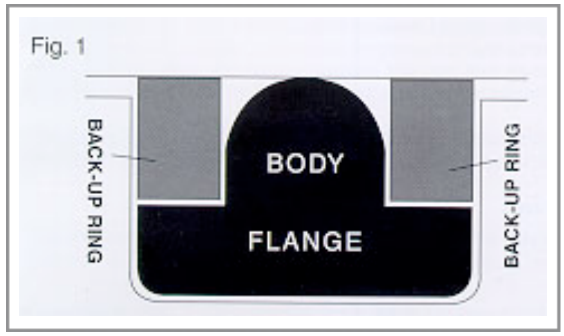
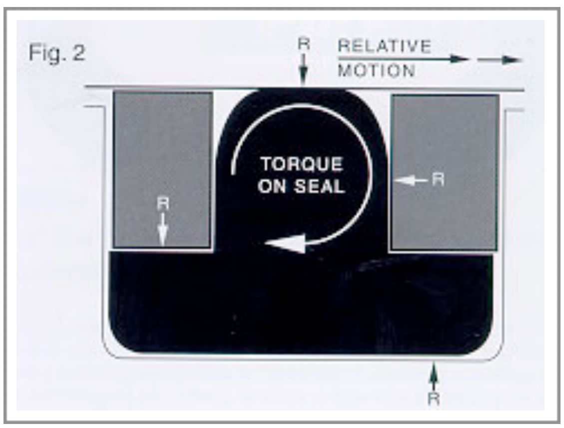
Parker T-Seals

A Seal Usable In Standard O-Ring Grooves With Built-In Resistance To Spiraling And Extrusion



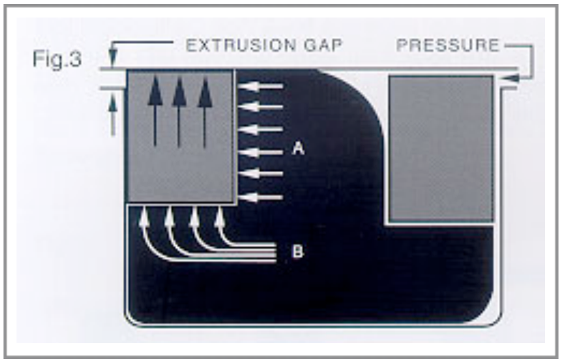
T-seals were originally developed to preserve advantages of O-rings in dynamic fluid power applications while ending two of their most serious reliability problems: (1) extrusion through the gap between static and dynamic surfaces, and (2) instability in their grooves, which led to spiral or twisting failure. The T-seal eliminates both of these problems while retaining the space-saving attributes of the compact O-ring groove. Above all, the T-seal meets or exceeds the O-ring's outstanding ability to seal at all pressures and temperatures.



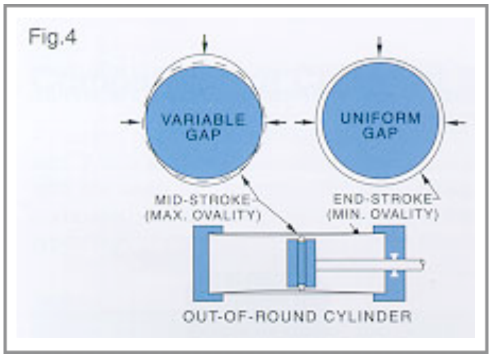
Parker T-seals have been developed to replace existing O-ring seals in long-lived hydraulic and pneumatic systems. Their ability to fit into existing grooves means that a retrofit can be made with no re-matching or major revisions to the existing hardware design. This simplifies both field changes and new equipment manufacturing.

The T-seal's distinctive cross-section is extremely functional. The elastomeric seal element (see Figure 1) consists of a flange and a body, each of which has a multiple purpose.

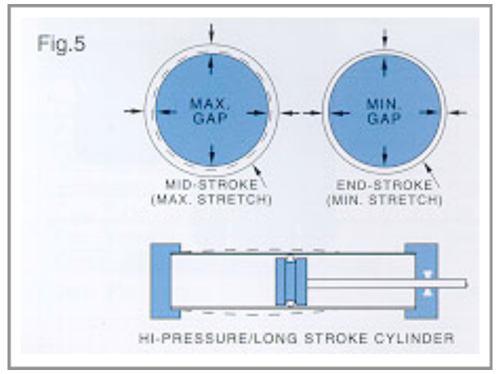
The flange provides the static seal against the bottom of the groove, provides positive radial actuation of the back-up rings, and stabilizes the seal against rolling in the grooves. The body provides the squeeze or interference seal against the dynamic surface, loads the flange to displace the back-up ring radially. The squeeze effected during installation duplicates that of an O-ring, giving the T-seal its ability to seal at the lowest pressures. Finally, the square or rectangular shape of the T-seal assembly with its back-up rings eliminates the spiral failure mode characteristic of O-rings. Parker T-seals cannot spiral fail. (see Figure 2).



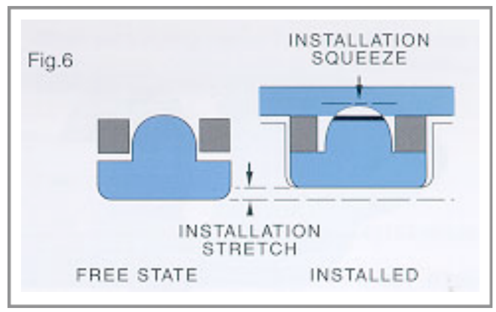
Back-up rings are on the outside diameters of piston T-seals, and the inside diameters of rod T-seals. The unique "hydraulic" loading of the back-up rings by the assembly is exposed to differential pressure causes positive back-up ring actuation. It is the positive actuation that allows the T-seal back-up rings to respond more rapidly than the plastic deformation that causes O-ring back-up rings to close an extrusion gap. For this reason



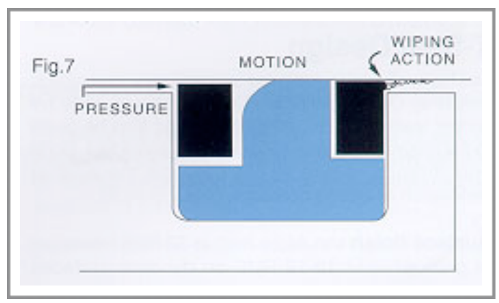
T-seals adapt to wider gaps, and respond to shocks and pressure surges immediately by increasing the radial force against the dynamic surface (see Figure 3).

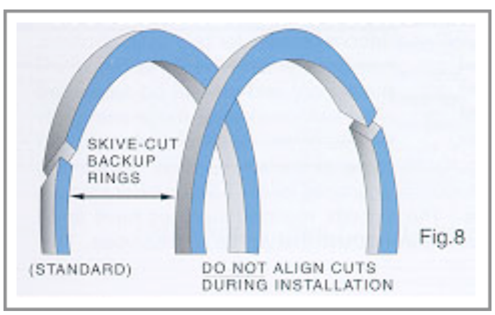


It should be remembered that extrusion gaps are seldom constant throughout a stroke. The gap may vary due to uneven wear along a rod or bore, it may vary as system pressure rises (breathing) and distance from end restraints changes (thereby changing the stretch of cylinder walls). Ovality of cylinder tubes or rod glands due to side-load is not necessarily constant throughout the stroke, and out-of-round tubes may assume a near-perfect circular shape where restrained by the end caps (see Figures 4 & 5).



These numerous possible sources of changing extrusion gaps make Parker T-seals' speed of response extremely valuable. Despite rapid strokes, lateral shock loads, pressure surges, and uneven wear or stretching, Parker T-seals maintain zero extrusion gaps. In the free state, back-up rings appear quite loose on their seal element. This slack is taken up during installation, however, since the interference fit of the seal in standard O-ring grooves either stretches (piston seals) or compresses (rod seals) the element to seat the backups. Parker T-seals are easy to assemble and may be inserted into their grooves manually without special assembly tools (see Figure 6).





The Parker T-seal back-up rings' ability to follow changing dynamic surfaces rapidly also makes them very effective wipers, keeping contaminants away from the sealing line (see Figure 7).

Standard to Parker T-seals are skive-cut back-up rings. Skive-cut rings are simple to install and allow harder and more extrusion-resistant materials to be used without sacrificing their ability to respond quickly to gap changes (see Figure 8).