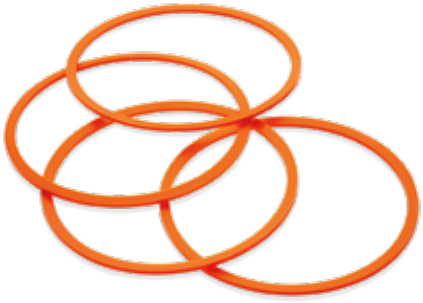
ESC
ENGINEERED SEALS & COMPONENTS, LLC.

# ANTI-EXTRUSION BACK-UP RINGS
## DESIGN GUIDE

## BACK-UPS

### STATIC

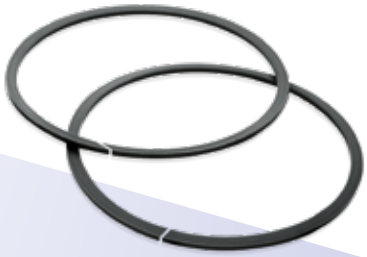


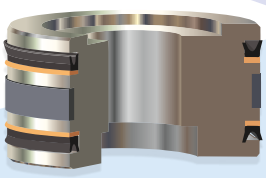
### STANDARD

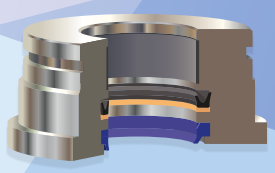
### VENTED

### MODULAR

### SPLIT NYLON







# HISTORY OF THE BACK-UP RING

The anti-extrusion Back-up Ring likely found its roots in the use of leather packings. Leather was used as the sealing device in glands prior to the use of O-Rings. In 1937, Niels A. Christensen was granted a U.S. Patent for "new and useful improvements in packings and the like for power cylinders." This seal was known as the O-ring.

The O-ring provided a much better seal compared to leather. However, the leather packings would fill the extrusion gap without being nibbled, allowing for larger gaps and higher pressures.

The persistent issue that engineers faced was how to take an O-ring that operated optimally with narrow extrusion gaps and extend its service by widening the extrusion gaps.

## Answer: The Back-up Ring

The first Back-up ring devices were made from materials like leather. Since leather was used in cup packings at higher pressures and higher clearance gaps, it made sense that a flat washer could be used as an anti-extrusion device for the O-ring. It worked!

The problem with leather was that it could become dry and shrink away from the sealing surface, exposing the elastomer to the same pressures and nibbling, it was intended to protect against. A material less sensitive to these conditions was needed.

Next in 1944 came the invention of PTFE, commonly known as TEFLON®. It was tried as a back-up ring and had much success because it overcame many of the problems of leather.

Introduced in 1960, the molded rubber concaved back-up ring came to market. It had many advantages over both leather and PTFE, especially cost and ease of assembly.

As hydraulic systems started to see larger extrusion gaps and higher temperatures, a more robust material was needed. In 1974 a material known as Hytrel® was introduced. Hytrel® is a copolyester elastomer, "a synthetic rubber", TPC-ET.

Hytrel® plays a big role in the O-ring Back-up ring market today.

Engineered Seals & Components has made this the base material in many of the ESC compounds known as POLY-TREL™. It has superior chemical, temperature and pressure resistance than many other materials.

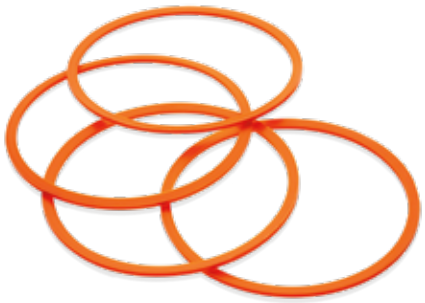
## Modern Design and Construction of the Back-up Ring.

Our modern hydraulic systems often find O-rings operating at extreme pressures with the use of Back-up rings made from a variety of materials like POLY-TREL™, Acetal, Nylon, PEEK, and Filled Nylon.

Engineered Seals & Components has always made its' line of Back-up Rings for specific applications so your systems will run at optimal efficiency.

The following pages are the standard product line offerings. ESC has many thousands of custom Back-up Rings designed specifically for the application, whatever it may be.

With today's technology and huge selection of materials, seals can reach the next level of performance with relatively little expense.

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# ENGINEERED SEALS & COMPONENTS
# EXTRUSION GAPS

The process by which seal material is forced into the clearances between components is called gap extrusion. The dimension of this clearance gap is referred to as the extrusion gap, or "e-gap". **(Fig. 2)**

The resistance of a given seal component to gap extrusion is mainly determined by the material composition and quality. Materials of greater hardness and stiffness typically also have improved resistance to extrusion. There-fore, fullface anti-extrusion or back-up rings of materials harder than the seal material may be used to prevent seal extrusion into the Extrusion-gap. **(Fig.3)**

Pressure is the main culprit of extrusion, but the egap size and system temperatures are also major factors. **Chart 2** shows the pressure resistance of different materials as a function of temperature, at 70F.

While these sample values illustrate the differences in extrusion resistance for standard grades of typical seal materials, there are many variations of each basic composition that impact the extrusion resistance of seals. In addition, the profile design and the seal friction affect extrusion. For maximum allowable pressure, temperature and e-gap of each seal profile, refer to the specific compound and manufacturers recommendations. The maximum egap in a hydraulic cylinder occurs when the cylinder components are at the maximum radial misalignment of components. This misalignment is affected by:

- External forces acting upon the cylinder assembly (acceleration forces, side loads, frictional moments from rotation of cylinder end connections).
- The weight of the cylinder components (especially when used horizontally).
- Deformation of cylinder components (rod flexing, wear ring radial deformation under load).
- The tolerance stack up of multiple cylinder components.

Fig. 2

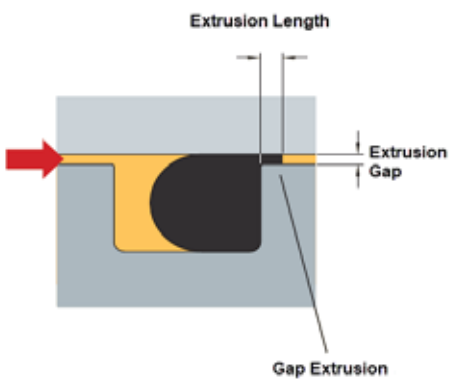
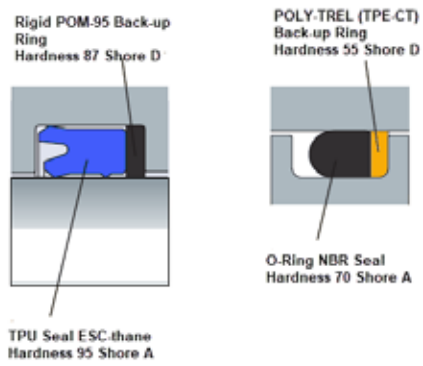
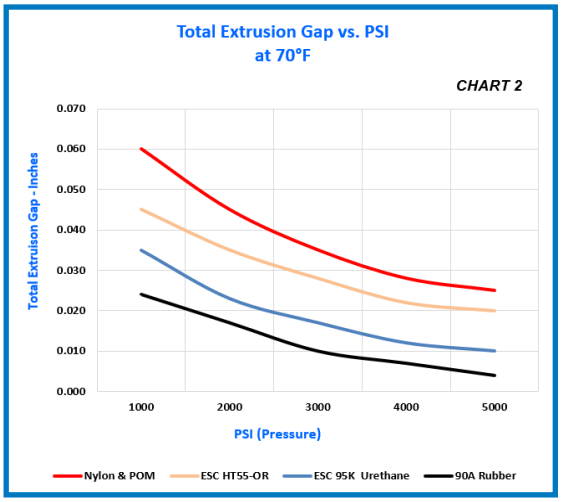



Fig.3



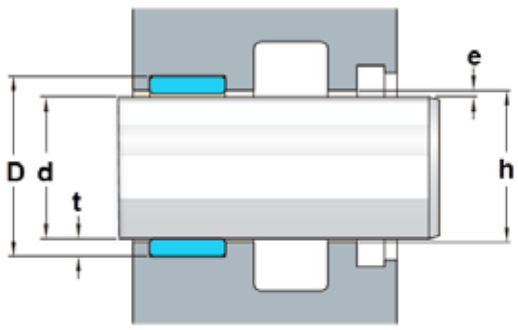
# ENGINEERED SEALS & COMPONENTS
# EXTRUSION GAPS

It is necessary to calculate the e-gap at the maximum misalignment at minimum material conditions of the cylinder and guide components.

For rod seals, the maximum e-gap should be calculated with the following conditions **(Fig. 5)**:

- Guide ring groove at maximum diameter **D**
- Rod at minimum diameter **d**
- Wear Ring cross section at minimum thickness **t** (considering tolerances and any radial deformation of the Wear Ring under load)
- Rod seal housing throat at maximum diameter **h**
- See **ESC** Wear Ring engineering guide to calculate values.

Fig.5



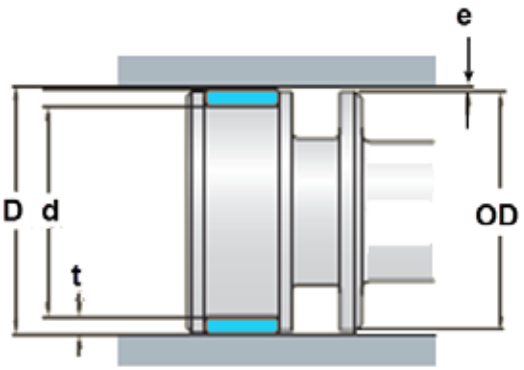

For piston seals, the maximum e-gap should be calculated with the following conditions: **(Fig. 6)**:

- Bore at maximum diameter **D**
- Wear Ring groove at minimum diameter **d**
- Wear Ring cross section at minimum thickness **t** (considering tolerances and any radial deformation of the Wear Ring under load)
- Piston seal housing at minimum outside diameter **OD**

The maximum allowable e-gap is provided in the profile data for each rod seal and piston seal profile by the relevant manufacturer. The e-gap can b kept within these limits by specifying and controlling the tolerances of dimensions described above and shown in **Figs. 5 and 6**.

See **ESC's** Wear Ring Engineering Guide to calculate these dimensions.

Fig. 6





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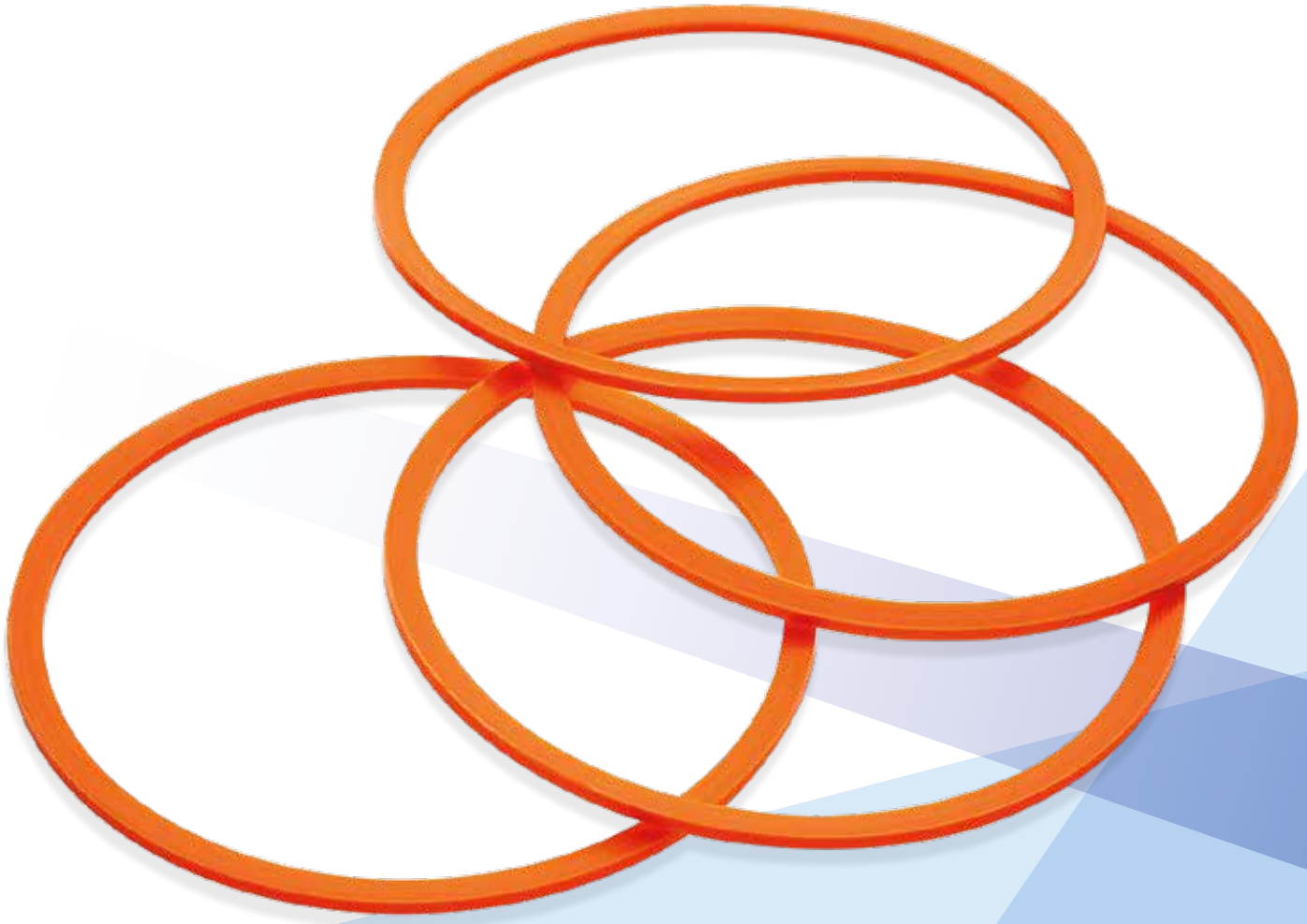
ENGINEERED SEALS & COMPONENTS, LLC.

# POLY-TREL SERIES 758
# STATIC BACK-UPS

## KEY FEATURES OF SERIES 758 BACK-UPS:

- Easy to Use
- Avoids Twisting or Bunching
- Maximum Extrusion Resistance
- Designed for Industrial Static Grooves



# SERIES 758
# STATIC BACK-UPS

Back-up Rings are in the most common anti-extrusion devices in dynamic sealing. They provide simple solutions to safely increase pressure or solve existing seal extrusion problems.

Back-up rings function by positioning a more robust material adjacent to the extrusion gap, taking the seals place and providing a barrier against high pressures and the extrusion gap. They also protect the seals against pressure spikes, and it insure seal performance at higher temperatures.

ESC Series 758 Back-up Rings have been specifically designed for an industrial static O- ring groove. This series was developed to overcome the cross section and diameter problems that "standard industrial" back-up rings have.

The cross section and diameter have been designed to fit the groove properly, and to give the O-ring optimum life. Series 758 will not tip over, bunch up, or get sheared off during assembly.

ESC Series 758 will also fit in an industrial dynamic groove, but just not as efficiently.

ESC has found that manufacturing Series 758 Compound HT55-OR, from a formulation of copolyester elastomer, TPC-ET, gives the Back-up rings advantages Rubber or Urethane do not. For example, better fluid resistance and much better pressure and heat resistance.

Typically, POLY-TREL HT55-OR, has an operating temperature range of -65°F to +275°F. Compound HT55-ORSHS is a Hydrolytically stabilized compound, which is used in water based fluid applications.

ESC Series 758 most popular sizes are molded endless without a imperfection where the material would enter the mold. This proprietary process was developed by ESC engineers to give the back-up rings maximum strength and flexibility.

The back-up rings are imperfection free resulting in a part that will not "neck down" due to the part not having a gate or nit line.

This makes the parts perfectly smooth on both the inside diameter and outside diameter.

## ADVANTAGES

- No more twisted back-ups.
- Fire Resistant Fluids.
- Extended Range -65° to +275°.
- **Dynamic Pressure to 7,000 psi**
- **Static Pressure to 20,000 psi**

## For Cartridge Valves Too!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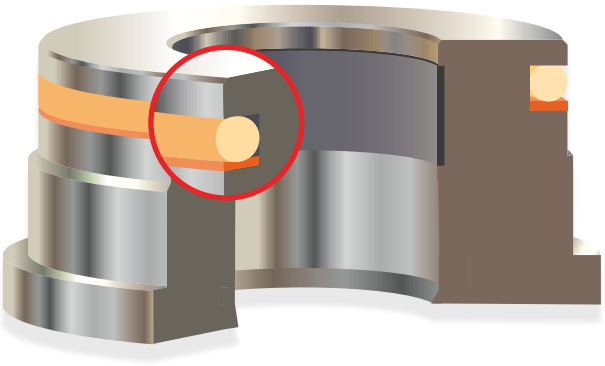
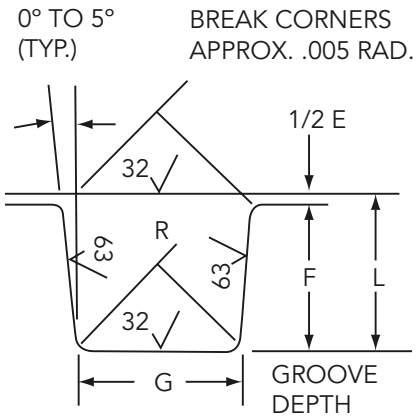
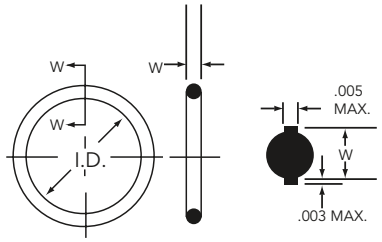
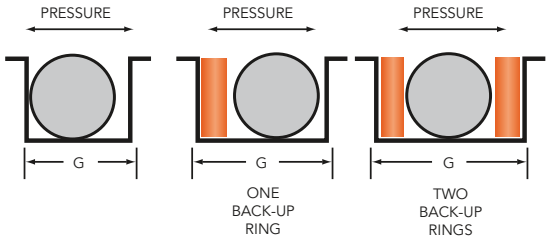
# SERIES 758
# POLY-TREL BACK-UP & O-RING GROOVE DESIGN GUIDE





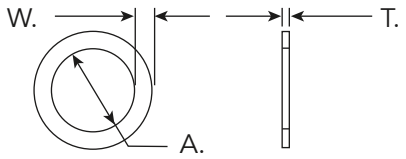




## INDUSTRIAL O-RING *STATIC SEAL* GLAND GUIDELINE

| O-Ring Size | W Cross Section | | L Gland | Squeeze | | E (a) (c) Diameteral | G Groove Width | | | R Groove | Eccentricity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nominal | Actual | Depth | Actual | % | Clearance | No Back-up Ring | One Back-up Ring | Two Back-up Rings | Radius | Max. (b) |
| 044 through 050 | 1/16 | .070 ±.003 | .050 to .052 | .015 to .023 | 22 to 32 | .002 to .005 | .093 to .098 | .138 to .143 | .205 to .210 | .005 to .015 | .002 |
| 102 through 178 | 3/32 | .103 ±.003 | .081 to .083 | .017 to .025 | 17 to 24 | .002 to .005 | .140 to .145 | .171 to .176 | .238 to .243 | .005 to .015 | .002 |
| 201 through 284 | 1/8 | .139 ±.004 | .111 to .113 | .022 to .032 | 16 to 23 | .003 to .006 | .187 to .192 | .208 to .213 | .275 to .280 | .010 to .025 | .003 |
| 309 through 395 | 3/16 | .210 ±.005 | .170 to 173 | .032 to .045 | 15 to 21 | .003 to .006 | .281 to .286 | .311 to .316 | .410 to .415 | .020 to .035 | .004 |
| 425 through 475 | 1/4 | .275 ±.006 | .226 to .229 | .040 to .055 | 15 to 20 | .004 to .007 | .375 to .380 | .408 to .413 | .538 to .543 | .020 to .035 | .005 |

(a) Clearance gap must be held to a minimum consistent with design requirements for temperature range variation.
(b) Total Indicator reading between groove and adjacent bearing surface.
(c) Reduce maximum diametrical clearance 50% when using silicone O-rings.

# SERIES 758
# POLY-TREL BACK-UP SIZES




| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPUOND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 758-004 | 0.088 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-006 | 0.135 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-007 | 0.166 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-008 | 0.197 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-009 | 0.228 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-010 | 0.260 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-010.5 | 0.260 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-011 | 0.322 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-011.5 | 0.322 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-012 | 0.385 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-012.5 | 0.385 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-013 | 0.447 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-013.5 | 0.447 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-014 | 0.510 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-014.5 | 0.510 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-015 | 0.572 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-015.5 | 0.572 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-016 | 0.635 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-016.5 | 0.635 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-017 | 0.697 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-017.5 | 0.697 | ± .005 | .052 | +.002/-.003 | .0285 | ± .005 | HT55-OR |
| 758-018 | 0.760 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-018.5 | 0.760 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-019 | 0.822 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-019.5 | 0.822 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-020 | 0.885 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-020.5 | 0.885 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-021 | 0.947 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-021.5 | 0.947 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-022 | 1.010 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-022.5 | 1.010 | ± .005 | .052 | +.002/-.003 | .028 | ± .005 | HT55-OR |
| 758-023 | 1.072 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-024 | 1.135 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-025 | 1.197 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-026 | 1.260 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-027 | 1.322 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-028 | 1.385 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-029 | 1.510 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-030 | 1.635 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-031 | 1.760 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-032 | 1.885 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-033 | 2.010 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-034 | 2.135 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-035 | 2.260 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-036 | 2.385 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-037 | 2.510 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-038 | 2.635 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-039 | 2.760 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-040 | 2.885 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-041 | 3.010 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-042 | 3.260 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-043 | 3.510 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-044 | 3.760 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-045 | 4.010 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-046 | 4.260 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-047 | 4.510 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-048 | 4.760 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-049 | 5.010 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-050 | 5.260 | ± .005 | .052 | +.002/-.003 | .045 | ± .005 | HT55-OR |
| 758-102 | 0.082 | ± .005 | .078 | ± .003 | 0.050 | ± .005 | HT55-OR |
| 758-103 | 0.114 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |

| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 758-104 | 0.145 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-105 | 0.176 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 750-106 | 0.207 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 750-107 | 0.239 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 750-108 | 0.270 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 750-109 | 0.332 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-110 | 0.395 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-111 | 0.457 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-112 | 0.520 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-113 | 0.582 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-114 | 0.645 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-115 | 0.707 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-116 | 0.770 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-117 | 0.832 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-117.5 | 0.832 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-118 | 0.895 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-119 | 0.957 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-120 | 1.020 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-121 | 1.082 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-122 | 1.145 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-123 | 1.205 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-124 | 1.270 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-125 | 1.332 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-126 | 1.395 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-127 | 1.457 | ± .005 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-128 | 1.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-129 | 1.582 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-130 | 1.645 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-131 | 1.707 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-132 | 1.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-133 | 1.832 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-134 | 1.895 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-135 | 1.957 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-136 | 2.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-137 | 2.082 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-138 | 2.145 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-139 | 2.207 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-140 | 2.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-141 | 2.332 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-142 | 2.395 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-143 | 2.457 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-144 | 2.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-145 | 2.582 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-146 | 2.645 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-147 | 2.707 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-148 | 2.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-149 | 2.832 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-150 | 2.895 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-151 | 3.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-152 | 3.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-153 | 3.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-154 | 3.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-155 | 4.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-156 | 4.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-157 | 4.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-158 | 4.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-159 | 5.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-160 | 5.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-161 | 5.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-162 | 5.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-163 | 6.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |

Part numbers shaded in Orange, when installed on a piston may not recover when stretched over. A softer compound may be needed.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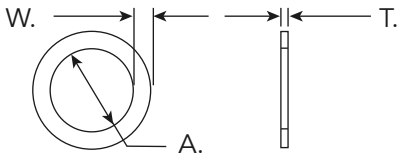
# SERIES 758
# POLY-TREL BACK-UP SIZES

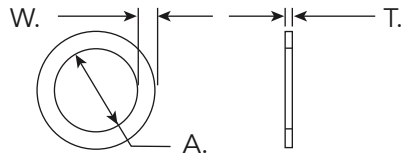



| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 758-164 | 6.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-165 | 6.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-166 | 6.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-167 | 7.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-168 | 7.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-169 | 7.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-170 | 7.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-171 | 8.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-172 | 8.270 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-173 | 8.520 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-174 | 8.770 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-175 | 9.020 | +.005/-.010 | .078 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-201 | 0.197 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-202 | 0.270 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-204 | 0.395 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-205 | 0.457 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-206 | 0.520 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-207 | 0.582 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-208 | 0.645 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-209 | 0.707 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-210 | 0.770 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-211 | 0.832 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-212 | 0.895 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-213 | 0.957 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-214 | 1.020 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-215 | 1.082 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-216 | 1.145 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-217 | 1.207 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-218 | 1.270 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-219 | 1.312 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-220 | 1.395 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-221 | 1.457 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-222 | 1.520 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-223 | 1.645 | ± .005 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-224 | 1.770 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-225 | 1.895 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-226 | 2.020 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-227 | 2.145 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-228 | 2.270 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-229 | 2.375 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-230 | 2.520 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-231 | 2.645 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-232 | 2.770 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-233 | 2.895 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-234 | 3.020 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-235 | 3.145 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-236 | 3.270 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-237 | 3.395 | +.005/-.010 | .108 | ± .003 | 0.05 | ± .005 | HT55-OR |
| 758-238 | 3.520 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-239 | 3.645 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-240 | 3.770 | +.005/-.010 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-241 | 3.895 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-242 | 4.020 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-243 | 4.145 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-244 | 4.270 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-245 | 4.375 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-246 | 4.520 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-247 | 4.645 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-248 | 4.770 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-249 | 4.895 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-250 | 5.020 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |

| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 758-251 | 5.145 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-252 | 5.270 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-253 | 5.375 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-254 | 5.520 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-255 | 5.625 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-256 | 5.770 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-257 | 5.875 | +.005/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-258 | 6.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-259 | 6.270 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-260 | 6.520 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-261 | 6.770 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-262 | 7.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-263 | 7.270 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-264 | 7.520 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-265 | 7.770 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-266 | 8.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-267 | 8.270 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-268 | 8.520 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-269 | 8.770 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-270 | 9.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-271 | 9.250 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-272 | 9.520 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-273 | 9.750 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-274 | 10.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-275 | 10.520 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-276 | 11.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-277 | 11.520 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-278 | 12.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-279 | 13.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-280 | 14.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-281 | 15.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-283 | 17.020 | +.010/-.015 | .108 | ± .003 | .050 | ± .005 | HT55-OR |
| 758-310 | 0.525 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-311 | 0.587 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-312 | 0.650 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-313 | 0.712 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-314 | 0.775 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-315 | 0.834 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-316 | 0.900 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-317 | 0.962 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-318 | 1.025 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-319 | 1.087 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-320 | 1.150 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-321 | 1.212 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-322 | 1.275 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-323 | 1.337 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-324 | 1.400 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-325 | 1.525 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-326 | 1.650 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-327 | 1.775 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-328 | 1.900 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-329 | 2.025 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-330 | 2.150 | ± .005 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-331 | 2.275 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-332 | 2.400 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-333 | 2.525 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-334 | 2.650 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-335 | 2.775 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-336 | 2.900 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-337 | 3.025 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-338 | 3.150 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |

Part numbers shaded in Orange, when installed on a piston may not recover when stretched over. A softer compound may be needed.

# SERIES 758
# POLY-TREL BACK-UP SIZES




| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 758-339 | 3.275 | +.005/-.010 | .167 | ± .003 | .070 | ± .005 | HT55-OR |
| 758-340 | 3.400 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-341 | 3.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-342 | 3.650 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-343 | 3.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-344 | 3.900 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-345 | 4.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-346 | 4.150 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-347 | 4.275 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-348 | 4.400 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-349 | 4.525 | +.005/-.015 | .167 | ± .003 | 0.07 | ± .006 | HT55-OR |
| 758-350 | 4.650 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-351 | 4.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-352 | 4.900 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-353 | 5.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-354 | 5.150 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-355 | 5.275 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-356 | 5.400 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-357 | 5.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-358 | 5.650 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-359 | 5.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-360 | 5.900 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-361 | 6.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-362 | 6.275 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-363 | 6.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-364 | 6.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-365 | 7.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-366 | 7.275 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-367 | 7.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-368 | 7.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-369 | 8.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-370 | 8.275 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-371 | 8.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-372 | 8.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-373 | 9.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-374 | 9.275 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-375 | 9.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-376 | 9.775 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-377 | 10.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-378 | 10.525 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |

| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 758-379 | 11.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-381 | 12.025 | +.005/-.015 | .167 | ± .003 | .070 | ± .006 | HT55-OR |
| 758-425 | 4.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-426 | 4.664 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-427 | 4.789 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-428 | 4.914 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-429 | 5.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-430 | 5.164 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-431 | 5.289 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-432 | 5.414 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-433 | 5.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-434 | 5.664 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-435 | 5.789 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-436 | 5.914 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-437 | 6.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-438 | 6.250 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-439 | 6.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-440 | 6.789 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-441 | 7.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-442 | 7.289 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-443 | 7.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-444 | 7.789 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-445 | 8.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-446 | 8.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-447 | 9.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-448 | 9.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-449 | 10.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-450 | 10.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-451 | 11.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-452 | 11.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-453 | 12.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-454 | 12.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-455 | 13.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-456 | 13.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-457 | 14.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-458 | 14.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-459 | 15.250 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-460 | 15.539 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |
| 758-461 | 16.039 | +.007/-.015 | .222 | ± .003 | .105 | ± .006 | HT55-OR |

Part numbers shaded in Orange, when installed on a piston may not recover when stretched over. A softer compound may be needed.

## Series 758 Poly-Trel Static O-Ring Groove Back-up Rings

ESC's Series 758 back-up rings offer extrusion resistance up to 7,000 psi for dynamic applications and 20,000 psi for static applications. ECS Series 758 are interchangeable with most existing O-ring back-ups being used today. The Orange color also ensures that the parts can be easily identified and that they are correctly assembled. Compound HT55-OR provides excellent extrusion resistance when compared to Nitrile and has a better fluid compatibility range than other back-up ring compounds.

**Technical Data**

| Standard Material | Temperature | Max Pressure Range Dynamic* | Static |
|---|---|---|---|
| HT55-OR | -65°F to +275°F (-54° C to +135°C) | 7,000 psi (482 bar) | 20,000 psi (1,379 bar) |
| HT65-N (Optional) | -65°F to +275°F (-54° C to +135°C) | 7,000 psi (482 bar) | 20,000 psi (1,379 bar) |

* 4,900 psi (337 bar) with ESC Ultra-Precision Wear Rings.
3,500 psi (241 bar) with standard tolerance wear rings.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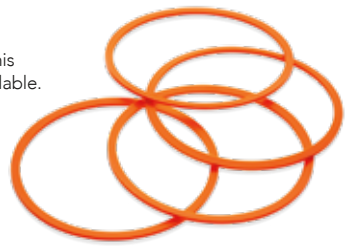
# SERIES 758 STANDARD COMPOUND

## POLY-TREL Compound HT55-OR

TPC-ET thermoplastic polyester elastomer

| Property | Test Method | Units | Value |
|---|---|---|---|
| Tensile Modulus | ISO 527-1/-2 | psi | 27,557 |
| Stress @5% Strain | ISO 527-1/-2 | psi | 1,000 |
| Stress @10% Strain | ISO 527-1/-2 | psi | 1,600 |
| Stress @ 50% Strain | ISO 527-1/-2 | psi | 2,030 |
| Stress at Break | ISO 527-1/-2 | psi | 5,800 |
| Nominal Strain at Break | ISO 527-1/-2 | % | 780 |
| Strain at Break | ISO 527-1/-2 | % | >300 |
| Flexural Modulus | ISO 178 | psi | 29,000 |
| Shear Modulus | ISO 6721 | psi | 9,430 |
| Tensile creep modulus, 1000h | ISO 899-1 | psi | 18,900 |
| Charpy Impact Strength, 23°C | ISO 179/1eU | ftlb/in² | N |
| Charpy Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | N |
| Charpy Notched Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | 71.4 |
| Charpy Notched Impact Strength, -40°C | ISO 179/1eU | ftlb/in² | 14.3 |
| Poisson's Ratio | | | .48 |
| Compression Set at 70°C | ISO 815 | % | 60 |
| Brittleness Temperature | ISO 974 | °F | -144 |
| Shore D Hardness, 15s | ISO 868 | D | 51 |
| Shore D Hardness, Max | ISO 868 | D | 55 |
| Tear Strength, parallel | ISO 34-1 | kN/m | 133 |
| Tear Strength, Normal | ISO 34-1 | kN/m | 133 |
| Abrasion Resistance | ISO 4649 | mm³ | 120 |
| Melting Temperature, 10°C/min | ISO 11357-1/-3 | °F | 397 |
| Glass Transition Temperature (10°C/min) | ISO 11357-1/2 | °F | -4 |
| Vicat Softening Temperature, 50°C/h, 10N | ISO 306 | °F | 356 |
| Coeff. Of Linear Therm. Expansion, Parallel | ISO 11359-1/2 | E-4/°F | 1.11 |
| Coeff. Of Linear Therm. Expansion, Normal | ISO 11359-1/2 | E-4/°F | 1.11 |
| Shelf Life | ISO R1183 | | 10 years |
| Service Temperature Range* | | | -65°F to +275°F |
| Color | | | ORANGE |

Test specimen for ISO 527 is 1BA (2mm) at 50mm/min; all other ISO & ASTM mechanical properties measured at 4mm; electrical properties measured at 2mm.
All mechanical & electrical properties measured on injection molded specimens.
Test temperatures are 23C unless otherwise stated.



The information provided in this data sheet corresponds to our knowledge on the subject at the date of this publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such materials used in combination with any other material, additives or pigments or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specifications limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to do to determine the suitability of a specific compound for your particular purpose. Since Engineered Seals, LLC cannot anticipate all variation in actual end-use conditions ESC makes no warranties and assumes no liability in connection with any use of this information. Caution: Do not use this product in medical application involving permanent implantation in the human body.

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# & Compound Specifications


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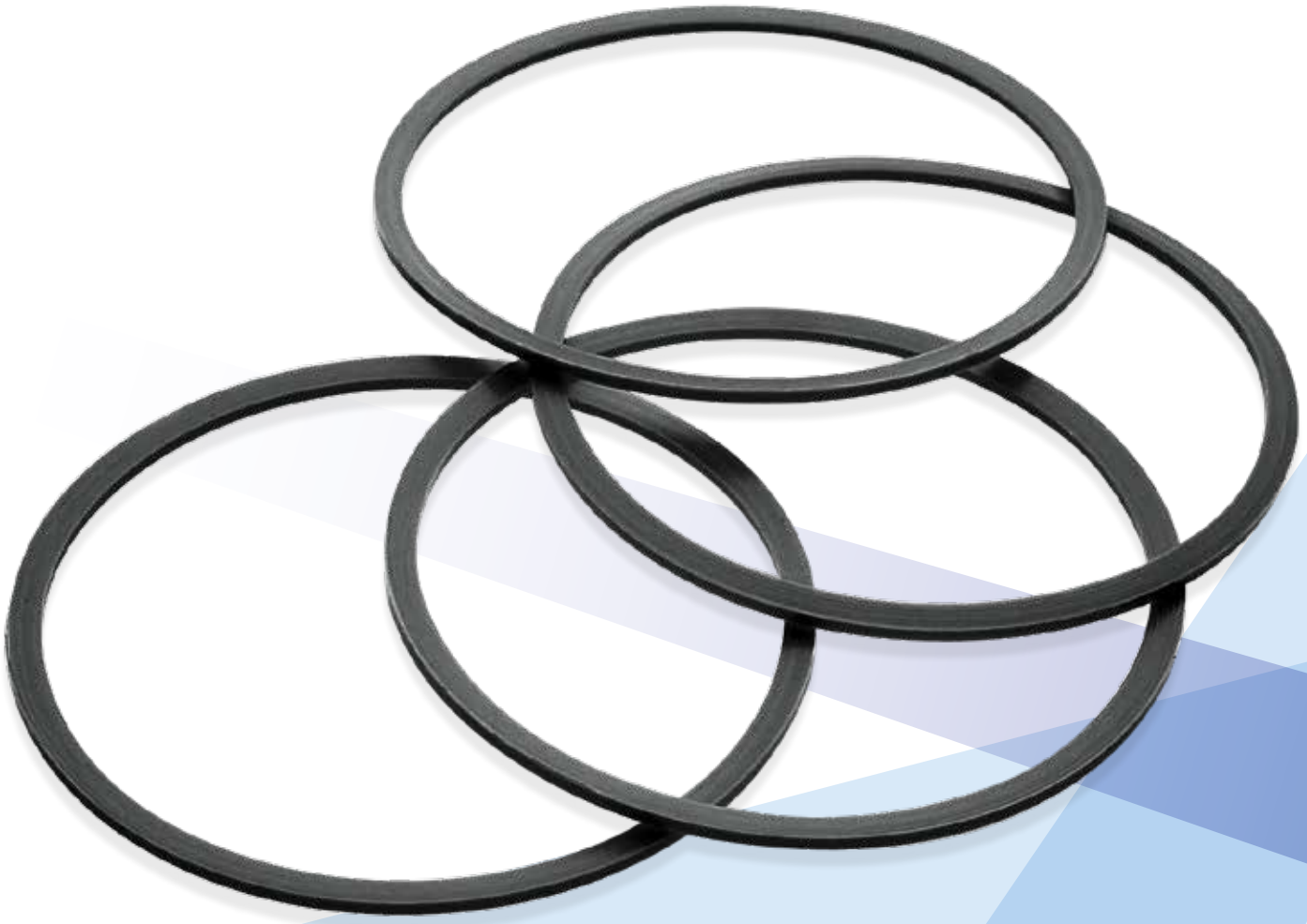
ENGINEERED SEALS & COMPONENTS, LLC.

# POLY-TREL SERIES 750
# STANDARD BACK-UPS

## KEY FEATURES OF SERIES 750 BACK-UPS:

- Maximum Chemical Resistance
- Avoids Twisting or Rolling
- Maximum Extrusion Resistance
- Designed for Industrial Grooves



# ENGINEERED SEALS & COMPONENTS

ESC Series 750 Back-up Rings have been specifically designed for an industrial O-Ring groove. Series 750 was developed to fit into a groove for either a static or dynamic O-ring. The MS28774 specification was the guide for the sizing of this series.

ESC Series 750 Back-up ring have a larger cross section and generally larger tolerances then Series 758. In some static applications the cross section could be larger than the groove depth making assemble more difficult. Actual sizes have been furnished on the following pages.

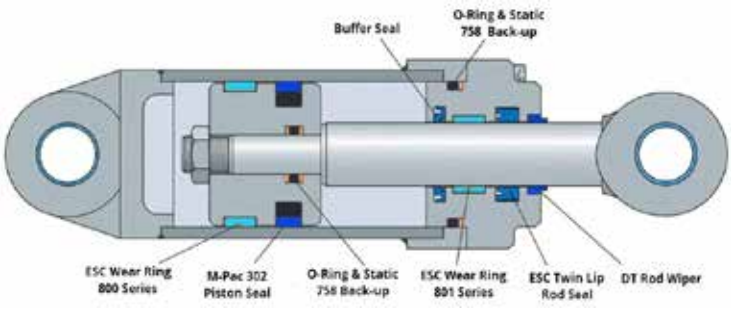
ESC Series 750 has been engineered to fit tightly in the groove. This small difference will make assembly of the hardware easier and faster. Series 750 Back-up rings do not twist or tip over upon assembly.

ESC engineering does not recommend using the 750 series in a double acting piston application where the system pressure oscillates rapidly. Series 756 "Vented" Back-ups are designed for this type system.

ESC Series 750 are molded from compound POLY-TREL HT55-BK, a formulation of DuPont Hytrel®. This 55D polyester elastomer has been formulated for maximum extrusion and chemical resistance. Operating temperatures may range from -65°F to +275°F. A Hydrolytically stable compound HT55-SHS-BK is available for even more demanding applications upon request. ESC also offers a Heat stable compound for extended time at elevated temperature, HT55-HS-BK.

ESC Series 750 most popular sizes are molded endless without a Gate Mark on the part. This proprietary process was developed by ESC to give the parts maximum strength and durability. Another major advantage is the parts will not "neck down" at the gate area, and there is no nit line. This makes for a perfectly smooth part, ID and OD.

Half-thickness back-ups in this series are also available. Ask for Series 750-xxx.5




## ADVANTAGES

- No more twisted back-ups.
- For use with Static or Dynamic Glands.
- Fire Resistant Fluids.
- Extended Range -65° to 275°.
- Dynamic pressure to 7,000 psi.
- Static Pressure to 20,000 psi.

### For Cartridge Valves Too!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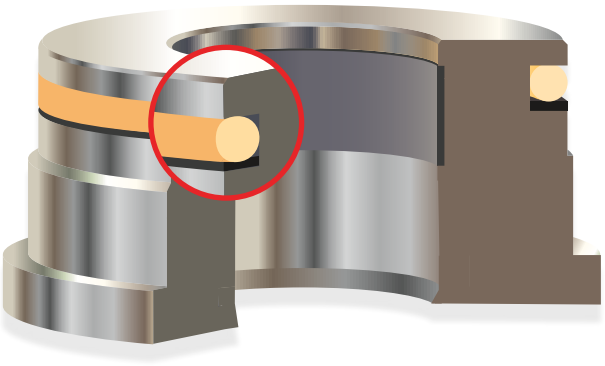
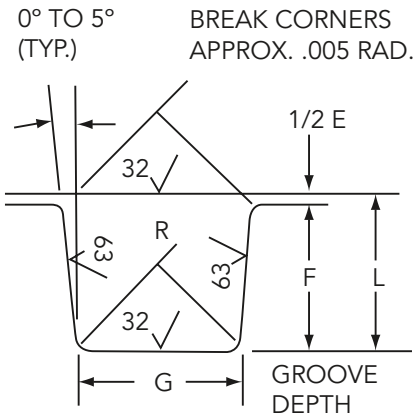
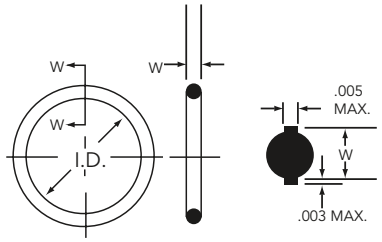
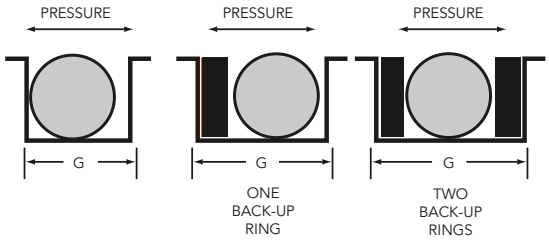
# SERIES 750
# POLY-TREL BACK-UP & O-RING GROOVE DESIGN GUIDE





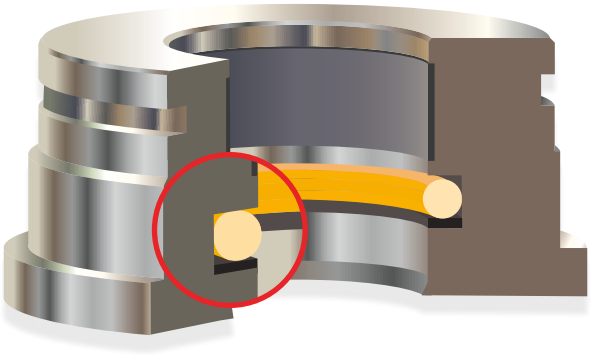



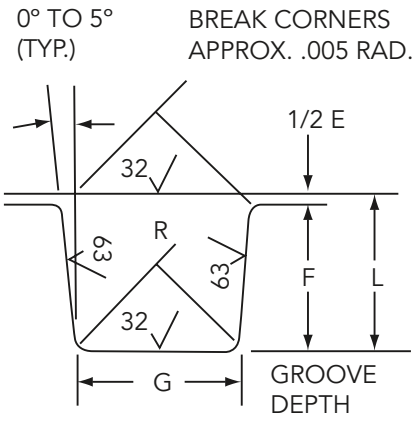

## INDUSTRIAL O-RING *STATIC SEAL* GLAND GUIDELINE

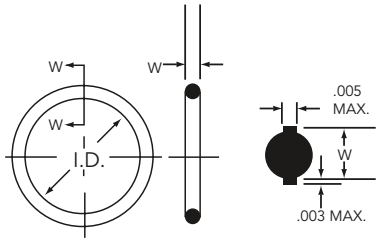
| O-Ring Size | W Cross Section | | L Gland | Squeeze | | E (a) (c) Diameteral | G Groove Width | | | R Groove | Eccentricity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nominal | Actual | Depth | Actual | % | Clearance | No Back-up Ring | One Back-up Ring | Two Back-up Rings | Radius | Max. (b) |
| 044 through 050 | 1/16 | .070 ±.003 | .050 to .052 | .015 to .023 | 22 to 32 | .002 to .005 | .093 to .098 | .138 to .143 | .205 to .210 | .005 to .015 | .002 |
| 102 through 178 | 3/32 | .103 ±.003 | .081 to .083 | .017 to .025 | 17 to 24 | .002 to .005 | .140 to .145 | .171 to .176 | .238 to .243 | .005 to .015 | .002 |
| 201 through 284 | 1/8 | .139 ±.004 | .111 to .113 | .022 to .032 | 16 to 23 | .003 to .006 | .187 to .192 | .208 to .213 | .275 to .280 | .010 to .025 | .003 |
| 309 through 395 | 3/16 | .210 ±.005 | .170 to 173 | .032 to .045 | 15 to 21 | .003 to .006 | .281 to .286 | .311 to .316 | .410 to .415 | .020 to .035 | .004 |
| 425 through 475 | 1/4 | .275 ±.006 | .226 to .229 | .040 to .055 | 15 to 20 | .004 to .007 | .375 to .380 | .408 to .413 | .538 to .543 | .020 to .035 | .005 |

(a) Clearance gap must be held to a minimum consistent with design requirements for temperature range variation.
(b) Total Indicator reading between groove and adjacent bearing surface.
(c) Reduce maximum diametrical clearance 50% when using silicone O-rings.

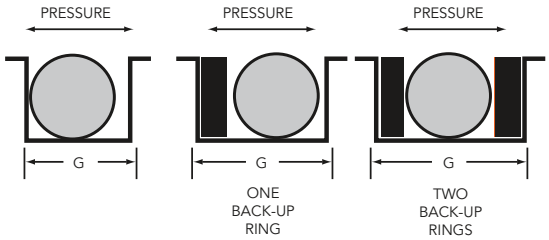
# SERIES 750
# POLY-TREL BACK-UP & O-RING GROOVE DESIGN GUIDE






SECTION W-W




## INDUSTRIAL O-RING *DYNAMIC SEAL* GLAND GUIDELINE

| O-Ring Size | W Cross Section | | L Gland Depth | Squeeze | | E (a) (c) Diameteral Clearance | G Groove Width | | | R Groove Radius | Eccentricity Max. (b) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nominal | Actual | | Actual | % | | No Back-up Ring | One Back-up Ring | Two Back-up Rings | | |
| -044 through -050 | 1/16 | .070 ±.003 | .055 to .057 | .010 to .018 | 15 to 25 | .002 to .005 | .093 to .098 | .138 to .143 | .205 to .210 | .005 to .015 | .002 |
| -102 through -178 | 3/32 | .103 ±.003 | .088 to .090 | .010 to .018 | 10 to 17 | .002 to .005 | .140 to .145 | .140 to .145 | .238 to .243 | .005 to .015 | .002 |
| -201 through -284 | 1/8 | .139 ±.003 | .121 to .123 | .012 to .022 | 9 to 16 | .003 to .006 | .187 to .192 | .187 to .192 | .275 to .280 | .010 to .025 | .003 |
| -309 through -395 | 3/16 | .210 ±.003 | .181 to 188 | .017 to .030 | 8 to 14 | .003 to .006 | .281 to .286 | .281 to .286 | .410 to .415 | .020 to .035 | .004 |
| -425 through -475 | 1/4 | .275 ±.003 | .237 to .240 | .029 to .044 | 11 to 16 | .004 to .007 | .375 to .380 | .375 to .380 | .538 to .543 | .020 to .035 | .005 |

(a) Clearance gap must be held to a minimum consistent with design requirements for temperature range variation.
(b) Total Indicator reading between groove and adjacent bearing surface.
(c) Reduce maximum diametrical clearance 50% when using silicone O-rings.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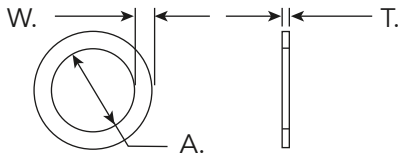
# SERIES 750
# POLY-TREL BACK-UP SIZES

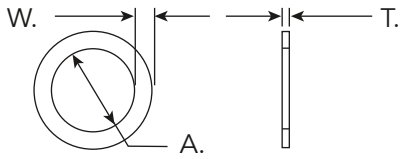



| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 750-004 | .078 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-006 | .125 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-007 | .156 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-008 | .187 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-009 | .218 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-010 | .250 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-010.5 | .250 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-011 | .312 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-011.5 | .312 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-012 | .375 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-012.5 | .375 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-013 | .437 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-013.5 | .437 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-014 | .500 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-014.5 | .500 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-015 | .562 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-015.5 | .562 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-016 | .625 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-016.5 | .625 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-017 | .687 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-017.5 | .687 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-018 | .750 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-018.5 | .750 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-019 | .812 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-019.5 | .812 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-020 | .875 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-020.5 | .875 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-021 | .937 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-021.5 | .937 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-022 | 1.000 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-022.5 | 1.000 | ± .010 | .055 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-023 | 1.062 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-024 | 1.125 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-025 | 1.187 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-026 | 1.250 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-027 | 1.312 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-028 | 1.375 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-029 | 1.500 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-030 | 1.625 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-031 | 1.750 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-032 | 1.875 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-033 | 2.000 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-034 | 2.125 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-035 | 2.250 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-036 | 2.375 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-037 | 2.500 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-038 | 2.625 | ± .010 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-039 | 2.750 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-040 | 2.875 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-041 | 3.000 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-042 | 3.250 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-043 | 3.500 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-044 | 3.750 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-045 | 4.000 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-046 | 4.240 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-047 | 4.500 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-048 | 4.750 | ± .015 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-049 | 5.000 | ± .023 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-050 | 5.250 | ± .023 | .055 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-102 | .062 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-103 | .094 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |

| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 750-104 | .125 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-105 | .155 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-106 | .187 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-107 | .219 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-108 | .250 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-109 | .312 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-110 | .375 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-111 | .437 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-112 | .500 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-113 | .562 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-114 | .625 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-115 | .687 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-116 | .750 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-117 | .812 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-117.5 | .812 | ± .010 | .088 | ± .005 | .028 | ± .005 | HT55-BK |
| 750-118 | .875 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-119 | .937 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-120 | 1.000 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-121 | 1.062 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-122 | 1.125 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-123 | 1.185 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-124 | 1.250 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-125 | 1.312 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-126 | 1.375 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-127 | 1.437 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-128 | 1.500 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-129 | 1.562 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-130 | 1.625 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-131 | 1.687 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-132 | 1.750 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-133 | 1.812 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-134 | 1.875 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-135 | 1.937 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-136 | 2.000 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-137 | 2.062 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-138 | 2.125 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-139 | 2.187 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-140 | 2.250 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-141 | 2.312 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-142 | 2.375 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-143 | 2.437 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-144 | 2.500 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-145 | 2.562 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-146 | 2.625 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-147 | 2.687 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-148 | 2.750 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-149 | 2.812 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-150 | 2.875 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-151 | 3.000 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-152 | 3.250 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-153 | 3.500 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-154 | 3.750 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-155 | 4.000 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-156 | 4.250 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-157 | 4.500 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-158 | 4.750 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-159 | 5.000 | ± .015 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-160 | 5.250 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-161 | 5.500 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-162 | 5.750 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-163 | 6.000 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |

Part numbers shaded in Blue, when installed on a piston application, may not recover when over streached. A softer POLY-TREL compound may be needed.

# SERIES 750
# POLY-TREL BACK-UP SIZES




| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 750-164 | 6.250 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-165 | 6.500 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-166 | 6.750 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-167 | 7.000 | ± .023 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-168 | 7.250 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-169 | 7.500 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-170 | 7.750 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-171 | 8.000 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-172 | 8.250 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-173 | 8.500 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-174 | 8.750 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-175 | 9.000 | ± .030 | .088 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-201 | .187 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-202 | .250 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-204 | .375 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-205 | .437 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-206 | .500 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-207 | .562 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-208 | .625 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-209 | .687 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-210 | .750 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-211 | .812 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-212 | .875 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-213 | .937 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-214 | 1.000 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-215 | 1.062 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-216 | 1.125 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-217 | 1.187 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-218 | 1.250 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-219 | 1.312 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-220 | 1.375 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-221 | 1.437 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-222 | 1.500 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-223 | 1.625 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-224 | 1.750 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-225 | 1.875 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-226 | 2.000 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-227 | 2.125 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-228 | 2.250 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-229 | 2.375 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-230 | 2.500 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-231 | 2.625 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-232 | 2.750 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-233 | 2.875 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-234 | 3.000 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-235 | 3.125 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-236 | 3.250 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-237 | 3.375 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-238 | 3.500 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-239 | 3.625 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-240 | 3.750 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-241 | 3.875 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-242 | 4.000 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-243 | 4.125 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-244 | 4.250 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-245 | 4.375 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-246 | 4.500 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-247 | 4.625 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-248 | 4.750 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-249 | 4.875 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-250 | 5.000 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55-BK |

| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 750-251 | 5.125 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-252 | 5.250 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-253 | 5.375 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-254 | 5.500 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-255 | 5.625 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-256 | 5.750 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-257 | 5.875 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-258 | 6.000 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-259 | 6.250 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-260 | 6.500 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-261 | 6.750 | ± .023 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-262 | 7.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-263 | 7.250 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-264 | 7.500 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-265 | 7.750 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-266 | 8.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-267 | 8.250 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-268 | 8.500 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-269 | 8.750 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-270 | 9.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-271 | 9.250 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-272 | 9.500 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-273 | 9.750 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-274 | 10.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-275 | 10.500 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-276 | 11.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-277 | 11.500 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-278 | 12.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-279 | 13.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-280 | 14.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-281 | 15.000 | ± .030 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-283 | 17.000 | ± .045 | .115 | ± .005 | .050 | ± .005 | HT55-BK |
| 750-310 | .500 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-311 | .562 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-312 | .625 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-313 | .687 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-314 | .750 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-315 | .809 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-316 | .875 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-317 | .937 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-318 | 1.000 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-319 | 1.062 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-320 | 1.125 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-321 | 1.187 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-322 | 1.250 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-323 | 1.312 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-324 | 1.375 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-325 | 1.500 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-326 | 1.625 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-327 | 1.750 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-328 | 1.875 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-329 | 2.000 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-330 | 2.125 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-331 | 2.250 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-332 | 2.375 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-333 | 2.500 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-334 | 2.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-335 | 2.750 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-336 | 2.875 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-337 | 3.000 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-338 | 3.125 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |

Part numbers shaded in Blue, when installed on a piston application, may not recover when over streached. A softer POLY-TREL compound may be needed.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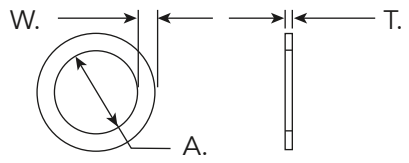
# SERIES 750
# POLY-TREL BACK-UP SIZES




| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 750-339 | 3.250 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-340 | 3.375 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-341 | 3.500 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-342 | 3.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-343 | 3.750 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-344 | 3.875 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-345 | 4.000 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-346 | 4.125 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-347 | 4.250 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-348 | 4.375 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-349 | 4.500 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-350 | 4.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-351 | 4.750 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-352 | 4.875 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-353 | 5.000 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-354 | 5.125 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-355 | 5.250 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-356 | 5.375 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-357 | 5.500 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-358 | 5.625 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-359 | 5.750 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-360 | 5.875 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-361 | 6.000 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-362 | 6.250 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-363 | 6.500 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-364 | 6.750 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-365 | 7.000 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-366 | 7.250 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-367 | 7.500 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-368 | 7.750 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-369 | 8.000 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-370 | 8.250 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-371 | 8.500 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-372 | 8.750 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-373 | 9.000 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-374 | 9.250 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-375 | 9.500 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-376 | 9.750 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-377 | 10.000 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-378 | 10.500 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |

| Part # SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 750-379 | 11.000 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-381 | 12.000 | ± .030 | .175 | ± .005 | .070 | ± .006 | HT55-BK |
| 750-425 | 4.500 | ± .015 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-426 | 4.625 | ± .015 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-427 | 4.750 | ± .015 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-428 | 4.875 | ± .015 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-429 | 5.000 | ± .015 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-430 | 5.127 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-431 | 5.250 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-432 | 5.375 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-433 | 5.500 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-434 | 5.625 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-435 | 5.750 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-436 | 5.875 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-437 | 6.000 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-438 | 6.250 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-439 | 6.500 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-440 | 6.750 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-441 | 7.000 | ± .023 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-442 | 7.250 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-443 | 7.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-444 | 7.750 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-445 | 8.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-446 | 8.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-447 | 9.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-448 | 9.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-449 | 10.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-450 | 10.530 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-451 | 11.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-452 | 11.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-453 | 12.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-454 | 12.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-455 | 13.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-456 | 13.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-457 | 14.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-458 | 14.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-459 | 15.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-460 | 15.500 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |
| 750-461 | 16.000 | ± .030 | .236 | ± .005 | .105 | ± .006 | HT55-BK |

Part numbers shaded in Blue, when installed on a piston application, may not recover when over streached. A softer POLY-TREL compound may be needed.

## Series 750 Poly-Trel O-Ring Groove Back-up Rings

ESC's Series 750 back-up rings offer extrusion resistance up to 7,000 psi for dynamic applications and 20,000 psi for static applications. ECS Series 750 are interchangeable with most existing O-ring back-ups being used today. The Black color also ensures that the parts can be easily identified. Compound HT55-BK provides excellent extrusion resistance when compared to Nitrile and has a better fluid compatibility range than other back-up ring compounds.

**Technical Data**

| Standard Material | Temperature | Max Pressure Range Dynamic* | Static |
|---|---|---|---|
| HT55-BK | -65°F to +275°F (-54° C to +135°C) | 7,000 psi (482 bar) | 20,000 psi (1,379 bar) |
| HT65-N (Optional) | -65°F to +275°F (-54° C to +135°C) | 7,000 psi (482 bar) | 20,000 psi (1,379 bar) |

# SERIES 750 STANDARD COMPOUND

## POLY-TREL Compound HT55-BK

TPC-ET thermoplastic polyester elastomer

| Property | Test Method | Units | Value |
|---|---|---|---|
| Tensile Modulus | ISO 527-1/-2 | psi | 27,557 |
| Stress @5% Strain | ISO 527-1/-2 | psi | 1,000 |
| Stress @10% Strain | ISO 527-1/-2 | psi | 1,600 |
| Stress @ 50% Strain | ISO 527-1/-2 | psi | 2,030 |
| Stress at Break | ISO 527-1/-2 | psi | 5,800 |
| Nominal Strain at Break | ISO 527-1/-2 | % | 780 |
| Strain at Break | ISO 527-1/-2 | % | >300 |
| Flexural Modulus | ISO 178 | psi | 29,000 |
| Shear Modulus | ISO 6721 | psi | 9,430 |
| Tensile creep modulus, 1000h | ISO 899-1 | psi | 18,900 |
| Charpy Impact Strength, 23°C | ISO 179/1eU | ftlb/in² | N |
| Charpy Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | N |
| Charpy Notched Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | 71.4 |
| Charpy Notched Impact Strength, -40°C | ISO 179/1eU | ftlb/in² | 14.3 |
| Poisson's Ratio | | | .48 |
| Compression Set at 70°C | ISO 815 | % | 60 |
| Brittleness Temperature | ISO 974 | °F | -144 |
| Shore D Hardness, 15s | ISO 868 | D | 51 |
| Shore D Hardness, Max | ISO 868 | D | 55 |
| Tear Strength, parallel | ISO 34-1 | kN/m | 133 |
| Tear Strength, Normal | ISO 34-1 | kN/m | 133 |
| Abrasion Resistance | ISO 4649 | mm³ | 120 |
| Melting Temperature, 10°C/min | ISO 11357-1/-3 | °F | 397 |
| Glass Transition Temperature (10°C/min) | ISO 11357-1/2 | °F | -4 |
| Vicat Softening Temperature, 50°C/h, 10N | ISO 306 | °F | 356 |
| Coeff. Of Linear Therm. Expansion, Parallel | ISO 11359-1/2 | E-4/°F | 1.11 |
| Coeff. Of Linear Therm. Expansion, Normal | ISO 11359-1/2 | E-4/°F | 1.11 |
| Shelf Life | ISO R1183 | | 10 years |
| Service Temperature Range* | | | -65°F to +275°F |
| Color | | | BLACK |

Test specimen for ISO 527 is 1BA (2mm) at 50mm/min; all other ISO & ASTM mechanical properties measured at 4mm; electrical properties measured at 2mm.
All mechanical & electrical properties measured on injection molded specimens.
Test temperatures are 23C unless otherwise stated.

The information provided in this data sheet corresponds to our knowledge on the subject at the date of this publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such materials used in combination with any other material, additives or pigments or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specifications limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to do to determine the suitability of a specific compound for your particular purpose. Since Engineered Seals, LLC cannot anticipate all variation in actual end-use conditions ESC makes no warranties and assumes no liability in connection with any use of this information. Caution: Do not use this product in medical application involving permanent implantation in the human body.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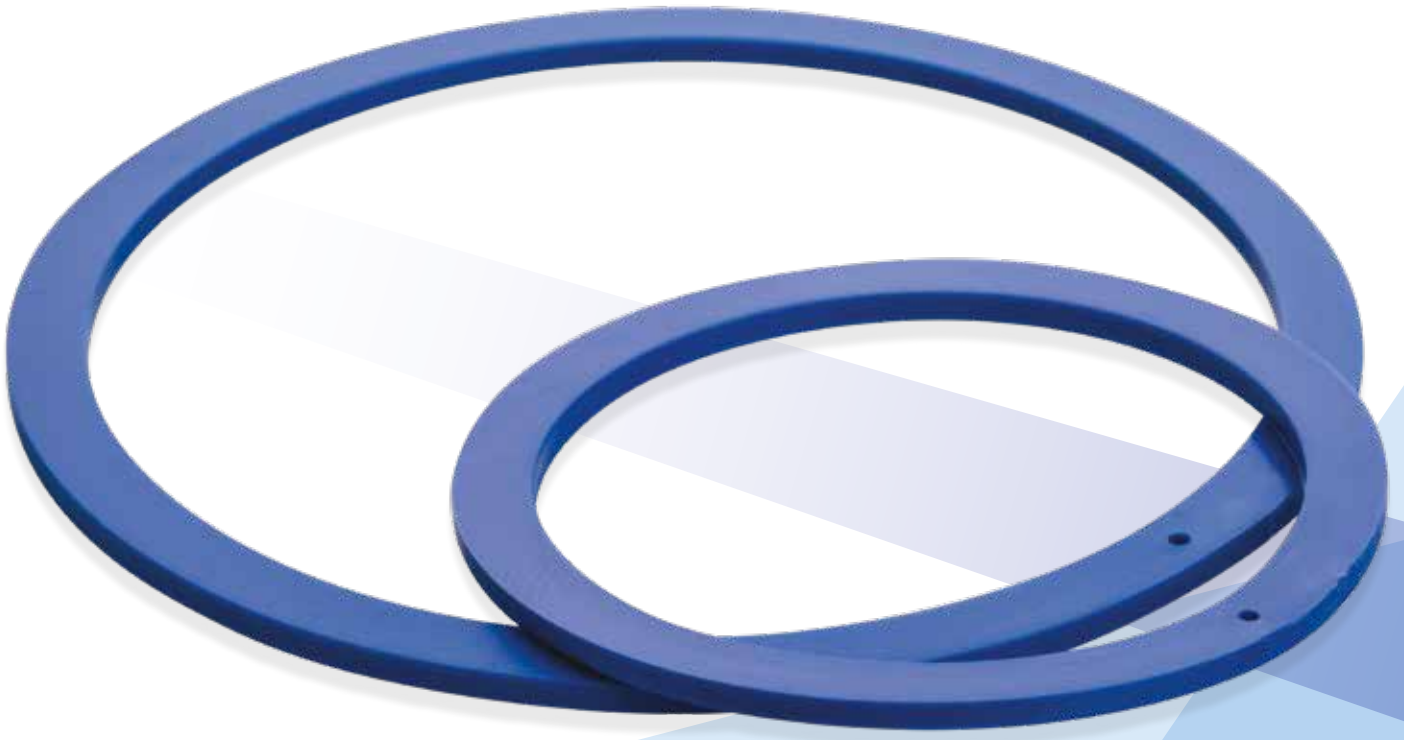
ESC
ENGINEERED SEALS & COMPONENTS, LLC.

# POLY-TREL SERIES 756
# VENTED BACK-UPS

## KEY FEATURES OF SERIES 756 BACK-UPS:

- Dynamic Back-Up Applications
- Reduces Pressure Trapping
- Tempurature Range -65°F to +275°F
- Extended Range Fluid Compatibility



# SERIES 756
# VENTED BACK-UP RINGS

The Vented back-up ring Series 756 was designed to help eliminate pressure trapping between 2 back-up rings and the O-ring. See Figure 1.

In a fast moving, continuous cycling hydraulic cylinders, pressure trapping may occur.

As the piston continues to cycle, the thermal expansion from the friction of the back-up rings rubbing on the cylinder surface causes them to expand. When the back-up rings have become a seal, from thermo expansion and pressure, the fluid trapped in-between the 2 back-ups rings becomes very hot.

As the system continues to cycle, the fluid between the 2 back-up rings become pressurized from the heat. This pressure will become much greater than the system pressure and will cause the back-up rings to extrude in opposite direction from each other. See Figure 1.

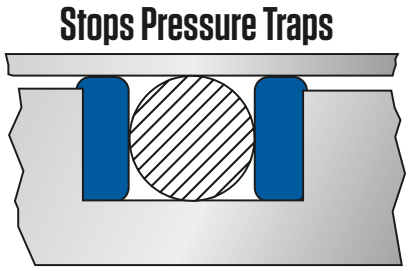



**Figure 1**

Cylinder applications such as steering cylinders or any cylinder that oscillates or vibrates at a high rate of speed and use an O-ring and two back-ups to seal the piston, are likely to see this phenomenon.

The series 756 Back-up ring was designed to prevent the pressure trapping. The back-up rings are seated on opposite sides of the sealing ring within the annular groove of a hydraulic piston.

The sealing ring is in frictional engagement with the interior of the hydraulic cylinder. The back-up rings are positioned within the cylinder groove and on opposite sides of the sealing ring. See Figure 2.

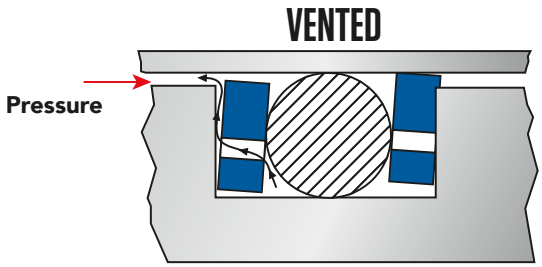



**Figure 2**

Series 756 back-up rings include a vent hole extending axially there through to permit the alleviation of any fluid pressure accumulating between the two spaced apart Back-up rings.

In Figure 2. the system pressure will push the back- up ring away from the side of the groove, thus releasing any fluid or pressure build-up thru the vent hole. The axial hole then acts as a relief, or vent, and it is unlikely a pressure buildup will occur. It takes very little movement or pressure to make the Series 756 do its job, "VENT".

Series 756 an excellent choice in static ID applications such as the static seal between the piston and rod.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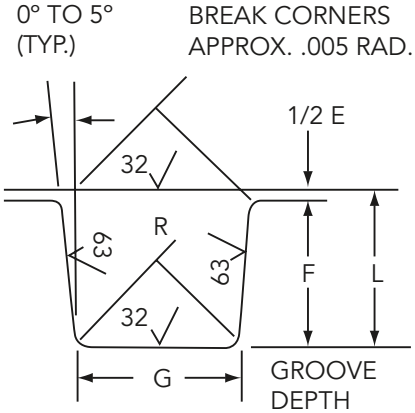
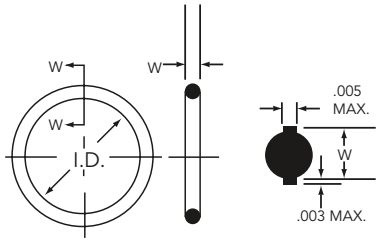
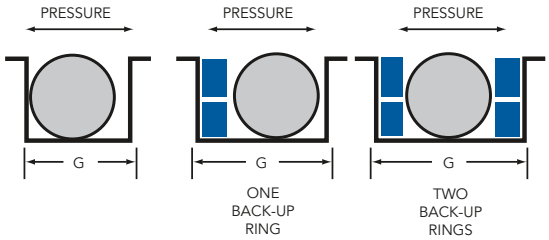
# SERIES 756
# POLY-TREL BACK-UP & O-RING GROOVE DESIGN GUIDE




SECTION W-W

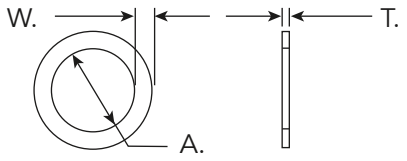



## INDUSTRIAL O-RING *DYNAMIC SEAL* GLAND GUIDELINE

| O-Ring Size | W Cross Section | | L Gland Depth | Squeeze | | E (a) (c) Diameteral Clearance | G Groove Width | | | R Groove Radius | Eccentricity Max. (b) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nominal | Actual | | Actual | % | | No Back-up Ring | One Back-up Ring | Two Back-up Rings | | |
| -044 through -050 | 1/16 | .070 ±.003 | .055 to .057 | .010 to .018 | 15 to 25 | .002 to .005 | .093 to .098 | .138 to .143 | .205 to .210 | .005 to .015 | .002 |
| -102 through -178 | 3/32 | .103 ±.003 | .088 to .090 | .010 to .018 | 10 to 17 | .002 to .005 | .140 to .145 | .140 to .145 | .238 to .243 | .005 to .015 | .002 |
| -201 through -284 | 1/8 | .139 ±.003 | .121 to .123 | .012 to .022 | 9 to 16 | .003 to .006 | .187 to .192 | .187 to .192 | .275 to .280 | .010 to .025 | .003 |
| -309 through -395 | 3/16 | .210 ±.003 | .181 to 188 | .017 to .030 | 8 to 14 | .003 to .006 | .281 to .286 | .281 to .286 | .410 to .415 | .020 to .035 | .004 |
| -425 through -475 | 1/4 | .275 ±.003 | .237 to .240 | .029 to .044 | 11 to 16 | .004 to .007 | .375 to .380 | .375 to .380 | .538 to .543 | .020 to .035 | .005 |

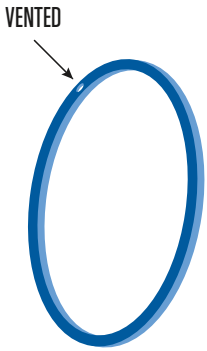
(a) Clearance gap must be held to a minimum consistent with design requirements for temperature range variation.
(b) Total Indicator reading between groove and adjacent bearing surface.
(c) Reduce maximum diameteral clearance 50% when using silicone O-rings.

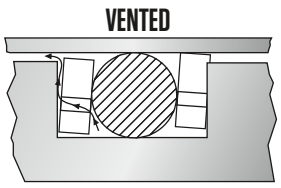
# SERIES 756
# VENTED POLY-TREL BACK-UP SIZES

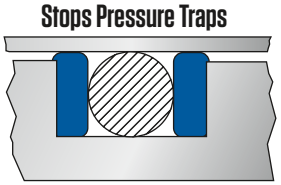



| Part Number SERIES | ID | | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|
| | A | TOL | W | TOL | T | TOL | |
| 756-133S | 1.812 | ± .010 | .088 | ± .005 | .050 | ± .005 | HT47N |
| 755-212S | .875 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT47N |
| 756-218S | 1.250 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT47N |
| 756-218 | 1.250 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55BLU |
| 756-222S | 1.520 | ± .010 | .108 | ± .003 | .050 | ± .005 | HT47N |
| 756-226S | 1.250 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT47N |
| 756-232 | 2.625 | ± .010 | .115 | ± .005 | .050 | ± .005 | HT55BLU |
| 756-233BK | 2.895 | ± .010 | .108 | ± .003 | .050 | ± .005 | HT55BK |
| 756-234 | 3.000 | ± .015 | .115 | ± .005 | .050 | ± .005 | HT55BLU |
| 756-250 | 5.020 | ± .015 | .108 | ± .003 | .050 | ± .005 | HT55BLU |
| 756-326 | 1.625 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-326S | 1.625 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT47N |
| 756-328S | 1.875 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT47N |
| 756-329S | 2.000 | ± .010 | .175 | ± .005 | .070 | ± .006 | HT47N |
| 756-330 | 2.125 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-330S | 2.125 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT47N |
| 756-334 | 2.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-336 | 2.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-338 | 3.125 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-342 | 3.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-345 | 4.000 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-346 | 4.150 | ± .015 | .167 | ± .003 | .070 | ± .006 | HT55BLU |
| 756-348 | 4.375 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-350 | 4.625 | ± .015 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-357 | 5.525 | ± .015 | .167 | ± .003 | .070 | ± .006 | HT55BLU |
| 756-361 | 6.000 | ± .023 | .175 | ± .005 | .070 | ± .006 | HT55BLU |
| 756-425 | 4.539 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-433 | 5.539 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-437 | 6.039 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-439 | 6.539 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-441 | 7.039 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-445 | 8.039 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-446 | 8.539 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-447 | 9.039 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-448 | 9.539 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-449 | 10.039 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |
| 756-455 | 13.039 | ± .015 | .222 | ± .003 | .105 | ± .006 | HT55BLU |

For sizes not shown, consult the factory.





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# SERIES 756
# VENTED POLY-TREL BACK-UPS STANDARD COMPOUNDS

## POLY-TREL™ Compound HT55-BLU, & HT47-N
### TPC-ET Thermoplastic Polyester Elastomer

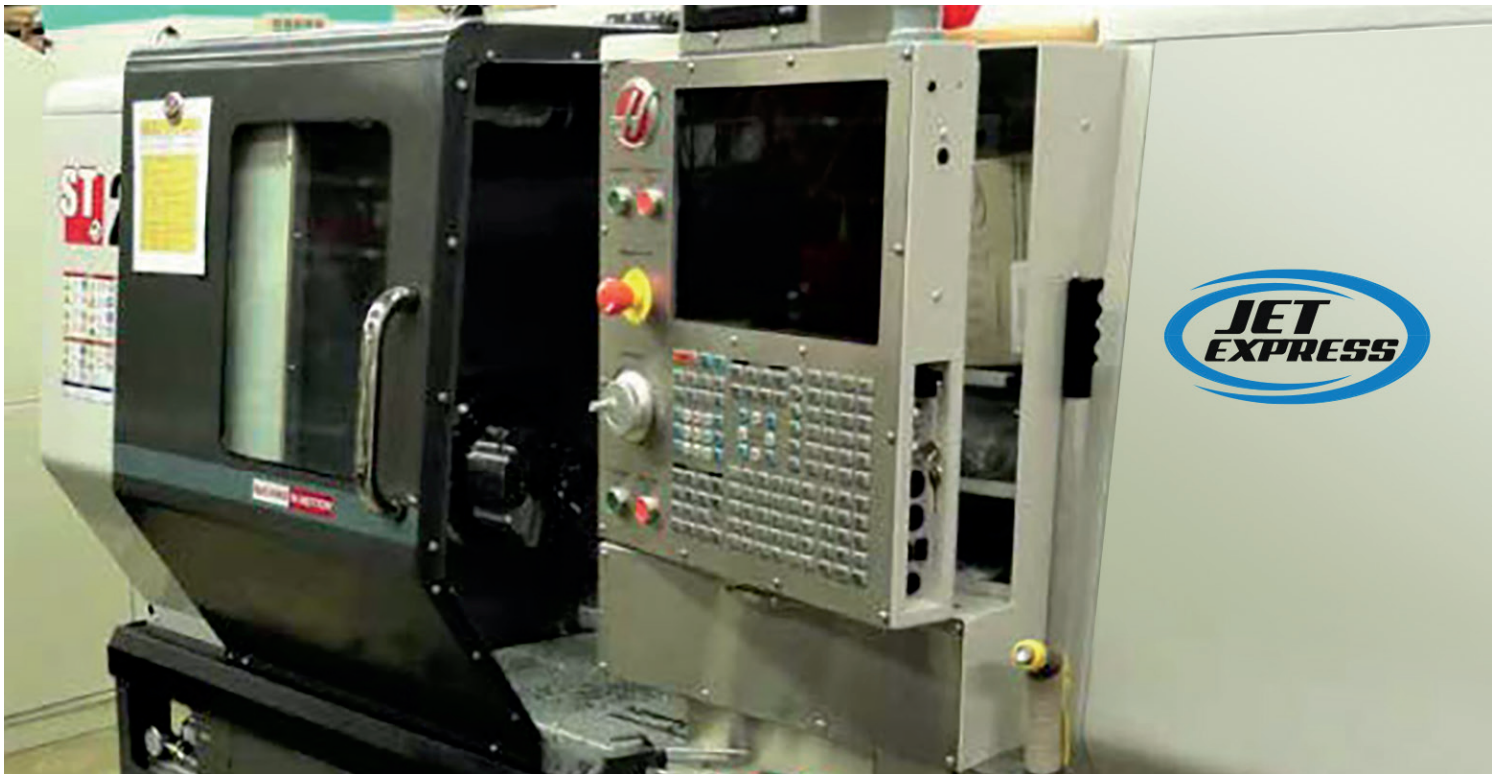
| Property<br>Compound Number | Test Method | Units | Value<br>HT47-N | Value<br>HT55-BLU |
|---|---|---|---|---|
| Tensile Modulus | ISO 527-1/-2 | psi | 16,000 | 27,557 |
| Stress @5% Strain | ISO 527-1/-2 | psi | N | 1,000 |
| Stress @10% Strain | ISO 527-1/-2 | psi | 1,020 | 1,600 |
| Stress @ 50% Strain | ISO 527-1/-2 | psi | 1,740 | 2,030 |
| Stress at Break | ISO 527-1/-2 | psi | 2,470 | 5,800 |
| Nominal Strain at Break | ISO 527-1/-2 | % | 400 | 780 |
| Strain at Break | ISO 527-1/-2 | % | 200 | >300 |
| Flexural Modulus | ISO 178 | psi | 16,100 | 29,000 |
| Shear Modulus | ISO 6721 | psi | 5,660 | 9,430 |
| Tensile creep modulus, 1000h | ISO 899-1 | psi | N | 18,900 |
| Charpy Impact Strength, 23°C | ISO 179/1eU | ftlb/in² | N | N |
| Charpy Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | N | N |
| Charpy Notched Impact Strength, 23°C | ISO 179/1eU | ftlb/in² | N | 71.4 |
| Charpy Notched Impact Strength, -40°C | ISO 179/1eU | ftlb/in² | 57.1 | 14.3 |
| Puncture Force, -30°C | ISO 6603-2 | N | N | .48 |
| Puncture Energy, -30°C | ISO 6603-2 | J | N | 60 |
| Brittleness Temperature | ISO 974 | °F | -86.8 | -144 |
| Shore D Hardness, 15s | ISO 868 | D | 43 | 51 |
| Shore D Hardness, Max | ISO 868 | D | 48 | 55 |
| Tear Strength, parallel | ISO 34-1 | kN/m | 100 | 133 |
| Tear Strength, Normal | ISO 34-1 | kN/m | 90 | 133 |
| Abrasion Resistance | ISO 4649 | mm³ | 33 | 120 |
| Melting Temperature, 10°C/min | ISO 11357-1/-3 | °F | 406 | 397 |
| Glass Transition Temperature (10°C/min) | ISO 11357-1/2 | °F | -49 | -4 |
| Vicat Softening Temperature, 50°C/h, 10N | ISO 306 | °F | 239 | 356 |
| Coeff. Of Linear Therm. Expansion, Parallel | ISO 11359-1/2 | E-4/°F | 1.22 | 1.11 |
| Coeff. Of Linear Therm. Expansion, Normal | ISO 11359-1/2 | E-4/°F | 1.06 | 1.11 |
| Shelf Life | ISO R1183 | | 10 years | 10 years |
| Service Temperature Range* | | | -65°F to +250°F | -65°F to +275°F |
| Color | | | OFF WHITE | BLUE |

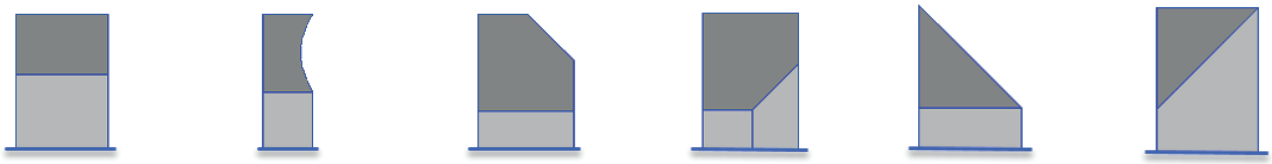
Test specimen for ISO 527 is 1BA (2mm) at 50mm/min; all other ISO & ASTM mechanical properties measured at 4mm; electrical properties measured at 2mm.
All mechanical & electrical properties measured on injection molded specimens.
Test temperatures are 23C unless otherwise stated.

The information provided in this data sheet corresponds to our knowledge on the subject at the date of this publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such materials used in combination with any other material, additives or pigments or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specifications limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to do to determine the suitability of a specific compound for your particular purpose. Since Engineered Seals, LLC cannot anticipate all variation in actual end-use conditions ESC makes no warranties and assumes no liability in connection with any use of this information. Caution: Do not use this product in medical application involving permanent implantation in the human body.

***We highly recommend testing in your specific application, this is a guide only.**

# JET EXPRESS
# CUSTOM BACK-UPS ON DEMAND



BU-108 BU-109 WBU-110 BU-111 BU-112 BU-113

ESC has the capability to manufacturer, machine, a custom size or shape to meet your needs.

Parts may be made split or solid.

Custom Back-ups from most any material to suite you needs.

Contact Engineering at ESC for a quote. or sales @engseals.com

Material Available: PEEK - POM - Nylon- PTFE- PTFE/ Glass - PTFE / Carbon - PTFE / Bronze
POLY-TEMP - 65D Urethane - UHMW-PE - Laminate Composites

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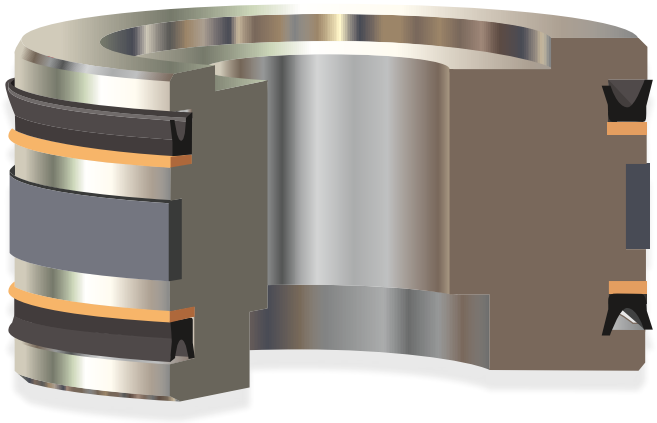
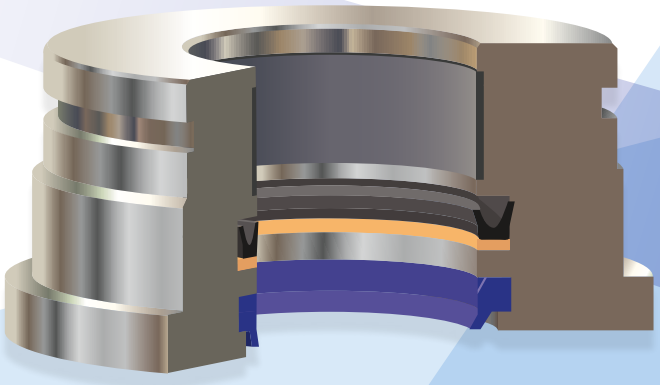
# POLY-TREL SERIES 790
# MODULAR BACK-UPS
For Loaded U-Cups & Standard U-Seals

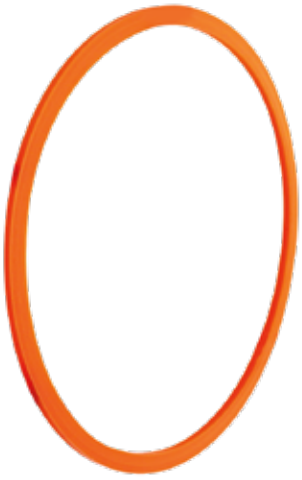
## KEY FEATURES OF SERIES 790 BACK-UPS:

- Easy to Use, Solid or Split
- Increase Pressure and Temp. Range
- Maximum Extrusion Resistance
- Designed for Rod or Piston Applications





# SERIES 790 U-CUP SEAL BACK-UPS



Series 790 Profile

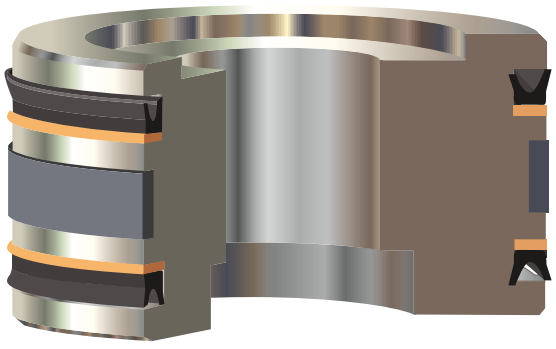
## 790 Series Back-up. Low Profile Modular Back-Up for Loaded U-Cup Seals and Rubber U-Cup Seals.

790 Series Back-up Rings provide added extrusion resistance for the U-Cups and Loaded U-Cup seals with only minimal increase in gland width. The 790 Series Back-up was originally designed to dramatically increase the pressure rating of Rubber U-Cups in applications where fluid compatibility or temperature prevent the use of urethane U-Cups. Additionally, the 790 Series Back-ups are perfect for adding higher pressure capabilities to medium duty urethane sealing systems. 790 Series Back-up Rings may be purchased either split or solid.

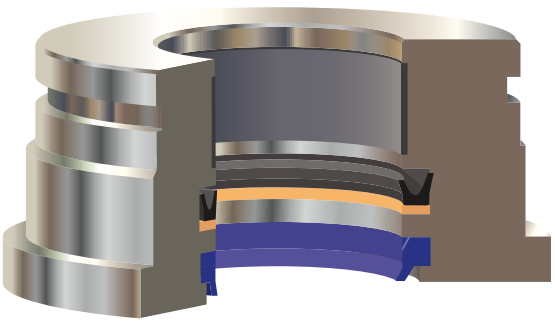
| Standard Materials | Temperature | Max. Pressure Range** |
|---|---|---|
| HT-55-OR | -65°F to +275°F<br>(-54°C to +135°C) | 7,000 psi<br>(482 bar) |

**Alternate Materials:** For applications that may require an alternate material, please contact ESC.

** 4,900 psi (337 bar) with tight-tolerance wear rings (.123/.125 c/s) Series 200 Ultra-Precision Wear Rings.
3,500 psi (241 bar) with stand-tolerance wear rings (.120/.125 c/s).



790 installed in Piston Gland



790 installed in Rod Gland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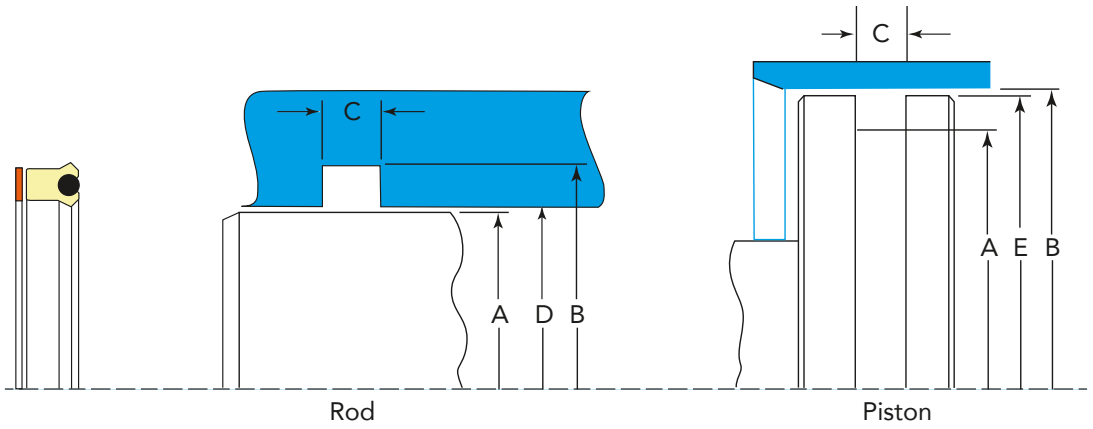
# SERIES 790
# BACK-UP RING GROOVE WIDTH DESIGN GUIDE

## How to Determine the Gland Width when using 790 Series Back-up Ring




Series 790 back-up ring allows you to extend the pressure rating of a seal that fits into the common gland used by such seals as Loaded U-cups, Un-Loaded U-Cups, Rubber U-Cups, Symmetrical U-Cups, and many other styles of U- Cup seals.

In order to use the 790 series Back- up ring, the width of the gland, **C**., must be extended to accommodate the height of the back-up ring.

Utilizing the axial gland length you have already calculated per the manufacturer specification, add the value shown in ***Table 790.1*** to the calculated gland width of the seal being used to get the new groove width to be machined.

**Table 790.1 Added Gland Width Values**

| Seal Cross Section | Added Gland Width |
|---|---|
| 1/8 | .062 |
| 3/16 | 062 |
| 1/4 | 062 |
| 5/16 | 062 |
| 3/8 | 062 |
| 7/16 | 062 |
| 1/2 | 062 |
| 5/8 | 062 |
| 3/4 | 062 |
| 1 | 062 |

Series 790 Profile

For non-standard cross sections, the added gland width can be determined by adding 0.062" to the width of the groove, C., to be used.

# SERIES 790 AVAILABLE SIZES
# LOW PROFILE BACK-UP RINGS

| Part Number | DESCRIPTION | | | | | |
|---|---|---|---|---|---|---|
| | ID | | O.D. | | C/S | Width |
| 790-15 | 0.500 | X | 0.750 | X | 0.125 | 0.062 |
| 790-17 | 0.625 | X | 0.875 | X | 0.125 | 0.062 |
| 790-19 | 0.750 | X | 1.000 | X | 0.125 | 0.062 |
| 790-214 | 1.000 | X | 1.250 | X | 0.125 | 0.062 |
| 790-227 | 2.125 | X | 2.375 | X | 0.125 | 0.062 |
| 790-228 | 2.250 | X | 2.500 | X | 0.125 | 0.062 |
| 790-237 | 3.375 | X | 3.625 | X | 0.125 | 0.062 |
| 790-239 | 3.625 | X | 3.875 | X | 0.125 | 0.062 |
| | | | | | | |
| 790-32 | 1.000 | X | 1.312 | X | 0.156 | 0.062 |
| 790-34 | 1.187 | X | 1.500 | X | 0.156 | 0.062 |
| 790-36 | 1.375 | X | 1.687 | X | 0.156 | 0.062 |
| | | | | | | |
| 790-324 | 1.375 | X | 1.750 | X | 0.187 | 0.062 |
| 790-325 | 1.500 | X | 1.875 | X | 0.187 | 0.062 |
| 790-45 | 1.625 | X | 2.000 | X | 0.187 | 0.062 |
| 790-46 | 1.750 | X | 2.125 | X | 0.187 | 0.062 |
| 790-48 | 2.000 | X | 2.375 | X | 0.187 | 0.062 |
| 790-49 | 2.125 | X | 2.500 | X | 0.187 | 0.062 |
| 750-358 | 5.625 | X | 6.000 | X | 0.187 | 0.062 |
| | | | | | | |
| 790-54 | 2.500 | X | 2.937 | X | 0.218 | 0.062 |
| 790-57 | 2.812 | X | 3.250 | X | 0.218 | 0.062 |
| 790-58 | 3.000 | X | 3.500 | X | 0.218 | 0.062 |
| | | | | | | |
| 790-66 | 3.500 | X | 4.000 | X | 0.250 | 0.062 |
| 790-68 | 4.000 | X | 4.500 | X | 0.250 | 0.062 |
| 790-70 | 4.500 | X | 5.000 | X | 0.250 | 0.062 |

| Part Number | DESCRIPTION | | | | | |
|---|---|---|---|---|---|---|
| | ID | | O.D. | | C/S | Width |
| 790-73 | 4.437 | X | 5.000 | X | 0.281 | 0.062 |
| 790-75 | 5.000 | X | 5.562 | X | 0.281 | 0.062 |
| 790-5.43X6 | 5.437 | X | 6.000 | X | 0.281 | 0.062 |
| 790-6.43X7 | 6.437 | X | 7.000 | X | 0.281 | 0.062 |
| | | | | | | |
| 790-79 | 5.375 | X | 6.000 | X | 0.312 | 0.062 |
| 790-5.5X6.12 | 5.500 | X | 6.125 | X | 0.312 | 0.062 |
| 790-83 | 6.375 | X | 7.000 | X | 0.312 | 0.062 |
| 790-84 | 7.375 | X | 8.000 | X | 0.312 | 0.062 |
| | | | | | | |
| 790-85 | 9.312 | X | 10.000 | X | 0.343 | 0.062 |
| | | | | | | |
| 790-86 | 11.250 | X | 12.000 | X | 0.375 | 0.062 |
| | | | | | | |
| 790-13.187 | 13.187 | X | 14.000 | X | 0.406 | 0.062 |
| | | | | | | |
| 790-11X12 | 11.000 | X | 12.000 | X | 0.500 | 0.062 |
| 790-87 | 13.000 | X | 14.000 | X | 0.500 | 0.062 |
| | | | | | | |
| | Solid is standard | | | | | |
| | For Split Back-ups add -S after the P/N | | | | | |

Consult factory for sizes not listed.

## Materials Available

**STANDARD MATERIAL**
Poly-Trel HT55-OR

**OPTIONAL MATERIALS**
POLY-TREL HT63-OR
POLY-TREL HT72-N
POM95-Acetal
PA101-Nylon
PA940-Glass filled Nylon
THE-100-Virgin PTFE
TFE-155Glass Filled PTFE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# SERIES 790 STANDARD COMPOUND

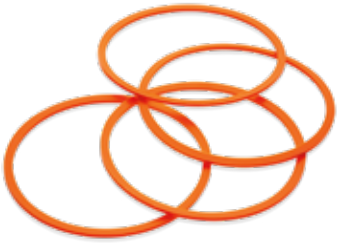
## POLY-TREL™ Compound HT55-OR, 55 Shore D

TPC-ET thermoplastic polyester elastomer

| Property | Test Method | Units | Value |
|---|---|---|---|
| Tensile Modulus | ISO 527-1/-2 | psi | 27,557 |
| Stress @5% Strain | ISO 527-1/-2 | psi | 1,000 |
| Stress @10% Strain | ISO 527-1/-2 | psi | 1,600 |
| Stress @ 50% Strain | ISO 527-1/-2 | psi | 2,030 |
| Stress at Break | ISO 527-1/-2 | psi | 5,800 |
| Nominal Strain at Break | ISO 527-1/-2 | % | 780 |
| Strain at Break | ISO 527-1/-2 | % | >300 |
| Flexural Modulus | ISO 178 | psi | 29,000 |
| Shear Modulus | ISO 6721 | psi | 9,430 |
| Tensile creep modulus, 1000h | ISO 899-1 | psi | 18,900 |
| Charpy Impact Strength, 23°C | ISO 179/1eU | ftlb/in² | N |
| Charpy Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | N |
| Charpy Notched Impact Strength, -30°C | ISO 179/1eU | ftlb/in² | 71.4 |
| Charpy Notched Impact Strength, -40°C | ISO 179/1eU | ftlb/in² | 14.3 |
| Poisson's Ratio | | | .48 |
| Compression Set at 70°C | ISO 815 | % | 60 |
| Brittleness Temperature | ISO 974 | °F | -144 |
| Shore D Hardness, 15s | ISO 868 | D | 51 |
| Shore D Hardness, Max | ISO 868 | D | 55 |
| Tear Strength, parallel | ISO 34-1 | kN/m | 133 |
| Tear Strength, Normal | ISO 34-1 | kN/m | 133 |
| Abrasion Resistance | ISO 4649 | mm³ | 120 |
| Melting Temperature, 10°C/min | ISO 11357-1/-3 | °F | 397 |
| Glass Transition Temperature (10°C/min) | ISO 11357-1/2 | °F | -4 |
| Vicat Softening Temperature, 50°C/h, 10N | ISO 306 | °F | 356 |
| Coeff. Of Linear Therm. Expansion, Parallel | ISO 11359-1/2 | E-4/°F | 1.11 |
| Coeff. Of Linear Therm. Expansion, Normal | ISO 11359-1/2 | E-4/°F | 1.11 |
| Shelf Life | ISO R1183 | | 10 years |
| Service Temperature Range* | | | -65°F to +275°F |
| Color | | | ORANGE |

Test specimen for ISO 527 is 1BA (2mm) at 50mm/min; all other ISO & ASTM mechanical properties measured at 4mm; electrical properties measured at 2mm.
All mechanical & electrical properties measured on injection molded specimens.
Test temperatures are 23C unless otherwise stated.

The information provided in this data sheet corresponds to our knowledge on the subject at the date of this publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such materials used in combination with any other material, additives or pigments or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specifications limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to do to determine the suitability of a specific compound for your particular purpose. Since Engineered Seals, LLC cannot anticipate all variation in actual end-use conditions ESC makes no warranties and assumes no liability in connection with any use of this information. Caution: Do not use this product in medical application involving permanent implantation in the human body.



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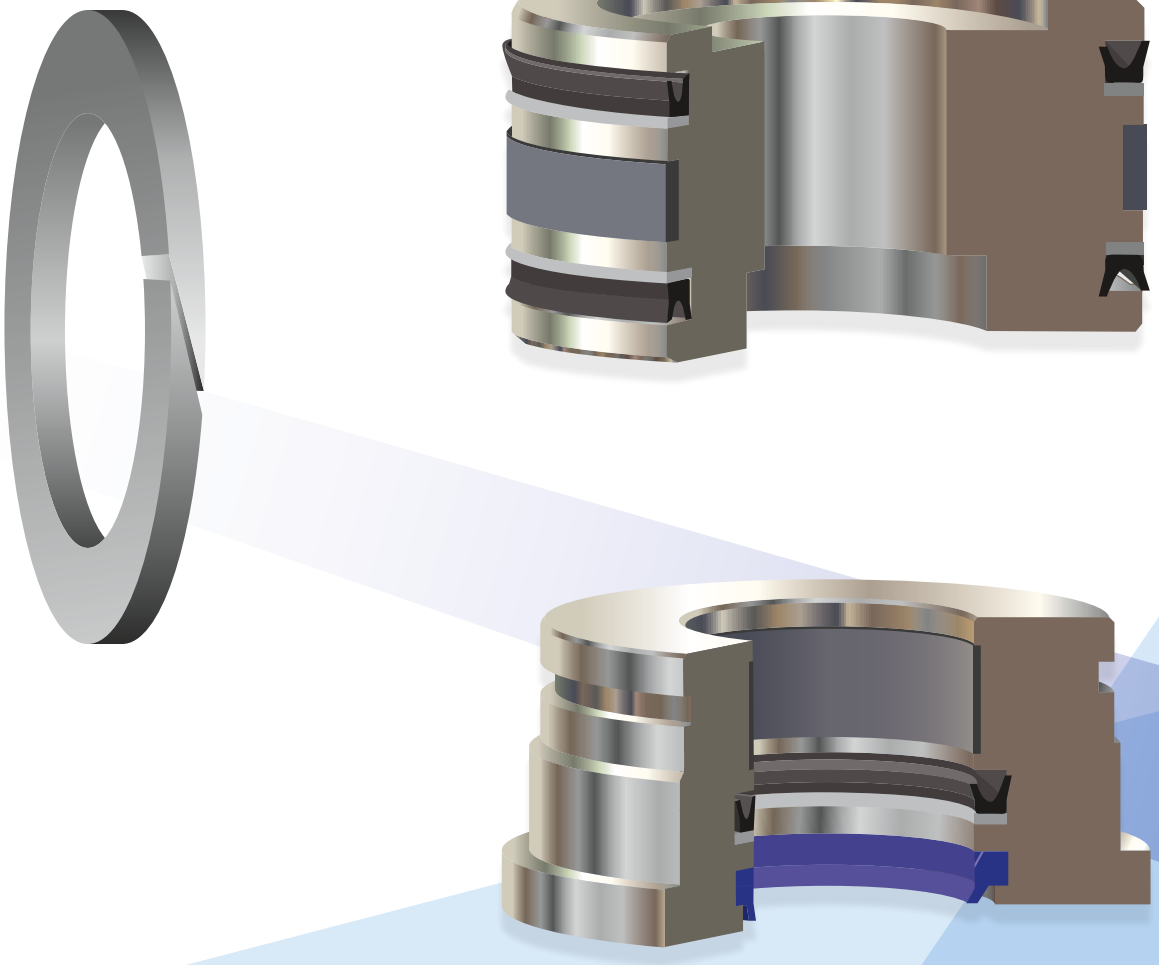
# SERIES 757 SPLIT GLASS FILLED NYLON MODULAR BACK-UPS

For Loaded U-Cups & Standard U-Seals

## KEY FEATURES OF SERIES 757 SPLIT BACK-UPS:

- Easy to assemble
- Increase Pressure and Temp. Range
- Maximum Extrusion Resistance
- Designed for Rod or Piston Applications



# SERIES 757 ESC-LON BACK-UP RINGS

Series 757 Profile

## 757 Series Back-up. Low Profile Modular Back-Up for Loaded U-Cup Seals and Urethane U-Cups.

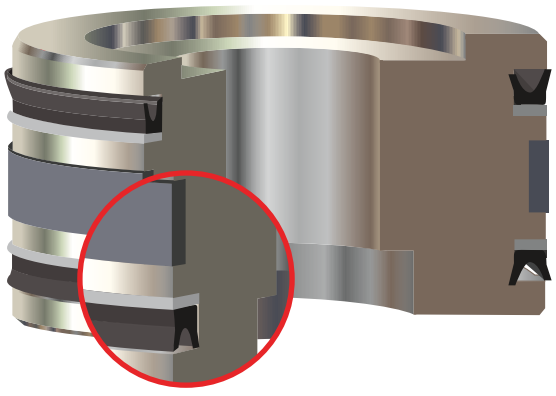
Series 757 Split Back-up rings provide added extrusion resistance over other materials. The specially formulated Glass filled Nylon, PA940, was designed to be used in conjunction with Urethane Loaded U-Cups , Rubber U-Cups, Rubber O-Rings and Un-Loaded Urethane U-Cups. This series will dramatically increase the pressure rating of the mating seal choice.

757 Series are perfect for adding life to a system where the seal is being nibbled from a large extrusion gap. Series 757 are manufactured split to enhance the assembly process.

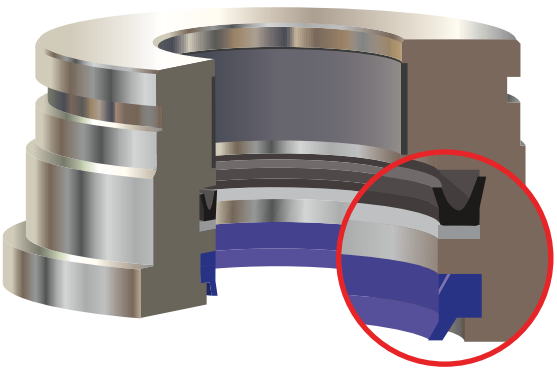
| Standard Materials | Temperature | Max. Pressure Range** |
|---|---|---|
| PA940 | -65°F to +275°F<br>(-54°C to +135°C) | 7,000 psi<br>(482 bar) |

**Alternate Materials:** For applications that may require an alternate material, please contact ESC.

** 4,900 psi (337 bar) with tight-tolerance wear rings (.123/.125 c/s) Series 200 Ultra-Precision Wear Rings.
3,500 psi (241 bar) with stand-tolerance wear rings (.120/.125 c/s).
Assumes industry standard clearances, could be more or less depending upon extrusion gap.



757 installed in Piston Gland



757 installed in Rod Gland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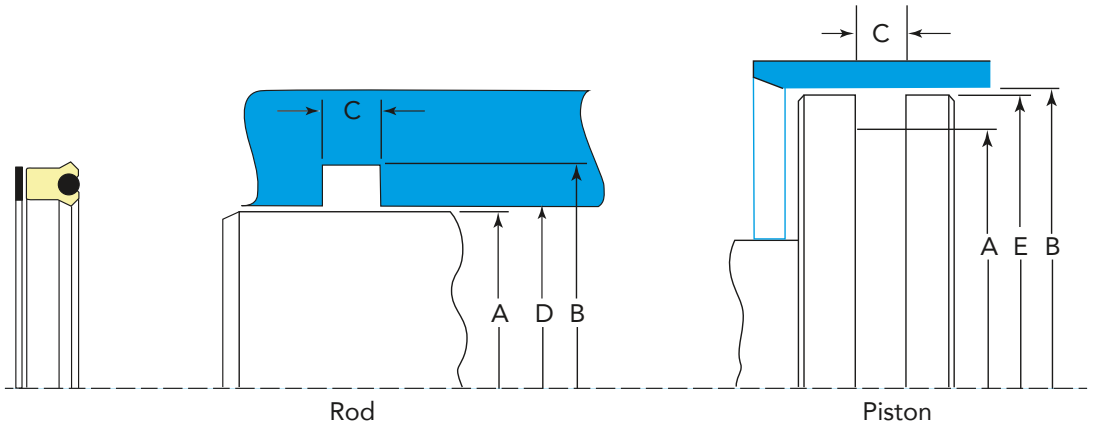
# SERIES 757
# BACK-UP RING GROOVE WIDTH DESIGN GUIDE

## How to Determine the Gland Width when using 757 Series Back-up Ring




Series 757 Back-up Rings allow you to extend the pressure rating of a seal that fits into a common gland at a very low cost.

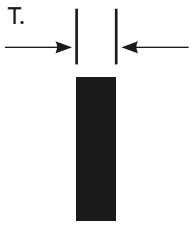
This Series Back-ups are designed to be used in either a Piston or Rod application.

By using Glass filled Nylon, PA940, much larger diametrical clearance may be used. Although Compound PA940 is standard, many other compound choices are also available.

To use the Series 757 Back-up ring, the width of the gland or groove must be extended to a accommodate the height if the back-up ring.

Utilizing the glands axical length you have already calculated per the manufacturer's specification, add the value shown in Table 757 for Width T. Add this dimension to the calculated gland width you will be using.

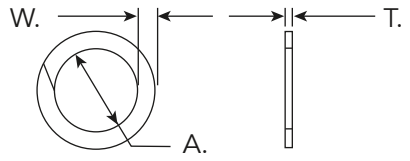
C = Previous gland width + T. Width




Series 757 Profile

For non-standard cross sections the added gland width can be determined by adding the Width T. of the back-up being used, to the to the width of the groove that was calculated.

# SERIES 757
# ESC-Ion BACK-UP RING SIZES




## Table 757

| Part Number SERIES | ID | | OD | C/S | | Width | | STANDARD COMPOUND |
|---|---|---|---|---|---|---|---|---|
| | A | TOL | REF | W | TOL | T | TOL | |
| 757-314 | .746 | ± .005 | 1.110 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-216 | 1.128 | ± .005 | 1.373 | .1225 | ± .0025 | .065 | .005 | PA940 |
| 757-320 | 1.136 | ± .005 | 1.500 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-322 | 1.246 | ± .005 | 1.610 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-324 | 1.371 | ± .005 | 1.735 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-325 | 1.496 | ± .004 | 1.860 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-326 | 1.621 | ± .005 | 1.985 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-327 | 1.746 | ± .005 | 2.110 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-328 | 1.871 | ± .005 | 2.235 | .182 | ± .001 | .065 | .005 | PA940 |
| 757-329 | 2.000 | ± .005 | 2.375 | .1875 | ± .0015 | .060 | .005 | PA940 |
| 575-405 | 2.000 | ± .005 | 2.488 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-330 | 2.125 | ± .005 | 2.490 | .1825 | ± .0015 | .065 | .005 | PA940 |
| 757-407 | 2.245 | ± .005 | 2.737 | .246 | ± .001 | .070 | .005 | PA940 |
| 757-331 | 2.255 | ± .005 | 2.620 | .1825 | ± .0015 | .065 | .005 | PA940 |
| 757-2.37X.125 | 2.370 | ± .005 | 2.615 | .1225 | ± .0025 | .065 | .005 | PA940 |
| 757-408 | 2.370 | ± .005 | 2.858 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-332 | 2.375 | ± .005 | 2.752 | .1885 | ± .0015 | .060 | .005 | PA940 |
| 757-2.50X.125 | 2.495 | ± .005 | 2.740 | .1225 | ± .0025 | .065 | .005 | PA940 |
| 757-333 | 2.500 | ± .005 | 2.866 | .183 | ± .002 | .060 | .005 | PA940 |
| 757-409 | 2.505 | ± .005 | 2.998 | .2465 | ± .0015 | .070 | .005 | PA940 |
| 757-2.62X3.00X.085 | 2.625 | ± .005 | 2.987 | .181 | ± .001 | .085 | .005 | PA940 |
| 757-334 | 2.625 | ± .005 | 3.002 | .1885 | ± .0015 | .060 | .005 | PA940 |
| 757-411 | 2.750 | ± .005 | 3.238 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-412 | 2.870 | ± .005 | 3.358 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-413 | 2.995 | ± .005 | 3.483 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-338 | 3.125 | ± .005 | 3.502 | .1885 | ± .0015 | .060 | .005 | PA940 |
| 757-3.18X3.75 | 3.180 | ± .005 | 3.730 | .275 | ± .002 | .070 | .005 | PA940 |
| 757-415 | 3.244 | ± .006 | 3.732 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-417 | 3.494 | ± .005 | 3.982 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-418-1/2 | 3.687 | ± .005 | 4.177 | .245 | ± .002 | .070 | .005 | PA940 |
| 757-419 | 3.745 | ± .005 | 4.237 | .246 | ± .001 | .070 | .005 | PA940 |
| 757-421 | 3.994 | ± .006 | 4.482 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-4X5 | 4.000 | ± .006 | 4.990 | .495 | ± .002 | .125 | .005 | PA940 |
| 575-423-1 | 4.255 | ± .005 | 4.743 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-425 | 4.494 | ± .006 | 4.982 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-427 | 4.773 | ± .006 | 5.261 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-429 | 4.995 | ± .006 | 5.483 | .244 | ± .001 | .070 | .005 | PA940 |
| 757-433 | 5.505 | ± .006 | 5.993 | .244 | ± .001 | .120 | .005 | PA940 |
| 757-5.75X.185 | 5.750 | ± .006 | 6.117 | .1835 | ± .0015 | .130 | .005 | PA940 |
| 757-6X7 | 6.000 | ± .010 | 6.990 | .495 | ± .002 | .125 | .005 | PA940 |

All sizes are split for easy assembly.
Consult factory if your application needs a solid back-up.
Consult factory for "Series 757 Glass Filled Nylon" Back-Ups NOT LISTED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# SERIES 757 STANDARD COMPOUND

## ESC-Ion Compound PA940

Nylon 6 Glass Fiber Reinforced (40%), Heat Stabilized

| Property | Test Method | Units | Value |
|---|---|---|---|
| Tensile Strength | ASTM D638 | PSI | 24,500 |
| Tensile Elongation | ASTM D638 | % | 2.5 |
| Tensile Modulus | ASTM D638 | PSI | 1,900,000 |
| Flexural Strength | ASTM D790 | PSI | 38,000 |
| Flexural Modulus | ASTM D790 | PSI | 1,600,000 |
| Compressive Strength | ASTM D695 | PSI | 24,000 |
| Impact Strength | | | |
| Notched 1/8" | ASTM D256 | J/m (ft-lb/in) | 133 (2.5) |
| Unnotched 1/8" | ASTM D256 | J/m (ft-lb/in) | 1270 (24) |
| Hardness, Rockwell | ASTM D785 | R | 120 |
| Specific Gravity | ASTM D792 | | 1.46 |
| Water Absorption 24 hrs. @ 73 F (23 C) | ASTM D570 | % | 1 |
| Coefficient of Friction (Dynamic) | | | 0.45 |
| Coefficient of Friction (Static) | | | .43 |
| Deflection Temperature | | | |
| @264 psi (1.8 Mpa) | ASTM D648 | C (F) | 204 (400) |
| @66 psi (0.45Mpa) | ASTM D648 | C (F) | 210 (410) |
| Coefficient of Linear | | | |
| Thermal Expansion | ASTM D696 | in/in/F | 0.000015 |
| Shelf Life | | | 10 years |
| Service Temperature Range | | Degrees F | -40F to + 275F |
| Color | | | BLACK |

* Estimated by the Laboratory

The information provided in this data sheet corresponds to our knowledge on the subject at the date of this publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such materials used in combination with any other material, additives or pigments or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specifications limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to do to determine the suitability of a specific compound for your particular purpose. Since Engineered Seals, LLC cannot anticipate all variation in actual end-use conditions ESC makes no warranties and assumes no liability in connection with any use of this information. Caution: Do not use this product in medical application involving permanent implantation in the human body.

We highly recommend testing in your specific application, this is a guide only.

# POLY-TREL STANDARD COMPOUNDS

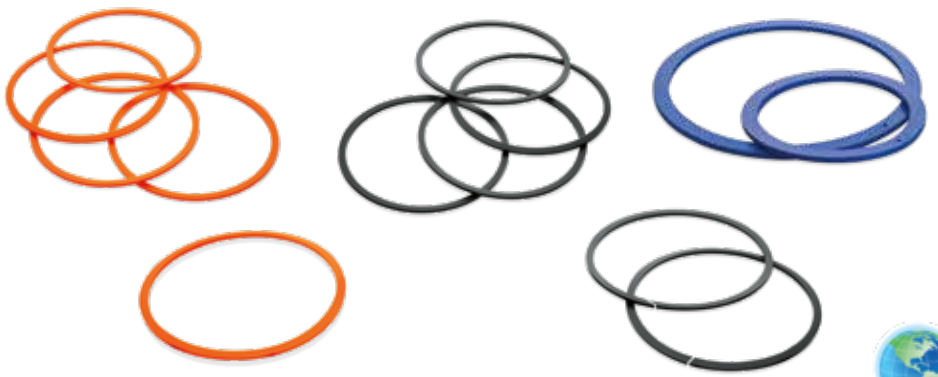
## POLY-TREL FAMILY OF COMPOUNDS

TPC-ET Thermoplastic Polyester Elastomer

| Property | Test Method | Units | COMPOUND NUMBER HT40 Value | HT47 Value | HT50 Value | HT55 Value | HT63 Value | HT72 Value |
|---|---|---|---|---|---|---|---|---|
| Hardness , Shore D | ISO 868 | D | 40 | 47 | 50 | 55 | 63 | 72 |
| Tensile Strength, Ultimate | ISO 527 | Mpa (psi) | 21 (3,050) | 30.5 (4,425) | 36.0 (5,220) | 40 (5,800) | 41 (5950) | 45.8 (6640) |
| Tensile Stress | ISO 527 | | | | | | | |
| @5% Strain | | Mpa (psi) | 2.5 (0.4) | n/a | | 6.9 (1) | 12 (1.7) | 14 (2) |
| @10% Strain | | Mpa (psi) | 4.4 (0.6) | 6.8 (1.0) | 6.8 (1.0) | 11 (1.6) | 15 (2.2) | 23 (3.3) |
| @50% Strain | | Mpa (psi) | 8.0 (1.2) | 11 (1.6) | 11 (1.6) | | | |
| Yield Stress | ISO 527 | Mpa (psi) | x | x | 30 | 14 (2,000) | 19 (2,800) | x |
| Stress at Break | ISO 527 | Mpa (psi) | 17 (2,500) | 17 (2,500) | | 44 (6,400) | 46 (6,700) | 53 (7,700) |
| Strain at Break | ISO 527 | % | 250 | 200 | | 500 | 490 | 450 |
| Normal Strain at Break | ISO 527 | % | 350 | >50 | | 800 | 540 | x |
| Yield Strain | ISO 527 | % | x | x | 30 | 37 | 35 | x |
| Tensile Modulus | ISO 527 | Mpa (psi) | 55 (8,000) | 105 (15,200) | 740 (10,700) | 188 (27,300) | 280 (41,000) | 525 (76,000) |
| Flexural Modulus -40°C (-40°F) | ISO 178 | Mpa (psi) | 200 (29,000) | 260 (37,000) | 470 (68,700) | 760 (110000) | 248 (36000) | 2350 (340000) |
| Flexural Modulus 23°C (73°F) | ISO 178 | Mpa (psi) | 65 (9,400) | 117 (17,000) | 124 ((18,000) | 200 (29000) | 330 (48000) | 570 (83000) |
| Flexural Modulus 100°C (212°F) | ISO 178 | Mpa (psi) | 30 (4,000) | 60 (9,000) | 46 (6,700) | 100 (14000) | 296 (43000) | 200 (28000) |
| Elongation at Break | ISO 527 | % | 424 | 462 | 530 | 500 | 490 | 450 |
| Tensile Strength at Yield | ISO 527 | Mpa (psi) | 7.5 (1,090) | 7.2 (1,045) | 36 (5,220) | 6.9 (1,000) | 19 (2760) | 26 (3770) |
| Glass Transition Temperature (10°C/min) | ISO 11357-1/2 | °C (°F) | -25 (-31F) | -45 (-49F) | +62 (+144F) | -20 (-4F) | 0 (+32F) | +25 (+77F) |
| Deflection Temp @ 66 psi | ISO 75f | °C (°F) | 50 (122F) | 60 (140F) | +62 (+144) | +70 (+160F) | +85 (+185F) | +95 (+203F) |
| Deflection Temp @ 264 psi | ISO 75f | °C (°F) | x | x | +40 (+104F) | +40 (+113F) | +45 (+113F) | +45 (+126F) |
| Temperature Range | | | -65F to +250F | -65F to +250F | -65F to +275F | -65F to +275F | -65F to +275F | -65F to +275F |
| Shelf Life | ISO R1183 | Years | 10 years | 10 years | 10 years | 10 years | 10 years | 10 years |

Test specimen for ISO 527 is 1BA (2mm) at 50mm/min; all other ISO & ASTM mechanical properties measured at 4mm; electrical properties measured at 2mm.
All mechanical & electrical properties measured on injection molded specimens.
Test temperatures are 23C unless otherwise stated.



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# ENGINEERED SEALS & COMPONENTS
# POLY-TREL FLEXABILITY AT TEMPERATURE

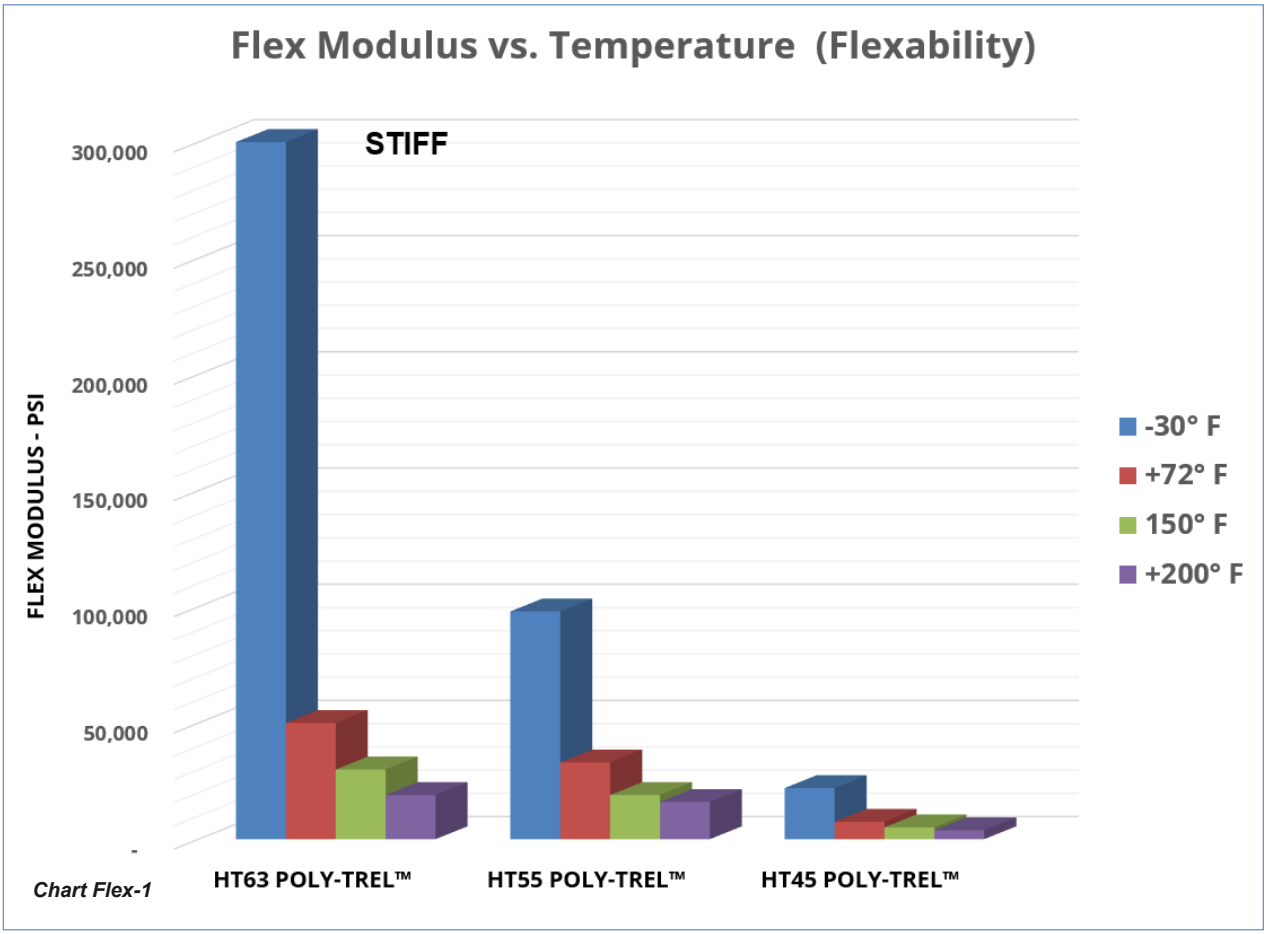



*Chart Flex-1*

Chart Flex-1 shows how Temperature effects the hardness and flexibility of 3 grades of POLY-TREL.

HT63 63 Shore D
HT55 55 Shore D
HT45 45 Shore D

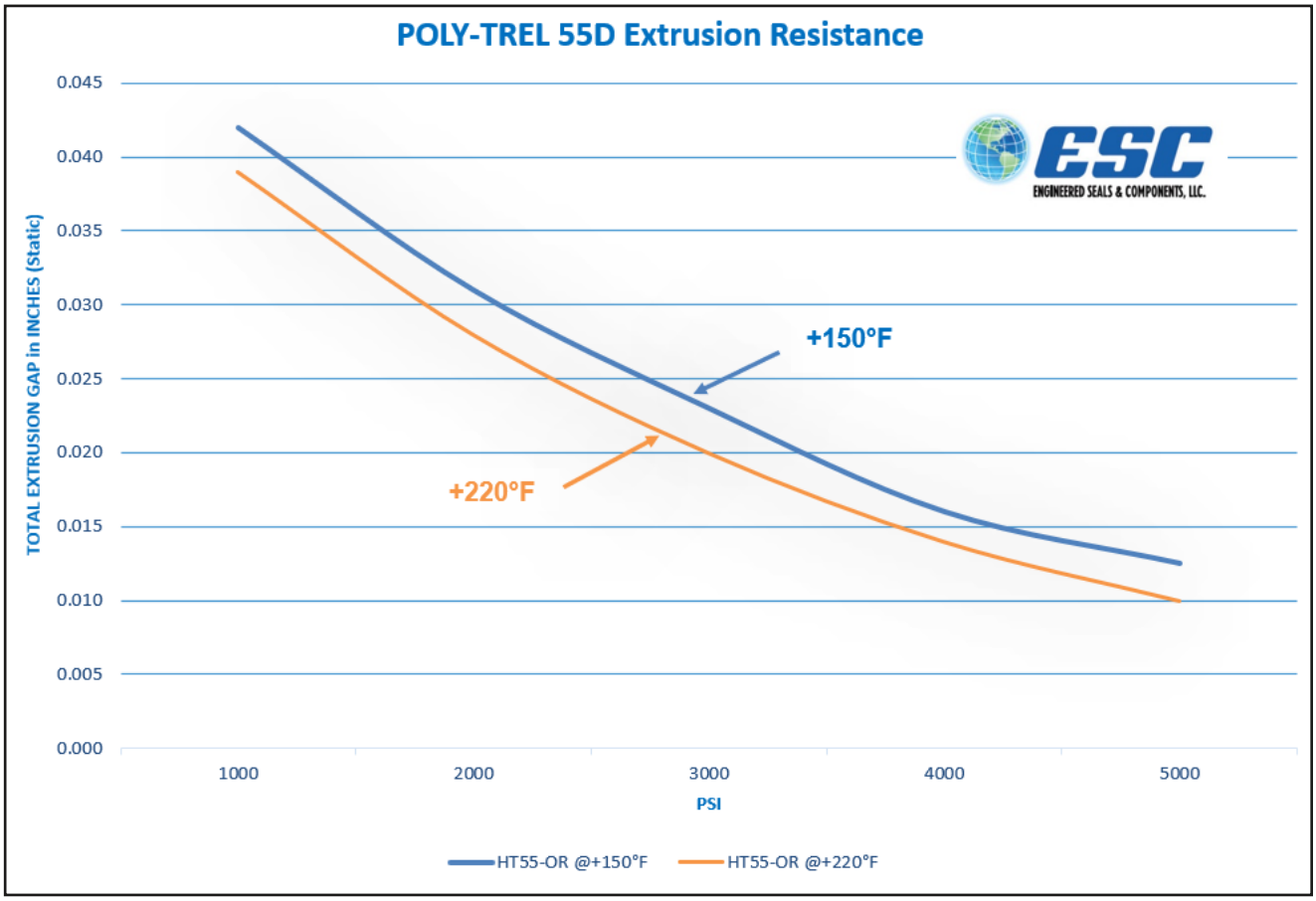
The colder the parts are the less flexible they become. Conversely, the hotter the parts get, the more flexible they become.

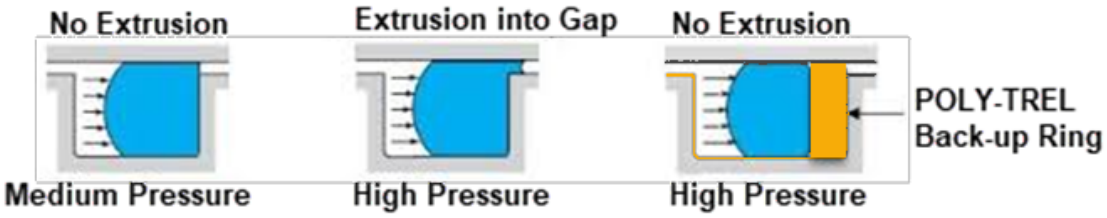
These compounds were engineered to be better at certain temperatures and pressures with certain extrusion gaps.

Compound HT55 is the best all around Material. Is not too hard as to interfere with assembly, yet not too soft to give up on the higher temperature ranges. These compounds have a useful temperature range of -65 F to +275 F.

# POLY-TREL BACK-UP RING EXTRUSION DESIGN GUIDE

## POLY-TREL HT55-OR Extrusion Resistance at +150F and +220F




O-Ring Deformation Under Pressure With and with out Back-up Ring

Above data was acquired in a test laboratory. No side load, shock loads, or dynamic motions were applied. Your results may be different. This information is to be used as a guideline only. It is always good practice to test in actual or specific conditions and applications.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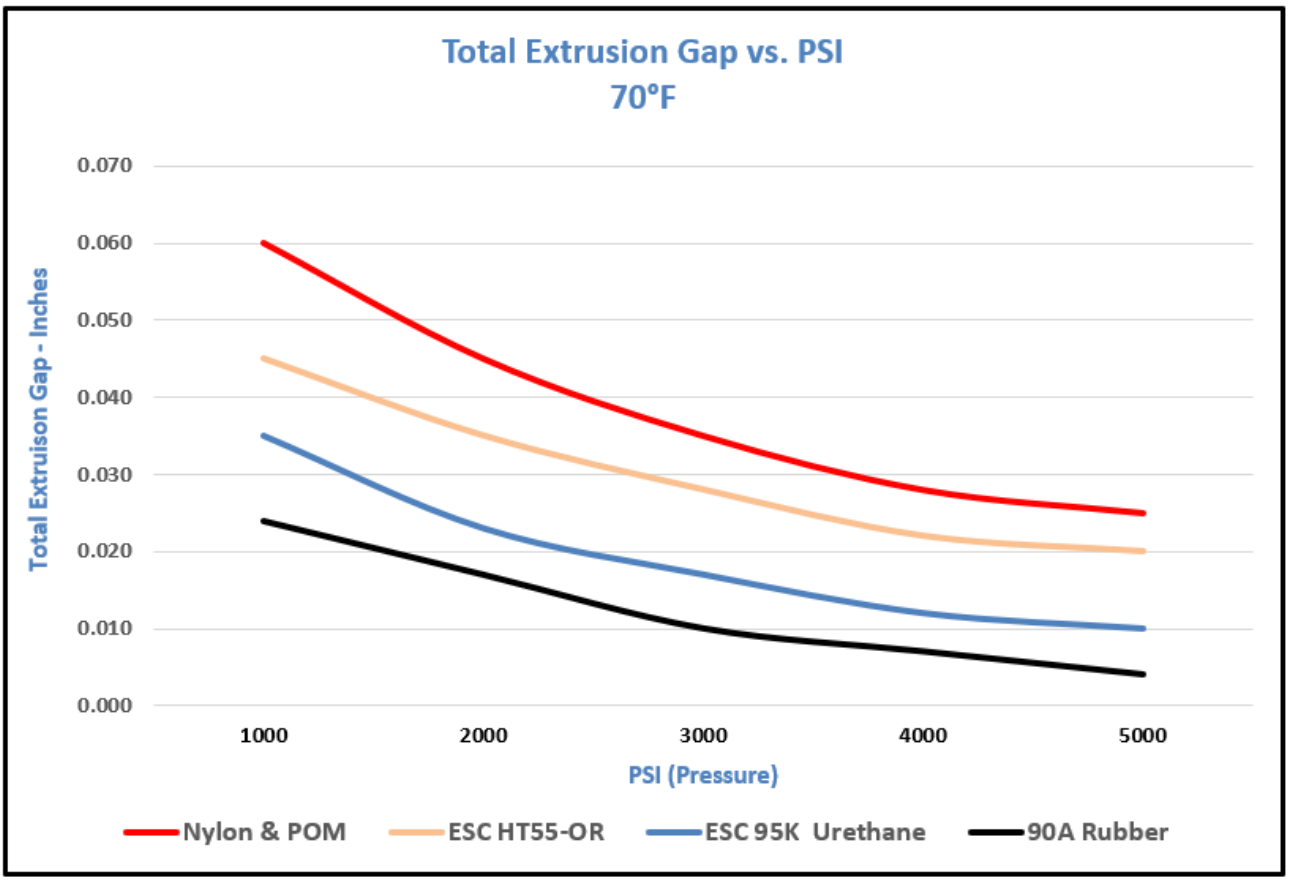
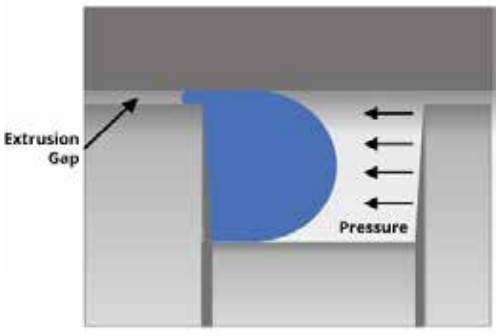
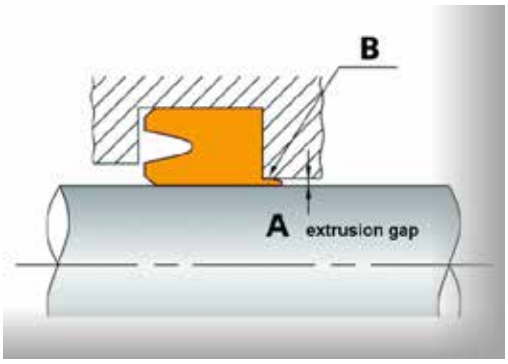
# ESC BACK-UP RING EXTRUSION DESIGN GUIDE

## Extrusion Resistance at +70F




Whatever the seal type there is always a need for a back-up ring. The chart above helps you determine the compound you should use.

Dissimilar materials work the best.

Above data was acquired in a test lab. No side loads, shock loads, or dynamic motions were applied. Your results may be different. This information is to be used as a guideline only. It is always good practice to test in your specific conditions and applications.

# POLY-TREL BACK-UP RING FLUID RESISTANCE DESIGN GUIDE

| Chemical | Rating* |
|---|---|
| Acetic acid, 20% | A |
| Acetic acid, 30% | A |
| Acetic acid, glacial | A |
| Acetic acid, glacial (+100° F - +38° C) | B |
| Acetic Anhydride | T |
| Acetone | B |
| Acetylene | A |
| Aluminum chloride solutions | T |
| Aluminum sulfate solutions | T |
| Ammonium chloride solutions | A |
| Ammonium hydroxide solutions | T |
| Ammonium sulfate solutions | B |
| Amyl Acetate | B |
| Amyl alcohol | A |
| Aniline | C |
| ASTM oil = 1 (300° F - 149° C) | A |
| ASTM oil = 3 (300° F - 149° C) | A |
| ASTM reference fuel A (158°F - 70° C) | A |
| ASTM reference fuel B (158°F - 70° C) | A |
| ASTM reference fuel C | A |
| ASTM reference fuel C (158°F - 70° C) | B |
| Asphalt | T |
| Barium hydroxide solutions | T |
| Beer | A |
| Benzene | B |
| Borax solutions | A |
| Boric acid solutions | A |
| Bromine anhydrous liquid | X |
| Butane | A |
| Butyr acetate | B |
| Butyric acid | T |
| Calcium chloride solutions | A |
| Calcium hydroxide solutions | T |
| Calcium hypochlorite 5% | A |
| Carbon bisulfide | B |
| Carbon dioxide | A |
| Carbon monoxide | A |
| Carbon tetrachloride | A,B,C |
| Castor oil | A,B |
| Chlorine gas, dry | X |
| Chlorine gas, wet | X |
| Chloroacetic acid | X |
| Chlorobenzene | X |
| Chloroform | C |
| Chlorosulfonic acid | C |
| Citric acid solutions | A |
| Copper chloride solutions | A |
| Copper sulfate solutions | A |
| Cottonseed oil | A |
| Cyclohexane | A |
| Dibufyl phthalate | A |
| Diethyl sebacate | A |

| Chemical | Rating* |
|---|---|
| Dioctyl phthalate | A |
| Epichlorohydrin | X |
| Ethyl acetate | A,B |
| Ethyl alcohol | A |
| Ethyl chloride | C |
| Ethylene dichloride | B,C |
| Ethylene glycol | A |
| Ethylene oxide | A |
| Ferric chloride solutions | T |
| Fluosilicic acid | T |
| Formaldehyde 40% | B |
| Formic Acid | B |
| FREON®-11 | A |
| FREON®-12 | A |
| FREON-113® (130° F - 55° C) | A |
| FREON®-114 | A |
| Gasoline | A |
| Glue | A |
| Glycerin | A |
| n-Hexane | A |
| Hydrazine | C |
| Hydrochloric acid 20% | B |
| Hydrocyanic acid | T |
| Hydrofluoric acid 48% | X |
| Hydrofluoric acid 75% | X |
| Hydrofluoric acid, anhydrous | X |
| Hydrogen | A |
| Hydrogen sulfide | A |
| Isooctane | A |
| Isopropyl alcohol | A |
| JP-4 | A |
| Kerosene | T |
| Lacquer solvents | A,B |
| Lactic acid | T |
| Linseed oil | T |
| Lubricating oils | A |
| Magnesium chloride solutions | T |
| Magnesium hydroxide solutions | T |
| Mercuric chloride solutions | T |
| Mercury | A |
| Methyl alcohol | A |
| Methyl ethyl ketone | A,B |
| Methylene chloride | C |
| Mineral oil | A |
| Naphtha | A |
| Naphthalene | A,B |
| Nitric acid 10% | B |
| Nitric acid 30% | C |
| Nitric acid 60% | C |
| Nitric acid 70% | C |
| Nitric acid, red fuming | C |

| Chemical | Rating* |
|---|---|
| Nitrobenzene | C |
| Oleic acid | A |
| Oleum 20-25% | C |
| Palmitic acid | A |
| Perchloroethylene | B,C |
| Phenol | C |
| Pickling Solution (20% nitric acid, 4% HF) | X |
| Pickling Solution (17% nitric acid, 4% HF) | X |
| Potassium dichromate solutions | T |
| Potassium hydroxide solutions | A |
| Pydraul 312C | A |
| Pyridine | X |
| SAE 10 oil | A |
| Sea water | A |
| Silicone grease | A |
| SKYDROL 500 | A |
| Soap solutions | A |
| Sodium chloride solutions | A |
| Sodium dichromate 20% | T |
| Sodium hydroxide 20% | A |
| Sodium hypochlorite 5% | B |
| Sodium hydroxide 46.5% | A |
| Soybean oil | T |
| Stannous chloride 15% | T |
| Steam (212° F - 100° C) stabilized | B |
| Steam (230° F - 110° C) stabilized | C |
| Stearic acid | T |
| Styrene | X |
| Sulfur, molten | T |
| Sulfur dioxide, liquid | T |
| Sulfur dioxide, gas | T |
| Sulfuric acid up to 50% | A |
| Sulfuric acid 50-80% | C |
| Sulfuric acid 60% | C |
| Sulfuric acid 90% | C |
| Sulfuric acid 95% | C |
| Sulfuric acid fuming (20% oleum) | C |
| Sulfurous acid | B |
| Tannic acid 10% | A |
| Tartanic acid | T |
| Tetrahydrofuran | A,B |
| Toluene | B |
| Trichloroethylene | C |
| Triethanolamine | C |
| Trisodium phosphate solution | C |
| Tung oil | T |
| Water (158° F - 70° C) | A |
| Water (212° F - 100° C) with stabilizer | B |
| Xylene | A,B |
| Zinc chloride solutions | A |

* Rating Key
A- Fluid has little or no effect
B- Fluid has minor to moderate effect
C- Fluid has severe effect
T-No data- likely to be compatible
X- No Data-not likely to be compatible

Unless otherwise noted concentrations of aqueous solutions are saturated. All ratings are at room temp. unless specified.

We emphasize that this tabulation should be used as a guide only.
It is based primarily on laboraory andservice tests but does not take nto account all variables that can be encountered in actual use. Therefore, it is always advisable to test the material under actual service conditions before specification. If this is not practical, tests should be devised that simulate service conditions as closely as possible.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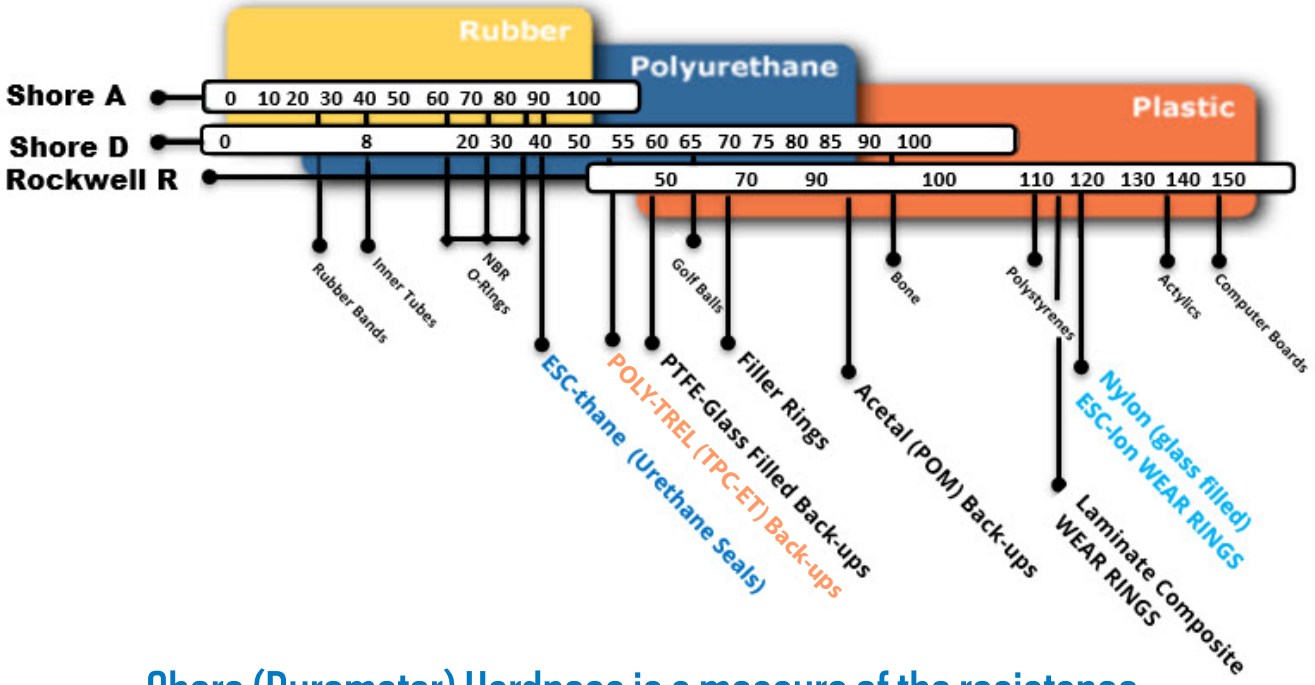
# ENGINEERED SEALS & COMPONENTS
# SHORE A, D AND R HARDNESS SCALES

## DUROMETER SCALES CROSS REFERENCE



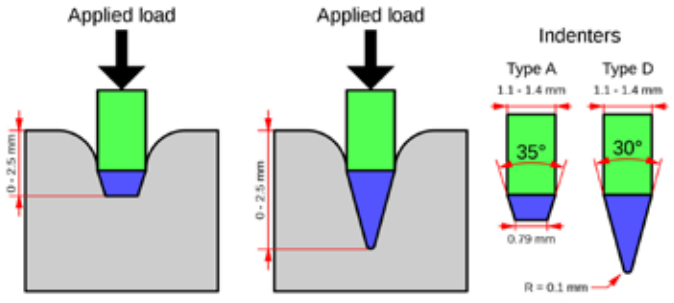

## Shore (Durometer) Hardness is a measure of the resistance a material has to indentation.

Named after its inventer, Albert Ferdinand Shore, Shore hardness offers different scales for measuring solidity of different materials. (Shore was born in 1876 and lived until 1936, creating the 'Shore" scale in the 1920s.)

There are different Shore Hardness scales for measuring the hardness of different materials, such as soft rubbers, ridgid plastics and super soft gels. These hardness scales were created so that everyone can discuss these materials and have a common point of reference for them.

Below is an example for the indenters used to measure Shore A and Shore D hardnesses.

**Durometer hardness test**



ENGINEERED SEALS & COMPONENTS, LLC.

# TYPICAL COMPOUND USAGE AND TEMPERATURE GUIDE

| Compound Number | | | Description | Temperature Range °C | Temperature Range °F | Typical Usages |
|---|---|---|---|---|---|---|
| ESC-lon™ | Compound | PA940 | Glass Filled Nylon 6 | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA940-B | Glass Filled Nylon 6 / Lub | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA940-CB | Glass Filled Nylon 6 / Lub (Blue "CB") | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA940-15 | Glass Filled Nylon 6 / PTFE | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA101-N | Nylon Unfilled 6/6 | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA101-BK | Nylon Unfilled 6/6 Black | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA101-BLU | Nylon Unfilled 6/6 Blue | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | PA933-BK | Glass Filled Nylon 6/6 | -54°/+135° | -65°/+275° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | HTN20-C | Hi Temp. "No Swell" Carbon Filled | -54°/+148° | -65°/+300° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | HTN30-C | Hi Temp. "No Swell" Carbon Filled | -54°/+148° | -65°/+300° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | HTN-30 | Hi Temp. "No Swell" Glass Filled | -54°/+148° | -65°/+300° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-lon™ | Compound | HTN-40 | Hi Temp. "No Swell" Glass Filled | -54°/+148° | -65°/+300° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-tal™ | Compound | POM95-BK | Acetal Unfilled | -43°/+100° | -45°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-tal™ | Compound | POM-30G | Acetal Glass Filled | -43°/+100° | -45°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-tal™ | Compound | POM-10C-RED | Acetal Carbon Filled | -43°/+100° | -45°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-tal™ | Compound | POM-30C | Acetal Carbon Filled | -43°/+100° | -45°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-comp™ | Compound | V-100 | Laminate Composite | -40°/+100° | -40°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-comp™ | Compound | V-111 | Laminate Composite | -40°/+100° | -40°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-comp™ | Compound | V-131A | Laminate Composite | -40°/+100° | -40°/+200° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| ESC-comp™ | Compound | V-333A | Laminate Composite | -40°/+148° | -40°/+300° | Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings |
| POLY-trel™ | Compound | HT40-BK | TPC-ET 40 Shore D, Black | -54°/+121° | -65°/+250° | Back-up Rings, Rod Wipers, Seals, Gaskets, Cushions |
| POLY-trel™ | Compound | HT47-BK | TPC-ET 47 Shore D, Black | -54°/+121° | -65°/+250° | Back-up Rings, Rod Wipers, Seals, Gaskets, Cushions |
| POLY-trel™ | Compound | HT47-N | TPC-ET 47 Shore D, Off White | -54°/+121° | -65°/+250° | Back-up Rings, Rod Wipers, Seals, Gaskets, Cushions |
| POLY-trel™ | Compound | HT47-BLU | TPC-ET 47 Shore D, Blue | -54°/+121° | -65°/+250° | Back-up Rings, Rod Wipers, Seals, Gaskets, Cushions |
| POLY-trel™ | Compound | HT50-OR | TPC-ET 50 Shore D, Orange | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Seals, Gaskets, Cushions |
| POLY-trel™ | Compound | HT55-OR | TPC-ET 55 Shore D, Orange | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT55-5OR | TPC-ET 55 Shore D, Orange / Fiber Glass | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT55-OR | TPC-ET 55 Shore D, Orange | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT55-BK | TPC-ET 55 Shore D, Black | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT55-BLU | TPC-ET 55 Shore D, Blue | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT55SH-OR | TPC-ET 55 Shore D, Orange- Heat Stabilized | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT55-SHS-OR | TPC-ET 55 Shore D, Orange -Hydrolytically Stabilized | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT63-N | TPC-ET 63 Shore D, Off White | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT63-OR | TPC-ET 63 Shore D, Orange | -54°/+135° | -65°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| POLY-trel™ | Compound | HT-63-5-OR | TPC-ET 63 Shore D, Orange / Fiber Glass | -54°/+135° | -65°/+275° | Back-up Rings, Piston Seals, Filler Rings |
| POLY-trel™ | Compound | HT-72-N | TPC-ET 72 Shore D, Off White | -54°/+135° | -65°/+275° | Back-up Rings, Piston Seals, Filler Rings |
| ESC-thane™ | Compound | U95K-BLU | TPU Urethane 95 Shore A, Blue | -40°/+121° | -40°/+250° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| ESC-thane™ | Compound | U95K-BLK | TPU Urethane 95 Shore A, Black | -40°/+121° | -40°/+250° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| ESC-thane™ | Compound | U94-BK | TPU Urethane 94 Shore A, Black | -40°/+110° | -40°/+230° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| ESC-thane™ | Compound | U94-BLU | TPU Urethane 94 Shore A, Blue | -40°/+110° | -40°/+230° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| ESC-thane™ | Compound | U65D-N | Urethane 65 Shore D, Milky | -40°/+110° | -40°/+230° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| ESC-thane™ | Compound | U95-HT | Urethane PPDI 95 Shore A | -40°/+135° | -40°/+275° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |
| ESC-thane™ | Compound | U95-LT | Urethane PPDI 95 Shore A | -54°/+121° | -65°/+250° | Back-up Rings, Rod Wipers, Rod Seals, Piston Seals, Gaskets |

Complete physical specifications can be found at www. engseals.com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# ENGINEERED SEALS & COMPONENTS
# SEALS & COMPONENTS STORAGE CONDITIONS / SHELF LIFE

## Factors that influence the LIFE of elastomer seals & components


The properties profile of an elastomer seal component will normally remain constant for years if it is properly stored. In the event of improper storage a large number of influencing factors can result in drastically reduced seal life.

Ultimately the seal is no longer fit for use due to cracking, hardening, softening, swelling, permanent deformation, breaking, and surface damage, etc.

To avoid this, Engineered Seals & Components, based on the DIN 7716 and ISO 2230 standards, recommends the following information to be used as a guideline for storage, cleaning, and maintenance of elastomer seals and components.

Cleaning: Contact ESC Engineering for instruction on cleaning of Seals & Components.

# ENGINEERED SEALS & COMPONENTS
# SEALS & COMPONENTS STORAGE CONDITIONS / SHELF LIFE

## Temperature

The recommended storage temperature for elastomer seals and components is +15C (+59F) and should not exceed +25C (+77F). Sources such as radiators, forced air units or boilers should be at least 1 meter or 3 feet away from the product.

Direct sunlight should be avoided. If temperatures drop below -10C (+14F) elastomer products tend to become very stiff. Special care should be taken to prevent the product from becoming deformed. Chloroprene material should not be stored below -12C (-10F).

## Humidity

It is very important to ensure that the relative humidity in storage facilities stay below 65%. Storage in humid areas with condensation must be avoided. Sealed polyethylene bags or foil bags are a good choice. By the same token extreamely dry condition will cause will cause premature failures also.

## Light / Radiation

Elastomer seals and components must be protected against light with high UV content. This light may cause damage to the products. Examples of light sources with high UV content include intense artificial light or direct sun light.

Light caused damage may be prevented by adding UV barriers or filters to window panes in the storage area. All types of radiation such as gamma or radioactive radiation must be avoided.

**Cleaning:** Contact ESC Engineering for instruction on cleaning of Seals & Components.

## Solvents / Greases

Greases, oils and solvents may cause damage to elastomer seals and components. Therefore it is imperative that seals and other plastic components do not come in contact with these media in storage, unless packaged by the manufacturer this way.

## Deformation

Elastomer seals and Thermoplastic components which are packed to tightly or crushed in a box will cause deforming. If the parts are exposed to tensile or compressive stress, the parts may be deformed. Cracking may occur or the parts may not be able to be installed correctly. It is a must that the seals and components be stored without being exposed to strain or deformation.

## Oxygen / Ozone

Generally, elastomer seals and components should be protected against circulating air by using stable packaging such as airtight containers or polyethylene bags. This very important for rvery small seals with large surface to volume ratio. Mercury vapor lamps, florescent light sources, electric motors - generally any device that is capable of producing ozone through sparks, electrical discharges or high-voltage fields must be avoided if at all possible. Ozone is harmful to many elastomers, so storage areas must be ozone free. This also applies to organic gases as well as combustion gases as they are capable of producing ozone via a photochemical process.

## Storage Period

A key criteria for the storage period of elastomers and components is the time which the product was produced. ESC indicates the date of the manufacture on the packing bags. The manufacture Quarter and the Year are the label in the Cure Date box. The recommended maximum storage period depends on the type of elastomer. **See Table S-1.**

The typical shelf life may be prolonged based on the actual product conditions at the end of the typical shelf life. Trained and experienced experts can approve a prolonged storage period based on a visual inspection of representative samples. The samples should not reveal any permanent distortion, mechanical damage or surface cracking. The material should not show any signs of hardening or softening nor any kind of tackiness.

**Table S-1**
Shelf Life Recommended in Years

| | Typical Shelf Life | Possible Extension |
|---|---|---|
| TPU H-Poly | 5 | 2 |
| ESC-Thane | 5 | 2 |
| TPC-ET (Hytrel) | 10 | 5 |
| NBR (Molded) | 6 | 3 |
| NBR (Machined) | 4 | |
| HNBR | 8 | 4 |
| FKM, FPM | 10 | 5 |
| MVQ (Silicone) | 10 | 5 |
| PTFE | 15 | 5 |
| PA (ESC-Ion) | 10 | 5 |
| POM (ESC-tal) | 10 | 5 |
| PPA (ESC-HTN) | 10 | 5 |
| PEEK | 10 | 5 |
| UHMWPE | 10 | 5 |


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# WARRANTY AND REMEDY

## Important Notice:

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Requests for more information are welcome. In particular, we will be glad to provide samples for your to inspect and test in your assemblies and plant before you make a final decision for you application.

## Notice of Exclusive Warranty and Remedy

Briefly, our exclusive warranty is against defects in materials and workmanship at the time of shipment. It is in lieu of all other warranties. There is no implied warranty of merchantability or fitness for a particular purpose. The exclusive remedy is replacement of defective products, or at our option, refund of their purchase price. All damages exceeding the purchase price are excluded, weather consequential or otherwise and regardless of cause. The terms and conditions on our printed quotation contain a much more complete statement of our Exclusive Warranty and Remedy

ESC

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# ENGINEERED SEALS & COMPONENTS

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