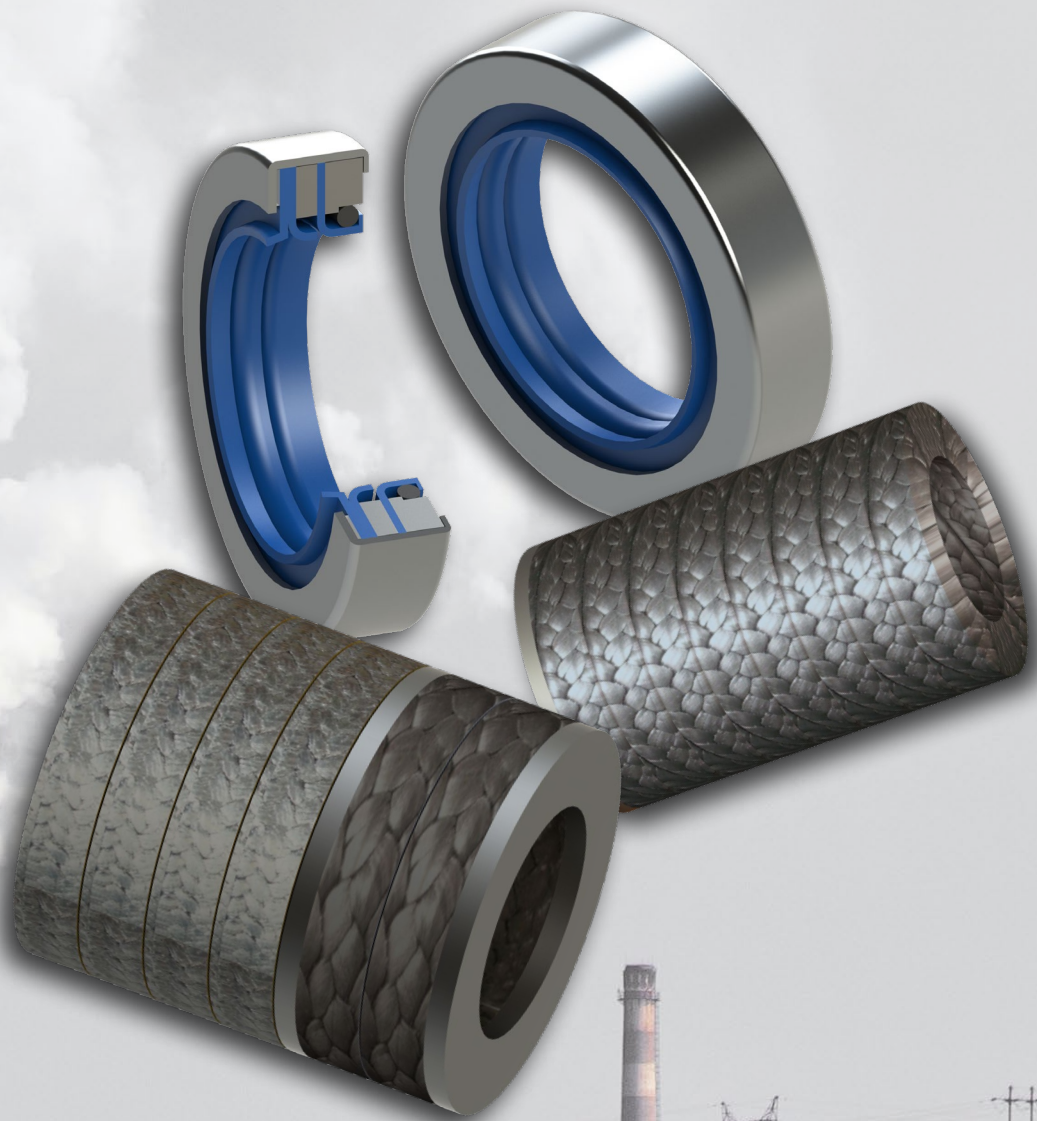




THE LEADING FORCE behind liquids™ since 1857

SEALING OPTIONS



GENERAL PURPOSE PUMPS

FOR MIXING, BLENDING, RECIRCULATING, FIXED & MOBILE TRANSFER



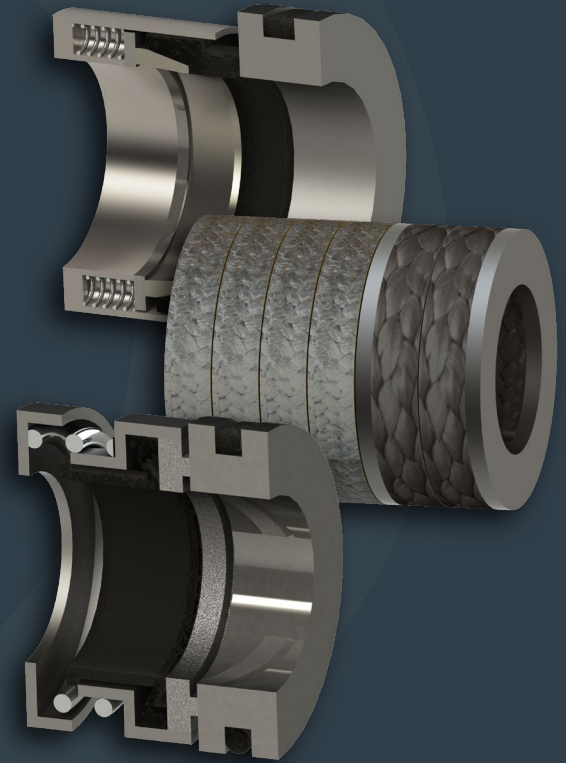
Always consult Roper Pump Company to select the best seal for your application.

Introduction

WHETHER BASIC ROPE PACKING WILL SUFFICE OR SOMETHING MORE ELABORATE IS NEEDED, ROPER PUMPS IS READY TO PROVIDE THE GUIDANCE AND SOLUTIONS TO MAXIMIZE THE EFFECIANCY AND OPERATION. THE INFORMATION IN THIS GUIDE IS DESIGNED TO INTRODUCE YOU TO THE ROPER PUMP SEALING SOLUTIONS.

Today's modern industrial environments require a great amount of consideration when choosing the right sealing arrangement for pumping equipment. In some applications, government regulations have resulted in a need for zero leakage. In other applications, ease of maintenance is the top priority. Chemical compatibility also plays an important role when selecting the best seal for the application.

With this in mind, Roper Pump Company has expanded its sealing options over the years. Today, we have a variety of seals to suit all of our consumers' needs. From Standard Packing, Triple Lip Seal, Mechanical Seals, to the Cartridge Seal, Roper Pumps is here to serve our community with state of the art sealing options.



SEAL COMPATIBILITY

Some = 1-10 drops per min

SEAL TYPE	LEAKAGE	WORKS WELL WITH	DOESN'T WORK WELL WITH
Graphite Filament Packing	Some	Hydrocarbons and most chemicals.	Abrasive applications or pumping "sticky" liquids like glues. Zero leakage requirements.
PTFE Impregnated Packing	Some	Hydrocarbons, solvents, mild chemicals and moderate abrasives.	Has a tendency to harden over time resulting in more frequent adjustment and shaft wear. Zero leakage requirements.
Graphite Impregnated PTFE Packing	Some	Most acids, caustics, solvents, and oils.	Has a tendency to harden over time resulting in more frequent adjustment and shaft wear. Zero leakage requirements.
Pure PTFE Packing	Some	Food service applications, some chemicals.	Frequent adjustments and replacements. Zero leakage requirements.
Dry run, Self Adjust (DSA)	Minimal	Truck mounted pumps that are used to pump clean, low viscosity fluids like gasoline and fuel oil.	Not as chemical resistant as packing with PTFE. Even though leakage is minimal, some applications may require "zero leakage".
Wedgee Packing	1/3 the leakage, 3x the life	Asphalt emulsions, crack sealant, industrial & abrasive liquids, molasses or liquid feed, chemical-extended PTT range, high temps, tack pumps, hot oil pumps, brewery, sludge, paper stock, gypsum	Zero leakage requirements.
Triple Lip Seal	None	Most applications, plus thicker cleaner fluids such as polymers and oils	Pumping a product with no lubricity, like water. Some Abrasives.
Triple Lip Seal with Packing Backup	None	Most applications, plus thicker cleaner fluids such as polymers and oils	Pumping a product with no lubricity, like water. Some Abrasives. Zero leakage requirements.
Type 9 Mechanical Seal	None	Chemical processing, food processing, marine, nuclear service, offshore oil and refinery, petrochemical processing, pharmaceutical, power generation, pulp and paper, wastewater, and water desalination industries.	Transport applications or others subject to shock / excessive vibration. Sticky and abrasive liquids.
Type 21 Mechanical Seal	None	Pulp & paper, water, food processing, wastewater treatment, and other general applications.	Transport applications or others subject to shock / excessive vibration.
Super Seal	None	Just about anything.	N/A
Quad Seal + Packing Backup	None	Demanding applications where max seal performance is needed.	N/A

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Always consult Roper Pump Company to select the best seal for your application.

PART NUMBERS

SEAL TYPE	SMALL 3600 (11-22 SIZES)	LARGE 3600 (32-65 SIZES)
Graphite Filament Packing Set	N43-1	N43-3
PTFE Impregnated Packing Set	N43-186	N43-187
Graphite Impregnated PTFE Packing Set	N43-151	N43-156
Pure PTFE Packing Set	N43-101	N43-105
Dry run, self Adjusting (DSA) Set	N43-170	N43-174
Wedgee™ Packing Set	N43-215	N43-226
Triple Lip Seal	G17-232	G17-234
Triple Lip Seal with Packing Backup	G17-232 + Packing Set	G17-234 + Packing Set
Type 21 Mechanical Seal-Buna**	G4-101	G4-112
Type 21 Mechanical Seal- Viton®	G4-140	G4-142
Type 9 Mechanical Seal-Teflon®	G4-288	G4-290
Super Seal	C/F	C/F
Quad Seal + Packing Backup	N24-207	N24-208

*= Standard Packing for 3600 & 4600 pumps

**= Standard mechanical seal for 3700 & 4700 pumps

C/F- Contact Factory

For special or non-standard sealing options, please contact Roper Pumps Company Viton® and Teflon® are registered trademarks or trademarks of E. I. du Pont de Nemours and Company or its affiliates.



Always consult Roper Pump Company to select the best seal for your application.

Super Seal

USERS HAVE CALLED IT THE “SUPER PUMP SEAL,” AND THE NAME HAS STUCK. WHAT’S SO SUPER ABOUT IT? CONSIDER THAT ONLY 10% OF PUMP SEALS FAIL BECAUSE THEY WEAR OUT. THE MODEL SPS ADDRESSES MANY, IF NOT MOST OF THE PROBLEMS THAT CAUSE SEAL FAILURES CONTAINED WITHIN THE OTHER 90%.

We can give you FIVE SOLID REASONS to choose the “Super Pump Seal”

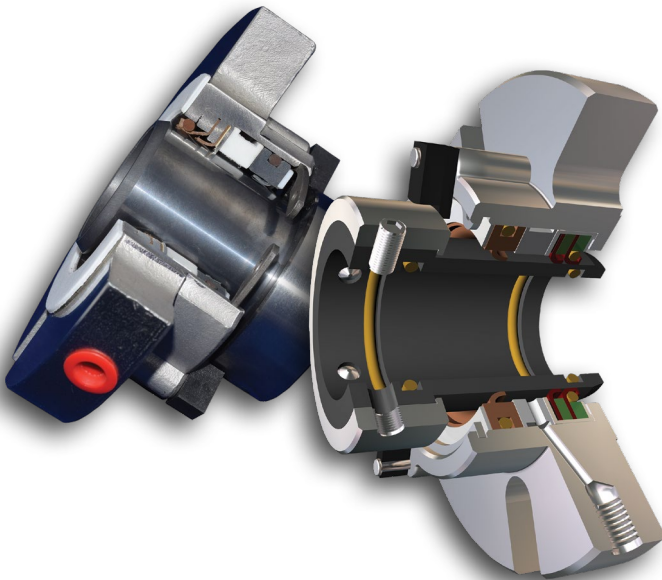
1. Will tolerate extended run dry
2. Will resist hydraulic shock
3. Versatility for thin to very thick liquids including non-lubricating or gas laden liquids
4. No springs to clog and no dynamic O-rings to hang up
5. Will tolerate a high degree of pump run-out due to pump wear and/or misalignment

Typical Applications:

Just about anything (Coatings, Paints, Inks, Resins, Asphalt, Coal Tar, Glues and Adhesives, Concrete Additives, Caulk & Sealants, Paper Coatings, Soaps and Tall Oil, Isocyanate, Polyol, Grease, Lube Oil and Lube Oil Additives, Heavy Fuel Oil, Crude Oil, Waste Oil Recycling, Wastewater Treatment Polymers & Emulsions, Rendering Fats, Vegetable Oil Refining, Fracking Fluids, Biodiesel Production from Fats & Oils, Acetates, Amines, and Polyamides for Synthetics)

WHAT MAKES THE SUPER SEAL DIFFERENT?

It’s essentially an “external Triple Lip Seal”. Most cartridge seal manufacturers have a multi-lip cartridge seal and typically handles some dry run and absorbs some shaft run out. The Super Seal has a Triple Lip Seal, which is the dynamic element, whereas a conventional cartridge seal has a dynamic rotating ceramic or metal seal face against a stationary seal face.



BENEFITS INCLUDE:

1. Runs on a silicon carbide sleeve which is harder than our standard shaft and it dissipates heat.
2. Has 3 sealing rings that offers triple seal protection before the liquid leaks from the pump.
3. Made of a heavy duty 316 SS Gland.
4. Can run dry.
5. Seal can be reused on a new/different pump and rebuild cost is approximately 25% of a new seal.
6. Versatility for thin to very thick liquids including non-lubricating one.
7. No springs to clog.
8. Will tolerate a high degree of shaft run-out due to pump wear.
9. Extended uptime in regards to service life.
10. Carbon fiber reinforced Teflon wetted lip material for wear resistance.
11. Seals like a mechanical seal but tends to fail like packing with a small drip occurring rather than a catastrophic failure like you see with a mechanical seal.

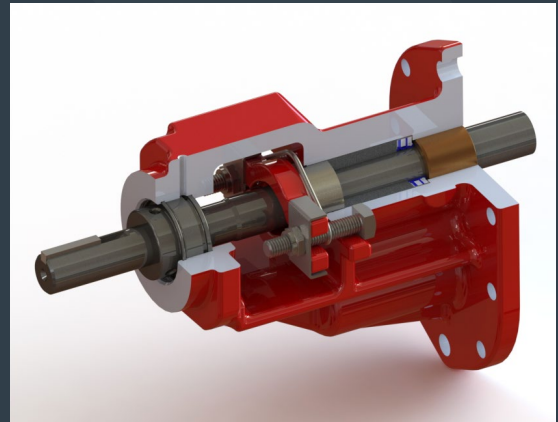


Always consult Roper Pump Company to select the best seal for your application.

Triple Lip Seal

THE ROPER PUMP TRIPLE LIP SEAL IS DESIGNED TO HANDLE THE DIVERSE APPLICATIONS FACED BY OUR GEAR PUMPS.

The Triple Lip Seal is pressed into the existing stuffing box and requires no adjustment. It is retained by the flat seal retainer plate used in a mechanical seal pump so there is no packing gland or adjustment hardware. Three sealing lips contact the shaft while two inner lips are formed to keep the product in the pump. The outer lip is designed to keep outside contaminants away from the main sealing lips.



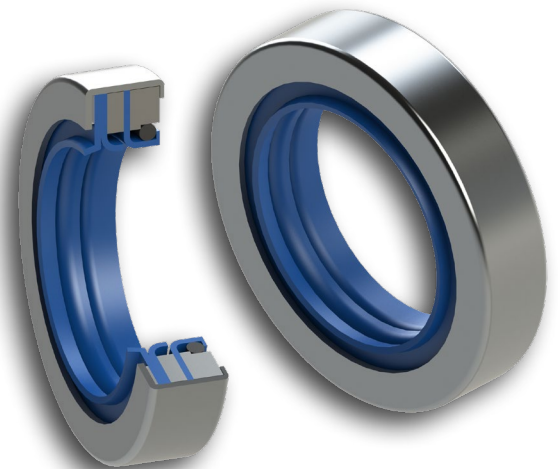
The materials of construction were chosen to allow for the widest range of chemical compatibility:

Metal Parts..... 304 Stainless Steel
Sealing Lips..... Engineered PTFE
O-ring..... Teflon

A TRULY UNIQUE SEAL

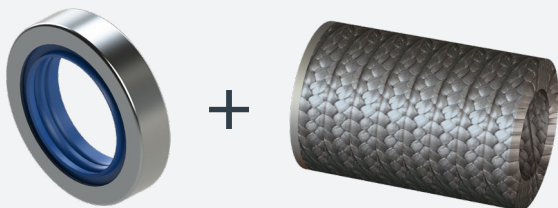
Roper Pump Triple Lip Seals can be retrofitted into all 3600 series pumps. It seals like a mechanical seal and fails like packing. There is no catastrophic failure like what you might see in a mechanical seal.

Notice that the Triple Lip Seal has a unique o-ring that squeezes the main sealing lip to the shaft regardless of any shaft “play” that might occur due to external forces such as misaligned shafts, or internal forces such as high bushing wear. The Triple Lip Seal is capable of operating to the maximum pressure rating of the pump. For exact temperature ratings, please consult the factory.



TRIPLE LIP SEAL WITH PACKING BACKUP

AN INNOVATIVE PACKING SOLUTION TO EXTEND PACKING LIFE & ZERO LEAKAGE.



USER BENEFITS:

- Additional Performance with Zero Leakage
- Improved Reliability
- Minimizes Maintenance Requirements
- Application Versatility
- Allows for leakage control if the Triple Lip Seal fails



Always consult Roper Pump Company to select the best seal for your application.

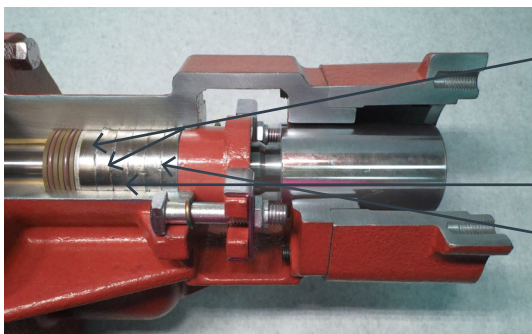
Quad Seal + Packing Backup

DESIGNED FOR DEMANDING APPLICATIONS WHERE MAXIMUM SEALING PERFORMANCE AND REDUNDANCY ARE REQUIRED, THE QUAD SEAL + PACKING BACKUP CONFIGURATION COMBINES MULTIPLE SEALING ELEMENTS TO DELIVER ENHANCED LEAKAGE CONTROL AND EXTENDED SERVICE LIFE.

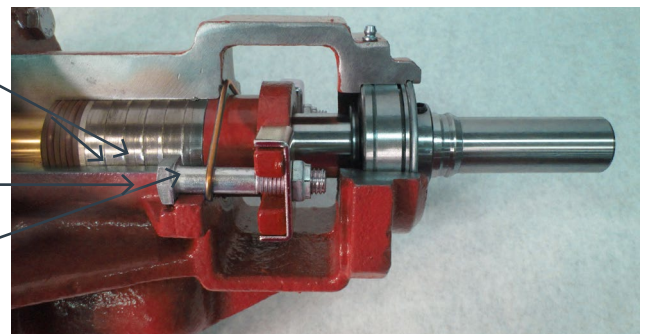


11, 17, 22 SERIES INSTALLATION INSTRUCTIONS

1. Clean the packing bore. Clean and deburr the driveshaft.
2. Grease the outer ring of the Viton oil ring on the lip seal and grease inner part of the ring.
3. Install the lip seal with the lips of the seal facing down toward the bushing inside the packing bore. The smooth side of the seal will be facing up toward the top open end of the packing bore.
4. Use a piece of PVC pipe to push the lip seal all the way to the bottom of the packing bore.
5. Repeat steps 3 and 4 to install the second lip seal.
6. Install the packing washer.
7. Install a total of 5 graphite packing rings.
8. Install the packing gland, put the clips on the gland, run the bolts thru, put the spring clip around the bolts, and finally screw on the locknuts and lightly tighten down. **DO NOT OVER TIGHTEN. LOOSELY TIGHTEN.**
9. ***HB {PTO Shaft Driven} Installation** - Install the ball bearing onto the drive shaft and tighten down into place. Insert the shaft into the top of the drive plate down thru the packing gland until the ball bearing is into place using a rubber mallet if necessary.
10. ***BH {Hydraulic Driven} Installation** - Insert the shaft into the top of the drive plate down thru the packing gland until you push pass the second groove on the shaft just far enough pass the endplate face {1/8" to 1/4"} to install the external retaining ring that holds the hydraulic gear into place, using a rubber mallet if necessary. If the shaft is pushed too far, when you pull the shaft back up into place you will destroy the lip seal.
11. This completes the installation of the lip seal. **DO NOT** install the shaft thru the bottom bushing side of the drive plate or you will ruin the lip seal.



***BH (Hydraulic Driven)**



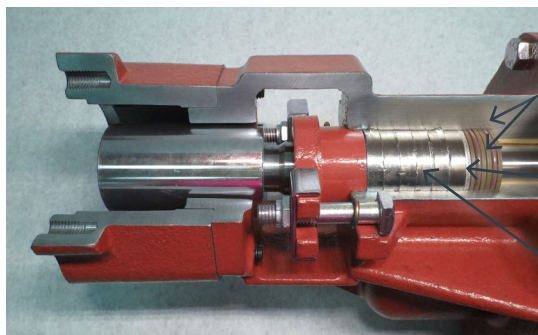
***HB (Shaft Driven)**

48 Series Installation Instructions

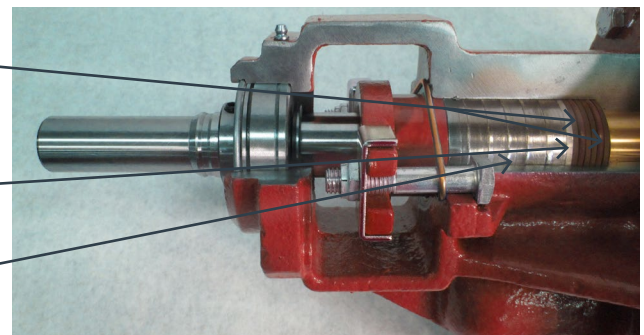
1. Clean the packing bore. Clean and deburr the driveshaft.
2. Grease the outer ring of the Viton oil ring on the lip seal and grease inner part of the ring.
3. Install the lip seal with the lips of the seal facing down toward the bushing inside the packing bore. The smooth side of the seal will be facing up toward the top open end of the packing bore.
4. Use a piece of PVC pipe to push the lip seal all the way to the bottom of the packing bore.
5. Repeat steps 3 and 4 to install the second lip seal.
6. Install the packing washer.
7. Install a total of 6 graphite packing rings.



8. Install the packing gland, put the clips on the gland, run the bolts thru, put the spring clip around the bolts, and finally screw on the locknuts and lightly tighten down. **DO NOT OVER TIGHTEN. LOOSELY TIGHTEN.**
9. ***HB (PTO Shaft Driven) Installation** - Install the ball bearing onto the drive shaft and tighten down into place. Insert the shaft into the top of the drive plate down thru the packing gland until the ball bearing is into place using a rubber mallet if necessary.
10. ***BH (Hydraulic Driven) Installation** - Insert the shaft into the top of the drive plate down thru the packing gland until you push pass the second groove on the shaft just far enough pass the endplate face (1/8" to 1/4") to install the external retaining ring that holds the hydraulic gear into place, using a rubber mallet if necessary. If the shaft is pushed too far, when you pull the shaft back up into place you will destroy the lip seal.
11. This completes the installation of the lip seal. **DO NOT** install the shaft thru the bottom bushing side of the drive plate or you will ruin the lip seal.

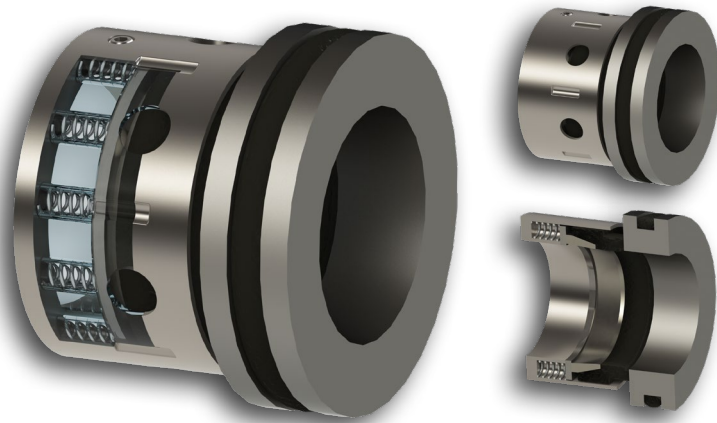


***BH (Hydraulic Driven)**



***HB (PTO Shaft Driven)**

Mechanical Seals



Mechanical seals play a crucial role in diverse industrial settings where secure and efficient fluid transfer is paramount.

They serve to avoid leaks, diminish friction, and extend the operational life of the pump. In certain cases, adjustments to the pump's backplate, drive shaft, and/or retainer might be necessary for the installation of these seals. For those looking to switch between a packed box pump and a mechanical seal pump, or vice versa, conversion kits are at your disposal. To inquire about the availability of these kits, reach out to your trusted Roper Pump distributor or directly contact Roper Pump Company.

MECHANICAL SEALS - TYPE 9

A wedge seal with pusher design. PTFE or flexible wedge used as a secondary seal. Positive drive by the use of two or more set screws which transmit shaft

torque directly to the sealing faces. Type 9 Seals are standard for use where corrosive liquids are being processed.



Mechanical seals are often preferred when leakage is unacceptable, such as applications involving hazardous materials.

Their durable construction can withstand more wear and tear than mechanical packing without leaking. Mechanical seals have multiple options of elastomers and seal face material to suit multiple types of liquids.

MECHANICAL SEALS - TYPE 21

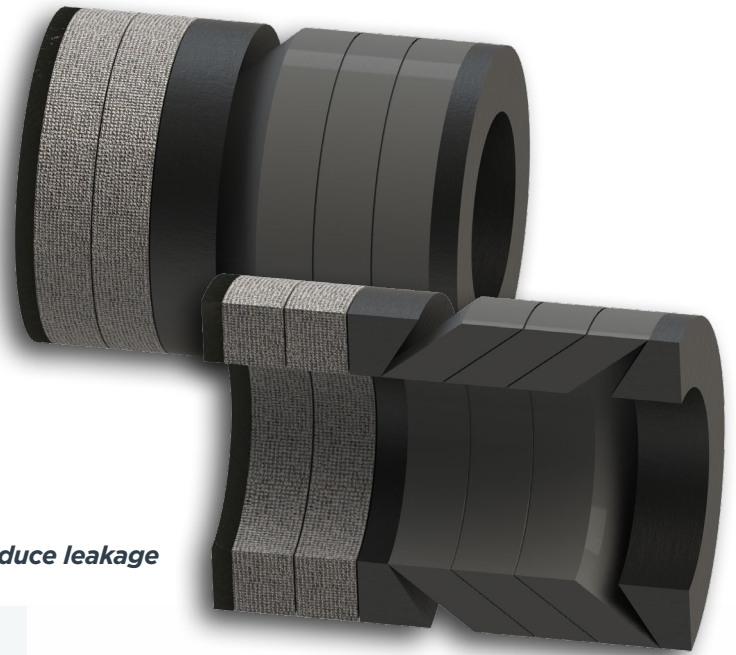
An elastomer bellows with non-pusher design. Seal rotates with the shaft against a stationary mating face. A single coil spring acts as the force to maintain

sealing. Standard materials of construction: 316SS hardware, Carbon vs. Ceramic faces and Viton elastomers.

Packing Options

GARLOCK DSA

A virtually dry running, leak free packing. The cup and cone design expands radially to form a positive seal against both the shaft and packing gland. This coupled with excellent memory means that after the initial installation and adjustment, it does not require re-adjusting. Material of construction: Flexible graphite.



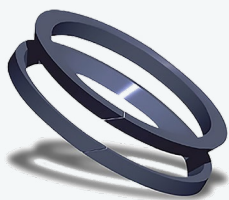
Dry Run, Self Adjust Packing

WEDGEE™

An innovative packing solution to **extend packing life & reduce leakage**

USER BENEFITS:

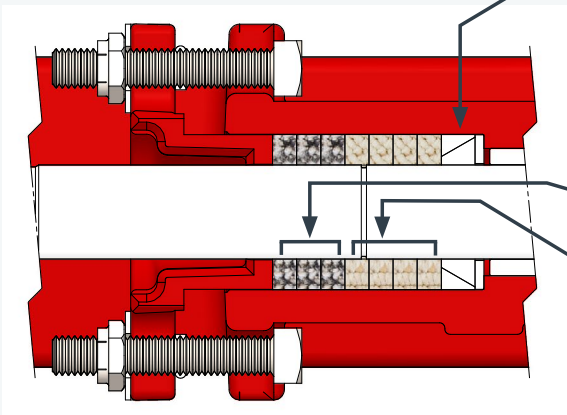
- Reduce Leakage by Two-Thirds
- Extend Packing Life by 2-3 Times
- Eliminate/Reduce Need for Flush



**REDUCES LEAKING
COMPARED TO
STANDARD PACKING
SETUPS**

**TWO-PIECE TEFLON® WEDGE SEAL
FITTED TO THE BOTTOM OF THE
STUFFING BOX**

- Provides close clearance flow restriction at the bottom of the stuffing box.
- Filters out abrasive solids that otherwise would damage the shaft and/or packing.



MIXED MEDIA PACKING SETS

Self-lubricating packing next to the gland where effective sealing work is done.

Dense and hard intermediate rings transfer force to keep the two-piece wedge seal closed.

Packing Options Cont.

Packing is the oldest sealing method and is sometimes called “rope packing” because in the past it was essentially rope coiled around a pump shaft to prevent leakage. Today’s packing is similar in principle, but much more effective in minimizing leaks. Most packing today is a tightly braided yarn that encapsulates a lubricating material. In order to keep packing lubricated, there is supposed to be a drip rate. 1-10 drops per minute is considered normal.

Roper Pump packing sets are die formed rings, pre-cut and sized to match the pump stuffing box bore. This allows the sets to be installed faster and to seat better. The pre-compression of the ring sets allows them to better distribute the mechanical pressure evenly along the entire shaft, reducing wear and subsequent leakage. The (6) packing types offered by Roper Pump and outlined below have some unique characteristics that may make them more suitable for specific applications.

HOW PACKING WORKS:

- Small leakage is expected.
- Tighten gland when leak increases.



Graphite Filament



Graphite Impregnated



PTFE Impregnated



Pure PTFE

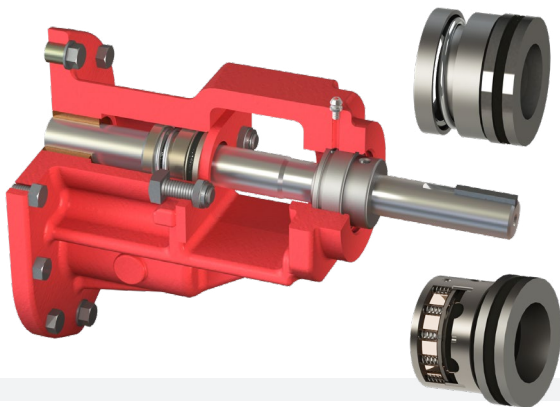


DSA

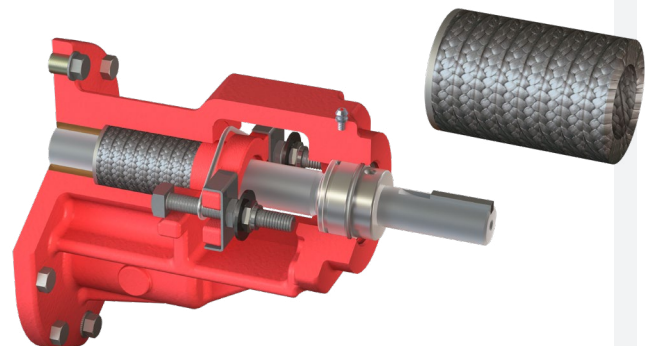


WEDGEE™

MECHANICAL SEAL



PACKED BOX





THE LEADING FORCE behind liquids™ since 1857

Roper Pump Company is a global supplier of high quality positive displacement pumps, designed to handle a broad range of industrial applications.

In addition to helical gear pumps and progressing cavity pumps, we design and develop numerous custom pumps for customers with unique and demanding applications.

From a small pump company founded in 1857, Roper Pump Company has grown into a technological leader. With a large installed base, we have both the knowledge and experience to help you solve your most challenging pumping problems...and our strong global distribution network ensures that your needs are met on time, every time.



Industrial

Roper Pump Company's rugged and dependable range of positive displacement pumps provides versatile pumping solutions for even the most challenging industrial applications.



Transport

With over a century of experience in liquid cargo transfer, Roper Pump Company has always been trusted to load and unload your tankers quickly and safely.



Power Gen.

For reliable operation of engines, compressors and turbines, thousands of customers depend on Roper Pump Company fuel pumps, lube pumps and liquid fuel flow dividers.

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