Wedged Back-up Rings

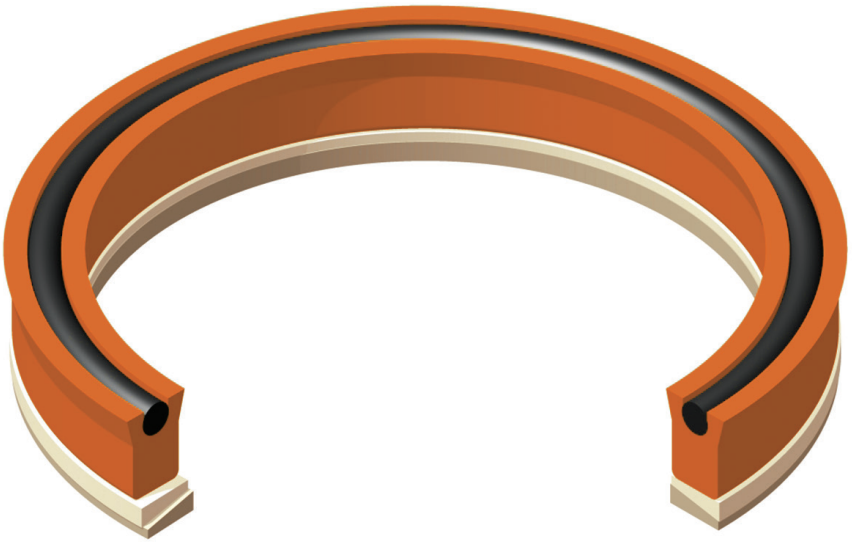
Bridge extrusion gaps in high pressure systems and extend seal life

Extend seal life in high pressure

As exploration and production of oil and gas reserves go deeper and hotter, sealing technologies must keep pace to withstand increasingly hostile conditions for longer periods of time.

Parker's wedged back-up rings extend seal life by preventing extrusion of elastomeric seals in high pressure, high temperature environments. Under high pressure, the elastomer seal applies an axial force on to the wedged back-up set. This axial force allows the wedged halves of the back-up set to slide along their common angle and bridge the metal clearance gaps – preventing extrusion of the primary sealing elastomer.

Call Parker's experienced oil and gas application engineers to learn more.



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Product Features:

- Two-piece design with common angle
- Split for easy installation
- May be designed to replace O-ring back-ups for higher pressures
- Universal sizing
- Machined to fit any size combination
- Available in filled and non-filled PEEK, Nylon 6,6 and filled PTFE blends

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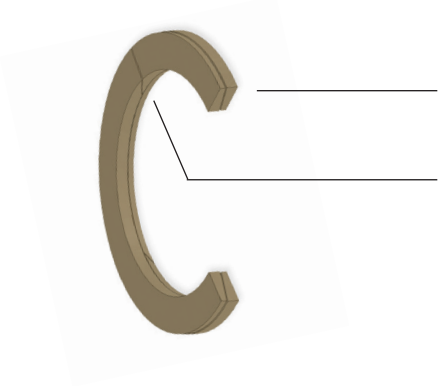
Features and Benefits of WB Profile



Features	Benefits
2 piece back-up with common angle	Common angle allows parts to slide apart to bridge extrusion gap
Split for easy installation	Back-ups are skive cut for easy installation and may be installed upside down for piston or rod extrusion gaps
Can be designed to replace O-ring back-up	Back-ups can be designed for use with U-cup seals, PolyPak® seals and other seal designs for higher pressures
All parts made to order	Parts are machined and can be made for any size combination and quantity

Preventing Extrusion

How Wedged Back-ups Work

Wedged back-up rings are used to protect the main sealing elements in high pressure applications. The WB Profile is not a seal, but is used in conjunction with elastomeric seals to bridge the metal gland extrusion gaps and prevent the elastomeric seal from extruding.

As pressure contacts the main seal upstream from the back-up rings, the sealing systems are forced to the point of least resistance which is the extrusion gap (Fig. 1 and 2). Since the seal is positioned on top of the back-up ring set, as pressure increases, it comes in contact with the back-up set. Pressure acts on the common-angled back-up rings causing them to slide apart. As they do, the respective ID and OD shift to their points of least resistance and close off the extrusion gap — providing zero clearance for the softer elastomer. With the gap eliminated, sealing becomes more effective and longer lasting despite extremely high system pressures.

Double-Acting
Two wedged-back-up ring sets can be used in double-acting applications with one back-up positioned downstream of each pressure direction (Fig 3). This design allows seals to function in static or dynamic applications under high pressure and high temperature conditions. The rigid back-up ring design has little effect on breakout and running friction. Depending upon the material selected, the split design facilitates intallation on solid pistons without necessity of auxiliary installation tools.

Failure: Seal extrusion

Legend: Blue arrow shows direction of system pressure. Red arrows show axial movement of wedged back-ups under pressure to bridge extrusion gap (green arrows).

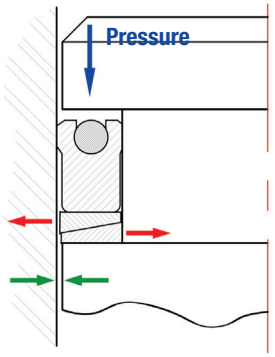


Fig. 1. Assembly in Piston Gland.

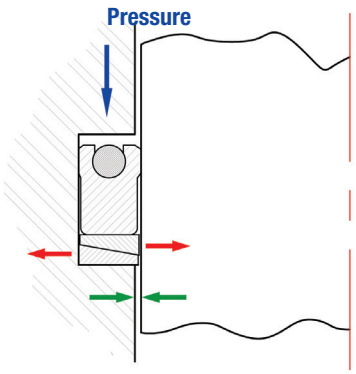


Fig. 2. Assembly in Rod Gland.

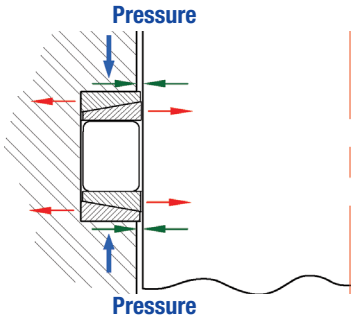
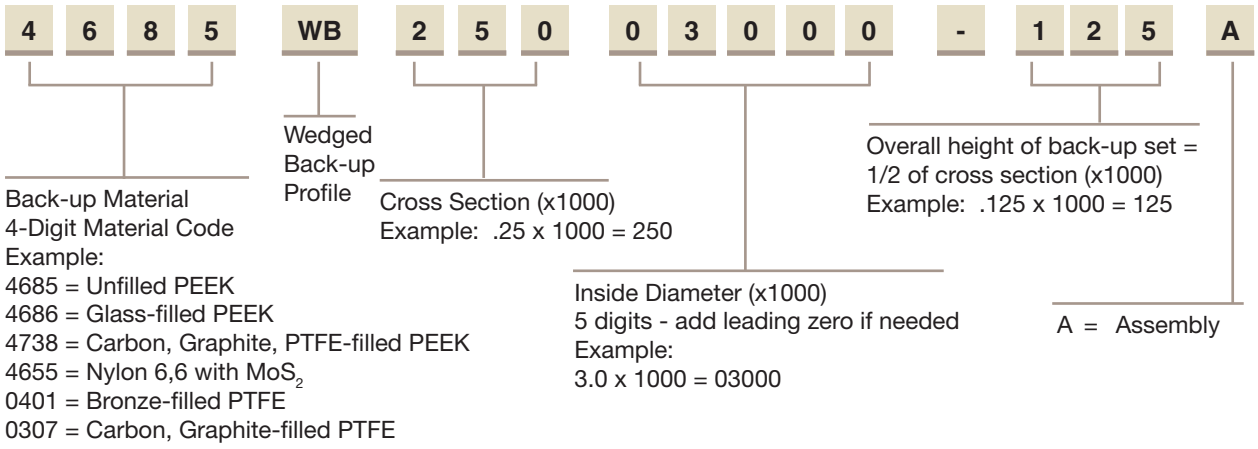


Fig. 3. Double-Acting Configuration

Part Numbering

Part Number Nomenclature — Wedged Back-up — WB Profile

WB Profile — Inch



Available Materials

Wedged back-up rings from Parker are available in a variety of materials to meet application requirements. For assistance in material selection, please call Parker's application engineers.

Typical Material Use:

- *PEEK can be used to 500°F and 20,000 psi*
- *Nylon 6,6 can be used to 186°F and 10,000 psi*
- *Filled PTFE blends can be used for applications requiring lower friction*

Table 1. Typical Properties of Available Materials

Material Type	PEEK			Nylon 6,6	Filled PTFE	
	4685	4686	4738	4655	0401	0307
Property	Unfilled PEEK	Glass-Filled PEEK	Filled PEEK	Nylon 6,6 with MoS_2	40% Bronze-Filled PTFE	23% Carbon-2% Graphite-Filled PTFE
Compressive Strength (psi)	17100	31100	21700	12000	9400	3600
Tensile Strength (psi)	14000	22600	20400	13000	3200	2250
Tensile Modulus (Kpsi)	507	1653	1464	536	—	—
Elongation (%)	—	—	—	—	250	100
Shear Strength (psi)	7687	14068	—	9500	—	—
Flexural Strength (psi)	23600	30700	33400	16000	—	—
Flexural Modulus (Kpsi)	579	1334	1189	406	—	—
Notched IZOD Impact Strength (Ft-Lbs/in)	2	2	2	1.69	—	—
Deformation Under Load (%)	—	—	—	—	3.1	2.5
Water Absorption, (%) 24 hr	0.50	0.11	0.06	0.50 to 1.40	—	—
Coefficient of Friction	—	—	—	—	0.23	0.24
Temperature Range (°F)	-65 to +500	-65 to +500	-65 to +500	-65 to +275	-200 to +575	-360 to +575
Rockwell Hardness (R Scale)	126	124	100	119	—	—
Shore D Hardness	—	—	—	—	65	64

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