137	1.375	.130				45		3000	1.291	.135		
-150	1.500	.126	.158	.062	50	@ .110	3333	1.406	.131			
-162	1.625	.138			55		4231	1.529	.143			
-175	1.750	.137			60		3529	1.650	.142			
-187	1.875	.140	.188	.078	63	@ .130	2864	1.769	.145			
-200	2.000	.145			65		2500	1.886	.150			
-212	2.125	.170			70		4667	2.003	.175			
-225	2.250	.175	.225	.093	75	@ .170	3947	2.120	.180			
-237	2.375	.175			80		3333	2.239	.180			
-250	2.500	.171			84		2971	2.360	.176			
-262	2.625	.181	.281	.111	88	@ .185	2514	2.481	.190			
-275	2.750	.217			94		4273	2.602	.222			
-287	2.875	.217			97		3731	2.721	.222			
-300	3.000	.225	.281	.111	100	@ .185	3333	2.838	.230			
-312	3.125	.230			103		2943	2.957	.235			
-325	3.250	.225			106		2678	3.076	.230			
-350	3.500	.245	.281	.111	115	@ .185	4423	3.316	.250			
-362	3.625	.250			117		4034	3.435	.255			
-375	3.750	.258			121		3667	3.552	.263			
-387	3.875	.255	.281	.111	126	@ .185	3073	3.673	.260			
-400	4.000	.268			130		3023	3.792	.273			
-412	4.125	.263			134		2735	3.919	.268			
-425	4.250	.248	.281	.111	140	@ .185	8235	4.065	.253			
-450	4.500	.256			150		6818	4.310	.261			
-475	4.750	.253			160		5714	4.550	.258			
WSE-500	5.000	.259				170		5000	4.790	.264		

WSE

DESCRIPTION

Similar to a standard retaining ring, except the axial wave form yields to compressibility. Pressure is applied in two directions to eliminate "play." If the part is stamped, see page 113.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify that the part is for an external application by checking the end per the drawing above.
2. Count the waves "peak to peak."
3. Determine thickness (T).
4. Verify free height (H).
5. Find the part in the chart above.

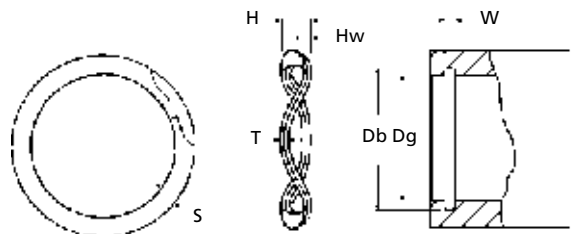


UNCOMMON

GENERAL USE

**TECHNICAL
BENEFITS
ARE MAKING
THIS SPRING
MORE
POPULAR
ALL THE
TIME!**

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**WAVE SPRING - INTERNAL****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Smalley

WHW



WSI	BORE		SPRING					GROOVE		MATERIAL			
	Decimal (Db)	Max. Free Height (H)	Radial Wall (S)	Thickness (T)	Number of Waves	Load at Work Height (Hw)	Theoretical Spring Rate	Diameter (Dg)	Width Min. (W)	Spring Steel	Stainless "-SS"		
WSI-075	.750	.114	.065	.035	3	25 @ .080	1042	.796	.119				
-087	.875	.110	.085	.042		30 @ .085	2000	.931	.115				
-100	1.000	.120				34 @ .085	1360	1.066	.125				
-112	1.125	.125				.128	.050	38 @ .100	2533			1.197	.130
-125	1.250	.135						40 @ .100	2000			1.330	.140
-137	1.375	.125	45 @ .100	3750				1.461	.130				
-150	1.500	.135	50 @ .100	3333				1.594	.140				
-162	1.625	.135	.158	.062		55 @ .110	5500	1.725	.140				
-175	1.750	.140				60 @ .110	4286	1.858	.145				
-187	1.875	.141				63 @ .110	3316	1.989	.146				
-200	2.000	.150			65 @ .110	2708	2.122	.155					
-212	2.125	.170	.188	.078	70 @ .130	5385	2.251	.175					
-225	2.250	.175			75 @ .130	4688	2.382	.180					
-237	2.375	.180			80 @ .130	3810	2.517	.185					
-250	2.500	.183			84 @ .130	3231	2.648	.188					
-262	2.625	.220	.225	.093	88 @ .170	5867	2.781	.225					
-275	2.750	.229			94 @ .170	4947	2.914	.234					
-287	2.875	.225			97 @ .170	4217	3.051	.230					
-300	3.000	.230			100 @ .170	3704	3.182	.235					
-312	3.125	.250	.281	.111	103 @ .185	7357	3.315	.255					
-325	3.250	.250			106 @ .185	6625	3.446	.255					
-350	3.500	.245			115 @ .185	5000	3.710	.250					
-362	3.625	.250			117 @ .185	4500	3.841	.250					
-375	3.750	.255	121 @ .185		4840	3.974	.260						
-387	3.875	.260	.312			@ .185	4200	4.107	.265				
-400	4.000	.255				3714	4.240	.260					
-412	4.125	.258				3526	4.365	.263					
-425	4.250	.264				3182	4.490	.269					
-450	4.500	.250				8333	4.740	.255					
-475	4.750	.252		6956		4.995	.257						
WSI-500	5.000	.247			5	126	6017	5.260	.252				

WSI	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	CIRCUMFERENTIAL MOVEMENT OF ENDS DURING COMPRESSION YIELDS PRECISE ENVELOPE OF MOTION.
	Similar to a standard retaining ring, except the axial wave form yields to compressibility. Pressure is applied in two directions to eliminate "play." If the part is stamped, see page 113. AXIAL ASSEMBLY	1. Verify that the part is for an internal application by checking the end per the drawing above. 2. Count the waves "peak to peak." 3. Determine thickness (T). 4. Verify free height (H). 5. Find the part in the chart above.	 UNCOMMON	

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MANUFACTURER CROSS-REFERENCE

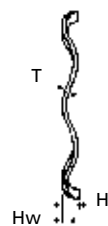
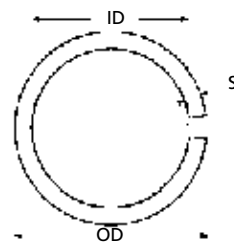
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SSR



Spirolox

TR



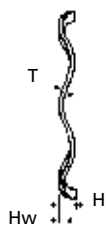
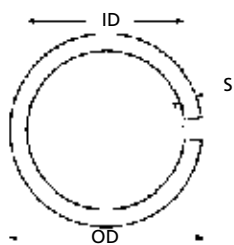
WSG	SIZE		WAVE SPRING						MATERIAL							
	Bore Ø Min. (OD)	Shaft Ø Max. (ID)	Load (Lbs.)	Work Height (Hw)	Free Height (H)	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Steel	Stainless "-SS"						
WSG-050*	.50	.40	7	.050	.085	3	.008	.040								
-062*	.62	.48	10		.095		.010	.058								
-075*	.75	.50	14		.160		.012	.078								
-087*	.87	.62	16	.130	.094											
-100*	1.00	.78	18	.160	.016											
-112*	1.12	.84	20	.130			.133									
-125*	1.25	.96	22	.150												
-137*	1.37	1.09	24	.190	.018		.143									
-150*	1.50	1.17	26	.170												
-162*	1.62	1.31	28	.200	4	.024	.150									
-175	1.75	1.44	30	.140												
-187	1.87	1.56	32	.150												
-200	2.00	1.68	34	.140												
-212	2.12	1.80	36	.150												
-225	2.25	1.93	38	.093			.170	.178								
-237	2.37	1.99	40				.160									
-250	2.50	2.12	42			.170	.030	.188								
-262	2.62	2.24	44	.190												
-275	2.75	2.34	46	.170	.233											
-287	2.87	2.47	48	.180												
-300	3.00	2.59	50	.190												
-312	3.12	2.71	52	.210												
-325	3.25	2.75	54	.200												
-337	3.37	2.84	56	.220												
-350	3.50	3.00	58	.230												
-362	3.62	3.12	60	.240												
-375	3.75	3.25	62	.260												
-387	3.87	3.37	64	.300												
-400	4.00	3.50	66	.190							5					
-412	4.12	3.62	67	.200												
-425	4.25	3.74	69	.210												
-437	4.37	3.86	70	.210												
-450	4.50	3.99	72	.230												
-462	4.62	4.11	73	.270												
-475	4.75	4.24	75	.310												
-487	4.87	4.37	76	.290												
WSG-500	5.00	4.49	78	.310												

* WSG-050 through WSG-162 overlap slightly at the ends rather than having a gap.

WSG	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	NICE COMPACT DESIGN!
	Flat wire design yields many benefits vs. compression springs: reduced operating height, precise load deflections, and lower cost. Precise envelope of motion.	1. Count the waves "peak to peak." 2. Measure the thickness (T) and radial wall (S). 3. Determine free height (H). 4. Find the part in the chart above.	 COMMON	
	AXIAL ASSEMBLY			

WSG CONTINUED NEXT PAGE.

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**STANDARD GAP WAVE SPRING****MANUFACTURER CROSS-REFERENCE**INDEX
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Smalley



SSR

Spirolox

TR



WSG	SIZE		WAVE SPRING						MATERIAL	
	Bore Ø Min. (OD)	Shaft Ø Max. (ID)	Load (Lbs.)	Work Height (Hw)	Free Height (H)	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Steel	Stainless "-SS"
WSG-512	5.12	4.61	80	.125	.340	5	.030	.233		
-525	5.25	4.74	82		.370					
-537	5.37	4.86	84		.380					
-550	5.50	4.99	86		.250					
-562	5.62	5.11	88		.270					
-575	5.75	5.24	90		.280					
-587	5.87	5.36	92		.300					
-600	6.00	5.49	94		.300					
-612	6.12	5.61	96		.310					
-625	6.25	5.73	98		.340					
-637	6.37	5.86	100		.350					
-650	6.50	5.98	102		.390					
-675	6.75	6.23	104		.420					
-700	7.00	6.16	106		.320					
-725	7.25	6.44	108		.350					
-750	7.50	6.69	110		.360					
-775	7.75	6.94	114		.380					
-800	8.00	7.19	118		.390					
-825	8.25	7.44	122		.430					
-850	8.50	7.68	126		.340					
-875	8.75	7.93	130		.340					
-900	9.00	8.18	134		.290					
-950	9.50	8.68	142		.240					
-1000	10.00	9.17	150		.290					
-1050	10.50	9.67	158		.310					
-1100	11.00	10.17	166		.350					
-1150	11.50	10.66	174		.360					
-1200	12.00	11.16	182		.440					
-1250	12.50	11.66	190		.350					
-1300	13.00	12.16	198		.410					
-1350	13.50	12.65	206		.430					
-1400	14.00	13.15	214		.300					
-1450	14.50	13.65	221		.320					
-1500	15.00	14.13	230		.350					
-1550	15.50	14.64	239		.310					
WSG-1600	16.00	15.14	248		.340					

WSG	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	PRECISE LOAD DEFLECTION CHARACTERISTICS!
	Flat wire design yields many benefits vs. compression springs: reduced operating height, precise load deflections, and lower cost. Precise envelope of motion. AXIAL ASSEMBLY	1. Count the waves "peak to peak." 2. Measure the thickness (T) and radial wall (S). 3. Determine free height (H).	 COMMON	 NARROW SECTION NEXT PAGE.

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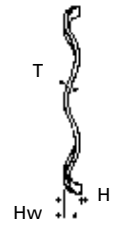
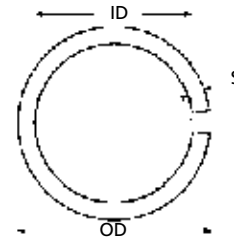
NARROW SECTION - SPLIT

MANUFACTURER CROSS-REFERENCE

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SSR-N



WSN	SIZE		WAVE SPRING						MATERIAL		
	Bore Ø Min. (OD)	Shaft Ø Max. (ID)	Load (Lbs.)	Work Height (Hw)	Free Height (H)	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Steel	Stainless "-SS"	
WSN-325	3.25	2.82	54	.109	.20	4	.030	.188			
-337	3.37	2.94	56		.22						
-350	3.50	3.07	58		.26						
-362	3.62	3.19	60		.27						
-375	3.75	3.32	62		.28						
-387	3.87	3.44	64		.31						
-400	4.00	3.57	66		.20						
-412	4.12	3.69	67		.20						
-425	4.25	3.82	69		.24						
-437	4.37	3.94	70		.21						
-450	4.50	4.07	72		.28						
-462	4.62	4.19	73	.125	.27	5					.188
-475	4.75	4.32	75		.32						
-487	4.87	4.44	76		.32						
-500	5.00	4.57	78		.35						
-512	5.12	4.69	80		.35						
-525	5.25	4.82	82		.36						
-537	5.37	4.94	84		.44						
-550	5.50	5.07	86		.28						
-562	5.62	5.19	88		.29						
-575	5.75	5.32	90		.34						
-587	5.87	5.44	92		.34						
-600	6.00	5.57	94	.34							
-612	6.12	5.69	96	.28							
-625	6.25	5.82	98	.28							
-637	6.37	5.94	100	.30							
-650	6.50	6.07	102	.30							
-675	6.75	6.32	104	.30							
-700	7.00	6.48	106	.32							
-725	7.25	6.73	108	.156	.33	7		.233			
-750	7.50	6.98	110		.36						
WSN-775	7.75	7.23	114		.38						

WSN

DESCRIPTION

Precision narrow wire section (S) with gap to eliminate binding and minimize radial expansion. Compact working envelope.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Count the waves "peak to peak."
2. Measure the thickness (T) and radial wall (S).
3. Determine free height (H).
4. Find the part in the chart above.

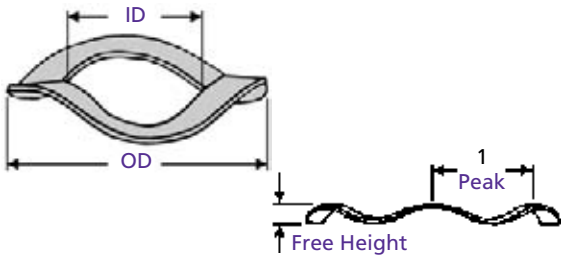
GENERAL USE



**NARROW
DESIGN
FOR
TIGHTER
WORKING
SPACES.**

COPY AND FAX SPECIAL SPRING QUOTATION NEEDS

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SPECIAL WAVE SPRINGS

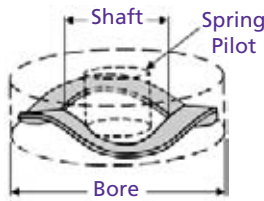
NAME: _____ COMPANY: _____
 PHONE: _____ FAX: _____
 ZODIAC SIGN: _____ NUMBER OF PETS: _____ ☐ SMOKER ☐ NONSMOKER

APPLICATION

There are thousands of wave spring applications, the peculiarities of which are limited only by your imagination. Wave springs are manufactured using an edge winding process, which is a precise method that requires minimal tooling modifications. As a result, we can offer customized parts, even in prototype or repair quantities, at a fairly reasonable cost. To assist you, we are providing this "Copy and Fax" design sheet. Please fill this page out as completely as possible and fax it to our plant for quotation.

How is the part going to be used? _____ Quantity to Quote: _____
 _____ Q₁: _____ Q₃: _____
 _____ Q₂: _____ Q₄: _____

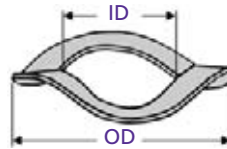
SIZING



ENVELOPE

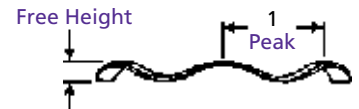
Operates in _____ Bore to Clear _____ Shaft
 size size

Spring Pilot: ☐ Bore ☐ Shaft



_____ O.D. Maximum

_____ I. D. Minimum



of Waves "Peak to Peak" _____

Maximum Free Height _____

USAGE

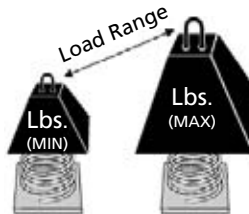
WORK HEIGHT



Refers to the progressively greater load required to compress the spring at decreasing work heights.

SPRING RATE

_____ Lbs./In. at
 _____ Work Height

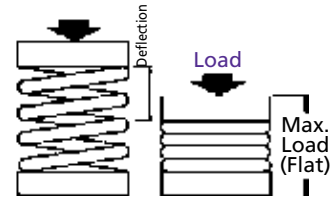


PERMITTED LOAD RANGE (Tolerances of Spring Rate)

Min: _____ Lbs. to Max: _____ Lbs.

At Work Height: _____ Inches

WORK HEIGHT



Minimum Load (1): _____

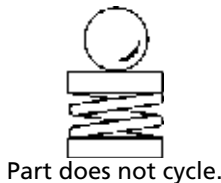
At Work Height of _____ Inches

Minimum Load (2): _____

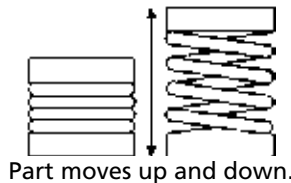
At Work Height of _____ Inches

LOAD

☐ Fixed Load



☐ Cyclical Load



Check One:

- ☐ Up To 10,000 Cycles
- ☐ Up To 100,000 Cycles
- ☐ Up To 1 Million Cycles
- ☐ Above 1 Million Cycles

☐ I'm Loaded



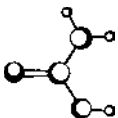
Call us for assistance.

MATERIAL

If you know . . .

MATERIAL

- ☐ Spring Steel
- ☐ 302 Stainless Steel
- ☐ Inconel X-750
- ☐ 17-7 Ph/C Stainless
- ☐ 316 Stainless Steel
- ☐ Other: _____



FINISH

- ☐ Black Oxide
- ☐ Phosphate
- ☐ Other: _____



If you don't know, give us some information about the environment:

TEMPERATURE
 _____ ° Maximum ☐ F ☐ C

ATMOSPHERE

- ☐ Corrosive
- ☐ Non-Corrosive



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COMPRESSION - LIGHT DUTY

MANUFACTURER CROSS-REFERENCE

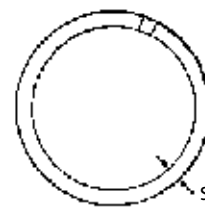
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PAGE 236.

Smalley

C-L

Spirolox

CML



CML

SPRING

	Operates in Bore Dia.	Clears Shaft Dia.	Load	Work Height (Hw)	Free Height (H)	Number of Turns	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Rate
CML-06203	5/8"	.450	6	.055	.160	3	2-1/2	.010	.058	48
-06204				.068	.210	4				35
-06205				.085	.260	5				28
-06206				.106	.320	6				24
-06207				.128	.370	7				21
-06209				.165	.480	9				16
-06211				.202	.590	11				13
-06213				.238	.690	13				11
-07503	3/4"	.550	7	.142	.220	3		.008	.071	65
-07504				.187	.290	4				48
-07505				.246	.370	5				41
-07506				.285	.440	6				33
-07507				.348	.520	7				30
-07509				.446	.670	9				23
-07512				.580	.880	12				17
-08703	7/8"	.600		.117	.190	3				90
-08704				.158	.250	4				69
-08705				.207	.320	5				57
-08706				.242	.380	6				47
-08707				.287	.450	7				41
-08709				.378	.590	9				32
-08712				.498	.780	12				24
-10003	1"	.730	12	.084	.190	3	3-1/2	.010	.086	72
-10004				.108	.260	4				53
-10005				.145	.330	5				44
-10006				.165	.390	6				36
-10007				.201	.470	7				31
-10009				.258	.600	9				24
-10012				.342	.800	12				18
-10015				.445	1.010	15				15
-10018	1-1/8"	.850		.519	1.200	18				12
-10021				.633	1.430	21				11
-10024				.710	1.620	24				9
-11203				.146	.240	3		.012	.094	78
-11204				.186	.320	4				56
-11205				.250	.410	5				48
-11206				.295	.490	6				39
-11207				.344	.570	7				34
CML-11208				.392	.650	8				29

SPECIFY CARBON STEEL OR STAINLESS STEEL "-SS."

CONTACT PLANT FOR PRICING.

CML

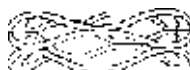
DESCRIPTION

Compact size, low operating height, and precise design yield superior product benefits versus round wire springs.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm end style.



Standard (CML)



Shimmed (CMLS)

2. Find part in the charts based on radial wall (S), thickness (T), and heights (H and Hw).

GENERAL USE



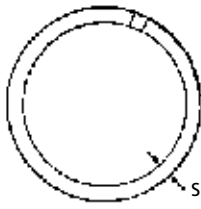
WEIRD



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COMPRESSION - LIGHT DUTY
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Smalley

C-L

Spirolox

CML


CML
SPRING

CML	Operates in Bore Dia.	Clears Shaft Dia.	Load	Work Height (Hw)	Free Height (H)	Number of Turns	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Rate		
CML-11210	1-1/8"	.850	12	.488	.810	10	3-1/2	.012	.094	23		
-11213				.659	1.080	13				19		
-11216				.807	1.330	16				15		
-11220				1.017	1.670	20				12		
-12503	.084	.230		3	56							
-12504	1-1/4"	1.000		.113	.310	4				42		
-12505				.149	.400	5				34		
-12506				.172	.460	6				28		
-12507				.207	.550	7				24		
-12508				.227	.620	8				21		
-12510				.301	.790	10				17		
-12513				.395	1.030	13				13		
-12516				.467	1.250	16				11		
-12520				.591	1.570	20				9		
-13703	1-3/8"	1.030	15	.075	.250	3		.016	.122	67		
-13704				.099	.330	4				50		
-13705				.129	.420	5				40		
-13706				.155	.510	6				34		
-13707				.179	.590	7				29		
-13708				.206	.680	8				25		
-13710				.256	.840	10				20		
-13713				.341	1.110	13				16		
-13716				.424	1.360	16				13		
-13720				.530	1.710	20				10		
-15003	1-1/2"	1.140		20	.129	.250			3	.016	.133	117
-15004					.164	.320			4			85
-15005					.213	.410			5			70
-15006					.247	.490			6			57
-15007			.301		.580	7			50			
-15008			.337		.660	8			43			
-15010			.430		.830	10			35			
-15013			.565		1.090	13			27			
-15016			.694		1.340	16			22			
-15020			.866		1.670	20			18			
-17503	1-3/4"	1.340	25		.155	.310		3	.018	.143	114	
-17504					.200	.410		4			83	
-17505					.265	.520		5			69	
-17506					.310	.620		6			57	
-17507				.367	.730	7		50				
-17508				.415	.830	8		43				
-17510				.523	1.040	10		34				
-17512				.638	1.260	12		29				
-17514				.737	1.460	14		25				
-17516				.844	1.680	16		22				
-20003	2"	1.600		.094	.340	3		89				
-20004				.120	.450	4		66				
-20005				.158	.570	5		54				
-20006				.179	.680	6		44				
-20007				.217	.800	7		38				
-20008				.243	.910	8		33				
-20010				.306	1.140	10		26				
-20012				.365	1.360	12		22				
-20014				.433	1.590	14		19				
CML-20016				.490	1.820	16				17		

SPECIFY CARBON STEEL OR STAINLESS STEEL "-SS."

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COMPRESSION - MEDIUM DUTY

MANUFACTURER CROSS-REFERENCE

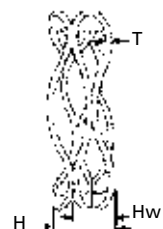
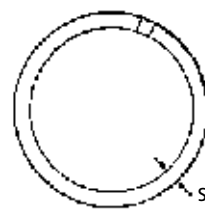
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Smalley

C-M

Spirolox

CMM



CMM

SPRING

CMM	Operates in Bore Dia.	Clears Shaft Dia.	Load	Work Height (Hw)	Free Height (H)	Number of Turns	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Rate	
CMM-06203	5/8"	.450	12	.104	.150	3	3-1/2	.010	.058	158	
-06204				.130	.190	4				109	
-06205				.175	.250	5				96	
-06206				.206	.300	6				78	
-06207				.246	.350	7				69	
-06209				.317	.450	9				54	
-06211				.386	.550	11				44	
-06213				.454	.650	13				37	
-07503	3/4"	.550	13	.159	.220	3			.078	143	
-07504				.203	.290	4				100	
-07505				.270	.380	5				88	
-07506				.314	.440	6				70	
-07507				.381	.520	7				64	
-07509				.489	.670	9				50	
-07512				.649	.900	12				37	
-08703				7/8"	.600	18		.124		.190	3	.012	.094	148
-08704	.164	.250	4					108			
-08705	.214	.320	5					89			
-08706	.252	.380	6					76			
-08707	.296	.450	7					66			
-08709	.385	.580	9					50			
-08712	.509	.770	12					38			
-10003	1"	.730	.087					.190		3	110
-10004			.113	.250	4			82			
-10005			.148	.320	5			67			
-10006			.175	.380	6			55			
-10007			.212	.450	7			49			
-10009			.276	.580	9			38			
-10012			.360	.770	12			28			
-10015			.452	.970	15			23			
-10018	1-1/8"	.850	20	.549	1.170			18	.015	19	
-10021				.650	1.370			21		16	
-10024				.720	1.540			24		14	
-11203				.160	.260			3		143	
-11204				.202	.340			4		101	
-11205				.270	.440			5		87	
-11206				.318	.520			6		71	
-11207				.381	.620			7		63	
CMM-11208				.427	.700		8				54

SPECIFY CARBON STEEL OR STAINLESS STEEL "-SS."

CONTACT PLANT FOR PRICING.

CMM

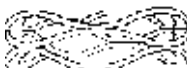
DESCRIPTION

Heavier gauge wire with 2-3 times the spring rate versus CML. Nice compact design, complete with precise design yield characteristics.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm end style.



Standard (CMM)



Shimmed (CMMS)

2. Find part in the charts based on radial wall (S), thickness (T), and heights (H and Hw).

GENERAL USE

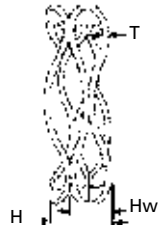
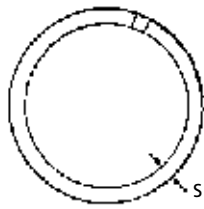


UNCOMMON

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COMPRESSION - MEDIUM DUTY
MANUFACTURER CROSS-REFERENCE

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PAGE 236

Smalley

C-M

Spirolox

CMM


CMM
SPRING

	Operates in Bore Dia.	Clears Shaft Dia.	Load	Work Height (Hw)	Free Height (H)	Number of Turns	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Rate
CMM-11210	1-1/8"	.850	20	.536	.880	10	3-1/2	.015	.094	43
-11213				.708	1.150	13				34
-11216				.861	1.410	16				27
-11220				1.088	1.770	20				22
-12503				.124	.280	3				114
-12504	1-1/4"	1.000	20	.165	.370	4	3-1/2	.015	.094	85
-12505				.215	.470	5				70
-12506				.253	.560	6				58
-12507				.303	.660	7				50
-12508				.341	.750	8				44
-12510				.427	.940	10				35
-12513				.577	1.240	13				28
-12516				.692	1.510	16				22
-12520				.866	1.890	20				18
-13703	1-3/8"	1.030	25	.142	.260	3	3-1/2	.016	.133	158
-13704				.186	.340	4				117
-13705				.240	.430	5				96
-13706				.281	.510	6				78
-13707				.340	.610	7				69
-13708				.384	.690	8				60
-13710				.486	.870	10				49
-13713				.632	1.130	13				37
-13716				.788	1.400	16				31
-13720				.982	1.740	20				25
-15003	1-1/2"	1.140	35	.122	.260	3	4-1/2	.018	.143	197
-15004				.158	.340	4				145
-15005				.206	.430	5				119
-15006				.241	.520	6				97
-15007				.291	.610	7				86
-15008				.324	.690	8				74
-15010				.409	.870	10				59
-15013				.540	1.140	13				46
-15016				.657	1.390	16				37
-15020				.835	1.750	20				30
-17503	1-3/4"	1.340	50	.188	.290	3	4-1/2	.018	.143	267
-17504				.244	.380	4				195
-17505				.315	.480	5				161
-17506				.374	.570	6				133
-17507				.452	.680	7				120
-17508				.505	.770	8				101
-17510				.629	.960	10				81
-17512				.768	1.160	12				68
-17514				.899	1.360	14				59
-17516				1.026	1.550	16				51
-20003	2"	1.600	50	.140	.300	3	3-1/2	.018	.143	213
-20004				.184	.390	4				158
-20005				.245	.510	5				132
-20006				.278	.590	6				106
-20007				.345	.710	7				95
-20008				.395	.810	8				83
-20010				.498	1.020	10				66
-20012				.593	1.220	12				55
-20014				.694	1.430	14				47
CMM-20016				.800	1.640	16				42

SPECIFY CARBON STEEL OR STAINLESS STEEL "-SS."

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COMPRESSION - HEAVY DUTY

MANUFACTURER CROSS-REFERENCE

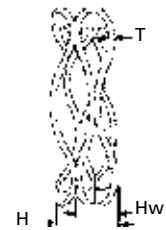
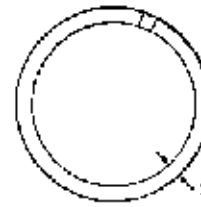
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Smalley

C-H

Spirolox

CMH



CMH

SPRING

CMH	Operates in Bore Dia.	Clears Shaft Dia.	Load	Work Height (Hw)	Free Height (H)	Number of Turns	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Rate	
CMH-07503	3/4"	.550	22	.169	.220	3	3-1/2	.013	.079	272	
-07504				.215	.280	4				186	
-07505				.291	.370	5				175	
-07506				.335	.430	6				133	
-07507				.405	.510	7				124	
-07509				.526	.670	9				98	
-07512				.699	.890	12				73	
-08703				7/8"	.600	25				.166	.220	3	298
-08704	.214	.290	4					210			
-08705	.278	.370	5					180			
-08706	.327	.440	6					145			
-08707	.395	.530	7					133			
-08709	.510	.680	9					104			
-08712	.670	.890	12					78			
-10003	1"	.730	.131					.220	3	210	
-10004			.174	.290	4			157			
-10005			.227	.380	5			132			
-10006			.266	.450	6			107			
-10007			.319	.530	7			95			
-10009			.406	.680	9			73			
-10012			.541	.900	12			54			
-10015			.688	1.140	15			45			
-10018			.813	1.350	18			36			
-10021			.957	1.590	21			32			
-10024			1.083	1.800	24			27			
-11203	1-1/8"	.850	30	.178	.250			3	.018		246
-11204				.229	.330			4			175
-11205				.303	.420			5			152
-11206				.350	.500			6			120
-11207				.421	.590			7			108
-11208				.470	.660			8			91
-11210				.593	.830			10			74
-11213				.787	1.100			13			58
-11216				.956	1.340			16			47
CMH-11220											1.103	1.830	20			38

SPECIFY CARBON STEEL OR STAINLESS STEEL "-SS."

CONTACT PLANT FOR PRICING.

CMH

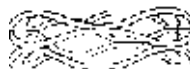
DESCRIPTION

Nearly twice the spring rate of CMM. Nice compact design, complete with precise design yield characteristics.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm end style.



Standard (CMH)



Shimmed (CMHS)

2. Find part in the charts based on radial wall (S), thickness (T), and heights (H and Hw).

GENERAL USE



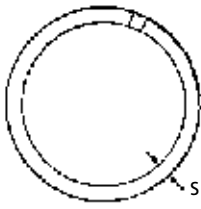
UNCOMMON

GETTING
MORE
POPULAR
ALL THE
TIME!

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COMPRESSION - HEAVY DUTY
MANUFACTURER CROSS-REFERENCE

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PAGE 236

Smalley

C-H

Spirolox

CMH


CMH
SPRING

	Operates in Bore Dia.	Clears Shaft Dia.	Load	Work Height (Hw)	Free Height (H)	Number of Turns	Number of Waves	Thickness (T)	Radial Wall (S)	Spring Rate
CMH-12503	1-1/4"	1.000	30	1.202	1.690	20	3-1/2	.019	.094	210
-12504				.158	.270	3				158
-12505				.210	.350	4				132
-12506				.272	.453	5				107
-12507				.320	.540	6				95
-12508				.384	.640	7				82
-12510				.433	.720	8				65
-12513				.538	.900	10				51
-12516				.717	1.190	13				42
-12520				.878	1.460	16				33
-13703	1-3/8"	1.030	35	.149	.250	3	3-1/2	.018	.133	232
-13704				.189	.330	4				166
-13705				.247	.420	5				138
-13706				.287	.500	6				112
-13707				.343	.590	7				98
-13708				.390	.670	8				85
-13710				.490	.840	10				69
-13713				.646	1.100	13				54
-13716				.793	1.350	16				43
-13720				1.000	1.700	20				35
-15003	1-1/2"	1.140	60	.166	.240	3	4-1/2	.018	.133	448
-15004				.216	.310	4				326
-15005				.278	.400	5				270
-15006				.329	.480	6				221
-15007				.390	.560	7				194
-15008				.443	.640	8				168
-15010				.555	.800	10				135
-15013				.726	1.050	13				105
-15016				.890	1.290	16				85
-15020				1.119	1.610	20				68
-17503	1-3/4"	1.340	90	.232	.300	3	4-1/2	.024	.148	629
-17504				.314	.410	4				484
-17505				.409	.530	5				417
-17506				.482	.630	6				336
-17507				.577	.740	7				307
-17508				.651	.840	8				258
-17510				.813	1.050	10				206
-17512				.980	1.270	12				173
-17514				1.147	1.480	14				149
-17516				1.317	1.700	16				132
-20003	2"	1.600	90	.197	.310	3	3-1/2	.024	.148	506
-20004				.258	.410	4				372
-20005				.332	.520	5				307
-20006				.389	.620	6				249
-20007				.465	.730	7				222
-20008				.525	.830	8				189
-20010				.661	1.040	10				153
-20012				.781	1.240	12				125
-20014				.941	1.480	14				111
CMH-20016				1.069	1.680	16				97





















SPECIFY CARBON STEEL OR STAINLESS STEEL "-SS."

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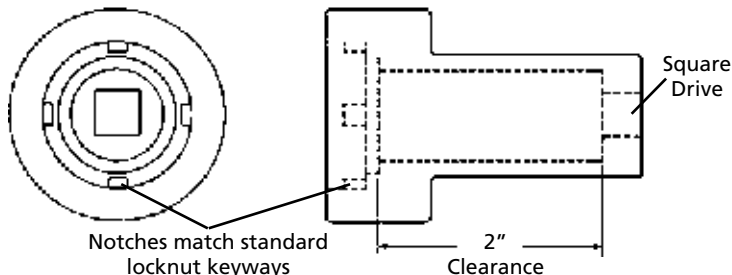
TYPES

	SC	SOLID SHAFT COLLAR	Black Oxide, Zinc Plated, Stainless, or Nylon.		W	STANDARD LOCKWASHER	Most common lockwasher.
		<u>IMPERIAL</u> Pg: 128, 130	<u>METRIC</u> Pg: 218			<u>IMPERIAL</u> Pg: 141	<u>METRIC</u> Pg: 221 (MB)
	SC1	SINGLE SPLIT SHAFT COLLAR	Black Oxide, Stainless, Aluminum, Threaded.		WS	STAINLESS LOCKWASHER	Stainless version of "W" Series.
		<u>IMPERIAL</u> Pg: 129, 131	<u>METRIC</u> N/A			<u>IMPERIAL</u> Pg: 142	<u>METRIC</u> N/A
	SC2	DOUBLE SPLIT SHAFT COLLAR	Black Oxide, Stainless, or Nylon.		WH	HEAVY DUTY LOCKWASHER	Thicker version.
		<u>IMPERIAL</u> Pg: 129-130	<u>METRIC</u> N/A			<u>IMPERIAL</u> Pg: 143	<u>METRIC</u> N/A
	N/AN	STANDARD LOCKNUT	NS - Stainless KM - Metric		WI	FINE THREAD LOCKWASHER	Imperial dimensions.
		<u>IMPERIAL</u> Pg: 132	<u>METRIC</u> Pg: 220 (KM)			<u>IMPERIAL</u> Pg: 144	<u>METRIC</u> N/A
	NH	HEAVY DUTY LOCKNUT	Thicker and more precise.		WT	THIN SECTION LOCKWASHER	Smaller OD than "W" Series.
		<u>IMPERIAL</u> Pg: 133	<u>METRIC</u> N/A			<u>IMPERIAL</u> Pg: 144	<u>METRIC</u> N/A
	NI	FINE THREAD LOCKNUT	All imperial dimensions.		ETR	EXTERNAL TOOTH RETAINER	For light duty bearing retention.
		<u>IMPERIAL</u> Pg: 134	<u>METRIC</u> N/A			<u>IMPERIAL</u> Pg: 145	<u>METRIC</u> N/A
	NL	LEFT HAND LOCKNUT	For high rotational speeds.		SS	SUPPORT WASHER DIN 988	Wide bearing abutment surface.
		<u>IMPERIAL</u> Pg: 135	<u>METRIC</u> N/A			<u>IMPERIAL</u> Pg: 146	<u>METRIC</u> N/A
	NT	THIN SECTION LOCKNUT	Light-weight version.		PS	SHIM RING DIN 988	For taking up slack on shafts.
		<u>IMPERIAL</u> Pg: 136	<u>METRIC</u> N/A			<u>IMPERIAL</u> Pg: 147	<u>METRIC</u> N/A
	30/70	MACHINE KEYS	Also available in stainless.		TW	THRUST WASHER	Equalize load on bearing.
		<u>IMPERIAL</u> Pg: 138-139	<u>METRIC</u> Pg: 219			<u>IMPERIAL</u> Pg: 148	<u>METRIC</u> N/A
	KF	KEYED SHAFTS	Partial keyways also available.		SR	SLITTED SHIM	For taking up slack on shafts.
		<u>IMPERIAL</u> Pg: 140	<u>METRIC</u> Pg: 218			<u>IMPERIAL</u> Pg: 149	<u>METRIC</u> N/A

AUTOMATED INSTALLATION

SHAFT LOCKNUTS

Use assembly sockets coupled with powered drive wrenches to automate locknut assembly.



CONTACT PLANT FOR SOCKET INFORMATION.

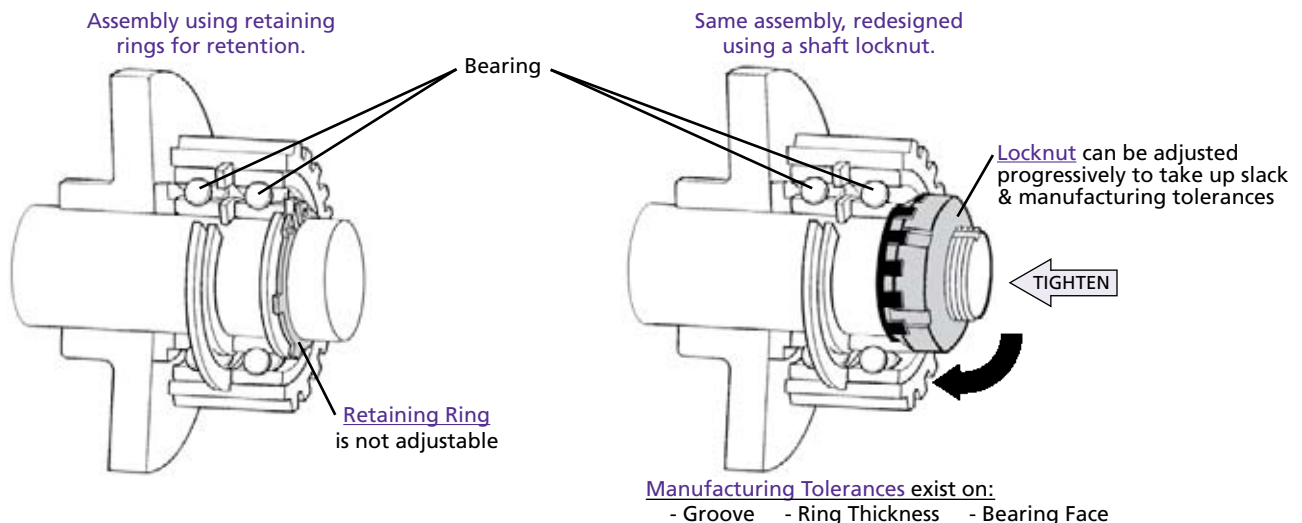
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PRODUCT COMPARISONS

LOCKNUTS "THE VERY BEST IN BEARING RETENTION"

Locknuts were the original and most popular form of bearing retention in the early part of the century. As wire forming technology improved, retaining rings gradually replaced locknuts because of their lower unit cost and reduced manufacturing costs. Locknuts also require more time during assembly.

Retaining rings are less precise and have less holding power than shaft locknuts, so in certain applications, there is still a place for locknuts. Locknuts are manufactured to very close and exacting tolerances, particularly when you consider their heavy duty design. In addition, locknuts are adjustable so that manufacturing tolerances for adjacent components can be compensated for by loosening or tightening the locknut.



The most common causes of bearing failure are poorly fitted parts from the sum total of allowable manufacturing tolerances; shock loading as the components are used; misalignment; and excessive vibration which amplifies these factors. In the example above, proper fit and alignment are very important because two bearings must be assembled properly together. Locknuts possess precision threads and ground faces. The locknut can be torqued correctly against the bearing wall, with perfect alignment from precision threading. The retaining ring design magnifies manufacturing tolerances that exist in groove, shaft, and ring construction. Retaining rings do not allow you to adjust torque. The result is that the ring design introduces several potential causes of bearing failure.

Locknuts are much more expensive; however, if the application requires precision and shock resistance, a designer may elect to use higher cost locknuts that extend bearing life. Examples of these applications are machine tools, medical and technological instruments, and other durable goods exposed to harsh and unstable environments. The next time you are in a machine shop that is still using Bridgeport™ mills from 1942, you'll know why -- shaft locknuts!

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SOLID COLLAR

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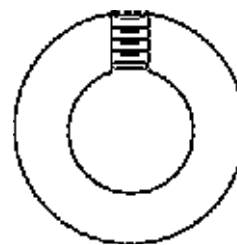
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Am. Collars ASC
Climax C


PART NUMBER CONFIGURATION

Style + Size # + Material Code

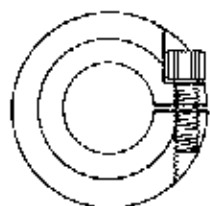
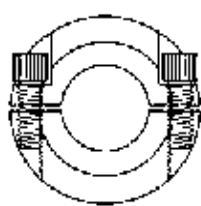
EXAMPLE: For 1/8" zinc shaft collars, ask for SC-0125-ZC.



SC	SHAFT COLLAR DIMENSIONS			WEIGHT Lbs. per Piece	MATERIAL		
	Inside Diameter	Outside Diameter	Thickness (Width)		Black Oxide "-BO"	Zinc Plated "-ZC"	Stainless "-SS"
SC-0125	1/8"	3/8"	1/4"	.0063			
-0187	3/16"	7/16"		.0125			
-0250	1/4"	1/2"	5/16"	.0125			
-0312	5/16"	5/8"		.0188			
-0375	3/8"	3/4"	3/8"	.0313			
-0437	7/16"	7/8"		.0500			
-0500	1/2"	1"	7/16"	.0688			
-0562	9/16"			.0625			
-0625	5/8"	1-1/8"	1/2"	.0938			
-0687	11/16"	1-1/4"		.1250			
-0750	3/4"		9/16"	.1188			
-0812	13/16"	1-5/16"		.1313			
-0875	7/8"	1-1/2"		.1500			
-0937	15/16"	1-5/8"		.2063			
-1000	1"			.2313			
-1062	1-1/16"	1-3/4"	5/8"	.2500			
-1125	1-1/8"			.2438			
-1187	1-3/16"	2"	11/16"	.3750			
-1250	1-1/4"			.3625			
-1312	1-5/16"	2-1/8"		.4063			
-1375	1-3/8"		3/4"	.4063			
-1437	1-7/16"	2-1/4"		.4750			
-1500	1-1/2"			.4625			
-1562	1-9/16"	2-1/2"	13/16"	.6563			
-1625	1-5/8"			.6500			
-1687	1-11/16"			.6313			
-1750	1-3/4"	2-3/4"	7/8"	.8500			
-1812	1-13/16"			.8000			
-1875	1-7/8"			.7813			
-1937	1-15/16"	3"		1.0250			
-2000	2"			1.0000			
-2125	2-1/8"			1.0000			
-2187	2-3/16"	3-1/4"	15/16"	1.1250			
-2250	2-1/4"			1.1250			
-2312	2-5/16"			1.0625			
-2375	2-3/8"			1.3750			
-2437	2-7/16"	3-1/2"	1"	1.3125			
-2500	2-1/2"			1.2500			
-2562	2-9/16"	3-3/4"		1.8750			
-2625	2-5/8"			2.2500			
-2687	2-11/16"	4"	1-1/8"	2.1875			
-2750	2-3/4"			2.1250			
-2875	2-7/8"			2.3750			
-2937	2-15/16"	4-1/4"		2.3125			
-3000	3"			2.2500			
-3187	3-3/16"			2.1875			
SC-3437	3-7/16"	4-1/2"		2.7500			

SC	DESCRIPTION	GENERAL USE
	Standard-style ("SC") shaft collars use a hardened set screw to penetrate the shaft so as to achieve grip. This penetration yields light-duty benefits for applications like thrust collars, arbor spacers, sprocket hubs, bearing holders, and shaft protectors. SC collars do not work well when the shaft is harder than the set screw or when penetration marks on the shaft are not desirable. Black oxide coating will slightly increase friction and holding power in some applications.	 COMMON

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**SC1****SC2****SPLIT COLLAR****MANUFACTURER CROSS-REFERENCE**INDEX
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Am. Collars ASP

Climax 1C/2C

PART NUMBER CONFIGURATION**Style + Size # + Material Code**


EXAMPLE: For 1/8" stainless double split collars, ask for SC2-0125-SS.



SC1 SC2	SHAFT COLLAR DIMENSIONS			WEIGHT Lbs. per Piece	SINGLE SPLIT		WEIGHT Lbs. per Piece	DOUBLE SPLIT	
	Inside Diameter	Outside Diameter	Thickness (Width)		MATERIAL			MATERIAL	
					Black Oxide "-BO"	Stainless "-SS"		Black Oxide "-BO"	Stainless "-SS"
-0125*	1/8"	5/8"	5/16"	0.0188			0.0269		
-0187*	3/16"			0.0188			0.0244		
-0250*	1/4"			0.0188			0.0238		
-0312	5/16"	11/16"	3/8"	0.0313			0.0213		
-0375	3/8"	7/8"		0.0500			0.0444		
-0437	7/16"	15/16"		0.0500			0.0475		
-0500	1/2"	1-1/8"	13/32"	0.0813			0.0788		
-0562	9/16"	1-5/16"	7/16"	0.1313			0.1250		
-0625	5/8"	1-1/2"	1/2"	0.1188			0.1125		
-0687	11/16"			0.1813	0.1750				
-0750	3/4"			0.1813	0.1625				
-0812	13/16"	1-5/8"		0.2000			0.1938		
-0875	7/8"	0.2000		0.1769					
-0937	15/16"	1-3/4"		0.2125			0.2125		
-1000	1"	1-7/8"		0.2000			0.1938		
-1062	1-1/16"			0.2375			0.2294		
-1125	1-1/8"			0.2375			0.2188		
-1187	1-3/16"	2-1/16"		0.2313			0.2813		
-1250	1-1/4"	0.2688		0.2638					
-1312	1-5/16"	2-1/4"		9/16"			0.3688			0.3688
-1375	1-3/8"		0.3688		0.3563				
-1437	1-7/16"		0.3500		0.3269				
-1500	1-1/2"	2-3/8"		0.4000			0.3788		
-1562	1-9/16"	0.4000		0.3506					
-1625	1-5/8"	2-5/8"		0.5819					
-1687	1-11/16"	2-3/4"	11/16"	0.6688			0.6163		
-1750	1-3/4"	3"		0.6688			0.6875		
-1875**	1-7/8"			0.7000			0.6538		
-1937	1-15/16"		0.7000	0.7231					
-2000	2"	3-1/4"	3/4"	0.7313			0.6875		
-2125	2-1/8"			0.9375			0.9375		
-2187	2-3/16"			0.8688			0.8750		
-2250	2-1/4"	3-1/2"		0.8375			0.8188		
-2375	2-3/8"			1.0125			0.9500		
-2437	2-7/16"			0.9813			0.9563		
-2500	2-1/2"	3-3/4"	7/8"	1.5188			1.3938		
-2625	2-5/8"	3-7/8"		1.6125			1.5000		
-2687	2-11/16"	4"		1.6500			1.5625		
-2750	2-3/4"		1.6625	1.5000					
-2875	2-7/8"		4-1/4"	1.8500	1.8125				
-2937	2-15/16"	1.7688		1.6563					
-3000	3"	1.7125		1.6125					
-3187	3-3/16"	4-1/2"		1.8250			1.7688		
-3437	3-7/16"	4-3/4"		1.7500			1.9375		

* Stainless Steel sizes 012 through 025 have an 11/16" O.D. (Single and Double split)

** Stainless Steel size 187 has a 2-7/8" O.D. (Double split only)

DESCRIPTION		GENERAL USE
SC1 SC2	Single split collars (SC1) use friction to provide grip on bars and shafts. This method is generally considered to be more sturdy than the set screw design of SC collars.	 COMMON
	Double split collars (SC2) allow installation without disassembling machinery. SC2 collars provide superior grip action.	

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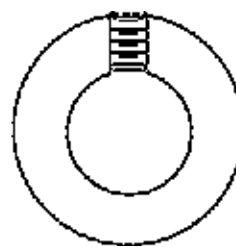
NYLON SOLID COLLAR

MANUFACTURER CROSS-REFERENCE

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Boston Gear

NSC



SC	SHAFT COLLAR DIMENSIONS			MATERIAL
	Inside Diameter	Outside Diameter	Thickness (Width)	
SC-0250	1/4	1/2	5/16	Nylon "-NY"
-0312	5/16	5/8		
-0375	3/8	3/4	3/8	
-0437	7/16	7/8	7/16	
-0500	1/2	1		
-0562	9/16	1		
-0625	5/8	1-1/8		
-0750	3/4	1-1/4	1/2	
-0875	7/8	1-1/2	9/16	
-1000	1	1-5/8	5/8	
-1187	1-3/16	2		
-1250	1-1/4	2		
SC-1375	1-3/8	2-1/8	3/4	

SC	SHAFT COLLAR DIMENSIONS			MATERIAL
	Inside Diameter	Outside Diameter	Thickness (Width)	Nylon "NY"
SC-1437	1-7/16	2-1/4	3/4	
-1500	1-1/2	2-1/4		
-1625	1-5/8	2-1/2	13/16	
-1750	1-3/4	2-5/8	7/8	
-1875	1-7/8	2-3/4		
-1937	1-15/16	3		
-2000	2	3		
-2187	2-3/16	3-1/4	15/16	
-2250	2-1/4	3-1/4		
-2437	2-7/16	3-1/2	1	
-2500	2-1/2	3-1/2		
SC-2750	2-3/4	4	1-1/8	



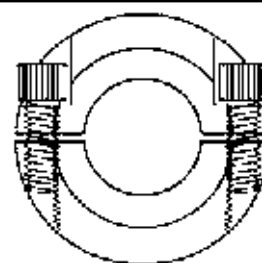
NYLON DOUBLE SPLIT COLLAR

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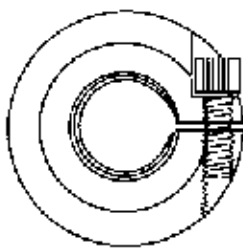
2NSC



SC2	SHAFT COLLAR DIMENSIONS			MATERIAL
	Inside Diameter	Outside Diameter	Thickness (Width)	Nylon "-NY"
SC2-0250	1/4	1	3/8	
-0312	5/16	1		
-0375	3/8	1-1/4	1/2	
-0437	7/16	1-1/4		
-0500	1/2	1-3/8	9/16	
-0562	9/16	1-3/8		
-0625	5/8	1-5/8	5/8	
-0750	3/4	1-3/4		
-0875	7/8	2	3/4	
-1000	1	2-1/8		
-1187	1-3/16	2-5/16		
-1250	1-1/4	2-3/8		
SC2-1375	1-3/8	2-1/2		

SC2	SHAFT COLLAR DIMENSIONS			MATERIAL
	Inside Diameter	Outside Diameter	Thickness (Width)	
SC2-1437	1-7/16	2-5/8	3/4	Nylon "-NY"
-1500	1-1/2	2-5/8	15/16	
-1625	1-5/8	3		
-1750	1-3/4	3-1/8		
-1875	1-7/8	3-1/4		
-1937	1-15/16	3-1/4		
-2000	2	3-3/8		
-2187	2-3/16	3-5/8		
-2250	2-1/4	3-5/8		
-2437	2-7/16	4-1/8	1-1/8	
-2500	2-1/2	4-1/8		
-2750	2-3/4	4-3/8		
SC2-3000	3	4-1/2		

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**SPLIT THREADED COLLAR****MANUFACTURER CROSS-REFERENCE**INDEX
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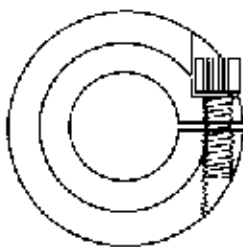
CSC

Climax

ISTC



SCT	SHAFT COLLAR DIMENSIONS			WEIGHT	MATERIAL	
	Inside Diameter	Outside Diameter	Thickness	Lbs. per 100 Pieces	Black Oxide "-BO"	Stainless "-SS"
SCT1-0010-32	10-32	5/8	5/16	-		
-0250-20	1/4-20	11/16		0.0250		
-0250-28	1/4-28			0.0256		
-0312-18	5/16-18			0.0250		
-0312-24	5/16-24		0.0250			
-0375-16	3/8-16	7/8	3/8	0.0031		
-0375-24	3/8-24			0.0029		
-0500-13	1/2-13	1-1/8	13/32	0.0055		
-0500-20	1/2-20			0.0055		
-0625-11	5/8-11	1-5/16	7/16	-		
-0625-18	5/8-18			0.0078		
-0750-10	3/4-10			0.0113		
-0750-16	3/4-16	1-1/2	1/2	0.0109		
-0875-09	7/8-9			0.2000		
-0875-14	7/8-14			0.1950		
-1000-08	1-8	1-3/4		0.2150		
-1000-14	1-14			0.2188		
-1125-12	1-1/8-12			0.2375		
-1250-07	1-1/4-7	2-1/16	9/16	0.2938		
-1250-12	1-1/4-12			0.2875		
-1375-12	1-3/8-12	2-1/4	1/2	-		
-1500-06	1-1/2-6	2-3/8	1/2	0.4188		
-1500-12	1-1/2-12	2-1/2	1/2	0.4125		
SCT1-2000-12	2-12	3	11/16	0.7375		

**ALUMINUM SPLIT COLLAR****MANUFACTURER CROSS-REFERENCE**INDEX
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Boston Gear

CAS

Climax

H1C



SC1	SHAFT COLLAR DIMENSIONS			WEIGHT Lbs. per 100 Pieces	MATERIAL Aluminum "-AL"	SC1	SHAFT COLLAR DIMENSIONS			WEIGHT Lbs. per 100 Pieces	MATERIAL Aluminum "-AL"
	<i>Inside Dia.</i>	<i>Outside Dia.</i>	<i>Thickness (Width)</i>				<i>Inside Dia.</i>	<i>Outside Dia.</i>	<i>Thickness (Width)</i>		
SC1-0125	1/8	1/2	1/4	-		SC1-1500	1-1/2	2-3/8	9/16	0.3938	
-0187	3/16	5/8	5/16	-		-1625	1-5/8	2-5/8	11/16	-	
-0250	1/4	11/16		0.0250		-1750	1-3/4	2-3/4		0.6375	
-0312	5/16	11/16		0.0225		-1875	1-7/8	2-7/8		0.6813	
-0375	3/8	7/8		0.0438		-2000	2	3		0.7250	
-0500	1/2	1-1/8	13/32	0.0813		-2125	2-1/8	3-1/4	3/4	-	
-0625	5/8	1-5/16	7/16	0.1125		-2250	2-1/4	3-1/4		-	
-0750	3/4	1-1/2		0.1688		-2375	2-3/8	3-1/2		-	
-0875	7/8	1-5/8		0.1850		-2500	2-1/2	3-3/4		-	
-1000	1	1-3/4	1/2	0.2063		-2625	2-5/8	3-7/8	7/8	-	
-1125	1-1/8	1-7/8		-		-2750	2-3/4	4		-	
-1250	1-1/4	2-1/16		0.2750		-2875	2-7/8	4-1/4		-	
SC1-1375	1-3/8	2-1/4		-		SC1-3000	3	4-1/4		-	

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AVAILABLE IN STAINLESS STEEL

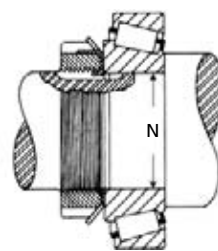
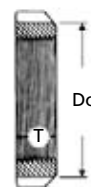
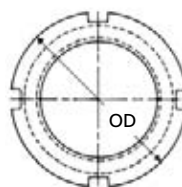


STANDARD

MANUFACTURER CROSS-REFERENCE

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Standard Locknut	N/AN
Whittet-Higgins	N/AN



N AN	BORE		LOCKNUT DIMENSIONS					WEIGHT Lbs. per 100 Pieces	MATERIAL		Mating Lockwasher
	Bearing Bore Nominal (N) Decimal	(N) MM	Threads per Inch	Outside Dia. (OD) +.005/-015	Thickness (T) Min. Max.		Nut Face Diameter (Dc) Min. Max.		Low Carbon	Stainless (NS-)	
N-00	.3937	10	32	3/4	.209	.229	.605	.625	1.2500		W-00
-01	.4724	12		7/8	.303	.323	.699	.719	3.1250		-01
-02	.5906	15		1	.303	.323	.793	.813	3.7500		-02
-03	.6693	17		1-1/8	.334	.354	.918	.938	5.6250		-03
-04	.7874	20		1-3/8	.365	.385	1.105	1.125	8.7500		-04
-05	.9843	25		1-9/16	.396	.416	1.261	1.281	11.2500		-05
-06	1.1811	30	18	1-3/4	.396	.416	1.480	1.500	13.7500		W-06
-065	1.3125	33-1/3		2-1/16	.428	.448	1.793	1.813	22.5000		WH-065
-07	1.3780	35		2-1/16	.428	.448	1.793	1.813	20.0000		W-07
-08	1.5748	40		2-1/4	.428	.448	1.980	2.000	23.1250		-08
-09	1.7717	45		2-17/32	.428	.448	2.261	2.281	28.7500		-09
-10	1.9685	50		2-11/16	.490	.510	2.418	2.438	33.7500		-10
-11	2.1654	55		2-31/32	.490	.510	2.636	2.656	41.2500		-11
-12	2.3622	60		3-5/32	.521	.541	2.824	2.844	46.8750		-12
-13	2.5591	65		3-3/8	.553	.573	3.043	3.063	53.7500		-13
N-14	2.7559	70		3-5/8	.553	.573	3.283	3.313	62.5000		-14
AN-15	2.9528	75	12	3-7/8	.584	.604	3.533	3.563	77.5000		-15
-16	3.1496	80		4-5/32	.584	.604	3.814	3.844	92.5000		-16
-17	3.3465	85		4-13/32	.615	.635	4.001	4.031	105.0000		-17
-18	3.5433	90		4-21/32	.678	.698	4.251	4.281	130.0000		-18
-19	3.7402	95		4-15/16	.709	.729	4.533	4.563	155.0000		-19
-20	3.9370	100		5-3/16	.735	.760	4.783	4.813	181.2500		-20
-21	4.1339	105		5-7/16	.735	.760	4.970	5.000	190.0000		-21
-22	4.3307	110		5-23/32	.766	.791	5.251	5.281	223.7500		-22
-24	4.7244	120		6-1/8	.798	.823	5.658	5.688	260.0000		-24
-26	5.1181	130		6-3/4	.860	.885	6.158	6.188	350.0000		-26
-28	5.5118	140	8	7-3/32	.923	.948	6.501	6.531	387.5000		-28
-30	5.9055	150		7-11/16	.954	.979	7.033	7.063	487.5000		-30
-32	6.2992	160		8-1/16	1.016	1.041	7.398	7.438	550.0000		-32
-34	6.6929	170		8-21/32	1.048	1.073	7.991	8.031	687.5000		-34
-36	7.0866	180		9-1/16	1.079	1.104	8.335	8.375	725.0000		-36
-38	7.4803	190		9-15/32	1.110	1.135	8.741	8.781	787.5000		-38
AN-40	7.8740	200		9-27/32	1.173	1.198	9.116	9.156	868.7500		-40
N-44	8.6614	220		11	1.230	1.260	9.803	9.841	1175.0000		W-44

MATING LOCKWASHER DESCRIPTIONS ON PAGE 141

N AN	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	REQUIRES A KEYWAY. LET OUR SHOP CUT IT FOR YOU!
	<p>Most commonly used locknuts. Require a lockwasher and keyway in the shaft. "AN" series were for an old specification (11 threads per inch) and should be avoided.</p> <p>AXIAL ASSEMBLY</p>	<ol style="list-style-type: none"> 1. Confirm the outside diameter (OD) of the part. 2. Measure the thickness (T) of the part. 3. Verify the nut face diameter (Dc). 4. Find the part in the chart above. 	<p>COMMON</p>	
<p>FOR TAPERED ROLLER BEARINGS IT IS BEST TO USE OUR HIGHER PRECISION "PN" SERIES (SEE PAGE 137).</p>				

SEE PAGE 140.



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HEAVY DUTY
MANUFACTURER CROSS-REFERENCE

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PAGE 236.


 Standard Locknut
Whittet-Higgins

 NHE
NH


NH	BORE		LOCKNUT DIMENSIONS						WEIGHT	MATERIAL	
	Bearing Bore		Threads per Inch	Outside Dia. (OD) +.005/- .015	Thickness (T)		Nut Face Diameter (Dc)		Lbs. per 100 Pieces	Low Carbon	Mating Lockwasher
	Nominal (N)						Min.	Max.				Min.	Max.
	Decimal	MM									
NH-08	1.5748	40	18	2-1/4	.5525	.5725	1.980	2.000	30.0000		WH-08
-09	1.7717	45		2-17/32	.5525	.5725	2.261	2.281	37.5000		-09
-10	1.9685	50		2-11/16	.6150	.6350	2.418	2.438	42.5000		-10
-11	2.1654	55		2-31/32	.6150	.6350	2.636	2.656	52.5000		-11
-12	2.3622	60		3-5/32	.6462	.6663	2.824	2.844	57.5000		-12
-13	2.5591	65		3-3/8	.7087	.7287	3.043	3.063	72.5000		-13
-14	2.7559	70		3-5/8	.7087	.7287	3.283	3.313	82.5000		-14
-15	2.9528	75	12	3-7/8	.7400	.7600	3.533	3.563	100.0000		-15
-16	3.1496	80		4-5/32	.7400	.7600	3.814	3.844	117.5000		-16
-17	3.3465	85		4-13/32	.7712	.7913	4.001	4.031	135.0000		-17
-18	3.5433	90		4-21/32	.8650	.8850	4.251	4.281	175.0000		-18
-19	3.7402	95		4-15/16	.8962	.9163	4.533	4.563	200.0000		-19
-20	3.9370	100		5-3/16	.9275	.9475	4.783	4.813	237.5000		-20
-21	4.1339	105		5-7/16	.9275	.9475	4.970	5.000	250.0000		-21
-22	4.3307	110	8	5-23/32	.9587	.9788	5.251	5.281	287.5000		-22
-24	4.7244	120		6-1/8	1.0212	1.0413	5.658	5.688	337.5000		-24
-26	5.1181	130		6-3/4	1.0837	1.1038	6.158	6.188	437.5000		-26
-28	5.5118	140		7-3/32	1.1775	1.1975	6.501	6.531	500.0000		-28
-30	5.9055	150		7-11/16	1.2400	1.2600	7.033	7.063	637.5000		-30
-32	6.2992	160		8-1/16	1.2712	1.2913	7.398	7.438	693.7500		-32
-34	6.6929	170		8-21/32	1.3337	1.3538	7.991	8.031	881.2500		-34
-36	7.0866	180		9-1/16	1.3962	1.4163	8.335	8.375	956.8750		-36
-38	7.4803	190		9-15/32	1.3962	1.4163	8.741	8.781	1000.0000		-38
NH-40	7.8740	200		9-27/32	1.4900	1.5100	9.116	9.156	1125.0000		WH-40

MATING LOCKWASHER DESCRIPTIONS ON PAGE 143.

MATING LOCKWASHER DESCRIPTIONS ON PAGE 143.

NH	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	EXTREMELY PRECISE RUNOUT AND PARALLELISM ON THE SURFACES.
	Designed with greater thread length for greater strength. Tighter tolerances make this a common part for tapered roller bearings.	<ol style="list-style-type: none">1. Confirm the outside diameter (OD) of the part.2. Measure the thickness (T) of the part.3. Verify the nut face diameter (Dc).4. Find the part in the chart above.	 COMMON	
	THE OBSOLETE NE SERIES (11 THREADS PER INCH) IS AVAILABLE AS A SPECIAL ORDER FOR FIELD REPLACEMENT AND REPAIR APPLICATIONS.			
AXIAL ASSEMBLY				

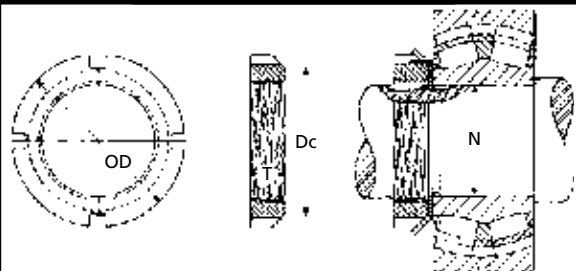

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FRACTIONAL INCH BORES



FINE THREAD

MANUFACTURER CROSS-REFERENCE

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Standard Locknut	NIN	
Whittet-Higgins	NI	

NI	BORE		LOCKNUT DIMENSIONS						WEIGHT	MATERIAL	
	Bearing Bore Nominal (N)		Threads per Inch	Outside Dia. (OD) +.005/- .015	Thickness (T)		Nut Face Diameter (Dc)		Lbs. per 100 Pieces		
	Decimal	Fraction			Min.	Max.	Min.	Max.			
NI-01	.750	3/4	16	1-1/2	.365	.385	1.168	1.188	11.2500	Spring Steel	WI-01
-02	.875	7/8		1-5/8			1.293	1.313	12.5000		-02
-03	1.000	1		1-3/4			1.418	1.438	13.7500		-03
-04	1.125	1-1/8		1-7/8			1.543	1.563	15.6250		-04
-05	1.250	1-1/4		2	.490	.510	1.668	1.688	23.7500		-05
-06	1.375	1-3/8		2-1/4			1.918	1.938	31.2500		-06
-07	1.500	1-1/2		2-1/4			1.918	1.938	26.8750		-07
-08	1.625	1-5/8		2-1/2			2.168	2.188	35.0000		-08
-09	1.750	1-3/4		2-5/8			2.293	2.313	38.1250		-09
-10	1.875	1-7/8		2-3/4			2.418	2.438	40.0000		-10
-11	2.000	2		3	.615	.635	2.668	2.688	48.7500		-11
-12	2.250	2-1/4		3-1/4			2.855	2.875	68.1250		-12
-13	2.500	2-1/2		3-1/2			3.105	3.125	75.0000		-13
NI-14	2.750	2-3/4		3-3/4			3.345	3.375	80.6250		WI-14

MATING LOCKWASHER DESCRIPTIONS ON PAGE 144

NI	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	REQUIRES A KEYWAY.
	AXIAL ASSEMBLY		UNCOMMON	
	Used by manufacturers who prefer not to use SAE-AFBMA metric modified series. These babies are "all English." Dimensions are based on the good king's foot.	<ol style="list-style-type: none"> 1. Confirm the outside diameter (OD) of the part. 2. Measure the thickness (T) of the part. 3. Verify the nut face diameter (Dc). 4. Find the part in the chart above, which is based entirely on an old king's foot. 		<p>LET OUR SHOP CUT IT FOR YOU!</p>

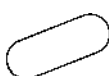
SEE PAGE 140.



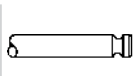
WE HAVE A COMPLETE MACHINE SHOP



STAMPING



CUTTING



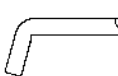
TURNING



HARD
CHROME



LASER



BENDING



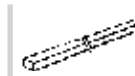
CENTERLESS
GRINDING



THREADING



MILLING



GRINDING

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LEFT-HAND THREAD
MANUFACTURER CROSS-REFERENCE

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PAGE 236

Standard Locknut

NL



Whittet-Higgins

NL



NL	BORE		Threads per Inch	LOCKNUT DIMENSIONS				WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	Mating Lockwasher
	Bearing Bore Nominal (N) Decimal	MM		Outside Dia. (OD) +.005/- .015	Thickness (T)		Nut Face Diameter (Dc)			
					Min.	Max.	Min.	Max.		
NL-00	.3937	10	32	3/4	.209	.229	.605	.625	1.8750	W-00
-01	.4724	12		7/8	.303	.323	.699	.719	3.1250	-01
-02	.5906	15		1	.303	.323	.793	.813	3.7500	-02
-03	.6693	17		1-1/8	.334	.354	.918	.938	5.6250	-03
-04	.7874	20		1-3/8	.365	.385	1.105	1.125	8.7500	-04
-05	.9843	25		1-9/16	.396	.416	1.261	1.281	11.2500	-05
-06	1.1811	30	18	1-3/4	.396	.416	1.480	1.500	13.1250	-06
-07	1.3780	35		2-1/16	.428	.448	1.793	1.813	20.6250	-07
-08	1.5748	40		2-1/4	.428	.448	1.980	2.000	22.5000	-08
-09	1.7717	45		2-17/32	.428	.448	2.261	2.281	28.7500	-09
-10	1.9685	50		2-11/16	.490	.510	2.418	2.438	33.7500	-10
-11	2.1654	55		2-31/32	.490	.510	2.636	2.656	41.2500	-11
-12	2.3622	60	12	3-5/32	.521	.541	2.824	2.844	46.2500	-12
-13	2.5591	65		3-3/8	.553	.573	3.043	3.063	55.0000	-13
-14	2.7559	70		3-5/8	.553	.573	3.283	3.313	62.5000	-14
-15	2.9528	75		3-7/8	.584	.604	3.533	3.563	77.5000	-15
-16	3.1496	80		4-5/32	.584	.604	3.814	3.844	90.0000	-16
-17	3.3465	85		4-13/32	.615	.635	4.001	4.031	103.7500	-17
-18	3.5433	90		4-21/32	.678	.698	4.251	4.281	133.7500	-18
-19	3.7402	95		4-15/16	.709	.729	4.533	4.563	153.7500	-19
-20	3.9370	100		5-3/16	.735	.760	4.783	4.813	177.5000	-20
-21	4.1339	105		5-7/16	.735	.760	4.970	5.000	192.5000	-21
NL-22	4.3307	110		5-23/32	.766	.791	5.251	5.281	226.2500	W-22

MATING LOCKWASHER DESCRIPTIONS ON PAGE 141

NL	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	USED IN RACING VEHICLES AND EQUIPMENT DRIVES.
	AXIAL ASSEMBLY			
	Left-hand threads for high rotational speeds or as an opposite to a standard right-hand part for ease in tightening and loosening.	1. Confirm the outside diameter (OD) of the part. 2. Measure the thickness (T) of the part. 3. Verify the nut face diameter (Dc). 4. Find the part in the chart above.	 UNCOMMON	


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 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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LIGHTWEIGHT

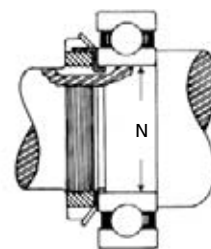
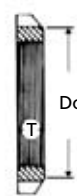
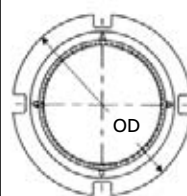


THIN SECTION

MANUFACTURER CROSS-REFERENCE

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Standard Locknut	NTH
Whittet-Higgins	NT



NT	BORE		LOCKNUT DIMENSIONS						WEIGHT	MATERIAL	
	Bearing Bore		Threads per Inch	Outside Dia. (OD) +.005/-0.015	Thickness (T)		Nut Face Diameter (Dc)		Lbs. per 100 Pieces		
	Nominal (N) Decimal	MM			Min.	Max.	Min.	Max.			
NT-00	.3937	10	32	23/32	.178	.198	.511	.531	1.2500	Low Carbon	WT-00
-01	.4724	12		13/16			.605	.625	1.8750		-01
-02	.5906	15		15/16			.730	.750	1.8750		-02
-03	.6693	17		1-1/16	.855	.875	3.1250	-03			
-04	.7874	20		1-3/16	.980	1.000	3.7500	-04			
-05	.9843	25		1-3/8	1.168	1.188	4.3750	-05			
-06	1.1811	30	18	1-11/16	.240	.260	1.418	1.438	6.2500		-06
-07	1.3780	35		1-29/32			1.636	1.656	8.7500		-07
-08	1.5748	40		2-3/32			1.824	1.844	10.0000		-08
-09	1.7717	45		2-5/16	2.042	2.062	11.8750	-09			
-10	1.9685	50		2-1/2	2.230	2.250	14.3750	-10			
-11	2.1654	55		2-3/4	.302	.322	2.480	2.500	18.1250		-11
-12	2.3622	60	12	2-15/16	.334	.354	2.668	2.688	18.7500		-12
-13	2.5591	65		3-1/8			2.855	2.875	22.5000		-13
-14	2.7559	70		3-11/32			3.074	3.094	24.3750		-14
-15	2.9528	75		3-11/16	3.355	3.375	32.5000	-15			
-16	3.1496	80		3-29/32	3.574	3.594	40.0000	-16			
-17	3.3465	85		4-1/8	.365	.385	3.792	3.812	43.7500		-17
NT-18	3.5433	90		4-5/16			3.980	4.000	45.0000	WT-18	

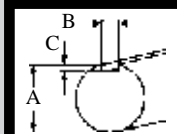
MATING LOCKWASHER DESCRIPTIONS ON PAGE 140.

NT	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	REQUIRES A KEYWAY. LET OUR SHOP CUT IT FOR YOU!
	Provides necessary holding power in less space. Smaller OD and 50-75% less thickness result in dramatic weight reduction. Used in aircraft, electronics, and machine tools with small bearings. AXIAL ASSEMBLY	1. Confirm the outside diameter (OD) of the part. 2. Measure the thickness (T) of the part. 3. Verify the nut face diameter (Dc). 4. Find the part in the chart above.	 UNCOMMON	

SEE PAGE 140.



KEYED SHAFTS SPECIAL ORDERS GUIDE



**To Order,
We Need
To Know:**



Diameter
"A"



Keyway
Size
"B" x "C"



Keyway
Length



Overall
Length




















Material

PARTIAL KEYWAYS AVAILABLE. WE CAN CUT KEYWAYS UP TO 12 FEET LONG.






KEYED SHAFTS LISTED ON PAGE 140.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

**SPECIAL ORDER****SPECIAL ORDER**

BASE TYPE		HIGH PRECISION VERSION		HIGH PRECISION WITH SELF-LOCKING FEATURES	
<i>IN THIS CATALOG</i>		<i>CONTACT PLANT FOR PRICING</i>		<i>CONTACT PLANT FOR PRICING</i>	
N/AN	Standard	PN	STANDARD HIGH PRECISION	BH	STANDARD SELF-LOCKING
	Pg: 132		Better surfaces, closer tolerances, and more locking positions. Fully interchangeable with N and AN series locknuts.		Uses a bone fibre collar with better machine tolerances for self-locking nuts. No keyway or lockwasher needed.
NS	Stainless Steel	PS	STAINLESS HIGH PRECISION	BHSS	STAINLESS SELF-LOCKING
	Pg: 132		Special order only. All stainless steel locknuts are passivated for uncontaminated installation.		303 stainless with nylon insert for self-locking (up to 250°F). Passivated to remove impurities.
NH	Heavy Duty			BHH	HEX WITH NYLON COLLAR
	Pg: 133				Has a hex configuration with a nylon collar. Provides some advantages in automated assembly.
NI	Fine Thread			BHI	FINE THREAD SELF-LOCKING
	Pg: 134				"All new" self-locking version of the NI with all imperial dimensions.
NL	Left-Hand Thread	PL	LEFT-HAND HIGH PRECISION	BHL	LEFT-HAND SELF-LOCKING
	Pg: 135		Fully interchangeable with left-hand threaded NL series. Precision manufacturing assures longer life and extra security.		Bone fibre collar for self-locking eliminates the need for a keyway or lockwasher. Left-hand threads.
NT	Thin Section	PT	THIN SECTION HIGH PRECISION		
	Pg: 136		Super high precision version to replace NT in aircraft, computer, and electronics industries.		
KM	Metric			BM	METRIC SELF-LOCKING
	Pg: 220				Manufactured in accordance with ISO-2982 as an all-metric, self-locking nut.

OTHER TYPES AND STYLES

BHM		HARDENED SELF-LOCKING	Hardened self-locking variation for Government and Military uses (like \$500 toilet seats).
N-000		LIGHTWEIGHT	Lightweight small dimensional series to AFBMA standard for large shafts and adaptor sleeves (up to 37").
MS-172236/259		AERONAUTIC SPECIFICATION	Hardened phosphate coated parts that are subjected to magnetic particle inspection to aeronautical standards.
MS-19068		MILITARY STANDARD	Manufactured of low-carbon steel and inspected using magnetic particle inspection for compliance to Department of Defense MS-19068-001.
ISO-2982		METRIC STANDARD	Metric standard listed in the metric section of this catalog on page 220.


LOCKWASHERS
 Pages 141-144

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SQUARE MACHINE KEY

MANUFACTURER CROSS-REFERENCE

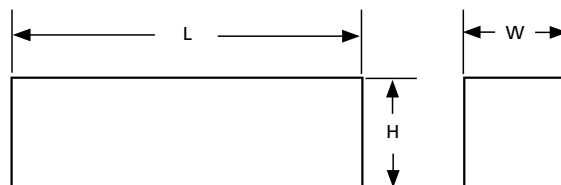
ITW/Bee-Leitzke

501

Stanho

See ANSI B17.1-1967

See also DIN 6885



LENGTH

HEIGHT & WIDTH

↓	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8	7/16	1/2
1/2	•	•	•	•	•	•	•	•	•	•
3/4	•	•	•	•	•	•	•	•	•	•
1	•	•	•	•	•	•	•	•	•	•
1-1/4	•	•	•	•	•	•	•	•	•	•
1-1/2	•	•	•	•	•	•	•	•	•	•
1-3/4	•	•	•	•	•	•	•	•	•	•
2	•	•	•	•	•	•	•	•	•	•
2-1/4	•	•	•	•	•	•	•	•	•	•
2-1/2	•	•	•	•	•	•	•	•	•	•
2-3/4	•	•	•	•	•	•	•	•	•	•
3	•	•	•	•	•	•	•	•	•	•
3-1/4	•	•	•	•	•	•	•	•	•	•
3-1/2	•	•	•	•	•	•	•	•	•	•
3-3/4	•	•	•	•	•	•	•	•	•	•
4	•	•	•	•	•	•	•	•	•	•
4-1/4	---	---	---	---	---	•	•	•	•	•
4-1/2	---	---	---	---	---	•	•	•	•	•
4-3/4	---	---	---	---	---	•	•	•	•	•
5	---	---	---	---	---	•	•	•	•	•
5-1/4	---	---	---	---	---	•	•	•	•	•
5-1/2	---	---	---	---	---	•	•	•	•	•
5-3/4	---	---	---	---	---	•	•	•	•	•
6	---	---	---	---	---	•	•	•	•	•
6-1/4	---	---	---	---	---	---	---	---	---	---
6-1/2	---	---	---	---	---	---	---	---	---	---
6-3/4	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	---	---	---	---
7-1/4	---	---	---	---	---	---	---	---	---	---
7-1/2	---	---	---	---	---	---	---	---	---	---
7-3/4	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---	---	---
8-1/4	---	---	---	---	---	---	---	---	---	---
8-1/2	---	---	---	---	---	---	---	---	---	---
8-3/4	---	---	---	---	---	---	---	---	---	---
9	---	---	---	---	---	---	---	---	---	---
9-1/4	---	---	---	---	---	---	---	---	---	---
9-1/2	---	---	---	---	---	---	---	---	---	---
9-3/4	---	---	---	---	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	---	---

• Indicates a stock item.

MK

DESCRIPTION

Machine keys are used to hold machinery parts in place or align components. They are specifically designed to fail as a safety mechanism to save more expensive components. Standard sizes are ready to use without any cutting or filing.

HOW TO IDENTIFY

1. Determine material by application usage.
2. Measure height (H) and width (W).
3. Verify length (L).
4. Find the part in the chart above.

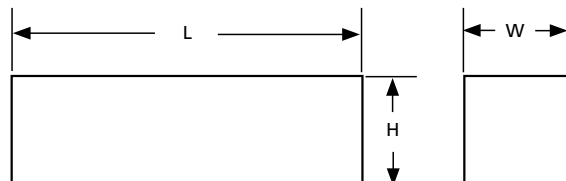
GENERAL USE



COMMON

**AVAILABLE
IN MOST
SIZES WITH
SQUARED,
ROUNDED, OR
CHAMFERED
ENDS. CALL,
E-MAIL, OR
FAX FOR A
QUOTE!**

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

**SQUARE MACHINE KEY****MANUFACTURER CROSS-REFERENCE**

ITW/Bee-Leitzke

501

Stanho

See ANSI B17.1-1967

See also DIN 6885



LENGTH ↓	HEIGHT & WIDTH								
	9/16	5/8	3/4	7/8	1	1-1/4	1-1/2	1-3/4	2
1/2	•	---	---	---	---	---	---	---	---
3/4	•	•	•	---	---	---	---	---	---
1	•	•	•	•	•	---	---	---	---
1-1/4	•	•	•	•	•	•	---	---	---
1-1/2	•	•	•	•	•	•	•	---	---
1-3/4	•	•	•	•	•	•	•	•	---
2	•	•	•	•	•	•	•	•	•
2-1/4	•	•	•	•	•	•	•	•	•
2-1/2	•	•	•	•	•	•	•	•	•
2-3/4	•	•	•	•	•	•	•	•	•
3	•	•	•	•	•	•	•	•	•
3-1/4	•	•	•	•	•	•	•	•	•
3-1/2	•	•	•	•	•	•	•	•	•
3-3/4	•	•	•	•	•	•	•	•	•
4	•	•	•	•	•	•	•	•	•
4-1/4	•	•	•	•	•	•	•	•	•
4-1/2	•	•	•	•	•	•	•	•	•
4-3/4	•	•	•	•	•	•	•	•	•
5	•	•	•	•	•	•	•	•	•
5-1/4	•	•	•	•	•	•	•	•	•
5-1/2	•	•	•	•	•	•	•	•	•
5-3/4	•	•	•	•	•	•	•	•	•
6	•	•	•	•	•	•	•	•	•
6-1/4	---	---	•	•	•	•	•	•	•
6-1/2	---	---	•	•	•	•	•	•	•
6-3/4	---	---	•	•	•	•	•	•	•
7	---	---	•	•	•	•	•	•	•
7-1/4	---	---	•	•	•	•	•	•	•
7-1/2	---	---	•	•	•	•	•	•	•
7-3/4	---	---	•	•	•	•	•	•	•
8	---	---	•	•	•	•	•	•	•
8-1/4	---	---	---	---	•	•	•	•	•
8-1/2	---	---	---	---	•	•	•	•	•
8-3/4	---	---	---	---	•	•	•	•	•
9	---	---	---	---	•	•	•	•	•
9-1/4	---	---	---	---	•	•	•	•	•
9-1/2	---	---	---	---	•	•	•	•	•
9-3/4	---	---	---	---	•	•	•	•	•
10	---	---	---	---	•	•	•	•	•

• Indicates a stock item.

STANDARD MATERIALS & TOLERANCES

Standard material is undersized negative tolerance bar stock made from C1018, 4045, C1095, 1215 and 303/304 stainless.

SIZE

1/16" through 3/4"
1/16" through 1/4"
7/8" through 1-1/2"
5/16" through 7/16"
1-3/4" through 2"
1/2"

CARBON STEEL

+ .000/- .002

+ .000/- .003

+ .000/- .004

STAINLESS STEEL

+ .000/- .002

+ .000/- .003

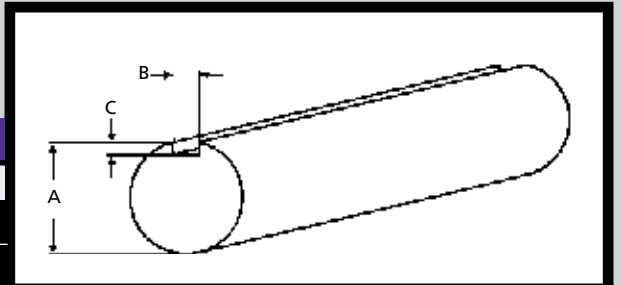
+ .000/- .004

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KEYED SHAFTS

MANUFACTURER CROSS-REFERENCE

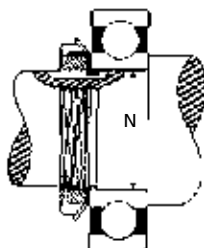
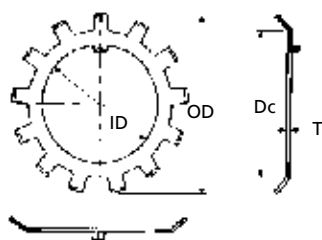
INDEX
PAGE 236.



KF	BAR	KEYWAY		WEIGHT	MATERIAL			
	Diameter (A)	Width (B)	Depth (C)	Lbs. per Foot	Carbon Steel		Stainless Steel	
					3'	6'	3'	6'
KF-0500	1/2"	1/8"	1/16"	0.6700				
-0625	5/8"			1.0400				
-0687	11/16"			1.2500				
-0750	3/4"	3/16"	3/32"	1.5000				
-0875	7/8"			2.0400				
-0937	15/16"			2.3500				
-1000	1"			2.6700				
-1062	1-1/16"			3.0100				
-1125	1-1/8"	1/4"	1/8"	3.3800				
-1187	1-3/16"			3.7700				
-1250	1-1/4"			4.1700				
-1312	1-5/16"			4.6000				
-1375	1-3/8"	5/16"	5/32"	5.0500				
-1437	1-7/16"			5.5200				
-1500	1-1/2"			6.0100				
-1625	1-5/8"	3/8"	3/16"	7.0500				
-1687	1-11/16"			7.6000				
-1750	1-3/4"			8.1800				
-1875	1-7/8"			9.3900				
-1937	1-15/16"	1/2"	1/4"	10.0200				
-2000	2"			10.6800				
-2187	2-3/16"			12.7800				
-2437	2-7/16"	5/8"	5/16"	15.8700				
-2500	2-1/2"			16.6900				
-2937	2-15/16"			23.0400				
-3000	3"			24.0400				
-3125	3-1/8"	3/4"	3/8"	26.0400				
-3187	3-3/16"			27.1200				
-3250	3-1/4"			28.2000				
-3375	3-3/8"			30.3600				
-3437	3-7/16"			31.5600				
-3500	3-1/2"	7/8"	7/16"	32.6400				
-3625	3-5/8"			35.0400				
-3750	3-3/4"			37.5600				
-3937	3-15/16"			41.4000				
-4000	4"			42.7200				
-4250	4-1/4"	1"	1/2"	48.1200				
-4375	4-3/8"			51.0000				
-4437	4-7/16"			52.5600				
KF-4500	4-1/2"			54.0000				

KF	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	LENGTHS OVER 3' MAY BE SUBJECT TO A PACKAGING CHARGE.
	Fully keyed shafting that provides a good fit between the key and the keyway. Partial keyways and other materials are available, including turned and polished, and medium carbon steel (suitable to heat treat). See the special orders guide on page 136.	<ol style="list-style-type: none">1. Confirm the diameter of the shaft (A).2. Determine the keyway width (B) and depth (C).3. Choose a length of 3' or 6'. Other lengths are available. Contact plant for quote.4. Find the part in the chart above.	 COMMON	
	Note: <i>There is some variance in length on this product (+/- 2") due to the nature of its manufacture. Please specify "Exact Size" if you need a precise length.</i>			

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**STANDARD****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Standard Locknut

W

Whittet-Higgins

W



W	BORE		LOCKWASHER DIMENSIONS					WEIGHT	MATERIAL	Mating Locknut
	Bearing Bore Nominal (N)		Free Outside Dia. +0/-1/16" (OD)	Inside Dia. (ID) Min./Max.	Thickness (T) Min./Max.	Face Dia. (Dc) Min./Max.	Number of Tangs	Lbs. per 100 Pieces	Spring Steel	
W-00	.3937	10	7/8	.406/.421		.625/.640	9	0.3750		N-00
-01	.4724	12	1-1/64	.484/.499		.719/.734		0.5000		-01
-02	.5906	15	1-5/32	.601/.616	.038/.046	.813/.827		0.6250		-02
-03	.6693	17	1-21/64	.679/.694		.938/.953	11	0.8750		-03
-04	.7874	20	1-17/32	.801/.816		1.125/1.140		1.1250		-04
-05	.9843	25	1-23/32	.989/1.009		1.281/1.296		1.5625		-05
-06	1.1811	30	1-59/64	1.193/1.213	.046/.054	1.500/1.515	13	1.8750		-06
-07	1.3780	35	2-1/4	1.396/1.416		1.813/1.827		2.5000		-07
-08	1.5748	40	2-15/32	1.583/1.603		2.000/2.030	15	3.7500		-08
-09	1.7717	45	2-47/64	1.792/1.817	.053/.063	2.281/2.311		4.3750		-09
-10	1.9685	50	2-59/64	1.992/2.017		2.438/2.468		4.3750		-10
-11	2.1654	55	3-7/64	2.182/2.207		2.656/2.686	17	5.3125		-11
-12	2.3622	60	3-11/32	2.400/2.425	.058/.064	2.844/2.874		5.4690		-12
-13	2.5591	65	3-37/64	2.588/2.613		3.063/3.093		6.2500		-13
-14	2.7559	70	3-53/64	2.791/2.816		3.313/3.343		6.8750		N-14
-15	2.9528	75	4-7/64	2.973/3.003		3.563/3.593		10.6250		AN-15
-16	3.1496	80	4-3/8	3.177/3.207	.067/.077	3.844/3.874		12.1875		-16
-17	3.3465	85	4-5/8	3.395/3.425		4.031/4.061		12.8125		-17
-18	3.5433	90	4-15/16	3.582/3.612		4.281/4.326		18.4375		-18
-19	3.7402	95	5-7/32	3.800/3.830	.088/.100	4.563/4.607		20.3125		-19
-20	3.9370	100	5-1/2	3.988/4.018		4.813/4.858		21.8750		-20
-21	4.1339	105	5-45/64	4.192/4.222		5.000/5.045		24.0625		-21
-22	4.3307	110	6-1/16	4.395/4.425		5.281/5.326	19	34.3750		-22
-24	4.7244	120	6-15/32	4.801/4.831	.118/.132	5.688/5.733		40.0000		-24
-26	5.1181	130	7-1/32	5.191/5.226		6.188/6.233		50.0000		-26
-28	5.5118	140	7-7/16	5.582/5.617		6.531/6.576		51.2500		-28
-30	5.9055	150	8-1/16	5.983/6.018		7.063/7.123		75.0000		-30
-32	6.2992	160	8-7/16	6.389/6.424		7.438/7.498		77.5000		-32
-34	6.6929	170	9-1/16	6.764/6.799		8.031/8.091		92.5000		-34
-36	7.0866	180	9-7/16	7.171/7.206	.148/.164	8.375/8.435		100.0000		-36
-38	7.4803	190	9-7/8	7.577/7.612		8.781/8.841		102.5000		-38
-40	7.8740	200	10-5/16	7.982/8.017		9.156/9.216		110.0000		AN-40
W-44	8.6614	220	11-7/16	8.701/8.736		9.875/9.930		131.2500		N-44

MATING LOCKNUT DESCRIPTIONS ON PAGE 132.

W	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE
	Most commonly used and least expensive. Note that the key is bent in the opposite direction of the tangs.	<ol style="list-style-type: none"> 1. Verify the face diameter (Dc) of the part. 2. Confirm the (ID) of the part. 3. Measure the thickness (T). 4. Find the part in the chart above. 	 COMMON
AXIAL ASSEMBLY			 USE WITH N/AN AND NL LOCKNUTS.
FOR THICKER VERSION, SEE "WH" ON PAGE 143.			

**MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS**

LOCKWASHERS

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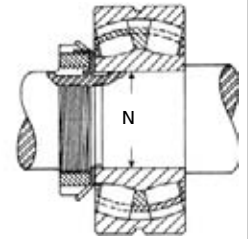
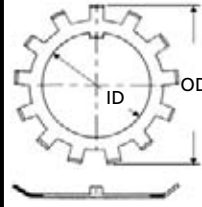


STANDARD STAINLESS STEEL

MANUFACTURER CROSS-REFERENCE

Standard Locknut	WS
Whittet-Higgins	WS

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PAGE 236.



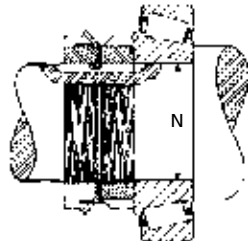
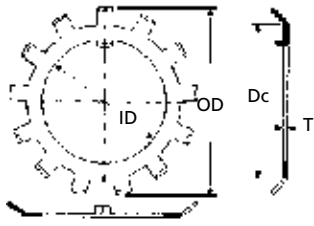
WS	BORE		LOCKWASHER DIMENSIONS					WEIGHT	MATERIAL	Mating Locknut
	Bearing Bore Nominal (N)		Free Outside Dia.	Inside Dia. (ID)	Thickness (T)	Face Dia. (Dc)	Number of Tangs	Lbs. per 100 Pieces	Stainless Steel	
	Decimal	MM	+0/-1/16" (OD)	Min./Max.	Min./Max.	Min./Max.				
WS-00	.3937	10	7/8	.406/.421	.038/.046	.625/.640	9	0.3750		NS-00
-01	.4724	12	1-1/64	.484/.499		.719/.734	11	0.5000		-01
-02	.5906	15	1-5/32	.601/.616		.813/.827		0.6250		-02
-03	.6693	17	1-21/64	.679/.694		.938/.953		0.7500		-03
-04	.7874	20	1-17/32	.801/.816	.046/.054	1.125/1.140	13	1.2500		-04
-05	.9843	25	1-23/32	.989/1.009		1.281/1.296		1.5625		-05
-06	1.1811	30	1-59/64	1.193/1.213		1.500/1.515		1.8750		-06
-07	1.3780	35	2-1/4	1.396/1.416		1.813/1.827	15	2.6563		-07
-08	1.5748	40	2-15/32	1.583/1.603	.053/.063	2.000/2.030		3.9063		-08
-09	1.7717	45	2-47/64	1.792/1.817		2.281/2.311		4.5313		-09
-10	1.9685	50	2-59/64	1.992/2.017		2.438/2.468	17	4.6875		-10
-11	2.1654	55	3-7/64	2.182/2.207	.058/.068	2.656/2.686		4.8438		-11
-12	2.3622	60	3-11/32	2.400/2.425		2.844/2.874		5.4690		-12
-13	2.5591	65	3-37/64	2.588/2.613		3.063/3.093	19	6.2500		-13
-14	2.7559	70	3-53/64	2.791/2.816	.067/.077	3.313/3.343		6.8750		-14
-15	2.9528	75	4-7/64	2.973/3.003		3.563/3.593		10.9380		-15
-16	3.1496	80	4-3/8	3.177/3.207		3.844/3.874		12.5000		-16
-17	3.3465	85	4-5/8	3.395/3.425	.088/.100	4.031/4.061		12.8130		-17
-18	3.5433	90	4-15/16	3.582/3.612		4.281/4.326		17.8125		-18
-19	3.7402	95	5-7/32	3.800/3.830		4.563/4.607		19.3750		-19
-20	3.9370	100	5-1/2	3.988/4.018		4.813/4.858		22.0000		-20
-21	4.1339	105	5-45/64	4.192/4.222	.118/.132	5.000/5.045		23.1250		-21
-22	4.3307	110	6-1/16	4.395/4.425		5.281/5.326		34.0000		-22
WS-24	4.7244	120	6-15/32	4.801/4.831		5.688/5.733		40.0000		NS-24

MATING LOCKNUT DESCRIPTIONS ON PAGE 132.

WS	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	USE WITH NS AND ANS LOCKNUTS.
	AXIAL ASSEMBLY		COMMON	
	Stainless steel version of "W" Series. Passivated to remove impurities.	<ol style="list-style-type: none"> 1. Verify the face diameter (Dc) of the part. 2. Confirm the (ID) of the part. 3. Measure the thickness (T). 4. Find the part in the chart above. 		



MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

**HEAVY DUTY****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Standard Locknut

TW

Whittet-Higgins

WH



WH	Bearing Bore Nominal (N)		LOCKWASHER DIMENSIONS					WEIGHT	MATERIAL	Mating Locknut
	Decimal	MM	Free Outside Dia. +0/-1/16" (OD)	Inside Dia. (ID) Min./Max.	Thickness (T) Min./Max.	Face Dia. (Dc) Min./Max.	Number of Tangs	Lbs. per 100 Pieces	Spring Steel	
WH-00	.3937	10	57/64	.406/.421	.038/.046	.625/.640	9	0.3750		NH-00
-01	.4724	12	1-1/32	.484/.499		.719/.734		0.5000		-01
-02	.5906	15	1-5/32	.601/.616		.813/.827		0.9375		-02
-03	.6693	17	1-11/32	.679/.694	.053/.063	.938/.953	11	1.2500		-03
-04	.7874	20	1-9/16	.801/.816		1.125/1.140		1.7190		-04
-05	.9843	25	1-45/64	.989/1.009		1.281/1.296		2.1429		-05
-06	1.1811	30	1-61/64	1.193/1.213	.057/.067	1.500/1.515	13	2.1875		-06
-065	1.3125	33-1/3	2-15/64	1.333/1.353		1.813/1.827		3.3929		-065
-07	1.3780	35	2-1/4	1.396/1.416		1.813/1.827	15	3.2143		-07
-08	1.5748	40	2-31/64	1.583/1.603		2.000/2.030		4.4440		-08
-09	1.7717	45	2-23/32	1.792/1.817	.067/.077	2.281/2.311		5.2083		-09
-10	1.9685	50	2-59/64	1.992/2.017		2.438/2.468		5.3570		-10
-11	2.1654	55	3-3/32	2.182/2.207		2.656/2.686		5.7143		-11
-12	2.3622	60	3-21/64	2.400/2.425		2.844/2.874		6.9640		-12
-13	2.5591	65	3-9/16	2.588/2.613	.077/.087	3.063/3.093		8.2143		-13
-14	2.7559	70	3-13/16	2.791/2.816		3.313/3.343		9.1667		-14
-15	2.9528	75	4-3/64	2.973/3.003		3.563/3.593		12.1875		-15
-16	3.1496	80	4-25/64	3.177/3.207	.089/.101	3.844/3.874		15.6250		-16
-17	3.3465	85	4-5/8	3.395/3.425		4.031/4.061		16.5630		-17
-18	3.5433	90	4-61/64	3.582/3.612		4.281/4.326		24.5830		-18
-19	3.7402	95	5-15/64	3.800/3.830	.118/.132	4.563/4.607		27.0830		-19
-20	3.9370	100	5-31/64	3.988/4.018		4.813/4.858		30.0000		-20
-21	4.1339	105	5-45/64	4.192/4.222		5.000/5.045		31.3889		-21
-22	4.3307	110	6	4.395/4.425	.133/.147	5.281/5.326	19	38.7500		-22
-24	4.7244	120	6-17/32	4.801/4.831		5.688/5.733		51.2500		-24
-26	5.1181	130	7-3/64	5.191/5.226	.157/.173	6.188/6.233		66.2500		-26
-28	5.5118	140	7-7/16	5.582/5.617		6.531/6.576		67.5000		-28
-30	5.9055	150	8-1/16	5.983/6.018		7.063/7.123		96.8750		-30
-32	6.2992	160	8-29/64	6.389/6.424		7.438/7.498		100.0000		-32
-34	6.6929	170	9-5/64	6.764/6.799	.194/.212	8.031/8.091		120.0000		-34
-36	7.0866	180	9-7/16	7.171/7.206		8.375/8.435		127.5000		-36
-38	7.4803	190	9-55/64	7.577/7.612		8.781/8.841		132.5000		-38
WH-40	7.8740	200	10-13/32	7.982/8.017		9.156/9.216		140.0000		NH-40

MATING LOCKNUT DESCRIPTIONS ON PAGE 133.

WH**DESCRIPTION**

Heavier duty, thicker version with the key bent in the same direction as the tangs.

AXIAL ASSEMBLY**HOW TO IDENTIFY**

1. Verify the face diameter (Dc) of the part.
2. Confirm the (ID) of the part.
3. Measure the thickness (T).
4. Find the part in the chart above.

GENERAL USE**UNCOMMON**

**USE WITH
NH
LOCKNUTS.**

FOR THINNER VERSION, SEE "W" ON PAGE 141.**MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS**

LOCKWASHERS

785-392-3017 FAX 785.392.2845

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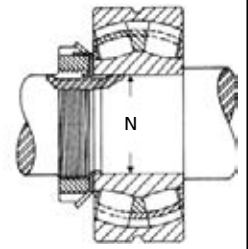
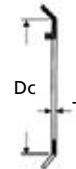
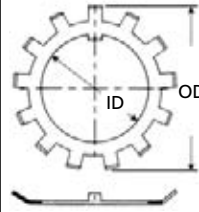


FINE THREAD

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Standard Locknut	WIN
Whittet-Higgins	WI



WI	BORE		LOCKWASHER DIMENSIONS				WEIGHT Lbs. per 100 Pieces	MATERIAL Spring Steel	Mating Locknut
	Bearing Bore Nom. (N)	Free Outside Diameter +0/-1/16" (OD)	Inside Dia. (ID) Min./Max.	Thickness (T) Min./Max.	Face Dia. (Dc) Min./Max.	Number of Tangs			
WI-01	.750	1.563	.797/.828	.046/.054	1.188/1.203	9	1.2500		NI-01
-02	.875	1.688	.922/.953		1.313/1.328		1.8750		-02
-03	1.000	1.813	1.047/1.078		1.438/1.453		1.8750		-03
-04	1.125	2.000	1.172/1.203		1.563/1.578	11	2.5000		-04
-05	1.250	2.125	1.297/1.328		1.688/1.703		2.5000		-05
-06	1.375	2.375	1.422/1.453	.058/.068	1.938/1.953	13	2.5000		-06
-07	1.500	2.375	1.547/1.578		1.938/1.953		2.5000		-07
-08	1.625	2.625	1.672/1.703		2.188/2.203		4.3750		-08
-09	1.750	2.750	1.797/1.828		2.313/2.328	15	5.0000		-09
-10	1.875	2.875	1.922/1.953		2.438/2.453		5.0000		-10
-11	2.000	3.125	2.047/2.078		2.688/2.703	17	5.6250		-11
-12	2.250	3.438	2.297/2.328		2.875/2.890		6.2500		-12
-13	2.500	3.688	2.547/2.578		3.125/3.140		6.8750		-13
WI-14	2.750	3.938	2.797/2.828		3.375/3.390		7.5000		NI-14

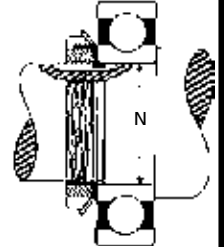
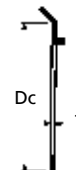
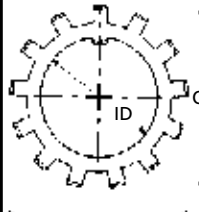


THIN SECTION

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Standard Locknut	WTH
Whittet-Higgins	WT



WT	BORE		LOCKWASHER DIMENSIONS					WEIGHT	MATERIAL	
	Bearing Bore Nominal (N)		Free Outside Dia.	Inside Dia. (ID)	Thickness (T)	Face Dia. (Dc)	Number of Tangs	Lbs. per 100 Pieces	Spring Steel	Mating Locknut
	Decimal	MM	+0/-1/16" (OD)	Min./Max.	Min./Max.	Min./Max.				
WT-00	.3937	10	53/64	.406/.421	.036/.044	.531/.551	9	0.62500		NT-00
-01	.4724	12	59/64	.484/.499		.625/.645		0.62500		-01
-02	.5906	15	1-3/32	.601/.616		.750/.770		0.62500		-02
-03	.6693	17	1-13/64	.679/.694		.875/.895	11	0.62500		-03
-04	.7874	20	1-3/8	.801/.816		1.000/1.020		1.25000		-04
-05	.9843	25	1-9/16	.989/1.009	.046/.054	1.188/1.208	13	1.25000		-05
-06	1.1811	30	1-55/64	1.193/1.213		1.438/1.458		1.87500		-06
-07	1.3780	35	2-5/64	1.396/1.416		1.656/1.676		15		1.87500	-07
-08	1.5748	40	2-1/4	1.583/1.603		1.844/1.864	2.50000			-08
-09	1.7717	45	2-1/2	1.792/1.817		.058/.068	2.062/2.082	17		3.12500	-09
-10	1.9685	50	2-11/16	1.992/2.017	2.250/2.270		3.12500			-10
-11	2.1654	55	2-61/64	2.182/2.207	2.500/2.520		3.75000			-11
-12	2.3622	60	3-3/16	2.400/2.425	2.688/2.708		19	4.37500		-12
-13	2.5591	65	3-3/8	2.588/2.613	2.875/2.895			4.37500		-13
-14	2.7559	70	3-19/32	2.791/2.816	3.094/3.114			5.00000		-14
-15	2.9528	75	3-59/64	2.973/3.003	3.375/3.395			6.87500		-15
-16	3.1496	80	4-9/64	3.177/3.207	3.594/3.614			7.50000		-16
-17	3.3465	85	4-23/64	3.395/3.425	3.812/3.832			7.50000		-17
WT-18	3.5433	90	4-35/64	3.582/3.612	4.000/4.020	8.12500		NT-18		

WT-00

-01

-02

-03

-04

-05

-06

-07

-08

-09

-10

-11

-12

-13

-14

-15

-16

-17

WT-18

NT-00

-01

-02

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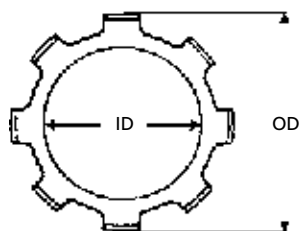
-17

NT-18


MATING LOCKNUT DESCRIPTIONS ON PAGE 136



MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

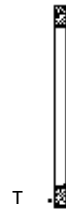
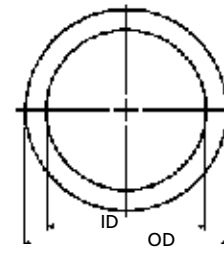
**EXTERNAL TOOTH RETAINER****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

ETR	DESIGN		DIMENSIONS				MATERIAL
	Hole Size Design		Outside Diameter (OD)		Inside Diameter Nominal (ID)	Material Thickness (T)	
			Min.	Max.			
ETR-03712	.3750	+/- .002	.3780	.3830	.1900	.0120	Spring Steel
-05812	.5800		.5960	.6040	.3540	.0120	
-06210	.6250		.6360	.6400	.3940	.0100	
-06515	.6500		.6690	.6730	.4250	.0150	
-07415	.7400		.7500	.7600	.5560	.0150	
-07515	.7500		.7530	.7630	.5050	.0150	
-07515-01	.7500		.7630	.7680	.5420	.0150	
-07536	.7500		.7630	.7680	.5430	.0360	
-08110	.8120		.8250	.8350	.5400	.0100	
-08130	.8120		.8180	.8310	.1970	.0300	
-08915	.8950		.9050	.9150	.7090	.0150	
-09015	.9000		.9080	.9200	.6250	.0150	
-10915	1.0950		1.2680	1.2720	.8660	.0150	
-11215	1.1250		1.1300	1.1370	.8750	.0150	
-13315	1.3350		1.3600	1.3700	1.0630	.0150	
-21115	2.1150		2.1300	2.1460	1.6530	.0150	
-23715	2.3750		2.3820	2.3870	1.8800	.0150	
ETR-30020	3.0000		3.0100	3.0180	2.3850	.0200	

ETR	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	FOR OTHER VERSIONS, SEE PAGES 90-101.
	Serves as spacer or retaining collar when used in bores. Teeth flex and resist pullout pressure.	<ol style="list-style-type: none">1. Determine the outside diameter (OD) of the part.2. Confirm the inside diameter (ID).3. Measure the material thickness (T).4. Find the part in the chart above.	 WEIRD	
	AXIAL ASSEMBLY			

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HARDENED



SUPPORT WASHER DIN 988


MANUFACTURER CROSS-REFERENCE

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PAGE 236.

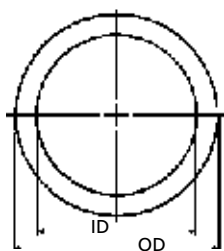
Anderton	R	Seeger	SS	DIN	988
Ellison	988SS	Waldes	5900		

SS	RING			MATERIAL	
	Inside Diameter (ID)	Outside Diameter (OD)	Thickness (T)		
SS-003006	3	6	1.0	+ .000/- .050	
-004008	4	8			
-005010	5	10			
-006012	6	12	1.2		
-007013	7	13			
-008014	8	14			
-009015	9	15			
-010016	10	16			
-011017	11	17			
-012018	12	18	1.5		
-013019	13	19			
-014020	14	20			
-015021	15	21			
-015022	15	22			
-016022	16	22			
-017024	17	24	2.0		
-018025	18	25			
-019026	19	26			
-020028	20	28			
-022030	22	30			
-022032	22	32			
-025035	25	35	2.5		
-025036	25	36			
-026037	26	37			
-028040	28	40			
-030042	30	42			
-032045	32	45			
-035045	35	45			
-036045	36	45			
SS-037047	37	47			

SS	RING			MATERIAL
	Inside Diameter (ID)	Outside Diameter (OD)	Thickness (T)	Spring Steel
SS-040050	40	50	2.5	+0.000/-0.050
-042052	42	52		
-045055	45	55	3.0	+0.000/-0.060
-045056	45	56		
-048060	48	60		
-050062	50	62		
-050063	50	63		
-052065	52	65		
-055068	55	68		
-056070	56	70		
-056072	56	72		
-060075	60	75		
-063080	63	80		
-065085	65	85	3.5	
-070090	70	90		
-075095	75	95		
-080100	80	100		
-085105	85	105		
-090110	90	110		
-095115	95	115		
-100120	100	120		
-100125	100	125		
-105130	105	130		
-110140	110	140		
-120150	120	150		
-130160	130	160		
-140170	140	170		
-150180	150	180		
-160190	160	190		
SS-170200	170	200		

	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE
SS PS	These support washers (SS) and shim rings (PS) conform to the DIN 988 standards.	<ol style="list-style-type: none">1. Determine the inside diameter (ID) and outside diameter (OD) of the part.2. Measure the thickness (T) of the part.3. Find the part in the charts.	 COMMON
	AXIAL ASSEMBLY		

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**SHIM RING DIN 988****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Anderton

R

Ellison

988SS

DIN

988

Bossard

Seeger

SS



PS	RING		THICKNESS / THICKNESS TOLERANCE MM									
	Inside Diameter MM (ID)	Outside Diameter MM (OD)	0.1	0.15	0.2	0.25	0.3	0.5	1.0	1.2	1.5	2.0
			-0.03	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.07	-0.07	-0.07
PS-003006	3	6	•	•	•	---	•	•	•	---	---	---
-004008	4	8	•	•	•	---	•	•	•	---	---	---
-005010	5	10	•	•	•	---	•	•	•	---	---	---
-006012	6	12	•	•	•	---	•	•	•	---	---	---
-007013	7	13	•	•	•	•	•	•	•	---	---	---
-008014	8	14	•	•	•	•	•	•	•	---	---	---
-009015	9	15	•	•	•	•	•	•	•	---	---	---
-010016	10	16	•	•	•	•	•	•	•	---	---	---
-011017	11	17	•	•	•	---	•	•	•	---	---	---
-012018	12	18	•	•	•	•	•	•	•	---	---	---
-013019	13	19	•	•	•	---	•	•	•	•	---	---
-014020	14	20	•	•	•	•	•	•	•	•	---	---
-015021	15	21	•	•	•	•	•	•	•	•	---	---
-015022	15	22	•	•	•	•	•	•	•	•	---	---
-016022	16	22	•	•	•	•	•	•	•	•	---	---
-017024	17	24	•	•	•	•	•	•	•	•	---	---
-018025	18	25	•	•	•	•	•	•	•	•	---	---
-019026	19	26	•	•	•	•	•	•	•	•	---	---
-020028	20	28	•	•	•	•	•	•	•	•	•	---
-022032	22	32	•	•	•	•	•	•	•	•	•	---
-025035	25	35	•	•	•	•	•	•	•	•	•	---
-026037	26	37	•	•	•	•	•	•	•	•	•	---
-028040	28	40	•	•	•	•	•	•	•	•	•	---
-030042	30	42	•	•	•	•	•	•	•	•	•	•
-032045	32	45	•	•	•	•	•	•	•	•	•	•
-035045	35	45	•	•	•	•	•	•	•	•	•	•
-036045	36	45	•	•	•	•	•	•	•	•	•	•
-037047	37	47	•	•	•	•	•	•	•	•	•	•
-040050	40	50	•	•	•	•	•	•	•	•	•	•
-042052	42	52	•	•	•	•	•	•	•	•	•	•
-045055	45	55	•	•	•	•	•	•	•	•	•	•
-048060	48	60	•	•	•	•	•	•	•	•	•	•
-050062	50	62	•	•	•	•	•	•	•	•	•	•
-050063	50	63	•	•	•	•	•	•	•	•	•	•
-052065	52	65	•	•	•	•	•	•	•	•	•	•
-055068	55	68	•	•	•	•	•	•	•	•	•	•
-056072	56	72	•	•	•	•	•	•	•	•	•	•
-060075	60	75	•	•	•	•	•	•	•	•	•	•
-063080	63	80	•	---	•	---	•	•	•	•	•	•
-065085	65	85	•	---	•	•	•	•	•	•	•	•
-070090	70	90	•	•	•	•	•	•	•	•	•	•
-075095	75	95	•	•	•	•	•	•	•	•	•	•
-080100	80	100	•	•	•	•	•	•	•	•	•	•
-085105	85	105	•	•	•	•	•	•	•	•	•	•
-090110	90	110	•	•	•	•	•	•	•	•	•	•
-095115	95	115	•	•	•	•	•	•	•	•	•	•
-100120	100	120	•	•	•	•	•	•	•	•	•	•
-105130	105	130	•	•	•	•	•	•	•	---	---	---
-110140	110	140	•	•	•	•	•	•	•	---	---	---
-120150	120	150	•	•	•	•	•	•	•	---	---	---
-130160	130	160	•	•	•	•	•	•	•	---	---	---
-140170	140	170	•	•	•	•	•	•	•	---	---	---
-150180	150	180	•	•	•	•	•	•	•	---	---	---
-160190	160	190	•	•	•	•	•	•	•	---	---	---
PS-170200	170	200	•	•	•	•	•	•	•	---	---	---

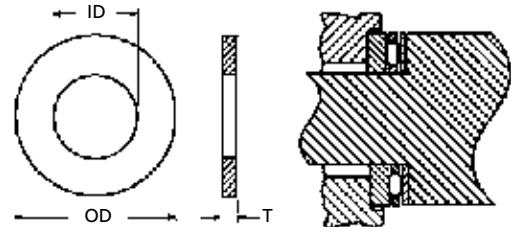
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THRUST WASHER

MANUFACTURER CROSS-REFERENCE

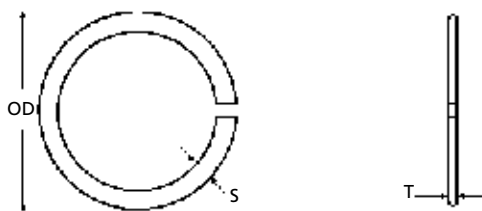
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TW	RING			MATERIAL		TW	RING			MATERIAL		
	Inside Dia. (ID)	Outside Dia. (OD)	Thickness (T)	Spring Steel	Stainless "-SS"		Inside Dia. (ID)	Outside Dia. (OD)	Thickness (T)	Spring Steel	Stainless "-SS"	
TW-01802806	3/16	9/32	1/16			TW-07513109	3/4	1-5/16	3/32			
-01802809			3/32			-07513118			3/16			
-01803706			1/16			-07516212			1/8			
-01803709		3/8	3/32			-07516218			3/16			
-01804306		7/16	1/16			-07517518		1-3/4	3/16			
-02505006	1/4	1/2	1/16			-07520018		2	3/16			
-02505009			3/32			-08711809		1-3/16	3/32			
-02505606		9/16	1/16			-08720012		1/8				
-03106206	5/16	5/8	1/16			-08720018	7/8	2	3/16			
-03106207			5/64			-08722518		2-1/4	3/16			
-03106212			1/8			-10015612		1-9/16	1/8			
-03706206			1/16			-10015618			3/16			
-03706212	3/8		1/8			-10020012	1	2	1/8			
-03706809		11/16	3/32			-10020018			3/16			
-04308109	7/16	13/16	3/32			-10022514			2-1/4			9/64
-04308706		7/8	1/16			-10022518						3/16
-04308715			5/32			-10025025			1/4			
-05007506		1/2	3/4			1/16	-10625025	1-1/16	2-1/2			1/4
-05007512			1/8			-11225025	1-1/8		1/4			
-05008712	7/8		1/8			-11820018	1-3/16	2	3/16			
05011206	1-1/8		1/16			-12520014			9/64			
-05011215			5/32			-12520018	1-1/4		3/16			
-05012518	1-1/4	3/16	-12524314			-12524314		2-7/16	9/64			
-05613709	9/16	1-3/8	3/32			-12524325			1/4			
-05613718			3/16			-12527514			2-3/4			9/64
-06207806			1/16			-12530025		3	1/4			
-06207812	5/8	25/32	1/8			-13127525	1-5/16	2-3/4	1/4			
-06212509			3/32			-13730015	1-3/8	3	5/32			
-06212518		1-1/4	3/16			-13730025						1/4
-06213718		1-3/8	3/16			-15030015	1-1/2		5/32			
-06215009		1-1/2	3/32			-15030025			1/4			
06215018			3/16			-15032512			1/8			
-06217518		1-3/4	3/16			-20040015	2	4	5/32			
TW-07510009		3/4	1			3/32	TW-20040031					5/16

TW	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE
	Used for bearing surfaces. Parts are hardened and ground flat and parallel to minimize wear on bearing surfaces. Most of these parts are made to order.	<ol style="list-style-type: none"> 1. Confirm inside diameter (ID) and outside diameter (OD) of the part. 2. Measure the thickness (T). 3. Find the part in the chart above. 	 UNCOMMON
AXIAL ASSEMBLY			

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Smalley

SSRS



SR	RING			MATERIAL		SR	RING			MATERIAL	
	Outside Diameter (OD)	Radial Wall (S)	Thickness (T)	Spring Steel	Stainless "-SS"		Outside Diameter (OD)	Radial Wall (S)	Thickness (T)	Spring Steel	Stainless "-SS"
SR-075	.750	+.000/- .015	.093	.024		SR-525	5.250	.233	.030		
-087	.875		-537			5.375					
-100	1.000		-550			5.500					
-112	1.125		-562			5.625					
-125	1.250		-575			5.750					
-137	1.375		-587			5.875					
-150	1.500		-600			6.000					
-162	1.625	+.000/- .020	.150			-612	6.125				
-175	1.750					-625	6.250				
-187	1.875					-637	6.375				
-200	2.000					-650	6.500				
-212	2.125					-675	6.750				
-225	2.250					-700	7.000				
-237	2.375					+.000/- .025	.178	-725	7.250		
-250	2.500	-750	7.500								
-262	2.625	-775	7.750								
-275	2.750	-800	8.000								
-287	2.875	-825	8.250								
-300	3.000	-850	8.500								
-312	3.125	+.000/- .030	.188					-875	8.750		
-325	3.250					-900	9.000				
-337	3.375					-950	9.500				
-350	3.500			-1000		10.000					
-362	3.625			-1050		10.500					
-375	3.750			-1100		11.000					
-387	3.875			+.000/- .035		.233	-1150	11.500			
-400	4.000	-1200	12.000								
-412	4.125	-1250	12.500								
-425	4.250	-1300	13.000								
-437	4.375	-1350	13.500								
-450	4.500	-1400	14.000								
-462	4.625	-1450	14.500								
-475	4.750	+.000/- .090		-1500			15.000				
-487	4.875			-1550			15.500				
-500	5.000			SR-1600			16.000				
SR-512	5.125										

SR	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	 UNCOMMON
	Often used with wave springs to adjust load or as a backup plate for soft metal housings.	<ol style="list-style-type: none"> Determine the outside diameter (OD) of the part. Measure the radial wall (S) and thickness (T) of the part. Find the part in the chart above. 		
	AXIAL ASSEMBLY			

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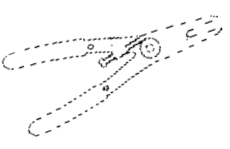

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DIN 471

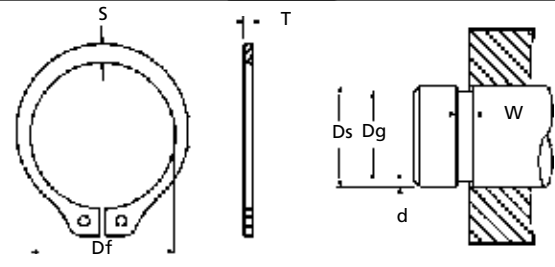


BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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Anderton	D1400	Ellison	471	Seeger	A
Bossard	BN818-820	Rotor Clip	DSH	Waldes	D1400



DSH	SHAFT		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
DSH-003	3	2.7	.8	.40	+.00/- .05	2.8	.10	.50	0.0017			-E009
-004	4	3.7	.9	.60		3.8		.70	0.0022			
-005	5	4.7	1.1	.70		4.8		.80	0.0066			
-006	6	5.6	1.3	.80		5.7	.15	.90	0.0084			
-007	7	6.5	1.4			6.7			0.0121			
-008	8	7.4	1.5			7.6			0.0158			
-009	9	8.4	1.7			8.6	.20		0.0300			
-010	10	9.3	1.8			9.6			0.0340			
-011	11	10.2	1.8			10.5			0.0410			-E013
-012	12	11.0	1.8			11.5	.25		0.0500			
-013	13	11.9	2.0	1.00	+.00/- .11	12.4		1.10	0.0530			
-014	14	12.9	2.1			13.4			0.0640			
-015	15	13.8	2.2			14.3			0.0670			
-016	16	14.7	2.2			15.2	.30		0.0700			
-017	17	15.7	2.3			16.2			0.0820			
-018	18	16.5	2.4			17.0			0.1110			
-019	19	17.5	2.5			18.0	.35		0.1220			
-020	20	18.5	2.6			19.0			0.1300			
-021	21	19.5	2.7			20.0			0.1420			
-022	22	20.5	2.8	1.20	+.00/- .13	21.0	.40		0.1500			
-023	23	21.5	2.9			22.0			0.1630			
-024	24	22.2	3.0			22.9			0.1770			
-025	25	23.2	3.0			23.9	.50		0.1900			
-026	26	24.2	3.1			24.9			0.1960			
-027	27	24.9	3.1			25.6			0.2080			
-028	28	25.9	3.2			26.6	.55		0.2920			
-029	29	26.9	3.4			27.6			0.3200			
-030	30	27.9	3.5			28.6			0.3320			
-031	31	28.6	3.5			29.3	.70		0.3450			
-032	32	29.6	3.6	1.50	+.00/- .21	30.3		1.60	0.3540			
-033	33	30.5	3.7			31.3			0.3690			
-034	34	31.5	3.8			32.3			0.3800			
-035	35	32.2	3.9			33.0	.85		0.4000			
-036	36	33.2	4.0			34.0			0.5000			
-037	37	34.2	4.1			35.0			0.5370			
-038	38	35.2	4.2	1.75		36.0	1.00	1.85	0.5620			
DSH-039	39	36.0	4.3			37.0			0.5850			

TOOL DESCRIPTIONS ON PAGES 226 & 228.

DSH

DESCRIPTION

Tapered-design ring to DIN 471 that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.

AXIAL ASSEMBLY

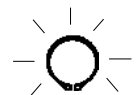
HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thick, see "DSHR" on page 158.



COMMON

ZINC PLATED



STACKED/ROLL PACK

NOT
AVAILABLE

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DSH ↔ DSHI (Page 160) ↔ DAK (Page 162) ↔ DAL (Page 163) ↔ DS (Page 190)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.



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DIN 471

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BASIC EXTERNAL
MANUFACTURER CROSS-REFERENCE

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Bossard	BN818-820	Rotor Clip	DSH	Waldes	D1400

 DIN
471

DSH	SHAFT		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
DSH-040	40	36.5	4.4	1.75	+0.00/-0.06	37.5	1.25	1.85	0.6030			-E023
-041	41	37.5	4.5			38.5			0.6215			
-042	42	38.5	4.5			39.5			0.6500			
-044	44	40.5	4.6			41.5			0.7000			
-045	45	41.5	4.7			42.5			0.7500			
-046	46	42.5	4.8			43.5			0.7600			
-047	47	43.5	4.9			44.5			0.7500			
-048	48	44.5	5.0			45.5			0.7900			
-050	50	45.8	5.1	2.00	+0.00/-0.07	47.0	1.50	2.15	1.0200			
-052	52	47.8	5.2			49.0			1.1100			
-054	54	49.8	5.3			51.0			1.1300			
-055	55	50.8	5.4			52.0			1.1400			
-056	56	51.8	5.5			53.0			1.1800			
-057	57	52.8	5.5			54.0			1.2200			
-058	58	53.8	5.6			55.0			1.2600			
-060	60	55.8	5.8			57.0			1.2900			
-062	62	57.8	6.0	2.50	+0.00/-0.08	59.0	1.75	2.65	1.4300			-E032
-063	63	58.8	6.2			60.0			1.5900			
-065	65	60.8	6.3			62.0			1.8200			
-067	67	62.5	6.4			64.0			2.0300			
-068	68	63.5	6.5			65.0			2.1800			
-070	70	65.5	6.6			67.0			2.2000			
-072	72	67.5	6.8			69.0			2.2500			
-075	75	70.5	7.0			72.0			2.4600			
-077	77	72.5	7.2	3.00	+0.00/-0.08	74.0		3.15	2.5700			
-078	78	73.5	7.3			75.0			2.6200			
-080	80	74.5	7.4			76.5			2.7300			
-082	82	76.5	7.6			78.5			3.1200			
-085	85	79.5	7.8			81.5			3.6400			
-087	87	81.5	7.9			83.5			3.9800			
-088	88	82.5	8.0			84.5			4.1200			
-090	90	84.5	8.2			86.5			4.4500			
-092	92	86.5	8.4	+0.54/-1.30	+0.00/-0.08	88.5	1.75	3.15	4.6000			
-095	95	89.5	8.6			91.5			4.9000			
-097	97	91.5	8.8			93.5			5.0200			
-098	98	91.5	8.8			94.5			5.0200			
DSH-100	100	94.5	9.0			96.5			5.3700			

TOOL DESCRIPTIONS ON PAGES 226 & 228.

DSH	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC PLATED
	Tapered-design ring to DIN 471 that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.	1. Measure the shaft diameter (Ds). 2. Determine the ring thickness (T). 3. Measure the maximum radial wall (S) of the ring. 4. Find the part in the chart above. If it is too thick, see "DSHR" on page 158.	 COMMON	 STACKED/ROLL PACK NOT AVAILABLE
AXIAL ASSEMBLY <div style="text-align: center;"> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>DSH ↔ DSHI (Page 160) ↔ DAK (Page 162) ↔ DAL (Page 163) ↔ DS (Page 190)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p> </div>				


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 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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DIN 471

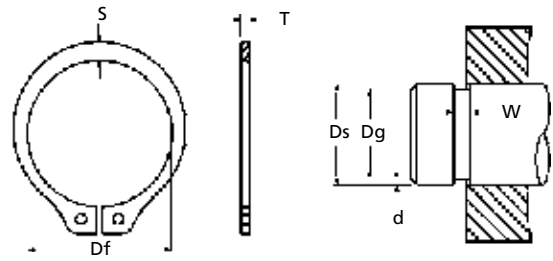


BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	D1400	Ellison	471	Seeger	A
Bossard	BN818-820	Rotor Clip	DSH	Waldes	D1400



DSH	SHAFT		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"	
DSH-102	102	95.0	+ .54/-1.30	9.2	4.00	98.0	2.00	4.15	7.8000			-E032
-105	105	98.0		9.3		101.0			8.0000			
-107	107	100.0		9.5		103.0			8.1000			
-108	108	100.0		9.5		104.0			8.1000			
-110	110	103.0		9.6		106.0			8.2000			
-112	112	105.0		9.7		108.0			8.3000			
-115	115	108.0		9.8		111.0			8.4000			
-117	117	110.0		10.0		113.0			8.5000			
-118	118	110.0		10.0		114.0			8.5000			
-120	120	113.0		10.2		116.0			8.6000			
-122	122	115.0	+ .63/-1.50	10.3	4.00	118.0	2.00	4.15	8.8000			-E035
-125	125	118.0		10.4		121.0			9.0000			
-127	127	120.0		10.5		123.0			9.5000			
-128	128	120.0		10.5		124.0			9.5000			
-130	130	123.0		10.7		126.0			10.0000			
-132	132	125.0		10.8		128.0			10.3000			
-135	135	128.0		11.0		131.0			10.4000			
-137	137	130.0		11.0		133.0			10.7000			
-138	138	130.0		11.0		134.0			10.7000			
-140	140	133.0		11.2		136.0			11.0000			
-142	142	135.0		11.3		138.0	2.50		11.2000			
-145	145	138.0		11.5		141.0			11.5000			
-147	147	140.0		11.6		143.0			11.6000			
-148	148	140.0		11.6		144.0			11.6000			
-150	150	142.0		11.8		145.0			12.0000			
-152	152	143.0		11.9		147.0			12.8000			
-155	155	146.0		12.0		150.0			13.5000			
-157	157	148.0		12.0		152.0			14.0000			
-158	158	148.0		12.0		153.0			14.0000			
-160	160	151.0		12.2		155.0			15.0000			
-162	162	152.5		12.3		157.0	2.50		15.5000			
-165	165	155.5		12.5		160.0			16.0000			
-167	167	157.5		12.9		162.0			16.3000			
-168	168	157.5		12.9		163.0			16.3000			
-170	170	160.5		12.9		165.0			17.0000			
-172	172	160.5		12.9		167.0			17.0000			
DSH-175	175	165.5		12.9		170.0			18.0000			

DSH

DESCRIPTION

Tapered-design ring to DIN 471 that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thick, see "DSHR" on page 158.



COMMON

ZINC PLATED



STACKED/ROLL PACK

NOT
AVAILABLE

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DSH ← DSHI (Page 160) ← DAK (Page 162) ← DAL (Page 163) ← DS (Page 190)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

HS



IMPERIAL
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MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	D1400	Ellison	471	Seeger	A
Bossard	BN818-820	Rotor Clip	DSH	Waldes	D1400

DIN
471

DSH	SHAFT	RING			GROOVE			WEIGHT	MATERIAL		TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-SS"	
DSH-177	177	167.5	13.5	4.00	172.0	2.50	4.15	18.3000			-E035
-178	178	167.5			173.0			18.3000			
-180	180	170.5			175.0			19.0000			
-182	182	170.5			177.0			19.0000			
-185	185	175.5			180.0			20.0000			
-187	187	177.5			182.0			20.3000			
-188	188	177.5			183.0			20.3000			
-190	190	180.5			185.0			21.0000			
-192	192	180.5			187.0			21.0000			
-195	195	185.5			190.0			22.0000			
-197	197	187.5	192.0	22.3000							
-198	198	187.5	193.0	22.3000							
-200	200	190.5	195.0	23.0000							
-202	202	190.0	14.0	5.00	196.0	3.00	5.15	23.5000			
-205	205	193.0			199.0			24.3000			
-207	207	193.0			201.0			24.3000			
-208	208	193.0			202.0			24.3000			
-210	210	198.0			204.0			24.8000			
-212	212	198.0			206.0			24.8000			
-215	215	203.0			209.0			26.0000			
-217	217	203.0			211.0			26.0000			
-218	218	203.0			212.0			26.0000			
-220	220	208.0			214.0			26.5000			
-222	222	208.0			216.0			26.5000			
-225	225	213.0			219.0			28.0000			
-227	227	213.0			221.0			28.0000			
-228	228	213.0			222.0			28.0000			
-230	230	218.0			224.0			29.0000			
-232	232	218.0			226.0			29.0000			
-235	235	223.0			229.0			30.5000			
-237	237	223.0			231.0			30.5000			
-238	238	223.0			232.0			30.5000			
-240	240	228.0			234.0			31.0000			
-242	242	228.0			236.0			31.0000			
-245	245	233.0			239.0			32.5000			
-247	247	233.0			241.0			32.5000			
DSH-248	248	233.0			242.0			32.5000			

TOOL DESCRIPTIONS ON PAGES 226 & 228

TOOL DESCRIPTIONS ON PAGES 226 & 228.

DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC PLATED
DSH Tapered-design ring to DIN 471 that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft. AXIAL ASSEMBLY	1. Measure the shaft diameter (Ds). 2. Determine the ring thickness (T). 3. Measure the maximum radial wall (S) of the ring. 4. Find the part in the chart above. If it is too thick, see "DSHR" on page 158.	 COMMON	
GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.			
DSH	DSHI (Page 160)	DAK (Page 162)	DAL (Page 163)
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.			
DS (Page 190)			

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DIN 471

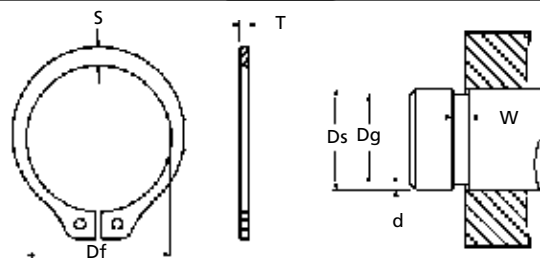


BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	D1400	Ellison	471	Seeger	A
Bossard	BN818-820	Rotor Clip	DSH	Waldes	D1400



DSH	SHAFT		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"	
DSH-250	250	238.0	14.0	5.00	+0.00/-0.12	244.0	3.00	5.15	33.5000			-E035
-252	252	238.0				244.0			33.5000			
-255	255	240.0				247.0			34.8000			
-257	257	240.0				249.0			34.8000			
-258	258	240.0				250.0			34.8000			
-260	260	245.0				252.0			35.5000			
-262	262	245.0				254.0			35.5000			
-265	265	250.0				257.0			37.0000			
-267	267	250.0				259.0			37.0000			
-268	268	250.0				260.0			37.0000			
-270	270	255.0	16.0	5.00	+0.00/-0.12	262.0	4.00	5.15	37.5000			-E045
-272	272	255.0				264.0			37.5000			
-275	275	260.0				267.0			39.0000			
-277	277	260.0				269.0			39.0000			
-278	278	260.0				270.0			39.0000			
-280	280	265.0				272.0			39.8000			
-282	282	265.0				274.0			39.8000			
-285	285	270.0				277.0			41.0000			
-287	278	270.0				279.0			41.0000			
-288	288	270.0				280.0			41.0000			
-290	290	275.0	20.0	6.00	+0.00/-0.15	282.0	5.00	6.20	41.8000			
-292	292	275.0				284.0			41.8000			
-295	295	280.0				287.0			43.0000			
-297	297	280.0				289.0			43.0000			
-298	298	280.0				290.0			43.0000			
-300	300	285.0				292.0			44.0000			
-305	305	288.0				295.0			73.8000			
-310	310	293.0				300.0			75.0000			
-315	315	298.0				305.0			76.0000			
-320	320	303.0				310.0			77.0000			
-325	325	308.0	20.0	6.00	+0.00/-0.15	315.0	5.00	6.20	78.7000			
-330	330	313.0				320.0			80.0000			
-335	335	318.0				325.0			82.6000			
-340	340	323.0				330.0			84.0000			
-345	345	328.0				335.0			84.5000			
-350	350	333.0				340.0			85.0000			
DSH-355	355	338.0				345.0			86.5000			

DSH

DESCRIPTION

Tapered-design ring to DIN 471 that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thick, see "DSHR" on page 158.



COMMON

ZINC PLATED



STACKED/ROLL PACK

NOT
AVAILABLE

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DSH ↔ DSHI (Page 160) ↔ DAK (Page 162) ↔ DAL (Page 163) ↔ DS (Page 190)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

HS



IMPERIAL
Page 6

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

DIN 471

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BASIC EXTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	D1400	Ellison	471	Seeger	A
Bossard	BN818-820	Rotor Clip	DSH	Waldes	D1400

 DIN
471

DSH	SHAFT	RING			GROOVE			WEIGHT	MATERIAL		TOOL		
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-SS"			
DSH-360	360	343.0	20.0	6.00	350.0	5.00	6.20	88.0000			-E045		
-365	365	348.0			355.0			88.5000					
-370	370	353.0			360.0			89.0000					
-375	375	358.0			365.0			91.0000					
-380	380	363.0			370.0			93.0000					
-385	385	368.0			375.0			94.0000					
-390	390	373.0			380.0			95.0000					
-395	395	378.0			385.0			99.0000					
-400	400	383.0			390.0			104.0000					
-410	410	390.0			398.0			132.0000					
-420	420	400.0	26.0	7.00	408.0	6.00	7.20	136.0000					-048
-430	430	410.0			418.0			139.0000					
-440	440	420.0			428.0			142.0000					
-450	450	430.0			438.0			145.0000					
-460	460	440.0			448.0			152.0000					
-470	470	450.0			458.0			159.0000					
-480	480	460.0			468.0			166.0000					
-490	490	470.0			478.0			172.5000					
-500	500	480.0			488.0			179.0000					
-510	510	485.0			496.0			230.0000					
-520	520	495.0	506.0	235.0000									
-530	530	505.0	516.0	240.0000									
-540	540	515.0	526.0	244.5000									
-550	550	525.0	536.0	249.0000									
-560	560	535.0	546.0	258.0000									
-570	570	545.0	556.0	267.0000									
-580	580	555.0	566.0	276.0000									
-590	590	565.0	576.0	284.0000									
-600	600	575.0	586.0	292.0000									
-650	650	620.0	34.0	9.00	634.0	8.00	9.20	377.0000					
-700	700	670.0			684.0	9.00		407.0000					
-750	750	715.0			732.0			464.0000					
-800	800	765.0			782.0	10.00		533.0000					
-850	850	810.0			830.0			603.0000					
-900	900	860.0			880.0	11.00		664.0000					
-950	950	900.0			928.0			726.0000					
DSH-1000	1000	950.0			978.0			813.0000					

TOOL DESCRIPTIONS ON PAGES 226 & 228.

DSH

Tapered-design ring to DIN 471 that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thick, see "DSHR" on page 158.

GENERAL USE


COMMON

ZINC PLATED

STACKED/ROLL PACK

 NOT
AVAILABLE

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DSH ← DSHI (Page 160) ← DAK (Page 162) ← DAL (Page 163) ← DS (Page 190)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.


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DIN 471 - HEAVY DUTY TYPE

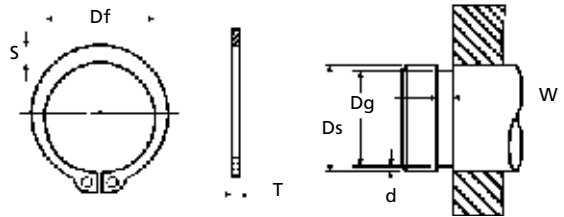


HEAVY DUTY EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Anderton	D1460	Ellison	EXT
Bossard	BN821	Seeger	AS



DSHR	SHAFT		RING			GROOVE			WEIGHT	MATERIAL	TOOL	
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel			
DSHR-012	12	11.0	+ .10/- .36	1.8	1.50	+ .00/- .06	11.5	+ .00/- .11	.25	1.60	0.0750	-E013
-015	15	13.8		2.4			14.3		.35		0.1200	-E018
-015B	15	13.8		2.0			14.2		.40		0.1200	-E013
-015C	15	13.7		2.4			14.2		.40		0.1140	-E018
-016	16	14.7		2.5			15.2		.40		0.1200	-E013
-016A	16	14.7		2.3			15.2		.40		0.1200	-E018
-016B	16	14.6		2.5			15.1		.45		0.1080	-E023
-017	17	15.7		2.6			16.2		.40		0.1240	
-017B	17	15.7		2.3			16.0		.50		0.1240	
-018	18	16.5		2.7			17.0		.50		0.1540	
-018A	18	16.3	2.4	16.8	.60	0.1540						
-019	19	17.5	2.8	18.0	.50	0.1450						
-019B	19	17.5	2.5	17.8	.60	0.1450						
-020	20	18.5	3.0	19.0	.50	0.2250						
-020B	20	18.3	3.0	18.8	.60	0.2310						
-020C	20	18.4	2.6	18.9	.55	0.2250						
-022	22	20.5	3.1	21.0	.50	0.2300						
-022A	22	20.3	3.2	20.8	.60	0.2400						
-023	23	21.3	3.2	21.8	.60	0.2600						
-024	24	22.2	3.2	22.9	.55	0.2700						
-024A	24	22.0	3.2	22.7	.65	0.2700						
-025	25	23.2	3.4	23.7	.65	0.3350						
-025A	25	23.0	3.4	23.7	.65	0.2400						
-026	26	23.6	3.3	24.4	.80	0.3650						
-027	27	24.7	3.4	25.5	.75	0.3850						
-028	28	25.9	3.5	26.6	.70	0.3900						
-028A	28	25.5	3.5	26.4	.80	0.3900						
-029	29	26.9	3.8	27.6	.70	0.4300						
-029A	29	26.9	3.5	27.6	.70	0.4070						
-030	30	27.9	4.1	28.6	.70	0.5000						
-030B	30	27.6	3.7	28.3	.85	0.4500						
-032	32	29.6	4.1	30.3	.85	0.5400						
-033	33	31.3	4.0	31.3	.85	0.5200						
-033A	33	30.5	4.0	31.3	.85	0.5200						
-034	34	31.5	4.2	32.1	.95	0.6800						
-034A	34	31.3	4.2	32.1	.95	0.6800						
-035	35	32.2	4.2	33.0	1.00	0.7100						
-035A	35	32.0	4.1	32.8	1.10	0.7000						
-036	36	33.2	4.2	34.0	1.00	0.7500						
DSHR-036A	36	33.0	4.2	33.8	1.10	0.7500						

TOOL DESCRIPTIONS ON PAGE 226 & 228

DSHR

DESCRIPTION

Extra-thick version of the DIN 471 DSH that is stronger and yields higher thrust loads. Installed axially using the same tools. Note that the DSHR will require a wider groove than the DSH.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thin, see "DSH" on page 152.

GENERAL USE



UNCOMMON

DSHR
CONTINUED
NEXT PAGE.

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DIN 471 - HEAVY DUTY TYPE

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HEAVY DUTY EXTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

 Anderton D1460
Bossard BN821

 Ellison EXT
Seeger AS

 DIN
471

DSHR	SHAFT	RING			GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	
DSHR-038	38	35.2	4.3	2.50	36.0	1.00	2.65	0.8000		-E023
-038A	38	35.0	4.5		35.8	1.10		0.8000		
-040	40	36.5	4.4		37.5	1.25		0.8200		
-042	42	38.5	4.5		39.5			0.9600		
-044	44	40.5	4.5		41.5			1.0400		
-045	45	41.5	4.7		42.5			1.0800		
-048	48	44.5	5.0	45.5	1.50	1.2200				
-050	50	45.8	5.1	47.0		1.4800				
-052	52	47.8	5.2	49.0		1.5400				
-055	55	50.8	5.4	52.0		1.7000				
-058	58	53.8	5.6	55.0		1.9400				
-060	60	55.8	5.8	57.0	1.75	2.0000				
-065	65	60.8	6.3	62.0		3.1000				
-070	70	65.5	6.6	67.0		3.2200				
-075	75	70.5	7.0	72.0		3.9800				
-080	80	74.5	7.4	76.5		4.2400				
-085	85	79.5	7.8	81.5	4.15	4.7000				
-090	90	84.5	8.2	86.5		5.5600				
-095	95	89.5	8.6	91.5		6.1200				
-100	100	94.5	9.0	96.5		7.2000				
-105	105	98.0	9.3	101.0	2.00	10.0000				
-110	110	103.0	9.6	106.0		10.2000				
-115	115	108.0	9.8	111.0		10.5000				
-120	120	113.0	10.2	116.0		10.7000				
-125	125	118.0	10.4	121.0		11.2000				
-130	130	123.0	10.7	126.0	2.50	12.5000				
-135	135	128.0	11.0	131.0		13.0000				
-140	140	133.0	11.2	136.0		13.7000				
-145	145	138.0	11.5	141.0		14.3000				
-150	150	142.0	11.8	145.0		15.0000				
-155	155	146.0	12.0	150.0	5.15	16.9000				
-160	160	151.0	12.2	155.0		18.7000				
-165	165	155.5	12.5	160.0		20.0000				
-170	170	160.5	12.9	165.0		21.3000				
-175	175	165.5	12.9	170.0		22.5000				
-180	180	170.5	13.5	175.0		23.8000				
-185	185	175.5	13.5	180.0		25.0000				
-190	190	180.5	14.0	185.0		26.3000				
-195	195	185.5	14.0	190.0		27.5000				
DSHR-200	200	190.5	14.0	195.0		28.8000				

DSHR

Extra-thick version of the DIN 471 DSH that is stronger and yields higher thrust loads. Installed axially using the same tools. Note that the DSHR will require a wider groove than the DSH.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thin, see "DSH" on page 152.

GENERAL USE


UNCOMMON

SHR

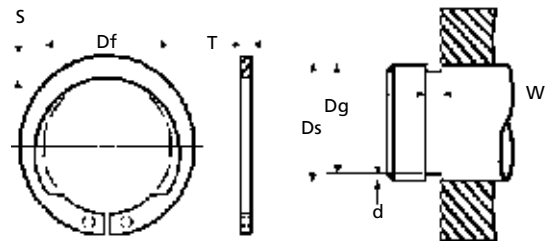
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INVERTED LUGS



INVERTED EXTERNAL

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Anderton

M1408

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EXTV

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BN829

Seeger

AV

DSHI	SHAFT	RING			GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	
DSHI-010	10	9.2	1.8	.60	9.5	.25	.70	0.0250		
-012	12	11.0	2.1		11.5			0.0500		
-013	13	11.9	2.1		12.4			0.0560		
-014	14	12.9	2.1		13.4	.30	1.10	0.0580		-E009
-015	15	13.8	2.2		14.3	.35		0.0660		
-016	16	14.7	2.3		15.2	.40		0.0720		
-017	17	15.7	2.4		16.2			0.0810		
-018	18	16.5	2.6		17.0			0.1140		
-020	20	18.5	2.8		19.0			0.1430		
-021	21	19.35	2.8		20.0	.50	1.30	0.1530		-E013
-022	22	20.5	3.0		21.0			0.1630		
-023	23	21.5	3.1		22.0			0.1780		
-024	24	22.2	3.2		22.9			0.1900		
-025	25	23.2	3.4		23.9	.55		0.2100		
-026	26	24.2	3.5		24.9			0.2180		
-028	28	25.9	3.8		26.6	.70	1.60	0.3180		-E018
-030	30	27.9	3.9		28.6			0.3580		
-032	32	29.6	4.0		30.3	.85		0.3880		
-034	34	31.5	3.5		32.3			0.3600		
-035	35	32.2	4.2		33.0	1.00	1.85	0.4530		
-038	38	34.5	4.5		35.8	1.10		0.5500		
-040	40	36.5	4.7		37.5			0.6490		
-042	42	38.5	4.7		39.5			0.6510		
-045	45	41.5	4.7		42.5	1.25		0.7800		
-047	47	43.5	5.0		44.5			0.8090		
-048	48	44.5	5.2		45.5			0.8480		
-050	50	45.8	5.2		47.0			0.9840		
-055	55	50.8	5.8		52.0		2.15	1.1420		
-058	58	53.8	5.8		55.0			1.3000		
-060	60	55.8	5.8		57.0	1.50		1.3800		-E023
-065	65	60.8	6.0		62.0			2.0750		
-070	70	65.5	6.5		67.0			2.3700		
-072	72	67.5	6.5		69.0		2.65	2.4700		
-075	75	70.5	6.5		72.0			2.7500		
-080	80	74.5	7.0		76.5			2.8900		
-082	82	76.5	7.0		78.5			2.9650		
-085	85	79.5	7.4		81.5	1.75	3.15	3.9500		-E032
-087	87	81.5	7.4		83.5			4.0000		
-090	90	84.5	7.4		86.5			4.1920		
DSHI-100	100	94.5	8.0		96.5			4.9920		

TOOL PRICES AND DESCRIPTIONS ON PAGE 226.

DSHI

DESCRIPTION

Tapered section ring similar to the DSH, except the lugs are inverted (on the ID), to allow use in tight areas with minimal clearance. Less thrust load than DSH. Installed axially using pliers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S).
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

SHI

IMPERIAL
Page 10

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DSHI

DSH (Page 152)

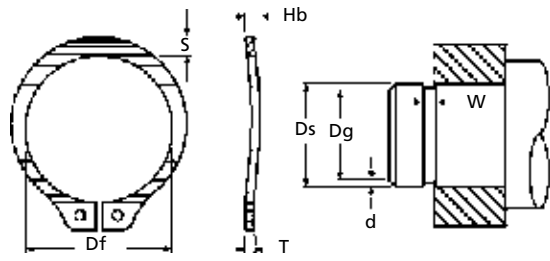
DAK (Page 162)

DAL (Page 163)

DS (Page 190)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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BOWED EXTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Seeger

AW



DBSH	SHAFT	RING				GROOVE		WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Bow Height (Hb)	Diameter (Dg)	Width (Min.) (W)	Kg per 100 Pieces	Spring Steel	
DBSH-040	40	36.5	+ .39/- .90	4.4	1.75	37.3	+ .00/- .25	0.6030	-E023	
-042	42	38.5		4.5		39.3		0.6500		
-045	45	41.5		4.7		42.3		0.7500		
-047	47	43.5		4.9		44.3		0.7500		
-048	48	44.5		5.0		45.3		0.7900		
-050	50	45.8	+ .46/- 1.10	5.1	2.00	46.7	+ .00/- .30	1.0200		
-052	52	47.8		5.2		48.7		1.1100		
-055	55	50.8		5.4		51.7		1.1400		
-057	57	52.8		5.5		53.7		1.2200		
-058	58	53.8		5.6		54.7		1.2600		
-060	60	55.8		5.8		56.7		1.2900		
-062	62	57.8		6.0		58.7		1.4300		
-063	63	58.8		6.2		59.7		1.5900		
-065	65	60.8		6.3		61.7		1.8200		
-067	67	62.8		6.4		63.7		2.0300		
-068	68	63.8	+ .54/- 1.30	6.5	2.50	64.7	+ .00/- .35	2.1800		
-070	70	65.8		6.6		66.7		2.2000		
-072	72	67.5		6.8		68.7		2.2500		
-075	75	70.5		7.0		71.7		2.4600		
-077	77	72.5		7.2		73.7		2.5700		
-078	78	73.5		7.3		74.7		2.6200		
-080	80	74.5		7.4		76.0		2.7300		
-082	82	76.5		7.6		78.0		3.1200		
-085	85	79.5		7.8		81.0		3.6400		
-087	87	81.5		7.9		83.0		3.9800		
-088	88	82.5	+ .63/- 1.50	8.0	3.00	84.0	+ .00/- .54	4.1200	-E032	
-090	90	84.5		8.2		86.0		4.4500		
-092	92	86.5		8.4		88.0		4.6000		
-095	95	89.5		8.6		91.0		4.9000		
-097	97	91.5		8.8		93.0		5.0200		
-098	98	92.5		9.0		94.0		5.0200		
-100	100	94.5		9.0		96.0		5.3700		
-105	105	98.0		9.3		100.5		8.0000		
-110	110	103.0		9.6		105.5		8.2000		
-115	115	108.0		9.8		110.5		8.4000		
-120	120	113.0	+ 2.00/- .00	10.2	4.00	115.5	+ .00/- .63	8.6000	-E035	
-125	125	118.0		10.4		120.5		9.0000		
-130	130	123.0		10.7		125.5		10.0000		
-140	140	133.0		11.2		135.5		11.0000		
DBSH-150	150	142.0		11.8	8.5	144.5		12.0000		

DBSH

Curved design for resilient end-play take-up of rattling in linkages provides tension on adjusting screws. Also used to salvage assemblies where grooves have been cut too wide.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Verify bowed-shape side profile.
2. Measure the shaft diameter (Ds).
3. Determine the ring thickness (T).
4. Measure the maximum radial wall (S) of the ring.
5. Find the part in the chart above.

GENERAL USE

BSH

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DIN 983



TABBED EXTERNAL

MANUFACTURER CROSS-REFERENCE

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Anderton

D2100

Seeger

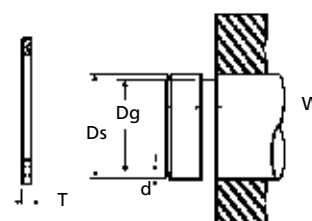
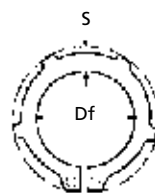
AK

Ellison

983

DIN

983



DAK	SHAFT	RING				GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	
DAK-016	16	14.7	2.3	1.00		15.2	.40	1.10	0.0820		-E013
-017	17	15.7	2.4			16.2			0.0930		
-018	18	16.5	2.5			17.0			0.1240		
-019	19	17.5	2.6			18.0			0.1350		
-020	20	18.5	2.6			19.0			0.1450		
-022	22	20.5	2.8	1.20		21.0	.50	1.30	0.1770		
-023	23	21.5	2.9			22.0			0.1840		
-024	24	22.2	3.0			22.9			0.1980		
-025	25	23.2	3.0			23.9	.55		0.2120		
-026	26	24.2	3.1			24.9			0.2180		
-028	28	25.9	3.3			26.6			0.3150		-E018
-029	29	26.9	3.4			27.6	.70		0.3350		
-030	30	27.9	3.4	1.50		28.6		1.60	0.3650		
-032	32	29.6	3.6			30.3	.85		0.4000		
-034	34	31.5	3.8			32.3			0.4150		
-035	35	32.2	3.8			33.0			0.4380		
-037	37	34.2	4.0			35.0	1.00		0.6300		
-038	38	35.2	4.1			36.0			0.6500		
-040	40	36.5	4.2			37.5			0.7000		
-042	42	38.5	4.5	1.75		39.5	1.25	1.85	0.7500		
-045	45	41.5	4.6			42.5			0.8500		
-047	47	43.5	4.8			44.5			0.8700		
-048	48	44.5	4.9			45.5			0.8900		
-050	50	45.8	5.0			47.0			1.1550		
-055	55	50.8	5.4			52.0			1.2990		
-057	57	52.8	5.6	2.00		54.0		2.15	1.4000		-E023
-058	58	53.8	5.7			55.0			1.4300		
-060	60	55.8	5.8			57.0	1.50		1.4800		
-062	62	57.8	5.9			59.0			1.5900		
-065	65	60.8	6.2			62.0			2.1700		
-067	67	62.5	6.4			64.0			2.2600		
-068	68	63.5	6.5	2.50		65.0		2.65	2.3500		
-070	70	65.5	6.6			67.0			2.5100		
-080	80	74.5	7.4			76.5			3.0750		
-090	90	84.5	8.2	3.00		86.5	1.75	3.15	4.7700		
-100	100	94.5	9.0			96.5			5.6600		-E032
-110	110	103.0	9.6			106.0			8.4600		
-120	120	113.0	10.1	4.00		116.0	2.00	4.15	8.9700		
-130	130	123.0	10.7			126.0			10.5000		-E035
DAK-140	140	133.0	11.2			136.0			11.5000		

TOOL DESCRIPTIONS ON PAGES 226 & 228.

DAK

DESCRIPTION

External tabs are concentrically positioned for positioning in a concealed assembly. Tabs act as spacers for securing machine components. Conforms to DIN 983.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify the presence of tabs on the ring periphery.
2. Measure the shaft diameter (Ds).
3. Determine the ring thickness (T).
4. Measure the maximum radial wall (S) of the ring.
5. Find the part in the chart above.

GENERAL USE



UNCOMMON

**SAME
SIZING AS
DSH,
BUT WITH
EXTERNAL
TABS.**

GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

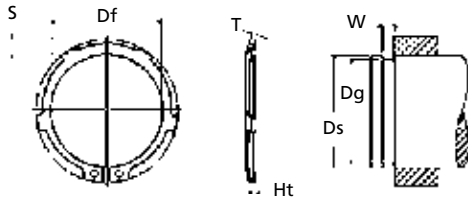
DAK ↔ DSH (Page 152) ↔ DSHI (Page 160) ↔ DAL (Page 163) ↔ DS (Page 190)

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BOWED TABBED EXTERNAL
MANUFACTURER CROSS-REFERENCE

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Seeger



AL



DAL	SHAFT	RING				GROOVE		WEIGHT	MATERIAL	TOOL		
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Wall Thick- ness (T)	Tab Height (Ht)	Diameter (Dg)	Width (W)	Kg per 100 Pieces	Spring Steel			
DAL-016	16	14.7	+10/-36	2.3	.60	.35	15.2	+100/-11	.70	0.0820		-E013
-017	17	15.7		2.4	.80		16.2		0.0930			
-018	18	16.5		2.5			17.0		.90	0.1240		
-019	19	17.5		2.6			18.0		0.1350			
-020	20	18.5	+13/-42	2.6		1.20		19.0	+100/-15	1.30	0.1450		-E018
-022	22	20.5		2.8	21.0			0.1770				
-023	23	21.5		2.9	22.0			0.1840				
-024	24	22.2		3.0	22.9			0.1980				
-025	25	23.2	3.0	23.9	0.2120							
-026	26	24.2	3.1	24.9	0.2180							
-028	28	25.9	3.3	26.6	0.3150							
-029	29	26.9	3.4	27.6	0.3350							
-030	30	27.9	3.4	28.6	0.3650							
-032	32	29.6	3.6	1.50	.45	30.3	1.60	0.4000				
-034	34	31.5	3.8			32.3		0.4150				
-035	35	32.2	3.8			33.0		0.4380				
-037	37	34.2	4.0			35.0		0.6300				
-038	38	35.2	4.1	1.75	.50	36.0	1.85	0.6500				
-040	40	36.5	4.2			37.5		0.7000				
-042	42	38.5	4.5			39.5		0.7500				
-045	45	41.5	4.6			42.5		0.8500				
-047	47	43.5	4.8	2.00	.60	44.5	2.15	0.8700				
-048	48	44.5	4.9			45.5		0.8900				
-050	50	45.8	5.0			47.0		1.1550				
-055	55	50.8	5.4			52.0		1.2990				
-057	57	52.8	5.6	2.50	.80	54.0	2.65	1.4000				
-058	58	53.8	5.7			55.0		1.4300				
-060	60	55.8	5.8			57.0		1.4800				
-062	62	57.8	5.9			59.0		1.5900				
-065	65	60.8	6.2	3.00	1.00	62.0	3.15	2.1700				
-067	67	62.5	6.4			64.0		2.2600				
-068	68	63.5	6.5			65.0		2.3500				
-070	70	65.5	6.6			67.0		2.5100				
-075	75	70.5	7.0			72.0		2.8200				
-080	80	74.5	7.4			76.5		3.0750				
-085	85	79.5	7.8			81.5		3.9500				
-090	90	84.5	8.2			86.5		4.7700				
-095	95	89.5	8.6			91.5		5.3000				
DAL-100	100	94.5	9.0			96.5		5.6600				

TOOL DESCRIPTIONS ON PAGES 226 & 228.

TOOL DESCRIPTIONS ON PAGES 226 & 228.

DAL	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	CURVED SHAPE WITH EXTERNAL TABS. SIMILAR IN SIZE TO DSH.
	Bowed version of DIN 983 for concealed assemblies requiring end-play take-up.	<div><div>1. Verify bowed-shape side profile, with tabs on the ring periphery.</div><div>2. Measure the shaft diameter (Ds).</div><div>3. Determine the ring thickness (T).</div><div>4. Confirm the maximum radial wall (S) of the ring.</div><div>5. Find the part in the chart above.</div></div> <td><div><div>WEIRD</div></div></td>	<div><div>WEIRD</div></div>	
	AXIAL ASSEMBLY			
	<div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div><div><div>DAL</div><div>DSH (Page 152)</div><div>DSHI (Page 160)</div><div>DAK (Page 162)</div><div>DS (Page 190)</div></div></div>			

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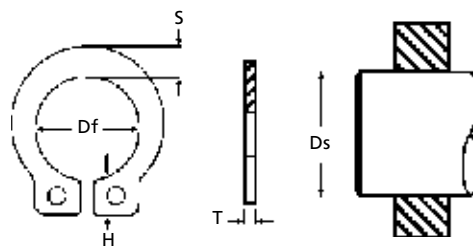
 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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ADJUSTABLE AND REMOVABLE



GROOVELESS

MANUFACTURER CROSS-REFERENCE

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Seeger

GA

DSHF

SHAFT	RING				WEIGHT	MATERIAL	TOOL
MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Lug Height Max. (H)	Thickness (T)	Assembled Outside Diameter	Kg per 100 Pieces	Spring Steel
DSHF-006	6	5.70	2.5	3.0	12.2	0.0410	-ZGG1
-008	8	7.70	3.0	3.9	16.0	0.0530	-ZGG2
-009	9	8.65	3.3	3.6	16.4	0.0794	-ZGG1
-011	11	10.60	4.2	4.3	19.8	0.1230	-ZGG1
-012	12	11.60	4.6	4.3	21.4	0.1484	-ZGG1
-013	13	12.55	5.0	4.7	23.2	0.1726	-ZGG2
-015	15	14.50	5.6	5.3	26.4	0.2836	-ZGG2
-016	16	15.40	5.9	5.5	28.0	0.3110	-ZGG3
DSHF-017	17	16.35	6.3	6.5	30.2	0.4350	-ZGG3

DSHF

DESCRIPTION

Reusable tapered section ring for grooveless shafts like plastics, tubes, and castings, or where adjustable ring placement is desired (like progressively tightening a compression spring). Installed using pliers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Find the part in the chart above.

Note: In metric applications, the DSHX (page 165) seems to be more popular.

GENERAL USE



WEIRD

METRIC
VERSION OF
AMERICAN
DESIGN.



GROOVELESS

USE ANY OF THESE PARTS ON THE SAME SIZED SHAFT.

DSHF

DSHX (Page 165)

DTX (Page 212)

DTR (Page 213)

DKS (Page 213)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

SHF

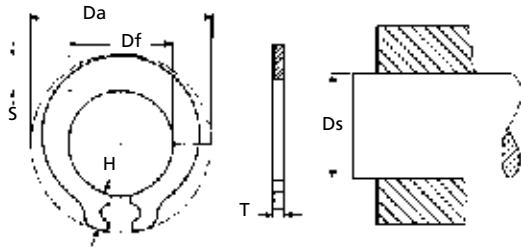


IMPERIAL
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MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

ADJUSTABLE AND REMOVABLE

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GROOVELESS / OPEN LUG

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton

M1440

Ellison

GR

Bossard

BN832

Seeger

G



DSHX	SHAFT		RING				WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Lug Height Max. (H)	Thickness (T)	Assembled Outside Dia. (Da)	Kg per 100 Pieces	Spring Steel	
DSHX-0015	1.5	1.40	+/- .020	.7	1.7	.40	5.1	0.0013	-ZGG0
-002	2.0	1.90		1.0	1.9		6.0	0.0036	
-0022	2.2	2.05	+/- .025	1.1	1.9		6.2	0.0038	
-0025	2.5	2.35	+/- .030	1.2	1.9	.60	6.5	0.0045	
-0028	2.8	2.65	+/- .035	1.3	2.0		7.0	0.0057	
-003	3.0	2.85	+/- .040	1.4	2.1		7.4	0.0065	
-0035	3.5	3.30	+/- .050	1.6	2.3		8.3	0.0081	
-004	4.0	3.80	+/- .060	1.8	2.7	.80	9.6	0.0154	
-0045	4.5	4.25		2.0	2.9		10.5	0.0173	
-005	5.0	4.75	+/- .075	2.2	2.9		11.0	0.0200	
-0055	5.5	5.20		2.2	3.0		11.7	0.0216	
-006	6.0	5.70	+/- .090	2.4	3.2	1.00	12.6	0.0402	
-007	7.0	6.70		2.7	3.4		14.0	0.0428	
-008	8.0	7.70	+/- .090	3.0	3.5		15.2	0.0524	
-009	9.0	8.65		3.3	4.7		18.6	0.0808	
-010	10.0	9.65	+/- .110	3.5	4.7		19.6	0.0944	
-0105	10.5	10.20		3.8	4.0	1.20	18.7	0.1100	
-011	11.0	10.60		4.2	4.8		20.8	0.1208	
-012	12.0	11.60		4.6	4.8		21.8	0.1454	
-013	13.0	12.55		5.0	5.3		23.8	0.1750	
-0138	13.8	13.30	+/- .130	5.4	5.1	1.50	24.8	0.2492	
-014	14.0	13.50		5.4	5.1		25.0	0.2456	
-015	15.0	14.50		5.6	5.1		26.4	0.2716	
-016	16.7	15.40		5.8	5.6		27.8	0.2940	
-017	17.0	16.35		6.2	6.0		29.5	0.4010	
-018	18.0	17.30		6.6	6.1	1.75	31.4	0.4460	-ZGG3
-020	20.0	19.30		7.1	6.1		34.4	0.5270	
-022	22.0	21.20		7.4	6.6		37.0	0.6060	
-024	24.0	23.15		7.8	6.6		39.8	0.7000	
-025	25.0	24.15		8.2	6.6		41.6	0.7450	
DSHX-030	30.0	29.00		9.0	9.0		48.2	1.0000	

TOOL DESCRIPTIONS ON PAGE 226.

DSHX

DESCRIPTION

Reusable tapered section ring for grooveless shafts like plastics, tubes, and castings, or where adjustable ring placement is desired (like progressively tightening a compression spring). Installed using pliers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Find the part in the chart above.

GENERAL USE



COMMON

THIS DESIGN
IS MORE
COMMON IN
EUROPE AND
INTERNATIONALLY.

DSHX

DSHF (Page 164)

DTX (Page 212)

DTR (Page 213)

DKS (Page 213)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.



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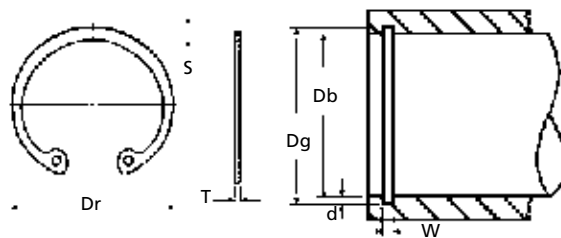


BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Anderton	D1300	Ellison	472	Seeger	J
Bossard	BN822-823	Rotor Clip	DHO	Waldes	D1300



DHO	BORE		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-SS"	
DHO-008	8	8.7	1.1	.80	+00/-05	8.4	.20	.90	0.0100			-1009
-009	9	9.8	1.3			9.4			0.0130			
-010	10	10.8	1.4			10.4			0.0260			
-011	11	11.8	1.5			11.4			0.0310			
-012	12	13.0	1.7			12.5			0.0370			
-013	13	14.1	1.8			13.6			0.0420			
-014	14	15.1	1.8			14.6			0.0520			
-015	15	16.2	2.0			15.7			0.0560			
-016	16	17.3	2.0	1.00		16.8			0.0600			
-017	17	18.3	2.1			17.8			0.0650			
-018	18	19.5	2.2		+00/-06	19.0	.25	1.10	0.0740			-1011
-019	19	20.5	2.2			20.0			0.0830			
-020	20	21.5	2.3			21.0			0.0900			
-021	21	22.5	2.4			22.0			0.1000			
-022	22	23.5	2.5			23.0			0.1100			
-023	23	24.6	2.5			24.1			0.1340			
-024	24	25.9	2.6			25.2			0.1420			
-025	25	26.9	2.7			26.2			0.1500			
-026	26	27.9	2.8			27.2			0.1600			
-027	27	29.1	2.9			28.4			0.1750			
-028	28	30.1	2.9	1.20	+00/-06	29.4	.30	1.30	0.1800			-1018
-029	29	31.1	3.0			30.4			0.1880			
-030	30	32.1	3.0			31.4			0.2060			
-031	31	33.4	3.1			32.7			0.2100			
-032	32	34.4	3.2			33.7			0.2210			
-033	33	35.5	3.3			34.7			0.2400			
-034	34	36.5	3.3			35.7			0.3200			
-035	35	37.8	3.4			37.0			0.3540			
-036	36	38.8	3.5			38.0			0.3700			
-037	37	39.8	3.6	1.50		39.0			0.3740			
-038	38	40.8	3.7		+00/-06	40.0	.35	1.60	0.3900			-1023
-039	39	42.0	3.8			41.0			0.4000			
-040	40	43.5	3.9			42.5			0.4700			
-041	41	44.5	4.0			43.5			0.5100			
-042	42	45.5	4.1	1.75		44.5			0.5400			
-043	43	46.5	4.2			45.5			0.5600			
-044	44	47.5	4.2			46.5			0.5800			
DHO-045	45	48.5	4.3			47.5			0.6000			

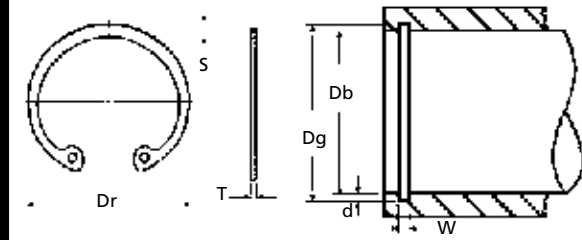
TOOL DESCRIPTIONS ON PAGES 227 & 228.

DHO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC PLATED
	Tapered section ring to DIN 472 that is installed axially with pliers into a housing or bore. High thrust load rating. Stacked roll pack prevents tangling for ease in handling.	<ol style="list-style-type: none"> 1. Measure the bore diameter (Db). 2. Determine the ring thickness (T). 3. Measure the maximum radial wall (S) of the ring. 4. Find the part in the chart above. 	 COMMON	 STACKED/ROLL PACK
<p>AXIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>DHO ← DHOI (Page 172) ← DJK (Page 175) ← DH (Page 194) ← DJL (Page 177)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

BASIC INTERNAL**MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Anderton	D1300	Ellison	472	Seeger	J
Bossard	BN822-823	Rotor Clip	DHO	Waldes	D1300

DIN
472

DHO	BORE		RING			GROOVE				WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	Stainless "-SS"				
DHO-046	46	49.5	+1.10/-46	4.4	1.75	+0.00/-0.06	48.5	1.25	1.85	0.6050			
-047	47	50.5		4.4			49.5			0.6100			
-048	48	51.5		4.5			50.5			0.6700			
-050	50	54.2		4.6			53.0			0.7300			
-051	51	55.2		4.7			54.0			0.7750			
-052	52	56.2		4.7			55.0			0.8200			
-053	53	57.2		4.9			56.0			0.8220			
-054	54	58.2		5.0			57.0			0.8250			
-055	55	59.2		5.0			58.0			0.8300			
-056	56	60.2		5.1			59.0			0.8800			
-057	57	61.2	5.1	60.0	0.9400								
-058	58	62.2	5.2	61.0	1.0500								
-060	60	64.2	5.4	63.0	1.1100								
-062	62	66.2	5.5	65.0	1.1200								
-063	63	67.2	5.6	66.0	1.2400								
-064	64	68.2	5.7	67.0	1.2450								
-065	65	69.2	5.8	68.0	1.4300								
-067	67	71.5	6.0	70.0	1.6000								
-068	68	72.5	6.1	71.0	1.6000								
-070	70	74.5	6.2	73.0	1.6500								
-072	72	76.5	6.4	75.0	1.8100								
-075	75	79.5	6.6	78.0	1.8800								
-077	77	82.5	6.8	80.0	2.0400								
-078	78	82.5	6.8	81.0	2.0400								
-080	80	85.5	7.0	83.5	2.2000								
-081	81	86.5	7.0	84.5	2.3000								
-082	82	87.5	7.0	85.5	2.4000								
-083	83	88.5	7.0	86.5	2.5000								
-085	85	90.5	7.2	88.5	2.5300								
-087	87	93.5	7.4	90.5	3.1000								
-088	88	93.5	7.4	91.5	3.1000								
-090	90	95.5	7.6	93.5	3.3000								
-092	92	97.5	7.8	95.5	3.5000								
-095	95	100.5	8.1	98.5	3.7000								
-097	97	103.5	8.3	100.5	4.1000								
-098	98	103.5	8.3	101.5	4.1000								
-100	100	105.5	8.4	103.5	4.2000								
-102	102	108.0	8.5	106.0	5.5000								
-105	105	112.0	8.7	109.0	5.6000								
-107	107	115.0	8.9	111.0	6.0000								
-108	108	115.0	8.9	112.0	6.0000								
-110	110	117.0	9.0	114.0	6.4500								
-112	112	119.0	9.1	116.0	7.2000								
-115	115	122.0	9.3	119.0	7.4500								
-117	117	125.0	9.6	121.0	7.5500								
-118	118	125.0	9.6	122.0	7.5500								
-120	120	127.0	9.7	124.0	7.7000								
-122	122	129.0	9.8	126.0	7.8000								
-125	125	132.0	10.0	129.0	7.9000								
-127	127	135.0	10.0	131.0	8.1100								
-128	128	135.0	10.2	132.0	8.1100								
-130	130	137.0	10.2	134.0	8.2000								
-132	132	139.0	10.3	136.0	8.3000								
DHO-135	135	142.0	10.5	139.0	8.4000								

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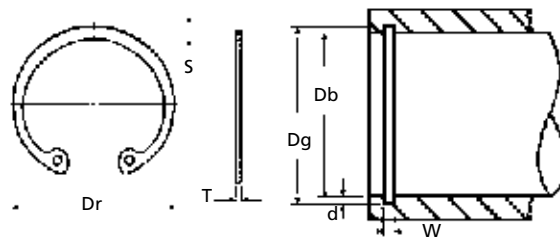


BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

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Anderton	D1300	Ellison	472	Seeger	J
Bossard	BN822-823	Rotor Clip	DHO	Waldes	D1300



DHO	BORE		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
DHO-137	137	145.0	10.6			141.0			8.6000			
-138	138	145.0	10.6			142.0			8.6000			
-140	140	147.0	10.7			144.0			8.7500			
-142	142	149.0	10.8			146.0	2.00		8.9000			
-145	145	152.0	10.9			149.0			9.3000			
-147	147	155.0	11.1			151.0			10.0000			
-148	148	155.0	11.1			152.0			10.0000			
-150	150	158.0	11.2			155.0			10.5000			
-152	152	161.0	11.3			157.0			10.6000			
-155	155	164.0	11.4			160.0			10.7000			
-157	157	167.0	11.5			162.0			10.9000			
-158	158	167.0	11.5			163.0			10.9000			
-160	160	169.0	11.6			165.0			11.0000			
-162	162	171.5	11.7			167.0			11.8000			
-165	165	174.5	11.8			170.0			12.5000			
-167	167	177.5	12.1			172.0			13.5000			
-168	168	177.5	12.1	4.00	+0.00/-0.10	173.0		4.15	13.5000			
-170	170	179.5	12.2			175.0			14.0000			
-172	172	181.5	12.5			177.0			14.5000			
-175	175	184.5	12.7			180.0	2.50		15.0000			
-177	177	187.5	12.9			182.0			16.2000			
-178	178	187.5	12.9			183.0			16.2000			
-180	180	189.5	13.2			185.0			16.5000			
-182	182	191.5	13.5			187.0			16.8000			
-185	185	194.5	13.7			190.0			17.0000			
-187	187	197.5	13.8			192.0			17.4000			
-188	188	197.5	13.8			193.0			17.4000			
-190	190	199.5	13.8			195.0			17.5000			
-192	192	201.5	13.8			197.0			17.8000			
-195	195	204.5	13.8			200.0			18.3000			
-197	197	207.5	14.0			202.0			19.0000			
-198	198	207.5	14.0			203.0			19.0000			
-200	200	209.5	14.0			205.0			19.5000			
-202	202	214.0	14.0			208.0			21.0000			
-205	205	217.0	14.0			211.0			22.5000			
-207	207	217.0	14.0	5.00	+0.00/-0.12	213.0	3.00	5.15	22.5000			
-208	208	222.0	14.0			214.0			27.0000			
DHO-210	210	222.0	14.0			216.0			27.0000			

TOOL DESCRIPTIONS ON PAGES 227 & 228.

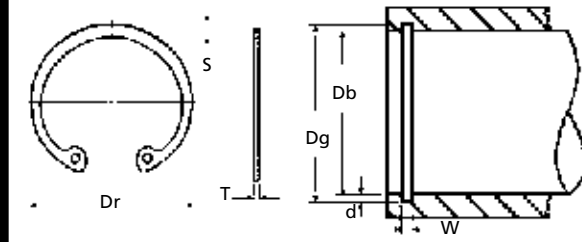
DHO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC PLATED
	Tapered section ring to DIN 472 that is installed axially with pliers into a housing or bore. High thrust load rating. Stacked roll pack prevents tangling for ease in handling.	<ol style="list-style-type: none"> 1. Measure the bore diameter (Db). 2. Determine the ring thickness (T). 3. Measure the maximum radial wall (S) of the ring. 4. Find the part in the chart above. 	 COMMON	 STACKED/ROLL PACK
<p>AXIAL ASSEMBLY</p> <p>GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</p> <p>DHO ← DHOI (Page 172) ← DJK (Page 175) ← DH (Page 194) ← DJL (Page 177)</p> <p>PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.</p>				

HO IMPERIAL
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MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

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PAGE 236

Anderton	D1300	Ellison	472	Seeger	J
Bossard	BN822-823	Rotor Clip	DHO	Waldes	D1300

DIN
472

DHO	BORE		RING			GROOVE			WEIGHT	MATERIAL		TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-SS"		
DHO-212	212	222.0	+1.70/- .72	14.0	+ .72/- .00	3.00	5.15	27.0000			-1035	
-215	215	227.0						30.0000				
-217	217	227.0						30.0000				
-218	218	232.0						31.5000				
-220	220	232.0						31.5000				
-222	222	232.0						31.5000				
-225	225	237.0						32.3000				
-227	227	237.0						32.3000				
-228	228	242.0						33.0000				
-230	230	242.0						33.0000				
-232	232	242.0						33.0000				
-235	235	247.0						33.8000				
-237	237	247.0						33.8000				
-238	238	252.0						34.5000				
-240	240	252.0	34.5000									
-242	242	252.0	34.5000									
-245	245	257.0	35.3000									
-247	247	257.0	35.3000									
-248	248	262.0	36.0000									
-250	250	262.0	36.0000									
-252	252	262.0	36.0000									
-255	255	270.0	36.8000									
-257	257	270.0	36.8000									
-258	258	275.0	37.5000									
-260	260	275.0	37.5000									
-262	262	275.0	37.5000									
-265	265	280.0	38.3000									
-267	267	280.0	38.3000									
-268	268	285.0	38.8000									
-270	270	285.0	38.8000									
-272	272	285.0	38.8000									
-275	275	290.0	39.3000									
-277	277	290.0	39.3000									
-278	278	295.0	40.0000									
-280	280	295.0	40.0000									
-282	282	295.0	40.0000									
-285	285	300.0	40.8000									
-287	287	300.0	40.8000									
-288	288	305.0	41.5000									
-290	290	305.0	41.5000									
-292	292	305.0	41.5000									
-295	295	310.0	42.6000									
-297	297	310.0	42.6000									
-298	298	315.0	43.5000									
-300	300	315.0	43.5000									
-305	305	322.0	75.5000									
-310	310	327.0	77.0000									
-315	315	332.0	78.5000									
-320	320	337.0	80.0000									
-325	325	342.0	81.0000									
-330	330	347.0	82.0000									
-335	335	352.0	83.0000									
-340	340	357.0	84.0000									
DHO-345	345	362.0	85.5000									

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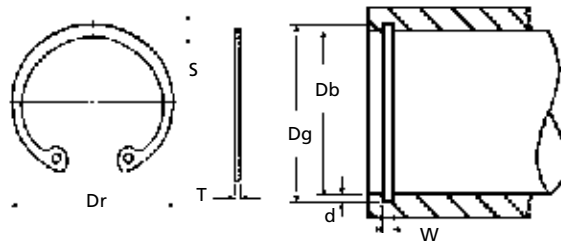


BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	D1300	Ellison	472	Seeger	J
Bossard	BN822-823	Rotor Clip	DHO	Waldes	D1300



DHO	BORE	RING				GROOVE			WEIGHT	MATERIAL		TOOL		
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-SS"			
DHO-350	350	367.0	+2.00/- .90	20.0	6.00	360.0	5.00	6.20	87.0000			-1045		
-355	355	372.0				365.0			88.0000					
-360	360	377.0				370.0			89.0000					
-365	365	382.0				375.0			90.6000					
-370	370	387.0				380.0			92.0000					
-375	375	392.0				385.0			93.2000					
-380	380	397.0				390.0			94.0000					
-385	385	402.0				395.0			95.0000					
-390	390	407.0				400.0			96.0000					
-395	395	412.0				405.0			97.2000					
-400	400	417.0	410.0	98.0000										
-410	410	430.0	+2.00/-1.00	26.0	7.00	422.0	6.00	7.20	138.0000					-048
-420	420	440.0				432.0			141.0000					
-430	430	450.0				442.0			144.0000					
-440	440	460.0				452.0			147.0000					
-450	450	470.0				462.0			151.0000					
-460	460	480.0				472.0			155.0000					
-470	470	490.0				482.0			159.5000					
-480	480	500.0				492.0			164.0000					
-490	490	510.0				502.0			168.5000					
-500	500	520.0				512.0			173.0000					
-510	510	535.0	+1.00/- .00	8.00	7.00	8.20	524.0	225.0000						
-520	520	545.0					534.0	229.0000						
-530	530	555.0					544.0	233.5000						
-540	540	565.0					554.0	238.0000						
-550	550	575.0					564.0	243.0000						
-560	560	585.0					574.0	249.5000						
-570	570	595.0					584.0	256.0000						
-580	580	605.0					594.0	262.5000						
-590	590	615.0					604.0	270.0000						
-600	600	625.0					614.0	277.0000						
-650	650	680.0	+3.00/-1.50	8.00	7.00	8.20	666.0	360.0000						
-700	700	730.0					716.0	412.0000						
-750	750	785.0					768.0	454.0000						
-800	800	835.0					818.0	545.0000						
-850	850	890.0					870.0	599.0000						
-900	900	940.0					920.0	674.0000						
-950	950	1000.0					972.0	793.0000						
DHO-1000	1000	1050.0					1022.0	888.0000						

TOOL DESCRIPTIONS ON PAGES 227 & 228.

DHOR
(PAGE 171)

DESCRIPTION

Extra-thick version of the DIN 472 DHO that is stronger and yields higher thrust loads. Installed axially using the same tools. Note that the DHOR will require a wider groove than the DHO.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the bore diameter (Db).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thin, see "DHO."

GENERAL USE



SEE
PAGE
171

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

DIN 472 - HEAVY DUTY TYPE

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HEAVY DUTY INTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Bossard

BN824

Seeger

JS

Ellison

INT

 DIN
472

DHOR	BORE		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL	TOOL		
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width Min (W)						
DHOR-020	20	21.5	+ .42/- .21	2.4	1.50	+ .00/- .06	21.0	.50	1.60	0.1400		-1018	
-022	22	23.5		2.8			+ .15/- .00			23.0			0.1900
-024	24	25.9		3.0			+ .21/- .00			25.2			0.2000
-025	25	26.9		3.1						26.2			0.2100
-026	26	27.9		3.1						27.2			0.2300
-027	27	29.1	+ .50/- .25	3.2	+ .00/- .07	28.4	.70	1.85	0.2400	-1023			
-028	28	30.1		3.2		29.4			0.2500				
-030	30	32.1		3.3		31.4			0.2700				
-032	32	34.4		3.4		33.7	0.2900						
-034	34	36.5		3.7		35.7	.85		0.4100				
-035	35	37.8	+ .90/- .39	3.8	+ .25/- .00	37.0	1.00	2.15	0.4500		-1032		
-037	37	39.8		3.9		39.0			0.4700				
-038	38	40.8		3.9		40.0			0.4800				
-040	40	43.5		3.9		42.5			0.5100				
-042	42	45.5		4.1		44.5			0.5600				
-045	45	48.5	+ 1.10/- .46	4.3	+ .30/- .00	47.5	1.25	2.65	0.6300			-1035	
-047	47	50.5		4.4		49.5			0.6700				
-050	50	54.2		4.6		53.0			0.8800				
-052	52	56.2		4.7		55.0			0.9900				
-055	55	59.2		5.0		58.0			1.0400				
-060	60	64.2	+ 1.30/- .54	5.4	+ .00/- .10	63.0	1.50	3.15	1.5900			-1035	
-062	62	66.2		5.5		65.0			1.6100				
-064	64	68.2		5.6		67.0			1.6500				
-065	65	69.2		5.8		68.0			1.6600				
-068	68	72.5		6.1		71.0			1.7200				
-070	70	74.5	+ 1.50/- .63	6.2	+ .00/- .12	73.0	1.75	4.15	1.8000			-1035	
-072	72	76.5		6.4		75.0			2.1700				
-075	75	79.5		6.6		78.0			2.2600				
-080	80	85.5		7.0		83.5			3.3200				
-085	85	90.5		7.2		88.5			3.3800				
-090	90	95.5	+ 1.70/- .72	7.6	+ .35/- .00	93.5	2.00	5.15	4.1300			-1035	
-095	95	100.5		8.1		98.5			4.6700				
-100	100	105.5		8.4		103.5			5.0700				
-105	105	112.0		8.7		109.0			7.0000				
-110	110	117.0		9.0		114.0			8.1000				
-115	115	122.0	+ 1.50/- .63	9.3	+ .54/- .00	119.0	2.50	5.15	9.4000			-1035	
-120	120	127.0		9.7		124.0			9.8000				
-125	125	132.0		10.0		129.0			10.2000				
-130	130	137.0		10.2		134.0			10.5000				
-135	135	142.0		10.5		139.0			10.7000				
-140	140	147.0	+ 1.70/- .72	10.7	+ .63/- .00	144.0	2.50	5.15	11.0000			-1035	
-145	145	152.0		10.9		149.0			11.6000				
-150	150	158.0		11.2		155.0			13.1000				
-155	155	164.0		11.4		160.0			13.4000				
-160	160	169.0		11.6		165.0			13.8000				
-165	165	174.5	+ 1.70/- .72	11.8	+ .72/- .00	170.0	2.50	5.15	15.6000			-1035	
-170	170	179.5		12.2		175.0			17.5000				
-175	175	184.5		12.7		180.0			18.8000				
-180	180	189.5		13.2		185.0			20.7000				
-185	185	194.5		13.7		190.0			21.3000				
-190	190	199.5	+ 1.70/- .72	13.8	+ .72/- .00	195.0	2.50	5.15	21.9000			-1035	
-195	195	204.5		13.8		200.0			22.9000				
DHOR-200	200	209.5		14.0		205.0			24.3000				

 DHOR TECHNICAL INFORMATION
ON PREVIOUS PAGE.

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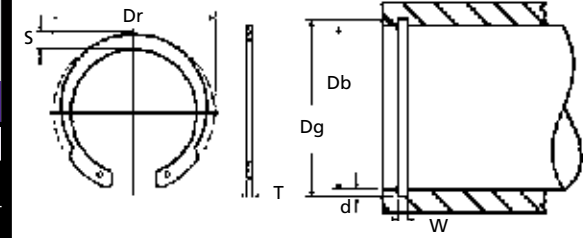
 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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INVERTED LUGS



INVERTED INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton	M1308	Ellison	INTV
Bossard	BN830	Seeger	JV



DHOI	BORE		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width Min. (W)				
DHOI-010	10	10.9	1.5	.60	10.5	.25	.70	0.0150			-I009
-012	12	13.1	1.8	.80	12.6	.30	.90	0.0250			
-015	15	16.1	2.0		15.7	.35		0.0410			
-016	16	17.3	2.1		16.8	.40		0.0530			
-017	17	18.3	2.1		17.8			0.0580			
-018	18	19.5	2.2		19.0			0.0620			
-019	19	20.5	2.2		20.0			0.0660			
-020	20	21.5	2.3		21.0	.50		0.0800			
-021	21	22.5	2.4		22.0			0.0810			
-022	22	23.5	2.4		23.0			0.0830			
-024	24	25.9	2.8		25.2			0.1300			-I011
-025	25	26.9	2.8		26.2	.60		0.1400			
-026	26	27.9	3.0		27.2			0.1500			
-027	27	29.1	3.0		28.4			0.1530			
-028	28	30.1	3.1		29.4	.70		0.1800			
-030	30	32.1	3.2		31.4			0.2030			
-032	32	34.4	3.3		33.7	.85		0.2050			
-033	33	35.5	3.3		34.7			0.2350			
-035	35	37.8	3.4		37.0			0.3200			
-036	36	38.8	3.6		38.0	1.00		0.3230			
-038	38	40.8	3.8		40.0			0.3680			-I018
-040	40	43.5	4.2		42.5			0.4750			
-042	42	45.5	4.2		44.5			0.5200			
-045	45	48.5	4.2		47.5	1.25		0.6000			
-047	47	50.5	4.7		49.5			0.6500			
-048	48	51.5	4.7		50.5			0.7000			
-050	50	54.2	5.2		53.0			0.8500			
-052	52	56.2	5.2		55.0			0.9000			
-055	55	59.2	5.2		58.0			1.0000			
-057	57	61.2	5.2		60.0			1.0250			
-058	58	62.2	5.2		61.0			1.0500			-I023
-060	60	64.2	5.2		63.0	1.50		1.1250			
-062	62	66.2	5.2		65.0			1.1750			
-065	65	69.2	5.7		68.0			1.6250			
-067	67	71.5	5.7		70.0			1.7300			
-068	68	72.5	5.7		71.0			1.7750			
-072	72	76.5	6.0		75.0			1.9600			
-080	80	85.5	6.0		83.5			2.2900			
-090	90	95.5	6.6		93.5	1.75		3.3000			
DHOI-100	100	105.5	7.4		103.5			4.1900			

DHOI

DESCRIPTION

Inverted lugs seat into the groove for better clearance and cleaner appearance. Good for shielded bearings that pass tightly through the bore or housing. Installed axially using pliers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Measure the bore diameter (Db).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above.

GENERAL USE



UNCOMMON

HOI

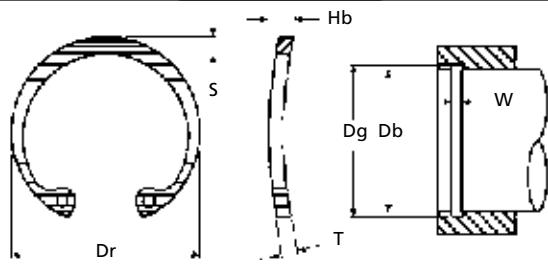


GROOVE INTERCHANGE
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DHOI ↔ DHO (Page 166) ↔ DJK (Page 175) ↔ DH (Page 194) ↔ DJL (Page 177)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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CURVED SHAPE


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BOWED INTERNAL
MANUFACTURER CROSS-REFERENCE

 INDEX
PAGE 236.

Seeger

JW



DBHO	BORE		RING			GROOVE		WEIGHT	MATERIAL	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)	Bow Height (Hb)	Diameter (Dg)	Width (W)	Kg per 100 Pieces	Spring Steel	
DBHO-040	40	43.5	3.9	1.75	3.5	42.7	3.4	0.4700		-1023
-042	42	45.5	4.1		3.5	44.7	3.4	0.5400		
-045	45	48.5	4.3		3.6	47.7	3.5	0.6000		
-047	47	50.5	4.4		3.7	49.7	3.5	0.6100		
-048	48	51.5	4.5		3.7	50.7	3.6	0.6700		
-050	50	54.2	4.6	2.00	4.0	53.3	3.9	0.7300		
-052	52	56.2	4.7		4.1	55.3	3.9	0.8200		
-055	55	59.2	5.0		4.2	58.3	4.1	0.8300		
-057	57	61.2	5.1		4.2	60.3	4.1	0.9400		
-058	58	62.2	5.2		4.3	61.3	4.2	1.0500		
-060	60	64.2	5.4	2.50	4.3	63.3	4.2	1.1100		
-062	62	66.2	5.5		4.4	65.3	4.2	1.1200		
-063	63	67.2	5.6		4.4	66.3	4.8	1.2400		
-065	65	69.2	5.8		5.0	68.3	4.8	1.4300		
-067	67	71.5	6.0		5.0	70.3	4.9	1.5300		
-068	68	72.5	6.1	3.00	5.1	71.3	4.9	1.6000		
-070	70	74.5	6.2		5.1	73.3	5.0	1.6500		
-072	72	76.5	6.4		5.2	75.3	5.0	1.8100		
-075	75	79.5	6.6		5.2	78.3	5.0	1.8800		
-077	77	81.5	6.7		5.3	80.3	5.1	2.0400		
-078	78	82.5	6.8	3.50	5.3	81.3	5.1	2.0400		-1032
-080	80	85.5	7.0		5.4	84.0	5.1	2.2000		
-082	82	87.5	7.0		5.4	86.0	5.8	2.4000		
-085	85	90.5	7.2		6.0	89.0	5.9	2.5300		
-087	87	92.5	7.3		6.1	91.0	5.9	3.1000		
-088	88	93.5	7.4	4.00	6.2	92.0	6.0	3.1000		-1035
-090	90	95.5	7.6		6.3	94.0	6.1	3.3000		
-092	92	97.5	7.8		6.4	96.0	6.2	3.5000		
-095	95	100.5	8.1		6.6	99.0	6.2	3.7000		
-097	97	102.5	8.2		6.7	101.0	6.8	4.1000		
-098	98	103.5	8.3	4.50	6.8	102.0	6.9	4.1000		
-100	100	105.5	8.4		6.9	104.0	8.0	4.2000		
-105	105	112.0	8.7		8.0	109.5	8.1	5.6000		
-110	110	117.0	9.0		8.1	114.5	8.1	6.4500		
-115	115	122.0	9.3		8.1	119.5	8.2	7.4500		
-120	120	127.0	9.7		8.2	124.5	8.2	7.7000		
-130	130	137.0	10.2		8.3	134.5	8.3	8.2000		
-140	140	147.0	10.7		8.4	144.5	8.4	8.7500		
-145	145	152.0	10.9		8.4	149.5	8.4	9.3000		
DBHO-150	150	158.0	11.2		8.5	155.5	8.5	10.5000		

TOOL DESCRIPTIONS ON PAGES 227 & 228.

DBHO
DESCRIPTION

Curved design for resilient end-play take-up of rattling in linkages. Provides tension on adjusting screws. Also used to salvage assemblies where grooves have been cut too wide. Install with the convex surface abutting the part.

AXIAL ASSEMBLY
HOW TO IDENTIFY

1. Verify bowed-shape side profile.
2. Measure the bore diameter (Db).
3. Determine the ring thickness (T).
4. Measure the maximum radial wall (S) of the ring.
5. Find the part in the chart above.

GENERAL USE

BHO

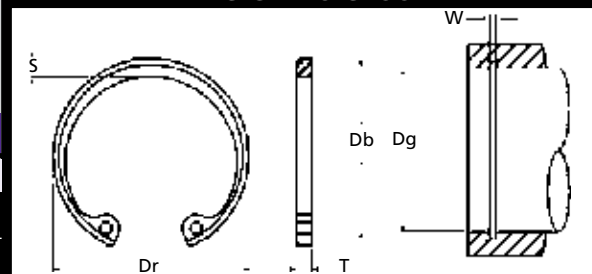
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WEDGES INTO GROOVE



BEVELED INTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Ellison

EJB

Seeger

JB

DVHO

DVHO	BORE	RING		GROOVE		WEIGHT	MATERIAL	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Width (W)	Kg per 100 Pieces	Spring Steel
DVHO-040	40	44.0	4.0	1.65	42.8	1.30	0.0180	-1018
-041	41	45.8	4.0		44.0		0.0200	
-042	42	46.6	4.2		45.0		0.0200	
-043	43	47.6	4.3		46.0		0.0200	
-044	44	49.3	4.3		47.2	1.27	0.0200	
-046	46	51.1	4.3		49.4		0.0230	
-047	47	52.2	4.3		50.4		0.0230	
-048	48	52.6	4.3		51.5		0.0230	
-051	51	56.1	4.3	2.05	54.6	1.22	0.0230	
-052	52	57.9	4.7		55.7	1.65	0.0230	
-054	54	59.7	4.9		57.9		0.0250	
-056	56	61.3	5.0		60.1		0.0250	
-057	57	63.2	5.2		61.5	1.63	0.0250	
-060	60	66.8	5.3		64.5	1.60	0.0280	
-062	62	68.6	5.2		66.5	1.57	0.0300	-1023
-063	63	70.5	5.3		67.7		0.0300	
-065	65	72.2	5.6	2.45	69.8	1.98	0.0300	
-067	67	73.9	5.7		71.9	1.96	0.0330	
-068	68	75.7	6.0		73.1		0.0330	
-070	70	77.5	5.9		75.2		0.0360	
-072	72	79.3	5.8		77.3	1.93	0.0360	
-078	78	86.8	6.5	2.85	83.7	2.26	0.0380	
-080	80	89.5	6.7		86.0		0.0380	
-082	82	92.0	6.8		88.1		0.0410	
-085	85	94.8	7.0		91.2		0.0410	
-088	88	98.0	7.4		94.6	2.05	0.0430	-1032
-090	90	100.0	7.4		96.8		0.0460	
-092	92	102.2	7.7		99.0		0.0400	
-095	95	105.6	7.8		102.1		0.0480	
-098	98	109.0	8.1	3.25	105.5	2.59	0.0510	
-100	100	110.7	8.1		107.6		0.0530	
-102	102	112.4	8.4		109.7		0.0530	
-105	105	115.8	8.4		112.8		0.0530	
-108	108	119.2	8.5		116.1	2.59	0.0530	
-110	110	120.8	8.6		118.0		0.0530	
-115	115	125.5	8.9		123.2		0.0560	
-118	118	128.9	8.9		126.3		0.0560	
-120	120	132.4	9.1	3.25	128.6	2.59	0.0580	
-127	127	139.3	9.9		135.8		0.0580	
DVHO-140	140	154.1	10.4	3.25	149.2	2.59	0.0610	

TOOL DESCRIPTIONS ON PAGE 227.

DVHO

DESCRIPTION

A 15° bevel on the outside diameter, when fitted into a 15° bevel on the load-bearing groove wall, yields rigid end-play take-up of manufacturing tolerances or wear on the retained part. Used in greasy and oily environments.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify the presence of a bevel along the outside diameter of the part.
2. Measure the bore diameter (Db).
3. Determine the ring thickness (T).
4. Confirm the maximum radial wall (S) of the ring.
5. Find the part in the chart above.

GENERAL USE



VHO



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DIN 984

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TABBED INTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton

D2000

Seeger

JK

Ellison

984

DIN

984

 DIN
984

DJK	BORE		RING			GROOVE				WEIGHT	MATERIAL	TOOL		
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width Min. (W)	Kg per 100 Pieces	Spring Steel				
DJK-016	16	17.3	+ .42/- .13	2.1	1.00	+ .00/- .06	16.8	.40	1.10	0.0720		-1011		
-017	17	18.3		2.2			+ .11/- .00			17.8			0.0800	
-018	18	19.5		2.3			+ .15/- .00			19.0			0.0900	
-019	19	20.5		2.3						20.0			0.0990	
-020	20	21.5		2.4						21.0			0.1060	
-021	21	22.5	2.4	22.0	0.1170									
-022	22	23.5	2.6	23.0	0.1280									
-023	23	24.6	+ .42/- .21	2.6	1.20	+ .00/- .06	24.1	.55	1.30	0.1480			-1018	
-024	24	25.9		2.6			+ .21/- .00			25.2				0.1600
-025	25	26.9		2.8			+ .25/- .00			26.2				0.1720
-026	26	28.5		2.8						27.2				0.2000
-027	27	29.1		2.9						+ .30/- .00				28.4
-028	28	30.1	3.0	29.4	0.2100									
-030	30	32.1	3.2	+ .30/- .00	31.4	0.2350								
-031	31	33.4	3.2		.85	32.7	0.2420							
-032	32	34.4	3.3			33.7	0.2500							
-033	33	35.5	3.3			34.7	0.2650							
-034	34	36.5	3.4			1.00	35.7	0.3800						
-035	35	37.8	3.6	37.0			0.4000							
-036	36	38.8	3.6	38.0	0.4150									
-038	38	40.8	3.8	40.0	0.4400									
-040	40	43.5	+ .90/- .39	4.0	1.75		+ .25/- .00	42.5	1.25	1.85	0.5300			-1023
-042	42	45.5		4.1		44.5		0.6000						
-044	44	47.5		4.2		46.5		0.6450						
-045	45	48.5		4.3		47.5		0.6600						
-047	47	50.5		4.5		49.5		0.6900						
-048	48	51.5	+ .10/- .46	4.5	2.00	+ .30/- .00	50.5	2.15	2.15	0.7500		-1023		
-050	50	54.2		4.7			53.0			0.8500				
-052	52	56.2		4.7			55.0			0.9400				
-055	55	59.2		5.1			58.0			0.9750				
-057	57	61.2		5.2			60.0			1.1650				
-058	58	62.2	5.3	2.50	+ .00/- .07	61.0	1.50	2.65	1.2000			-1023		
-060	60	64.2	5.5			63.0			1.2700					
-062	62	66.2	5.6			65.0			1.2750					
-065	65	69.2	5.8			68.0			1.6700					
-067	67	71.5	6.0			70.0			1.8600					
-068	68	72.5	6.1	2.50	+ .00/- .07	71.0	2.65	2.65	1.9300					-1023
-070	70	74.5	6.2			73.0			2.0200					
-072	72	76.5	6.4			75.0			2.1200					
DJK-075	75	79.5	6.6			78.0			2.2600					

DJK	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	SAME SIZING AS DHO, BUT WITH INTERNAL TABS.
	Internal tabs are concentrically positioned for a concealed assembly. Tabs act as spacers for securing machine components. Conforms to DIN 984.	1. Verify the presence of tabs on the inside rim of the ring. 2. Measure the bore diameter (Db). 3. Determine the ring thickness (T). 4. Confirm the maximum radial wall (S) of the ring. 5. Find the part in the chart above.	 UNCOMMON	DJK CONTINUED NEXT PAGE.
AXIAL ASSEMBLY				
GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.				
DJK	DHO (Page 166)	DHOI (Page 172)	DH (Page 194)	DJL (Page 177)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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DIN 984

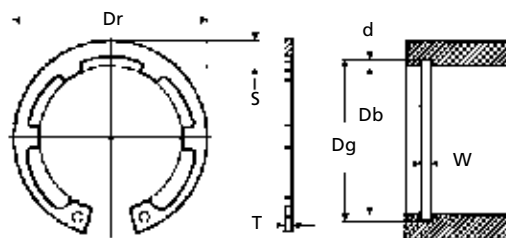


TABBED INTERNAL

MANUFACTURER CROSS-REFERENCE


INDEX
PAGE 236.

Anderton	D2000	Seeger	JK
Ellison	984	DIN	984




DJK	BORE		RING			GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width Min. (W)	Kg per 100 Pieces	Spring Steel	
DJK-080	80	85.5	+1.30/-0.54	7.0	2.50	83.5	1.75	2.65	2.5000		-1023
-085	85	90.5		7.4		88.5			3.0100		
-090	90	95.5		7.7		93.5			3.5500		
-095	95	100.5		8.1		98.5			4.0000		
-100	100	105.5		8.5		103.5			4.3500		-1032
-110	110	117.0	+1.50/-0.63	9.0		114.0	2.00		7.3000		
-115	115	122.0		9.3		119.0			8.2000		
-120	120	127.0		9.6		124.0			8.7000		
-125	125	132.0		9.9		129.0			9.2000		
-130	130	137.0		10.2		134.0			10.2000		
-140	140	148.0		10.7		144.0	2.50		11.2000		-1035
-150	150	158.0		11.1		155.0			12.3000		
-160	160	169.0		11.8		165.0			13.3000		
DJK-170	170	179.5		12.3		175.0			14.5000		


TOOL DESCRIPTIONS ON PAGES 227 & 228.

DJK	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	SAME SIZING AS DHO, BUT WITH INTERNAL TABS.
	Internal tabs are concentrically positioned for a concealed assembly. Tabs act as spacers for securing machine components. Conforms to DIN 984.	<ol style="list-style-type: none">1. Verify the presence of tabs on the inside rim of the ring.2. Measure the bore diameter (Db).3. Determine the ring thickness (T).4. Confirm the maximum radial wall (S) of the ring.5. Find the part in the chart above.	 UNCOMMON	
	AXIAL ASSEMBLY			

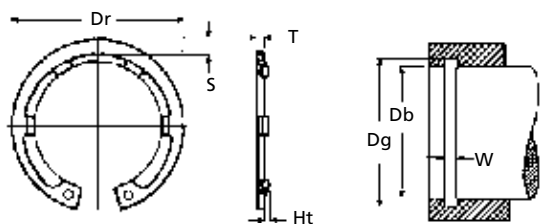
GROOVE INTERCHANGE USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.				
DJK	DHO (Page 166)	DHOI (Page 172)	DH (Page 194)	DJL (Page 177)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.



<div>DJL</div> <div>(PAGE 177)</div>	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	<div>FROM</div> <div>PAGE</div> <div>177</div>
	Bowed version of DIN 984 for concealed assemblies requiring end-play take-up.	<div>1. Verify bowed shape side profile, with tabs on the inside diameter.</div> <div>2. Measure the bore diameter (Db).</div> <div>3. Determine the ring thickness (T).</div> <div>4. Confirm the maximum radial wall (S) of the ring.</div> <div>5. Find the part in the chart on page 177.</div>	<div></div> <div>WEIRD</div>	
	AXIAL ASSEMBLY			
<div><div>GROOVE INTERCHANGE</div><div>USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.</div></div>				
DJL	DHO (Page 166)	DHOI (Page 172)	DJK (Page 175)	DH (Page 194)
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.				
				<div>CURVED</div> <div>SHAPE WITH</div> <div>INTERNAL</div> <div>TABS.</div> <div>SIMILAR IN</div> <div>SIZE TO DHO.</div>

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**BOWED TABBED INTERNAL****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236

Seeger

JL



DJL	BORE	RING				GROOVE		WEIGHT	MATERIAL	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Wall Thickness (T)	Tab Height (Ht)	Diameter (Dg)	Width (W)	Kg per 100 Pieces	Spring Steel	
DJL-016	16	17.3	2.1	.60	.25	16.8	.70	0.0720		-I011
-017	17	18.3	2.2	.60		17.8		0.0800		
-018	18	19.5	2.3	.80		19.0	.90	0.0900		
-019	19	20.5	2.3	.80		20.0		0.0990		
-020	20	21.5	2.4	1.00		21.0	1.10	0.1060		
-021	21	22.5	2.4	1.00	.35	22.0		0.1170		-I018
-022	22	23.5	2.6	1.00		23.0	1.30	0.1280		
-023	23	24.6	2.6	1.00		24.1		0.1480		
-024	24	25.9	2.6	1.00		25.2		0.1600		
-025	25	26.9	2.8	1.00		26.2		0.1720		
-026	26	28.5	2.8	1.00		27.2	1.60	0.2000		
-027	27	29.1	2.9	1.00		28.4		0.2000		
-028	28	30.1	3.0	1.20		29.4		0.2100		
-030	30	32.1	3.2	1.20		31.4		0.2350		
-031	31	33.4	3.2	1.20		32.4		0.2420		
-032	32	34.4	3.3	1.20	.45	33.7	1.60	0.2500		-I023
-033	33	35.5	3.3	1.20		34.7		0.2650		
-034	34	36.5	3.4	1.20		35.7		0.3800		
-035	35	37.8	3.6	1.50		37.0		0.4000		
-036	36	38.8	3.6	1.50		38.0	1.85	0.4150		
-038	38	40.8	3.8	1.50	.55	40.0		0.4400		
-040	40	43.5	4.0	1.50		42.5		0.5300		
-042	42	45.5	4.1	1.75		44.5		0.6000		
-044	44	47.5	4.2	1.75		46.5	2.15	0.6450		
-045	45	48.5	4.3	1.75		47.5		0.6600		
-047	47	50.5	4.5	1.75	.65	49.5		0.6900		
-048	48	51.5	4.5	1.75		50.5		0.7500		
-050	50	54.2	4.7	1.75		53.0	2.65	0.8500		-I032
-052	52	56.2	4.7	2.00		55.0		0.9400		
-055	55	59.2	5.1	2.00		58.0		0.9750		
-057	57	61.2	5.2	2.00		60.0		1.1650		
-058	58	62.2	5.3	2.00	.90	61.0		1.2000		
-060	60	64.2	5.5	2.00		63.0	3.15	1.2700		
-062	62	66.2	5.6	2.00		65.0		1.2750		
-065	65	69.2	5.8	2.00		68.0		1.6700		
-067	67	71.5	6.0	2.00		70.0		1.8600		
-068	68	72.5	6.1	2.00	3.00	71.0		1.9300		
-070	70	74.5	6.2	2.50		73.0		2.0200		
-072	72	76.5	6.4	2.50		75.0		2.1200		
-075	75	79.5	6.6	2.50		78.0		2.2600		
-080	80	85.5	7.0	2.50		83.5	3.15	2.5000		
-085	85	90.5	7.4	3.00		88.5		3.0100		
-090	90	95.5	7.7	3.00		93.5		3.5500		
-095	95	100.5	8.1	3.00		98.5	3.15	4.0000		
DJL-100	100	105.5	8.5	3.00		103.5		4.3500		

TOOL DESCRIPTIONS ON PAGES 227 & 228

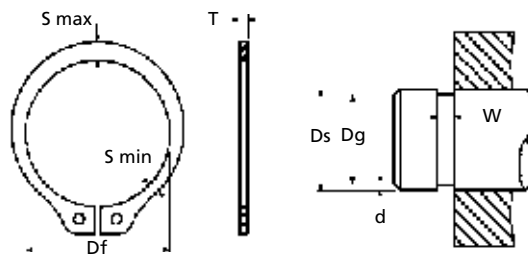
DJL TECHNICAL INFORMATION
ON PREVIOUS PAGE.**MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS**

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BASIC EXTERNAL - ANSI

MANUFACTURER CROSS-REFERENCE

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Rotor Clip

MSH

ANSI

B27.7-

MSH	SHAFT		RING				GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall (S) Min. Max.	Thickness (T)			Diameter (Dg)	Depth (d)	Width (W)			
MSH-004*	4	3.60	.40 .65	.25	+/- .05		3.80	.10	.32	0.0017		-E023-M
-005*	5	4.55	.40 .65	.40			4.75	.13	.50	0.0029		-E023-L
-006*	6	5.45	.50 .75				5.70	.15		0.0040		
-007	7	6.35	.60 .90				6.60	.20		0.0100		
-008	8	7.15	.65 1.00				7.50	.25		0.0120		
-009	9	8.15	.75 1.15				8.45	.28		0.0150		
-010	10	9.00	.80 1.30	.60			9.40	.30	.70	0.0190		
-011	11	10.00	.85 1.40				10.35	.33		0.0230		
-012	12	10.85	.90 1.50				11.35	.33		0.0240		-E038
-013	13	11.90	.95 1.60				12.30	.35		0.0440		
-014	14	12.90	1.00 1.70				13.25	.38		0.0490		
-015	15	13.80	1.05 1.80	.90			14.15	.43	1.00	0.0540		
-016	16	14.70	1.15 2.05				15.10	.45		0.0590		
-017	17	15.75	1.15 2.10				16.10	.45		0.0640		
-018	18	16.65	1.25 2.25				17.00	.50		0.0920		
-019	19	17.60	1.30 2.35				17.95	.53		0.0950		
-020	20	18.35	1.35 2.40				18.85	.58		0.1000		-E047
-021	21	19.40	1.40 2.50				19.80	.60		0.1100		
-022	22	20.30	1.50 2.70	1.10			20.70	.65	1.20	0.1300		
-023	23	21.25	1.60 2.80				21.65	.67		0.1400		
-024	24	22.20	1.60 2.90				22.60	.70		0.1500		
-025	25	23.10	1.70 2.90				23.50	.75		0.1600		
-026	26	24.05	1.70 3.00				24.50	.75		0.1800		
-028	28	25.80	1.80 3.20				26.40	.80		0.2300		
-030	30	27.90	1.80 3.30				28.35	.83		0.2500		-E070
-032	32	29.60	1.90 3.60				30.20	.90		0.2800		
-034	34	31.40	2.00 3.80	1.30			32.00	1.00	1.40	0.3100		
-035	35	32.30	2.10 3.90				32.90	1.05		0.3300		
-036	36	33.25	2.20 4.10				33.85	1.06		0.3600		
-038	38	35.20	2.30 4.30				35.80	1.10		0.4000		
-040	40	36.75	2.30 4.40				37.70	1.15		0.5600		
-042	42	38.80	2.40 4.60				39.60	1.20		0.6300		
-043	43	39.65	2.50 4.70				40.50	1.25		0.6700		
-045	45	41.60	2.60 4.80	1.60			42.40	1.30	1.75	0.7000		
-046	46	42.55	2.60 4.90				43.30	1.35		0.7300		
-048	48	44.40	2.60 5.00				45.20	1.40		0.7700		
-050	50	46.20	2.70 5.10				47.20	1.40		0.8200		
-054	54	49.90	2.90 5.40				51.00	1.50		1.1800		
-055	55	50.60	2.90 5.40				51.80	1.60		1.1900		
-058	58	53.60	3.00 5.60				54.70	1.65		1.2600		
-060	60	55.80	3.00 5.70	2.00			56.70	1.65	2.15	1.3200		
-062	62	57.30	3.00 5.80				58.60	1.70		1.3400		
-065	65	60.40	3.10 6.00				61.60	1.70		1.5400		-E115
-068	68	63.10	3.30 6.20				64.50	1.75		1.6300		
-070	70	64.60	3.30 6.30				66.40	1.80		1.9300		
-072	72	66.60	3.30 6.40				68.30	1.85		2.0600		
-075	75	69.00	3.40 6.60				71.20	1.90		2.2600		
-078	78	72.00	3.40 6.60	2.40			74.00	2.00	2.55	2.1500		
-080	80	74.20	3.60 7.00				75.90	2.05		2.6800		
-082	82	76.40	3.70 7.10				77.80	2.10		2.8100		
-085	85	78.60	3.80 7.30				80.60	2.20		2.9000		
-088	88	81.40	3.90 7.50				83.50	2.25		3.2200		
-090	90	83.20	3.90 7.50	2.80			85.40	2.30	2.95	3.3100		
-095	95	88.10	4.10 7.90				90.20	2.40		3.7600		
MSH-100	100	92.50	4.10 8.00				95.20	2.42		4.3100		

*May be beryllium copper instead of carbon

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HEAVY DUTY EXTERNAL - ANSI
MANUFACTURER CROSS-REFERENCE

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Rotor Clip

MSR

ANSI

B27.8M-3DM1



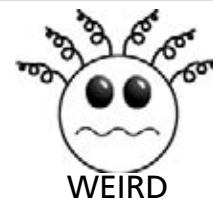
MSHR	SHAFT	RING			GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall Max. (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	
MSHR-010	10	9.20	1.7	.9	9.40	.30	1.00	0.0320		-E038
-011	11	10.00	1.9		10.30	.35	1.20	0.0390		
-012	12	11.05	2.2		11.30	.35		0.0630		
-013	13	11.80	2.3		12.20	.40		0.0720		
-014	14	12.80	2.4	1.3	13.15	.43	1.40	0.0800		-E047
-015	15	13.80	2.6		14.10	.45		0.1000		
-016	16	14.70	2.7		15.00	.50		0.1040		
-017	17	15.65	2.8		15.95	.53	1.75	0.1200		
-018	18	16.55	3.0	1.6	16.85	.58		0.1900		-E070
-019	19	17.50	3.2		17.80	.60		0.2500		
-020	20	18.45	3.4		18.75	.63	2.15	0.2800		
-022	22	20.40	3.8		20.70	.65		0.3400		
-025	25	23.10	3.8	2.0	23.50	.75		0.3500		-E093
-027	27	24.85	4.1		25.40	.80	2.55	0.5200		
-028	28	25.70	4.3		26.30	.85		0.5600		
-030	30	27.60	4.5		28.20	.90		0.6100		
-032	32	29.35	4.7	2.4	30.00	1.00	2.95	0.6800		-E108
-035	35	32.20	5.1		32.80	1.10		0.8100		
-038	38	35.05	5.5		35.60	1.20		1.2200		
-040	40	36.70	5.8		37.50	1.25	3.40	1.4100		-E120-X
-045	45	41.10	6.5	2.8	42.20	1.40		1.5100		
MSHR-050	50	45.50	7.1		47.00	1.50		2.1800		

MSHR

Extra-thick version of the ANSI metric MSH that is stronger and yields higher thrust loads. Installed axially using the same tools. Note that the MSHR will require a wider groove than the MSH.

AXIAL ASSEMBLY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the radial wall (S) of the ring.
4. Find the part in the chart above. If it is too thin, see "MSH" on page 178.



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MSH
(PAGE 178)

Tapered-design ring to ANSI metric dimensions that is installed into a groove to provide a rigid shoulder for high thrust loads. Installed axially using pliers that expand the part over the shaft.

AXIAL ASSEMBLY

1. Measure the shaft diameter (Ds).
2. Determine the ring thickness (T).
3. Measure the radial wall (S) of the ring.
4. Find the part in the chart on page 178. If it is too thick, see "MSHR" above.



**DIN 471
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152-157.**

MSH ON PREVIOUS PAGE.

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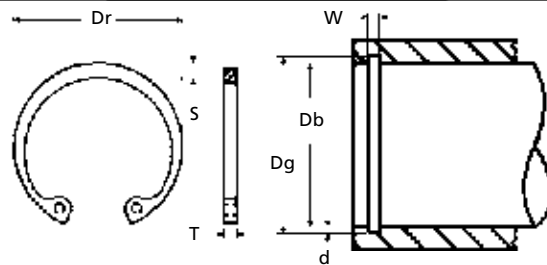
All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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ANSI METRIC DIMENSIONS



BASIC INTERNAL - ANSI

MANUFACTURER CROSS-REFERENCE

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Rotor Clip

MHO

ANSI

B27.7-



MHO	BORE		RING			GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width Min. (W)	Kg per 100 Pieces		
MHO-008	8	8.80	0.85	.4		8.40	.20	.50	0.0050	Spring Steel	-1025
-009	9	10.00	1.25			9.45	.23		0.0110		
-010	10	11.10	1.30			10.50	.25		0.0140		
-011	11	12.20	1.30	.6		11.60	.30	.70	0.0170		-1038
-012	12	13.30	1.35			12.65	.33		0.0190		
-013	13	14.25	1.35			13.70	.35		0.0350		
-014	14	15.45	1.60			14.80	.40		0.0390		
-015	15	16.60	1.65			15.85	.43		0.0420		
-016	16	17.70	1.70			16.90	.45		0.0470		
-017	17	18.90	1.70	.9		18.00	.50	1.00	0.0520		
-018	18	20.05	1.80			19.05	.53		0.0580		
-019	19	21.10	1.80			20.10	.55		0.0590		
-020	20	22.25	2.00			21.15	.57		0.0700		
-021	21	23.30	2.10			22.20	.60		0.0820		-1047
-022	22	24.40	2.10			23.30	.65		0.0900		
-023	23	25.45	2.20			24.35	.67		0.1000		
-024	24	26.55	2.30	1.1		25.40	.70	1.20	0.1090		
-025	25	27.75	2.60			26.60	.80		0.1260		
-026	26	28.85	2.70			27.70	.85		0.1300		
-027	27	29.95	2.80			28.80	.90		0.1700		
-028	28	31.10	2.90			29.80	.90		0.1800		
-030	30	33.40	3.00			31.90	.95		0.2000		
-032	32	35.35	3.10			33.90	.95		0.2200		
-034	34	37.75	3.20	1.3		36.10	1.05	1.40	0.2300		-1070
-035	35	38.75	3.30			37.20	1.10		0.2300		
-036	36	40.00	3.40			38.30	1.15		0.2600		
-037	37	41.05	3.40			39.30	1.15		0.2900		
-038	38	42.15	3.40			40.40	1.20		0.3000		
-040	40	44.25	4.00			42.40	1.20		0.4000		
-042	42	46.60	4.20			44.50	1.25		0.4700		
-045	45	49.95	4.30			47.60	1.30		0.5100		
-046	46	51.05	4.30	1.6		48.70	1.35	1.75	0.5200		
-047	47	52.15	4.30			49.80	1.40		0.5800		
-048	48	53.30	4.50			50.90	1.45		0.6100		
-050	50	55.35	4.60			53.10	1.55		0.6200		
-052	52	57.90	4.70			55.30	1.65		0.8100		-1090
-055	55	61.10	5.10			58.40	1.70		0.8900		
-057	57	63.25	5.20	2.0		60.50	1.75	2.15	0.9900		
-058	58	64.40	5.30			61.60	1.80		1.0100		
MHO-060	60	66.80	5.30			63.80	1.90		1.0500		

TOOL DESCRIPTIONS ON PAGE 227.

MHO

DESCRIPTION

Tapered section ring to ANSI metric dimensions that is installed axially with pliers into a housing or bore. High thrust load rating.

AXIAL ASSEMBLY

HOW TO IDENTIFY

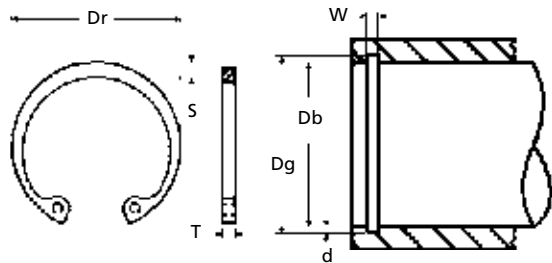
1. Measure the bore diameter (Db).
2. Determine the ring thickness (T).
3. Measure the maximum radial wall (S) of the ring.
4. Find the part in the chart above.

GENERAL USE



**SPECIAL
FINISHES AND
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UPON REQUEST.**

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ANSI METRIC DIMENSIONS


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BASIC INTERNAL - ANSI
MANUFACTURER CROSS-REFERENCE

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Rotor Clip

MHO


ANSI

B27.7-



MHO	BORE		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel	TOOL
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall Max. (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width Min. (W)			
MHO-062	62	68.60	+1.00/-0.75	5.30	2.0	65.80	1.90	2.15	1.1500		-1090
-063	63	69.90		5.40		66.90	1.95		1.1600		
-065	65	72.20		5.60		69.00	2.00		1.5400		
-068	68	75.70		5.80		72.20	2.10		1.5900		
-070	70	77.50		5.80		74.40	2.20		1.6100		
-072	72	79.60	+1.40	5.80	2.4	76.50	2.25	2.55	1.6300		
-075	75	83.30		6.20		79.70	2.35		1.9300		
-078	78	86.80		6.50		82.80	2.40		2.4000		
-080	80	89.10		6.70		85.00	2.50		2.5900		
-082	82	91.10		6.90		87.20	2.60		2.7200		
-085	85	94.40	+/-1.65	7.00	2.8	90.40	2.70	2.95	2.9500		-1108
-088	88	97.90		7.30		93.60	2.80		3.1300		
-090	90	100.00		7.40		95.70	2.85		3.2600		
-092	92	102.20		7.60		97.80	2.90		3.3100		
-095	95	105.60		7.80		101.00	3.00		3.5400		
-098	98	109.00	+/-1.10	8.10	3.2	104.20	3.10	3.40	3.9400		
-100	100	110.70		8.20		106.30	3.15		3.9900		
-102	102	112.40		8.40		108.40	3.20		4.2200		
-105	105	115.80		8.40		111.50	3.25		4.4000		
-108	108	119.20		8.50		114.60	3.30		4.5800		
-110	110	120.80	+/-2.05	8.70	4.0	116.70	3.35	4.25	4.7600		-1035
-115	115	126.00		8.90		121.90	3.45		5.0300		
-120	120	132.40		9.40		127.00	3.50		5.6200		
-125	125	137.10		9.50		132.10	3.55		6.0000		
-130	130	142.50		9.80		137.20	3.60		6.3500		
-135	135	148.50	+/-2.30	10.40	4.8	142.30	3.65	5.10	7.9000		
-140	140	154.10		10.40		147.40	3.70		8.3000		
-145	145	159.50		10.60		152.50	3.75		8.7000		
-150	150	164.50		10.80		157.60	3.80		8.9000		
-155	155	168.80		10.80		162.70	3.85		9.1000		
-160	160	175.10	+/-1.12	10.90	4.0	167.80	3.90	4.25	12.1000		-1045
-170	170	185.60		11.40		178.00	4.00		13.8000		
-180	180	196.60		12.00		188.40	4.20		15.6000		
-190	190	207.70		12.90		198.80	4.40		22.0000		
-200	200	217.80		13.30		209.00	4.50		23.5000		
-210	210	230.30	+/-1.50	14.20	4.8	219.40	4.70	5.10	27.5000		
-220	220	240.50		15.00		230.00	5.00		28.5000		
-230	230	251.40		15.50		240.60	5.30		33.0000		
-240	240	262.30		16.30		251.00	5.50		36.5000		
MHO-250	250	273.30		16.70		261.40	5.70		37.5000		

TOOL DESCRIPTIONS ON PAGE 227

MHO	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	DIN 472 PAGES 166-170.
	Tapered section ring to ANSI metric dimensions that is installed axially with pliers into a housing or bore. High thrust load rating._	<ol style="list-style-type: none">1. Measure the bore diameter (Db).2. Determine the ring thickness (T).3. Measure the maximum radial wall (S) of the ring.4. Find the part in the chart above.	 WEIRD	
	AXIAL ASSEMBLY			

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DIN 6799

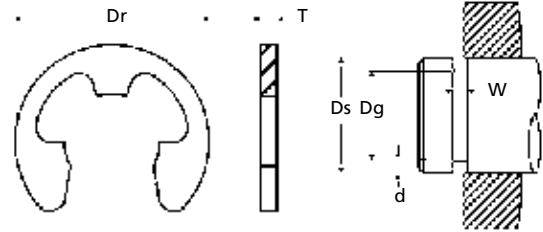


BASIC E-CLIP

MANUFACTURER CROSS-REFERENCE

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PAGE 236

Anderton	D1500	Ellison	6799	Seeger	RA
Bossard	BN809-812	Rotor Clip	DE	Waldes	D1500



DE	SHAFT		RING		GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL		TOOL
	From	To	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Nominal Depth (d)	Width (W)		Spring Steel	Stainless "SS"	
DE-008	1.0	1.4	1.95	.20	.8	.20	.24	0.0003			-708
-012	1.4	2.0	2.90	.30	1.2	.25	.34	0.0009			-712
-015	2.0	2.5	3.90	.40	1.5	.38	.44	0.0021			-715
-019	2.5	3.0	4.40	.50	1.9	.43	.54	0.0040			-719
-023	3.0	4.0	5.90	.60	2.3	.60	.64	0.0069			-723
-032	4.0	5.0	6.90	.60	3.2	.65	.64	0.0088			-310
-040	5.0	7.0	8.85	.70	4.0	1.00	.74	0.0158			-340
-050	6.0	8.0	10.85	.70	5.0	1.00	.74	0.0236			-605
-060	7.0	9.0	11.80	.70	6.0	1.00	.74	0.0255			-606
-070	8.0	11.0	13.80	.90	7.0	1.25	.94	0.0474			-607
-080	9.0	12.0	15.75	1.00	8.0	1.25	1.05	0.0660			-608
-090	10.0	14.0	18.20	1.10	9.0	1.50	1.15	0.1090			-609
-100	11.0	15.0	19.70	1.20	10.0	1.50	1.25	0.1250			-610
-120	13.0	18.0	22.70	1.30	12.0	1.75	1.35	0.1630			-612
-150	16.0	24.0	28.70	1.50	15.0	2.50	1.55	0.3370			-615
-190	20.0	31.0	36.50	1.75	19.0	3.25	1.80	0.6420			-619
-240	25.0	38.0	43.50	2.00	24.0	3.75	2.05	0.8550			-
DE-300	32.0	42.0	51.30	2.50	30.0	-	2.55	1.3500			-

TOOL DESCRIPTIONS ON PAGE 234

DE DRE	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC PLATED
	Stamped clips to DIN 6799 with three prongs for deep grooves that yield high thrust load capacity. DRE rings are heavier duty for higher thrust loads and 50% higher RPMs. RADIAL ASSEMBLY	1. Determine if you have a DE or DRE based on the shoulder design and appearance. 2. Measure the diameter of the shaft (Ds). 3. Confirm the outside diameter (Dr) of the ring. 4. Determine the ring thickness (T). 5. Find the part in the charts.	 COMMON	 STACKED/ROLL PACK



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HEAVY DUTY

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REINFORCED E-CLIP

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Rotor Clip

MRE



DRE	SHAFT		RING		GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Outside Dia. (Dr)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	
DRE-004	4	8.50	.6	+/- .06	3.00	.50	.7	0.0140		-120
-005	5	9.50			3.85	.57		0.0180		-130
-006	6	11.35			4.85	.57		0.0240		-140
-007	7	13.10			5.40	.80		0.0320		-160
-008	8	14.95			6.40	.80		0.0360		-500
-009	9	15.70	.9	+/- .06	7.10	.95	1.0	0.0600		-
-010	10	16.75			7.80	1.10		0.0680		-170
-011	11	18.95			8.80	1.10		0.0860		-270
-012	12	19.60	1.1	+/- .06	9.50	1.25	1.2	0.1200		-
-013	13	20.55			10.2	1.40		0.1450		-200
-014	14	22.10			11.2	1.40		0.1600		-280
DRE-015	15	23.20			11.8	1.60		0.1750		-

TOOL DESCRIPTIONS ON PAGE 234.

DRE TECHNICAL INFORMATION
ON PREVIOUS PAGE.



SLOTTED E-CLIP

MANUFACTURER CROSS-REFERENCE

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Seeger

ST



DST	SHAFT		RING		GROOVE		WEIGHT	MATERIAL
	From (Ds)	To (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Width Min. (W)	Kg per 100 Pieces	Spring Steel
DST-003	3	4	5.0	.6	2.3	.64	0.0070	
-004	4	5	7.0		3.2		0.0100	
-005	5	6	8.5		4.0		0.0150	
-006	6	7	10.0	.7	5.0	.74	0.0200	
-007	7	8	11.0	.8	6.0	.85	0.0290	
-008	8	9	13.0	1.0	7.0	1.05	0.0410	
-009	9	10	14.0		8.0		0.0540	
DST-010	10	11	17.0		9.0		0.0900	

DST

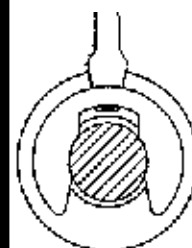
Variant of standard DIN 6799 E-clip with a slotted ID. Slot yields a pivot point for removal using a screwdriver.

RADIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm the presence of a slot on inside diameter of the ring.
2. Measure the diameter of the shaft (Ds).
3. Measure the free outside diameter (Dr) of the ring.
4. Determine the ring thickness (T).
5. Find the part in the chart above.

GENERAL USE



Slot yields a pivot point for removal using a screwdriver.

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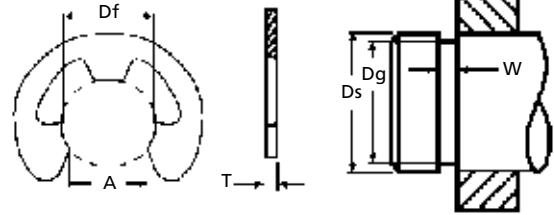


JAPANESE INDUSTRIAL SPEC (JIS)

MANUFACTURER CROSS-REFERENCE

Rotor Clip

JE



JE	SHAFT		RING				GROOVE		MATERIAL	TOOL
	From (Ds)	To (Ds)	Free Inside Dia. (Df)	Thickness (T)	Gap (A)	Installed Outside Diameter	Diameter (Dg)	Width (W)		
JE-0008	1.0	1.4	.8	+.05	.2	+.02	.7	.8	Spring Steel	-
-0012	1.4	2.0	1.2	+.06	.3	+.025	1.0	1.2		-
-0015	2.0	2.5	1.5	+.06	.4	+.03	1.3	1.5		-
-002	2.5	3.2	2.0	+.06	.4	+.03	1.7	2.0		-
-0025	3.2	4.0	2.5	+.06	.4	+.03	2.1	2.5		-050
-003	4.0	5.0	3.0	+.06	.6	+.03	2.6	3.0		-070
-004	5.0	7.0	4.0	+.075	.6	+.03	3.5	4.0		-340
-005	6.0	8.0	5.0	+.075	.6	+.03	4.3	5.0		-605
-006	7.0	9.0	6.0	+.075	.8	+.03	5.2	6.0		-606
-007	8.0	11.0	7.0	+.09	.8	+.03	6.1	7.0		-607
-008	9.0	12.0	8.0	+.09	.8	+.03	6.9	8.0	Spring Steel	-608
-009	10.0	14.0	9.0	+.09	.8	+.03	7.8	9.0		-
-010	11.0	15.0	10.0	+.11	1.0	+.05	8.7	10.0		-
-012	13.0	18.0	12.0	+.11	1.0	+.05	10.4	12.0		-612
-015	16.0	24.0	15.0	+.13	1.5	+.06	13.0	15.0		-
-019	20.0	31.0	19.0	+.13	1.5	+.06	16.5	19.0		-
JE-024	25.0	38.0	24.0	+.13	2.0	+.07	20.8	24.0		-

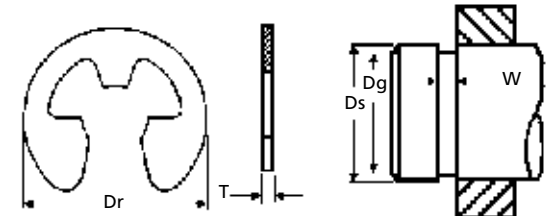
CONTACT PLANT FOR TOOL INFORMATION.



BRITISH SPECIFICATION

MANUFACTURER CROSS-REFERENCE

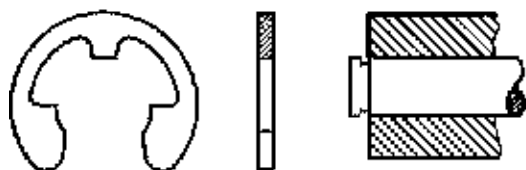
Anderton B1500



EBS	SHAFT		RING		GROOVE		MATERIAL	TOOL
	Decimal (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Installed Outside Diameter	Diameter (Dg)	Width (W)		
EBS-052	.062	.156	.015	.165	.052	.019	Spring Steel	-021A
-074	.094	.187	.020	.200	.074	.024		-002B
-079	.110	.375	.020	.390	.079	.024		-006B
-095	.125	.230	.020	.240	.095	.024		-003B
-095A	.125	.230	.025	.240	.095	.029		-003D
-102	.140	.203	.020	.215	.102	.024		-017B
-116	.156	.282	.020	.295	.116	.024		-004B
-125	.188	.310	.015	.330	.125	.019		-004A
-125A	.188	.310	.020	.330	.125	.024		-004D
-125B	.188	.375	.020	.395	.125	.024		-006B
-125C	.188	.375	.015	.395	.125	.019	Spring Steel	-060
-147	.188	.335	.020	.350	.147	.024		-005A
-147A	.188	.335	.032	.350	.147	.037		-005C
-188	.219	.437	.030	.450	.188	.034		-008B
-210	.250	.527	.035	.540	.210	.040		-009C
EBS-250	.312	.500	.035	.520	.250	.040		-009C

CONTACT PLANT FOR TOOL INFORMATION.

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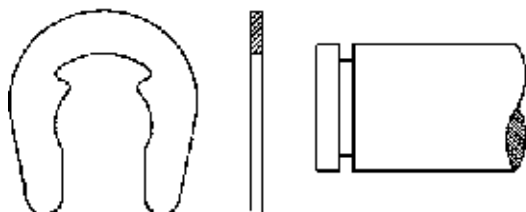
DIN 9133

GERMAN STANDARD
MANUFACTURER CROSS-REFERENCE

Ellison

9133



German-engineered e-clip that conforms to DIN 9133. Used for various applications, including automotive engineering, electrical engineering, and precision mechanical devices.

DE9

U-CLIP
MANUFACTURER CROSS-REFERENCE

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Benzing

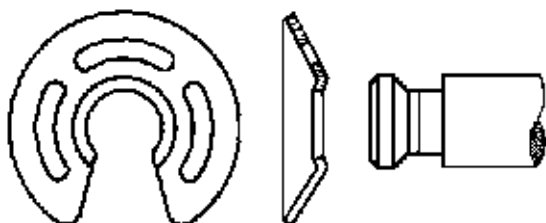
U

Bossard

BN815



U-shaped clips for radial application into grooves on shafts. Slot yields a pivot point for removal using a screwdriver. Some sizes available in a stacked roll pack for automated installation.

DU

BOWED SLOTTED E-CLIP
MANUFACTURER CROSS-REFERENCE

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Benzing

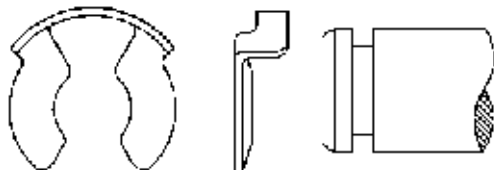
AS

Bossard

BN814



Bowed slotted e-clips with curved shape for resilient end-play take-up. Install with the *concave* surface abutting the part. Slots in the ring serve to make the part lighter, decrease stiffness, and aid in removal.

DBS

CLIP WASHER
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Benzing

STS



Clip washer for radial assembly into grooves on shafts. Bevel allows for take-up of play on axial tolerances. Easily installed by hand using the perpendicular tab at the top of the ring.

DSTS

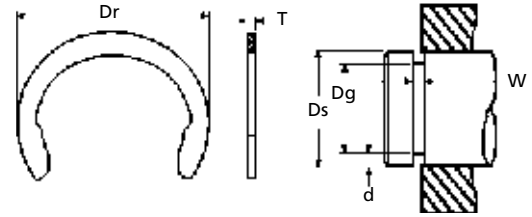
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LOW PROFILE



BASIC C-CLIP

MANUFACTURER CROSS-REFERENCE

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Anderton	M1800	Ellison	H	Seeger	H
Bossard	BN831	Rotor Clip	DC		

DC	SHAFT	RING			GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Installed Outside Diameter	Diameter (Dg)	Depth (d)	Width Min. (W)	Kg per 100 Pieces	Spring Steel	
DC-003	3	3.98	.40	4.1	2.3	.35	.44	0.0020		-03
-004	4	5.00	.40	5.2	3.2	.40	.44	0.0040		-04
-005	5	6.20	.60	6.4	4.0	.50	.64	0.0080		-05
-006	6	7.40	.70	7.6	5.0	.50	.74	0.0110		-06
-0065	6.5	8.20		8.4	5.8	.35		0.0120		-
-007	7	8.60	.80	8.8	6.0	.50	.85	0.0130		-07
-008	8	10.00		10.2	7.0	.50		0.0170		-08
-009	9	11.20		11.4	8.0	.50		0.0220		-09
-010	10	12.15		12.4	9.0	.50		0.0260		-10
-011	11	13.20		13.6	10.0	.50		0.0290		-11
-012	12	14.35		14.7	10.9	.55		0.0320		-12
-013	13	15.40	1.00	15.8	11.8	.60	1.10	0.0360		-13
-014	14	16.30		16.7	12.7	.65		0.0400		-14
-015	15	17.40		17.8	13.6	.70		0.0460		-15
-016	16	18.50		18.9	14.5	.75		0.0540		-16
-017	17	19.40		19.9	15.4	.80		0.0640		-17
-018	18	20.40		20.9	16.3	.85		0.0720		-18
-019	19	21.50		22.0	17.2	.90		0.0800		-19
-020	20	22.65		23.2	18.1	.95		0.0870		-20
-022	22	25.00	1.20	25.5	19.9	1.05	1.30	0.1100		-22
-023	23	26.00		26.6	20.8	1.10		0.1150		-23
-024	24	27.10		27.7	21.7	1.15		0.1520		-24
-025	25	28.30		28.9	22.6	1.20		0.1740		-25
-026	26	29.40		30.0	23.5	1.25		0.1880		-26
-028	28	31.60		32.2	25.2	1.40		0.2320		-
-030	30	33.70	1.50	34.4	27.0	1.50	1.60	0.2430		-
-032	32	36.10		36.8	28.8	1.60		0.3020		-
-035	35	39.40		40.1	31.5	1.75		0.3300		-
-036	36	40.50		41.2	32.4	1.80		0.4400		-
-038	38	42.60		43.4	34.2	1.90		0.4620		-
-040	40	45.00	1.75	45.8	36.0	2.00	1.85	0.5050		-
-042	42	47.20		48.0	37.8	2.10		0.5460		-
-045	45	50.60		51.5	40.5	2.25		0.5980		-
-048	48	54.10		55.0	43.2	2.40		0.7820		-
-050	50	56.40	2.00	57.4	45.0	2.50	2.15	0.8850		-
-052	52	58.60		59.6	47.0	2.50		0.9330		-
DC-055	55	61.50		63.0	50.0	2.50		1.0400		-

TOOL DESCRIPTIONS ON PAGE 234.

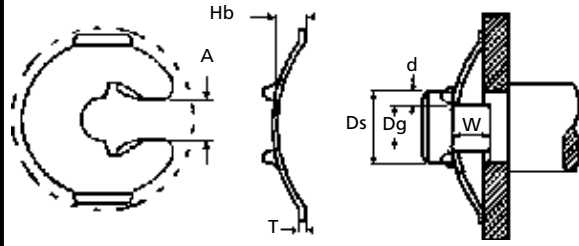
DC	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	ZINC PLATED
	RADIAL ASSEMBLY		COMMON	
	Radially-assembled part that uses circular deformation for retainage. Narrow section height provides good clearance capabilities. Absence of teeth and deep set mean less thrust load ratings than E-clips. Install using an applicator.	<ol style="list-style-type: none"> 1. Confirm the diameter of the shaft (Ds). 2. Measure the outside diameter (Dr) of the ring. 3. Determine the ring thickness (T). 4. Find the part in the chart above. 		 STACKED / ROLL PACK



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FOR ROTATING PARTS

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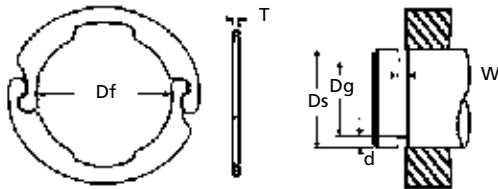

PRONG LOCKED E-CLIP
MANUFACTURER CROSS-REFERENCE

Seeger

SL

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PAGE 236.


DEL	SHAFT		RING		GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel
	MM (Ds)	Gap (A)	Thickness (T)	Bow Height Min. (Hb)	Diameter (Dg)	Depth (d)	Width Min. (W)		
DEL-003	3	2.1	.25	1.2	2.0	.50	1.1	0.0070	
-004	4	2.9	.25	1.3	2.8	.60	1.1	0.0090	
-005	5	3.6	.40	1.5	3.5	.75	1.3	0.0250	
-006	6	4.2	.40	1.8	4.2	.90	1.5	0.0330	
-008	8	6.2	.40	2.4	6.0	1.00	1.9	0.0530	
-010	10	7.7	.50	3.1	7.5	1.25	2.5	0.1000	
-012	12	9.4	.60	3.3	9.2	1.40	2.8	0.1250	
DEL-015	15	12.2	.60	3.8	12.0	1.50	3.2	0.1520	

BALANCED FOR HIGH SPEED ROTATION

INTERLOCKING RING
MANUFACTURER CROSS-REFERENCE

Seeger

S

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PAGE 236.


	SHAFT		RING		GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel	TOOL
	From (Ds)	To (Ds)	Free Inside Dia. (Df)	Thickness (T)	Assembled Outside Diameter	Diameter (Dg)	Depth (d)	Width (W)		
DLC-010	10	12	8.9	1.00	14.1	9.0	.50	1.05	0.0640	SEE PAGE 32.
-012	12	14	10.7		16.0	10.9	.55		0.0750	
-014	14	16	12.5		18.0	12.7	.65		0.0850	
-016	16	18	14.3		20.0	14.5	.75		0.0960	
-018	18	20	16.0	1.20	22.7	16.3	.85	1.25	0.1500	
-020	20	22	17.8		24.7	18.1	.95		0.1750	
-022	22	24	19.6		26.7	19.9	1.05		0.1900	
-024	24	26	21.4		28.7	21.7	1.15		0.2100	
-026	26	28	23.1	1.50	30.6	23.5	1.25	1.60	0.2600	
-028	28	30	24.8		34.1	25.2	1.40		0.4250	
-030	30	32	26.6		36.1	27.0	1.50		0.4600	
-032	32	35	28.4		38.0	28.8	1.60		0.5000	
-035	35	38	31.0	1.75	41.0	31.5	1.75	1.85	0.5400	
-038	38	40	33.7		44.7	34.2	1.90		0.7500	
-040	40	42	35.5		46.7	36.0	2.00		0.8200	
-042	42	45	37.3		48.7	37.8	2.10		0.9000	
-045	45	48	40.0	2.00	51.7	40.5	2.25	2.10	0.9750	
-048	48	50	42.7		54.7	43.2	2.40		1.0500	
-050	50	55	44.4		57.9	45.0	2.50		1.4200	
-055	55	60	49.4		62.9	50.0	2.50		1.5000	
-060	60	65	54.2	2.50	67.9	54.8	2.60	2.60	1.7300	
-065	65	70	58.9		72.9	59.5	2.75		2.0000	
-070	70	75	63.7		79.7	64.3	2.85		2.9000	
-075	75	80	68.5		84.7	69.1	2.95		3.3000	
-080	80	85	73.3	+ .00/- .07	89.7	73.9	3.05		3.7500	
-085	85	90	78.0		95.0	78.7	3.15		4.9000	
-090	90	95	82.8		101.2	83.5	3.25		5.2000	
-095	95	100	87.5		106.7	88.2	3.40		5.4000	
DLC-100	100	105	92.3		112.3	93.0	3.50		5.6000	

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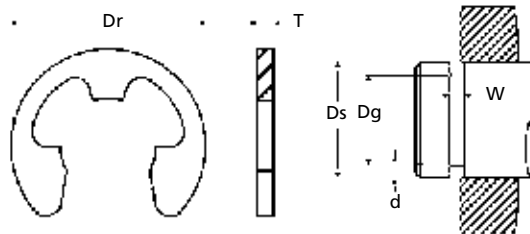
 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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ANSI METRIC DIMENSIONS



BASIC E-CLIP - ANSI

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Rotor Clip

ME

ANSI

B27.7-3CM1

ME

SHAFT

MM
(Ds)

Decimal
(Ds)

RING

Free
Outside
Dia. (Dr)

Thickness
(T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT

Kg per
100
Pieces

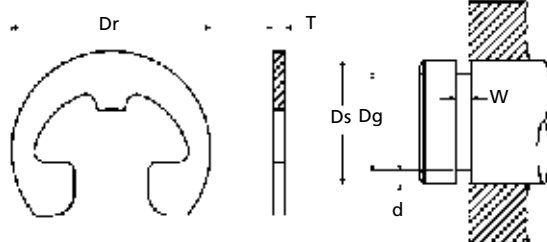
MATERIAL

Spring
Steel

TOOL

ME	SHAFT MM (Ds)	Decimal (Ds)	RING Free Outside Dia. (Dr)	Thickness (T)	GROOVE Diameter (Dg)	Depth (d)	Width (W)	WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel	TOOL
ME-002	2	.079	4.0	.25	1.45	.28	.32	0.0014		-040
-003	3	.118	5.6	.40	2.30	.35	.50	0.0036		-050
-004	4	.157	7.2		3.10	.45		0.0095		-100
-005	5	.197	8.5		3.90	.55		0.0130		-120
-006	6	.236	11.1	.60	4.85	.58	.70	0.0210		-140
-008	8	.315	14.6		6.40	.80		0.0350		-290
-009	9	.354	15.8		7.20	.90		0.0580		-608
-010	10	.393	16.8	.90	8.00	1.00	1.00	0.0680		-290
-012	12	.472	18.6		9.60	1.20		0.1000		-609
-015	15	.591	22.8	1.10	11.80	1.60	1.20	0.1400		-612
-016	16	.630	23.8		12.50	1.75		0.1450		-210
-020	20	.787	30.0	1.30	16.00	2.00	1.40	0.2800		-
ME-025	25	.984	37.1		20.00	2.50		0.4200		-

ANSI METRIC DIMENSIONS



REINFORCED E-CLIP - ANSI

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Rotor Clip

MRE

ANSI

B27.8M-3EM1

MRE

SHAFT

MM
(Ds)

Free
Outside
Dia. (Dr)

Thickness
(T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

WEIGHT

Kg per
100
Pieces

MATERIAL

Spring
Steel

TOOL

MRE	SHAFT MM (Ds)	Free Outside Dia. (Dr)	Thickness (T)	GROOVE Diameter (Dg)	Depth (d)	Width (W)	WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel	TOOL
MRE-004	4	8.50		3.00	.50		0.0140		-120
-005	5	9.50		3.85	.57		0.0180		-130
-006	6	11.35	.6	4.85	.57	.7	0.0240		-140
-008	8	14.95		6.40	.80		0.0360		-500
-009	9	15.70	.9	7.10	.95	1.0	0.0600		-
-010	10	16.75		7.80	1.10		0.0680		-170
-012	12	19.60	1.1	9.50	1.25	1.2	0.1200		-
MRE-015	15	23.20		11.8	1.60		0.1750		-

**ME
MRE**

DESCRIPTION

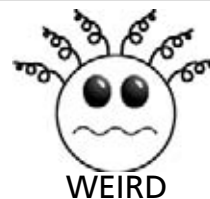
Stamped clips to ANSI metric dimensions with three prongs for deep grooves that yield high thrust load capacity. MRE rings are heavier duty for higher thrust loads, and 50% higher RPM's.

RADIAL ASSEMBLY

HOW TO IDENTIFY

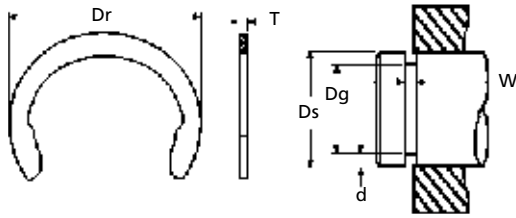
1. Determine if you have a ME or MRE based on the shoulder design and appearance.
2. Measure the diameter of the shaft (Ds).
3. Confirm the free outside diameter (Dr) of the ring. Determine the ring thickness (T).
4. Find the part in the charts above.

GENERAL USE



**DIN 6799
PAGE
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ANSI METRIC DIMENSIONS


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BASIC C-CLIP - ANSI
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Rotor Clip

MC

ANSI

B27.8M-3SM1



MC	SHAFT	RING		GROOVE			WEIGHT	MATERIAL	TOOL
	MM (Ds)	Free Outside Dia. (Dr)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	
MC-003	3	3.98	+/- .06	2.3	.35	.50	0.0019		-
-004	4	5.00		3.2	.40		0.0025		-080
-005	5	6.20	+/- .08	4.0	.50		0.0055		-
-006	6	7.40		5.0	.50		0.0072		-320
-007	7	8.60	+/- .09	6.0	.50		0.0090		-
-008	8	10.00		7.0	.50	.70	0.0120		-350
-009	9	11.20		8.0	.50		0.0130		-
-010	10	12.15	+/- .10	9.0	.50		0.0150		-
-011	11	13.20		10.0	.50		0.0170		-
-012	12	14.35		10.9	.55		0.0200		-
-013	13	15.40		11.8	.60		0.0390		-
-014	14	16.30	+/- .18	12.7	.65	1.10	0.0420		-
-015	15	17.40		13.6	.70		0.0500		-
-016	16	18.50		14.5	.75		0.0510		-400
-017	17	19.40	+/- .21	15.4	.80		0.0550		-
-018	18	20.40		16.3	.85		0.0670		-
-019	19	21.50		17.2	.90	1.30	0.0850		-280
-020	20	22.65		18.1	.95		0.0850		-
-022	22	25.00	+/- .25	19.9	1.05		0.1070		-
-023	23	26.00		20.8	1.10		0.1150		-
-024	24	27.10		21.7	1.15		0.1200		-
-025	25	28.30	+/- .39	22.6	1.20		0.1400		-
-026	26	29.40		23.5	1.25		0.1500		-
-028	28	31.60		25.2	1.40	1.75	0.2500		-
-030	30	33.70		27.0	1.50		0.2600		-
-032	32	36.10	+/- .08	28.8	1.60		0.3200		-
-035	35	39.40		31.5	1.75		0.3500		-480
-036	36	40.50		32.4	1.80		0.4100		-
-038	38	42.60		34.2	1.90		0.4300		-
-040	40	45.00		36.0	2.00		0.4700		-
-042	42	47.20	+/- .25	37.8	2.10		0.5000		-
-045	45	50.60		40.5	2.25		0.5400		-
-048	48	54.10		43.2	2.40		0.7100		-
-050	50	56.40		45.0	2.50	2.15	0.8900		-
-052	52	58.60		47.0	2.50		0.9300		-
MC-055	55	61.50		50.0	2.50		1.0400		-

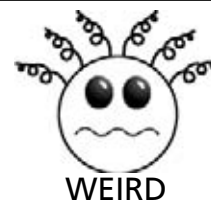
CONTACT PLANT FOR TOOL INFORMATION.

MC
DESCRIPTION

Radially-assembled part to ANSI metric dimensions that uses circular deformation for retainage. Narrow section height provides good clearance capabilities. Absence of teeth and deep set mean less thrust load ratings than E-clips. Install using an applicator.

RADIAL ASSEMBLY
HOW TO IDENTIFY

1. Confirm the diameter of the shaft (Ds).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T).
4. Find the part in the chart above.

GENERAL USE


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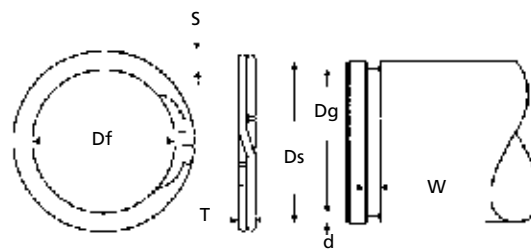
BASIC EXTERNAL

MANUFACTURER CROSS-REFERENCE



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Smalley

DNS



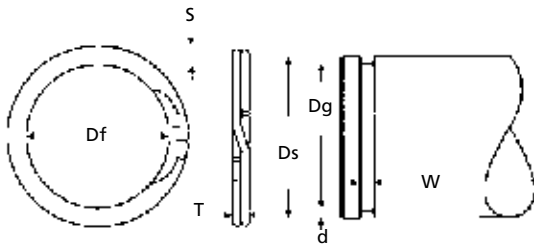
DS	SHAFT		RING			GROOVE			WEIGHT Kg per 100 Pieces	MATERIAL	
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)		Spring Steel	Stainless "-S02"
DS-013	13	12.27	1.27-1.48	.99		12.4	.3	1.10	0.0470		
-014	14	13.26				13.4			0.0500		
-015	15	14.15	1.52-1.73			14.3	.4		0.0530		
-016	16	15.04				15.2			0.0670		
-017	17	16.04	1.78-1.98	1.14		16.2	.5	1.30	0.0710		
-018	18	16.83				17.0			0.1000		
-019	19	17.83				18.0			0.1060		
-020	20	18.82				19.0			0.1110		
-021	21	19.79	2.03-2.24			20.0	.6		0.1160		
-022	22	20.78				21.0			0.1210		
-023	23	21.77				22.0			0.1270		
-024	24	22.66				22.9			0.1500		
-025	25	23.65	2.26-2.46			23.9	.7		0.1560		
-026	26	24.64				24.9			0.1620		
-027	27	25.34				25.6			0.1670		
-028	28	26.34				26.6			0.2430		
-029	29	27.33	3.12-3.33	1.44		27.6	.9	1.60	0.2520		
-030	30	28.32				28.6			0.2600		
-032	32	30.00				30.3			0.3840		
-033	33	30.99				31.3			0.3950		
-034	34	31.98	3.89-4.09	1.69		32.3	1.0		0.4060		
-035	35	32.66				33.0			0.4140		
-036	36	33.65				34.0			0.6290		
-038	38	35.64				36.0			0.6630		
-040	40	37.11	4.93-5.18	1.93		37.5	1.3	1.85	0.6870		
-042	42	39.09				39.5			0.7200		
-045	45	42.06				42.5			0.7700		
-046	46	43.05				43.5			0.7860		
-047	47	44.04				44.5	1.5	2.15	0.8030		
-048	48	45.03				45.5			0.8190		
-050	50	46.53				47.0			1.2470		
-052	52	48.51				49.0			1.2940		
-054	54	50.50				51.0			1.3420		
-055	55	51.49				52.0			1.3660		
-056	56	52.48				53.0			1.3900		
-058	58	54.43				55.0			1.4370		
-060	60	56.42				57.0			1.4850		
-062	62	58.42				59.0			1.5340		
-063	63	59.39				60.0			1.5570		
DS-065	65	61.39				62.0			2.0050		

DS	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	<div>FITS INTO THE SAME GROOVE AS DIN 471</div> 
	Popular series for metric applications that will accommodate light and medium bearing series thrust loads. For aerospace, see page 192. Fits same grooves but does not conform to DIN 471.	<div>1. Verify shaft diameter (Ds).</div> <div>2. Measure the free inside diameter (Df) of the ring.</div> <div>3. Determine thickness (T) and radial wall (S).</div> <div>4. Find the part in the charts.</div>	<div></div> <div>UNCOMMON</div>	
	AXIAL ASSEMBLY			
	GROOVE INTERCHANGE			
USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.				
DS	DSH (Page 152)	DSHI (Page 160)	DAK (Page 162)	DAL (Page 163)
PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.				

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DIN METRIC SERIES

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BASIC EXTERNAL
MANUFACTURER CROSS-REFERENCE

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Smalley

DNS

 DIN
471
GROOVES

DS	SHAFT	RING			GROOVE			WEIGHT	MATERIAL			
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-S02"		
DS-067	67	63.37	4.93-5.18	2.41	+/- .08	64.0	1.5	2.65	+ .14/- .00	2.0650		
-068	68	64.34				65.0				2.0940		
-070	70	66.34				67.0				2.1540		
-072	72	68.33				69.0				2.2140		
-075	75	71.33				72.0				2.3050		
-077	77	73.33	5.89-6.15	2.41	+ .00/- .76	74.0	2.3650					
-078	78	74.33				75.0	2.3950					
-080	80	75.81				76.5	2.9380					
-082	82	77.81				78.5	3.0100					
-085	85	80.80				81.5	3.9330					
-088	88	83.80	6.15-6.40	2.91	+ .00/- .89	84.8	4.0690					
-090	90	85.80				86.5	4.1590					
-095	95	90.80				91.5	4.3850					
-098	98	93.79				94.5	4.5200					
-100	100	95.79				96.5	4.6100					
-105	105	100.28	6.58-6.83	3.89	+/- .10	101.0	2.0	4.15	+ .18/- .00	6.9030		
-108	108	103.25				104.0				7.0940		
-110	110	105.23				106.0				7.2220		
-115	115	110.19				111.0				7.5420		
-120	120	115.16				116.0				7.8630		
-125	125	120.12				121.0				8.1830		
-130	130	125.07				126.0				8.5020		
-135	135	130.02				131.0				8.8210		
-140	140	134.98				136.0				9.1410		
-145	145	139.93				141.0				9.4600		
-150	150	143.91	7.72-8.03	3.89	+ .00/- .63	145.0	2.5	4.15	+ .18/- .00	11.5310		
-155	155	148.89				150.0				11.9090		
-160	160	153.85				155.0				12.2860		
-165	165	158.80				160.0				12.6620		
-170	170	163.75				165.0				13.0380		
-175	175	168.73				170.0				13.4160		
-180	180	173.69				175.0				13.7930		
-185	185	178.66				180.0				14.1700		
-190	190	183.59				185.0				14.5450		
-200	200	193.54				195.0				15.3000		
-210	210	202.54	10.90-11.20	4.86	+ .00/- .72	204.0	3.0	5.15	+ .22/- .00	28.3920		
-220	220	212.47				214.0				29.7120		
-230	230	222.40				224.0				31.0320		
-240	240	232.33				234.0				32.3510		
-250	250	242.24				244.0				33.6680		
-260	260	250.19	12.45-12.83	4.86	+ .00/- .81	252.0	4.0	5.15	+ .22/- .00	39.9740		
-270	270	260.15				262.0				41.4890		
-280	280	270.08				272.0				42.9990		
-290	290	279.98				282.0				44.5040		
-300	300	289.92				292.0				46.0160		
-310	310	297.84	15.62-16.00	5.87	+/- .13	300.0	5.0	6.20	+ .22/- .00	72.0200		
-320	320	307.84				310.0				74.3160		
-330	330	317.75				320.0				76.5910		
-340	340	327.69				330.0				78.8730		
-350	350	337.64				340.0				81.1570		
-360	360	347.57				350.0				83.4370		
-370	370	357.48				360.0				85.7120		
-380	380	367.41				370.0				87.9920		
-390	390	377.34				380.0				90.2710		
DS-400	400	387.25				390.0				92.5460		

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METRIC AEROSPACE



EXTERNAL AEROSPACE

MANUFACTURER CROSS-REFERENCE

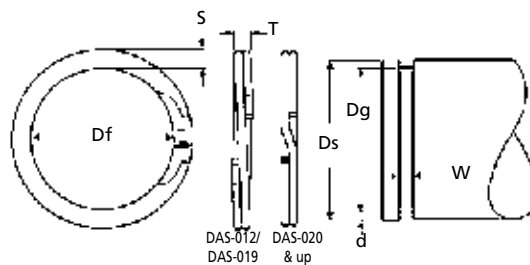
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Smalley

ES

Aerospace

MA4016



DAS-012/
DAS-019
DAS-020
& up

DAS	SHAFT	RING				GROOVE				WEIGHT	MATERIAL		
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-S02"			
DAS-012	12	11.18	1.02-1.22	.60	11.29	.36	.70	0.0310					
-013	13	12.13			1.14-1.35	+/- .060					12.24	.38	0.0330
-014	14	13.06									13.19	.41	0.0350
-015	15	13.98									14.09	.46	0.0380
-016	16	14.90	1.27-1.48	+/- .075	15.02		.49	0.0400					
-017	17	15.82			16.02		.49	0.0430					
-018	18	16.80			16.92		.54	0.0740					
-019	19	17.73	1.52-1.73		+/- .075	17.87	.57	0.0780					
-020	20	18.62				18.77	.62	0.0820					
-021	21	19.57				19.72	.64	0.0860					
-022	22	20.45	1.78-1.98	+/- .100		20.62	.69	0.1050					
-023	23	21.39				21.57	.72	0.1100					
-024	24	22.35				22.52	.74	0.1150					
-025	25	23.25	2.03-2.24		+/- .100	23.42	.79	0.1380					
-026	26	24.21				24.42	.79	0.1420					
-027	27	25.04				2.49-2.69	+/- .100	25.35			.83	0.2160	
-028	28	26.00	26.30	.85				0.2240					
-029	29	26.95	27.27	.87				0.2320					
-030	30	27.92	28.25	.88				0.2390					
-031	31	28.84	29.17	.92	0.2470								
-032	32	29.77	2.87-3.07	+/- .150	30.09			.96			0.2540		
-034	34	31.54			31.90	1.05	0.3130						
-035	35	32.44			32.80	1.10	0.3210						
-036	36	33.40			33.75	1.13	0.3290						
-037	37	34.24			34.67	1.17	0.3380						
-038	38	35.18			3.12-3.33	+/- .150	35.66	1.17			0.3450		
-040	40	37.15	37.55	1.23			0.4920						
-042	42	39.02	39.45	1.28			0.5160						
-045	45	41.77	42.25	1.38			0.5510						
-046	46	42.67	43.15	1.43			0.5630						
-047	47	43.81	3.89-4.09	+/- .080			44.31	1.35			0.7260		
-048	48	44.48			45.05	1.48	0.7410						
-050	50	46.69			47.05	1.48	0.7690						
-052	52	49.62	3.12-3.33		+/- .080	50.15	.93	0.4620					
-053	53	50.62				51.15	.93	0.4790					
-054	54	51.62				52.15	.93	0.4960					
DAS-055	55	52.62	3.38-3.58	53.15		.93	0.5200						

DAS

DESCRIPTION

Standard metric series produced to metric aerospace specifications. Fits into grooves designed for two turn spiral rings in light and medium duty applications.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Measure the free inside diameter (Df) of the ring.
3. Determine thickness (T) and radial wall (S).
4. Find the part in the charts.

GENERAL USE

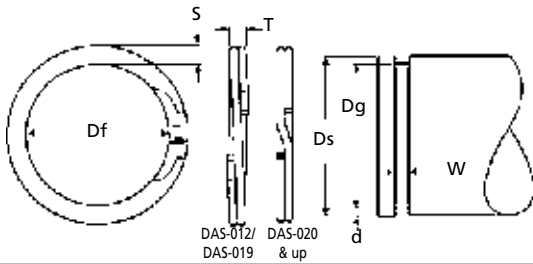


**FOR METRIC
SERIES FOR
DIN 471
GROOVES,
SEE PAGES
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 DAS-012/
DAS-019

 DAS-020
& up

EXTERNAL AEROSPACE
MANUFACTURER CROSS-REFERENCE

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Smalley

ES

Aerospace

MA4016



DAS	SHAFT	RING				GROOVE				WEIGHT	MATERIAL	
	MM (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-SO2"		
DAS-056	56	53.62	3.38-3.58	1.25	+/- .080	54.15	.93	1.42	+ .100/- .000	0.5300		
-058	58	55.43				56.01	1.00			0.5800		
-059	59	56.43				57.01	1.00			0.5820		
-060	60	57.43				58.01	1.00			0.5850		
-061	61	58.36				58.91	1.05			0.6050		
-062	62	59.30	3.63-3.84			59.91	1.05			0.6250		
-063	63	60.30				60.91	1.05			0.6450		
-064	64	61.25				61.91	1.05			0.6680		
-065	65	62.20				62.81	1.10			0.6900		
-066	66	63.16				63.79	1.11			0.7070		
-067	67	64.16	3.89-4.09			64.71	1.15	0.7240				
-068	68	65.08				65.71	1.15	0.7400				
-069	69	66.06				66.71	1.15	0.7500				
-070	70	67.08				67.71	1.15	0.7600				
-071	71	68.04				68.71	1.15	0.7800				
-072	72	69.00	4.11-4.37	69.65	1.18	0.8000						
-075	75	71.93		72.61	1.20	0.8700						
-078	78	74.84		75.55	1.23	1.1300						
-080	80	76.80		77.51	1.25	1.2100						
-082	82	78.72		79.45	1.28	1.2700						
-085	85	81.62	4.62-4.88	82.35	1.33	1.3400						
-088	88	84.53		85.31	1.35	1.4300						
-090	90	86.43		87.21	1.40	1.4900						
-095	95	91.37		92.15	1.43	1.6200						
-100	100	96.10		97.01	1.50	1.7800						
-105	105	100.94	5.13-5.38	1.55	101.85	1.58	1.73	+ .130/- .000	1.9700			
-110	110	105.75			106.69	1.66			2.1400			
-115	115	110.59			111.55	1.73			2.3200			
-120	120	115.49			116.45	1.78			3.3500			
-125	125	120.44			121.45	1.78			3.5000			
-130	130	125.34	6.20-6.45		126.35	1.83			3.6400			
-135	135	130.20			131.27	1.87			3.8000			
-140	140	135.14			136.25	1.88			3.9000			
-145	145	140.00			141.17	1.92			4.0600			
-150	150	145.00			146.17	1.92			4.2000			
-155	155	149.33	5.38-5.64		1.83	150.60	2.20	2.00	+ .150/- .000	6.5000		
-160	160	154.31				155.60	2.20			6.7500		
-165	165	159.23				160.60	2.20			6.9200		
-170	170	164.00				165.40	2.30			7.1500		
-175	175	169.00				170.40	2.30			7.3400		
-180	180	173.78	5.64-5.89	175.20		2.40	7.5700					
-185	185	178.70		180.20		2.40	7.7000					
-190	190	183.70		185.20		2.40	8.0000					
-195	195	188.43		190.00		2.50	8.2000					
-200	200	193.43		195.00		2.50	8.3500					
-210	210	202.93	5.89-6.15	2.18		204.60	2.70	2.40	+ .150/- .000	10.6000		
-220	220	212.65				214.40	2.80			11.3000		
-230	230	222.60				224.40	2.80			11.5000		
-240	240	232.32				234.20	2.90			12.1000		
-250	250	241.83				243.80	3.10			12.4000		
-260	260	251.57	9.32-9.63		253.60	3.20	13.1000					
-270	270	261.30			263.40	3.30	13.6000					
DAS-280	280	271.04			273.20	3.40	14.0000					

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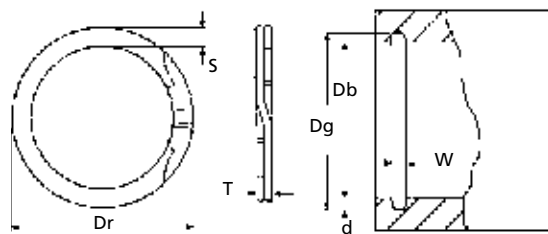
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DIN METRIC SERIES



BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

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Smalley

DNH

DH	BORE	RING			GROOVE			WEIGHT	MATERIAL				
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-S02"			
DH-013	13	13.72	1.27-1.48	.99	+/- .05	13.6	.3	1.10	+ .11/- .00	+ .14/- .00	0.0420		
-014	14	14.75				14.6					0.0450		
-015	15	15.85				15.7					0.0490		
-016	16	16.97				16.8					0.0620		
-017	17	17.98				17.8					0.0660		
-018	18	19.18	1.52-1.73			19.0	.4				0.0800		
-019	19	20.19				20.0					0.0850		
-020	20	21.21				21.0					0.0900		
-021	21	22.23				22.0					0.0940		
-022	22	23.23				23.0					0.0990		
-023	23	24.33	1.78-1.98	24.1	.5	0.1470							
-024	24	25.45		25.2		0.1550							
-025	25	26.45		26.2		0.1610							
-026	26	27.48		27.2		0.1680							
-027	27	28.68		28.4		0.1950							
-028	28	29.69	2.03-2.24	29.4	.6	0.2020							
-029	29	30.71		30.4		0.2100							
-030	30	31.71		31.4		0.2180							
-031	31	33.02		32.7		0.2270							
-032	32	34.04		33.7		0.2350							
-033	33	35.05	2.26-2.46	34.7	.7	0.2430							
-034	34	36.07		35.7		0.3790							
-035	35	37.38		37.0		0.3940							
-036	36	38.39		38.0		0.4050							
-037	37	39.40		39.0		0.4170							
-038	38	40.41	3.12-3.33	40.0	.9	0.4290							
-040	40	42.93		42.5		0.6500							
-041	41	43.94		43.5		0.6670							
-042	42	44.96		44.5		0.6840							
-045	45	47.98		47.5		0.7350							
-047	47	49.99	3.89-4.09	49.5	1.0	0.7680							
-048	48	51.00		50.5		0.7850							
-050	50	53.54		53.0		1.1070							
-051	51	54.54		54.0		1.1300							
-052	52	55.55		55.0		1.1530							
-055	55	58.57	4.93-5.18	58.0	1.3	1.2210							
-056	56	59.59		59.0		1.2450							
-057	57	60.60		60.0		1.2670							
-058	58	61.62		61.0		1.2910							
DH-060	60	63.63		63.0		1.3360							

DH

DESCRIPTION

Popular series for metric applications that will accommodate light and medium bearing series thrust loads. For aerospace, see page 196. Fits into same grooves but does not conform to DIN 472.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine thickness (T) and radial wall (S).
4. Find the part in the charts.

GENERAL USE



FITS INTO
THE SAME
GROOVE
AS DIN 472
SNAP RINGS.

GROOVE INTERCHANGE

USE ANY OF THESE PARTS IN THE SAME SIZED GROOVE.

DH ↔ DHO (Page 166) ↔ DHOI (Page 172) ↔ DJK (Page 175) ↔ DJL (Page 177)

PERFORMANCE RESULTS VARY. YOUR RING SELECTION SHOULD BE MADE BASED ON INDIVIDUAL APPLICATION.

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BASIC INTERNAL
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Smalley

DNH

 DIN
472
GROOVES

DH	BORE	RING			GROOVE			WEIGHT	MATERIAL					
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-S02"				
DH-062	62	65.66	4.93-5.18	1.93	+/- .08	65.0	1.5	2.15	+ .14/- .00	1.3820				
-063	63	66.67		2.41		2.41		66.0		+ .30/- .00			2.65	1.4050
-064	64	67.67						67.0						1.4200
-065	65	68.67						68.0						1.8120
-068	68	71.67						71.0						1.8970
-070	70	73.67						73.0						1.9530
-072	72	75.67						75.0						2.0100
-075	75	78.68						78.0						2.0950
-078	78	81.69						81.0						2.1810
-080	80	84.19						83.5						2.8050
-082	82	86.20	5.89-6.15	2.91		85.5	+ .35/- .00	1.8	2.8770					
-085	85	89.20				88.5			3.6040					
-088	88	92.21				91.5			3.7340					
-090	90	94.21				93.5			3.8210					
-092	92	96.22				95.5			3.9080					
-095	95	99.24				98.5			4.0390					
-098	98	102.26				101.5			4.1700					
-100	100	104.29				103.5			4.2580					
-102	102	106.79				106.0			6.58-6.83	3.89			+/- .10	2.0	6.4540
-105	105	109.79			109.0	6.6480								
-108	108	112.80	112.0	6.8420										
-110	110	114.83	114.0	6.9730										
-112	112	116.84	116.0	7.1030										
-115	115	119.86	119.0	7.2970										
-120	120	124.92	124.0	7.6240										
-125	125	129.97	129.0	7.9500										
-127	127	131.97	131.0	7.72-8.03	+ .63/- .00	2.5	8.0790							
-130	130	135.00	134.0				8.2740							
-140	140	145.11	144.0				8.9260							
-150	150	156.13	155.0				11.2560							
-160	160	166.22	165.0				12.0220							
-170	170	176.33	175.0				12.7900							
-180	180	186.39	185.0				13.5540							
-190	190	196.47	195.0				14.3190							
-200	200	206.58	205.0	9.32-9.63	+ .72/- .00	3.0	15.0870							
-210	210	217.58	216.0				23.7270							
-220	220	227.66	226.0				24.8770							
-230	230	237.72	236.0				26.0240							
-240	240	247.80	246.0				27.1740							
-250	250	257.89	10.90-11.20	4.86	+ .72/- .00	5.15	28.3240							
-260	260	269.93					256.0	34.3980						
-270	270	280.01					268.0	35.7380						
-280	280	290.09					278.0	37.0770						
-290	290	300.15					288.0	38.4140						
-300	300	310.24	12.45-12.83	5.87	+/- .13	4.0	39.7550							
-310	310	322.25					298.0	39.7550						
-320	320	332.33					308.0	56.8510						
-330	330	342.42					320.0	58.7030						
-340	340	352.50					330.0	60.5560						
-350	350	362.56					340.0	62.4070						
-360	360	372.64					350.0	64.2550						
-370	370	382.73					360.0	66.1060						
-380	380	392.79					370.0	67.9590						
-390	390	402.84					380.0	69.8070						
DH-400	400	412.93	390.0	71.6520										
			400.0	73.5050										
			410.0											

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METRIC AEROSPACE

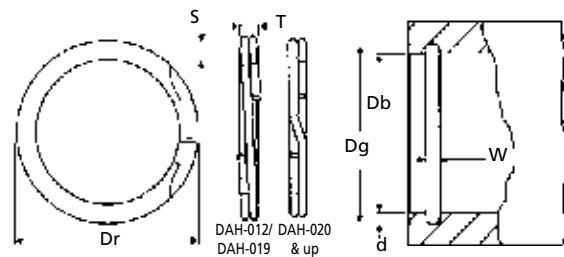


INTERNAL AEROSPACE

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Smalley EH
Aerospace MA4017



DAH	BORE		RING			GROOVE				WEIGHT Kg per 100 Pieces	MATERIAL	
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)			Spring Steel	Stainless "S02"
DAH-012	12	12.89	1.02-1.22	.60		12.70	.35	.70		0.0300		
-013	13	13.95				13.75				0.0330		
-014	14	15.07				14.85				0.0400		
-015	15	16.14	1.27-1.47			15.90	.45			0.0430		
-016	16	17.15				16.95				0.0460		
-017	17	18.32				18.05				0.0580		
-018	18	19.39	1.52-1.73	.89		19.10	.55			0.0620		
-019	19	20.48				20.17				0.0660		
-020	20	21.51				21.22				0.0940		
-021	21	22.56	1.78-1.98			22.27	.64			0.1000		
-022	22	23.65				23.37				0.1050		
-023	23	24.69				24.42				0.1240		
-024	24	25.73	2.03-2.24	1.07		25.47	.74			0.1300		
-025	25	27.03				26.67				0.1360		
-026	26	28.07				27.77				0.1420		
-027	27	29.11				28.87	.94			0.2090		
-028	28	30.10				29.87				0.2180		
-029	29	31.21				30.95				0.2270		
-030	30	32.28	2.49-2.69			32.00	1.00			0.2360		
-031	31	33.32				33.05				0.2440		
-032	32	34.23				34.00				0.2530		
-034	34	36.46				36.20	1.10			0.3060		
-035	35	37.55				37.30				0.3160		
-036	36	38.68				38.40				0.3240		
-037	37	39.60	2.87-3.07			39.40	1.20			0.3350		
-038	38	40.77				40.50				0.3450		
-040	40	42.91				42.50				0.4870		
-042	42	45.01	3.12-3.33			44.60	1.30			0.5130		
-045	45	48.13				47.70				0.5530		
-046	46	49.28				48.80				0.5670		
-047	47	50.32	3.89-4.09	1.57		49.90	1.45			0.7070		
-048	48	51.46				51.00				0.7250		
-050	50	53.66				53.20				0.7590		
-052	52	54.30	3.12-3.33			53.79	.90			0.4600		
-053	53	55.32				54.79				0.4800		
-055	55	57.38				56.85				0.5200		
-056	56	58.40	3.38-3.58	1.25		57.85	.93			0.5300		
-058	58	60.43				59.85				0.5400		
DAH-059	59	61.54				60.93				0.5550		

DAH

DESCRIPTION

Standard metric series produced to metric aerospace specifications. Fits into grooves designed for two turn spiral rings in light and medium duty applications.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine thickness (T) and radial wall (S).
4. Find the part in the charts.

GENERAL USE



**FOR METRIC
SERIES
DIN 472
GROOVES,
SEE PAGES
194-195.**

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METRIC AEROSPACE

BOX 232 • MINNEAPOLIS, KS • 67467


INTERNAL AEROSPACE
MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Smalley	EH
Aerospace	MA4017



DAH	BORE		RING			GROOVE			WEIGHT	MATERIAL		
	MM (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Depth (d)	Width (W)	Kg per 100 Pieces	Spring Steel	Stainless "-SO2"	
DAH-060	60	62.57	3.38-3.58	1.25	+/- .080	61.99	1.00	1.42	0.5700			
-061	61	63.65				3.63-3.84	63.09		1.05			0.5900
-062	62	64.70					64.09		1.05			0.6100
-063	63	65.70					65.09		1.05			0.6250
-064	64	66.77					66.19		1.10			0.6420
-065	65	67.82					67.19		1.10			0.6600
-066	66	68.80				3.89-4.09	68.19		1.10			0.6770
-067	67	69.90					69.25		1.13			0.6940
-068	68	70.94					70.29		1.15			0.7100
-069	69	71.94					71.29		1.15			0.7200
-070	70	72.94	72.29	1.15	0.7300							
-071	71	73.99	4.11-4.39	73.29	1.15	0.7700						
-072	72	75.04		74.39	1.20	0.8100						
-075	75	78.07		77.39	1.20	0.8500						
-078	78	81.21		4.37-4.62	80.45	1.23	1.1000					
-080	80	83.22			82.49	1.25	1.1600					
-082	82	85.28	84.55		1.28	1.2300						
-085	85	88.38	4.62-4.88		87.65	1.33	1.3000					
-088	88	91.45			90.69	1.35	1.3700					
-090	90	93.58		92.79	1.40	1.4500						
-092	92	95.66		4.88-5.13	94.85	1.43	1.4900					
-095	95	98.69			97.85	1.43	1.5600					
-098	98	101.83	100.99		1.50	1.7100						
-100	100	103.83	102.99		1.50	1.7500						
-102	102	106.00	5.13-5.38		105.15	1.58	1.8500					
-105	105	109.00		108.15	1.58	1.9600						
-108	108	112.22		5.64-5.89	111.31	1.66	2.0600					
-110	110	114.25			113.31	1.66	2.1000					
-112	112	116.44			5.89-6.15	115.45	1.73	2.2200				
-115	115	119.44	118.45			1.73	2.3000					
-120	120	124.54	6.20-6.45			123.55	1.78	3.3000				
-125	125	129.59		128.55		1.78	3.5000					
-130	130	134.71		133.65		1.83	3.6000					
-135	135	139.74		138.62	1.81	3.7000						
-140	140	144.87			143.72	1.86	3.8000					
-145	145	150.04	148.82		1.91	4.0000						
-150	150	155.07	153.82		1.91	4.1000						
-155	155	160.72	159.40		2.20	6.3000						
-160	160	165.74		164.40	2.20	6.5000						
-165	165	170.77		169.40	2.20	6.7000						
-170	170	176.05		174.60	2.30	7.0000						
-175	175	181.05		179.60	2.30	7.2000						
-180	180	186.38	184.88		2.44	7.4000						
-185	185	191.10	189.88		2.44	7.6000						
-190	190	196.45	194.88		2.44	7.8000						
-195	195	201.74	200.14		2.57	8.0000						
-200	200	206.76		205.14	2.57	8.2000						
-210	210	217.10			215.40	2.70	10.4000					
-220	220	227.40				225.64	2.82	11.0000				
-230	230	237.73					235.90	2.95	11.4000			
-240	240	247.80	245.90					2.95	11.9000			
-250	250	258.10		256.16				3.08	12.3000			
-260	260	268.43			266.40			3.20	13.0000			
-270	270	278.50				276.40		3.20	13.3000			
DAH-280	280	288.82					286.66	3.33	13.9000			

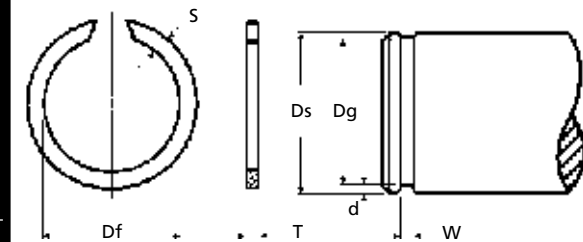
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 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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EXTERNAL METRIC

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

DUSC	SHAFT		RING			GROOVE			MATERIAL	TOOL
	Decimal (Ds)	MM (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	Spring Steel	
DUSC-0584	.4724	12	.421 $\pm .000 / - .020$	.062	.042	.436 $\pm .002$	.018	.046 $\pm .003 / - .000$		
-0594	.5906	15	.538 $\pm .000 / - .025$	.078	.047	.550	.020	.053		-E015R
-0614	.6693	17	.616 $\pm .000 / - .025$	.078		.629				
-0639R	.7874	20	.710 $\pm .000 / - .031$	.093	.062	.731	.028	.068		
-0698R	.9843	25	.910 $\pm .000 / - .031$	.109		.924	.030			
-0740R	1.1811	30	1.093 $\pm .000 / - .046$	.125	.075	1.111	.035	.085		
-0823	1.3780	35	1.265 $\pm .000 / - .046$	.156		1.288	.045			
-0916R	1.5748	40	1.452 $\pm .000 / - .062$	.156	.093	1.465	.055	.108		-E047R
-0974R	1.7717	45	1.625 $\pm .000 / - .062$	.188		1.648	.062			
-1065R	1.9685	50	1.820 $\pm .000 / - .078$	.188		1.844				
-1129R	2.1654	55	1.995 $\pm .000 / - .062$	.218	.109	2.015	.075	.120		
-1185	2.3622	60	2.187 $\pm .000 / - .062$	.218		2.212				
-1258	2.5591	65	2.359 $\pm .000 / - .062$	.250		2.389				
-1308R	2.7559	70	2.556 $\pm .000 / - .062$	.250	.125	2.586	.085	.139		-E601R
-1378	2.9528	75	2.750 $\pm .000 / - .078$	.250		2.783				
-1407R	3.1496	80	2.946 $\pm .000 / - .078$	.312		2.979				
-1468R	3.3465	85	3.139 $\pm .000 / - .078$	.312		3.176				
-1517R	3.5433	90	3.308 $\pm .000 / - .078$	.312		3.343				
-1551R	3.7402	95	3.500 $\pm .000 / - .078$	.312		3.540				
-1572R	3.9370	100	3.697 $\pm .000 / - .078$	.312	.156	3.737	.100	.174		-E602R
-2919R	4.1339	105	3.888 $\pm .000 / - .078$	.312		3.934				
DUSC-1625R	4.3307	110	4.080 $\pm .000 / - .078$	.312		4.131				

CONTACT PLANT FOR TOOL INFORMATION.

DUSC	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	SEE BEARING CROSS REFERENCE CHART ON PAGE 201.
	AXIAL ASSEMBLY		UNCOMMON	
	Metric wire formed external retaining ring for use with SAE standard bearings. See the bearing cross reference chart on page 199 for bearing numbers.	<ol style="list-style-type: none"> 1. Confirm the shaft diameter (Ds). 2. Measure the free inside diameter (Df) of the ring. 3. Determine the ring thickness (T) and radial wall (S). 4. Find the part in the chart above. 		



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EXTERNAL

DUSC	BASIC BEARING NUMBER			DUSC	BASIC BEARING NUMBER		
	Light	Medium	Heavy		Light	Medium	Heavy
DUSC-0584	201	301	-	DUSC-1185	212	312	412
-0594	202	302	-	-1258	213	313	413
-0614	203	303	403	-1308R	214	314	414
-0639R	204	304	404	-1378	215	315	415
-0698R	205	305	405	-1407R	216	316	416
-0740R	206	306	406	-1468R	217	317	417
-0823	207	307	407	-1517R	218	318	418
-0916R	208	308	408	-1551R	219	319	419
-0974R	209	309	409	-1572R	220	320	420
-1065R	210	310	410	-2919R	221	321	421
DUSC -1129R	211	311	411	DUSC-1525R	222	322	422

DUSC ON PAGE 198.

INTERNAL

DUHB	BASIC BEARING NUMBER			DUHB	BASIC BEARING NUMBER		
	Light	Medium	Heavy		Light	Medium	Heavy
DUHB-0738-1	200	-	-	DUHB-1504	-	-	406
-0721-1	-	-	-	-1581-5	211	-	-
-0725-1R	-	-	-	-1573-1	-	309	-
-0775	201	-	-	-2230	-	-	407
-0744	-	-	-	-1634-3	212	-	-
-2884-R	-	-	-	-1626-3	-	310	-
-0837	202	-	-	-1627-2	-	-	408
-0801	-	300	-	-2104	213	-	-
-0793-R	-	-	-	-1661	-	311	-
-0866	-	-	-	-2103	-	-	409
-0846-1	-	301	-	-1924	214	-	-
-0836-R	-	-	-	-1683-2	-	-	-
-0913-1	203	-	-	-1678-1	-	-	-
-0886	-	-	-	-1701-1	215	-	-
-0887	-	-	-	-1699-2	-	312	-
-1880-4	-	-	-	-2008	-	-	410
-0932-1	-	302	-	-1720	216	-	-
-3068-1	-	-	-	-1719	-	313	-
-1026-1	204	-	-	-3033-1	-	-	411
-0992-1	-	303	-	-2790-1	217	-	-
-0981-R	-	-	-	-1739	-	314	-
-1080-2	205	-	-	-2013	-	-	412
-1080-2A	-	304	-	-1759-1	218	-	-
-1069-R	-	-	-	-1754-2	-	315	-
-1208-1	206	-	-	-2117-2	-	-	413
-1208-1A	-	305	-	-2656-1	219	-	-
-1198	-	-	403	-1767-2	-	316	-
-1343-3	207	-	-	-2581	-	-	-
-1331	-	306	-	-1956	220	-	-
-1336	-	-	404	-3222	-	317	-
-1433-1	208	-	-	-4570	-	-	414
-1410	-	307	-	-2331-1	221	-	-
-1415-R	-	-	405	-3960-2	-	318	-
-1483-1	209	-	-	-2246-2	-	-	-
-1469-2	-	-	-	-2034-6	222	-	-
-1472-5R	-	-	-	-1801	-	319	-
-1526-1	210	-	-	DUHB-2127-1	-	-	416
DUHB-1521	-	308	-				

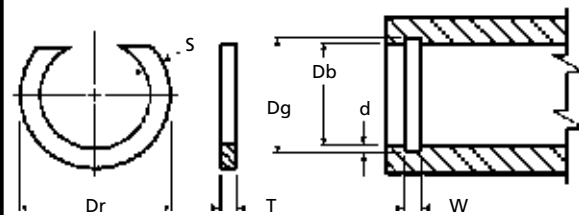
DUHB ON PAGE 200.

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METRIC SAE BEARINGS

MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

DUHB

BORE

Decimal
(Db)

MM
(Db)

RING

Free
Outside Dia.
(Dr)

Radial Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Depth
(d)

Width
(W)

MATERIAL

Spring
Steel

DUHB	Decimal (Db)	MM (Db)	Free Outside Dia. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Depth (d)	Width (W)	MATERIAL
DUHB-0738-1			1.265		.100	1.243	.031	.035	
-0721-1	1.1811	29.93	1.265		.125	1.253	.036	.046	
-0725-1R			1.271		.109	1.251	.035	.068	
-0775			1.349		.100	1.321	.031	.035	
-0744	1.2598	31.93	1.343		.125	1.331	.036	.046	
-2884-R			1.365		.109	1.329	.035	.068	
-0837			1.468		.100	1.440	.031	.035	
-0801	1.3780	34.92	1.468		.125	1.450	.036	.046	
-0793-R			1.486		.140	1.458	.040	.068	
-0866			1.546		.100	1.518	.031	.035	
-0846-1	1.4567	36.92	1.546		.125	1.528	.036	.046	
-0836-R			1.564		.140	1.536	.040	.068	
-0913-1			1.687		.125	1.654	.040	.046	
-0886	1.5748	39.91	1.703		.156	1.668	.047	.046	
-0887			1.703		.156	1.668	.047	.068	
-1880-4			1.765		.125	1.733	.040	.046	
-0932-1	1.6535	41.90	1.781		.156	1.747	.047	.046	
-3068-1			1.781		.156	1.747	.047	.062	
-1026-1			1.968		.125	1.930	.040	.046	
-0992-1	1.8504	46.89	1.968		.156	1.944	.047	.046	
-0981-R			1.976		.172	1.951	.050	.068	
-1080-2			2.171		.156	2.137	.045	.046	
-1080-2A	2.0472	51.88	2.171		.156	2.141	.047	.046	
-1069-R			2.179		.172	2.148	.050	.068	
-1208-1			2.562		.156	2.530	.045	.068	
-1208-1A	2.4409	61.86	2.562		.156	2.544	.052	.068	
-1198			2.593		.187	2.565	.062	.103	
-1343-3			2.968		.156	2.934	.050	.068	
-1331	2.8346	71.83	2.984		.187	2.959	.062	.068	
-1336			3.000		.187	2.959	.062	.103	
-1433-1			3.281		.156	3.249	.050	.068	
-1410	3.1496	79.82	3.296		.187	3.274	.062	.068	
-1415-R			3.312		.218	3.274	.062	.103	
-1483-1			3.484		.156	3.446	.050	.068	
-1469-2	3.3465	84.81	3.500		.187	3.471	.062	.068	
-1472-5R			3.500		.218	3.471	.062	.103	
-1526-1	3.5433	89.79	3.687		.156	3.643	.050	.103	
DUHB-1521			3.703		.187	3.668	.062	.103	

DUHB

DESCRIPTION

Metric wire formed internal retaining ring for use with SAE standard bearings. See the bearing cross reference chart on page 199 for bearing numbers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Confirm the bore diameter (Db).
2. Measure the free outside diameter (Dr) of the ring.
3. Determine the ring thickness (T) and radial wall (S).
4. Find the part in the charts above.

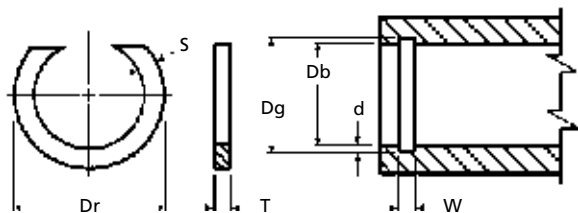
GENERAL USE






UNCOMMON

**SEE BEARING
CROSS
REFERENCE
CHART ON
PAGE 199.**

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**METRIC SAE BEARINGS****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

DUHB	BORE		RING			GROOVE			MATERIAL
	<i>Decimal (Db)</i>	<i>MM (Db)</i>	<i>Free Outside Dia. (Dr)</i>	<i>Radial Wall (S)</i>	<i>Thickness (T)</i>	<i>Diameter (Dg)</i>	<i>Depth (d)</i>	<i>Width (W)</i>	
DUHB-1504	3.5433	89.79	3.750	.250	.125	3.713	.085	.103	Spring Steel
-1581-5			4.093	.187	.093	4.062	.062	.103	
-1573-1	3.9370	100.00	4.140	.250	.093	4.107	.085	.103	
-2230			4.140	.250	.125	4.107	.085	.139	
-1634-3			4.500	.187	.093	4.455	.062	.103	
-1626-3	4.3307	110.00	4.531	.250	.093	4.500	.085	.103	
-1627-2			4.531	.250	.125	4.500	.085	.139	
-2104			4.937	.250	.109	4.884	.080	.120	
-1661	4.7244	120.00	4.953	.281	.109	4.912	.094	.120	
-2103			4.937	.250	.125	4.894	.085	.139	
-1924			5.125	.250	.109	5.081	.080	.120	
-1683-2	4.9213	125.00	5.156	.281	.109	5.109	.094	.120	
-1678-1			5.151	.312	.156	5.121	.100	.174	
-1701-1			5.312	.250	.109	5.278	.080	.120	
-1699-2	5.1181	130.00	5.343	.281	.109	5.306	.094	.120	
-2008			5.355	.312	.156	5.318	.100	.174	
-1720			5.703	.250	.109	5.671	.080	.120	
-1719	5.5118	140.00	5.750	.281	.109	5.699	.094	.120	
-3033-1			5.750	.312	.156	5.711	.100	.174	
-2790-1			6.093	.250	.109	6.065	.080	.120	
-1739	5.9055	150.00	6.125	.281	.109	6.093	.094	.120	
-2013			6.156	.312	.156	6.105	.100	.174	
-1759-1			6.500	.250	.109	6.459	.080	.120	
-1754-2	6.2992	160.00	6.550	.281	.109	6.497	.094	.120	
-2117-2			6.550	.312	.156	6.500	.100	.174	
-2656-1			6.937	.312	.125	6.872	.100	.139	
-1767-2	6.6929	170.00	6.982	.375	.125	6.942	.125	.139	
-2581			6.937	.312	.156	6.892	.100	.174	
-1956			7.343	.312	.125	7.286	.100	.139	
-3222	7.0866	180.00	7.380	.375	.125	7.336	.125	.139	
-4570			7.380	.375	.187	7.336	.125	.209	
-2331-1			7.718	.312	.125	7.680	.100	.139	
-3960-2	7.4803	190.00	7.781	.375	.125	7.730	.125	.139	
-2246-2			7.782	.375	.187	7.730	.125	.209	
-2034-6			8.125	.312	.125	8.074	.100	.139	
-1801	7.8740	200.00	8.187	.375	.125	8.125	.125	.139	
DUHB-2127-1			8.187	.375	.187	8.125	.125	.209	

DUHB	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	UHB  IMPERIAL Page 72 
	AXIAL ASSEMBLY			
	Metric wire formed internal retaining ring for use with SAE standard bearings. See the bearing cross reference chart on page 199 for bearing numbers.	1. Confirm the bore diameter (Db). 2. Measure the free outside diameter (Dr) of the ring. 3. Determine the ring thickness (T) and radial wall (S). 4. Find the part in the charts above.	 UNCOMMON	

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DIN 7993A

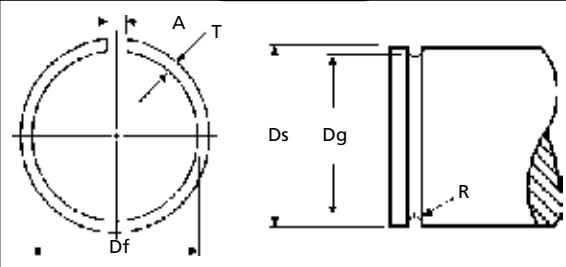


ROUND SECTION - EXTERNAL


MANUFACTURER CROSS-REFERENCE

INDEX
PAGE 236.

Bossard	BN825	Seeger	RW
Ellison	7993A	DIN	7993A



DRP	SHAFT	RING			GROOVE		WEIGHT	MATERIAL
	MM (Ds)	Free Inside Dia. (Df)	Wire Cross Section (T)	Gap (A)	Diameter (Dg)	Radius (R)	Kg per 100 Pieces	
DRP-004	4	3.1	.8	1	3.2	.5	0.0044	Spring Steel
-005	5	4.1		2	4.2		0.0057	
-006	6	5.1			5.2		0.0069	
-007	7	6.1			6.2		0.0077	
-008	8	7.1			7.2		0.0090	
-010	10	9.1	1.0	3	9.2	.6	0.0115	
-012	12	10.8			11.0		0.0210	
-014	14	12.8			13.0		0.0250	
-016	16	14.2			14.4		0.0740	
-018	18	16.2			16.4		0.0830	
-020	20	17.7	1.6	4	18.0	.9	0.1450	
-022	22	19.7			20.0		0.1600	
-024	24	21.7			22.0		0.1780	
-025	25	22.7			23.0		0.1840	
-026	26	23.7			24.0		0.1910	
-028	28	25.7	2.0	5	26.0	1.1	0.2070	
-030	30	27.7			28.0		0.2220	
-032	32	29.1			29.5		0.3670	
-035	35	32.1			32.5		0.3980	
-038	38	35.1			35.5		0.4400	
-040	40	37.1	2.5	4	37.5	1.4	0.4640	
-042	42	39.0			39.5		0.4870	
-045	45	42.0			42.5		0.5230	
-048	48	45.0			45.5		0.5600	
-050	50	47.0			47.5		0.5830	
-055	55	51.1	3.2	5	51.8	1.8	1.0510	
-060	60	56.1			56.8		1.1500	
-065	65	61.1			61.8		1.2490	
-070	70	66.0			66.8		1.3400	
-075	75	71.0			71.8		1.4390	
-080	80	76.0	3.2	5	76.8	1.8	1.5380	
-085	85	81.0			81.8		1.6380	
-090	90	86.0			86.8		1.7370	
-095	95	91.0			91.8		1.8360	
-100	100	95.8			96.8		1.9310	
-105	105	100.8	3.2	5	101.8	1.8	2.0300	
-110	110	105.8			106.8		2.1290	
-115	115	110.8			111.8		2.2290	
-120	120	115.8			116.8		2.3280	
DRP-125	125	120.8			121.8		2.4270	

DRP	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	CLOSED GAP DESIGN
	Round section wire rings mostly used in semicircular grooves. Applications include gear systems, automotive engineering, and retaining gudgeon pins.	1. Verify shaft diameter (Ds). 2. Confirm free diameter (Df), wire cross-section (T), and gap (A) of the part. 3. Find the part in the chart above.	 UNCOMMON	
AXIAL ASSEMBLY				

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ROUND SECTION - INTERNAL**MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Bossard

BN826

Seeger

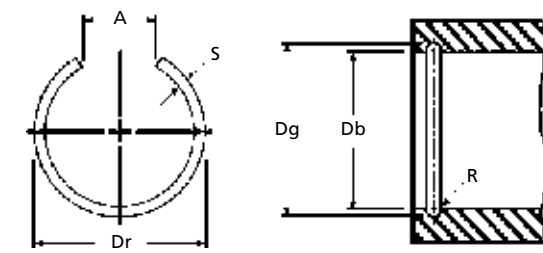
RB

Ellison


7993B

DIN

7993B

DIN
7993B

DRB	BORE	RING			GROOVE		WEIGHT	MATERIAL
	MM (Db)	Free Outside Diameter (Dr)	Wire Cross Section (S)	Gap (A)	Diameter (Dg)	Radius (R)	Kg per 100 Pieces	Spring Steel
DRB-007	7	7.9	.8	4	7.8	.5	0.0071	
-008	8	8.9			8.8		0.0083	
-010	10	10.9			10.8		0.0108	
-012	12	13.2	1.0	6	13.0	.6	0.0196	
-014	14	15.2			15.0		0.0234	
-016	16	17.8			17.6		0.0706	
-018	18	19.8	1.6	8	19.6	.9	0.0804	
-020	20	22.3			22.0		0.1320	
-022	22	24.3			24.0		0.1470	
-024	24	26.3	2.0	10	26.0	1.1	0.1630	
-025	25	27.3			27.0		0.1700	
-026	26	28.3			28.0		0.1790	
-028	28	30.3			30.0		0.1940	
-030	30	32.3			32.0		0.2100	
-032	32	34.9	2.5	12	34.5	1.4	0.3470	
-035	35	37.9			37.5		0.3850	
-038	38	40.9			40.5		0.4200	
-040	40	42.9			42.5		0.4430	
-042	42	45.0			44.5		0.4540	
-045	45	48.8	3.2	16	47.5	1.8	0.4890	
-048	48	51.0			50.5		0.5240	
-050	50	53.0			52.5		0.5510	
-055	55	58.9			58.2		0.9770	
-060	60	63.9			63.2		1.0760	
-065	65	68.9	3.2	20	68.2	1.8	1.1750	
-070	70	74.0			73.2		1.2440	
-075	75	79.0			78.2		1.3430	
-080	80	84.0			83.2		1.4420	
-085	85	89.0			88.2		1.5410	
-090	90	94.0	3.2	25	93.2	1.8	1.6400	
-095	95	99.0			98.2		1.7390	
-100	100	104.2			103.2		1.7980	
-105	105	109.2			108.2		1.8980	
-110	110	114.2			113.2		1.9970	
-115	115	119.2	3.2	32	118.2	1.8	2.0960	
-120	120	124.2			123.2		2.1950	
DRB-125	125	129.2			128.2		2.2940	

DRB	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	OPEN GAP DESIGN
	Round section wire rings mostly used in semicircular grooves. Applications include gear systems, automotive engineering, and retaining gudgeon pins.	<ol style="list-style-type: none">1. Verify bore diameter (Ds).2. Confirm free diameter (Df), wire cross-section (T), and gap (A) of the part.3. Find the part in the chart above.	 UNCOMMON	
	AXIAL ASSEMBLY			

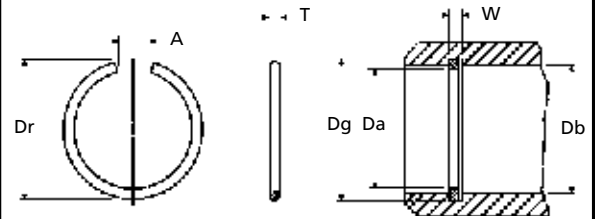
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FOR GUDGEON PIN RETENTION



ROUND SECTION - INTERNAL

MANUFACTURER CROSS-REFERENCE

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Anderton

M1700

D17

BORE

MM
(Db)

Free Outside
Diameter Min.
(Dr)

Wire
Cross Section
(T)

Gap Min.
(A)

Assembled
Inside Dia.
(Da)

GROOVE

Diameter
(Dg)

Width
(W)

MATERIAL

Spring
Steel

D17-010

10

11.8

.9

7.0

8.9

11.05

1.0

-012

12

13.9

1.0

7.0

10.8

13.13

1.1

-0125

12.5

14.4

1.0

7.0

11.3

13.64

1.1

-013

13

14.9

1.0

7.0

11.8

14.15

1.1

-014

14

16.1

1.2

7.5

12.6

15.34

1.3

-015

15

17.1

1.2

7.5

13.6

16.36

1.3

-016

16

18.1

1.2

7.5

14.6

17.35

1.3

-017

17

19.3

1.4

8.0

15.3

18.54

1.5

-0175

17.5

20.0

1.4

9.0

15.8

19.05

1.5

-018

18

20.5

1.4

9.0

16.3

19.56

1.5

-019

19

21.5

1.6

9.5

17.3

20.55

1.7

-020

20

22.5

1.6

9.5

18.3

21.54

1.7

-021

21

23.7

1.6

9.5

19.1

22.76

1.7

-022

22

24.7

1.8

10.0

20.1

23.75

1.9

-024

24

27.0

1.8

10.0

21.9

25.96

1.9

-025

25

27.9

2.0

11.0

22.9

26.95

2.1

-028

28

31.1

2.0

11.0

25.7

30.15

2.1

-030

30

33.1

2.0

11.0

27.7

32.15

2.1

-032

32

35.1

2.0

11.0

29.7

34.15

2.1

D17-034

34

37.1

2.0

11.0

31.7

36.17

2.1

D17

DESCRIPTION

Round section wire formed ring for internal application. Used to retain gudgeon pins. This ring type is gradually becoming obsolete.

AXIAL ASSEMBLY

HOW TO IDENTIFY

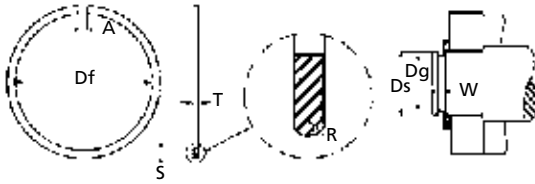
1. Verify shaft diameter (Ds).
2. Confirm free diameter (Df), wire cross-section (T), and gap (A) of the part.
3. Find the part in the chart above.

GENERAL USE



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**EXTERNAL - RADIUSED EDGE****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.

Anderton

M3200

Peterson

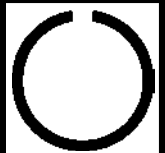
R Series

Ellison

ESP

Seeger

SP



DSP	SHAFT		RING					GROOVE		WEIGHT	MATERIAL
	MM (Ds)	Decimal (Ds)	Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Gap (approx.) (A)	Radius min. (R)	Diameter (Dg)	Width (W)	Kg per 100 Pieces	Spring Steel
DSP-022	22	.8661	20.3	2.39	1.07	3	.4	20.64	1.30	0.2700	
-030	30	1.1811	27.4					28.17		0.2800	
-032	32	1.2598	29.4					30.15		0.3000	
-035	35	1.3780	32.4					33.17		0.3200	
-037	37	1.4567	34.0	3.25	1.12	4	.4	34.77	1.35	0.3400	
-040	40	1.5748	37.3					38.10		0.3600	
-042	42	1.6535	38.9					39.75		0.3800	
-044	44	1.7323	40.9					41.75		0.4000	
-047	47	1.8504	43.7	4.04	1.70	5	.6	44.60	1.90	0.5300	
-050	50	1.9685	46.7					47.60		0.5800	
-052	52	2.0472	48.8					49.73		0.5900	
-055	55	2.1654	51.7					52.60		0.6200	
-056	56	2.2047	52.4	4.85	2.46	7	.7	53.60	2.70	0.6500	
-058	58	2.2835	54.4					55.60		0.6700	
-062	62	2.4409	58.2					59.61		1.0500	
-065	65	2.5591	61.2					62.60	3.10	1.1000	
-068	68	2.6772	63.4	7.21	2.82	10	1.2	64.82		1.2600	
-072	72	2.8346	67.4					68.81		1.4700	
-075	75	2.9528	70.4					71.83		1.5300	
-080	80	3.1496	75.4					76.81	3.50	1.6300	
-090	90	3.5433	85.4	9.60	3.10	1.5	1.5	86.79		2.6600	
-100	100	3.9370	95.2					96.80		2.9200	
-110	110	4.3307	105.2					106.81	4.50	3.2800	
-120	120	4.7244	113.6	10.00	3.50	1.5	1.5	115.21		6.0600	
-125	125	4.9213	118.6					120.22		6.3000	
-130	130	5.1181	123.6					125.22	5.50	6.5600	
-150	150	5.9005	142.9	12.00	4.50	1.5	1.5	145.24		7.7200	
-160	160	6.2992	152.9					155.22		8.1000	
-180	180	7.0866	171.2					173.66	+3/-0	12.8000	
-200	200	7.8740	191.0	+2.5/-0	+0.0/-0.30	+0.0/-0.2	+0.0/-0.2	193.65		14.8000	
-225	225	8.8583	214.3					217.00		19.6000	
-240	240	9.4488	229.2					232.00	+4/-0	20.9000	
-250	250	9.8425	239.2	+1.6/-0	+0.0/-0.30	+0.0/-0.2	+0.0/-0.2	242.00		22.0000	
-260	260	10.2362	247.5					252.00		23.0000	
-280	280	11.0236	267.5					272.00	+5/-0	25.0000	
-300	300	11.8110	284.5	+3.0/-0	+0.0/-0.30	+0.0/-0.2	+0.0/-0.2	290.00		40.0000	
-320	320	12.5984	304.0					310.00		42.0000	
-340	340	13.3858	324.0					330.00		44.6000	
-370	370	14.5669	353.0					360.00		48.5000	
DSP-400	400	15.7480	383.0	+3.0/-0	+0.0/-0.30	+0.0/-0.2	+0.0/-0.2	390.00		52.5000	

DSP**DESCRIPTION**

Used to secure roller bearings. Unique radiused edge makes these parts very application-specific.

AXIAL ASSEMBLY**HOW TO IDENTIFY**

1. Confirm that the ring has radiused edges.
2. Verify shaft diameter (Ds).
3. Determine free diameter (Df), radial wall (S), and thickness (T) of the part.
4. Find the part in the chart above.

GENERAL USE

UNCOMMON

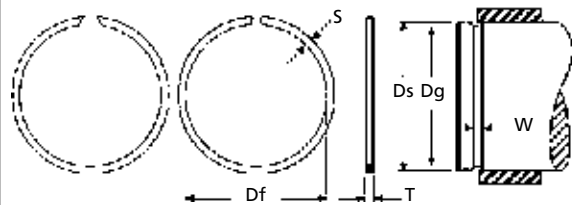
**CLOSED
GAP
DESIGN****MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS**

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FOR BEARING RETENTION



RECTANGULAR SECTION - EXTERNAL

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Anderton

M2400

Seeger

SW

Ellison

ESW

DSW

SHAFT

MM
(Ds)

RING

Max. Free
Inside Dia.
(Df)

Radial Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Width min.
(W)

WEIGHT

Kg per
100
Pieces

MATERIAL

Spring
Steel

DSW	SHAFT MM (Ds)	Max. Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	GROOVE Diameter (Dg)	Width min. (W)	WEIGHT Kg per 100 Pieces	MATERIAL Spring Steel
DSW-004	4	3.7	.80	.5	3.8	.6	0.0020	
-005	5	4.7	1.00		4.8		0.0050	
-006	6	5.6	1.10	.7	5.7	.8	0.0090	
-007	7	6.5	1.20		6.7		0.0120	
-008	8	7.4			7.6		0.0200	
-009	9	8.4			8.6		0.0240	
-010	10	9.4			9.6		0.0250	
-011	11	10.2	1.30	1.0	10.5	1.1	0.0290	
-012	12	11.2			11.5		0.0300	
-013	13	12.2			12.5		0.0340	
-014	14	13.1	1.50		13.5		0.0500	
-015	15	14.0			14.4		0.0660	
-016	16	15.0			15.4		0.0690	
-017	17	16.0			16.4		0.0720	
-018	18	17.0			17.4		0.0750	
-019	19	17.9			18.4		0.0800	
-020	20	18.7	1.75	1.2	19.2	1.3	0.0840	
-021	21	19.7			20.2		0.0870	
-022	22	20.7			21.2		0.0910	
-024	24	22.5			23.0		0.0990	
-025	25	23.5			24.0		0.1000	
-026	26	24.5			25.0		0.1100	
-027	27	25.5			26.0		0.2000	
-028	28	26.5			27.0		0.2110	
-029	29	27.5			28.0		0.2200	
-030	30	28.5			29.0		0.2330	
-032	32	30.2			30.8		0.2410	
-035	35	33.2			33.8		0.2510	
-037	37	35.2			35.8		0.2720	
-038	38	36.2			36.8		0.2830	
-040	40	37.8	2.30	1.5	38.5	1.6	0.2910	
-042	42	39.8			40.5		0.3100	
-043	43	40.8			41.5		0.3250	
-045	45	42.8			43.5		0.3390	
-047	47	44.8			45.5		0.3480	
-048	48	45.8			46.5		0.3600	
-050	50	47.8			48.5		0.3730	
-052	52	49.8			50.5		0.3920	
-055	55	52.6			53.5		0.4110	
DSW-058	58	55.6			56.5		0.4400	

DSW

DESCRIPTION

Small radial width. Applications include gear systems, securing needle bearings, and use as spacers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify shaft diameter (Ds).
2. Determine free diameter (Df), radial wall (S), and thickness (T) of the part.
3. Find the part in the chart above.

GENERAL USE



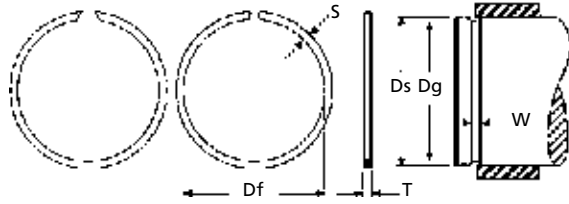
UNCOMMON

**SEE
DIN 7993
ON PAGES
202-203**

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RECTANGULAR SECTION - EXTERNAL
MANUFACTURER CROSS-REFERENCE

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Anderton

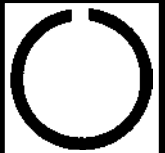
M2400

Seeger

SW

Ellison

ESW



DSW	SHAFT	RING			GROOVE		WEIGHT	MATERIAL
	MM (Ds)	Max. Free Inside Dia. (Df)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Width min. (W)	Kg per 100 Pieces	
DSW-060	60	57.6	2.3	1.5	58.5	1.6	0.4550	Spring Steel
-063	63	60.6			61.5		0.4580	
-065	65	62.6			63.5		0.4640	
-068	68	65.4			66.2		0.8590	
-070	70	67.4	2.8	2.0	68.2	2.2	0.8710	
-072	72	69.4			70.2		0.8800	
-073	73	70.4			71.2		0.8900	
-075	75	72.4			73.2		0.9320	
-080	80	77.4	3.4	2.5	78.2	2.7	0.9670	
-085	85	82.0			83.0		1.6000	
-090	90	87.0			88.0		1.6000	
-095	95	92.0			93.0		1.8200	
-100	100	97.0			98.0		1.8900	
-105	105	101.7			102.7		2.0700	
-110	110	106.6			107.7		2.0900	
-115	115	111.6			112.7		2.2100	
-120	120	116.5	4.0	3.0	117.7	3.2	2.4100	
-125	125	121.5			122.7		2.5100	
-130	130	126.4			127.7		2.6600	
-135	135	131.1			132.4		3.0200	
-140	140	136.0			137.4		3.1100	
-145	145	141.0			142.4		3.2600	
-150	150	145.9			147.4		3.2800	
-155	155	150.9			154.4		3.4700	
-160	160	155.8	5.0	4.0	157.4	4.2	3.6600	
-165	165	160.8			162.4		3.7400	
-170	170	165.7			167.4		3.8500	
-175	175	170.7			172.4		3.9400	
-180	180	175.2			177.0		6.1200	
-185	185	180.2			182.0		6.3900	
-190	190	185.1			187.0		6.5900	
-195	195	190.1			192.0		6.7500	
-200	200	196.0	7.5	4.5	197.0	4.8	6.8400	
-210	210	204.9			207.0		7.2000	
-220	220	214.8			217.0		7.6300	
-230	230	224.7			227.0		7.9800	
-240	240	234.6			237.0		8.1700	
-250	250	244.5			247.0		8.6500	
-260	260	252.4			255.0		17.9000	
-265	265	257.4			260.0		18.5200	
-270	270	262.3	12.0	4.5	265.0	4.8	19.7700	
-280	280	272.2			275.0		19.8700	
-285	285	277.2			280.0		19.9500	
-290	290	282.1			285.0		20.5300	
-300	300	292.1			295.0		21.4200	
-305	305	297.1			300.0		21.9400	
-310	310	302.0			305.0		22.3100	
-320	320	311.9			315.0		22.5300	
-330	330	321.8	4.5	4.5	325.0	4.8	22.8600	
-340	340	331.7			335.0		23.9300	
-350	350	341.6			345.0		25.1200	
-360	360	351.5			355.0		25.3100	
-380	380	371.4			375.0		26.5800	
-400	400	391.2			395.0		28.1100	
DSW-460	460	449.5			455.0		58.2000	

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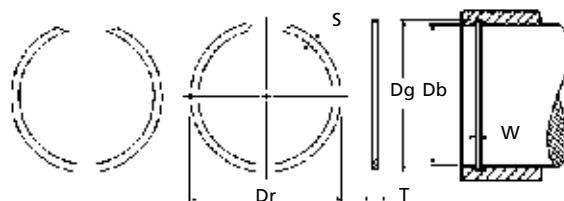
 All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above.
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FOR BEARING RETENTION



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Anderton

M2300

Seeger

SB

Ellison

ESB

DSB

BORE

MM
(Db)

Free Outside
Diameter
Max. (Dr)

RING

Radial Wall
(S)

Thickness
(T)

GROOVE

Diameter
(Dg)

Width Min.
(W)

WEIGHT
Kg per
100
Pieces

MATERIAL
Spring
Steel

DSB-007	7	7.5	1.00		.8	7.3		.9	0.0090
-008	8	8.5				8.3	+0.09/-0.00		0.0100
-009	9	9.5	1.10			9.3			0.0130
-010	10	10.6	1.20			10.4			0.0150
-011	11	11.6				11.4			0.0210
-012	12	12.7				12.4			0.0250
-013	13	13.8	1.30		1.0	13.5	+0.11/-0.00	1.1	0.0280
-014	14	14.8				14.5			0.0310
-015	15	15.8				15.5			0.0340
-016	16	16.8				16.5			0.0530
-017	17	17.8				17.5			0.0550
-018	18	18.9				18.5			0.0680
-019	19	19.9				19.6			0.0720
-020	20	21.0				20.6			0.0760
-021	21	22.0				21.6			0.0790
-022	22	23.0	1.75	+0.00/-0.10	1.2	22.6	+0.13/-0.00	1.3	0.0810
-023	23	24.0				23.6			0.0880
-024	24	25.2				24.8			0.0900
-025	25	26.2				25.8			0.0910
-026	26	27.2				26.8			0.0980
-027	27	28.2				27.8			0.1110
-028	28	29.2				28.8			0.1130
-029	29	30.2				29.8			0.1150
-030	30	31.4				31.0			0.2000
-031	31	32.4				32.0			0.2030
-032	32	33.4				33.0			0.2110
-033	33	34.4				34.0			0.2260
-034	34	35.4				35.0			0.2340
-035	35	36.4	2.30		1.5	36.0	+0.16/-0.00	1.6	0.2360
-037	37	38.8				38.2			0.2530
-038	38	39.8				39.2			0.2610
-039	39	40.8				40.2			0.2670
-040	40	41.8				41.2			0.2800
-042	42	43.8				43.2			0.2920
DSB-043	43	44.8				44.2			0.3030

DSB

DESCRIPTION

Small radial width. Applications include gear systems, securing needle bearings, and use as spacers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Determine free diameter (Df), radial wall (S), and thickness (T) of the part.
3. Find the part in the chart above.

GENERAL USE



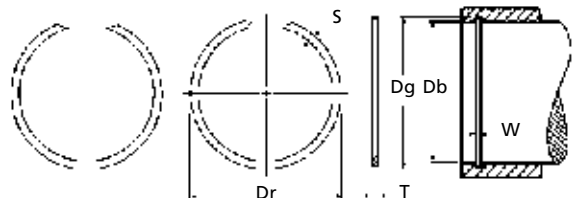
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**CLOSED
GAP
DESIGN**

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FOR BEARING RETENTION

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Anderton

M2300

Seeger


SB

Ellison

ESB



DSB	BORE		RING			GROOVE		WEIGHT	MATERIAL
	MM (Db)	Free Outside Diameter Max. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Width Min. (W)	Kg per 100 Pieces	
DSB-044	44	45.8	2.30	1.5	+0.00/-0.10	45.2	1.6	0.3110	Spring Steel
-045	45	46.8				46.2		0.3250	
-046	46	47.8				47.2		0.3280	
-047	47	48.8				48.2		0.3290	
-048	48	49.8				49.2		0.3450	
-050	50	51.8				51.2		0.3570	
-052	52	54.3				53.5		0.3580	
-053	53	55.3				54.5		0.3820	
-055	55	57.3				56.5		0.3930	
-057	57	59.3				58.5		0.4120	
-058	58	60.3				59.5		0.4130	
-060	60	62.3				61.5		0.4280	
-062	62	64.3				63.5		0.4420	
-063	63	65.3				64.5		0.4500	
-065	65	67.3				66.5		0.4720	
-068	68	70.3				69.5		0.4900	
-070	70	72.3				71.5		0.4930	
-072	72	74.6	2.80	2.0	+0.00/-0.10	73.8	2.2	0.8490	
-073	73	75.6				74.8		0.8520	
-074	74	76.6				75.8		0.8600	
-076	76	78.6				77.8		0.8890	
-078	78	80.6				79.8		0.9050	
-079	79	81.6				80.8		0.9070	
-080	80	82.6				81.8		0.9220	
-081	81	83.6				82.8		0.9310	
-082	82	84.6				83.8		0.9450	
-083	83	85.6				84.8		0.9630	
-085	85	87.6	3.40	2.5	+0.00/-0.10	86.8	2.7	0.9810	
-086	86	88.6				87.8		0.9910	
-088	88	91.0				90.0		1.5400	
-090	90	93.0				92.0		1.5600	
-092	92	95.0				94.0		1.6600	
-093	93	96.0				95.0		1.6800	
-095	95	98.0				97.0		1.6900	
DSB-097	97	100.0				99.0		1.7100	

DSB	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	SEE DIN 7993 ON PAGES 202-203
	Small radial width. Applications include gear systems, securing needle bearings, and use as spacers.	<ol style="list-style-type: none">1. Verify bore diameter (Db).2. Determine free diameter (Df), radial wall (S), and thickness (T) of the part.3. Find the part in the chart above.	 UNCOMMON	
	AXIAL ASSEMBLY			

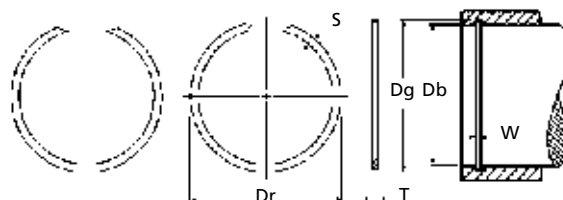
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Ellison	ESB		

DSB	BORE	RING				GROOVE		WEIGHT	MATERIAL
	MM (Db)	Free Outside Diameter Max. (Dr)	Radial Wall (S)	Thickness (T)	Diameter (Dg)	Width Min. (W)	Kg per 100 Pieces	Spring Steel	
DSB-098	98	101.0	3.4	2.5	100.0	2.7	1.7500		
-100	100	103.0			102.0		1.7900		
-102	102	105.3			104.3		1.8400		
-103	103	106.3			105.3		1.8500		
-105	105	108.3			107.3		1.8700		
-107	107	110.3			109.3		1.9100		
-108	108	111.3			110.3		1.9300		
-110	110	113.4			112.3		1.9800		
-112	112	115.4			114.3		2.0300		
-113	113	116.4			115.3		2.0500		
-115	115	118.4			117.3		2.0600		
-117	117	120.4			119.3		2.0800		
-118	118	121.4			120.3		2.1100		
-120	120	123.5			122.3		2.1400		
-123	123	126.5			125.3		2.2000		
-125	125	128.5			127.3		2.2500		
-127	127	130.5			129.3		2.3000		
-130	130	133.6			132.3		2.3400		
-133	133	136.6	135.3	2.4400					
-135	135	138.6	137.3	2.5000					
-137	137	140.6	139.3	2.5300					
-140	140	144.0	4.0	3.0	142.6	3.2	2.9300		
-143	143	147.0			145.6		3.0100		
-150	150	154.1			152.6		3.1900		
-153	153	157.1			155.6		3.2600		
-160	160	164.2			162.6		3.4400		
-163	163	167.2			165.6		3.4600		
-165	165	169.2			167.6		3.4900		
-170	170	174.3			172.6		3.6200		
-173	173	177.3			175.6		3.7100		
-175	175	179.3			177.6		3.7300		
-180	180	184.5	182.6	3.8300					
-183	183	187.5	185.6	4.1000					
DSB-190	190	194.9	5.0	3.0	193.0	3.2	6.1300		

DSB

DESCRIPTION

Small radial width. Applications include gear systems, securing needle bearings, and use as spacers.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Verify bore diameter (Db).
2. Determine free diameter (Df), radial wall (S), and thickness (T) of the part.
3. Find the part in the chart above.

GENERAL USE



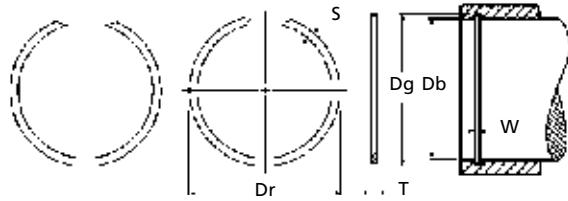
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Anderton

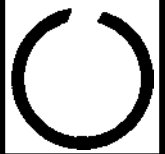
M2300

Seeger


SB

Ellison

ESB



DSB	BORE		RING			GROOVE		WEIGHT	MATERIAL
	MM (Db)	Free Outside Diameter Max. (Dr)	Radial Wall (S)	Thickness (T)		Diameter (Dg)	Width Min. (W)	Kg per 100 Pieces	
DSB-195	195	199.9	5.0	3.0		198.0	+ .29/- .00	6.1600	Spring Steel
-200	200	205.0				203.0		6.4500	
-205	205	210.0				208.0		6.6400	
-210	210	215.1				213.0		6.8800	
-215	215	220.1				218.0		6.9500	
-220	220	225.2				223.0		7.2400	
-225	225	230.2				228.0		7.2900	
-230	230	235.3				233.0		7.5200	
-240	240	245.4				243.0		8.0900	
-250	250	255.5				253.0		8.4200	
-260	260	267.6	7.5	4.0		265.0	+ .32/- .00	16.5000	
-270	270	277.7				275.0		17.4000	
-280	280	287.8				285.0		18.4000	
-290	290	297.9				295.0		19.0000	
-300	300	307.9				305.0		19.6000	
-310	310	318.0				315.0		20.0000	
-320	320	328.1				325.0		20.3000	
-325	325	333.1				330.0		20.6000	
-330	330	338.2				335.0		20.9000	
-340	340	348.3				345.0		21.9000	
-350	350	358.4				355.0		22.9000	
-355	355	363.4				360.0		23.1000	
-360	360	368.5				365.0		23.3000	
-370	370	378.5				375.0		23.6000	
-375	375	383.5				380.0		24.0000	
-380	380	388.6				385.0		24.2000	
-390	390	398.7				395.0		25.3000	
-395	395	403.7				400.0		25.7000	
-400	400	408.9				405.0		26.0000	
-410	410	419.0				415.0		26.6000	
-415	415	424.0				420.0		27.3000	
-420	420	429.1				425.0		27.7000	
-430	430	439.2				435.0		28.5000	
DSB-440	440	449.3				445.0	+ .40/- .00	29.4000	

DSB	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	SEE DIN 7993 ON PAGES 202-203
	Small radial width. Applications include gear systems, securing needle bearings, and use as spacers.	<ol style="list-style-type: none">1. Verify bore diameter (Db).2. Determine free diameter (Df), radial wall (S), and thickness (T) of the part.3. Find the part in the chart above.	 UNCOMMON	
	AXIAL ASSEMBLY			

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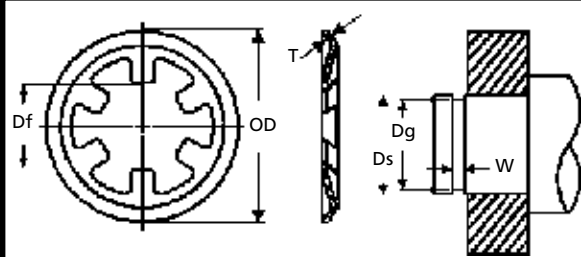


REINFORCED EXTERNAL

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Anderton	M1465	Seeger	ZA
Rotor Clip	DTX		



DTX	SHAFT	RING				GROOVE		MATERIAL	
	MM (Ds)	Free Inside Dia. (Df)	Outside Diameter (OD)	Thickness (T)	No. of Prongs	Diameter (Dg)	Width min. (W)	Spring Steel	
DTX-0015	1.5	1.40	6.0	.25	3	1.40	.40		
-002	2	1.85	6.5			1.90			
-003	3	2.80	8.0			2.90			
-0035	3.5	3.30	8.2	.40	4	3.40	.50		
-004	4	3.80	9.0	.25		3.90	.40		
-005	5	4.80	10.0			4.90			
-006	6	5.80	11.0			5.90			
-007	7	6.80	12.0			4-5			6.90
-008	8	7.75	13.0			4			7.85
-009	9	8.75	14.0	.30	5-6	8.85	.60		
-010	10	9.75	16.0		6	9.85			
-012	12	11.70	18.0			11.85			
-015	15	14.60	23.0	.50	8	14.80	1.00		
-016	16	15.60	24.5	.40		15.80			
-018	18	17.60	27.0			17.80			
-019	19	18.60	28.0	.50		18.80			
-020	20	19.50	29.0			19.75			
-022	22	21.50	31.0			21.75			
-025	25	24.50	34.0			24.75			
-030	30	29.50	40.0			29.75			
-035	35	34.50	46.0		34.75				
DTX-045	45	44.50	60.0			44.75	1.50		

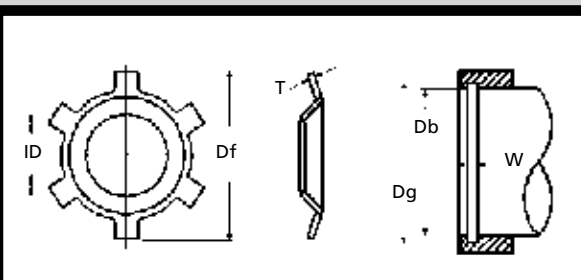


BASIC INTERNAL

MANUFACTURER CROSS-REFERENCE

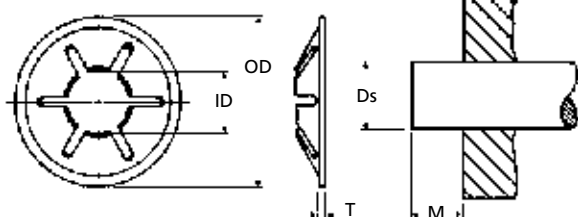
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Rotor Clip	DTI	
Seeger	ZJ	



DTI	BORE	RING				GROOVE			MATERIAL
	MM (Db)	Free Outside Dia. (Df)	Inside Diameter (ID)	Thickness (T)	No. of Prongs	Diameter (Dg)	Width Min. (W)	Spring Steel	
DTI-008	8	8.25	4.0	.25	6	8.10	.40		
-010	10	10.20	5.0			10.10			
-012	12	12.25	6.0			12.10			
-015	15	15.25	9.0			15.10			
-017	17	17.30	11.0	.30	8	17.15	.50		
-018	18	18.30	10.5	.40		18.15	.80		
-020	20	20.35	11.0			20.20			
-025	25	25.35	16.0			25.20			1.00
-026	26	26.40	17.0		8-10	26.20			
-028	28	28.40	19.0	28.20					
-030	30	30.40	21.0	30.20					
-035	35	35.40	25.0	12		35.20			
-040	40	40.40	30.0		40.20				
-045	45	45.40	35.0		45.20				
DTI-050	50	50.50	39.0		50.20				

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SHAFT RETENTION WASHER

MANUFACTURER CROSS-REFERENCE

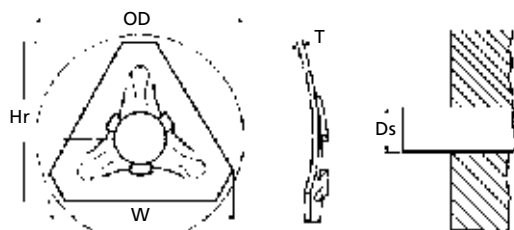
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Seeger

KS



DKS	SHAFT		RING					MATERIAL
	MM (Ds)		Free Inside Dia. (ID)	Thickness (T)	Free Outside Dia. (OD)	No. of Prongs	Edge Margin Min. (M)	Spring Steel
DKS-0015	1.5	+.000/ -.025	1.30	.25	6.00	3	2.5	
-002	2.0		1.80	.30	7.00			
-0025	2.5		2.30		8.25			
-003	3.0	+.000/ -.030	2.80	.40	10.00	5	3.0	
-0035	3.5		3.25		11.50			
-004	4.0		3.75	.50	13.00			
-005	5.0	+.000/ -.030	4.75		15.00	5	3.5	
-006	6.0		5.75	.60	16.50			
-007	7.0		6.75		18.00			
-008	8.0	+.000/ -.036	7.75	.70	19.50	6	4.0	
-009	9.0		8.75		21.00			
DKS-010	10.0		9.75	.80	22.00			



TRIANGULAR PUSH-ON

MANUFACTURER CROSS-REFERENCE

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PAGE 236.

Seeger

D



DTR	SHAFT	RING					MATERIAL	
	MM (Ds)	Outside Diameter (OD)	Thickness (T)	Height (Hr)	Width (W)	Edge Margin Min.	Spring Steel	
	DTR-0015	1.5	9.8	.25	8	9.3	2.8	
	-002	2.0	11.0		9	10.5	2.9	
	-003	3.0	14.7		12	14.0	3.5	
	-004	4.0		.40	14	16.2	4.5	
	-005	5.0	17.2		17	19.6	5.0	
	-006	6.0	20.8		19	22.0	6.0	
	-007	7.0						
	-008	8.0						
-009	9.0							
DTR-011	11.0	23.2						

DTX

DTI

(PAGE 212)

DESCRIPTION

Axially-applied grooveless rings installed with a tube or plunger. Available for external (DTX) and internal (DTI) applications.

AXIAL ASSEMBLY

HOW TO IDENTIFY

1. Determine whether you need an external (DTX) or internal (DTI) ring.
2. Confirm the shaft diameter (Ds) or bore diameter (Db).
3. Measure the thickness (T) of the part.
4. Verify the number of prongs.
5. Find the part in the charts on page 212.

GENERAL USE



UNCOMMON

**GROOVELESS
DESIGN
MAKES THESE
RINGS MORE
POPULAR ALL
THE TIME.**

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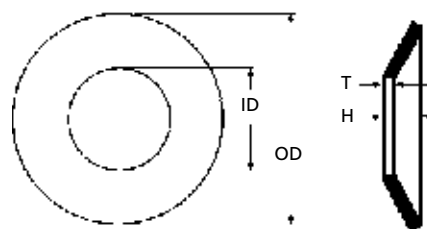
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BELLEVILLE DISC SPRING

MANUFACTURER CROSS-REFERENCE

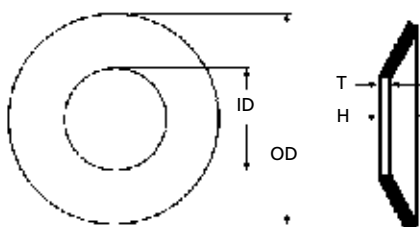
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DBW	SPRING				MATERIAL		
	Minimum Inside Diameter (ID)	Maximum Outside Diameter (OD)	Thickness (T)	Approximate Height (H)	Spring Steel	Stainless "S"	
-0080A-003	3.2	8.0	.30	.55			
-0100A-004		10.0	.40	.70			
-0080B-002	4.2	8.0	.20	.45			
-0080B-004			.40	.60			
-0100C-0025	5.2	10.0	.25	.55			
-0100C-004			.40	.70			
-0100C-005			.50	.75			
-0150C-005		15.0	.50	1.00			
-0150C-006	.60		1.05				
-0125D-0035	6.2	12.5	.35	.80			
-0125D-005			.50	.85			
-0125D-007			.70	1.00			
-0140E-0035	7.2	14.0	.35	.80			
-0140E-005			.50	.90			
-0140E-008			.80	1.10			
-0160F-004	8.2	16.0	.40	.90			
-0160F-006			.60	1.05			
-0160F-009			.90	1.25			
-0180F-005		18.0	.50	1.10			
-0180G-0045	9.2		.45	1.05			
-0180G-007			.70	1.20			
-0180G-01			1.00	1.40			
-0200H-005	10.2	20.0	.50	1.15			
-0200H-008			.80	1.35			
-0200H-011			1.10	1.55			
-0230H-0125		23.0	1.25	1.90			
-0225I-008	11.2	22.5	.80	1.45			
-0225I-0125			1.25	1.75			
-0230K-015	12.2	23.0	1.50	2.00			
-0250K-007		25.0	.70	1.60			
-0250K-009			.90	1.60			
-0250K-015			1.50	2.05			
-0280M-008	14.2	28.0	.80	1.80			
-0280M-01			1.00	1.80			
-0280M-015			1.50	2.15			
-0315O-008	16.3	31.5	.80	1.85			
-0315O-0125			1.25	2.15			
-0315O-0175			1.75	2.45			
-0355P-009	18.3	35.5	.90	2.05			
-0355P-0125			1.25	2.25			

DBW	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	STACK IN SERIES
	AXIAL ASSEMBLY		COMMON	OR PARALLEL
	Very common spring with high load capacity but limited deflection. Will take an initial set when loaded to flat. Also known as conical washers or spring washers.	<ol style="list-style-type: none"> 1. Measure inside diameter (ID), outside diameter (OD), thickness (T), and height (H). 2. Find the part in the charts above. 3. Fax a quote request if the part is not a standard. 		
				TO INCREASE LOAD AND DEFLECTION.

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**BELLEVILLE DISC SPRING****MANUFACTURER CROSS-REFERENCE**INDEX
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DBW	SPRING				MATERIAL	
	<i>Minimum Inside Diameter (ID)</i>	<i>Maximum Outside Diameter (OD)</i>	<i>Thickness (T)</i>	<i>Approximate Height (H)</i>	<i>Spring Steel</i>	<i>Stainless "S"</i>
-0355P-02	18.3	35.5	2.00	2.80		
-0500Q-03	18.4	50.0	3.00	4.00		
-0400R-01			1.00	2.30		
-0400R-015	20.4	40.0	1.50	2.65		
-0400R-0225			2.25	3.15		
-0600S-025	20.5	60.0	2.50	4.30		
-0450T-0125			1.25	2.85		
-0450T-0175	22.4	45.0	1.75	3.05		
-0450T-025			2.50	3.50		
-0500V-0125			1.25	2.85		
-0500V-02	25.4	50.0	2.00	3.40		
-0500V-025			2.50	3.90		
-0500V-03			3.00	4.10		
-0560Y-015			1.50	3.45		
-0560Y-02	28.5	56.0	2.00	3.60		
-0560Y-03			3.00	4.30		
-0630AA-018			1.80	4.15		
-0630AA-025		63.0	2.50	4.25		
-0630AA-035	31.0		3.50	4.90		
-0800AA-025		80.0	2.50	5.20		
-0800AA-03			3.00	5.50		
-0710CC-02			2.00	4.60		
-0710CC-025	36.0	71.0	2.50	4.50		
-0710CC-04			4.00	5.60		
-0800DD-0225			2.25	5.20		
-0800DD-03	41.0	80.0	3.00	5.30		
-0800DD-04			4.00	6.20		
-0800DD-05			5.00	6.70		
-1250DD-04		125.0	4.00	8.20		
-0900EE-025			2.50	5.70		
-0900EE-035	46.0	90.0	3.50	6.00		
-0900EE-05			5.00	7.00		
-1000FF-027			2.70	6.20		
-1000FF-035		100.0	3.50	6.30		
-1000FF-05	51.0		5.00	7.80		
-1000FF-06			6.00	8.20		
-1250FF-04		125.0	4.00	8.50		
-1250FF-05			5.00	8.90		
-1250FF-06			6.00	9.40		
-1120GG-03			3.00	6.90		
-1120GG-04	57.0	112.0	4.00	7.20		
-1120GG-06			6.00	8.50		
-1250HH-05			5.00	9.00		
-1250HH-06	61.0		6.00	9.60		
-1250HH-08			8.00	10.90		
-1250II-05		125.0	5.00	8.50		
-1250II-08	64.0		8.00	10.60		
-1250JJ-06			6.00	9.30		
-1250JJ-08	71.0		8.00	10.40		
-1250JJ-10			10.00	11.80		
-1400KK-05			5.00	9.00		
-1400KK-08	72.0	140.0	8.00	11.20		
-1600MM-06			6.00	10.50		
-1600MM-10	82.0	160.0	10.00	13.50		
-1800NN-06	92.0	180.0	6.00	11.10		

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STANDARD WAVE SPRING

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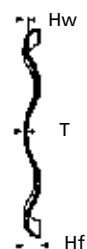
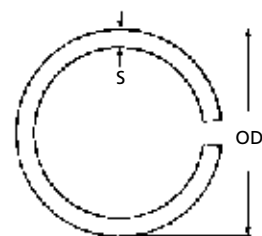
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Smalley


SSB

Spirolox

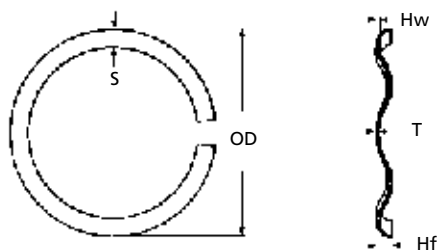
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DWS	BEARING	BEARING PRE-LOAD SPRING							MATERIAL	
	Bearing Outside Dia. (OD)	Load Newtons	Work Height (Hw)	Free Height (Hf)	Number of Waves	Thickness (T)	Radial Wall (S)	Theoretical Spring Rate N/MM	Spring Steel	Stainless “-SS”
DWS-0063	16	44.5	1.57	2.29	3	.25	1.98	65		
-0075	19	53.4		3.05				35		
-0087	22	62.3		2.79		48				
-0095	24	66.7		3.56		35				
-0102	26	71.2	1.98	2.54		.41	3.38	111		
-0110	28	75.6		2.79				85		
-0118	30	84.5		3.30				66		
-0126	32	89.0		3.81				52		
-0138	35	97.9		4.57		38				
-0146	37	102.3		3.81		.46	3.63	58		
-0158	40	111.2		5.08				37		
-0165	42	115.7		3.05				99		
-0185	47	129.0	3.81	68						
-0205	52	142.4	2.36	3.56	.61	3.81	121			
-0217	55	151.3		3.81			100			
-0244	62	169.1		4.32	4	.61	4.52	85		
-0268	68	186.9		4.32				4.78			131
-0276	70	191.3	4.32	119						
-0284	72	195.8	4.57	108						
-0295	75	204.7	5.08	94						
-0315	80	218.0	5.59	5.92		76				
-0335	85	231.4	5.59			83				
-0354	90	249.2	6.35			68				
-0374	95	262.5	7.37			57				
-0394	100	275.9	4.57			5	.76	157		
-0413	105	289.2	5.08					134		
-0433	110	302.6	5.33					115		
-0453	115	315.9	6.35		99					
-0472	120	329.3	7.11		86					
-0492	125	342.6	7.62		76					
-0512	130	356.0	8.64		6	67				
-0532	135	369.3	9.40			59				
-0551	140	382.7	6.86			108				
-0571	145	396.0	7.37			97				
-0591	150	404.9	7.87			87				
-0630	160	440.5	9.40			71				
-0650	165	453.9	10.41		64					
DWS-0669	170	467.2			11.18					

DWS	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	NICE COMPACT DESIGN.
	Flat wire design yields many benefits vs. compression springs: reduced operating height, precise load deflections, lower cost.	<ol style="list-style-type: none">1. Count the waves "peak to peak."2. Measure the thickness (T) and radial wall (S).3. Determine free height (Hf).4. Find the part in the chart above.	 WEIRD	
	AXIAL ASSEMBLY			

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Smalley



SSB

Spirolox

TB



DWS	BEARING		BEARING PRE-LOAD SPRING						MATERIAL	
	Bearing Outside Dia. (OD)	Load Newtons	Work Height (Hw)	Free Height (Hf)	Number of Waves	Thickness (T)	Radial Wall (S)	Theoretical Spring Rate N/MM	Spring Steel	Stainless "-SS"
DWS-0689	175	480.6	3.96	8.13	6	.81	9.53	116		
-0709	180	493.9		8.64				105		
-0728	185	507.3		9.14				97		
-0748	190	520.6		9.91				88		
-0787	200	547.3		7.11	7			174		
-0807	205	560.7		7.37				161		
-0827	210	578.5		7.87				149		
-0847	215	591.8		8.38				138		
-0866	220	605.2		8.64	8			128		
-0886	225	618.5		7.11				203		
-0906	230	631.9		6.10				303		
-0925	235	645.2		6.35	9			283		
-0945	240	658.6		6.35				265		
-0984	250	685.3		6.86				232		
-1024	260	712.0		7.37				205		
-1043	265	725.3		7.62				193		
-1063	270	743.1		8.13				182		
-1102	280	769.8		8.64				162		
-1142	290	796.5		9.40				144		
-1181	300	823.2		10.41	10			129		
-1221	310	849.9		7.11				264		
-1260	320	876.6		7.62				239		
-1339	340	934.5		8.64				198		
-1378	350	961.1		9.40				180		
-1417	360	987.9		7.62				271		
-1457	370	1014.6		8.13	11	249				
-1496	380	1041.3		8.64		229				
-1535	390	1072.4		9.14		211				
-1575	400	1099.1		9.65		196				
-1614	410	1125.8		8.38		251				
-1654	420	1152.5		8.89		233				
-1693	430	1179.2		7.62	12.70	317				
-1732	440	1205.9		8.13		295				
-1811	460	1263.7		8.89		256				
-1890	480	1317.1		8.13		12	318			
-1969	500	1370.5		8.89			280			
-2126	540	1481.8		8.89		13	303			
DWS-2284	580	1593.0		8.89		14	327			

DWS	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	PRECISE LOAD DEFLECTION CHARACTERISTICS
	Flat wire design yields many benefits vs. compression springs: reduced operating height, precise load deflections, lower cost.	<ol style="list-style-type: none">1. Count the waves "peak to peak."2. Measure the thickness (T) and radial wall (S).3. Determine free height (Hf).4. Find the part in the chart above.	 WEIRD	
	AXIAL ASSEMBLY			<div>WSG</div> <div>IMPERIAL Page 116</div>

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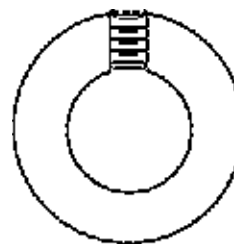


METRIC SHAFT COLLAR

MANUFACTURER CROSS-REFERENCE

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DIN 6885
Bossard BN 868



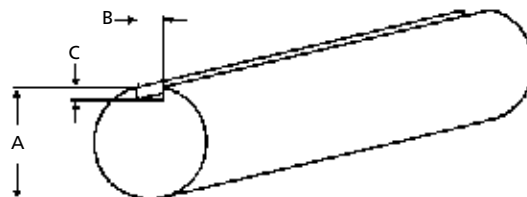
SCM	SHAFT COLLAR			MATERIAL			SCM	SHAFT COLLAR			MATERIAL		
	Inside Dia. (Bore)	Outside Dia.	Thickness (Width)	Black Oxide "-BO"	Zinc Plated "-ZC"	Stainless "-SS"		Inside Dia. (Bore)	Outside Dia.	Thickness (Width)	Black Oxide "-BO"	Zinc Plated "-ZC"	Stainless "-SS"
SCM-002	2	6	2.5				SCM-020	20	32	14			
-0025	2.5		4				-022	22	36				
-003	3	7					-024	24					
-0035	3.5	8	5				-025	25	40				
-004	4						-026	26					
-0045	4.5	10	6				-028	28	45				
-005	5						-030	30					
-0055	5.5	12	8				-032	32	50				
-006	6						-034	34					
-007	7	16	10				-035	35					
-008	8	18					-036	36	56				
-009	9	20	12				-038	38					
-010	10	22					-040	40	63				
-011	11	25	14				-042	42					
-012	12	28					-045	45	70				
-013	13						-048	48					
-014	14	32					-050	50	80				
-015	15						-052	52					
-016	16						SCM-055	55					



METRIC KEYED SHAFTS

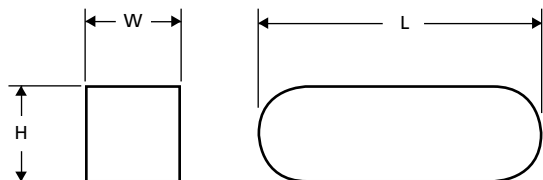
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KFM	BAR	KEYWAY		LENGTH		KFM	BAR	KEYWAY		LENGTH	
	Diameter (A)	Width (B)	Depth (C)	3' "-914"	6' "-1829"		Diameter (A)	Width (B)	Depth (C)	3' "-914"	6' "-1829"
KFM-013	13	5	3.0			KFM-026	26	8	4.0		
-014	14					-027	27				
-015	15					-028	28				
-016	16					-030	30				
-017	17					-032	32				
-018	18	-033	33			10	5.0				
-019	19	-035	35								
-020	20	-036	36								
-021	21	6	3.5			-040	40	12	5.5		
-022	22					-045	45	14			
-023	23					-050	50	18			
-024	24	8	4.0			-060	60	18	7.0		
KFM-025	25			KFM-065	65						

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**CARBON STEEL SHAFT KEYS****MANUFACTURER CROSS-REFERENCE**INDEX
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DIN 6885

Bossard BN870

DIN 6885

Width x Height (W) x (H)	LENGTH											
	(L) 8mm	(L) 10mm	(L) 12mm	(L) 14mm	(L) 16mm	(L) 20mm	(L) 25mm	(L) 30mm	(L) 36mm	(L) 40mm	(L) 45mm	(L) 50mm
2 x 2	•	•	•	•	•	•	---	---	---	---	---	---
3 x 3	•	•	•	•	•	•	•	•	•	•	---	---
4 x 4	•	•	•	•	•	•	•	•	•	•	•	•
5 x 3	---	•	•	•	•	•	•	•	•	•	•	•
5 x 5	---	•	•	•	•	•	•	•	•	•	•	•
6 x 4	---	•	•	•	•	•	•	•	•	•	•	•
6 x 6	---	•	•	•	•	•	•	•	•	•	•	•
8 x 5	---	•	•	•	•	•	•	•	•	•	•	•
8 x 7	---	•	•	•	•	•	•	•	•	•	•	•
10 x 6	---	---	---	---	•	•	•	•	•	•	•	•
10 x 8	---	---	---	---	•	•	•	•	•	•	•	•
12 x 6	---	---	---	---	---	•	•	•	•	•	•	•
12 x 8	---	---	---	---	---	•	•	•	•	•	•	•
14 x 6	---	---	---	---	---	---	•	•	•	•	•	•
14 x 9	---	---	---	---	---	•	•	•	•	•	•	•
16 x 7	---	---	---	---	---	---	---	•	•	•	•	•
16 x 10	---	---	---	---	---	---	---	•	•	•	•	•

Width x Height (W) x (H)	LENGTH										
	(L) 56mm	(L) 63mm	(L) 70mm	(L) 80mm	(L) 90mm	(L) 100mm	(L) 110mm	(L) 120mm	(L) 130mm	(L) 140mm	(L) 150mm
2 x 2	---	---	---	---	---	---	---	---	---	---	---
3 x 3	---	---	---	---	---	---	---	---	---	---	---
4 x 4	•	•	•	•	---	•	---	---	---	---	---
5 x 3	•	•	---	---	---	---	---	---	---	---	---
5 x 5	•	•	•	•	---	•	---	---	---	---	---
6 x 4	•	•	•	---	---	---	---	---	---	---	---
6 x 6	•	•	•	•	•	•	•	---	---	•	---
8 x 5	•	•	•	•	•	---	---	---	---	---	---
8 x 7	•	•	•	•	•	•	•	•	•	•	•
10 x 6	•	•	•	•	•	•	•	---	---	---	---
10 x 8	•	•	•	•	•	•	•	•	•	•	•
12 x 6	•	•	•	•	•	•	•	•	•	•	---
12 x 8	•	•	•	•	•	•	•	•	•	•	•
14 x 6	•	•	•	•	•	•	•	•	•	•	---
14 x 9	•	•	•	•	•	•	•	•	•	•	•
16 x 7	•	•	•	•	•	•	•	•	•	•	•
16 x 10	•	•	•	•	•	•	•	•	•	•	•

**OTHER TYPES OF SHAFT KEYS AVAILABLE**

Form C	Form D	Form E	Form F	Form G	Form H	Form J

Please
Call
Plant
For
Details.**MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS**

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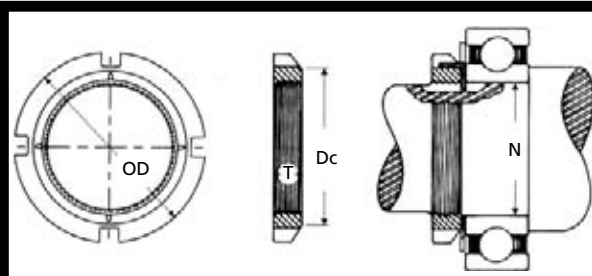
METRIC LOCKNUT

MANUFACTURER CROSS-REFERENCE

Whittet-Higgins

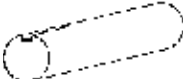

KM

INDEX
PAGE 236



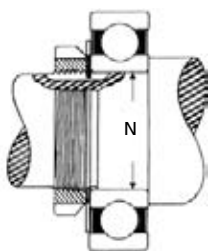
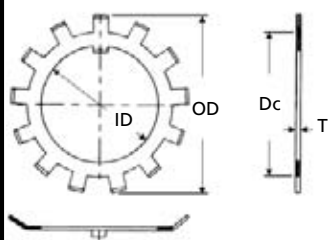
KM	BORE Bearing Bore Nominal (N)	LOCKNUT DIMENSIONS					WEIGHT Kg per 100 Pieces	MATERIAL Low Carbon	Mating Lockwasher
		Pitch Length	Major Diam- eter	Outside Diameter Max. (OD)	Thickness (T)	Nut Face Diameter Max. (Dc)			
KM-00	10	.75	10	18	4	13.5	0.5682		MB-00
-01	12	1.00	12	22	4	17.0	0.8523		-01
-02	15		15	25	5	21.0	1.1364		-02
-03	17		17	28	5	24.0	1.4205		-03
-04	20		20	32	6	26.0	1.9886		-04
-045	22		22	34	6	28.0	2.2727		-045
-05	25	1.50	25	38	7	32.0	3.1250		-05
-055	28		28	42	7	36.0	3.6932		-055
-06	30		30	45	7	38.0	4.5455		-06
-065	32		32	48	8	40.0	5.6818		-065
-07	35		35	52	8	44.0	6.5341		-07
-08	40	2.00	40	58	9	50.0	9.0909		-08
-09	45		45	65	10	56.0	12.2159		-09
-10	50		50	70	11	61.0	14.7727		-10
-11	55		55	75	11	67.0	16.4773		-11
-12	60		60	80	11	73.0	17.8977		-12
-13	65		65	85	12	79.0	21.0227		-13
-14	70		70	92	12	85.0	25.0000		-14
-15	75		75	98	13	90.0	15.3409		-15
-16	80		80	105	15	95.0	19.8864		-16
-17	85		85	110	16	102.0	46.0227		-17
-18	90	3.00	90	120	16	108.0	56.8182		-18
-19	95		95	125	17	113.0	64.7727		-19
-20	100		100	130	18	120.0	72.7273		-20
-21	105		105	140	18	126.0	87.5000		-21
-22	110		110	145	19	133.0	97.7273		-22
-23	115		115	150	19	137.0	90.9091		-23
-24	120		120	155	20	138.0	107.9545		-24
-25	125		125	160	21	148.0	119.0000		-25
-26	130		130	165	21	149.0	125.0000		-26
-27	135		135	175	22	160.0	155.0000		-27
-28	140	3.00	140	180	22	160.0	159.0909		-28
-29	145		145	190	24	171.0	200.0000		-29
-30	150		150	195	24	171.0	207.3864		-30
-31	155		155	200	25	182.0	221.0000		-31
-32	160		160	210	25	182.0	255.6818		-32
-33	165		165	210	26	193.0	284.0909		-33
-34	170		170	220	26	193.0	280.0000		-34
-36	180		180	230	27	203.0	305.1136		-36
KM-40	200		200	250	29	226.0	373.2955		MB-40

MATING LOCKWASHER DESCRIPTIONS ON PAGE 221.

KM	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	REQUIRES A KEYWAY.  LET OUR SHOP CUT IT FOR YOU!
	These metric locknuts fall under ISO-2982. Fully interchangeable with most standard metric locknuts.	<ol style="list-style-type: none">1. Verify the bearing bore nominal (N).2. Determine the major diameter (Dm), outside diameter (OD), and thickness (T) of the part.3. Find the part in the chart above.	 UNCOMMON	
	AXIAL ASSEMBLY			

SEE PAGE 218.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

**METRIC LOCKWASHER****MANUFACTURER CROSS-REFERENCE**INDEX
PAGE 236.


Whittet-Higgins

MB



MB	BORE	LOCKWASHER DIMENSIONS					WEIGHT	MATERIAL	Mating Locknut
	Bearing Bore Nominal (N)	Free Outside Diameter (OD)	Inside Diameter Min. (ID)	Thickness (T)	Face Diameter Min. (Dc)	Number of Tangs	Kg per 100 Pieces	Spring Steel	
MB-00	10	21	10	1.00	13.5	9	0.1136		KM-00
-01	12	25	12		17.0	11	0.2273		-01
-02	15	28	15		21.0		0.2273		-02
-03	17	32	17		24.0		0.1705		-03
-04	20	36	20		26.0		0.3409		-04
-045	22	38	22	1.25	28.0	13	0.3409		-045
-05	25	42	25		32.0		0.7102		-05
-055	28	46	28		36.0		-		-055
-06	30	49	30		38.0		0.8523		-06
-065	32	52	32		40.0		-		-065
-07	35	57	35	1.50	44.0	17	1.0654		-07
-08	40	62	40		50.0		1.2784		-08
-09	45	69	45		56.0		1.4205		-09
-10	50	74	50		61.0		1.7045		-10
-11	55	81	55		67.0		2.2727		-11
-12	60	86	60	1.80	73.0	19	2.4148		-12
-13	65	92	65		79.0		2.8409		-13
-14	70	98	70		85.0		3.2670		-14
-15	75	104	75		90.0		3.5511		-15
-16	80	112	80		95.0		4.5455		-16
-17	85	119	85	2.00	102.0	19	5.1136		-17
-18	90	126	90		108.0		6.3636		-18
-19	95	133	95		113.0		6.5341		-19
-20	100	142	100		120.0		7.6705		-20
-21	105	145	105		126.0		9.0909		-21
-22	110	154	110	2.50	133.0	19	10.7955		-22
-23	115	159	115		137.0		10.2273		-23
-24	120	164	120		138.0		10.2273		-24
-25	125	170	125		148.0		11.8000		-25
-26	130	175	130		149.0		10.7955		-26
-27	135	185	135	2.50	160.0	19	13.6364		-27
-28	140	192	140		160.0		12.5000		-28
-29	145	202	145		171.0		15.9091		-29
-30	150	205	150		171.0		14.7727		-30
-31	155	212	155		182.0		22.7273		-31
-32	160	217	160	2.50	182.0	19	23.8636		-32
-33	165	222	165		193.0		25.5682		-33
-34	170	232	170		193.0		26.1364		-34
-36	180	242	180		203.0		28.9773		-36
MB-40	200	262	200		226.0		30.6818		KM-40

MATING LOCKNUT DESCRIPTIONS ON PAGE 220.

MB	DESCRIPTION	HOW TO IDENTIFY	GENERAL USE	USE WITH KM LOCKNUTS.
	These metric lockwashers fall under ISO-2982. Key is shorter and is not bent.	<ol style="list-style-type: none">1. Verify the bearing bore nominal (N).2. Determine the free outside diameter (OD), inside diameter (ID), thickness (T), and number of tangs.3. Find the part in the chart above.	 UNCOMMON	
	AXIAL ASSEMBLY			

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ASSORTMENTS

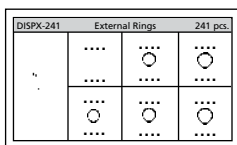


DISP

STANDARD PACKS

Pre-selected boxes of our most popular rings with convenient packaging and labels to help increase your profits.

Pgs: 224-225



DISPX

COMBINATION PACKS

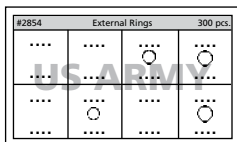
We make these boxes on a special order basis only. Combos contain part families and tools as a complete retaining solution for your customers.



KIT

MAINTENANCE KITS

Available as a special order, these boxes are organized unique to a particular situation or equipment model. These kits are often used to support planned maintenance.



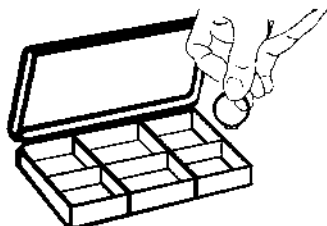
DISPC

CUSTOM PACKS

We can assemble packages complete to your requirements, including labels, logos, and special art work.

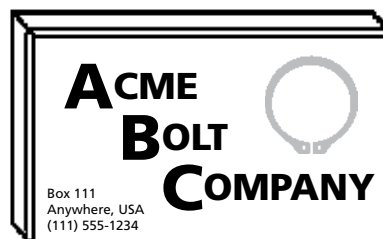
HOW ASSORTMENTS HELP YOU

Sell "from the box"



to minimize your inventory.

Sell "by the box"

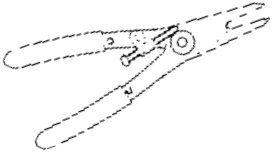
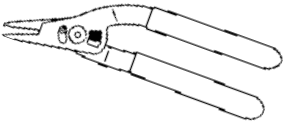
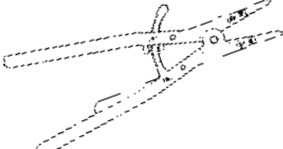
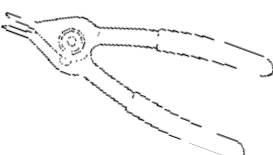
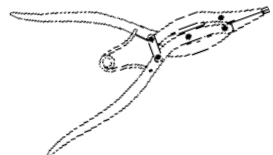
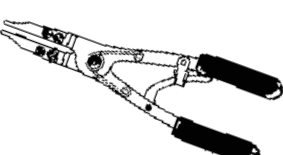
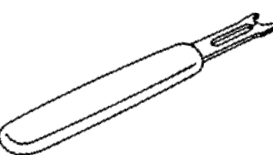


to spread your advertising message and yield greater transaction value.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

TOOLS

BEGINS PAGE 226

	PRS STANDARD PLIERS
Permanent tip pliers with separate tools for internal and external rings. Available with straight, 45°, or 90° tips.	Pgs: 226-227
	PRE ERGONOMIC PLIERS
Similar to PRS pliers, with a longer curved grip that yields more force, which minimizes operator fatigue. Permanent tips come in straight, 45°, and 90° angles.	Pgs: 226-227
	PRR RATCHET PLIERS
Ratchet pliers feature removable tips so that one pliers may be used on many different rings (providing that you have the tips). Must have separate tools for internal and external applications.	Pg: 228
	PRC CONVERTIBLE PLIERS
Permanent tip pliers that can be used on both external and internal rings. As a special order item, we offer quarter turn convertible pliers, which make the conversion process even easier.	Pg: 229
	PRS STANDARD PLIERS - WIRE RINGS
Eight basic wire ring pliers designs that have knurled tips or indentions to hold lugless wire rings more securely; <i>however, safety glasses should always be worn when using these pliers.</i>	Pg: 230
	PRR RATCHET PLIERS - WIRE RINGS
Removable tip wire ring pliers with ratchet action for large-sized rings. Additional "horseshoe" tips can be purchased to expand the pliers capabilities.	Pg: 231
	RRA APPLICATORS
Applicators come in a variety of sizes and angles that are uniquely dedicated to a very limited number of clip ring sizes.	Pgs: 232-234

HOW TO USE APPLICATORS

 Purchase rings in a stacked roll pack.	 Mount on a rail dispenser.	 Remove ring from rail using applicator.	 Use the correct tip design for the job, such as this offset example.
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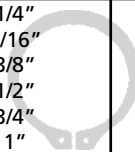
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ASSORTMENTS


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REVISED 09-04
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NOTHING HAS OUR NAME ON IT!


SH		EXTERNAL "SNAP"	
			
DISP-SH125		125 Pcs.	
Shaft Dia.	Qty		
1/4"	30		
5/16"	25		
3/8"	20		
1/2"	20		
3/4"	20		
1"	10		
Carbon Steel			

HO		INTERNAL HOUSING	
		SEE DISP-HO300 BELOW	
DISP-HO125		125 Pcs.	
Housing Dia.	Qty		
1/4"	25		
5/16"	25		
3/8"	25		
1/2"	25		
3/4"	15		
1"	10		
Carbon Steel			

SHI		PAGE 10.	
		INVERTED EXTERNAL	
DISP-SHI125		125 Pcs.	
Shaft Dia.	Qty		
1/2"	30		
9/16"	25		
5/8"	20		
3/4"	20		
7/8"	20		
1"	10		
Carbon Steel			

HOI		INVERTED INTERNAL	
			
DISP-HOI125		125 Pcs.	
Housing Dia.	Qty		
5/8"	25		
3/4"	25		
7/8"	25		
1"	25		
1-1/4"	15		
1-1/2"	10		
Carbon Steel			

SHR




PAGE 9.


HEAVY DUTY


"SNAP"

DISP-SHR125		125 Pcs.
Shaft Dia.	Qty	
1/2"	30	
5/8"	25	
3/4"	20	
7/8"	20	
63/64"	20	
1-1/16"	10	

Carbon Steel

SHF		PAGE 14.	
	EXTERNAL GRIP		
DISP-SHF125		125 Pcs.	
Shaft Dia.	Qty		
3/16"	30		
1/4"	25		
5/16"	20		
3/8"	20		
1/2"	20		
3/4"	10		
Carbon Steel			

E		PAGE 26.	
		E-CLIP	
DISP-E125		125 Pcs.	
Shaft Dia.	Qty		
1/8"	30		
3/16"	25		
1/4"	20		
3/8"	20		
1/2"	20		
5/8"	10		
Carbon Steel			

RE		PAGE 27.	
		REINFORCED E-CLIP	
DISP-RE125		125 Pcs.	
Shaft Dia.		Qty	
1/8"		30	
3/16"		25	
1/4"		20	
5/16"		20	
3/8"		20	
1/2"		10	
Carbon Steel			

C

DISP-C125

125 Pcs.

Shaft Dia.	Qty
1/4"	25
5/16"	25
3/8"	25
1/2"	25
5/8"	15
3/4"	10

Carbon Steel

PAGE 32.

CRESCENT

SH		EXTERNAL "SNAP" LARGE SIZE	
		PAGE 6.	
DISP-SH300		300 Pcs.	
Shaft Dia.	Qty	Shaft Dia.	Qty
1/4"	25	1-3/8"	5
5/16"	25	1-7/16"	3
3/8"	25	1-1/2"	3
7/16"	25	1-5/8"	3
1/2"	30	1-3/4"	3
9/16"	25	1-7/8"	2
5/8"	25	2"	2
3/4"	25	2-1/4"	2
13/16"	10	2-1/2"	2
7/8"	15	2-5/8"	1
1"	20	2-3/4"	1
1-1/4"	16	2-7/8"	1
1-5/16"	5	3"	1
Carbon Steel			

HO		INTERNAL HOUSING LARGE SIZE	
		PAGE 16.	
DISP-HO300		300 Pcs.	
Housing Dia.	Qty	Housing Dia.	Qty
3/8"	25	1-1/2"	8
7/16"	25	1-5/8"	3
1/2"	25	1-3/4"	3
5/8"	25	1-7/8"	3
11/16"	25	2"	3
3/4"	25	2-1/4"	2
13/16"	25	2-3/8"	2
7/8"	25	2-1/2"	2
1"	20	2-5/8"	1
1-1/16"	10	2-3/4"	1
1-1/8"	15	2-7/8"	1
1-1/4"	15	3"	1
1-3/8"	10		
Carbon Steel			

SH/HO		EXTERNAL / INTERNAL MIX	
		PAGES 6, 16.	
DISP-SHHO220		220 Pcs.	
External	Qty	Internal	Qty
1/4"	10	3/8"	5
5/16"	10	7/16"	10
3/8"	15	1/2"	15
7/16"	15	9/16"	15
1/2"	15	5/8"	15
5/8"	15	3/4"	15
11/16"	15	7/8"	10
3/4"	10	1"	10
7/8"	5	1-1/8"	5
1"	5	1-1/4"	5
Carbon Steel			

E		E-CLIP LARGE SIZE	
		PAGE 26.	
DISP-E300		300 Pcs.	
Shaft Dia.	Qty	Shaft Dia.	Qty
1/8"	30	5/16"	30
5/32"	20	3/8"	35
3/16"	40	7/16"	25
7/32"	20	1/2"	30
1/4"	40	5/8"	15
Carbon Steel			

DE		METRIC E-CLIP	
		PAGE 182.	
DISP-DE300		300 Pcs.	
Shaft Dia.	Qty	Shaft Dia.	Qty
1.2mm	20	5.0mm	30
1.5mm	20	6.0mm	30
1.9mm	20	7.0mm	30
2.3mm	20	8.0mm	30
3.2mm	30	9.0mm	20
4.0mm	30	10.0mm	20
Carbon Steel			

All assortments are packaged in a compartmentalized polypropylene box with an identification card. Identification cards can be printed with your company name and logo. Call today!



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SH PAGE 6.

**STAINLESS STEEL
EXTERNAL "SNAP"**

DISP-SH100SS 100 Pcs.		DISP-SH50SS 50 Pcs.	
Shaft Dia.	Qty	Shaft Dia.	Qty
1/4"	10	1/4"	5
5/16"	10	5/16"	5
3/8"	10	3/8"	5
7/16"	10	7/16"	5
1/2"	10	1/2"	5
9/16"	10	9/16"	5
5/8"	10	5/8"	5
3/4"	10	3/4"	5
7/8"	10	7/8"	5
1"	10	1"	5

HO PAGE 16.

**STAINLESS STEEL
INTERNAL HOUSING**

DISP-HO100SS 100 Pcs.		DISP-HO50SS 50 Pcs.	
Housing Dia.	Qty	Housing Dia.	Qty
1/4"	6	1/4"	4
5/16"	6	5/16"	3
3/8"	6	3/8"	3
7/16"	6	7/16"	3
1/2"	20	1/2"	10
9/16"	6	9/16"	3
5/8"	8	5/8"	4
3/4"	10	3/4"	5
7/8"	7	7/8"	3
1"	15	1"	7
1-1/4"	10	1-1/4"	5

E PAGE 26.

**STAINLESS STEEL
E-CLIPS**

DISP-E100SS 100 Pcs.		DISP-E50SS 50 Pcs.	
Shaft Dia.	Qty	Shaft Dia.	Qty
1/8"	10	1/8"	5
5/32"	6	5/32"	3
3/16"	10	3/16"	5
7/32"*	6	7/32"*	3
1/4"	12	1/4"	6
3/8"	20	3/8"	10
7/16"	6	7/16"	3
1/2"	20	1/2"	10
5/8"	10	5/8"	5

*This size only conforms to SE type ring.

RS,RR,RST,RRT PAGES 38,52,42,56.

SPIRAL

Diameter	Qty	Diameter	Qty
1/2"	30	1-5/8"	3
5/8"	30	1-3/4"	3
11/16"	25	1-7/8"	3
3/4"	30	2"	3
13/16"	25	2-1/4"	2
7/8"	25	2-3/8"	2
1"	30	2-1/2"	2
1-1/16"	12	2-5/8"	1
1-1/8"	20	2-3/4"	1
1-1/4"	25	2-7/8"	1
1-3/8"	12	3"	1
1-1/2"	12	Total	298

DISP-RS298	Ext. Medium
DISP-RR298	Int. Medium
DISP-RST298	Ext. Heavy
DISP-RRT298	Int. Heavy

RS/RR,RST/RRT PAGES 38,52,42,56.

SPIRAL MIX

External	Qty	Internal	Qty
1/2"	12	1/2"	12
5/8"	12	5/8"	12
3/4"	12	3/4"	12
7/8"	12	7/8"	12
1"	12	1"	12
1-1/8"	12	1-1/8"	12
1-1/4"	12	1-1/4"	12
1-3/8"	12	1-3/8"	12
1-1/2"	12	1-1/2"	12
Total Pieces		216	

DISP-MDSPI216	Carbon Medium
DISP-MDSPI216SS	Stainless Medium
DISP-MHSPi216	Carbon Med Hvy
DISP-MHSPi216SS	Stainless Med Hvy

DSH/DHO/DE PAGES 152,166,182.

METRIC MIX

DISP-MET300 300 Pcs.	
Diameter	Qty
External Rings	
20mm	20
25mm	15
30mm	15
35mm	10
40mm	8
50mm	5
60mm	3
70mm	2
80mm	2
E-Clip Rings	
3.2mm	30
4.0mm	30
5.0mm	30
Internal Rings	
20mm	20
25mm	15
30mm	15
Carbon Steel	

DSH PAGE 152.

METRIC EXTERNAL

DISP-DSH150 150 Pcs.	
Shaft Dia.	Qty
8mm	15
10mm	15
12mm	15
14mm	15
15mm	10
16mm	10
17mm	10
18mm	10
20mm	8

Carbon Steel

DHO PAGE 166.

METRIC INTERNAL

DISP-DHO150 150 Pcs.	
Housing Dia.	Qty
15mm	20
16mm	20
18mm	15
20mm	15
22mm	10
24mm	10
25mm	10
26mm	10
28mm	8

Carbon Steel

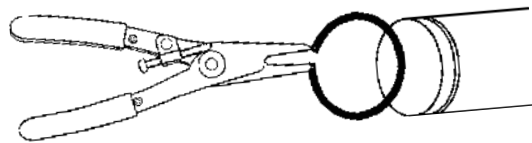
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SNAP RING PLIERS

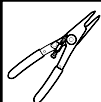
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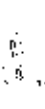


PERMANENT TIPS



FOR AXIAL ASSEMBLY OF SNAP RINGS



EXTERNAL RETAINING RINGS

RING STYLE AND SIZE								TIP ANGLE			PLIERS STYLES				
 BSH		 VSH		 SHI		 SHR		 USH							
Part #															
From	To	From	To	From	To	From	To	Straight	45°	90°	Standard "PRS"	Ergonomic "PRE"			
-012	-	-	-	-	-	-	-	-E023-S	-E023-45S	-E023-90S					
-015	-	-	-	-	-	-	-	-E023-M	-E023-45M	-E023-90M					
-018	-023	-	-	-	-	-	-	-E023-L	-E023-45L	-E023-90L					
-025	-066	-050	-078	-039	-047	-	-	-E038	-E038-45	-E038-90					
-068	-087	-081	-100	-050	-066	-	-	-E047	-E047-45	-E047-90					
-093	-143	-106	-200	-075	-098	-	-	-E070	-E070-45	-E070-90					
-150	-350	-215	-325	-	-	-206	-312	-E115	-E115-45	-E115-90					
 SHF						From	To	Straight	45°	90°	Standard "PRS"	Ergonomic "PRE"			
						-006	-011	-E034	-E034-45	-E034-90					
						-012	-015	-E040	-E040-45	-E040-90					
						-018	-027	-E047-X	-E047-45X	-E047-90X					
						-031	-075	-E070-X	-E070-45X	-E070-90X					

METRIC

DSH		DBSH		DSHI		DSHR		Part #		Part #		Standard "PRS"	Standard "PRS"
From	To	From	To	From	To	From	To	Straight	Standard "PRS"	90°	Standard "PRS"		
-003	-010	-010	-017	-	-	-	-	-E009		-E009-90			
-010	-025	-018	-026	-012	-016	-	-	-E013		-E013-90			
-019	-060	-028	-048	-017	-030	-	-	-E018		-E018-90			
-040	-100	-050	-082	-032	-080	-	-	-E023		-E023-90			
-085	-165	-085	-100	-085	-100	-	-	-E032		-E032-90			
								From	To	Straight	Standard "PRS"	90°	Standard "PRS"
								-006	-	-ZGG1		-ZGG1-90	
								-008	-	-ZGG2		-ZGG2-90	
								-009	-012	-ZGG1		-ZGG1-90	
								-013	-016	-ZGG2		-ZGG2-90	
								-017	-	-ZGG3		-ZGG3-90	
								From	To	Straight	Standard "PRS"	90°	Standard "PRS"
								-0015	-003	-ZGG0		-ZGG0-90	
								-0035	-008	-ZGG1		-ZGG1-90	
								-009	-010	-ZGG2		-ZGG2-90	
								-0105	-	-ZGG1		-ZGG1-90	
								-011	-015	-ZGG2		-ZGG2-90	
								-016	-030	-ZGG3		-ZGG3-90	



Contact plant for price and availability of 45° metric pliers (PRS).

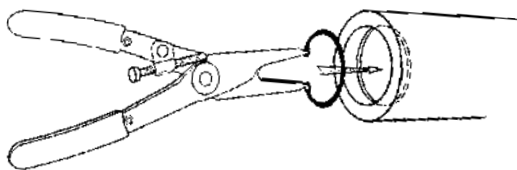
METRIC

CONTACT PLANT FOR PRICE AND AVAILABILITY OF 45° METRIC PLIERS.

ALL RINGS IN A GIVEN ROW USE THE SAME PLIERS.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

PERMANENT TIPS

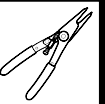


FOR AXIAL ASSEMBLY OF SNAP RINGS

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INTERNAL RETAINING RINGS



RING STYLE AND SIZE						TIP ANGLE			PLIERS TYPES	
 HO VHO		 BHO VVH		 HOI		 UHO		 	 Standard "PRS"	 Ergonomic "PRE"
From	To	From	To	From	To	Part #				
-025	-031	-062	-	-	-	Straight	45°	90°		
-037	-056	-075	-100	-	-	-I025	-I025-45	-I025-90		
-062	-102	-106	-137	-	-	-I038	-I038-45	-I038-90		
-106	-175	-143	-200	-175	-231	-I047	-I047-45	-I047-90		
-181	-300	-206	-300	-237	-300	-I070	-I070-45	-I070-90		
						-I090	-I090-45	-I090-90		

 DHO DJK		 DBHO DJL		 DHOI DVHO		 DHOR		 Part #	 Standard "PRS"	 90° Part #	 Standard "PRS"	METRIC
From	To	From	To	From	To	Straight						
-008	-010	-010	-015	-	-	-I009		-I009-90				
-010	-025	-016	-040	-	-	-I011		-I011-90				
-019	-060	-040	-070	020	-032	-I018		-I018-90				
-040	-100	-050	-108	-034	-080	-I023		-I023-90				
-085	-165	-110	-140	-085	-100	-I032		-I032-90				

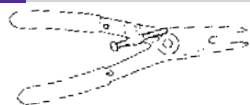
ALL RINGS IN A GIVEN ROW USE THE SAME PLIERS.

CONTACT PLANT FOR 45° METRIC PLIERS.

PLIERS TYPES

PRS

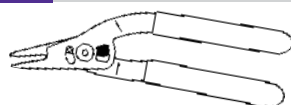
STANDARD



Spring-loaded handles, air-cushioned grips, and presets make these the ideal tool for work situations where similar-sized rings are used. The dedicated design requires separate pliers for internal and external rings. These pliers are made of heat-treated, high carbon steel for a long life.

PRE

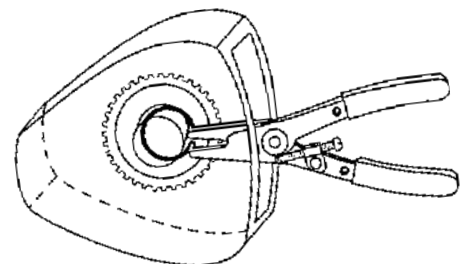
ERGONOMIC



Longer, curved, air-cushioned grip design yields 30% more force. Higher force minimizes fatigue and reduces incidence of carpal tunnel syndrome. Adjustable stops prevent stressful overexpansion of external rings and allow presets that align with the lug holes of internal rings.

TIP ANGLES

Use a tip angle that maximizes operator comfort and production efficiency.



Application using 90° tip angle.

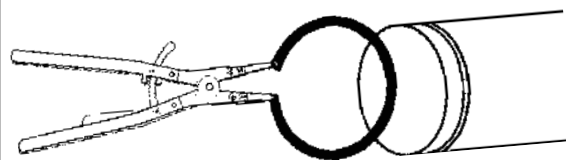
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SNAP RING PLIERS

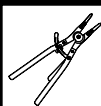
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SWITCH FROM INTERNAL TO EXTERNAL



FOR AXIAL ASSEMBLY OF SNAP RINGS



REPLACEABLE TIP RATCHET PLIERS

RING STYLE AND SIZE						TIP ANGLE				PLIERS
 SH BSH VSH		 SHI		 SHR		 Part #				 Standard Ratchet Pliers come with straight tips.
From	To	From	To	From	To	Straight	15°	45°	90°	
-	-	-	-	-106	-137	-T093	-T093-15	-T093-45	-T093-90	Part # "PRR"
-	-	-	-	-150	-175	-T108-X	-T108-15X	-T108-45X	-T108-90X	-E093
-150	-375	-215	-325	-	-	-T120	-T120-15	-T120-45	-T120-90	-E108
-354	-650	-350	-393	-193	-200	-T120-X	-	-T120-45X	-T120-90X	-E120
-675	-950	-	-	-	-	-T170	-T170-15	-T170-45	-T170-90	-E120-X
-975	-	-	-	-	-	-	-	-	-	-E170
-1000	-	-	-	-	-	-	-	-	-	-E035
-	-	-	-	-	-	-	-	-	-	-E045

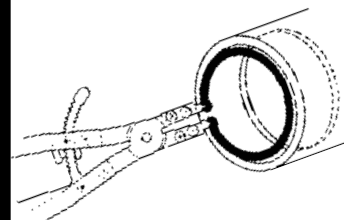
 HO BHO VHO		 HOI		 UHO		 Part #				 Standard Ratchet Pliers come with straight tips.
From	To	From	To	From	To	Straight	15°	45°	90°	
-181	-237	-206	-250	-	-	-T093	-T093-15	-T093-45	-T093-90	Part # "PRR"
-244	-300	-262	-300	-306	-334	-T108	-T108-15	-T108-45	-T108-90	-I093
-306	-400	-315	-400	-346	-400	-T120	-T120-15	-T120-45	-T120-90	-I108
-306	-600	-315	-400	-413	-500	-T120-X	-	-T120-45X	-T120-90X	-I120
-625	-1000	-	-	-525	-700	-T150	-T150-15	-T150-45	-T150-90	-I120-X
-	-	-	-	-725	-1000	-	-	-	-	-I150
-	-	-	-	-	-	-	-	-	-	-I045

 DSH DBSH DAK DAL		 DSHR		 Part #	
From	To	From	To	Straight	90°
-122	-250	-105	-200	PRR-E035	PRR-E035-90
-252	-400	-	-	PRR-E045	PRR-E045-90
-400	-1000	-	-	PRR-048	PRR-048-90

 DHO DBHO DJK DJL		 DHOR		 Part #	
From	To	From	To	Straight	90°
-122	-250	-105	-200	PRR-I035	PRR-I035-90
-252	-400	-	-	PRR-I045	PRR-I045-90
-400	-1000	-	-	PRR-048	PRR-048-90

RATCHET PLIERS

Ratchet mechanism compresses or expands rings gradually.

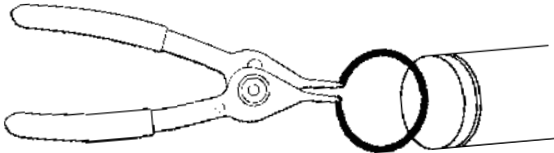


Work best on really **BIG** rings.

METRIC

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SWITCH FROM INTERNAL TO EXTERNAL

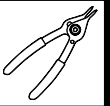


FOR AXIAL ASSEMBLY OF SNAP RINGS

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CONVERTIBLE PLIERS



USE THE SAME PLIERS FOR ALL PARTS IN ONE ROW.

EXTERNAL						PLIERS	INTERNAL			
 SH BSH VSH		 SHI		 SHR		 Tip Dia.	 HO VHO BHO VVHO		 HOI	
From	To	From	To	From	To	Tip Dia.	From	To	From	To
-025	-066	-050	-078	-039	-047	.038	-037	-043	-075	-100
-067	-087	-079	-100	-048	-066	.047	-044	-102	-101	-137
-088	-143	-101	-200	-067	-098	.070	-103	-175	-138	-200
-144	-200	-	-	-	-	.090	-175	-206	-201	-212

Identify correct tool by tip diameter.

PART # PRC-			
Tip Dia.	Straight	45°	90°
.038	-038	-038-45	-038-90
.047	-047	-047-45	-047-90
.070	-070	-070-45	-070-90
.090	-090	-090-45	-090-90

CONVERTIBLE PLIERS

Convertible pliers are great for small quantity applications of similar size external and internal retaining rings. Switch the placement of the pliers halves to go from external to internal and vice versa. See the convertible pliers interchange chart above for an easy overview of external/internal convertibility.

QUARTER TURN PLIERS

AVAILABLE AS A SPECIAL ORDER: Quarter turn convertible pliers make pliers adjustment fast and easy. Twist the pivot a quarter turn to go from external to internal and vice versa. Contact plant for price and availability.



ASSORTMENTS

REPLACEABLE TIP PLIERS

DISP-RRPK1 10 Pcs.

CONTAINS		#PRS-EXT-NT External #PRS-INT-NT Internal
		(External and Internal) .038" .047" .070"

Good for snap rings 3/8" to 2"

RATCHET PLIERS

DISP-RRPK2 10 Pcs.

CONTAINS		#PRR-E108-NT External #PRR-I093-NT Internal
		.018" (straight, 15°, 45°, 90°) .120" (straight, 15°, 45°, 90°)

For bigger rings!

CONVERTIBLE PLIERS

DISP-RRPK3 12 Pcs.

CONTAINS		.038" (straight, 45°, 90°)
		.047" (straight, 45°, 90°)
		.070" (straight, 45°, 90°)
		.090" (straight, 45°, 90°)

Does the work of 24 tools!

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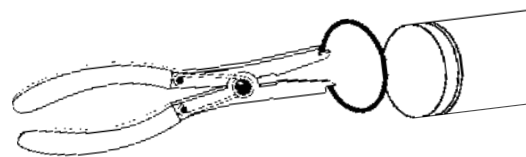
WIRE RING PLIERS

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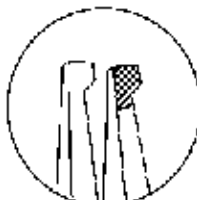
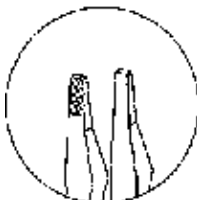
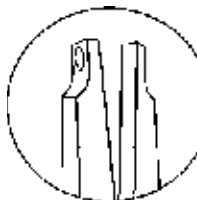

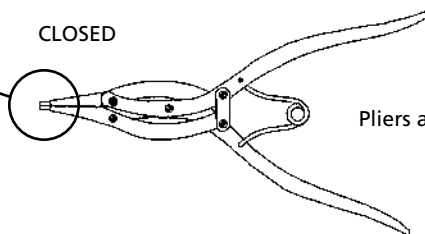
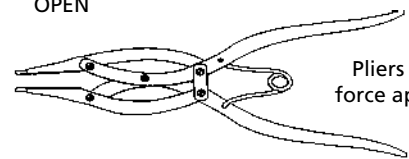
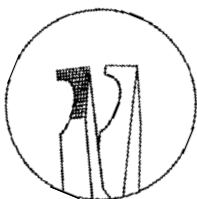
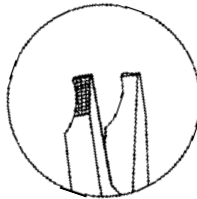
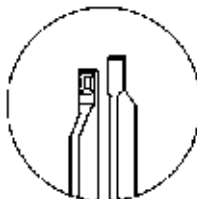
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PERMANENT TIP WIRE RING PLIERS



FOR AXIAL ASSEMBLY OF WIRE RINGS

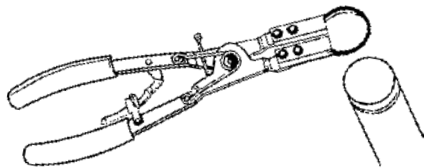
PRS-E015R	PRS-E047R	PRS-E048R	PRS-E601R	PRS-E602R
				
Small fixed tip pliers with a torsion spring and plastic grips. Ideal for small light duty external rings with minimal gaps. Knurled, shaped tip ensures a positive grip.	Standard fixed tip pliers with a torsion spring and plastic grips. L-shaped knurled tips make this pliers practical for many applications of external rings.	Thin nose fixed tip pliers with a torsion spring and plastic grips. "Needle nose" knurled tips make these pliers useful for installing rings where little clearance around the shaft exists.	Heavier duty "needle nose" pliers with a torsion spring, plastic grips, and an indentation in each tip. Jaws open 1-1/2". Work well in low clearance areas for installation and removal of spear tipped rings with a wall thickness up to .128" (3.25mm).	Heavy duty fixed tip pliers with a torsion spring and plastic grips. Heavier duty pliers with a .16" high and .18" wide abutment behind the tips. Capable of expanding thicker walled rings from .27" up to 1.4".
PRS-EG404	PRS-EG704	PRS-EG705	<h2>PARALLEL ACTION</h2> <div>  <p>CLOSED Pliers at rest.</p>  <p>OPEN Pliers with force applied.</p> </div> <p>Parallel action jaws open the ring with less chance of the ring buckling or twisting that can occur with regular wire ring pliers.</p>	
				
Fixed tip pliers with right angled tips to spread, remove, and install rings with a wide range of gap forms. Knurled tips hold rings securely in a variety of positions. Require at least .37" clearance for effective use of these pliers.	Fixed tip pliers with knurled tips to spread, remove and install rings without lug holes. Jaws open 1-1/2". Similar to the PRS-E601R with its narrow tips, but capable of handling a greater variety of gap forms. Works best where the minimum clearance is .21" to a depth of .43"	Fixed tip pliers with parallel action jaws notched to hold rings securely as they open in a parallel plane. Spring action closes jaws automatically. Notches can accommodate a wide variety of gap forms in rings with a cross section of up to .185".		

SAFETY CONCERNS

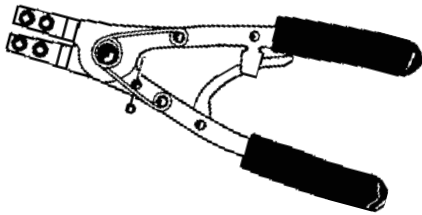


Application of wire rings can be dangerous. With no lug holes and the absence of sophisticated ring design, there is a greater risk of operator injury when installing or removing wire rings. Parts can fly off the tips when overstressed or when mismatched. Always wear safety glasses when using retaining ring pliers.

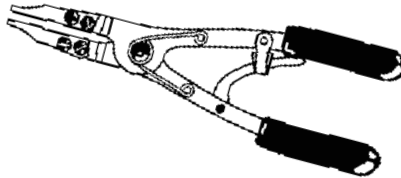
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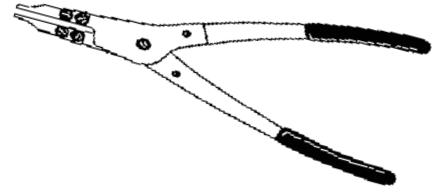
FOR AXIAL ASSEMBLY OF WIRE RINGS

REMOVABLE TIP WIRE RING PLIERS**PRR-E038R**

External pliers with a ratchet lock and spring return. Pliers do not come with tips. To purchase tips, see PRR-T069, PRR-T089, and PRR-T125 below.

PRR-2836R

These pliers come with tips similar to those on our PRS-E047R. Tips can also be purchased separately (see PRR-T5036 below). Overall length is 10-1/2".

PRR-4936R

These pliers come with tips similar to those on our PRS-E047R. Tips can also be purchased separately (see PRR-T5036 below). Overall length is 14".

TIPS**PRR-T069**

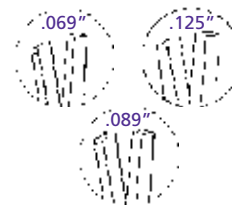
0.069" wide groove tips for use with PRR-E038R pliers on 0.46" to 1.40" diameter wire rings.

PRR-T089

0.089" wide groove tips for use with PRR-E038R pliers on 1.46" to 4.73" diameter wire rings.

PRR-T125

0.125" wide groove tips for use with PRR-E038R pliers on 2.59" to 3.71" diameter wire rings.

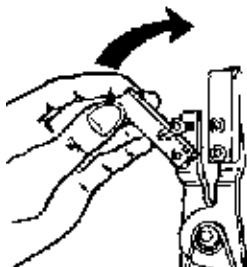
PRR-TSET

COMPLETE SET

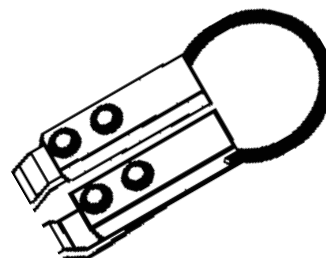
Set including PRR-T069, PRR-T089, and PRR-T125 tips for use with PRR-E038R pliers.

PRR-T5036R

L-shaped knurled tips for use with PRR-2836R and PRR-4936R pliers.

TIP INSTALLATION

1. Fit the notch in the bottom of the tip onto the lower screw.
2. Swing the tip up and fit the second notch onto the upper screw.
3. Tighten the screws slightly to hold the tips in place.

SLOTTED DESIGN

Ring is stabilized from slotted design which diminishes the chance of the ring ejecting from pliers.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

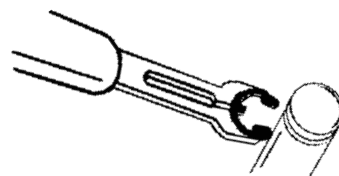
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INCH SIZES

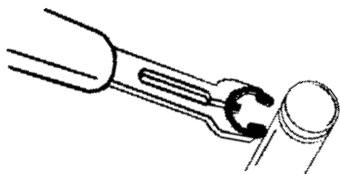


FOR RADIAL ASSEMBLY OF SNAP RINGS

TOOL	RING STYLE AND SIZE					APPLICATOR STYLES			
RRA	E	SE	YE	RE	C				
-010	-004	-	-	-	-	•	•	•	•
-020	-	-006	-	-	-	•	•	•	•
-030	-	-	-006	-	-	•	•	•	•
-040	-006	-	-	-	-	•	•	•	•
-050	-012	-009	-	-	-	•	•	•	•
-060	-	-011	-	-	-	•	•	•	•
-070	-014	-	-	-	-	•	•	•	•
-080	-	-014	-	-009	-015	•	•	•	•
-090	-	-	-014	-	-018	•	•	•	•
-100	-015	-	-	-	-	•	•	•	•
-110	-	-017	-	-	-	•	•	•	•
-120	-018	-	-	-015	-	•	•	•	•
-130	-	-018	-	-018	-	•	•	•	•
-140	-	-021	-	-021	-	•	•	•	•
-150	-025	-	-	-	-	•	•	•	•
-160	-	-031	-	-025	-	•	•	•	•
-170	-037	-	-	-037	-	•	•	•	•
-180	-043	-	-	-	-	•	•	•	•
-190	-	-043	-	-	-	•	•	•	•
-200	-050	-	-	-050	-	•	•	•	•
-210	-062	-	-	-	-	•	•	•	•
-220	-	-074	-	-	-	•	•	•	•
-230	-075	-	-	-	-	•	•	•	•
-240	-087	-	-	-	-	•	•	•	•
-250	-	-098	-	-	-	•	•	•	•
-260	-	-118	-	-	-	•	•	•	•
-270	-	-	-	-043	-	•	•	•	•
-280	-	-	-	-056	-075	•	•	•	•
-290	-	-037	-	-	-050	•	•	•	•
-300	-	-	-	-	-012	•	•	•	•
-310	-	-	-	-	-021	•	•	•	•
-320	-	-	-	-	-023	•	•	•	•
-330	-	-	-	-	-025	•	•	•	•
-340	-	-	-	-	-028	•	•	---	---
-350	-	-	-	-	-031	•	•	•	•
-360	-	-	-	-	-037	•	•	•	•
-370	-	-	-	-	-040	•	•	•	•
-380	-	-	-	-	-043	•	•	•	•
-390	-	-	-	-	-056	•	•	•	•
-400	-	-	-	-	-062	•	•	•	•
-410	-	-	-	-	-068	•	•	•	•
-420	-	-	-	-	-081	•	•	•	•
-430	-	-	-	-	-087	•	•	•	•
-440	-	-	-	-	-093	•	•	•	•
-450	-	-	-	-	-100	•	•	•	•
-460	-	-	-	-	-112	•	•	•	•
-470	-	-	-	-	-125	•	•	•	•
-480	-	-	-	-	-137	•	•	•	•
-490	-	-	-	-	-150	•	•	•	•
-500	-	-	-	-031	-	•	•	•	•
-510	-009	-	-	-	-	•	•	•	•
-520	-	-	-	-012	-	•	•	•	•

ALL RINGS IN A GIVEN ROW USE THE SAME APPLICATOR.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS



FOR RADIAL ASSEMBLY OF SNAP RINGS

BOX 232 • MINNEAPOLIS, KS • 67467



INCH SIZES

TOOL	RING STYLE AND SIZE					APPLICATOR STYLES				
RRA	BE	BSE	PO	POL	EL		30°	45°	90°	OFFSET
-091	-	-	-	-	-009	---	•	•	---	---
-112	-	-	-	-	-012	---	•	---	---	---
-115	-	-	-	-	-015	---	•	---	---	---
-118	-	-	-	-	-018	---	•	---	---	---
-125	-	-	-	-	-025	---	---	---	---	---
-131	-	-	-	-	-031	---	---	---	---	---
-143	-	-	-	-	-043	---	---	---	---	---
-371	-	-	-	-	-037	---	---	---	---	---
-550	-	-011	-	-	-	---	•	---	---	---
-551	-012	-	-	-	-	---	•	---	---	---
-552	-014	-	-	-	-	---	---	---	---	---
-553	-	-014	-	-	-	---	---	---	---	---
-554	-015	-	-	-	-	---	---	---	---	---
-555	-	-017	-	-	-	---	---	---	---	---
-556	-018	-	-	-	-	---	•	---	---	---
-557	-	-018	-	-	-	---	•	---	---	---
-558	-	-021	-	-	-	---	---	---	---	---
-559	-025	-	-	-	-	---	•	---	---	---
-560	-	-031	-	-	-	---	---	---	---	---
-561	-037	-	-	-	-	---	•	---	---	---
-562	-043	-	-	-	-	---	---	---	---	---
-563	-	-043	-	-	-	---	---	---	---	---
-564	-050	-	-	-	-	---	•	---	---	---
-565	-062	-	-	-	-	---	•	---	---	---
-566	-	-074	-	-	-	---	---	---	---	---
-567	-075	-	-	-	-	---	---	---	---	---
-568	-087	-	-	-	-	---	---	---	---	---
-569	-	-098	-	-	-	---	---	---	---	---
-815	-	-	-015	-	-	•	---	•	•	•
-818	-	-	-018	-	-	•	---	•	•	•
-825	-	-	-025	-	-	•	---	•	•	•
-831	-	-	-031	-	-	•	---	•	•	•
-837	-	-	-037	-	-	•	---	•	•	•
-843	-	-	-043	-	-	•	---	•	•	•
-850	-	-	-050	-	-	•	---	•	•	•
-915	-	-	-	-015	-	•	---	•	•	•
-918	-	-	-	-018	-	•	---	•	•	•
-925	-	-	-	-025	-	•	---	•	•	•
-931	-	-	-	-031	-	•	---	•	•	•
-937	-	-	-	-037	-	•	---	•	•	•
-943	-	-	-	-043	-	•	---	•	•	•
-950	-	-	-	-050	-	•	---	•	•	•

ALL RINGS IN A GIVEN ROW USE THE SAME APPLICATOR.

TIP DESIGN

STRAIGHT	45°	90°	OFFSET	30°
				ONLY STYLE AVAILABLE ON BE/BSE/EL SERIES.

MOST SIZES AVAILABLE IMMEDIATELY • \$2 LINE REQUESTED • CALL PLANT FOR QUANTITY DISCOUNTS

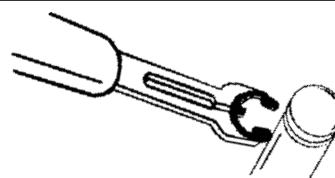
APPLICATORS

785-392-3017 FAX 785.392.2845

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METRIC SIZES



FOR RADIAL ASSEMBLY OF SNAP RINGS

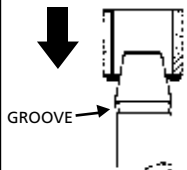
TOOL	RING STYLE AND SIZE			APPLICATOR STYLES			
RRA	DE	DRE	DC				
-120	-	-004	-	•	•	•	•
-130	-	-005	-	•	•	•	•
-140	-	-006	-	•	•	•	•
-160	-	-007	-	•	•	•	•
-170	-	-010	-	•	•	•	•
-200	-	-013	-	•	•	•	•
-270	-	-011	-	•	•	•	•
-280	-	-014	-	•	•	•	•
-310	-032	-	-	•	•	•	•
-340	-040	-	-	•	•	---	---
-500	-	-008	-	•	•	•	•
-605	-050	-	-	•	---	---	---
-606	-060	-	-	•	---	---	---
-607	-070	-	-	•	---	---	---
-608	-080	-	-	•	---	---	---
-609	-090	-	-	•	---	---	---
-610	-100	-	-	•	---	---	---
-612	-120	-	-	•	---	---	---
-615	-150	-	-	•	---	---	---
-619	-190	-	-	•	---	---	---
-708	-008	-	-	•	---	---	---
-712	-012	-	-	•	---	---	---
-715	-015	-	-	•	---	---	---
-719	-019	-	-	•	---	---	---
-723	-023	-	-	•	---	---	---
-03	-	-	-003	---	---	---	---
-04	-	-	-004	---	---	---	---
-05	-	-	-005	---	---	---	---
-06	-	-	-006	---	---	---	---
-07	-	-	-007	---	---	---	---
-08	-	-	-008	---	---	---	---
-09	-	-	-009	---	---	---	---
-10	-	-	-010	---	---	---	---
-11	-	-	-011	---	---	---	---
-12	-	-	-012	---	---	---	---
-13	-	-	-013	---	---	---	---
-14	-	-	-014	---	---	---	---
-15	-	-	-015	---	---	---	---
-16	-	-	-016	---	---	---	---
-17	-	-	-017	---	---	---	---
-18	-	-	-018	---	---	---	---
-19	-	-	-019	---	---	---	---
-20	-	-	-020	---	---	---	---
-22	-	-	-022	---	---	---	---
-23	-	-	-023	---	---	---	---
-24	-	-	-024	---	---	---	---
-25	-	-	-025	---	---	---	---
-26	-	-	-026	---	---	---	---

ALL RINGS IN A GIVEN ROW USE THE SAME APPLICATOR.

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SPECIAL TOOLING APPLICATIONS

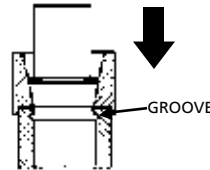
SNAP RINGS



EXTERNAL

Using mandrel and pressure sleeve.

Installation of snap rings can be automated using 6° tapered mandrels and mounting fixtures. In these instances, the ring is "snapped" into place using axial force.



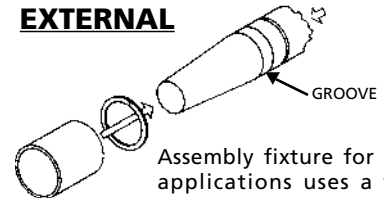
INTERNAL

Using tapered mandrel and pressure sleeve.

Page 4

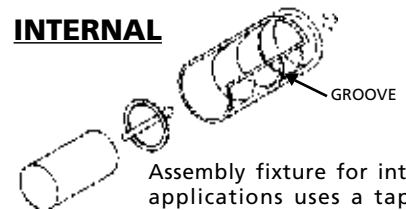
SPIRAL RINGS

EXTERNAL



Assembly fixture for external applications uses a tapered plug to expand the ring and a plunger to push the ring into position.

INTERNAL



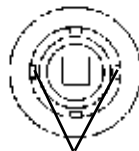
Assembly fixture for internal applications uses a tapered sleeve to contract the ring and a plunger to push the ring into position.

Page 34

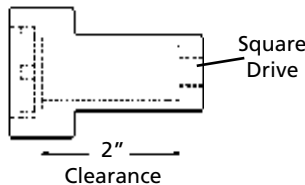
LOCKNUTS

SHAFT LOCKNUTS

Use assembly sockets coupled with powered drive wrenches to automate locknut assembly.

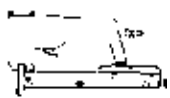


Notches match standard locknut keyways



Page 126

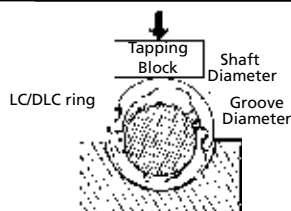
CLIPS



Automated "staple gun" equipment is available as a special order.

Page 24

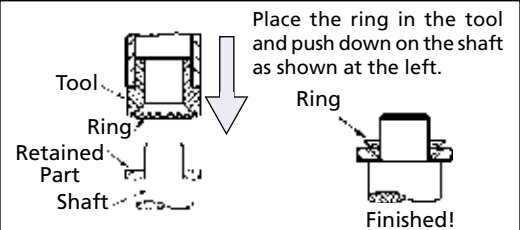
INTERLOCKING RINGS



Make LC installation easier by building a V-block fixture like the one at the left, or let our shop build a fixture for you!

Page 32

PUSH-ON RINGS



Place the ring in the tool and push down on the shaft as shown at the left.

Page 90

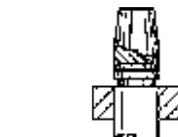
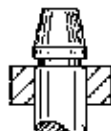
TAMPER-PROOF RINGS



Start with a hollowed taper pin and sleeve ...



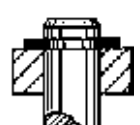
... or design a taper into the assembly.



Place taper pin over end with assembly mounted in work piece ...



... install part using sleeve.



Finished!

See page 15 for sleeve and pin dimensions.

"LET OUR SHOP ASSIST IN AUTOMATING YOUR ASSEMBLY"

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All manufacturer names and numbers are for identification purposes only. In no way are we implying that our parts were made by the manufacturers listed above. Prices, materials, tolerances, and grades subject to change without notice.

PART NUMBER CROSS REFERENCE

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HOW TO USE THIS CROSS REFERENCE:

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2. Note the Huyett part number.
3. Find the page number, and you've found the part.

Part #	Mfg.	Huyett Part #	Page #
471	DIN	DSH	152
472	DIN	DHO	166
983	DIN	DAK	162
984	DIN	DJK	175
988	DIN	SS/PS	146/147
988PS	Ellison	PS	147
988SS	Ellison	SS	146
1000	IRR	E	26
1001	IRR	BE	28
1200	IRR	RE	27
2000	IRR	C	32
3000	IRR	HO	16
3001	IRR	BHO	20
3100	IRR	SH	6
3101	IRR	BSH	11
3215	Military	RE	27
3217	Military	SHR	9
4000	IRR	HOI	19
4100	IRR	SHI	10
5005	Waldes	TI	93
5008	Waldes	HOI	19
5100	Waldes	SH	6
5101	Waldes	BSH	11
5102	Waldes	VSH	12
5103	Waldes	C	32
5105	Waldes	TY	92
5107	Waldes	LC	31
5108	Waldes	SHI	10
5115	Waldes	TX	92
5131	Waldes	BE	28
5133	Waldes	E	26
5135	Waldes	RG	27
5139	Waldes	EL	33
5144	Waldes	RE	27
5160	Waldes	SHR	9
5300	Waldes	NTR	97
5304	Waldes	PO	30
5305	Waldes	TR	97
5555	Waldes	SHF	14
5560	Waldes	SHM	15
5590	Waldes	PSW	112
5900	Waldes	SS	146
6000	IRR	TI	93
6100	IRR	TY	92
6799	DIN	DE	182
7100	IRR	SHF	14
7200	IRR	SHR	9
7993A	DIN	DRP	202
7993B	DIN	DRB	203
9000	Ellison	HO	16

Part #	Mfg.	Huyett Part #	Page #
9002	Ellison	VHO	22
9100	Ellison	SH	6
9103	Ellison	C	32
9133	Ellison	DE9	185
16624	Military	SH	6
16625	Military	HO	16
16626	Military	SHI	10
16627	Military	HOI	19
16628	Military	BSH	11
16629	Military	BHO	20
16630	Military	VSH	12
16631	Military	VHO	22
16632	Military	C	32
16633	Military	E	26
16634	Military	BE	28
73123/73130	DIN	S	105
90707	Military	SHF	14
100 SERIES	Eaton	XRC	86
200 SERIES	Eaton	XRO	84
23 SERIES	ITW	BPX	106
300 SERIES	Eaton	XSC	82
400 SERIES	Eaton	XSO	80
A	Seeger	DSH	152
A0500	Anderton	TRC	88
A0600	Anderton	XSO	80
A0700	Anderton	XSC	82
A0900	Anderton	XRC	86
A1000	Anderton	A10	87
A1100	Anderton	BPXZ	106
A1200	Anderton	A12	104
A1500	Anderton	A15	29
AK	Seeger	DAK	162
AL	Seeger	DAL	163
AN	Whittet-Higgins	AN	132
AS (Clip)	Benzing	DBS	185
AS (Snap)	Seeger	DSHR	158
AS3215	Aerospace	RRN	58
AS3216	Aerospace	RSN	44
AS3217	Aerospace	RR	52
AS3218	Aerospace	RS	38
AV	Seeger	DSHI	160
AW	Seeger	DBSH	161
B1500	Anderton	EB5	184
BE	Rotor Clip	BE	28
BHO	Rotor Clip	BHO	20
BN809-812	Bossard	DE	182
BN814	Bossard	DBS	185
BN815	Bossard	DU	185
BN818-820	Bossard	DSH	152
BN821	Bossard	DSHR	158

Part #	Mfg.	Huyett Part #	Page #
BN822-823	Bossard	DHO	166
BN824	Bossard	DHOR	171
BN829	Bossard	DSHI	160
BN830	Bossard	DHOI	172
BN831	Bossard	DC	186
BN832	Bossard	DSHX	165
BR	Spirolox	BR	64
BSH	Rotor Clip	BSH	11
C	Rotor Clip	C	32
C-H	Smalley	CMH	124
C-L	Smalley	CML	120
C-M	Smalley	CMM	122
CMH	Spirolox	CMH	124
CML	Spirolox	CML	120
CMM	Spirolox	CMM	122
D	Seeger	DTR	213
D1300	Anderton	DHO	166
D1400	Anderton	DSH	152
D1460	Anderton	DSHR	158
D1500	Anderton	DE	182
D2000	Anderton	DJK	175
D2100	Anderton	DAK	162
DC	Rotor Clip	DC	186
DE	Rotor Clip	DE	182
DHO	Rotor Clip	DHO	166
DNH	Smalley	DH	194
DNS	Smalley	DS	190
DSH	Rotor Clip	DSH	152
DTI	Rotor Clip	DTI	212
DTX	Rotor Clip	DTX	212
E	Rotor Clip	E	26
EH	Smalley	DAH	196
EJB	Ellison	DVHO	174
EL	Rotor Clip	EL	33
EN	Eaton	USH	71
ES	Smalley	DAS	192
ESB	Ellison	DSB	208
ESP	Ellison	DSP	205
ESW	Ellison	DSW	206
EXT	Ellison	DSHR	158
EXTV	Ellison	DSHI	160
G	Seeger	DSHX	165
GA	Seeger	DSHF	164
GR	Ellison	DSHX	165
H	Ellison	DC	186
HO	Rotor Clip	HO	16
HOI	Rotor Clip	HOI	19
HPC	Hubbard	BPX	106
IN	Eaton	UHO	76
INT	Ellison	DHOR	171

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Part #	Mfg.	Huyett Part #	Page #
INTV	Ellison	DHOI	172
J	Seeger	DHO	166
JB	Seeger	DVHO	174
JE	Rotor Clip	JE	184
JK	Seeger	DJK	175
JL	Seeger	DJL	177
JS	Seeger	DHOR	171
JV	Seeger	DHOI	172
JW	Seeger	DBHO	173
KR	Spirolox	KR	61
KS (Push-On)	Seeger	DKS	213
KS (Spiral)	Spirolox	KS	47
LC	Rotor Clip	LC	31
M1308	Anderton	DHOI	172
M1408	Anderton	DSHI	160
M1440	Anderton	DSHX	165
M1465	Anderton	DTX	212
M1700	Anderton	D17	204
M1800	Anderton	DC	186
M2300	Anderton	DSB	208
M2400	Anderton	DSW	206
M2500	Anderton	D25	104
M3200	Anderton	DSP	205
MA4016	Aerospace	DAS	192
MA4017	Aerospace	DAH	196
MC	Rotor Clip	MC	189
ME	Rotor Clip	ME	188
MHO	Rotor Clip	MHO	180
MIL-R-27426A1	Military	RS	38
MIL-R-27426A2	Military	RSN	44
MIL-R-27426B1	Military	RR	52
MIL-R-27426B2	Military	RRN	58
MR	Spirolox	MR	62
MRE	Rotor Clip	MRE	188
MS	Spirolox	MS	48
MSH	Rotor Clip	MSH	178
MSR	Rotor Clip	MSHR	179
N	Whittet-Higgins	N	132
N1300	Anderton	HO	16
N1302	Anderton	VHO	22
N1305	Anderton	TI	93
N1308	Anderton	HOI	19
N1400	Anderton	SH	6
N1408	Anderton	SHI	10
N1440	Anderton	SHF	14
N1460	Anderton	SHR	9
N1465	Anderton	TX	92
N1500	Anderton	E	26
N1501	Anderton	BE	28

Part #	Mfg.	Huyett Part #	Page #
N1540	Anderton	RE	27
N1800	Anderton	C	32
N5000	Waldes	HO	16
N5001	Waldes	BHO	20
N5002	Waldes	VHO	22
N5003	Waldes	VVH	21
NAN	Eaton	UHB	72
ND	Eaton	ND	74
NH	Whittet-Higgins	NH	133
NHE	Std. Locknut	NH	133
NI	Whittet-Higgins	NI	134
NIN	Std. Locknut	NI	134
NL	Whittet-Higgins	NL	135
NT	Whittet-Higgins	NT	136
NTH	Std. Locknut	NT	136
P	Anderton	PS	147
PO	Rotor Clip	PO	30
POL	Rotor Clip	POL	30
PS	Seeger	PS	147
R	Anderton	SS	146
R Series	Peterson	DSP	205
RA	Seeger	DE	182
RB	Seeger	DRB	203
RE	Rotor Clip	RE	27
RG	Rotor Clip	RG	27
RR	Spirolox	RR	52
RRN	Spirolox	RRN	58
RRT	Spirolox	RRT	56
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