

RETAINING RING DESIGN CONSIDERATIONS

Reduce your fastener assembly costs by designing in a Rotor Clip Retaining Ring. Consider replacing costly traditional fasteners with retaining rings and enjoy savings you didn't know were possible. Retaining rings can also handle many "Non-Traditional" fastener requirements for even greater savings. Before you designate a ring for your application, follow these simple steps.

STEP 1 - DETERMINE THE RING TYPE

If the assembly you must retain is in a housing/bore, then you need an internal type or HOUSING (HO) ring.

If the assembly you must retain is on a shaft, then you need an external type or SHAFT (SH) ring.

If you are looking for a retaining ring to act as a spring or as a preload on parts to reduce chatter or vibration, then you need either a bowed (BHO, BSH for resilient end-play take-up) or a beveled (VHO, VSH for rigid end-play take-up) retaining ring. These are available for both internal and external applications.

There are two other important variations of both HO internal rings and SH external rings. The "Bowed" HO (BHO)...

...and "Bowed" SH (BSH), so named because they are shaped like a bow, are used to compensate for accumulated tolerances.

If the assembly you must retain is characterized by very little thrust load, consider a self-locking retaining ring. These require no groove and are ideal for use on shaft/housing diameters of 1" or less.

STEP 2 - INSTALLATION CONSIDERATIONS - AXIAL VERSUS RADIAL

How the ring is to be installed will affect the type of ring you select. If installation is axial, (along the axis or center point of a shaft/housing), you will need an Axial Retaining Ring. These include HO, SH, HOI, SHI, SHR, SHM rings listed in the axial ring section of the catalog.

Axial, along the center point of a shaft or housing.

If installation is radial, (along the radius of a circle), you will need a Radial Retaining Ring. These include E, RE, C, PO/POL, LC rings listed in the radial section of the catalog.

STEP 3 - RING SIZE

Measure the diameter of the housing or shaft. This dimension will give you the size retaining ring you will need. Note: Rotor Clip retaining rings are made to Inch, DIN, and ANSI Metric standards. "E" retaining rings are also available to JIS (Japanese) standards.

STEP 4 – MATERIAL

Standard material for Rotor Clip retaining rings is carbon spring steel (SAE 1060-1090/UNS G10600-G10900). Rings can also be produced in stainless steel (PH-15-7Mo/UNS S15700) and beryllium copper (Alloy #25/UNS C17200).

ST-Carbon Spring Steel (SAE 1060-1090/UNS G10600-G 10900). This is known for its high strength and reliability in retaining ring applications. (Ex. HO-25ST) offering the following advantages -

1. High strength-the heat treating process assures the rings are wear resistant.
2. Ductility-the heat treating process also assures the spring characteristic of the ring enabling it to return to its original shape after it is deformed.
3. Corrosion Protection Option-It is cost effective to plate carbon steel for corrosion resistance.

BC-Beryllium Copper (Alloy #25/UNS C17200), for applications where the ring must be non-magnetic and conduct electricity. It is also characterized by excellent corrosion resistance and is particularly effective in sea air and sea water applications (Ex. HO-25BC). This is a useful material when the following parameters apply to your application:

1. The ring must be non-magnetic.
2. The ring must conduct electricity.
3. The ring must be highly corrosion resistant to sea air and sea water.

SS-Stainless Steel (PH-15-7Mo/UNS S15700). An extra strength, corrosion resistant steel, capable of preventing

atmospheric oxidation at temperatures up to 1000° F. It is also effective for applications where the rings need protection in extremely corrosive atmospheres like sea water (Ex. HO-25SS). Other features include:

1. Minimal distortion due to precipitation hardened condition RH 950.
2. A minimum of 225,000 psi for high ultimate tensile strength.
3. High creep strength.
4. Highest temperature limit of standard materials (900° F).

STAINLESS STEEL TYPE 420 - A less expensive alternative to PH 15-7. Since general corrosion resistance for this material is less than PH 15-7, use of this material depends on the application. Contact Rotor Clip Technical Sales for assistance.

COPPER ALLOY C72900 - A less expensive alternative to Alloy #25 offering the following characteristics:

1. Excellent high temperature stress relaxation resistance
2. High strength and excellent formability
3. Lack of distortion during aging

Contact Rotor Clip Technical Sales regarding use of this material.

PHOSPHOR BRONZE ALLOY #5218 -The least expensive copper material Rotor Clip offers. This type exhibits higher strength compared to standard phosphor bronze materials with the same tin percentages. It is also characterized by very good stress relaxation characteristics. (Note: Rotor Clip can also supply phosphor bronze material to DIN standard 17 662, Material Number 2.1020. Contact Rotor Clip Technical Sales for more information).

STEP 5 - FINISHES

PHOSPHATE COATING (PA) - This standard finish is recommended over unfinished plain steel since it offers an extended shelf-life protection against rusting. THERE IS NO ADDITIONAL CHARGE FOR THIS FINISH.

PHOSPHATE AND OIL (PD) - This finish provides 8-hour salt spray protection.

PHOSPHATE WITH SEALER (PAL) - A coating is added to the finish to control loose phosphate crystals on the surface of the part.

HEAVY PHOSPHATE AND OIL (HPD) - This finish provides 72 salt spray hours and can be used in place of costly stainless steel material in some applications. (Contact Rotor Clip Technical Sales for more information).

ZINC PLATING (ZD) - This coating features a yellow dichromate post plating finish. It affords the metal excellent salt spray protection (96 hours) and is particularly effective for applications exposed to seawater. Rotor Clip SAE 1060-1090 steel retaining rings are zinc plated using a mechanical plating process, which effectively eliminates hydrogen embrittlement.

ZINC BRIGHT (ZF) - Most of the dichromate is leached out of this process, leaving a "bright" silver finish on the parts. ZF offers some corrosion protection (48 hours), but is widely used when the aesthetics of the part are a factor.

ZINC DICHROMATE w/SEALER (ZDL) -This improved finish offers corrosion protection of up to 240 hours of salt spray protection. (Heavy Zinc Dichromate with Sealer - HZDL - offers 480 hours of salt spray protection.) It is a low cost substitution for costly non-corrosive materials such as stainless steel in some applications. Call for additional information.

TRIVALENT CHROMATE over ZINC (Z3X, Z3X4) - This coating meets global requirements for hexavalent-free coatings. Z3X, trivalent with a sealer, affords 240 salt spray hours of protection (plating thickness is .0008-.0012"). Z3X4 offers 96 hours of salt spray protection (plating thickness is .0002-.0003"). RoHS & ELV compliant.

STEP 6 - INSTALLATION TOOLS

This important step is all too often overlooked. Selecting the right tool for your assembly needs should be a high priority. Don't wait until your rings are delivered before looking into installation issues.

Rotor Clip retaining rings can be installed using any of a variety of manual and automatic tools, including pliers and pneumatic tools for axial retaining rings, and applicators and dispensers for radial retaining rings. Many of these feature ergonomic designs that reduce the risk of Carpal Tunnel Syndrome. Avoid using fingers, hammers and makeshift devices as these can cause injury as well as damage to the application.

For high volume installation, consider building your own automated assembly equipment.

STEP 7 – PACKAGING

Rotor Clip retaining rings can be supplied in the following four ways:

1. Bulk, No code, packaged in varying size boxes or bags depending upon the size of the part. If your part is to be installed using a manual or pneumatic installation tool, this will probably best suit your needs.

2. Stacked (S), meaning the rings are stacked on top of one another, using automated equipment, and taped in that position. The resulting cartridges can be used to feed automated assembly equipment for easier, more efficient installation of the rings.

For your information, the following retaining rings are offered stacked: E, ME, DE, MRE, JE, C, DC, MC, RE, HO, DHO, MHO, HOI, VHO, RG, and PO/POL. (Note: Stacked HO internal retaining rings eliminate the time workers must spend untangling the bulk version of these parts)

3. R01-Plastic Shrink Wrapped. Rings are shrink wrapped instead of tape stacked. This is particularly useful on Phosphate & Oil (PD) or other oiled parts in which tape will not stick.

4. Rings On Wire (ROW).

Rings on Wire offer the following advantages:

1. Eliminates Mixed Parts
2. Eliminates Sorting
3. Reduces Handling
4. All Parts Are Burr Oriented
5. Beveled Parts Will Be Properly Oriented On the Stack
6. Yields A Flatter Part

There is no additional charge for Rings on Wire (ROW) packaging. ROW is standard bulk packaging for certain rings.