

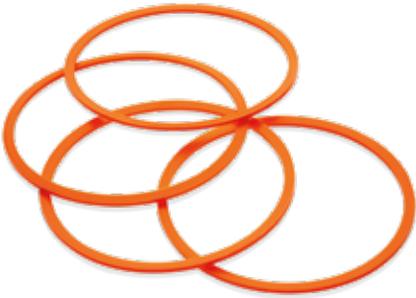


ESCC
ENGINEERED SEALS & COMPONENTS, LLC.

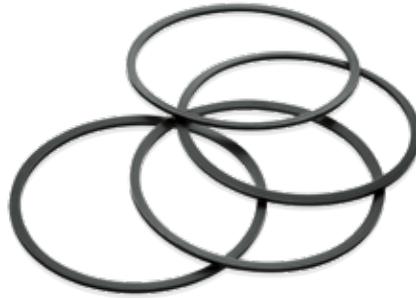
ANTI-EXTRUSION BACK-UP RINGS DESIGN GUIDE

BACK-UPS

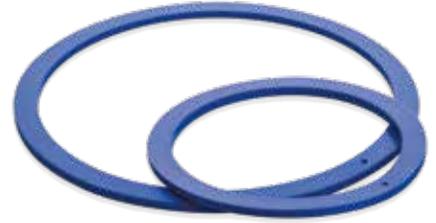
STATIC



STANDARD



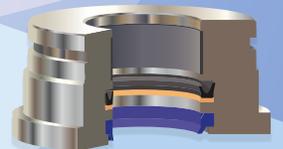
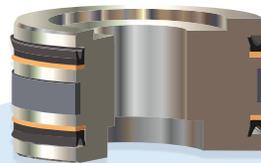
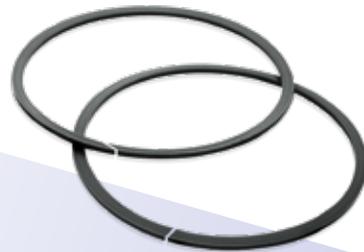
VENTED



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.

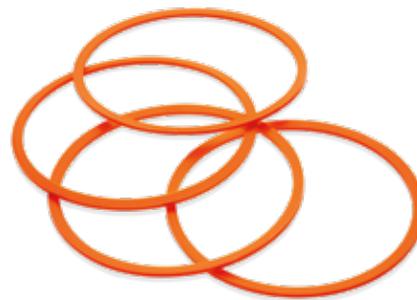
Modern Design and Construction of the Back-up Ring.

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.





ENGINEERED SEALS & COMPONENTS

EXTRUSION GAPS

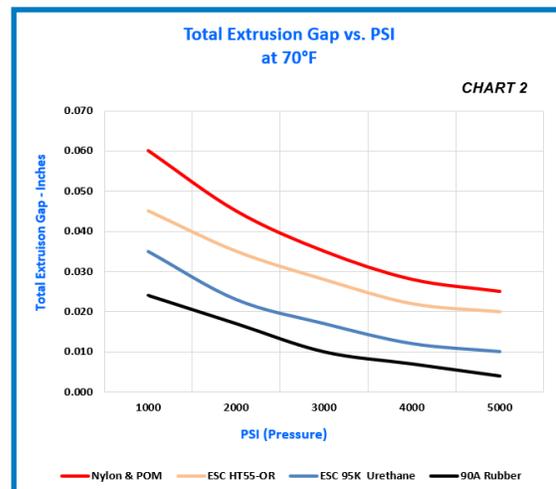
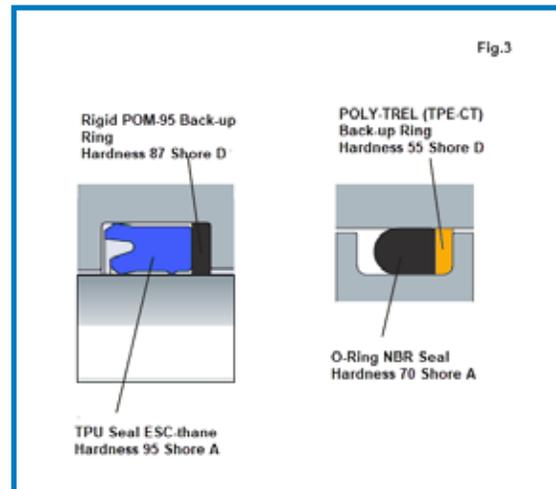
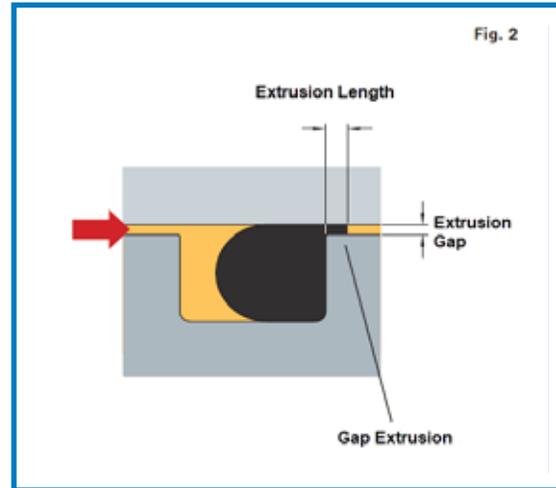
The process by which seal material is forced into the clearances between components is called gap extrusion. The dimension of this clearance gap is referred to as the extrusion gap, or "e-gap". (Fig. 2)

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.





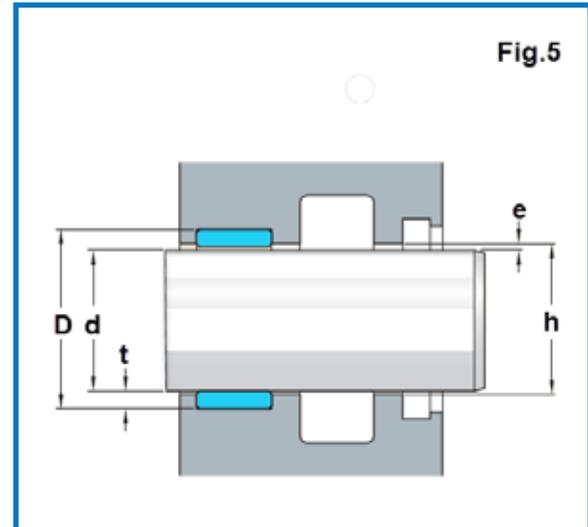
ENGINEERED SEALS & COMPONENTS

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.

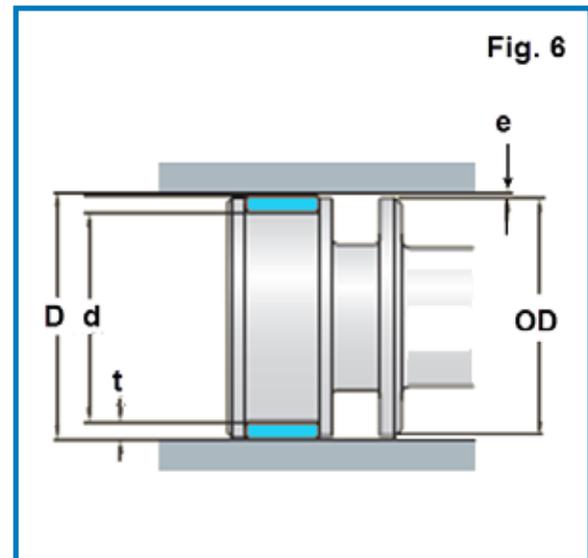


For piston seals, the maximum e-gap should be calculated with the following conditions: (**Fig. 6**):

- 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 be 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.



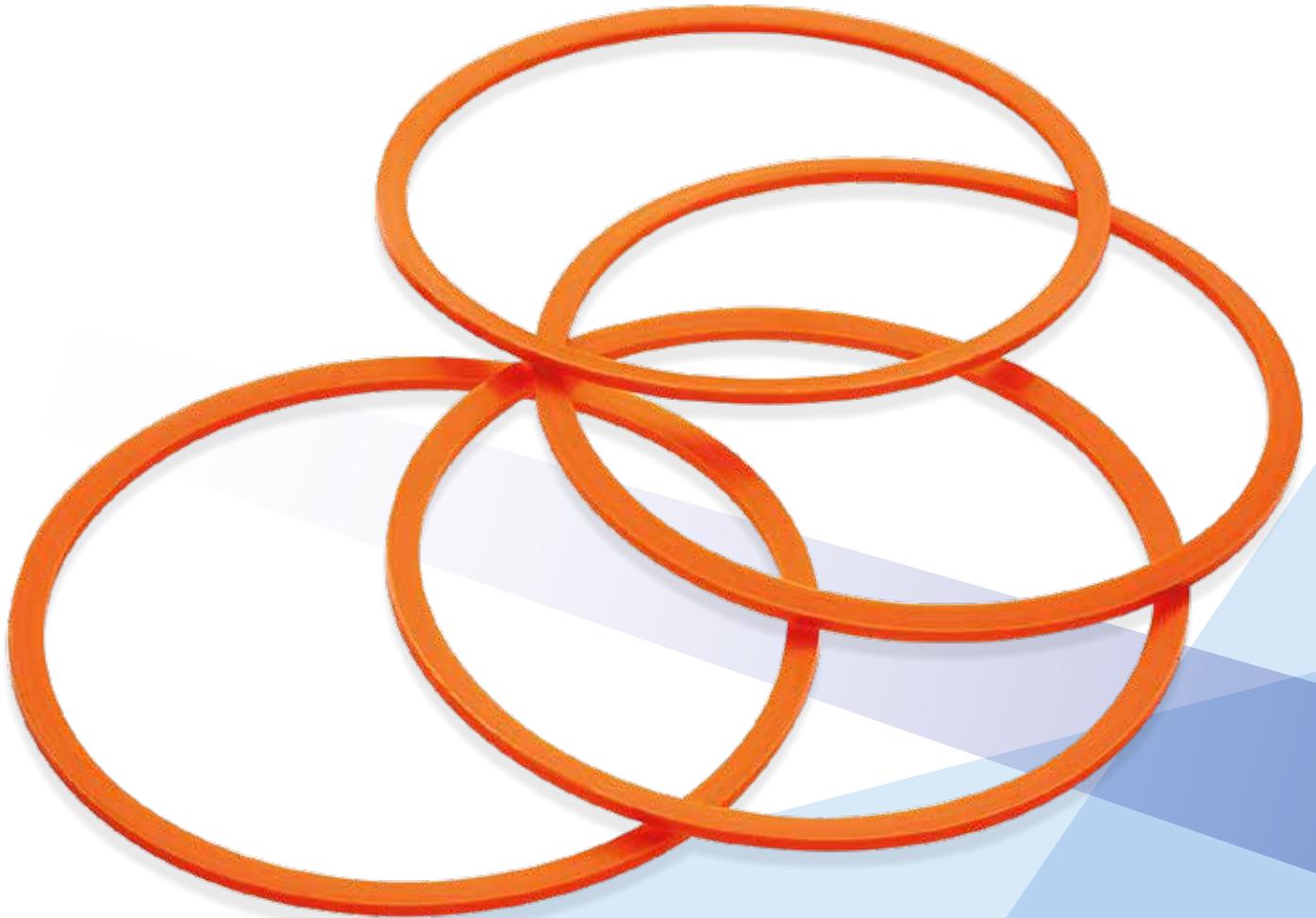


ES&C
ENGINEERED SEALS & COMPONENTS, LLC.

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 copoly-ester 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

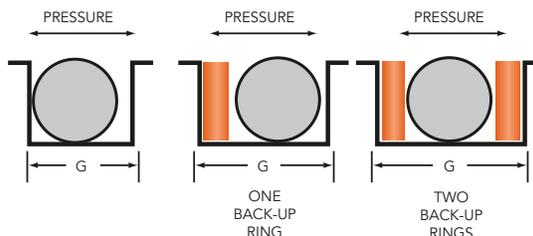
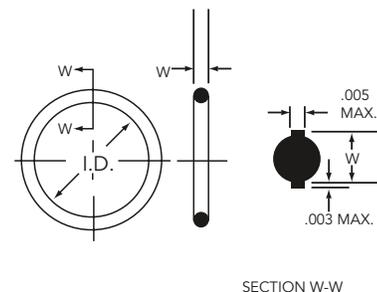
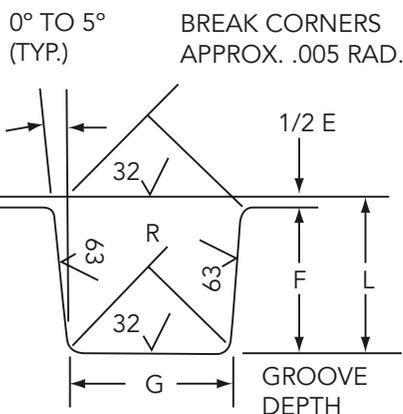
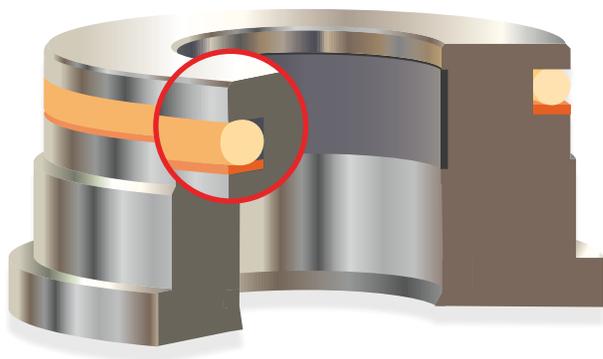
- No more twisted back-ups.
- Fire Resistant Fluids.
- Extended Range -65° to +275°.
- **Dynamic Pressure to 7,000 psi**
- **Static Pressure to 20,000 psi**

For Cartridge Valves Too!





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 Depth	Squeeze		E (a) (c) Diametral 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	.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.

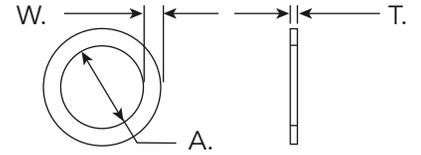
(b) Total Indicator reading between groove and adjacent bearing surface.

(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	4.250	± .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

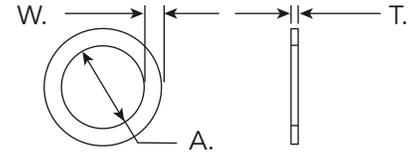
Part # SERIES	ID		C/S		Width		STANDARD COMPOUND
	A	TOL	W	TOL	T	TOL	
758-104	0.145	± .005	.078	± .003	.050	± .005	HT55-OR
758-105	0.175	± .005	.078	± .003	.050	± .005	HT55-OR
750-106	0.207	± .005	.078	± .003	.050	± .005	HT55-OR
750-107	0.239	± .005	.078	± .003	.050	± .005	HT55-OR
750-108	0.270	± .005	.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.





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	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-165	6.520	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-166	6.770	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-167	7.020	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-168	7.270	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-169	7.520	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-170	7.770	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-171	8.020	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-172	8.270	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-173	8.520	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-174	8.770	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-175	9.020	+0.05/-0.10	.078	± .003	.050	± .005	HT55-OR
758-201	0.197	± .005	.108	± .003	.050	± .005	HT55-OR
758-202	0.260	± .005	.108	± .003	.050	± .005	HT55-OR
758-204	0.385	± .005	.108	± .003	.050	± .005	HT55-OR
758-205	0.447	± .005	.108	± .003	.050	± .005	HT55-OR
758-206	0.510	± .005	.108	± .003	.050	± .005	HT55-OR
758-207	0.572	± .005	.108	± .003	.050	± .005	HT55-OR
758-208	0.635	± .005	.108	± .003	.050	± .005	HT55-OR
758-209	0.697	± .005	.108	± .003	.050	± .005	HT55-OR
758-210	0.760	± .005	.108	± .003	.050	± .005	HT55-OR
758-211	0.822	± .005	.108	± .003	.050	± .005	HT55-OR
758-212	0.885	± .005	.108	± .003	.050	± .005	HT55-OR
758-213	0.947	± .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	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-225	1.895	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-226	2.020	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-227	2.145	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-228	2.270	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-229	2.375	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-230	2.520	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-231	2.625	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-232	2.770	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-233	2.895	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-234	3.020	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-235	3.145	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-236	3.270	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-237	3.395	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-238	3.520	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-239	3.645	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-240	3.770	+0.05/-0.10	.108	± .003	.050	± .005	HT55-OR
758-241	3.895	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-242	4.020	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-243	4.145	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-244	4.270	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-245	4.375	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-246	4.520	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-247	4.645	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-248	4.770	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-249	4.895	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-250	5.020	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR

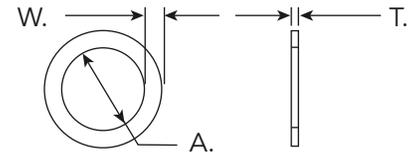
Part # SERIES	ID		C/S		Width		STANDARD COMPOUND
	A	TOL	W	TOL	T	TOL	
758-251	5.145	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-252	5.270	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-253	5.375	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-254	5.520	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-255	5.625	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-256	5.770	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-257	5.875	+0.05/-0.15	.108	± .003	.050	± .005	HT55-OR
758-258	6.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-259	6.270	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-260	6.520	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-261	6.770	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-262	7.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-263	7.270	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-264	7.520	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-265	7.770	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-266	8.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-267	8.270	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-268	8.520	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-269	8.770	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-270	9.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-271	9.250	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-272	9.520	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-273	9.750	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-274	10.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-275	10.520	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-276	11.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-277	11.520	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-278	12.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-279	13.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-280	14.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-281	15.020	+0.10/-0.15	.108	± .003	.050	± .005	HT55-OR
758-283	17.020	+0.10/-0.15	.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	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-332	2.400	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-333	2.525	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-334	2.650	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-335	2.775	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-336	2.900	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-337	3.025	+0.05/-0.10	.167	± .003	.070	± .005	HT55-OR
758-338	3.150	+0.05/-0.10	.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	+0.005/-0.010	.167	± .003	.070	± .005	HT55-OR
758-340	3.400	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-341	3.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-342	3.650	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-343	3.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-344	3.900	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-345	4.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-346	4.150	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-347	4.275	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-348	4.400	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-349	4.525	+0.005/-0.015	.167	± .003	0.07	± .006	HT55-OR
758-350	4.650	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-351	4.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-352	4.900	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-353	5.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-354	5.150	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-355	5.275	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-356	5.400	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-357	5.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-358	5.650	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-359	5.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-360	5.900	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-361	6.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-362	6.275	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-363	6.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-364	6.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-365	7.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-366	7.275	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-367	7.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-368	7.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-369	8.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-370	8.275	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-371	8.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-372	8.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-373	9.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-374	9.275	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-375	9.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-376	9.775	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-377	10.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-378	10.525	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR

Part # SERIES	ID		C/S		Width		STANDARD COMPOUND
	A	TOL	W	TOL	T	TOL	
758-379	11.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-381	12.025	+0.005/-0.015	.167	± .003	.070	± .006	HT55-OR
758-425	4.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-426	4.664	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-427	4.789	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-428	4.914	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-429	5.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-430	5.125	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-431	5.250	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-432	5.414	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-433	5.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-434	5.664	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-435	5.789	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-436	5.914	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-437	6.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-438	6.250	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-439	6.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-440	6.789	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-441	7.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-442	7.289	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-443	7.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-444	7.789	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-445	8.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-446	8.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-447	9.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-448	9.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-449	10.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-450	10.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-451	11.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-452	11.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-453	12.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-454	12.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-455	13.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-456	13.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-457	14.039	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-458	14.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-459	15.250	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-460	15.539	+0.007/-0.015	.222	± .003	.105	± .006	HT55-OR
758-461	16.039	+0.007/-0.015	.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
HT55-OR

Temperature
-65°F to +275°F
(-54° C to +135°C)

HT65-N (Optional)

-65°F to +275°F
(-54° C to +135°C)

Max Pressure Range

Dynamic*	Static
7,000 psi (482 bar)	20,000 psi (1,379 bar)
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.





SERIES 758 STANDARD COMPOUND

POLY-TREL Compound HT55-OR

TPC-ET thermoplastic polyester elastomer

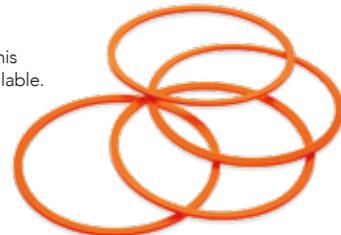
Property	Test Method	Units	Value
Tensile Modulus	ISO 527-1/-2	psi	27,557
Stress @5% Strain	ISO 527-1/-2	psi	1,000
Stress @10% Strain	ISO 527-1/-2	psi	1,600
Stress @ 50% Strain	ISO 527-1/-2	psi	2,030
Stress at Break	ISO 527-1/-2	psi	5,800
Nominal Strain at Break	ISO 527-1/-2	%	780
Strain at Break	ISO 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/in ²	N
Charpy Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	N
Charpy Notched Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	71.4
Charpy Notched Impact Strength, -40°C	ISO 179/1eU	ftlb/in ²	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	mm ³	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.





ENGINEERED SEALS & COMPONENTS

VISIT
www.engseals.com

**For latest Technical Data
& Compound Specifications**

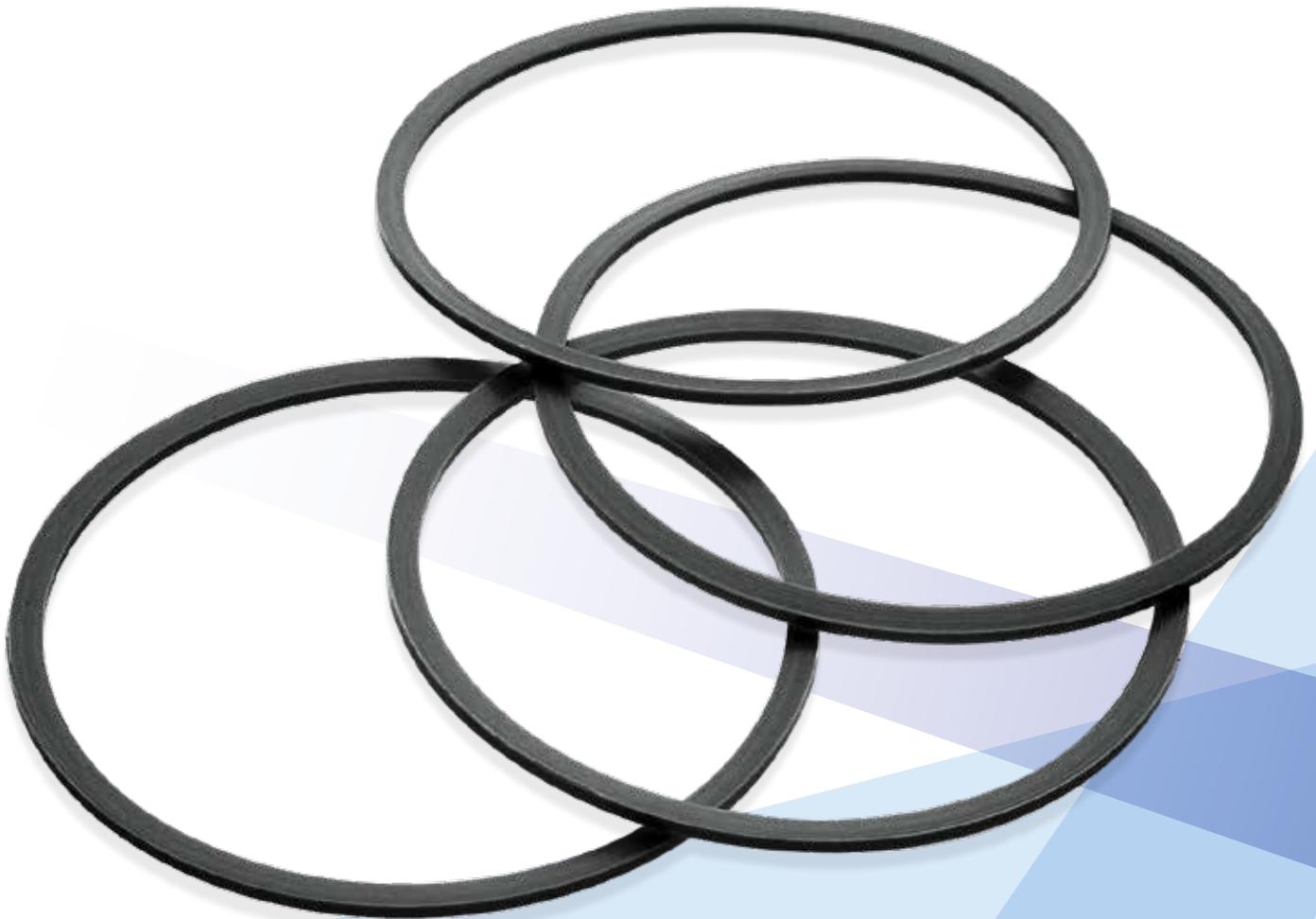


ES&C
ENGINEERED SEALS & COMPONENTS, LLC.

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 than Series 758. In some static applications the cross section could be larger than the groove depth making assembly more difficult. Actual sizes have been furnished on the following pages.

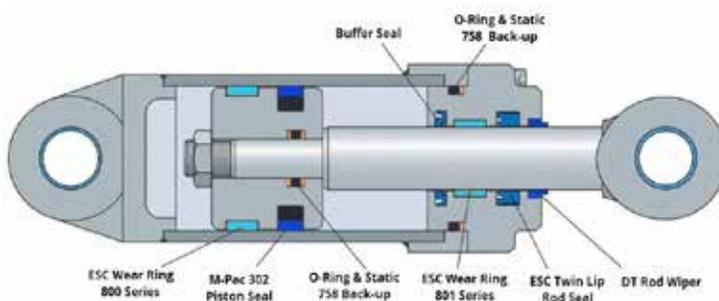
ESC Series 750 has been engineered to fit tightly in the groove. This small difference will make assembly of the hardware easier and faster. Series 750 Back-up rings do not twist or tip over upon assembly.

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

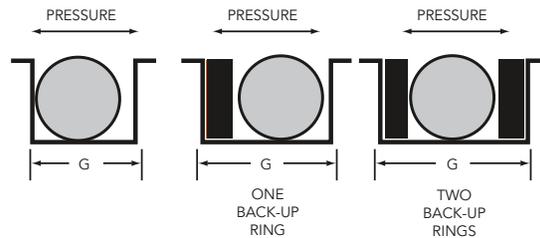
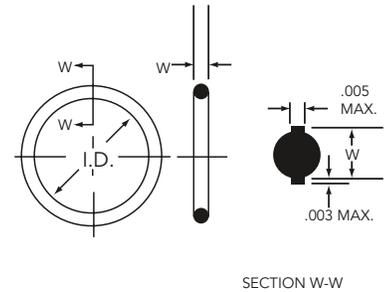
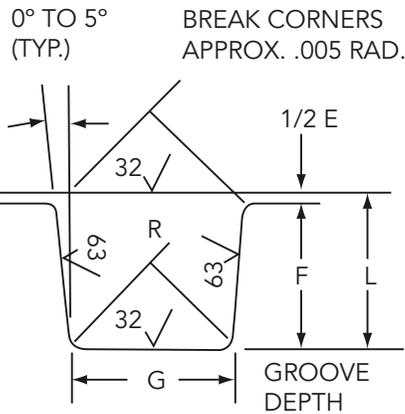
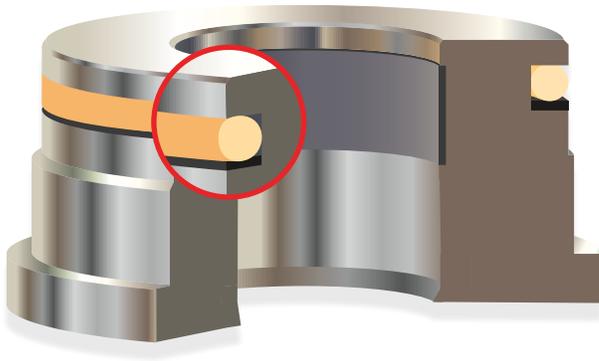
- No more twisted back-ups.
- For use with Static or Dynamic Glands.
- Fire Resistant Fluids.
- Extended Range -65° to 275°.
- Dynamic pressure to 7,000 psi.
- Static Pressure to 20,000 psi.

For Cartridge Valves Too!





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 Depth	Squeeze		E (a) (c) Diametral 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	.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.

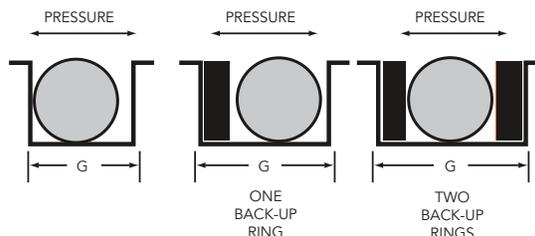
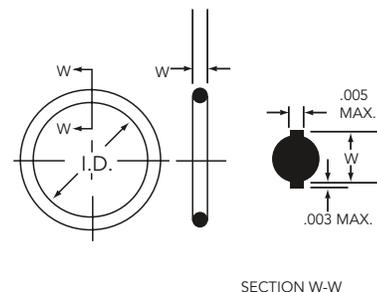
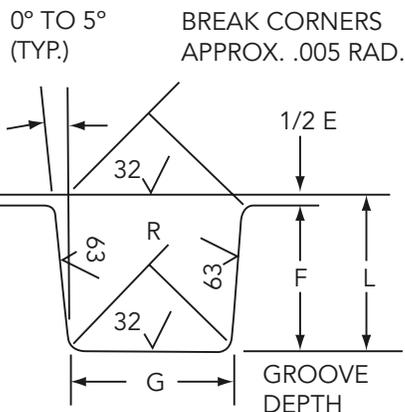
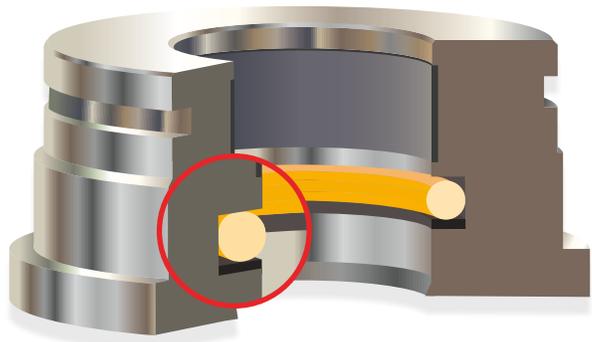
(b) Total Indicator reading between groove and adjacent bearing surface.

(c) Reduce maximum diametrical clearance 50% when using silicone O-rings.





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



INDUSTRIAL O-RING DYNAMIC SEAL GLAND GUIDELINE

O-Ring Size	W Cross Section		L Gland Depth	Squeeze		E (a) (c) Diametral 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

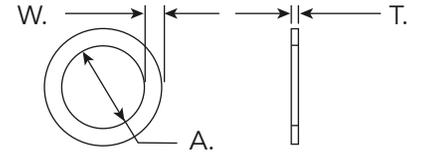
(a) Clearance gap must be held to a minimum consistent with design requirements for temperature range variation.

(b) Total Indicator reading between groove and adjacent bearing surface.

(c) Reduce maximum diametral clearance 50% when using silicone O-rings.



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

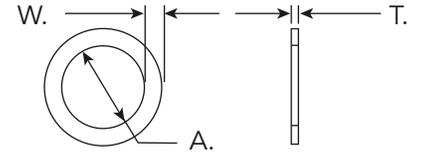
Part # SERIES	ID		C/S		Width		STANDARD COMPOUND
	A	TOL	W	TOL	T	TOL	
750-104	.125	± .010	.088	± .005	.050	± .005	HT55-BK
750-105	.155	± .010	.088	± .005	.050	± .005	HT55-BK
750-106	.187	± .010	.088	± .005	.050	± .005	HT55-BK
750-107	.219	± .010	.088	± .005	.050	± .005	HT55-BK
750-108	.250	± .010	.088	± .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 stretched. 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

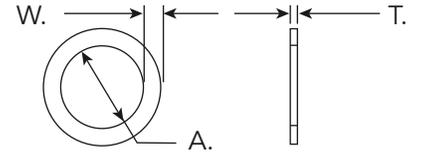
Part # SERIES	ID		C/S		Width		STANDARD COMPOUND
	A	TOL	W	TOL	T	TOL	
750-251	5.125	± .023	.115	± .005	.050	± .005	HT55-BK
750-252	5.250	± .023	.115	± .005	.050	± .005	HT55-BK
750-253	5.375	± .023	.115	± .005	.050	± .005	HT55-BK
750-254	5.500	± .023	.115	± .005	.050	± .005	HT55-BK
750-255	5.625	± .023	.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 stretched. 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	
750-339	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 stretched. 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
HT55-BK

Temperature
-65°F to +275°F
(-54° C to +135°C)

HT65-N (Optional)
-65°F to +275°F
(-54° C to +135°C)

Max Pressure Range

Dynamic* 7,000 psi (482 bar)

Static 20,000 psi (1,379 bar)





SERIES 750 STANDARD COMPOUND

POLY-TREL Compound HT55-BK

TPC-ET thermoplastic polyester elastomer

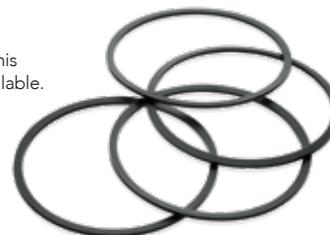
Property	Test Method	Units	Value
Tensile Modulus	ISO 527-1/-2	psi	27,557
Stress @5% Strain	ISO 527-1/-2	psi	1,000
Stress @10% Strain	ISO 527-1/-2	psi	1,600
Stress @ 50% Strain	ISO 527-1/-2	psi	2,030
Stress at Break	ISO 527-1/-2	psi	5,800
Nominal Strain at Break	ISO 527-1/-2	%	780
Strain at Break	ISO 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/in ²	N
Charpy Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	N
Charpy Notched Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	71.4
Charpy Notched Impact Strength, -40°C	ISO 179/1eU	ftlb/in ²	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	mm ³	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.



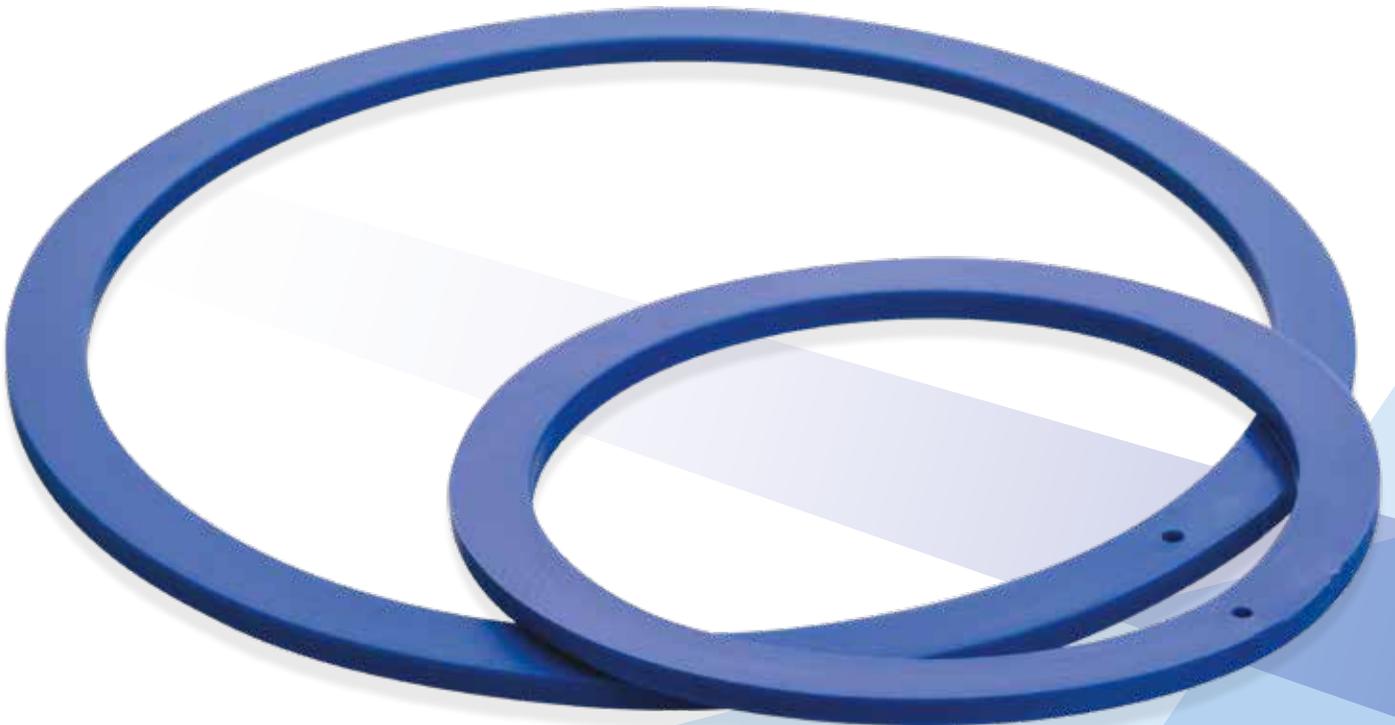


ES&C
ENGINEERED SEALS & COMPONENTS, LLC.

POLY-TREL SERIES 756 VENTED BACK-UPS

KEY FEATURES OF SERIES 756 BACK-UPS:

- Dynamic Back-Up Applications
- Reduces Pressure Trapping
- Temperature 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.

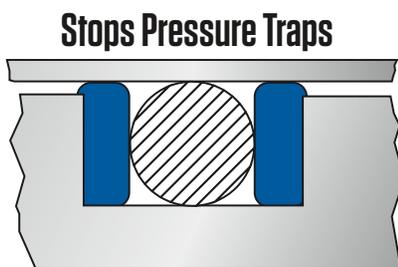


Figure 1

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.

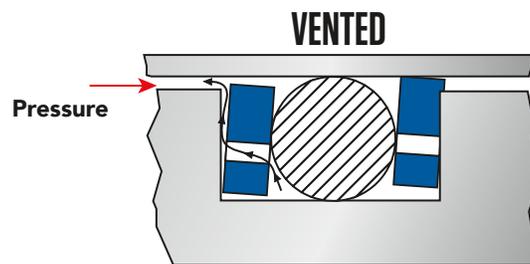


Figure 2

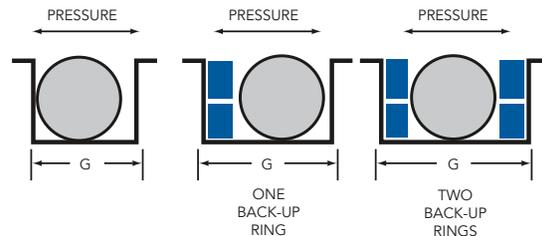
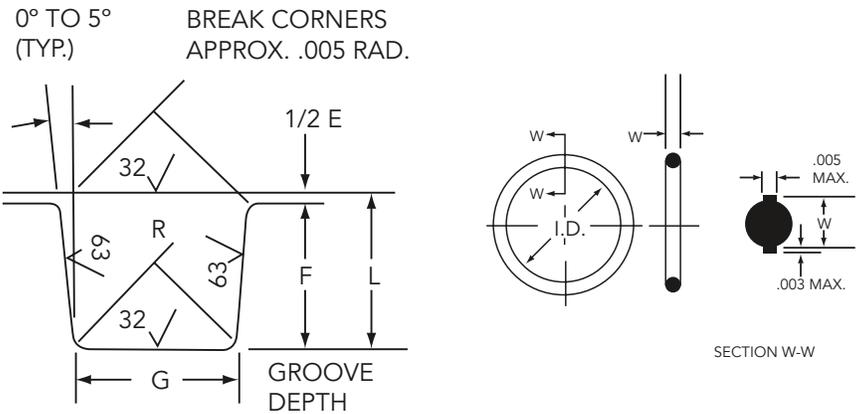
Series 756 back-up rings include a vent hole extending axially there through to permit the alleviation of any fluid pressure accumulating between the two spaced apart Back-up rings.

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.



SERIES 756 POLY-TREL BACK-UP & O-RING GROOVE DESIGN GUIDE



INDUSTRIAL O-RING DYNAMIC SEAL GLAND GUIDELINE

O-Ring Size	W Cross Section		L Gland Depth	Squeeze		E (a) (c) Diametral 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.

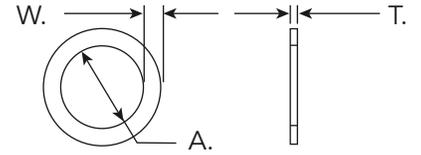
(b) Total Indicator reading between groove and adjacent bearing surface.

(c) Reduce maximum diametral clearance 50% when using silicone O-rings.



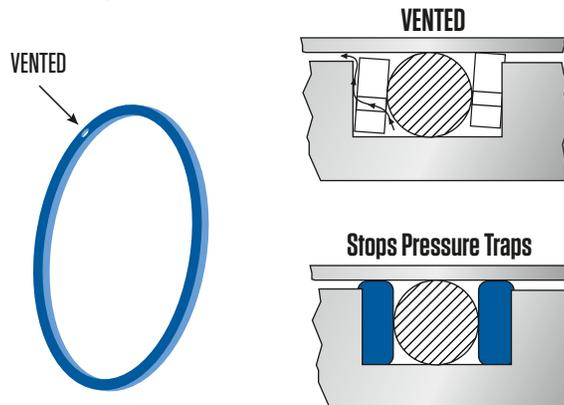


SERIES 756 VENTED POLY-TREL BACK-UP SIZES



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
756-212S	.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.





SERIES 756

VENTED POLY-TREL BACK-UPS STANDARD COMPOUNDS

POLY-TREL™ Compound HT55-BLU, & HT47-N

TPC-ET Thermoplastic Polyester Elastomer

Property Compound Number	Test Method	Units	Value HT47-N	Value 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/in ²	N	N
Charpy Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	N	N
Charpy Notched Impact Strength, 23°C	ISO 179/1eU	ftlb/in ²	N	71.4
Charpy Notched Impact Strength, -40°C	ISO 179/1eU	ftlb/in ²	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	mm ³	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.

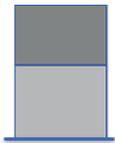


*We highly recommend testing in your specific application, this is a guide only.

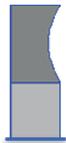




JET EXPRESS CUSTOM BACK-UPS ON DEMAND



BU-108



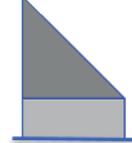
BU-109



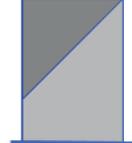
WBU-110



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](mailto:sales@engseals.com)

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





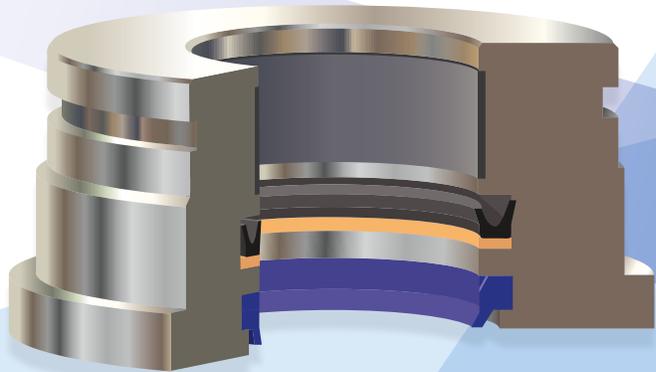
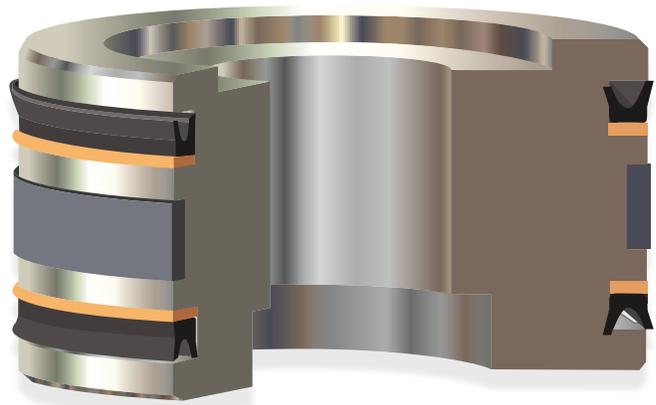
ESCC
ENGINEERED SEALS & COMPONENTS, LLC.

POLY-TREL SERIES 790 MODULAR BACK-UPS

For Loaded U-Cups & Standard U-Seals

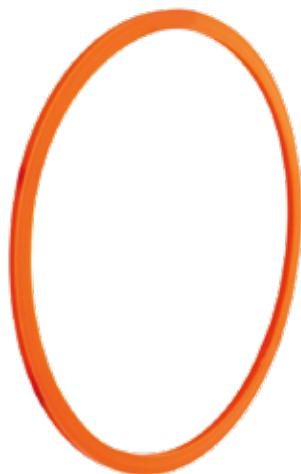
KEY FEATURES OF SERIES 790 BACK-UPS:

- 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

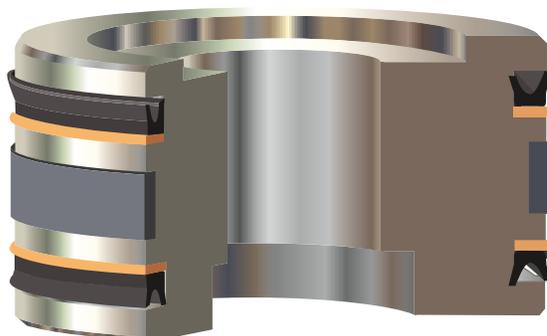
790 Series Back-up. Low Profile Modular Back-Up for Loaded U-Cup Seals and Rubber U-Cup Seals.

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.

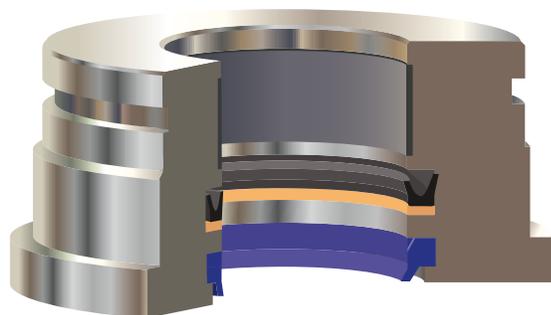
Standard Materials	Temperature	Max. Pressure Range**
HT-55-OR	-65°F to +275°F (-54°C to +135°C)	7,000 psi (482 bar)

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

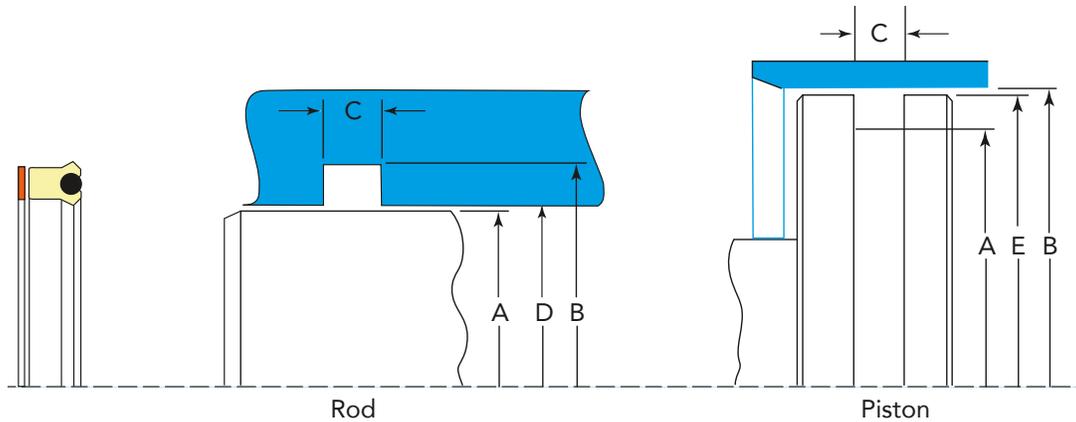


790 installed in Rod Gland



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





SERIES 790 STANDARD COMPOUND

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

TPC-ET thermoplastic polyester elastomer

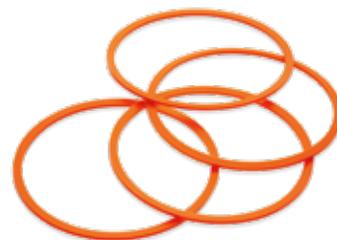
Property	Test Method	Units	Value
Tensile Modulus	ISO 527-1/-2	psi	27,557
Stress @5% Strain	ISO 527-1/-2	psi	1,000
Stress @10% Strain	ISO 527-1/-2	psi	1,600
Stress @ 50% Strain	ISO 527-1/-2	psi	2,030
Stress at Break	ISO 527-1/-2	psi	5,800
Nominal Strain at Break	ISO 527-1/-2	%	780
Strain at Break	ISO 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/in ²	N
Charpy Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	N
Charpy Notched Impact Strength, -30°C	ISO 179/1eU	ftlb/in ²	71.4
Charpy Notched Impact Strength, -40°C	ISO 179/1eU	ftlb/in ²	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	mm ³	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.





ENGINEERED SEALS & COMPONENTS

VISIT
www.engseals.com

**For latest Technical Data &
Compound Specifications**

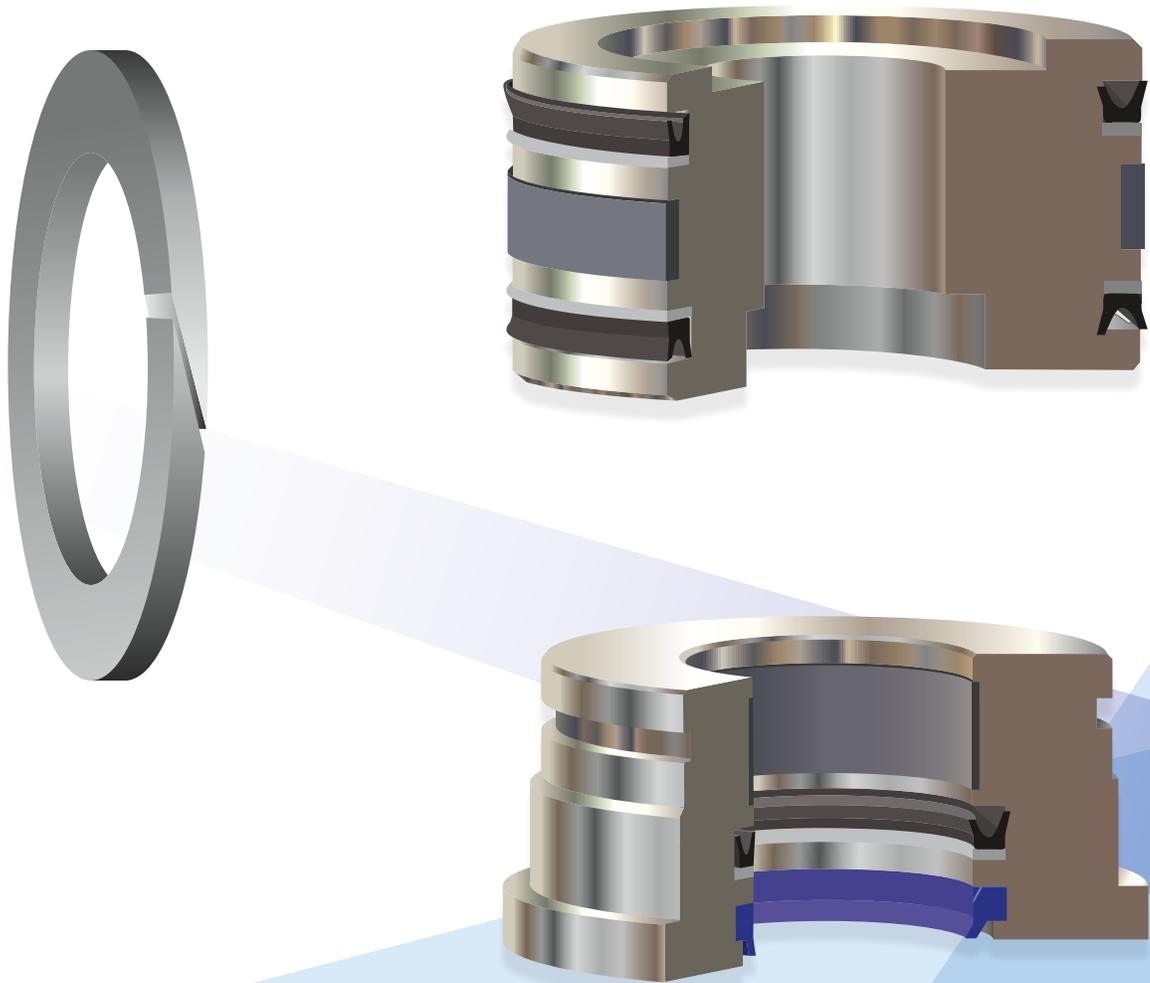


ESCC
ENGINEERED SEALS & COMPONENTS, LLC.

SERIES 757 SPLIT
GLASS FILLED NYLON
MODULAR BACK-UPS
For Loaded U-Cups & Standard U-Seals

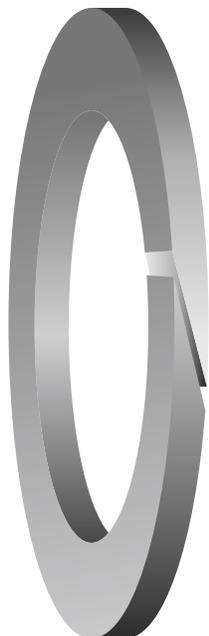
KEY FEATURES OF SERIES 757 SPLIT BACK-UPS:

- 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.

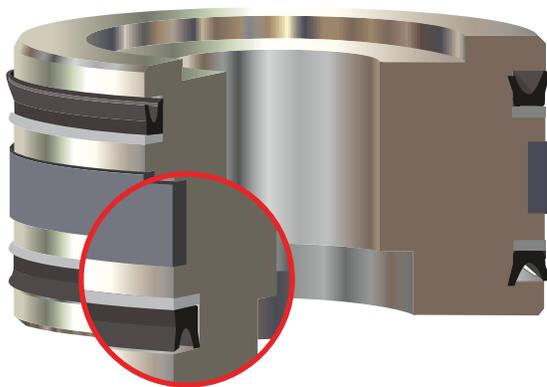
Standard Materials	Temperature	Max. Pressure Range**
PA940	-65°F to +275°F (-54°C to +135°C)	7,000 psi (482 bar)

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

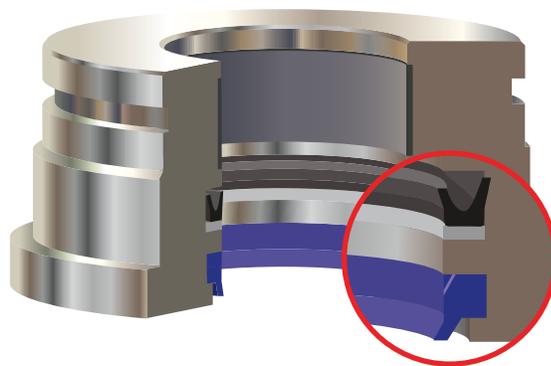
** 4,900 psi (337 bar) with tight-tolerance wear rings (.123/.125 c/s) Series 200 Ultra-Precision Wear Rings.

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

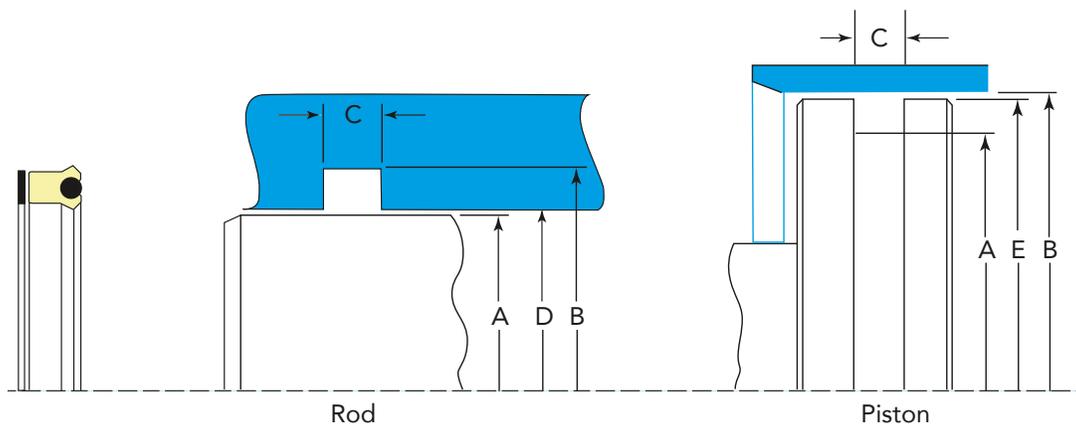


757 installed in Rod Gland



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.

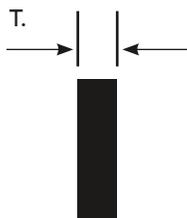
This Series Back-ups are designed to be used in either a Piston or Rod application.

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 accommodate the height of the back-up ring.

Utilizing the glands axial 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.

$$C = \text{Previous gland width} + T. \text{ Width}$$



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 width of the groove that was calculated.

Series 757 Profile



SERIES 757 ESC-Ion BACK-UP RING SIZES

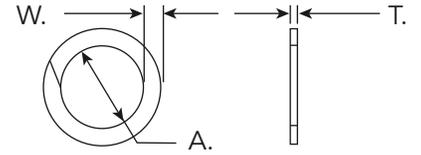


Table 757

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





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

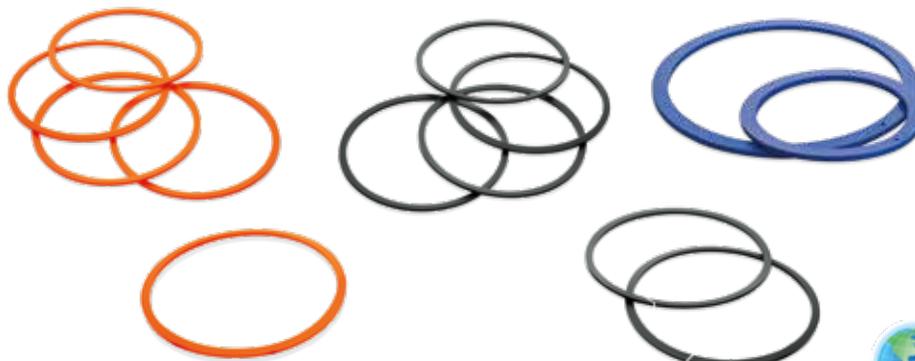
POLY-TREL FAMILY OF COMPOUNDS

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.

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 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.





ENGINEERED SEALS & COMPONENTS

POLY-TREL FLEXIBILITY AT TEMPERATURE

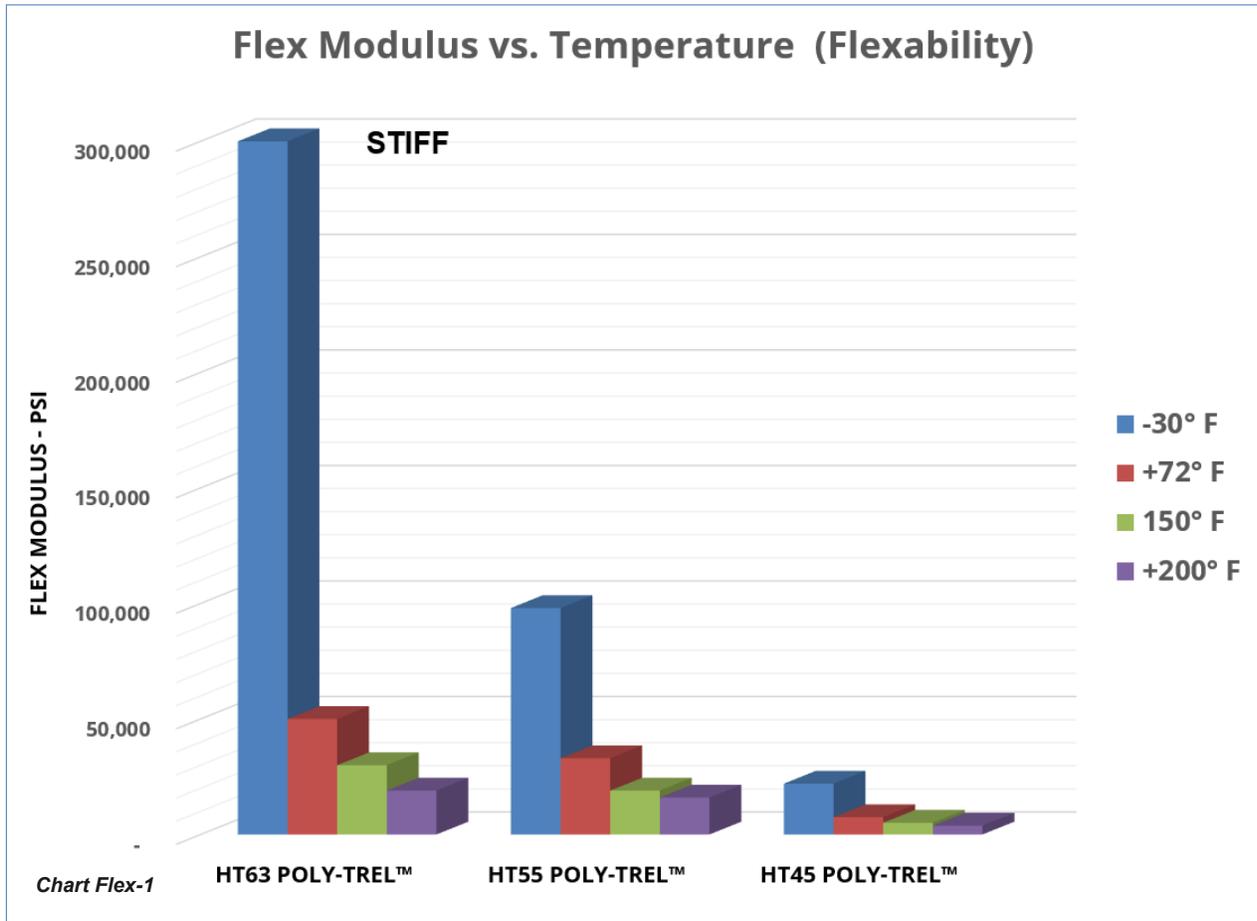


Chart Flex-1 shows how Temperature effects the hardness and flexibility of 3 grades of POLY-TREL.

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.

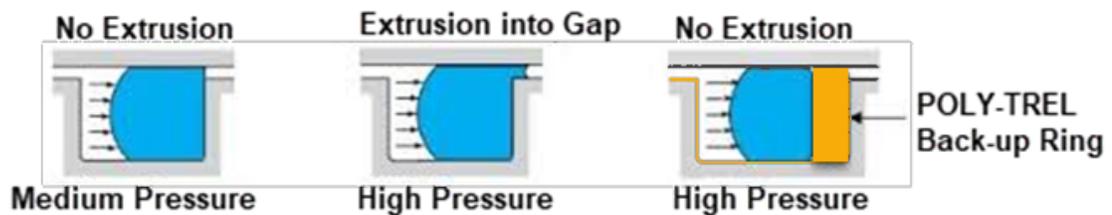
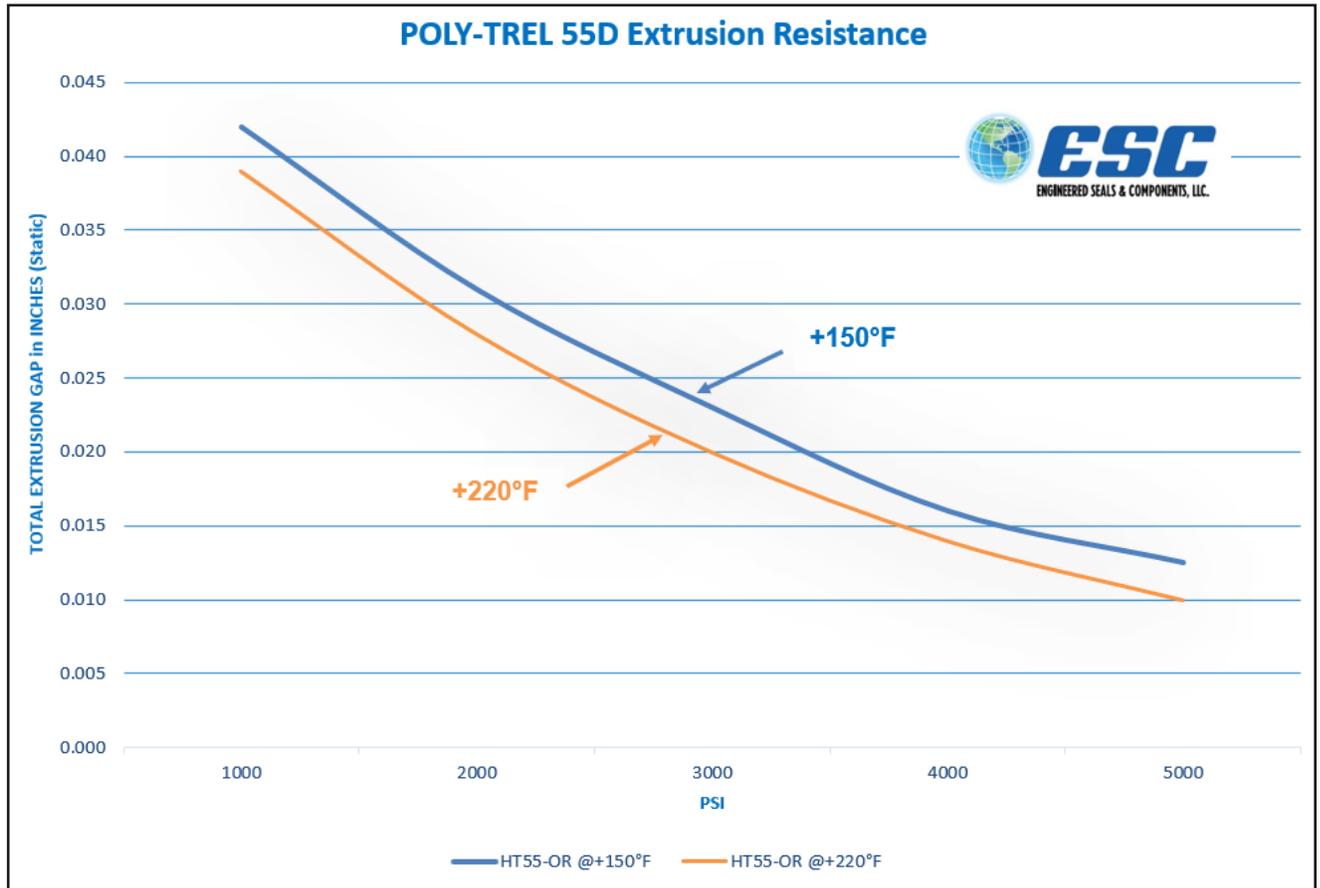
Compound HT55 is the best all around Material. Is not too hard as to interfere with assembly, yet not too soft to give up on the higher temperature ranges. These compounds have a useful temperature range of -65 F to +275 F.





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

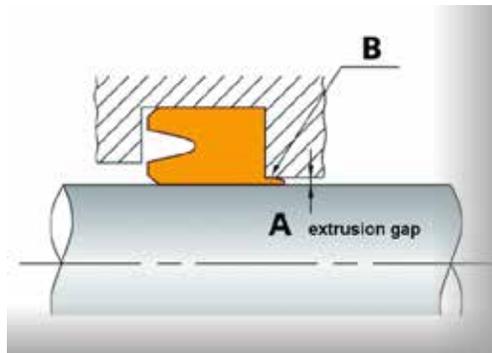
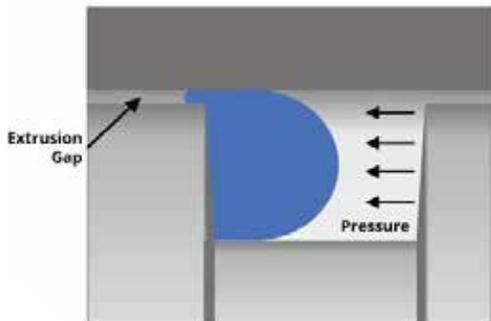
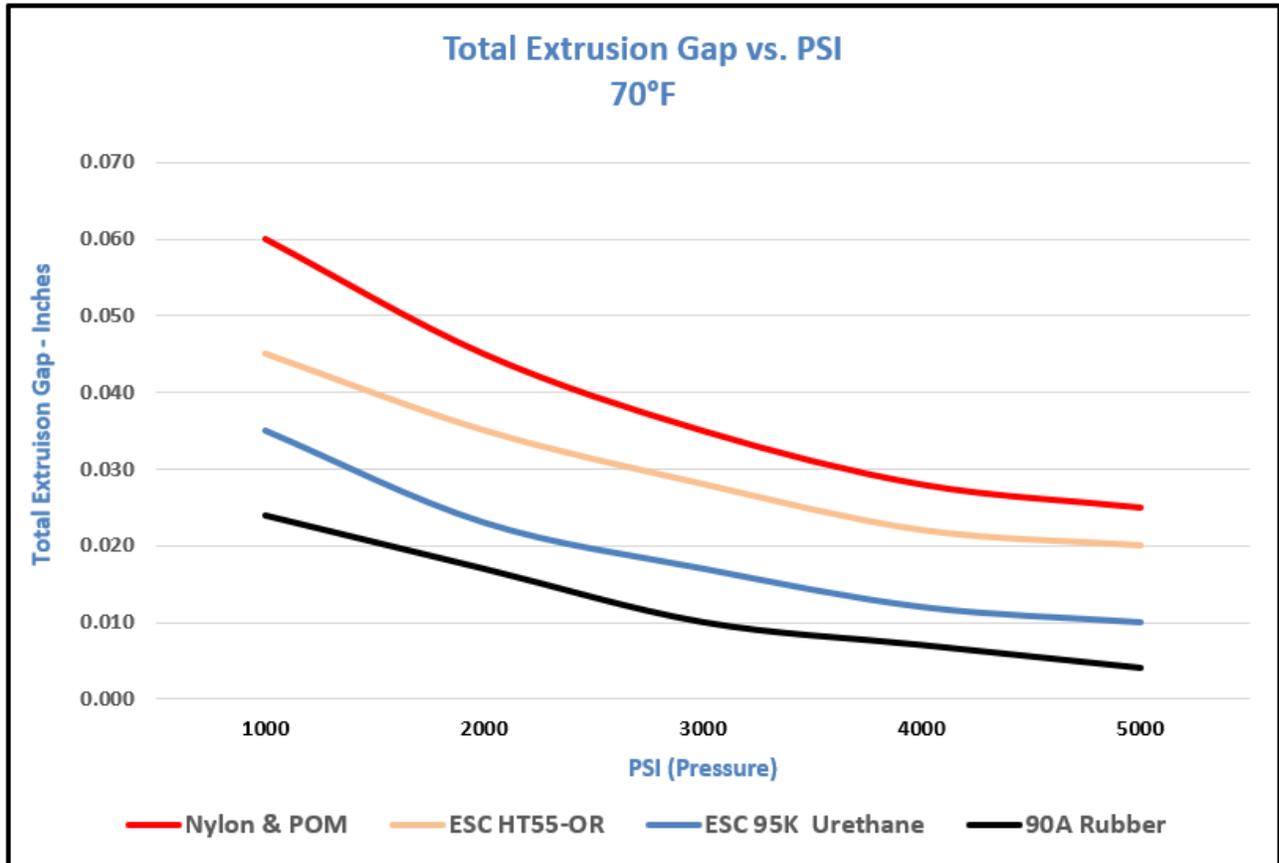
Above data was acquired in a test laboratory. No side load, shock loads, or dynamic motions were applied. Your results may be different. This information is to be used as a guideline only. It is always good practice to test in actual or specific conditions and applications.





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*	Chemical	Rating*	Chemical	Rating*
Acetic acid, 20%	A	Diocetyl phthalate	A	Nitrobenzene	C
Acetic acid, 30%	A	Epichlorohydrin	X	Oleic acid	A
Acetic acid, glacial	A	Ethyl acetate	A,B	Oleum 20-25%	C
Acetic acid, glacial (+100° F - +38° C)	B	Ethyl alcohol	A	Palmitic acid	A
Acetic Anhydride	T	Ethyl chloride	C	Perchloroethylene	B,C
Acetone	B	Ethylene dichloride	B,C	Phenol	C
Acetylene	A	Ethylene glycol	A	Pickling Solution (20% nitric acid, 4% HF)	X
Aluminum chloride solutions	T	Ethylene oxide	A	Pickling Solution (17% nitric acid, 4% HF)	X
Aluminum sulfate solutions	T	Ferric chloride solutions	T	Potassium dichromate solutions	T
Ammonium chloride solutions	A	Fluosilicic acid	T	Potassium hydroxide solutions	A
Ammonium hydroxide solutions	T	Formaldehyde 40%	B	Pydraul 312C	A
Ammonium sulfate solutions	B	Formic Acid	B	Pyridine	X
Amyl Acetate	B	FREON®-11	A	SAE 10 oil	A
Amyl alcohol	A	FREON®-12	A	Sea water	A
Aniline	C	FREON-113® (130° F - 55° C)	A	Silicone grease	A
ASTM oil = 1 (300° F - 149° C)	A	FREON®-114	A	SKYDROL 500	A
ASTM oil = 3 (300° F - 149° C)	A	Gasoline	A	Soap solutions	A
ASTM reference fuel A (158°F - 70° C)	A	Glue	A	Sodium chloride solutions	A
ASTM reference fuel B (158°F - 70° C)	A	Glycerin	A	Sodium dichromate 20%	T
ASTM reference fuel C	A	n-Hexane	A	Sodium hydroxide 20%	A
ASTM reference fuel C (158°F - 70° C)	B	Hydrazine	C	Sodium hypochlorite 5%	B
Asphalt	T	Hydrochloric acid 20%	B	Sodium hydroxide 46.5%	A
Barium hydroxide solutions	T	Hydrocyanic acid	T	Soybean oil	T
Beer	A	Hydrofluoric acid 48%	X	Stannous chloride 15%	T
Benzene	B	Hydrofluoric acid 75%	X	Steam (212° F - 100° C) stabilized	B
Borax solutions	A	Hydrofluoric acid, anhydrous	X	Steam (230° F - 110° C) stabilized	C
Boric acid solutions	A	Hydrogen	A	Stearic acid	T
Bromine anhydrous liquid	X	Hydrogen sulfide	A	Styrene	X
Butane	A	Isooctane	A	Sulfur, molten	T
Butyr acetate	B	Isopropyl alcohol	A	Sulfur dioxide, liquid	T
Butyric acid	T	JP-4	A	Sulfur dioxide, gas	T
Calcium chloride solutions	A	Kerosene	T	Sulfuric acid up to 50%	A
Calcium hydroxide solutions	T	Lacquer solvents	A,B	Sulfuric acid 50-80%	C
Calcium hypochlorite 5%	A	Lactic acid	T	Sulfuric acid 60%	C
Carbon bisulfide	B	Linseed oil	T	Sulfuric acid 90%	C
Carbon dioxide	A	Lubricating oils	A	Sulfuric acid 95%	C
Carbon monoxide	A	Magnesium chloride solutions	T	Sulfuric acid fuming (20% oleum)	C
Carbon tetrachloride	A,B,C	Magnesium hydroxide solutions	T	Sulfurous acid	B
Castor oil	A,B	Mercuric chloride solutions	T	Tannic acid 10%	A
Chlorine gas, dry	X	Mercury	A	Tartanic acid	T
Chlorine gas, wet	X	Methyl alcohol	A	Tetrahydrofuran	A,B
Chloroacetic acid	X	Methyl ethyl ketone	A,B	Toluene	B
Chlorobenzene	X	Methylene chloride	C	Trichloroethylene	C
Chloroform	C	Mineral oil	A	Triethanolamine	C
Chlorosulfonic acid	C	Naphtha	A	Trisodium phosphata solution	C
Citric acid solutions	A	Naphthalene	A,B	Tung oil	T
Copper chloride solutions	A	Nitric acid 10%	B	Water (158° F - 70° C)	A
Copper sulfate solutions	A	Nitric acid 30%	C	Water (212° F - 100° C) with stabilizer	B
Cottonseed oil	A	Nitric acid 60%	C	Xylene	A,B
Cyclohexane	A	Nitric acid 70%	C	Zinc chloride solutions	A
Dibufyl phthalate	A	Nitric acid, red fuming	C		
Diethyl sebacate	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.

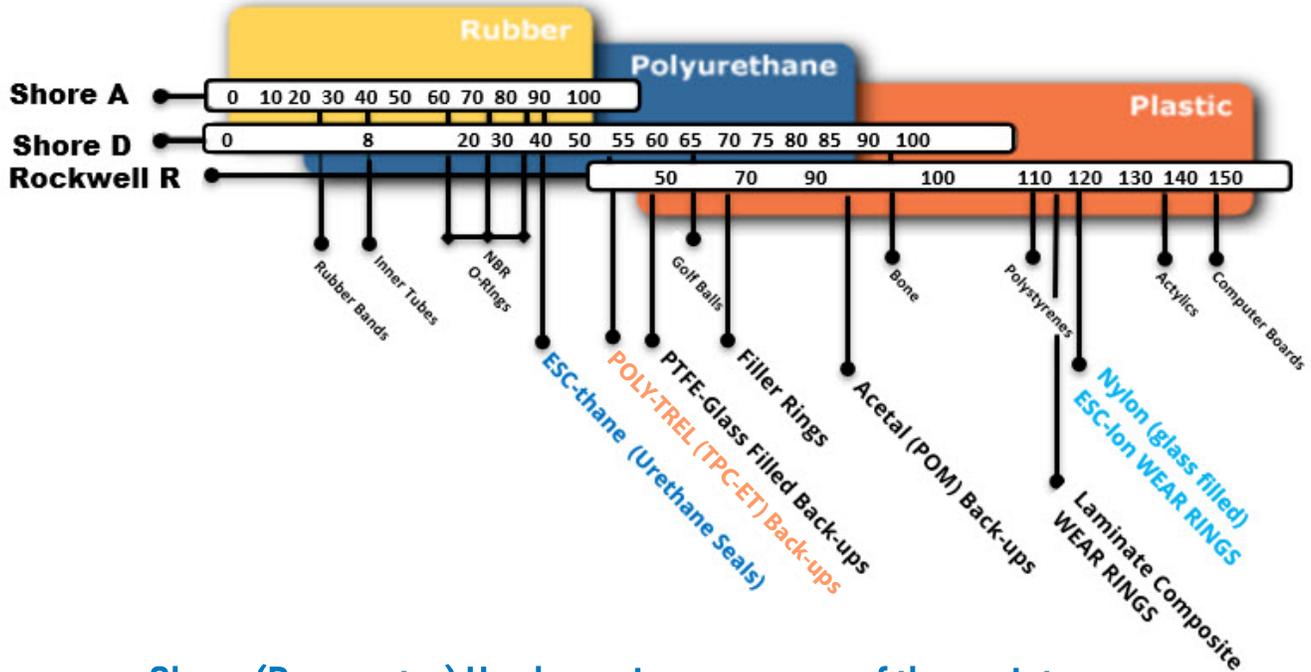
We emphasize that this tabulation should be used as a guide only. It is based primarily on laboratory and service tests but does not take into account all variables that can be encountered in actual use. Therefore, it is always advisable to test the material under actual service conditions before specification. If this is not practical, tests should be devised that simulate service conditions as closely as possible.





ENGINEERED SEALS & COMPONENTS SHORE A, D AND R HARDNESS SCALES

DUROMETER SCALES CROSS REFERENCE

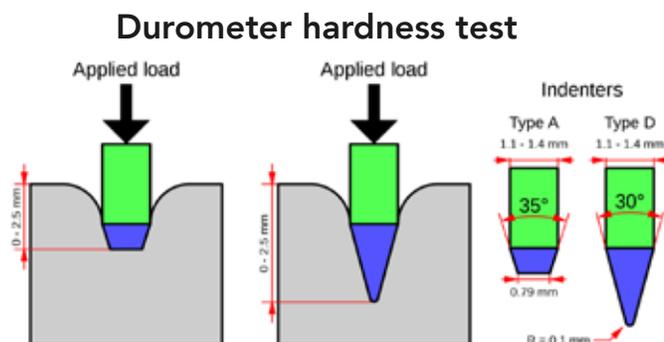


Shore (Durometer) Hardness is a measure of the resistance a material has to indentation.

Named after its inventor, 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, rigid 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.



TYPICAL COMPOUND USAGE AND TEMPERATURE GUIDE

Compound Number			Description	Temperature Range		Typical Usages
				°C	°F	
ESC-Ion™	Compound	PA940	Glass Filled Nylon 6	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA940-B	Glass Filled Nylon 6 / Lub	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA940-CB	Glass Filled Nylon 6 / Lub (Blue "CB")	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA940-15	Glass Filled Nylon 6 / PTFE	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA101-N	Nylon Unfilled 6/6	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA101-BK	Nylon Unfilled 6/6 Black	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA101-BLU	Nylon Unfilled 6/6 Blue	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	PA933-BK	Glass Filled Nylon 6/6	-54°/+135°	-65°/+275°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	HTN20-C	Hi Temp. "No Swell" Carbon Filled	-54°/+148°	-65°/+300°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	HTN30-C	Hi Temp. "No Swell" Carbon Filled	-54°/+148°	-65°/+300°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	Compound	HTN-30	Hi Temp. "No Swell" Glass Filled	-54°/+148°	-65°/+300°	Wear Rings, Back-ups, Piston Seals, Guide Rings, Bearings
ESC-Ion™	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-SOR	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	HT55SHS-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



ENGINEERED SEALS & COMPONENTS

SEALS & COMPONENTS STORAGE CONDITIONS / SHELF LIFE

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



- Temperature
- Humidity
- Light / Radiation
- Solvents / Greases
- Deformation
- Storage Time
- O₂ Oxygen / Ozone

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 extremely 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 very 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.

	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





WARRANTY AND REMEDY

Important Notice:

We reserve the right to make changes without notice in our products and in the information content of this brochure / catalog. The statements and information in the brochure / catalog are intended to serve as a guide only. They are not warranties or binding descriptions of the products.

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





ES&C

ENGINEERED SEALS & COMPONENTS, LLC.

ENGINEERED SEALS & COMPONENTS
“Let’s Make it Happen”

www.engseals.com • 712-580-3990