



Industrial Piston and Rod T-Seals

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Catalog PPD-3001A/USA



Industrial Piston and Rod T-Seals



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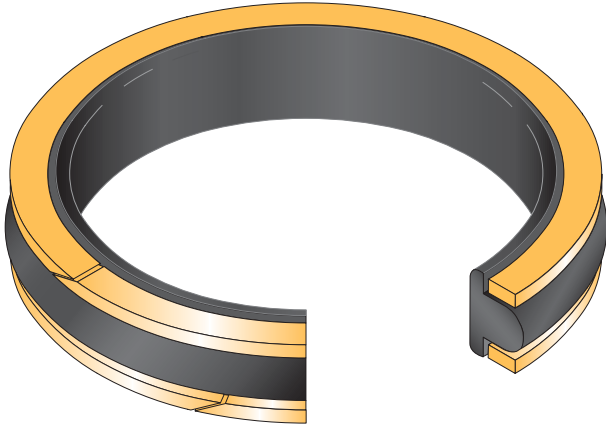
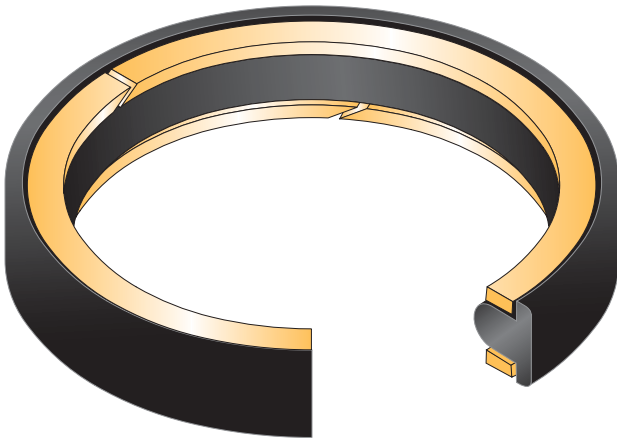


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PARKER T-SEALS

A SEAL USABLE IN STANDARD O-RING GROOVES WITH BUILT-IN RESISTANCE TO SPIRALLING AND EXTRUSION

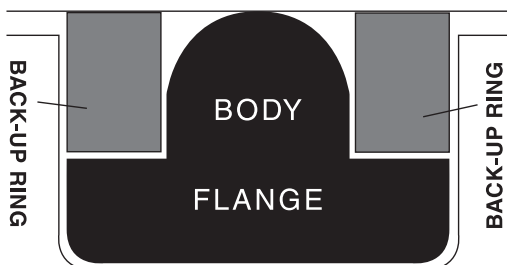


T-seals were originally developed to preserve advantages of O-rings in dynamic fluid power applications while ending two of their most serious reliability problems: (1) extrusion through the gap between static and dynamic surfaces, and (2) instability in their grooves, which led to spiral or twisting 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-machining or major revisions to the existing hardware design. This simplifies both field changes and new equipment manufacturing.

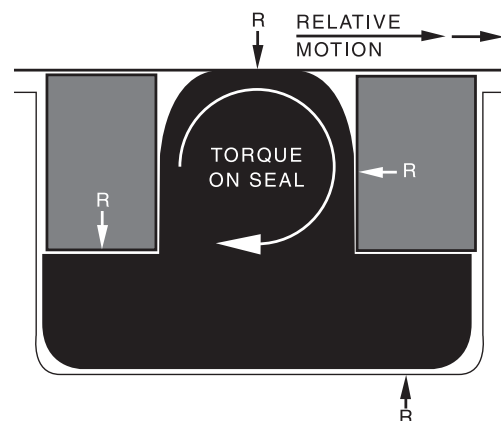
The T-seals' distinctive cross-section is extremely functional. The elastomeric seal element (see Figure 1) consists of a flange and a body, each of which has a multiple purpose. The flange provides the static seal against the bottom of the groove, provides positive

Fig. 1



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 enhance the static seal against the groove, and contributes elastomeric mass to the downstream 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).

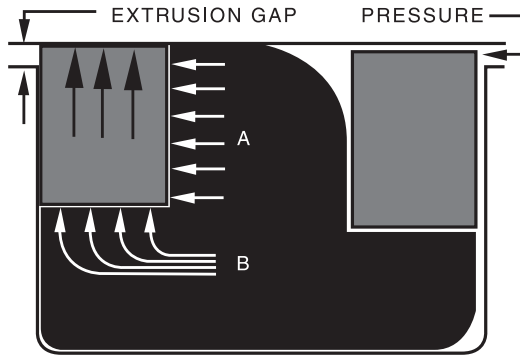
Fig. 2



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 T-seal flanges that occurs when the installed seal 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).

Fig.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).

Fig.4

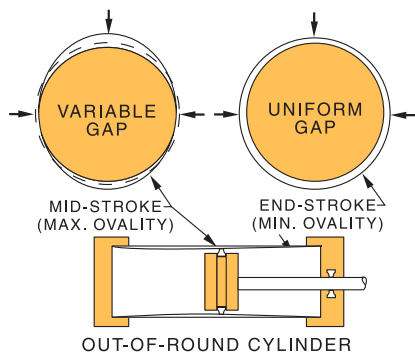
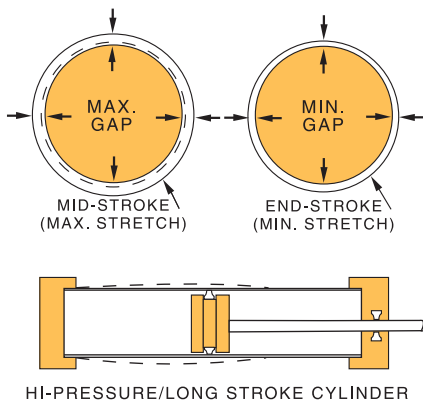
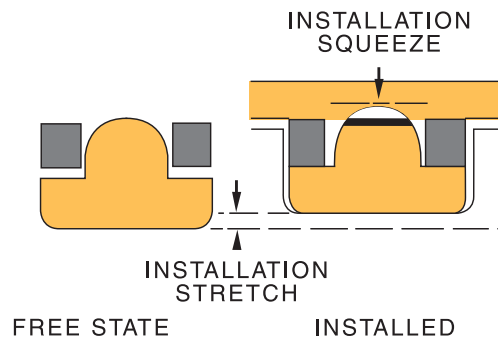


Fig.5



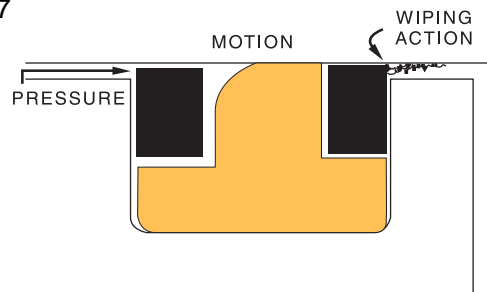
These numerous possible sources of changing extrusion gaps make Parker T-seals' speed of response extremely valuable. Despite rapid strokes, lateral shock loads, pressure surges, and uneven wear or stretching, Parker T-seals maintain zero extrusion gaps. In the free state, back-up rings appear quite 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 back-ups. Parker T-seals are easy to assemble and may be inserted into their grooves manually without special assembly tools (see Figure 6).

Fig.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).

Fig.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).

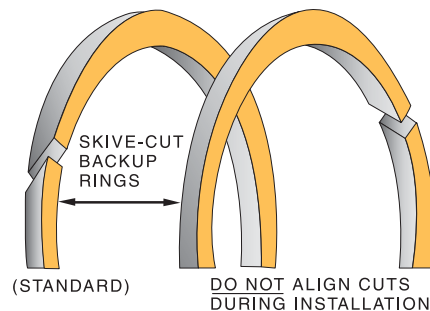
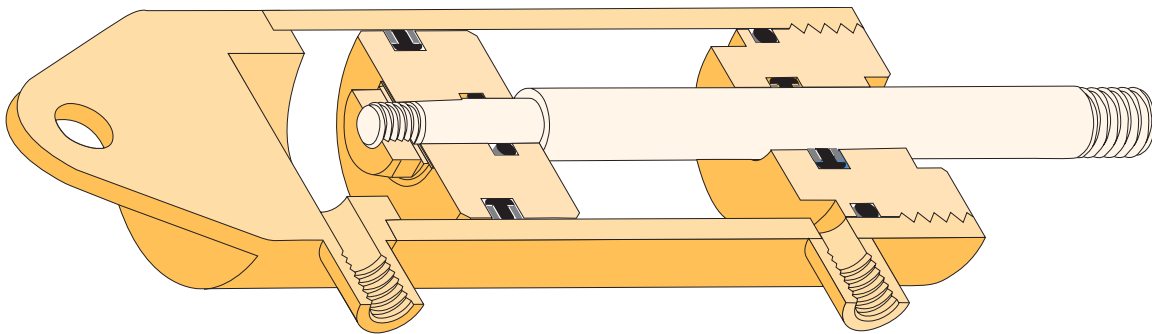


Fig.8

Hydraulic Fluids

There are so many types of hydraulic fluids that no single compound can be used to seal all of them. Consult Parker's Applications Engineers if compatibility issues between seal element and fluids arise. It is important to select a seal compound having a temperature range that is suitable for the application. Materials used for Parker T-seal assemblies are chosen for their abrasion resistance, fluid compatibility and temperature range, but the seal element and back-up rings have additional

requirements unique to themselves. The seal element, for example, must have a high resistance to compression set, possess high tear resistance, and long retention of its resilience. Back-up rings, in addition to the common requirements, must also have high shear strength and sufficient hardness to bridge large gaps without extrusion. (See Table A-3 on pages 5-6 for specific service conditions.)



T-Seal Design

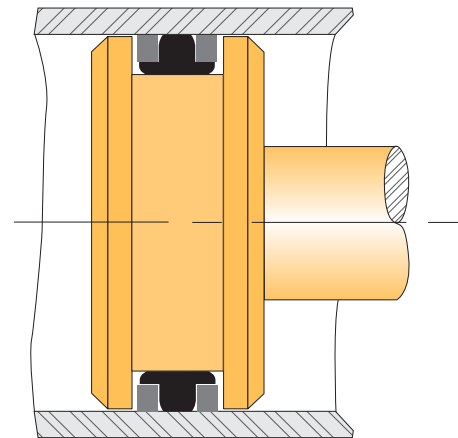
The Parker T-seal is designed for installation in standard industrial O-ring grooves. Designs should allow for proper lead-in angle. Attention should also be given to the chamfering and/or recessing of shoulders, ports and threads, which might damage the seal at installation or during operation (see Figure 9).

Surface finish should be held to 32 RMS maximum in grooves, and **10-16 RMS** on dynamic surfaces against which the seal operates.

Finishes of contacting surfaces have much to do with the life of T-Seals. Surface roughness values less than 5 RMS are not recommended for hydraulic dynamic seals, inasmuch as an extending rod, for instance, will be wiped completely dry and will not be lubricated when it retracts. The surface must be rough enough to hold minute amounts of oil. Ideally, a microscopic "orange peel" type of surface is best, presenting smooth rounded surfaces for the T-Seal rubber element to slide. The smooth, rounded surfaces have small crevices between them that act as oil reservoirs. This kind of surface is

approximated by peening with metal shot or glass beads. The most desirable surface finish is from 10 to 16 RMS.

Fig.9



Piston T-Seal Design

The T-Seal is designed for installation in standard commercial O-ring grooves. Designs should allow for proper lead-in angle (identical to those specified for O-rings). Due attention should also be given the chamfering and/or recessing of shoulders, ports and threads, which might damage the seal in installation or operation.

Surface finish should be held to 32 RMS maximum in grooves, and **10-16** RMS on dynamic surfaces against which the seal is to operate.

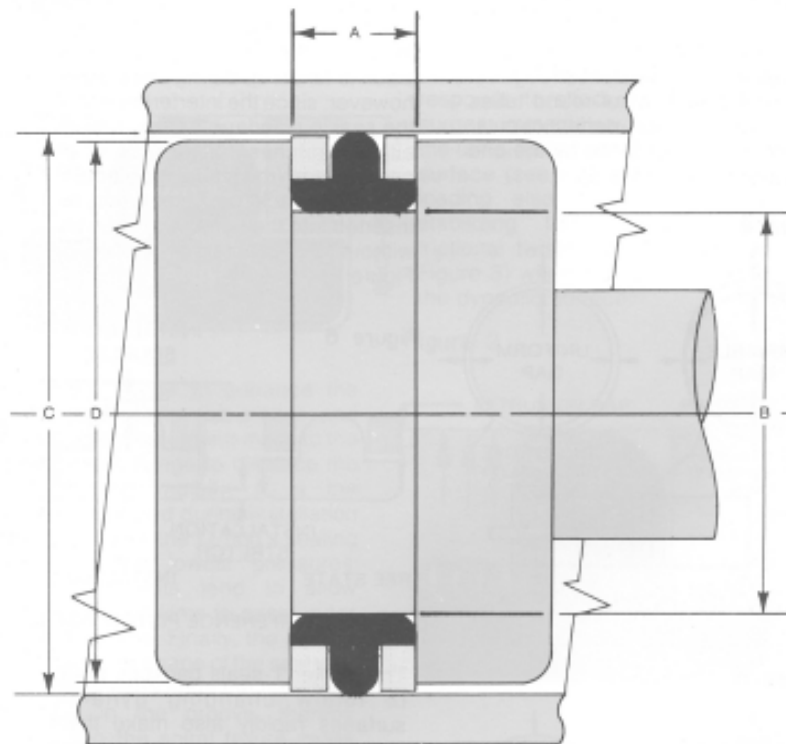
Groove corners at B diameter may have .030 maximum radius. The other groove corners may be rounded .005 max. Groove radial walls may be relieved 5° maximum for ease of machining.

The T-Seal is intended for use as a single seal. Multiple installation tends to produce pressure lock with resultant reduced seal life. In the rather unusual cases where multiple seals are called for, venting should be provided between seals.

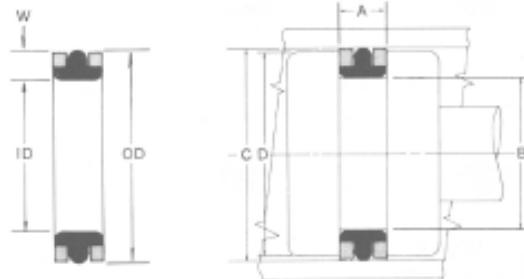
Industrial piston T-seals are also available to fit one and two backup O-ring grooves. When substituting T-seals for these two industrial groove widths, use the following part number designation:

- | Example | Piston T-seal |
|--|------------------------|
| No backup industrial O-ring groove (as shown in this catalog) | 4115 B001 TPO28 |
| One backup industrial O-ring groove | 4115 B001 TPS28 |
| Two backup industrial O-ring grooves | 4115 B001 TPT28 |

Recommended gland dimensions for one (1) and two (2) backup industrial O-ring grooves can be found in the Parker O-ring Reference Guide, ORD 5703.



Piston T-Seal Dimensional Data

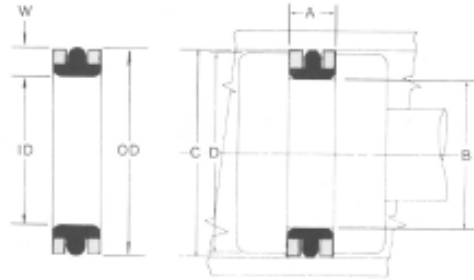


EXAMPLE PART NO: **4115** **B001** **TPO14**
Compound Backup Type/size

Parker T-seals can be installed in stand-
ard industrial no backup O-Ring grooves.
AS-568 O-Ring dash numbers are refer-
enced below.

PARKER PART NO.	OD	NOMINAL SIZE ID	W	C BORE DIAM.	B GROOVE DIAM.	A GROOVE LGTH.	D PISTON DIAM.	AS 568
TP001	3/8	3/8	3/32	.375 ± .001	.190 +.002-.000	.150 +.005-.000	.371 ± .001	-106
TP002	5/16	5/16	3/32	.437	.252	.150	.433	-108
TP003	1/2	3/8	3/32	.500	.315	.150	.496	-109
TP004	5/8	3/8	3/16	.5625	.317	.185	.558	-203
TP005	3/4	3/8	3/16	.625	.380	.185	.621	-204
TP006	7/8	5/8	3/16	.687	.442	.185	.683	-205
TP007	1	3/2	3/16	.750	.505	.185	.746	-206
TP008	1 1/8	3/4	3/16	.812	.567	.185	.808	-207
TP009	1 1/4	3/4	3/16	.875	.630	.185	.871	-208
TP010	1 3/8	3/4	3/16	.937	.692	.185	.933	-209
TP011	1	3/4	3/16	1.001	.756	.185	.997	-210
TP012	1 1/8	3/4	3/16	1.063	.818	.185	1.059	-211
TP013	1 1/4	3/4	3/16	1.126	.881	.185	1.122	-212
TP014	1 3/8	3/4	3/16	1.188	.943	.185	1.184	-213
TP015	1 1/2	1	3/16	1.251	1.006	.185	1.247	-214
TP016	1 3/4	1 1/8	3/16	1.313	1.068	.185	1.309	-215
TP017	1 7/8	1 1/4	3/16	1.376	1.131	.185	1.372	-216
TP018	2	1 3/8	3/16	1.438	1.193	.185	1.434	-217
TP019	1 1/2	1 1/4	3/16	1.501	1.256	.185	1.497	-218
TP020	1 3/4	1 3/8	3/16	1.563	1.318	.185	1.559	-219
TP021	1 1/2	1 1/4	3/16	1.626	1.381	.185	1.622	-220
TP022	1 3/4	1 1/2	3/16	1.751	1.506	.185	1.747	-222
TP023	1 3/4	1 1/2	3/16	1.876	1.502	.280	1.872	-325
TP024	2	1 3/4	3/16	2.001	1.627	.280	1.997	-326
TP025	2 1/4	1 3/4	3/16	2.126	1.752	.280	2.122	-327
TP026	2 1/4	1 3/4	3/16	2.251	1.877	.280	2.247	-328
TP027	2 3/4	2	3/16	2.376	2.002	.280	2.372	-329
TP028	2 3/4	2 1/4	3/16	2.501	2.127	.280	2.497	-330
TP029	2 3/4	2 1/4	3/16	2.626	2.252	.280	2.620	-331
TP030	2 3/4	2 3/4	3/16	2.751 ± .002	2.377 +.003-.001	.280	2.745 ± .002	-332
TP031	2 3/4	2 3/4	3/16	2.876	2.502	.280	2.870	-333
TP032	3	2 3/4	3/16	3.001	2.627	.280	2.995	-334
TP033	3 1/4	2 3/4	3/16	3.126	2.752	.280	3.120	-335
TP034	3 1/4	2 3/4	3/16	3.251	2.877	.280	3.245	-336
TP035	3 3/4	3 1/4	3/16	3.502	3.128	.280	3.496	-338

Piston T-Seal Dimensional Data (cont.)



EXAMPLE PART NO: **4115** **B001** **TPO14**
Compound Backup Type/size

Parker T-seals can be installed in standard industrial no backup O-Ring grooves. AS-568 O-Ring dash numbers are referenced below.

PARKER PART NO.	OD	NOMINAL SIZE ID	W	C BORE DIAM.	B GROOVE DIAM.	A GROOVE LGTH.	D PISTON DIAM.	AS 568
TP036	3%	3%	3/4	3.627 ± .002	3.253 + .003 - .001	.280 + .005 - .001	3.621 ± .002	-339
TP037	3%	3%	3/4	3.752	3.378	.280	3.746	-340
TP038	3%	3%	3/4	3.877	3.503	.280	3.871	-341
TP039	4	3%	3/4	4.002	3.628	.280	3.996	-342
TP040	4%	3%	3/4	4.127	3.753	.280	4.121	-343
TP041	4%	3%	3/4	4.252	3.878	.280	4.246	-344
TP042	4%	4	3/4	4.377	4.003	.280	4.371	-345
TP043	4%	4%	3/4	4.502	4.128	.280	4.496	-346
TP044	4%	4%	3/4	4.627	4.253	.280	4.621	-347
TP045	4%	4%	3/4	4.752	4.378	.280	4.746	-348
TP046	4%	4%	3/4	4.877	4.503	.280	4.871	-349
TP047	5	4%	3/4	5.003	4.629	.280	4.997	-350
TP048	5%	4%	3/4	5.128	4.649	.366	5.122	-426
TP049	5%	4%	3/4	5.253	4.774	.366	5.247	-427
TP050	5%	4%	3/4	5.378	4.899	.366	5.372	-428
TP051	5%	5	3/4	5.503	5.024	.366	5.497	-429
TP052	5%	5%	3/4	5.628	5.149	.366	5.622	-430
TP053	5%	5%	3/4	5.753	5.274	.366	5.747	-431
TP054	5%	5%	3/4	5.878	5.399	.366	5.874	-432
TP055	6	5%	3/4	6.003	5.524	.366	5.997	-433
TP056	6%	5%	3/4	6.128	5.649	.366	6.122	-434
TP057	6%	5%	3/4	6.253	5.774	.366	6.247	-435
TP058	6%	6	3/4	6.503 ± .003	6.024 + .004 - .002	.366	6.495 ± .003	-437
TP059	6%	6%	3/4	6.753	6.274	.366	6.745	-438
TP060	7	6%	3/4	7.003	6.524	.366	6.995	-439
TP061	7%	6%	3/4	7.253	6.774	.366	7.245	-440
TP062	7%	7	3/4	7.503	7.024	.366	7.495	-441
TP063	7%	7%	3/4	7.753	7.274	.366	7.745	-442
TP064	8	7%	3/4	8.003	7.524	.366	7.995	-443
TP065	8%	7%	3/4	8.253	7.774	.366	8.245	-444
TP066	8%	8	3/4	8.503	8.024	.366	8.495	-445
TP067	9	8%	3/4	9.003	8.524	.366	8.995	-446
TP068	9%	9	3/4	9.503	9.024	.366	9.495	-447
TP069	10	9%	3/4	10.003	9.524	.366	9.995	-448
TP070	10%	10	3/4	10.503	10.024	.366	10.495	-449
TP071	11	10%	3/4	11.003	10.524	.366	10.995	-450
TP072	11%	11	3/4	11.503	11.024	.366	11.495	-451
TP073	12	11%	3/4	12.003	11.524	.366	11.995	-452
TP077	14	13%	3/4	14.003	13.524	.366	13.995	-456
TP080	15%	15	3/4	15.503	15.024	.366	15.495	-459
TP081	16	15%	3/4	16.003	15.524	.366	15.995	-460
TP083	17	16%	3/4	17.003	16.524	.366	16.995	-462

Rod T-Seal Design

The T-Seal is designed for installation in standard commercial O-ring grooves. Designs should allow for proper lead-in angle (identical to those specified for O-rings). Due attention should also be given the chamfering and/or recessing of shoulders, ports and threads, which might damage the seal in installation or operation.

Surface finish should be held to 32 RMS maximum in grooves, and **10-16** RMS on dynamic surfaces against which the seal is to operate.

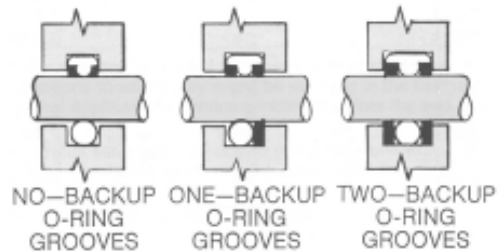
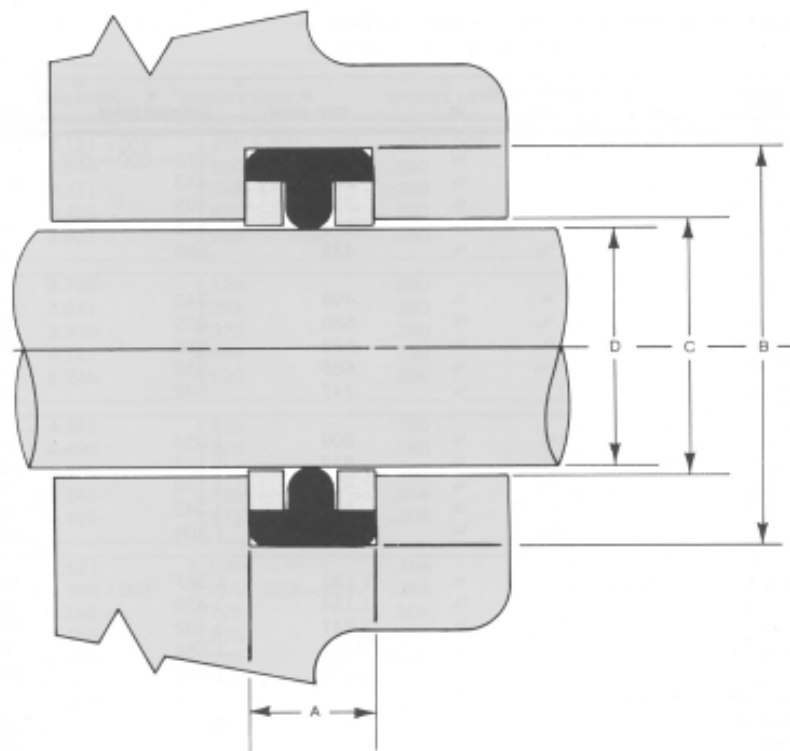
Grooves corners at B diameter may have .030 maximum radius. The other groove corners may be rounded .005 max. Groove radial walls may be relieved 5° maximum for ease of machining.

The T-Seal is intended for use as a single seal. Multiple installation tends to produce pressure lock with resultant reduced seal life. In the rather unusual cases where multiple seals are called for, venting should be provided between seals.

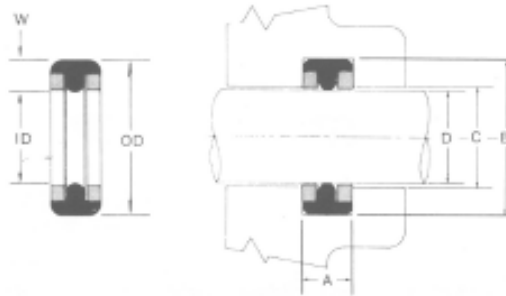
Industrial rod T-seals are also available to fit one and two backup O-ring grooves. When substituting T-seals for these two industrial groove widths, use the following part number designation:

- | | |
|---|------------------------|
| Example | Rod T-seal |
| No backup industrial O-ring groove
(as shown in this catalog) | 4115 B001 TRO38 |
| One backup industrial O-ring groove | 4115 B001 TRS38 |
| Two backup industrial O-ring grooves | 4115 B001 TRT38 |

Recommended gland dimensions for one (1) and two (2) backup industrial O-ring grooves can be found in the Parker O-ring Reference Guide, ORD 5703.



Rod T-Seal Dimensional Data



EXAMPLE PART NO: **4115 B001 TR012**
 Compound Backup Type/size

Parker T-seals can be installed in standard industrial no backup O-Ring grooves. AS-568 O-Ring dash numbers are referenced below.

PARKER PART NO.	ID	NOMINAL SIZE OD	W	D ROD DIAM.	B GROOVE DIAM.	A GROOVE LGTH.	C CLEARANCE DIAM.	AS 568
TR001	3/16	3/8	3/32	.186±.001	.370+.000-.002	.150+.005-.000	.189±.001	-106
TR002	1/4	7/16	3/32	.248	.433	.150	.251	-108
TR003	5/16	1/2	3/32	.310	.495	.150	.313	-109
TR004	3/8	9/16	3/32	.373	.618	.185	.376	-204
TR005	7/16	11/16	3/32	.435	.680	.185	.438	-205
TR006	1/2	3/4	1/4	.498	.743	.185	.501	-206
TR007	5/8	13/16	3/8	.560	.805	.185	.563	-207
TR008	3/4	1 1/16	1/2	.623	.868	.185	.626	-208
TR009	7/8	1 1/4	3/4	.685	.930	.185	.688	-209
TR010	1	1 1/2	3/4	.747	.992	.185	.750	-210
TR011	1 1/8	1 3/4	1	.809	1.054	.185	.812	-211
TR012	1 1/4	1 7/8	1	.872	1.117	.185	.875	-212
TR013	1 3/8	1 11/16	1 1/4	.934	1.179	.185	.937	-213
TR014	1 1/2	1 3/4	1 1/2	.997	1.242	.185	1.000	-214
TR015	1 3/4	1 11/16	1 1/2	1.059	1.304	.185	1.062	-215
TR016	1 7/8	1 15/16	1 3/4	1.122	1.367	.185	1.125	-216
TR017	1 5/8	1 13/16	1 3/4	1.184	1.429	.185	1.187	-217
TR018	1 1/2	1 1/2	1 3/4	1.247	1.492	.185	1.250	-218
TR019	1 3/4	1 3/4	1 3/4	1.309	1.554	.185	1.312	-219
TR020	1 3/4	1 3/4	1 3/4	1.372	1.617	.185	1.375	-220
TR021	1 3/4	1 3/4	1 3/4	1.434	1.679	.185	1.437	-221
TR022	1 3/4	1 3/4	1 3/4	1.497	1.742	.185	1.500	-222
TR023	1 3/4	1 3/4	1 3/4	1.497	1.871	.280	1.500	-325
TR024	1 3/4	2	1 3/4	1.622	1.996	.280	1.625	-326
TR025	1 3/4	2 1/4	1 3/4	1.747	2.121	.280	1.750	-327
TR026	1 3/4	2 1/4	1 3/4	1.872	2.246	.280	1.875	-328
TR027	2	2 1/2	1 3/4	1.997	2.371	.280	2.000	-329
TR028	2 1/4	2 1/2	1 3/4	2.122	2.496	.280	2.125	-330
TR029	2 1/4	2 1/2	1 3/4	2.247	2.613	.280	2.250	-331
TR030	2 1/4	2 1/2	1 3/4	2.372 ± .002	2.746+.001-.003	.280	2.377 ± .002	-332
TR031	2 1/2	2 1/2	1 3/4	2.497	2.871	.280	2.502	-333
TR032	2 1/2	3	1 3/4	2.622	2.996	.280	2.627	-334
TR033	2 1/2	3 1/4	1 3/4	2.747	3.121	.280	2.752	-335
TR034	2 1/2	3 1/4	1 3/4	2.872	3.246	.280	2.877	-336
TR035	3	3 1/4	1 3/4	2.996	3.370	.280	3.001	-337

Parker T-seals can be installed in standard industrial no backup O-Ring grooves. AS-568 O-Ring dash numbers are referenced below.

PARKER PART NO.	ID	NOMINAL SIZE OD	W	D ROD DIAM.	B GROOVE DIAM.	A GROOVE LGTH.	C CLEARANCE DIAM.	AS 568
TR036	3%	3%	3/8	3.121 ± .002	3.495 + .001 - .003	.280 + .005 - .000	3.126 ± .002	-338
TR037	3%	3%	3/8	3.246	3.620	.280	3.251	-339
TR038	3%	3%	3/8	3.371	3.745	.280	3.376	-340
TR039	3%	3%	3/8	3.496	3.870	.280	3.501	-341
TR040	3%	4	3/8	3.621	3.995	.280	3.626	-342
TR041	3%	4%	3/8	3.746	4.120	.280	3.751	-343
TR042	3%	4%	3/8	3.871	4.245	.280	3.876	-344
TR043	4	4%	3/8	3.996	4.370	.280	4.001	-345
TR044	4%	4%	3/8	4.121	4.495	.280	4.126	-346
TR045	4%	4%	3/8	4.246	4.620	.280	4.251	-347
TR046	4%	4%	3/8	4.371	4.745	.280	4.376	-348
TR047	4%	4%	3/8	4.496	4.870	.280	4.501	-349
TR048	5	5%	3/8	4.996	5.475	.366	5.001	-429
TR049	5%	5%	3/8	5.246	5.725	.366	5.251	-431
TR050	5%	6	3/8	5.496	5.975	.366	5.501	-433
TR051	5%	6%	3/8	5.621	6.100	.366	5.626	-434
TR052	6	6%	3/8	5.996 ± .003	6.475 + .002 - .004	.366	6.003 ± .003	-437
TR053	6%	6%	3/8	6.246	6.725	.366	6.253	-438
TR054	6%	7	3/8	6.496	6.975	.366	6.503	-439
TR055	6%	7%	3/8	6.746	7.225	.366	6.753	-440
TR056	7	7%	3/8	6.996	7.475	.366	7.003	-441
TR057	7%	7%	3/8	7.246	7.725	.366	7.253	-442
TR058	7%	8	3/8	7.500	7.984	.366	7.507	-443
TR059	8	8%	3/8	7.996	8.475	.366	8.003	-445
TR060	9	9%	3/8	8.996	9.475	.366	9.003	-447
TR061	9%	10	3/8	9.496	9.975	.366	9.503	-448
TR062	10	10%	3/8	9.996	10.475	.366	10.003	-449
TR063	11	11%	3/8	10.996	11.475	.366	11.003	-451
TR064	11%	12	3/8	11.500	11.979	.366	11.507	-452
TR065	12	12%	3/8	11.996	12.475	.366	12.003	-453

The information in this publication is based on the best sources available, and Parker Packing has attempted to make it both accurate and useful. However, it is impossible to test packings and sealing devices under all the conditions to which they might be exposed in the field. It is important, therefore, that packings and sealing devices be tested under conditions that duplicate the service conditions before the seal design is finalized.

PATENT NOTICE—No attempt has been made to determine the patent status of the various seals and methods of using the same which are illustrated or described in this publication. Inclusion in this publication of any design or method which may be patented is not to be construed as promoting or sanctioning unauthorized use.

All goods sold hereunder are warranted to be free from defects in material and workmanship. These express warranties are in lieu of and exclude all other warranties expressed or implied. Parker Packing recommends all designs be tested in prototype prior to production due to the many variables involved in sealing.

T-Seal Materials & Ordering Information

Parker T-seals are available in a number of rubber components and back-up materials to meet various service conditions. Some of the more popular materials are listed below.

STANDARD MATERIALS

4115A75 shore A durometer nitrile compound exhibits excellent resistance to petroleum based hydraulic oils, lubricating oils, and greases. Also suggested for water/oil and water/glycol based fire safe fluids. Compound 4115 is also widely used in pneumatic systems.

B001—Nylon with molybdenum disulfide is a tough extrusion resistant back-up ring material suitable for service in most industrial fluids where high pressures and wide clearances—extrusion gaps—are encountered.

ORDERING INFORMATION

The T-seal is a three piece assembly consisting of a rubber seal element—the "T" and two back-up rings. The seal will not function without all three parts. When ordering specify the TP or TR size from the previous pages and material. Both the back-up ring and T-seal material should be called out. A typical complete part number incorporates the size and two material designations.

Seal Material	Back-up Material	Size
4115	B001	TPO22

Orders or inquiries with only a size given will be processed using standard B001 & 4115 materials.

OVER AND UNDER SIZE GLANDS

Parker T-seals are designed to fit the gland dimensions shown in this brochure. Because of the resilience of both the seal and back-up ring materials they can accommodate

slight variations in either direction from the dimensions shown. The extent to which such variation can be tolerated is dependent on the seal size, diameter and cross section, extrusion gap and pressures. In most instances a diametrical change of ten thousandths can be accommodated without adverse effects.

Very often special diameter T-seals can be provided at a very nominal tooling expense through modification of existing tool assemblies. Please consult the sales office for specific information on individual applications.

The T-seal is a 3-element seal and only sold as an assembly. Rubber elements and back-up rings cannot be ordered separately.



Elastomeric Seal

Base Polymer	Compound Number	Durometer	Temperature Range °F	Service
Ethylene Propylene	E4183A	80	-65°F/+275°F	Skydrol ¹ and other phosphate esters, water, dilute acids and alkalis.
	E4259A	80		
Fluorocarbon ²	V4205A	75	-20°F/+400°F	High temperature oils, aromatic solvents, industrial phosphate esters.
	V4208A	90		
Neoprene	C4107A	70	-40°F/+300°F	Refrigerants.
Nitrile	N4115A	75	-40°F/+225°F	Standard material - for petroleum based hydraulic and lubricating oils, pneumatics.
	N4182A	70	-65°F/+275°F	Low temperature hydraulic fluid applications.
	N4187A	70	-40°F/+250°F	Petroleum based oils and fuels.
	N4242A	70	-65°F/+275°F	Low temperature petroleum based hydraulic fluid applications.
Nitroxile	N4257A	80	-20°F/+250°F	Petroleum based fluids, high water content fluids, abrasion/wear resistance.
	N4274A	85	-20°F/+250°F	Low friction, long wearing (ELF) extremely low friction.

Back-up Ring

Base Material	Compound Number	Temperature Range °F	Service
Nylatron	B001	-65°F/+250°F	Standard material -most hydraulic/pneumatic service.
TFE Resin	B011	-65°F/+350°F	High temperature hydraulic and chemical resistant. For +350°F to +450°F service - Consult factory.

¹ TM © Monsanto Co. ² Viton © /DuPont; Fluorel © /3M



Need Help? If you need assistance, please photocopy this page and the facing page. Fill out the required information, and fax it (801) 972-4777. Utilize the information below and other information in this catalog to determine the dimensions needed. We will contact you to discuss your specific application and make recommendations. If you need help filling out the form, please call Applications Engineering at (801) 972-3000.

**ENGINEERED POLYMER SYSTEMS DIVISION
DESIGN ACTION REQUEST**

SALT LAKE CITY OPERATIONS
2220 SOUTH 3600 WEST
SALT LAKE CITY, UTAH
PHONE (801) 972-3000
FAX (801) 972-4777

CHICAGO OPERATIONS
2565 NORTHWEST PARKWAY
ELGIN, IL 60123
PHONE (847) 783-4300
FAX (847) 783-4301

Project # _____
Date Entered _____
Date Required _____
Prepared by _____
Territory Mgr _____
Distributor/Location _____

Referred by _____
Lead # _____ Dist. Sales _____

COMPANY: _____ FAX NUMBER: _____
ADDRESS: _____ P.O. BOX: _____ MAILSTOP: _____
CITY: _____ STATE: _____ ZIP: _____
CONTACT: _____ TITLE: _____ PHONE: _____ EXT: _____
ALT. CONTACT: _____ TITLE: _____ PHONE: _____ EXT: _____
E-MAIL: _____

EQUIPMENT: _____ MODEL: _____
COMPONENTS: _____ PROBLEM: _____
EXISTING SEAL: _____ PROBLEM PARTS INCLUDED: YES NO
PRICE: \$ _____ @ _____ pcs USAGE / YEAR: _____ CUSTOMER P/N: _____
TARGET: \$ _____ @ _____ pcs QUOTE QTY: _____ PROTO QTY: _____
DATE PROTO' REQ'D: _____

PRODUCT TYPE

ROD / SHAFT INTERNAL FACE WIPER VANE
 PISTON EXTERNAL FACE BEARING NON-SEAL

SPECIAL INSPECTION REQUIREMENTS? YES NO

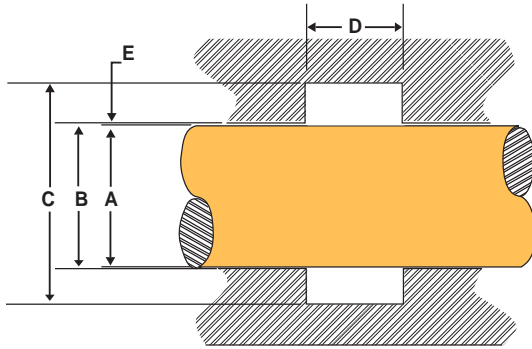
SPECIAL PACKAGING REQUIREMENTS? YES NO

<u>OPERATING PARAMETERS</u>	<u>UNIT (CIRCLE ONE)</u>	MINIMUM	OPERATING	MAXIMUM	<u>MOTION</u>
TEMPERATURE:	°K °F °C	_____	_____	_____	<input type="checkbox"/> STATIC
PRESSURE:	PSI BAR MPA	_____	_____	_____	<input type="checkbox"/> RECIPROCATING
STROKE LENGTH:	INCH MM	_____	_____	_____	<input type="checkbox"/> ROTARY
CYCLE RATE:	/MIN. /HR. HZ	_____	_____	_____	<input type="checkbox"/> OSCILLATORY
ROTATION:	DEG. RAD.	_____	_____	_____	
RPM:		_____	_____	_____	
VELOCITY:	FT/MIN. MM/MIN.	_____	_____	_____	<input type="checkbox"/> UNIDIRECTIONAL
VACUUM:	IN. HG TORR	_____	_____	_____	<input type="checkbox"/> BI-DIRECTIONAL
DIRECTION OF ROTATION:	<input type="checkbox"/> CLOCKWISE <input type="checkbox"/> COUNTER CLOCKWISE <input type="checkbox"/> BI-DIRECTIONAL				

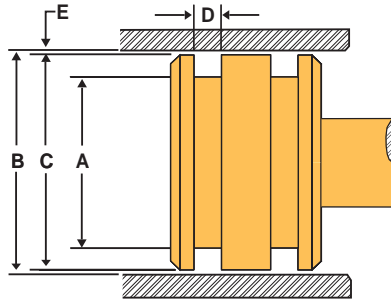
MEDIA TO BE SEALED: _____

Hardware (check one)

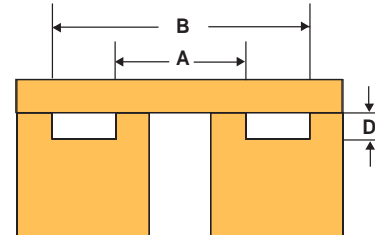
Rod



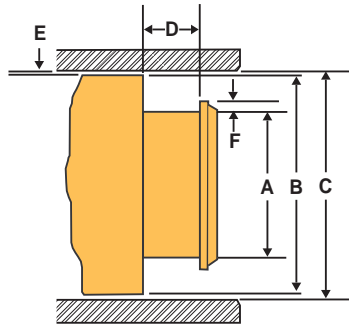
Piston



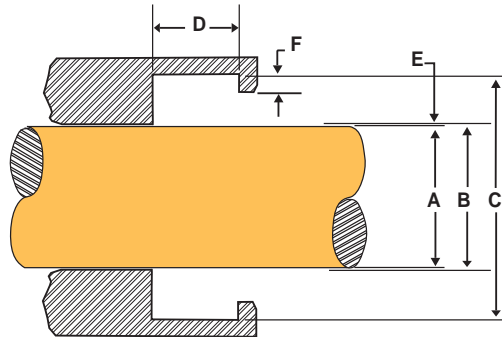
Face Seal



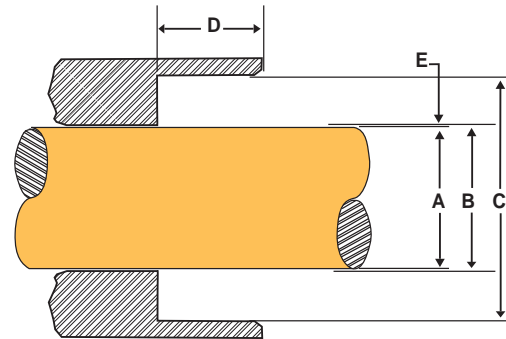
Other Piston



Other Rod



Rotary



HARDWARE SPECIFICATIONS

A DIAMETER MIN. _____ MAX. _____
 B DIAMETER MIN. _____ MAX. _____
 C DIAMETER MIN. _____ MAX. _____
 D GROOVE WIDTH MIN. _____ MAX. _____
 E RADIAL CLEARANCE MIN. _____ MAX. _____
 F ROD / PISTON STEP HEIGHT: MIN. _____ MAX. _____
 RUN OUT (TIR): MIN. _____ MAX. _____
 ECCENTRICITY: MIN. _____ MAX. _____

HARDWARE DRAWINGS INCLUDED WITH DAR _____ YES _____ NO

HARDNESS _____ FINISH _____ MAT'L _____
 HARDNESS _____ FINISH _____ MAT'L _____
 HARDNESS _____ FINISH _____ MAT'L _____
 CAN HARDWARE BE CHANGED? _____ YES _____ NO
 HOW? _____

SIDE LOAD (LBS NEWTON'S): _____
 MIL-G-5514 O-RING DASH # _____ BACK-UP WIDTH _____
 AS4716 O-RING DASH # _____ BACK-UP WIDTH _____

PERFORMANCE REQUIREMENTS

(CIRCLE ONE)

FRICTION: LBS OZ GMS BREAKOUT _____ DYNAMIC _____
 TORQUE: FT/LB IN/OZ GM/CM BREAKOUT _____ DYNAMIC _____
 EXPECTED LIFE: CYC HRS YRS _____
 MAX. LEAKAGE: DROPS CC/MIN _____
 MOST CRITICAL ASPECT: _____
 CONTAMINATION: _____

GLAND TYPE

METRIC

_____ SPLIT _____ OPEN
 _____ SOLID _____ STEPPED

_____ YES
 _____ NO

NOTES:

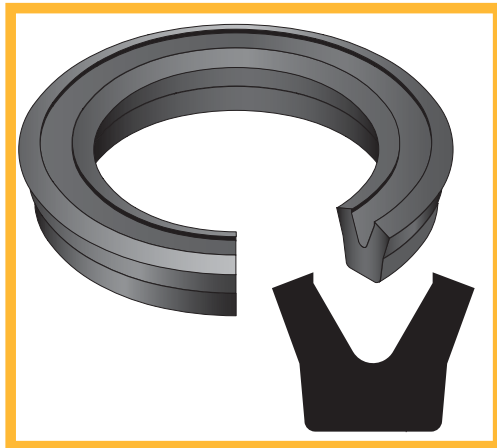
Aerospace T-Seals
Catalog EPS 5209/USA



FlexiSeal™
Catalog EPS 5315/USA



8400 / 8500 SERIES U-CUPS



POLYPAK™ SEALS
PolyPak™ Seal Design Handbook
Catalog EPS 3800/USA



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2. Payment: Payment shall be made by Buyer net 30 days from the day of invoice of the items purchased hereunder. Parker reserves the right to charge interest on all past due amounts. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided in the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty. Seller warrants that the items sold hereunder shall be free from defects in material or workmanship at the time of delivery. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.

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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without

Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereunder "Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after the Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, place or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Any special requirements for items to be provided by Seller hereunder including without limitation; compliance with military specifications, special documentation, or testing requirements, must be communicated to Seller in writing at the time the items are first requested. Any such requests that are communicated to Seller after preparation to manufacture an item has commenced may result in additional charges for rework or remanufacture of the item.

13. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either more than two (2) years after the cause of action accrues.

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For fast, easy and accurate seal design assistance, ask for *Parker's Total inPHorm™ seal design and material selection software*. Total inPHorm™ includes five separate programs for the specification of:

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- **Static Seals**
- **Composite Sealing Products**
- **Hydraulic & Pneumatic Seals**
- **EMI Shielding & Thermal Management Products**



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Parker Hannifin Corporation
Engineered Polymer Systems Division
2220 South 3600 West
Salt Lake City, UT 84119
Phone: (801) 972-3000
Fax: (801) 972-4777

Rev. 8/02-1.5M-CT

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