

3.1.5 Lubrication

Lubrication of O-ring seals is extremely important for installation and operation of dynamic seals as well as proper seating of static seals. The general rule for use of lubrication is: **The greatest benefit in using a lubricant is obtained during the initial installation of the O-ring.**

Lubricants are commonly used on O-rings and other elastomeric seals. Using a suitable grease or oil during assembly helps protect the O-ring from damage by abrasion, pinching, or cutting. It also helps to seat the O-ring properly, speeds up assembly operations, and makes automated assembly line procedures possible. An additional benefit is the protection that the lubricant provides as a surface film. Proper lubrication also helps protect some polymers from degradation by atmospheric elements such as ozone and its presence helps extend the service life of any O-ring. A lubricant is almost essential in pneumatic applications requiring dynamic service. In vacuum applications, appropriate lubricants help reduce the overall leak rate by filling the microfine inclusions of the gland's metal surfaces and lowering permeation rates of the elastomer.

Parker Seal offers two lubricants that will satisfy most service needs: Parker O-Lube and Parker Super-O-Lube. These two lubricants are described in the following paragraphs. Table 3-1 lists their key properties along with others used in specific types of services. Table 3-2 provides part number information for O-Lube and Super O-Lube.

Parker O-Ring Lubricants			
O-Lube		Super-O-Lube	
Part Number	Description	Part Number	Description
OLUBE 884-2GRAMS	2 gr. tube	SLUBE 884-Grams	2 gr. tube
OLUBE .25OZ	¼ oz. tube	SLUBE .25OZ	¼ oz. tube
OLUBE 884-.50	½ oz. tube	SLUBE 884-.5	½ oz. tube
OLUBE 884-4	4 oz. tube	SLUBE 884-2	2 oz. tube
OLUBE 884-35	35 lb. pail	SLUBE 884-8	8 lb. can
OLUBE 884-400	400 lb. drum	SLUBE 884-40	40 lb pail

Note: MSDS are available at www.parkerorings.com

Table 3-2: O-Ring Lubricants

3.1.5.1 Parker O-Lube

Parker O-Lube is an outstanding general-purpose grease intended for use with O-ring and other seals in hydrocarbon service. It can also be used in pneumatic service. The useful temperature is from -29°C to 82°C (-20°F to 180°F).

3.1.5.2 Parker Super-O-Lube

Parker Super-O-Lube is an all-purpose O-ring lubricant. It is not a grease, but rather a high-viscosity silicone oil. It is especially useful as a seal lubricant. The temperature range is -54°C to 204°C (-65°F to 400°F).

Parker Super-O-Lube can be used as an assembly lubricant on all rubber polymers, including silicones. (Note: Silicones require special consideration.) In addition, Parker Super-

Lubricants				
Type of Elastomer	Type of Service	Best	Manufacturer	Temp Range °F
NBR, Nitrile	Hydraulic Oils & Fuels Extreme Service Pneumatic Vacuum	O-Lube	Parker	-20 to 180
		Petrolatum	Many	-20 to 180
		Barium Grease	Many	-20 to 300
		Super O-Lube	Parker	-65 to 400
		DC-55	Dow Corning Co.	-65 to 275
		Celvacene	Consolidated Vacuum Corp.	-40 to 200
CR, Neoprene	Hydraulic Oils & Freon® Vacuum	O-Lube	Parker	-20 to 180
		Petrolatum	Many	-20 to 180
		Celvacene	Consolidated Vacuum Corp.	-40 to 200
EPDM	Skydrol® Steam & Hot Water	MCS-352	Aviation Fluid Service Co.	-65 to 300
		Super O-Lube	Parker	-65 to 400
		DC4, DC-7, DC55	Dow Corning Co.	+32 to 350
Silicone	General High Temperature	Petrolatum	Many	-20 to 300
		FS1292	Dow Corning Co.	-20 to 400
Fluorosilicone	Oil or Fuel High Temperature	Mil P 37649	Many	-20 to 180
		Petrolatum	Many	-65 to 350
		Super O-Lube	Parker	-65 to 400
		DC 4 or DC-7	Dow Corning Co.	+32 to 350
Fluorocarbon	Hydraulic Vacuum & High Temperature	Petrolatum	Many	-20 to 180
		Super O-Lube	Parker	-65 to 400
		DC-55	Dow Corning	-65 to 400

Notes: Assembly lubricants should always be used sparingly during application. A light film is all that is required. This is doubly important in cases 1 and 2 below.

1. When only a thin film of O-Lube is used for assembly purposes, the assembly may be subject to higher temperatures, with limits determined by the fluid and elastomer being used.

2. Use only a thin film of Super-O-Lube on silicone rubber if the temperature will exceed 149°C (300°F).

Table 3-1: Parker O-Ring Lubricants

Freon® is a registered trademark of E.I. du Pont de Nemours & Co.
Skydrol® is a registered trademark of Solutia Inc.



O-Lube has some unique advantages. It clings tenaciously to rubber or metal surface helping to prevent it from being flushed away by action of the system fluid. It has one of the widest temperature ranges of any seal lubricant available. It can be used for high pressure systems or in **hard vacuum environments**. Super-O-Lube's inert nature lends itself to a wide variety of fluid systems. Since there are no organic fillers, there can be no clogging of microfilters.

In addition to its outstanding performance in internal service, Parker Super-O-Lube gives protection to rubber polymers that are normally age sensitive when exposed to the atmosphere. This is a typical concern with ozone sensitive polymers that require age control.

There are special situations that may exist where one of the two Parker lubricants would *not* be the best recommendation. For instance, there may be a need for a special high vacuum grease, or a lubricant that would be especially suited to phosphate ester service. For guidance in handling these unique situations consult a Parker O-Ring Division Application Engineer.

Before selecting a lubricant (other than the primary fluid being sealed) for use with O-rings, determine that it meets the following requirements:

1. It or any additives that it contains, should not cause shrinkage or excessive swelling of the O-ring compound being used.
2. It should not excessively soften or solidify over the anticipated service temperature range.
3. It should not break-down and leave gummy or gritty deposits after cycling, or show any adverse chemical reaction with the primary fluid being sealed.
4. It should be capable of forming a thin, strong (high surface tension) film over the metal being lubricated that the O-ring's dynamic motion cannot wipe away.
5. It should pass through any filters used in the system.

3.1.5.3 PTFE Coatings

PTFE coatings of O-rings is an ideal low-friction coating where operational flexibility is a major consideration. PTFE also offers additional benefits such as:

- Positive identification at the assembly line
- Ease of installation
- Lower break-in torques
- Reduces costly "hang-ups" on automatic systems
- Lower initial running friction
- Eliminates sticking of components after long storage
- Reduces twisting of rings during installation

The following colors are available: standard blue, medium blue, light blue, white, purple, red, yellow, medium green, dark green, grey, clear, black, orange, brown umber, pink and green/gold.

3.1.5.4 Other Friction Reduction Methods

Besides O-Lube and Super-O-Lube, Parker Seal can supply O-rings that have received various friction reducing treatments. These may include internal lubrication and Parker's Proprietary Lube Treatment. Both are valuable aids for automated assembly operations, and may also be used in many types of applications to reduce friction in service.

Note: While it is always preferable to use a lubricant, keep in mind that there are certain systems in which lubricants would introduce unacceptable contamination, such as semiconductor fabrication and processing equipment or medical and food processing devices.

3.1.5.5 Internal Lubrication

Internal lubrication involves the incorporation of friction reducing ingredients into the elastomer formula. Since this process alters the material's chemistry, Parker's internally lubricated materials are assigned unique compound numbers to differentiate them from their non-lubricated counterparts.

Internal lubricants consist of organic materials such as graphite, molybdenum disulfide, powdered PTFE or, more commonly, a proprietary Parker organic lubricant. Because the lubricant is dispersed throughout the body of an O-ring, this method of friction reduction generally functions longer in service than external lubrication, but to a somewhat lesser degree.

Graphite-impregnated compounds are commonly used to seal rotary shafts. It should not however, be used in contact with stainless steel surfaces because graphite tends to cause corrosive pitting of stainless materials. For such applications, compounds containing molybdenum disulfide are often a successful alternative.

Compound V0848-75 contains powdered PTFE to reduce friction.

Compounds containing this organic lubricant have become quite popular. PTFE migrates through the O-ring and gradually blooms to the surface, prolonging its lubricating effectiveness. It takes a long time to degrade a significant portion of the coating when it is lost only through the mechanical action of the mating surface. Fluids, however, tend to dissolve it, and some solvents can leach out much of the internal lubricant in a short time.

Internally lubricated compounds, where applicable, are available from the O-Ring Division.