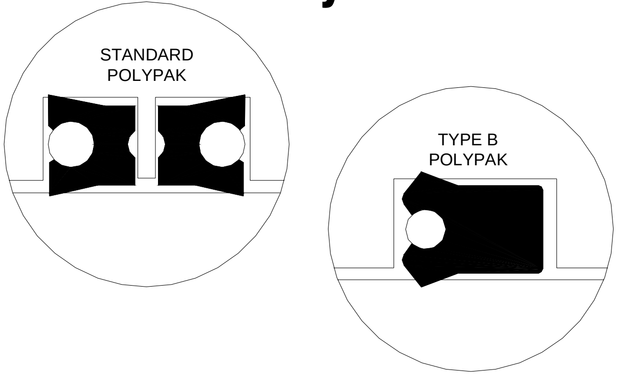
PARKER PolyPak SEALS



GENERAL The Parker PolyPak is a patented precision molded multi-purpose seal. The Parker PolyPak combines an O-ring type synthetic rubber O-Spring with a conventional lip-type seal (see Figure 1.) to produce a unique sealing device capable of sealing both vacuum, high and low pressure.

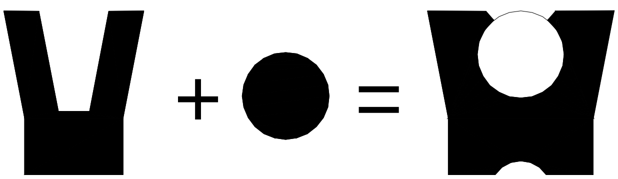


FIGURE 1

POLYPAK THEORY Conventional lip seals, such as the standard U-Packing are prone to leakage under low pressure because little or no LIP LOADING is inherent in the basic seal design.

The Parker PolyPak however, is a squeeze type seal and provides high sealability at low pressure. As system pressure increases, additional force is applied to the PolyPak's seal interface and as pressure continues to increase, lip loading is automatically increased to compensate for this higher pressure and thus maintain a positive, leak-free seal from hard vacuum to over 60,000 psi with proper design and auxiliary devices (see Figure 2.).

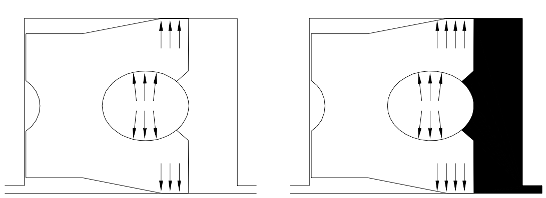


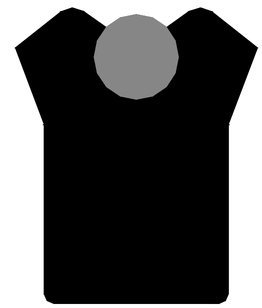
FIGURE 2

O-SPRING IS SQUEEZED CREATING A POSITIVE UNIT LOAD ON POLYPAK INDEPENDENT OF SYSTEM PRESSURE POLYPAK THUS SEALS EFFECTIVELY AT LOW PRESSURE OR VACUUM.

LIPS ARE FORCED AGAINST SURFACES TO BE SEALED AS A FUNCTION OF APPLIED SYSTEM PRESSURE PLUS THE INITIAL O-SPRING SQUEEZE. O-SPRING PRESSURE REMAINS CONSTANT FROM ZERO PRESSURE TO INFINITY.

POLYPAK ADVANTAGES In addition to providing superior sealing in vacuum, low and high pressure applications, the PolyPak offers a number of distinct advantages over conventional symmetrical or non-symmetrical U-Packings.

(1) The PolyPak's O-Spring stabilizes the seal under extreme pressures , preventing seal lip distortion and rolling or twisting in the gland.
(2) At low or high temperature extremes, the O-Spring maintains lip loading on both I.D. and O.D. of the seal interface.
(3) The PolyPak seal can be stretched or squeezed to accomodate oversize cylinder bores and undersize rods. As long as the seal CROsS-SECTION is correct in relation to the radial groove dimensions, the PolyPak will compensate and maintain proper lip loading.
(4) The range of materials available to the user of the Parker PolyPak insures the proper combination or abrasion, extrusion, temperature resitance and fluid compatibility which produces high sealability and long seal life.



·HIGH CONFORMABILITY

·EXCELLENT SEALABILITY

·HIGH MEMORY OF O-SPRING

·LONG SERVICE LIFE

·HIGH STABILITY

·CHOICE OF STYLES

·CHOICE OF MATERIALS

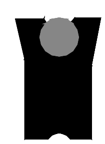
·EASILY RETROFITS

OTHER SEALS

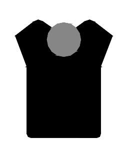
PARKER POLYPAK STYLES

STANDARD
Standard PolyPak seals are square in cross-section and are suitable for a wide variety of rod and piston applications. Available in cross-sections from 1/8" to 1" and diameters to 90", the Standard PolyPak is ideal for retrofit of existing seal grooves.

DEEP
Deep PolyPak seals are rectangular versions of the Standard PolyPak. The added length improves stability in high-shock, heavy duty applications. Available in cross-sections from 1/8" to 1" and diameters to 90".



TYPE "B"
Type "B" PolyPak seals add a back-bevel lip to the Deep PolyPak shape and thus align the seal interface near the centerline of the O-Spring to provide increased squeeze (and sealability). This highly stable configuration provides excellent low pressure sealing as well as "super-pressure" capability. Available in all sizes from 1/8" to over 90" diameter.



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PolyPak DESIGN DATA

INTRODUCTION This section covers the basics of PolyPak Seal design and is intended to give the designer / engineer a brief overview of the requirements for reliable seal performance. **Complete design and engineering assistance is available by calling us during normal business hours.**

ROD SEALING WITH POLYPAK As a general rule, rod seals are more critical in nature than their companion piston seals. As most equipment manufacturers require "dry rod" capability, both to conserve system fluid and to avoid leakage for cosmetic and environmental reasons, the design and selection of the rod seal can be rather more difficult than it's piston counterpart.

Parker recommends the use of the Type B PolyPak for rod seal applications. First, because of the excellent film-breaking capability of the back-beveled design. Second, the higher level of lip loading provided by the Type B offers maximum sealability and finally because the long body of the design provides maximum stability and extrusion resistance.

PISTON SEALING WITH POLYPAK Piston Seals can be classed in two categories, SINGLE ACTING and DOUBLE ACTING. The single acting seal is only required to seal in a single direction as system pressure is seen on only one side of the cylinder (return of the piston in a single acting system is accomplished either by gravity or spring loading). The double acting cylinder requires that the piston be sealed in both directions of stroke as system fluid is applied to one side or the other to achieve movement.

Parker recommends the use of either (1) two Standard (2) two Deep PolyPak or (3) one Type B PolyPak with PIP ring (see PIP SEAL) on double acting cylinders. **DO NOT USE TWO TYPE B POLYPAKS in double acting applications** as the extreme sealing ability of the Type B PolyPak is such that a PRESSURE TRAP (see pressure trap, page 6) may be created.

PISTON & ROD SEAL DESIGN HINTS Some other things to remember when considering piston & rod seal design are:

(1) Surface Finish-An 10-16 rms finish is preferred on all dynamic surfaces and a 10-32 rms finish for static (see SURFACE FINISH on page 6).
(2) Adequate Bearing surface – Be sure to allow for sufficient bearing surface to protect against side loading.
(3) Wear Bands – Use of wear bands can cause unexpected problems with rod & piston seal geometry. Consult factory for assistance.
(4) Seal cross-section – Use the largest seal cross-section that your design and good installation practice will allow. Parker PolyPaks are available in a number of C / S dimensions to suit your requirements.

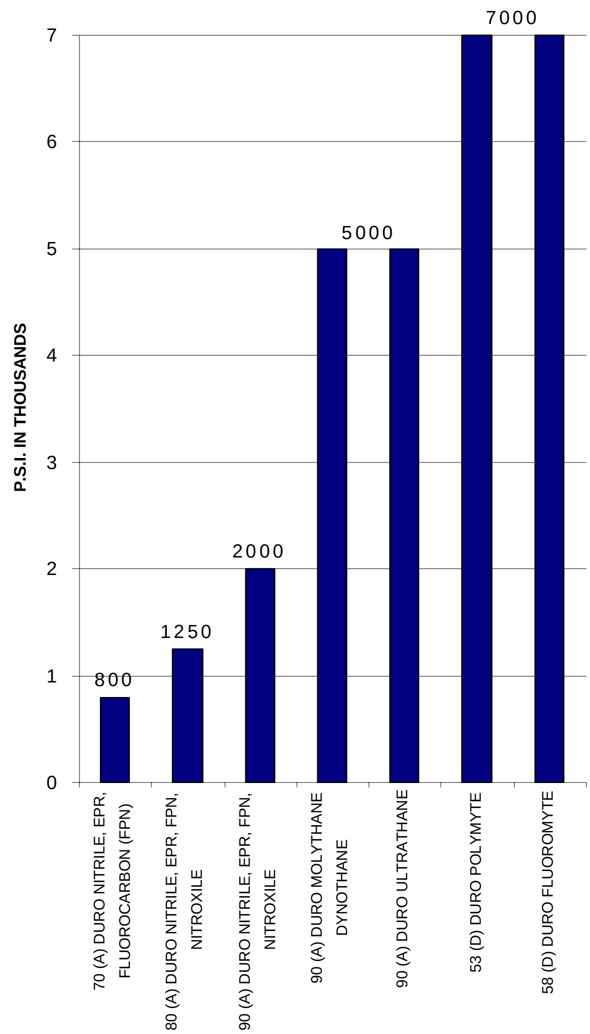
SUGGESTED CROSS-SECTIONS :

Up to 2" Dia. – 3/16 in.	5" to 10" – 3/8"
2" to 5" Dia. – ¼ in.	Above 10" – ½ in.

(5) Installation – Break all sharp edges on metal components to prevent damage to seal lip during assembly and use adequate lubrication. See Chamfer Data, page 6).

SYSTEM PRESSURE The ability of seal materials to withstand the pressure of hydraulic system fluids varies with the compound. The chart below lists the MAXIMUM recommended operating pressure to which the material may be exposed without special back-up devices or reduced clearances with minimum risk of extrusion.

MAXIMUM RECOMMENDED PRESSURE FOR PARKER PACKING COMPOUNDS*



*TEST CONDITIONS

1. 100.000 PRESSURE CYCLES AT RATE OF 60 PER MINUTE FROM ZERO TO INDICATED PRESSURE.
2. TEST TEMPERATURE +160ºF.
3. TESTS CONDUCTED WITH NO BACK-UP DEVICES.
4. MAXIMUM .010 DIAMETRICAL & .005 RADIAL CLEARANCE.

ENGINEERED DESIGN CHARTS There are complete design tables available for all PolyPak Seals. We have included sufficient information at the end of this catalog to allow the designer or user to select the PolyPak needed for his application. Both Piston and Rod design information are shown.

MATERIAL SELECTION

INTRODUCTION This section briefly covers the wide range of basic seal materials available to the user of the Parker TOTAL Sealing System.

MATERIAL COLOR CODE Following each material type there is a color description indicating the base color of the polymer for identification purposes.

WHY DIFFERENT MATERIALS? New hydraulic fluids are being introduced into service at a rapid rate and system operating parameters (Pressure & Temperature) are changing to meet user needs. To keep pace with these changing conditions, Parker is constantly testing and developing new seal materials to extend service life. The material types listed below are general categories only. For complete technical information, ask Parker for test reports covering your specific fluid or application.

MOLYTHANE ● GRAY

Parker Molythane is the oldest and most generally specified seal material for hydraulic service. This unique material is a blend of Polyurethane and MolyDiSulfide (for reduced friction) developed for long service in all petroleum-based fluids. The Temperature Range of Molythane is -65°F to +200°F (-54°C to +93°C), 140°F in water and high water based fluids. Parker's Molythane offers excellent resistance to extrusion and abrasion. The most popular compound is P4615A90.

DYNOTHANE ● CLEAR

Parker Dynothane is a polyurethane material with improved physical properties. Dynothane offers improved compression set resistance, higher rebound resilience and tensile strength resulting in improved seal performance. Fluid compatibility same as Molythane. Temperature range is -65°F to +200°F (-54°C to +107°C). The Dynothane compound number is P4693A90.

ULTRATHANE K-24 ● YELLOW

Ultrathane is a new polyurethane material from Parker offering up to 43% reduced friction over conventional urethane materials. Because of this reduced friction and the resulting lowering of frictional heat build-up at the seal interface, the operating temperature of this material is -65°F to +225°F (-54°C to +107°C). Ultrathane fluid compatibility is the sane as Parker's other high tensile urethane materials and is good for service to 5000 psi at recommended dimensions and tolerances. The Ultrathane compound number is P4622A90.

NITROXILE ● BLACK

Nitroxile is a Carboxylated Nitrile material offering 3 to 5 times greater resistance to abrasion than conventional nitrile compounds. This material is also available with internal lubrication to reduce friction. Nitroxile is suitable for general hydraulic service in petroleum-based fluids, water-oil emulsions, water-glycol fluids and water base fluids (HWBF). Nitroxile's temperature range is -40°F to +250°F (-40°C to +121°C). The most popular of the Nitroxile materials are N4257A80 (w / internal lubrication), N4274A85 (ELF) for extreme low friction requirements.

POLYMYTE ● ORANGE

Parker PolyMyte is an "elastoplastic" material with exceptionally high tear strength and abrasion resistance. PolyMyte's high modulus and high durometer (53 & 65 Shore D) make it very suitable for high-pressure service where extrusion is a problem. PolyMyte is suitable for service in petroleum based fluids, water base fluids (HWBF)*, phosphate ester fluids, some chlorinated fluids and solvents. Temperature range is is -65°F to +275°F (-54°C to +135°C), 180°F in water based fluids. The standard compound is Z4651D53. * (under 180°F)

FLUOROMYTE ● PURPLE

FluoroMyte was developed to meet seal needs in high-pressure hydraulic systems. FluoroMyte has exceptionally high tear strength and abrasion resistance. It also has lower friction than PolyMyte due to special lubricants disbursed in the base material. FluoroMyte has excellent resistance to oxygen, ozone, petroleum and phosphate ester based fluids. The temperature range of this material is -65°F to +300°F (-54°C to +149°C). The FluoroMyte compound number is Z4653D58.

FLUOROCARBON ● BLACK

Fluorocarbon materials offer the user a wide range of fluid compatibility and broad temperature range often resulting in reduced seal inventory requirements. Fluorocarbon is suitable for use in most hydraulic fluids (except Skydrol types and some ester / ether fluids). Temperature range is -20°F to +400°F (-29°C to +204°C). The standard Fluorocarbon compounds are V4208A90 and V42266A95 (+450°F).

NITRILE ● BLACK

Nitrile is one of the oldest and most popular seal compounds. Nitrile compounds have good resistance to abrasion, extrusion and compression-set and are generally suitable for service in petroleum, water-oil emulsions and water-glycol fluids. The temperature range of Nitrile is -40°F to +250°F (-40°C to +121°C). Special Nitrile materials may have a higher upper limit (to +300°F). The general usage Nitrile compound is N4121A90 for PolyPak seals.

ETHYLENE PROPYLENE ● BLACK

Ethylene Propylene or EPR is a useful seal material for sealing phosphate ester type hydraulic fluids such as Skydrol. Ethylene Propylene is also suitable for use with automotive brake fluids, weak caustics, acids and Methyl Ethyl Keytone. This material SHOULD NEVER BE EXPOSED TO ANY TYPE PETROLEUM BASE FLUID OR LUBRICANT. Ethylene Propylene has a temperature range of -65°F to +300°F (-54°C to +149°C) and to +400°F in steam. The standard EPR compounds are E4207A90 and E4183A80. E4207A90 is a newly developed geothermal EPR material for service to 600°F in steam applications. Also has good explosive decompression resistance in CO_2.

PARKERTHANE ○WHITE

Parkerthane is an improved formulation of polyurethane materials with extreme resistance to extrusion and abrasion. Parkerthane is suitable for use in most petroleum-based fluids. The temperature range of Parkerthane is -65°F to +200°F (-54°C to +93°C). Parkerthane is identified by compound number P4611A90.

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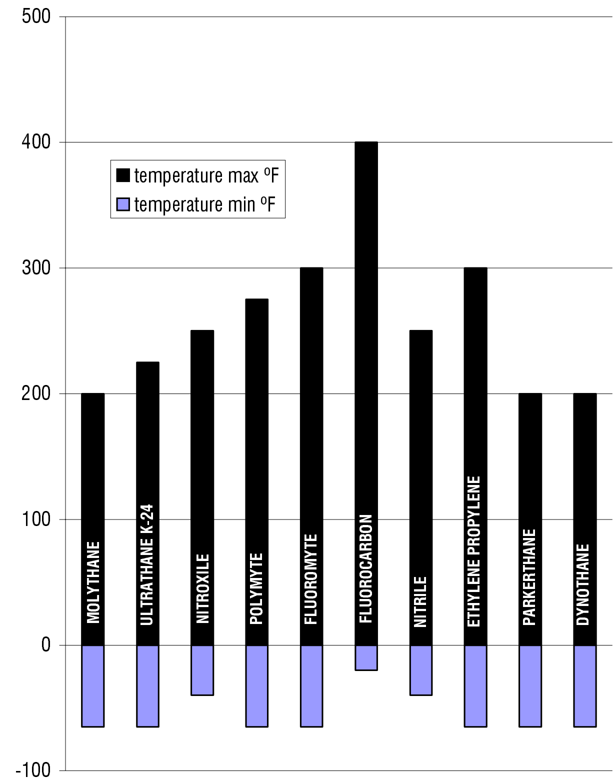
MATERIAL SELECTION(con't)

TEMPERATURE COMPATIBILITY is one of the prime considerations involved in seal material selection. In selecting a seal material, the user must determine both the upper and lower EXTREMES at which the seal will be expected to function and also take into account the TIME (duration) to which these extremes of temperature excursion will be experienced, bearing in mind that compression set (and therefore sealability) is a function of the time / temperature relationship. The general temperature capabilities for Parkers hydraulic and pneumatic seal materials are shown in the chart at right.

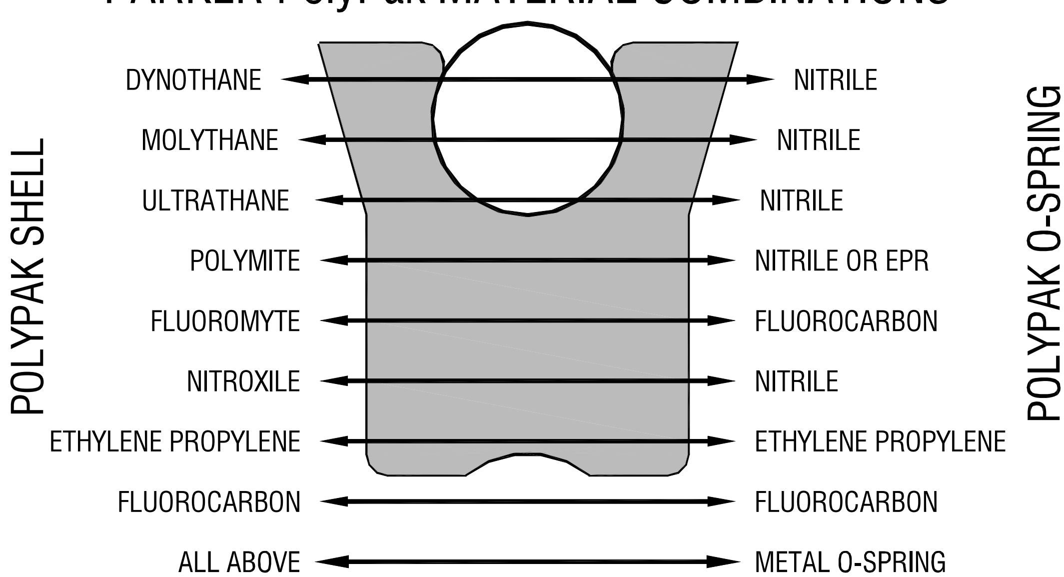
PRESSURE COMPATIBILITY is another consideration when selecting a seal material. This characteristic is determined by the durometer (hardness) of the material and by its internal chemistry. Pressure limitations for Parker compounds are shown on page 2 and are based on our recommended dimensions and tolerances.

FLUID COMPATIBILITY is the final requirement for material selection. As all elastomers are affected to some degree by their fluid environment, it is vital that a material be selected that will be affected the LEAST by the fluid and again, there is the factor of TIME to be considered, a material which may be fine for 100 hours @ 200ºF in the specified fluid may soften just enough @ 400 hours to extrude during a high pressure excursion. For your information, a short fluid compatibility table is provided on the next page.

TESTING of all sealing materials is recommended as there are many factors which may effect seal life. Parker suggests that all new and replacement materials and seal geometries be fully evaluated under actual service conditions before production and / or major retrofit programs are finalized.



PARKER PolyPak MATERIAL COMBINATIONS



FLUID COMPATIBILITY TABLE

This table is a brief guide to some of the more common hydraulic, pneumatic and general service fluids. For more detailed information on these fluids or other not listed, contact US.

Chemical/Fluid Media

Chemical/Fluid Media	N4115A75 NITRILE	N4180A80 NITRILE	N4181A85 NITRILE	N4182A75 NITRILE	E4183A80 ETHYLENE PROPYLENE	V4205A75 FLUOROCARBON	E4207A90 ETHYLENE PROPYLENE	E4270A90 ETHYLENE PROPYLENE	V4208A90 FLUOROCARBON	V4266A95 FLUOROCARBON	N4257A80 NITROXYLE	N4274A85 NITROXYLE (ELF)	N4263A90 NITROXYLE	P4615A90 MOLYTHANE	P4611A90 PARKERTHANE	P4617D65 MOLYTHANE	P4622A90 ULTRATHANE K-24	P4693A90 DYNOTHANE	W4650NHH MOLYGARD	Z4651D53 POLYMYTHE	Z4653D58 FLUOROMYTE	W4655NHH NYLON
GENERAL FLUIDS																						
Air and Dry Gas	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Acid, weak<50% conc.						■			■	■												
Alcohols	■	■	■	■	■	■	■	■	■	■	■	■	■						■			■
Brake Fluids					■		■	■											■			■
Chlorine, dry						■			■	■									■			■
Ethers	■	■	■	■							■	■	■	■	■	■	■	■	■	■	■	■
Gasoline	■	■	■	■		■			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Glycols, ethylene base	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Hydrogen	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Hydroxydes, weak<50% conc.	■	■	■	■	■		■	■			■	■	■	■	■	■	■	■	■	■	■	■
Jet Fuel, JP-4, JP-5, JP-6	■	■	■	■		■			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Ketones					■		■	■											■	■	■	■
Oil, Mil-H-5606, R-3065, Std. 417, Petroleum Base	■	■	■	■					■	■	■	■	■	■	■	■	■	■	■	■	■	■
Oli, minaral base	■	■	■	■		■			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Water, hot 180oF					■		■	■			■	■	■									
Water, cold under 150oF	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
WATER-GLYCOL FLUIDS																						
Fyre-Safe 160,225					■		■	■			■	■	■							■		
Fyreguard 150, 200, G-200					■		■	■			■	■	■							■		
Houghto-Safe 500, 600					■		■	■			■	■	■							■		
Hydrolube 150LT, 200LT, 275LT, 300LT					■		■	■			■	■	■							■		
Santosafe W/G15, W/G20, W/G30					■		■	■			■	■	■							■		
WATER-IN-OIL EMULSION FLUIDS																						
Fyre-Safe 500	■	■	■	■							■	■	■							■		
Gulf FR Fluid	■	■	■	■							■	■	■							■		
Houghto-Safe 5000	■	■	■	■							■	■	■							■		
Hulsafe 500,600	■	■	■	■							■	■	■							■		
Inverse Emulsion	■	■	■	■							■	■	■							■		
Invert Emulsion	■	■	■	■							■	■	■							■		
AIRCRAFT TYPE FLUIDS																						
Aerosafe 2300, ER					■		■	■											■	■	■	■
Phosphate Ester Hydraulic Fluid					■		■	■											■	■	■	■
Skydrol 500B, 500B4, 500C					■		■	■											■	■	■	■
Hyjet W, III, IVA					■		■	■											■	■	■	■
INDUSTRIAL PHOSPHATE ESTER FLUIDS																						
Fyrquel Blend G, Pydraul 10E					■		■	■											■	■	■	■
Chevron FR-32, FR-46, FR-66, FR-150					■		■	■											■	■	■	■
Fyrquel 90, 150, 220, 300, 550, 550RC, 1000, 149ELT, 140RO, 220RO, G I					■		■	■											■	■	■	■
Houghto-Safe 1000, 1010,1055, 1120					■		■	■											■	■	■	■
P-37, P-40, P-43, P-45, P-47					■		■	■											■	■	■	■
PE-15, PE-22, PE-30, PE-55					■		■	■											■	■	■	■
Phosphate Ester Hyd. Fluid					■		■	■											■	■	■	■
Pydraul 29E-LT, 30-E, 50-E, 65-E, 90E, 115E					■		■	■											■	■	■	■
PHOSPHATE ESTER-OIL BLENDS																						
Phosphate Ester, Base Fluid						■			■	■									■	■	■	■
Pydraul 230-C, 312-C, 540-C, MC						■			■	■									■	■	■	■
Sunguard 350 Safety Fluid						■			■	■									■	■	■	■
Vital Hydraulic Fluid						■			■	■									■	■	■	■

1. - ■-Generally Aceptable.
   □-Check specific fluid with us.
2. - Consult page C-5 for temperature ratings.
3. - Recommendations should be tested in service before production.

Parker Seals

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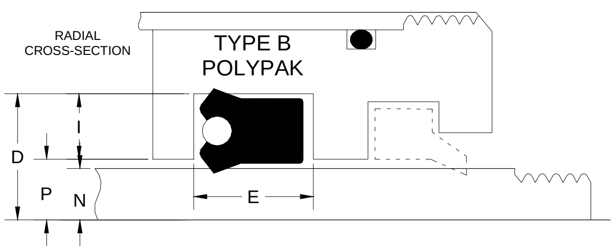
PolyPak ROD DESIGN TABLE



Rod Seal Example

Given desired rod diameter of 2-1/2" with a normal seal cross-section of 1/4".

Rod dia.(N) = 2.500 $^{+.000/-.002}$

Throat dia.(P) = N_{max} + .001 $^{+.003/-.000}$ = 2.500 + .001 = 2.501 $^{+.003/-.000}$

Groove dia.(D) = N_{max} + 2(I) $^{+.003/-.000}$ = 2.500 + 2(.250) = 2.750 $^{+.003/-.000}$

Axial groove length(E) = Given .413 $^{+.013/-.000}$

N Nominal Rod I.D. Range	Nominal Radial Cross-Section	I	E Axial Groove Length Standard	 Deep & Type B	P Throat Diameter	D Groove O.D.
1/4" - 2 1/8" $\pm^{.000}_{.001}$	1/8	.125	.138 $\pm^{.015}_{.000}$	.275 $\pm^{.015}_{.000}$	Nmax + .001 $\pm^{.002}_{.000}$	Nmax + 2 (I) $\pm^{.002}_{.000}$
5/16" - 4 1/4" $\pm^{.000}_{.002}$	3/16	.187	.206 $\pm^{.015}_{.000}$	.343 .413 $\pm^{.015}_{.000}$	Nmax + .001 $\pm^{.002}_{.000}$	Nmax + 2 (I) $\pm^{.002}_{.000}$
1/4" - 12 3/4" $\pm^{.000}_{.002}$	1/4	.250	.275 $\pm^{.015}_{.000}$	.413 .618 $\pm^{.015}_{.000}$	Nmax + .001 $\pm^{.003}_{.000}$	Nmax + 2 (I) $\pm^{.003}_{.000}$
3/4" - 9 5/8" $\pm^{.000}_{.002}$	5/16	.312	.343 $\pm^{.015}_{.000}$	.550 .688 $\pm^{.015}_{.000}$	Nmax + .002 $\pm^{.003}_{.000}$	Nmax + 2 (I) $\pm^{.004}_{.000}$
1 1/2" - 14 3/4" $\pm^{.000}_{.002}$	3/8	.375	.412 $\pm^{.015}_{.000}$	.550 .688 $\pm^{.015}_{.000}$	Nmax + .002 $\pm^{.004}_{.000}$	Nmax + 2 (I) $\pm^{.005}_{.000}$
2 1/4" - 5" $\pm^{.000}_{.003}$	7/16	.437	.481 $\pm^{.015}_{.000}$	.688 .825 $\pm^{.015}_{.000}$	Nmax + .002 $\pm^{.004}_{.000}$	Nmax + 2 (I) $\pm^{.006}_{.000}$
1 3/4" - 24 7/8" $\pm^{.000}_{.003}$	1/2	.500	.550 $\pm^{.015}_{.000}$	.825 $\pm^{.015}_{.000}$	Nmax + .002 $\pm^{.005}_{.000}$	Nmax + 2 (I) $\pm^{.007}_{.000}$
2 3/4" - 19 3/4" $\pm^{.000}_{.003}$	5/8	.625	.688 $\pm^{.015}_{.000}$	1.100 1.375 $\pm^{.015}_{.000}$	Nmax + .003 $\pm^{.006}_{.000}$	Nmax + 2 (I) $\pm^{.009}_{.000}$
7 1/4" - 31" $\pm^{.000}_{.004}$	3/4	.750	.825 $\pm^{.015}_{.000}$	1.238 1.375 $\pm^{.015}_{.000}$	Nmax + .003 $\pm^{.007}_{.000}$	Nmax + 2 (I) $\pm^{.011}_{.000}$
15" - 39" $\pm^{.000}_{.005}$	1	1.000	1.100 $\pm^{.015}_{.000}$	1.650 $\pm^{.015}_{.000}$	Nmax + .004 $\pm^{.009}_{.000}$	Nmax + 2 (I) $\pm^{.015}_{.000}$
F1	F2			F3	F4	F5

Notes:

F_1 – The Nominal Rod Diameter spread shown is taken from Price List PPD3701. Available sizes fall in cross-section range. Rod size range given based on Type B Poly Pak availability.

F_2 – The Radial Cross-Section I is shown as a fraction for Seal Reference and a three place decimal for Gland Reference.

F_3 – There may be two possible Axial Groove Lengths for some cross-sections.

F_4 – The throat diameters are simply figured by taking the maximum Rod Diameter plus the noted clearance.

F_5 – The Groove Outside Diameter is calculated by taking the maximum Rod Diameter plus two radial cross-sections I.

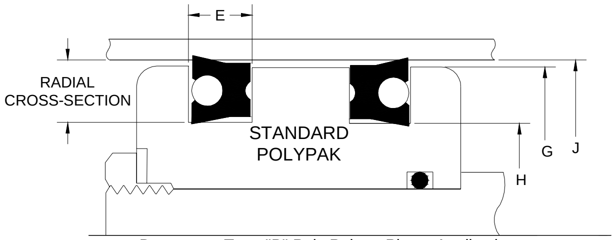
Note:

1 – Molythane parts can be stretched up to 5% of its diameter or compressed up to 2% for rod applications. Therefore if odd size rods or bores are encountered, existing sizes can be used without special non-available seals. Careful attention must be taken when using the 5% rule so that the radial cross-section "I" must be maintained no matter what dimension the rod or piston actually measures. Careful attention must be taken to select a size that requires 5% max **stretch** on the diameter in piston applications, and 2% max. **compression** on the diameter in rod applications.

2 – Axial groove lengths for PolyPaks with non-positively actuated modular back-ups are calculated by: (nominal radial c/s desired x 1.100) + "E".

Parker Seals

PolyPak PISTON DESIGN TABLE



Do not use Type "B" Poly Pak on Piston Application

Piston Seal Example

Given desired bore diameter of 6" with a normal seal cross-section of 3/8".

Bore dia.(J) = 6.000 +.004/-.000

Piston O.D.(G) = J_{min} - .002 +.000/-.002 = 6.000 - .002 = 5.998 +.000/-.002

Groove I.D.(H) = J_{min} - 2(I) +.000/-.005 = 6.000 - 2(.375) = 5.250 +.000/-.005

Axial groove length(E) = Given .550 +.015/-.000

N Nominal Bore O.D. Range	Nominal Radial Cross-Section	I	E Axial Groove Length Standard	 Deep	G Piston O.D. Formula	H Groove I.D. Formula
5/16" - 6" $\pm^{.002}_{.000}$	1/8	.125	.138 $\pm^{.015}_{.000}$	.275 $\pm^{.015}_{.000}$	Jmin + .001 $\pm^{.000}_{.001}$	Jmin + 2 (I) $\pm^{.000}_{.002}$
9/16" - 6 11/16" $\pm^{.002}_{.000}$	3/16	.187	.206 $\pm^{.015}_{.000}$	.343 .413 $\pm^{.015}_{.000}$	Jmin + .001 $\pm^{.000}_{.002}$	Jmin + 2 (I) $\pm^{.000}_{.002}$
3/4" - 14" $\pm^{.003}_{.000}$	1/4	.250	.275 $\pm^{.015}_{.000}$	.413 .618 $\pm^{.015}_{.000}$	Jmin + .001 $\pm^{.000}_{.002}$	Jmin + 2 (I) $\pm^{.000}_{.003}$
1" - 15 1/2" $\pm^{.003}_{.000}$	5/16	.312	.343 $\pm^{.015}_{.000}$	.550 .688 $\pm^{.015}_{.000}$	Jmin + .002 $\pm^{.000}_{.002}$	Jmin + 2 (I) $\pm^{.000}_{.004}$
1 1/4" - 20 1/4" $\pm^{.004}_{.000}$	3/8	.375	.412 $\pm^{.015}_{.000}$	.550 .688 $\pm^{.015}_{.000}$	Jmin + .002 $\pm^{.000}_{.002}$	Jmin + 2 (I) $\pm^{.000}_{.005}$
1 7/8" - 6 3/8" $\pm^{.005}_{.000}$	7/16	.437	.481 $\pm^{.015}_{.000}$	.688 .825 $\pm^{.015}_{.000}$	Jmin + .002 $\pm^{.000}_{.002}$	Jmin + 2 (I) $\pm^{.000}_{.006}$
1 5/8" - 52 1/2" $\pm^{.005}_{.000}$	1/2	.500	.550 $\pm^{.015}_{.000}$	.688 .825 $\pm^{.015}_{.000}$	Jmin + .002 $\pm^{.000}_{.003}$	Jmin + 2 (I) $\pm^{.000}_{.007}$
3 5/8" - 5 1/2" $\pm^{.006}_{.000}$	9/16	.562	.618 $\pm^{.015}_{.000}$	.963 $\pm^{.015}_{.000}$	Jmin + .002 $\pm^{.000}_{.003}$	Jmin + 2 (I) $\pm^{.000}_{.008}$
2 1/2" - 26" $\pm^{.006}_{.000}$	5/8	.625	.688 $\pm^{.015}_{.000}$	1.100 1.375 $\pm^{.015}_{.000}$	Jmin + .003 $\pm^{.000}_{.003}$	Jmin + 2 (I) $\pm^{.000}_{.009}$
4 1/2" - 27 1/2" $\pm^{.007}_{.000}$	3/4	.750	.825 $\pm^{.015}_{.000}$	1.238 1.375 $\pm^{.015}_{.000}$	Jmin + .003 $\pm^{.000}_{.004}$	Jmin + 2 (I) $\pm^{.000}_{.011}$
6" - 21 3/4" $\pm^{.008}_{.000}$	7/8	.875	.963 $\pm^{.015}_{.000}$	1.375 1.513 $\pm^{.015}_{.000}$	Jmin + .004 $\pm^{.000}_{.001}$	Jmin + 2 (I) $\pm^{.000}_{.012}$
4" - 18" $\pm^{.009}_{.000}$	1	1.000	1.100 $\pm^{.015}_{.000}$	1.650 $\pm^{.015}_{.000}$	Jmin + .004 $\pm^{.000}_{.001}$	Jmin + 2 (I) $\pm^{.000}_{.011}$
F1	F2			F3	F4	F5

Notes:

F_1 – The Nominal Bore Diameter spread shown is taken from Parker availability tooling list.

F_2 – The Radial Cross-Section I is shown as a fraction for Seal Reference and a three place decimal for Gland Reference.

F_3 – There may be two possible Axial Groove Lengths for some cross-sections.

F_4 – The Piston outside Diameter is simply figured by taking the minimum Bore Diameter minus the noted clearance.

F_5 – The Groove Inside Diameter is calculated by taking the minimum Bore Diameter minus two radial cross-sections I.

Note:

1 – Molythane parts can be stretched up to 5% of its diameter or compressed up to 2% for rod applications. Therefore if odd size rods or bores are encountered, existing sizes can be used without special non-available seals. Careful attention must be taken when using the 5% rule so that the radial cross-section "I" must be maintained no matter what dimension the rod or piston actually measures. Careful attention must be taken to select a size that requires 5% max **stretch** on the diameter in piston applications, and 2% max. **compression** on the diameter in rod applications.

2 – Axial groove lengths for Poly Paks with non-positively actuated modular back-ups are calculated by: (nominal radial c/s desired x 1.100) + "E".

Parker Seals

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