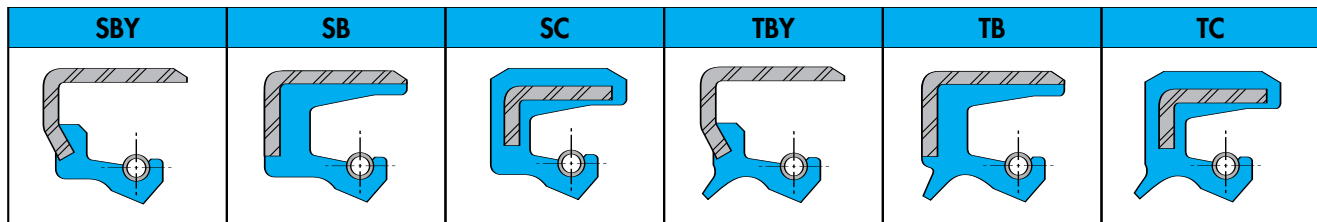


## ■ HOW TO SELECT THE PROPER LIP DESIGN

In order to select the proper seal design for an application, you must consider fluid pressure, shaft eccentricity, temperature and fluid viscosity.

The sections below briefly discuss each standard lip design's most common applications, its limits of tolerance for shaft speed, eccentricity, and pressure at various shaft diameters. Testing in each application is required to verify the seal's design effectiveness.

### "S" AND "T" LIP DESIGNS AND PERFORMANCE DATA



SHAFT DIAMETER	NITRILE LIP MAXIMUM SHAFT SPEED*	MAXIMUM PRESSURE**	MAXIMUM TOTAL ECCENTRICITY***
.500	8,000 rpm	5 psi	.004"
1.000	7,000 rpm	5 psi	.006"
2.000	4,500 rpm	5 psi	.010"
3.000	3,800 rpm	5 psi	.012"
4.000	2,750 rpm	5 psi	.016"

10

The "S" and "T" spring-loaded designs are the two most commonly used. The garter spring in these designs applies additional lip force against the shaft, thus enabling the lip to follow shaft rotation more closely at higher RPMs. This ensures more positive sealing with lower viscosity fluids and extends service life.

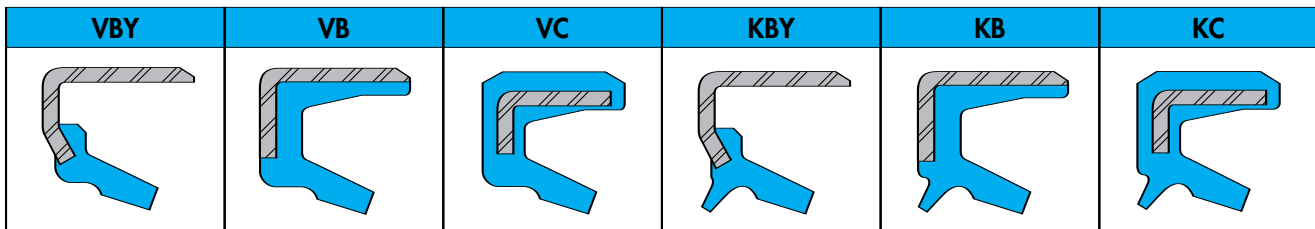
The "S" style is used for such applications as engines, drive axles, transmissions, pumps, and electric motors. The "T" style is similar, but with a secondary lip for dirt exclusion. This secondary lip excludes contaminants and keeps lubrication in place under the primary lip. This secondary lip is designed with a net contact to the shaft minimizing heat generation. It is not intended as a sealing lip for external fluids. Specialized designs in this section address external fluid sealing.

- \* Will tolerate slightly higher shaft speeds if high-temperature elastomer materials are used, e.g. Viton<sup>1</sup>, silicone, hydrogenated nitrile, or Vamac<sup>1</sup>.
- \*\* Will tolerate slightly higher continuous pressure if the shaft speed is below 200 feet per minute.
- \*\*\* Will tolerate higher eccentricity if shaft speed is low or if fluid viscosity is high.

<sup>1</sup> Viton and Vamac are trademarks of the E.I. duPont Company and refer to fluorocarbon elastomer and ethylene acrylic.

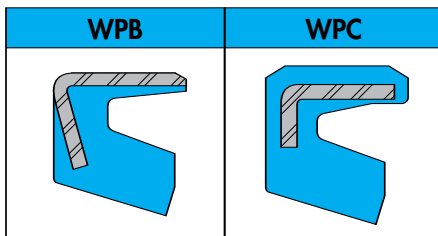
## "V" AND "K" LIP DESIGNS AND PERFORMANCE DATA

"V" and "K" are non-spring loaded designs normally used for sealing against grease or other viscous fluid. They are also effective dirt excluders. "V" is single-lipped, while "K" has the secondary lip for greater contaminant exclusion and lubricant retention. "V" and "K" are more limited in range of application than "S" or "T" because they lack the spring-loading. However, they are less expensive, and work well with higher viscosity fluids and lower RPMs. These designs are good dirt excluders for electric motors and for such applications as vehicle wheels, and conveyor rollers.



SHAFT DIAMETER	NITRILE LIP MAXIMUM SHAFT SPEED	MAXIMUM PRESSURE	MAXIMUM TOTAL ECCENTRICITY*
.500	4,000 rpm	4 psi	.003"
1.000	3,000 rpm	4 psi	.005"
2.000	2,300 rpm	4 psi	.006"
3.000	1,700 rpm	4 psi	.008"
4.000	1,400 rpm	4 psi	.010"

11



## "W" LIP DESIGNS AND PERFORMANCE DATA

The "W" design was specially developed as a dirt excluder for reciprocating shafts in hydraulic or pneumatic cylinders. It helps protect the metal components within the cylinder by preventing abrasive contaminants from being drawn into the cylinder on the rod.

ROD DIAMETER	MAXIMUM ROD SPEED	MAXIMUM TOTAL ECCENTRICITY
.500	200 fpm	.006"
1.000	200 fpm	.008"
2.000	200 fpm	.009"
3.000	200 fpm	.010"
4.000	200 fpm	.012"

\* Will tolerate higher eccentricities at lower shaft speeds.