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REF: Tools & Fasteners

REF: Retaining Ring Sizing Charts

Retaining Rings work by creating a shoulder that can hold components in place. The retaining shoulder is created when the ring attaches itself to the bore or shaft, typically by snapping into a groove. Ordinarily (however not always) a groove is dug into the shaft or bore, and this groove becomes the seat for the retaining ring. Retaining rings are designed such that their contact diameter has some interference fit with the groove in which they fit. This creates a “snug” fit between the ring and groove. The term used to describe the amount of interference fit is “cling”.

Cling causes the retaining ring to fit tightly and securely against its groove bottom. Without cling a ring would have a loose fit and would “rattle” in its groove. This lack of cling would decrease the retention capacity of the ring because a “cling-less” ring is free to move radially, creating weak retention points that will ultimately cause the assembly to fail. Another key factor is the width of the groove. The groove width is slightly larger than the rings thickness, thus creating a snug axial fit. The tight axial fit along with the cling to the groove bottom creates a rigid shoulder which can retain thrust loads. ¹⁾

The phrase “Retaining Ring” is sort of vague and refers broadly over several different types of retaining fasteners. Some names used include: snap rings, wire rings, circlips, lock rings, retainer clips, retainer rings among others. For our purposes, Internal or External are the main words to remember since the rings are machined different for both types of use. Rings for bores are referred to as internal retaining rings, because the ring fits inside a hole (or bore). Similarly rings that fit over shafts are referred to as external retaining rings, because the are installed on the outside (or external) side of a shaft.

Choosing what size retaining ring to buy can be challenging with all the different types and material construction. Mainly, you choose a ring based on the diameter of the housing or shaft. The groove sizes are also shown below but, in general, the piece you are working on should be sized to standard groove dimensions. However, there may be instances where special considerations were made from standards. In addition, retaining rings are made to many standards such as inch, DIN, ANSI METRIC, and JIS.

- Decide whether the ring installation is for internal or external applications. This determines ring sizing also.
- Measure the shaft (external) or bore (internal) and choose the ring sized accordingly.
- Be sure to measure the groove diameter also to make sure that ring will sit properly in it. The ring should be snug but too tight and it will stretch beyond what it was made to handle. Some rings are made for shallow grooves and some are made for deeper grooves. Circlips that wrap around the shaft (axial) require less groove depth than “C” or “E” clips (radial).
- Most rings have tolerances for installation depending on what size and type of ring it is. You can download the full PDFs of the charts below or go to their websites to see all the specs.

External Circlips

External Snap rings are axial retaining rings and are installed into a groove in a shaft or bore along an axis center point.

The rings have lugs and lug holes that are used for installation. Once installed, they contact virtually the entire groove.

They transmit loads into the groove wall around most of the groove circumference, which lets them withstand significant thrust loadings. ²⁾

External retaining rings are sized more narrow in the charts than internal rings.

(due to them being spec'd by their inside diameter and meant to expand onto a groove on a shaft)

So comparing, measuring or ordering needs to be done in kind.

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for Standard SAE External Circlips.

Check with the manufacturer for exact specs of the brand clips desired.

Standard SAE External Circlips						
ARCON Part#	Shaft Dia		Ring Groove		Ring Dia	
	Fraction	Decimal	Dia	Width	Thick	Free Dia
1400-12	1/8"	.125"	.117"	.012"	.010"	.112"
1400-15	5/32"	.156"	.146"	.012"	.010"	.142"
1400-18	3/16"	.188"	.175"	.018"	.015"	.168"
1400-19	(5mm)	.197"	.185"	.018"	.015"	.179"
1400-21	7/32"	.219"	.205"	.018"	.015"	.196"
1400-23	15/16"	.236"	.222"	.018"	.015"	.215"
1400-25	1/4	.250"	.230"	.029	.025"	.225"
1400-27	(7 mm)	.276"	.255"	.029	.025"	.250"
1400-28	9/32"	.281"	.261"	.029	.025"	.256"
1400-31	5/16"	.312"	.290"	.029	.025"	.281"
1400-34	11/32"	.344"	.321"	.029	.025"	.309"
1400-35	(9 mm)	.354"	.330"	.029	.025"	.320"
1400-37	3/8"	.375"	.352"	.029	.025"	.338"
1400-39	(10 mm)	.394"	.369"	.029	.025"	.354"
1400-40	13/32"	.406"	.382"	.029	.025"	.366"
1400-43	7/16"	.438"	.412"	.029	.025"	.395"
1400-46	15/32"	.469"	.443"	.029	.025"	.428"
1400-50	1/2"	.500"	.468"	.039	.035"	.461"
1400-55	(14 mm)	.551"	.519"	.039	.035"	.509"
1400-56	9/16"	.562"	.530"	.039	.035"	.521"
1400-59	19/32"	.594"	.559"	.039"	.035"	.550"
1400-62	5/8"	.625"	.588"	.039"	.035"	.579"

1400-66	(17 mm)	.669"	.629"	.039"	.035"	.621"
1400-66	43/64"	.672"	.631"	.039"	.035"	.621"
1400-68	11/16"	.688"	.646"	.046"	.042"	.635"
1400-75	3/4"	.750"	.704"	.046"	.042"	.693"
1400-78	25/32"	.781"	.733"	.046"	.042"	.722"
1400-81	13/16"	.812"	.762"	.046"	.042"	.751"
1400-87	7/8"	.875"	.821"	.046"	.042"	.810"
1400-93	15/16"	.938"	.882"	.046"	.042"	.867"
1400-98	63/64"	.984"	.926"	.046"	.042"	.910"
1400-100	1"	1.000"	.940"	.046"	.042"	.925"
1400-102	(26 mm)	1.023"	.961"	.046"	.042"	.946"

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for Standard Metric External Circlips.

Check with the manufacturer for exact specs of the brand clips desired.

Standard Metric External Circlips						
ARCON Part#	Shaft Dia	Ring Groove			Ring Dia	
		Dia	Width	Depth	Thick	Free Dia
D1400-3	3 mm	2.8 mm	.50 mm	.10 mm	.40 mm	2.7 mm
D1400-4	4 mm	3.8 mm	.50 mm	.10 mm	.40 mm	3.7 mm
D1400-5	5 mm	4.8 mm	.70 mm	.10 mm	.60 mm	4.7 mm
D1400-6	6 mm	5.7 mm	.80 mm	.15 mm	.70 mm	5.6 mm
D1400-7	7 mm	6.7 mm	.90 mm	.15 mm	.80 mm	6.5 mm
D1400-8	8 mm	7.6 mm	.90 mm	.20 mm	.80 mm	7.4 mm
D1400-	9 mm	8.6 mm	1.10 mm	.20 mm	1.00 mm	8.4 mm
D1400-10	10 mm	9.6 mm	1.10 mm	.20 mm	1.00 mm	9.3 mm
D1400-11	11 mm	10.5 mm	1.10 mm	.25 mm	1.00 mm	10.2 mm
D1400-12	12 mm	11.5 mm	1.10 mm	.25 mm	1.00 mm	11.0 mm
D1400-13	13 mm	12.4 mm	1.10 mm	.30 mm	1.00 mm	11.9 mm
D1400-14	14 mm	13.4 mm	1.10 mm	.30 mm	1.00 mm	12.9 mm
D1400-15	15 mm	14.3 mm	1.10 mm	.35 mm	1.00 mm	13.8 mm
D1400-16	16 mm	15.2 mm	1.10 mm	.40 mm	1.00 mm	14.7 mm
D1400-17	17 mm	16.2 mm	1.10 mm	.40 mm	1.00 mm	15.7 mm
D1400-18	18 mm	17.0 mm	1.30 mm	.50 mm	1.20 mm	16.5 mm
D1400-19	19 mm	18.0 mm	1.30 mm	.50 mm	1.20 mm	17.5 mm
D1400-20	20 mm	19.0 mm	1.30 mm	.50 mm	1.20 mm	18.5 mm
D1400-21	21 mm	20.0 mm	1.30 mm	.50 mm	1.20 mm	19.5 mm
D1400-22	22 mm	21.0 mm	1.30 mm	.50 mm	1.20 mm	20.5 mm
D1400-23	23 mm	22.0 mm	1.30 mm	.50 mm	1.20 mm	21.5 mm
D1400-24	24 mm	22.9 mm	1.30 mm	.55 mm	1.20 mm	22.2 mm
D1400-25	25 mm	23.9 mm	1.30 mm	.55 mm	1.20 mm	23.2 mm
D1400-26	26 mm	24.9 mm	1.30 mm	.55 mm	1.20 mm	24.2 mm

Internal Circlips

Internal retaining rings are sized wider in the charts than external rings due to them being spec'd by their outside diameter and meant to compress into a groove in a bore. So comparing, measuring or ordering needs to be done in kind.

Standard SAE Internal Circlips						
Housing Bore Dia			Bore Groove Dia		Ring Dia	
Fraction	Decimal	Millimeter	Dia	Width	Thickness	Free Dia
1/4"	.250"	-	.268"	.018"	.015"	.280"
5/16"	.312"	-	.330"	.018"	.015"	.346"
3/8"	.375"	-	.397"	.029"	.025"	.415"
7/16"	.438"	-	.461"	.029"	.025"	.482"
29/64"	.453"	-	.477"	.029"	.025"	.498"
1/2"	.500"	-	.530"	.039"	.035"	.548"
-	.512"	13 mm	.542"	.039"	.035"	.560"
9/16"	.562"	-	.596"	.039"	.035"	.620"
5/8"	.625"	-	.665"	.039"	.035"	.694"
11/16"	.688"	-	.732"	.039"	.035"	.763"
3/4"	.750"	19 mm	.796"	.039"	.035"	.831"
-	.777"	19.7 mm	.825"	.046"	.042"	.859"
13/16"	.812"	-	.862"	.046"	.042"	.901"
-	.866"	22 mm	.920"	.046"	.042"	.961"
7/8"	.875"	-	.931"	.046"	.042"	.971"
-	.901"	22.9	.959"	.046"	.042"	1.000"
15/16"	.938"	-	1.000"	.046"	.042"	1.041"
1"	1.000"	-	1.066"	.046"	.042"	1.111"
-	1.023"	26 mm	1.091"	.046"	.042"	1.136"

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#). Some specs are left out for space. The chart below shows general sizing specs for Standard Metric Internal Circlips. Check with the manufacturer for exact specs of the brand clips desired.

Standard Metric Internal Circlips					
ARCON Part#	Housing Bore Dia	Groove		Ring	
		Dia	Width	Thickness	Free Diameter
D1300-8	8mm	8.4mm	.90mm	.80mm	8.7mm
D1300-9	9mm	9.4mm	.90mm	.80mm	9.8mm
D1300-9.5	9.5mm	9.9mm	1.10mm	1.00mm	10.3mm
D1300-10	10mm	10.4mm	1.10mm	1.00mm	10.8mm
D1300-11	11mm	11.4mm	1.10mm	1.00mm	11.8mm

D1300-12	12mm	12.5mm	1.10mm	1.00mm	13.0mm
D1300-13	13mm	13.6mm	1.10mm	1.00mm	14.1mm
D1300-14	14mm	14.6mm	1.10mm	1.00mm	15.1mm
D1300-15	15mm	15.7mm	1.10mm	1.00mm	16.2mm
D1300-16	16mm	16.8mm	1.10mm	1.00mm	17.3mm
D1300-17	17mm	17.8mm	1.10mm	1.00mm	18.3mm
D1300-18	18mm	19.0mm	1.10mm	1.00mm	19.5mm
D1300-19	19mm	20.0mm	1.10mm	1.00mm	20.5mm
D1300-20	20mm	21.0mm	1.10mm	1.00mm	21.5mm
D1300-21	21mm	22.0mm	1.10mm	1.00mm	22.5mm
D1300-22	22mm	23.0mm	1.10mm	1.00mm	23.5mm
D1300-23	23mm	24.1mm	1.30mm	1.20mm	24.6mm
D1300-24	24mm	25.2mm	1.30mm	1.20mm	25.9mm
D1300-25	25mm	26.2mm	1.30mm	1.20mm	26.9mm
D1300-26	26mm	27.2mm	1.30mm	1.20mm	27.9mm

Constant Section Retaining Ring

(AKA, Eaton-style or horseshoe snap ring).³⁾ A Constant Section Retaining Ring (Snap Ring) is a retaining ring often specified for heavy-duty or impact loading applications.⁴⁾ It features a uniform, constant section. This means that the material used to make the ring is the same width at any point along the circumference of the ring. These can be bought from fastener companies in carbon steel as plain or with oil embedded.

SAE Constant Section Rings								
Housing Bore Diameter			Groove Size			Ring Dimensions		
Fraction	Decimal	Millimeter	Dia	Width	Depth	Free Dia (outside)	Thickness	Free Gap

1.125"	1-1/8"	28.58 mm	1.181"	.046" +.003" -.000"	.028"	1.196"	.042"	.375" - .562"
1.250"	1-1/4"	31.75 mm	1.310"		.030"	1.330"	.042"	.375" - .562"
1.375"	1-3/8"	34.93 mm	1.435"		.030"	1.460"	.042"	.375" - .562"
1.500"	1-1/2"	38.10 mm	1.580"		.040"	1.600"	.042"	.375" - .562"
1.625"	1-5/8"	41.28 mm	1.705"		.040"	1.725"	.042"	.437" - .750"
1.750"	1-3/4"	44.45 mm	1.830"		.040"	1.855"	.042"	.437" - .750"
1.875"	1-7/8"	47.63 mm	1.965"		.045"	1.990"	.042"	.437" - .750"
2.000"	2"	50.80 mm	2.090"		.045"	2.115"	.042"	.437" - .750"

Bearing Snap Ring

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for Bearing Retainer Rings. Check with the manufacturer for exact specs of the brand clips desired.

This retainer ring below (when installed into a groove) is tough to remove. Normally a spreader tool is used to widen the ring to install it onto a groove of a shaft. The MoCo used one inside the swingarm as a bearing race spacer in the grooved area between the (Timkin) bearings. It is a "Constant Section Retaining Ring" of the "Bearing Snapping" variety with beefier dims than the ones below. There are no known pliers to compress the ring (used internally) due to it having no holes or slots for pliers to compress it.

So it was pried out with screwdrivers in a circle pattern to get the ring out of the groove in the pivot.

Used on 1982-2003 swingarms, all models.

This is the ring installed between the two inner bearing races (and inside the lockring).

It has no part number as it comes in a set with the bearings.

SAE Bearing Snap Rings								
Shaft Diameter or Bearing Bore		Groove			Ring			Free Gap
Decimal	≈Metric	Dia	Width	Depth	Dia	Width	Thickness	Min-Max
.4724"	12.00mm	.436"	.046" +.003" -.000"	.018"	.421"	.062 ±.003"	.042"	.062" - .187"
.5906"	15.00mm	.550"	.053"	.020"	.538"	.078"	.047"	
.6693"	17.00mm	.629"	+.004" -.000"		.616"	±.003"		.078" - .218"

.7874"	20.00mm	0.731"	.068"	.028"	.710"	.093" ±.003"	.062"	
.9843"	25.00mm	.924"	+.004" -.000"	.030"	.910"	.109" ±.003"		.156" - .312"
1.1811"	30.00mm	1.111"	.085" +.004" -.000"	.035"	1.093"	.125" ±.005"	.075"	
1.3780"	35.00mm	1.288"		.045"	1.265"	-.031"	.156"	.250" - .406"
1.5748"	40.00mm	1.465"	.108"	.055"	1.452"	±.005"	.093"	
1.7717"	45.00mm	1.648"	+.005"	.062"	1.625"	.188"		
1.9685"	50.00mm	1.844"	-.000"		1.820"	±.005"		
2.1654"	55.00mm	2.015"	.120"	.075"	1.995"	.218"	.109"	.250" - .468"
2.3622"	60.00mm	2.212"	+.005" -.000"	2.187"				
2.5591"	65.00mm	2.389"			2.359"			
2.7559"	70.00mm	2.586"			2.556"	.250"		

"C" Clips

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for SAE C-clips. Check with the manufacturer for exact specs of the brand clips desired.

SAE C-Clips								
ARCON Part#	Shaft Diameter			Groove		Ring		
	Frac.	Dec.	mm	Dia	Width	Thickness	Free O.D.	Free ID
1800-12	1/8"	.125"	3.2mm	.106"	.020"	.015"	.165"	.102"
1800-15	5/32"	.156"	4.0mm	.135"	.020"	.015"	.205"	.131"
1800-18	3/16"	.188"	4.8mm	.165"	.020"	.015"	.244"	.161"
1800-21	7/32"	.219"	5.6mm	.193"	.029"	.025"	.275"	.187"
1800-23	15/64"	.236"	6.0mm	.208"	.029"	.025"	.295"	.203"
1800-25	1/4"	.250"	6.4mm	.220"	.029"	.025"	.311"	.211"
1800-28	9/32"	.281"	7.1mm	.247"	.029"	.025"	.346"	.242"
1800-31	5/16"	.312"	7.9mm	.276"	.029"	.025"	.376"	.270"
1800-37	3/8"	.375"	9.5mm	.335"	.029"	.025"	.448"	.328"
1800-40	13/32"	.406"	10.3mm	.364"	.029"	.025"	.486"	.359"
1800-43	7/16"	.438"	11.1mm	.393"	.029"	.025"	.517"	.386"
1800-50	1/2"	.500"	12.7mm	.450"	.039"	.035"	.581"	.441"
1800-56	9/16"	.562"	14.3mm	.507"	.039"	.035"	.653"	.497"
1800-62	5/8"	.625"	15.9mm	.563"	.039"	.035"	.715"	.553"

1800-68	11/16"	.688"	17.5mm	.619"	.046"	.042"	.784"	.612"
1800-75	3/4"	.750"	19.0mm	.676"	.046"	.042"	.845"	.665"
1800-81	13/16"	.812"	20.6mm	.732"	.046"	.042"	.915"	.721"
1800-87	7/8"	.875"	22.2mm	.789"	.046"	.042"	.991"	.777"
1800-93	15/16"	.938"	23.8mm	.843"	.046"	.042"	1.058"	.830"
1800-100	1"	1.000"	25.4mm	.900"	.046"	.042"	1.130"	.887"
1800-112	1-1/8"	1.125"	28.6mm	1.013"	.056"	.050"	1.267"	.997"

The chart below is a reprint from ROTORCLIP.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for their (DC) Metric C-clips. Check with the manufacturer for exact specs of the brand clips desired.

Metric C-Clips (DC)							
Rotor Clip Part#	Shaft	Groove			Ring		
	Dia	Dia	Width	Depth	Thick	Free O.D.	Free ID
DC-3	3mm	2.3mm	.44mm	.35mm	.40mm	3.98mm	2.18mm
DC-4	4mm	3.2mm	.44mm	.40mm	.40mm	5.00mm	3.00mm
DC-5	5mm	4.0mm	.64mm	.50mm	.60mm	6.20mm	3.80mm
DC-6	6mm	5.0mm	.74mm	.50mm	.70mm	7.40mm	4.80mm
DC-7	7mm	6.0mm	.85mm	.50mm	.80mm	8.60mm	5.80mm
DC-8	8mm	7.0mm	.85mm	.50mm	.80mm	10.00mm	6.80mm
DC-9	9mm	8.0mm	1.10mm	.50mm	1.00mm	11.20mm	7.80mm
DC-10	10mm	9.0mm	1.10mm	.50mm	1.00mm	12.15mm	8.75mm
DC-11	11mm	10.0mm	1.10mm	.50mm	1.00mm	13.20mm	9.65mm
DC-12	12mm	10.9mm	1.10mm	.55mm	1.00mm	14.35mm	10.55mm
DC-13	13mm	11.8mm	1.10mm	.60mm	1.00mm	15.40mm	11.40mm
DC-14	14mm	12.7mm	1.10mm	.65mm	1.00mm	16.30mm	12.30mm
DC-15	15mm	13.6mm	1.10mm	.70mm	1.00mm	17.40mm	13.20mm
DC-16	16mm	14.5mm	1.10mm	.75mm	1.00mm	18.50mm	14.10mm
DC-17	17mm	15.4mm	1.10mm	.80mm	1.00mm	19.40mm	14.90mm
DC-18	18mm	16.3mm	1.30mm	.85mm	1.20mm	20.40mm	15.80mm
DC-19	19mm	17.2mm	1.30mm	.90mm	1.20mm	21.50mm	16.70mm
DC-20	20mm	18.1mm	1.30mm	.95mm	1.20mm	22.65mm	17.55mm

"E" Clips

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for E-clips. Check with the manufacturer for exact specs of the brand clips desired.

SAE E-Clips

ARCON Part#	Shaft Diameter			Groove		Ring		
	Frac.	Dec.	mm	Dia	Width	Thickness	Free O.D.	Free ID
1500-4	-	.040"	1mm	.026"	.012"	.010"	.079"	.025"
1500-X6	1/16"	.062"	1.5mm	.052"	.012"	.010"	.140"	.051"
1500-Y6	1/16"	.062"	1.6mm	.052"	.023"	.020"	.187"	.051"
1500-6	1/16"	.062"	1.5mm	.052"	.012"	.010"	.156"	.051"
1500-X9	3/32"	.094"	2.4mm	.074"	.020"	.015"	.230"	.069"
1500-9	3/32"	.094"	2.4mm	.074"	.020"	.015"	.187"	.073"
1500-X11	7/64"	.110"	2.8mm	.079"	.020"	.015"	.375"	.076"
1500-12	1/8"	.125"	3.2mm	.095"	.020"	.015"	.230"	.094"
1500-X14	9/64"	.140"	3.6mm	.102"	.020"	.015"	.203"	.100"
1500-Y14	9/64"	.140"	3.6mm	.110"	.020"	.015"	.250"	.108"
1500-14	9/64"	.140"	3.6mm	.105"	.029"	.025"	.270"	.102"
1500-15	5/32"	.156"	4.0mm	.116"	.029"	.025"	.282"	.114"
1500-X17	11/64"	.172"	4.4mm	.127"	.029"	.025"	.312"	.125"
1500-X18	3/16"	.188"	4.8mm	.125"	.029"	.025"	.375"	.122"
1500-18	3/16"	.188"	4.8mm	.147"	.029"	.025"	.335"	.145"
1500-X21	7/32"	.219"	5.6mm	.188"	.029"	.025"	.437"	.185"
1500-25	1/4"	.250"	6.3mm	.210"	.029"	.025"	.527"	.207"
1500-X31	5/16"	.312"	7.9mm	.250"	.029"	.025"	.500"	.243"
1500-37	3/8"	.375"	9.5mm	.303"	.039"	.035"	.660"	.300"
1500-43	7/16"	.438"	11.1mm	.343"	.039"	.035"	.687"	.337"
1500-X43	7/16"	.438"	11.1mm	.380"	.039"	.035"	.600"	.375"
1500-50	1/2"	.500"	12.7mm	.396"	.046"	.042"	.800"	.392"
1500-62	5/8"	.625"	15.9mm	.485"	.046"	.042"	.940"	.480"
1500-X74	3/4"	.744"	19.0mm	.625"	.056"	.050"	1.000"	.616"
1500-75	3/4"	.750"	19.0mm	.580"	.056"	.050"	1.120"	.574"
1500-87	7/8"	.875"	22.2mm	.675"	.056"	.050"	1.300"	.668"
1500-X98	1"	.984"	25.0mm	.835"	.056"	.050"	1.500"	.822"
1500-X118	13/16"	1.188"	30.2mm	1.079"	.068"	.062"	1.626"	1.066"
1500-X137	13/8"	1.375"	34.9mm	1.230"	.068"	.062"	1.875"	1.213"

The chart below is a reprint from ARCONRING.com. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for E-clips. Check with the manufacturer for exact specs of the brand clips desired.

Metric E-Clips						
ARCON Part#	Shaft Diameter	Groove		Ring		
		Dia	Width	Thickness	Free O.D.	Free ID
D1500-.8	1.20mm	0.8mm	.24mm	.20mm	1.95mm	.58mm
D1500-1.2	1.70mm	1.2mm	.34mm	.30mm	2.90mm	1.01mm
D1500-1.5	2.25mm	1.5mm	.44mm	.40mm	3.85mm	1.28mm
D1500-1.9	2.75mm	1.9mm	.54mm	.50mm	4.40mm	1.61mm

D1500-2.3	3.50mm	2.3mm	.64mm	.60mm	5.90mm	1.94mm
D1500-3.2	4.50mm	3.2mm	.64mm	.60mm	6.80mm	2.70mm
D1500-4	6.00mm	4.0mm	.74mm	.70mm	8.80mm	3.34mm
D1500-5	7.00mm	5.0mm	.74mm	.70mm	10.75mm	4.11mm
D1500-6	8.00mm	6.0mm	.74mm	.70mm	11.75mm	5.26mm
D1500-7	9.50mm	7.0mm	.94mm	.90mm	13.80mm	5.84mm
D1500-8	10.50mm	8.0mm	1.05mm	1.00mm	15.60mm	6.52mm
D1500-9	12.00mm	9.0mm	1.15mm	1.10mm	18.20mm	7.63mm
D1500-10	13.00mm	10.0mm	1.25mm	1.20mm	19.65mm	8.32mm
D1500-12	15.50mm	12.0mm	1.35mm	1.30mm	22.65mm	10.45mm
D1500-15	20.00mm	15.0mm	1.55mm	1.50mm	28.60mm	12.61mm
D1500-19	25.50mm	19.0mm	1.85mm	1.75mm	36.70mm	15.92mm
D1500-24	31.50mm	24.0mm	2.05mm	2.00mm	43.65mm	21.88mm

Heavy Duty "E" Clips

The chart below is a reprint from McMaster-Carr.com. Here is the [link to their web page](#) .
Some specs are left out for space. The chart below shows general sizing specs for Heavy E-clips.
Check with the manufacturer for exact specs of the brand clips desired.

Also known as reinforced E-style retaining rings, these rings are reinforced to withstand faster rotation than other side-mount retaining rings.

Heavy E-clips have the same dims (fit in the same grooves as standard E-clips) but have a larger OD.
The OD listed in part specs can be .040"-.080" larger depending on installed vs uninstalled specs given (some list either / or, some both).

SAE Heavy Duty E-Clips				
Shaft Size	Groove		Ring	
	OD	Width	Installed OD	Thickness
3/32"	.074"	.02"	.206"	.015"
1/8"	.095"	.02"	.27"	.015"
5/32"	.116"	.029"	.335"	.025"
3/16"	.147"	.029"	.375"	.025"
7/32"	.188"	.029"	.446"	.025"
1/4"	.21"	.029"	.516"	.025"
5/16"	.25"	.029"	.588"	.025"
3/8"	.303"	.039"	.66"	.035"
7/16"	.343"	.039"	.746"	.035"
1/2"	.396"	.046"	.81"	.042"
9/16"	.437"	.046"	.87"	.042"

External Bowed Locking Ring

The chart below is a reprint from ROTORCLIP.COM. Here is the [link to the full PDF](#).

Some specs are left out for space. The chart below shows general sizing specs for Bowed Retainer Clips. Check with the manufacturer for exact specs of the brand clips desired.

External Bowed Locking Ring																
Rotorclip Part#	Shaft Diameter			Groove Size					Ring Size							
				Diameter		Width		Depth	Length		Thickness		Bow Height		Gap	
	Dec	Tol	Fract	OD	Tol	W	Tol	D	L	Tol	T	Tol	BH	Tol	Gap	Tol
EL-9	.092"	±.002"	3/32"	.061"	±.001"	.035"	+ .005" - .000"	.016"	.307"	±.010"	.010"	±.001"	.050"	±.010"	.063"	±.004"
EL-12	.125"	±.002"	1/8"	.082"	±.0015"	.035"	+ .005" - .000"	.021"	.307"	±.010"	.010"	±.001"	.050"	±.010"	.086"	±.004"
EL-18	.188"	±.003"	3/16"	.124"	±.002"	.045"	+ .005" - .000"	.032"	.390"	±.010"	.015"	±.002"	.060"	±.010"	.130"	±.005"
EL-25	.250"	±.003"	1/4"	.165"	±.002"	.055"	+ .005" - .000"	.042"	.500"	±.010"	.015"	±.002"	.070"	±.010"	.172"	±.005"
EL-31	.312"	±.003"	5/16"	.228"	±.003"	.080"	+ .005" - .000"	.042"	.620"	±.010"	.015"	±.002"	.095"	±.010"	.234"	±.005"
EL-37	.375"	±.003"	3/8"	.270"	±.003"	.095"	+ .005" - .000"	.052"	.740"	±.010"	.020"	±.002"	.130"	±.010"	.280"	±.005"

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1)

http://www.americanring.com/products/rings_retaining_overview.aspx

2)

<https://www.machinedesign.com/archive/article/21818343/using-retaining-rings-properly>

3)

<https://www.prospectfastener.com/snappings/internalrings/constant-section-internal-rings>

4)

<https://www.smalley.com/retaining-rings/constant-section-snap-rings>

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