

# Bushing Seal Kits

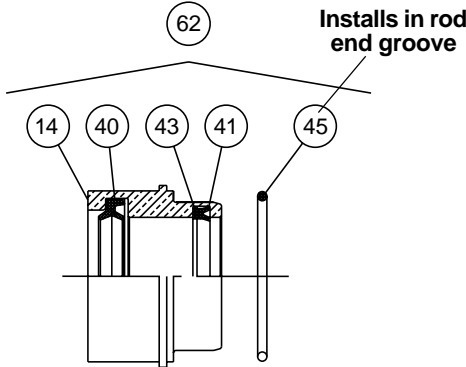
## (Bushings and Rod Seals)

### For AV Series Air Cylinders

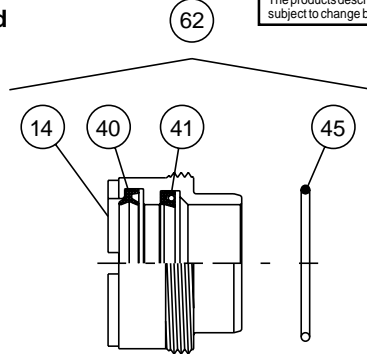
**WARNING**  
 FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from the Company, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having expertise. It is important that you analyze all aspects of your application, including consequences of any failure and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

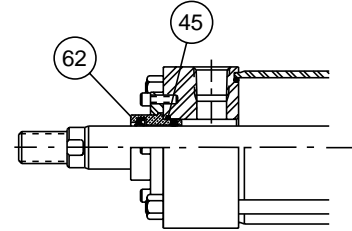
The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by the Company and its related companies at any time without notice.



For rod diameter 2 1/2" and under.  
 (Class 1 and Class 5 Service)



For rod diameter 3" and over.  
 (Class 1 and Class 5 Service)



Head End

#### Rod Seal Kit —

- contains 1 each of the following:
- symbol 40, rod wiper
  - symbol 43, back-up washer for rod seal
  - symbol 41, rod seal
  - symbol 45, O-ring, bushing to head seal.

#### Bushing Kit —

- (symbol 62) contains 1 each of the following:
- symbol 14, bushing
  - symbol 40, rod wiper
  - symbol 43, back-up washer for rod seal
  - symbol 41, rod seal
  - symbol 45, O-ring, bushing to head seal.

Service kits of expendable parts for fluid power cylinders are stocked in principal industrial locations across the U.S.A. and other countries. For prompt delivery and complete information, contact your nearest Miller distributor.

**Standard Seals** — Class 1 Service Kits contain Buna-N seals for standard fluid service. Class 1 Service Kits are suitable for use when air, or hydraulic (mineral-type) oil are the operating medium.

The recommended operating temperature range for Class 1 seals is -10°F (-23°C) to +165°F (+74°C).

**Fluorocarbon Seals** — Class 5 Service Kits contain fluorocarbon seals and are especially suited for elevated temperature service. Fluorocarbon seals (Class 5) should be used for high temperature service within a temperature range of -10°F (-23°C) to +250°F (+121°C). Fluorocarbon seals may be operated to +400°F (+204°C) with limited service life.

For temperatures above +250°F (+121°C) the cylinder must be manufactured with a non-studded piston rod end thread and a pinned piston to rod connection.

**Warning** — The piston rod stud and the piston rod to piston threaded connections are secured with an anaerobic adhesive which is temperature sensitive. Cylinders specified with fluorocarbon seals are assembled with anaerobic adhesive having a maximum operating temperature rating of +250°F (+121°C). Cylinders specified with all other seal compounds are assembled with anaerobic adhesive having a maximum operating temperature rating of +165°F (+74°C). These temperature limitations are necessary to prevent the possible loosening of threaded connections. Cylinders originally manufactured with standard seals that will be exposed to ambient temperatures above +165°F (+74°C) must be modified for higher temperature service. Contact the factory immediately and arrange for the piston to rod and the stud to piston rod connections to be properly reassembled to withstand the higher temperature service.

Rod Dia.	AV Series Cylinders – Class 1		Rod Dia.	AV Series Cylinders – Class 5	
	Bushing (Symbol 62) Kits	Rod Seal Kits		Bushing (Symbol 62) Kits	Rod Seal Kits
	Contains Symbols 14, 40, 41, 43 & 45	Contains Symbols 40, 41, 43 & 45		Contains Symbols 14, 40, 41, 43 & 45	Contains Symbols 40, 41, 43 & 45
1/2	AV-KR100-50	AV-KR300-50	1/2	AV-KR200-50	AV-KR400-50
5/8	AV-KR100-63	AV-KR300-63	5/8	AV-KR200-63	AV-KR400-63
1	AV-KR100-100	AV-KR300-100	1	AV-KR200-100	AV-KR400-100
1 1/8	AV-KR100-138	AV-KR300-138	1 1/8	AV-KR200-138	AV-KR400-138
1 3/4	AV-KR100-175	AV-KR300-175	1 3/4	AV-KR200-175	AV-KR400-175
2	AV-KR100-200	AV-KR300-200	2	AV-KR200-200	AV-KR400-200
2 1/2	AV-KR100-250	AV-KR300-250	2 1/2	AV-KR200-250	AV-KR400-250
3	AV-KR100-300	AV-KR300-300	3	AV-KR200-300	AV-KR400-300
3 1/2	AV-KR100-350	AV-KR300-350	3 1/2	AV-KR200-350	AV-KR400-350
4	AV-KR100-400	AV-KR300-400	4	AV-KR200-400	AV-KR400-400
4 1/2	AV-KR100-450	AV-KR300-450	4 1/2	AV-KR200-450	AV-KR400-450
5	AV-KR100-500	AV-KR300-500	5	AV-KR200-500	AV-KR400-500
5 1/2	AV-KR100-550	AV-KR300-550	5 1/2	AV-KR200-550	AV-KR400-550

# How To Replace Cylinder Rod Bushing and Rod Seals

Fluid leakage around piston rod at the bushing area normally indicates a need to replace bushing seals. First, remove cylinder from machine to which it is mounted or, if this is not feasible, disconnect the piston rod from rod clevis, rod eye, or machine member to which it is fastened.

A threaded bushing is used on rod diameters of 3" and above. It is threaded into the bushing retainer plate, and all sizes are removable without disturbing the tie rod torque.

To remove the bushing:

- Inspect the piston rod to make sure it is free of burrs or other displaced metal which would prevent sliding the bushing off the rod.
- Cylinders with rod diameter of 1/2" to 2 1/2" feature a bolted bushing which is easily removed by loosening (4) socket head cap screws.
- Cylinders with rod diameter of 3" and over utilize a threaded rod bushing which is removed by unscrewing it from the bushing retainer (right hand thread). See chart for bushing wrench.
- Slide the bushing off of the piston rod and remove the seals. Thoroughly clean the bushing and seal grooves. Inspect bushing bore for wear. If bore is worn, replace using bushing kit containing seals for proper class service.
- If bushing is not worn, replace seals only, using rod seal kit, containing seals for proper class service. Lubricate bushing seal grooves and all new seals. Install wiper, Sym. 40, in groove closest to end of bushing. Slightly collapse back-up washer, Sym. 43, and install in seal groove. Make sure it is flat against wall of groove. Install lipseal, Sym. 41, in seal groove. Lips of seals should point toward the long bearing side of bushing.
- An O-ring, Sym. 45, is supplied with each bushing kit. It serves as a seal between the bushing and the head. This O-ring is a static seal and does not normally require replacement. The original O-ring may be left in place, unless it is known to be leaking (fluid flow around bushing O.D.).

## Installation

Before installing a new bushing, inspect the surface of the piston rod for scratches, burrs, dents or other damage. A damaged piston rod surface will result in premature rod seal failure.

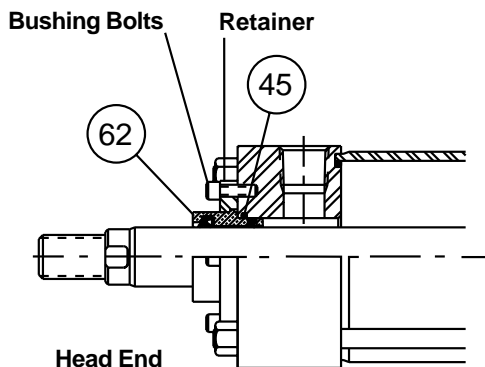
Lubricate the bore of the bushing, the O.D. of the bushing which fits into the cylinder head and the seals. Slide bushings which have no threads (2 1/2" or smaller) over the end of the piston rod and seat it firmly against the cylinder head. Replace the retainer and tighten bushing bolts securely and evenly to the force listed in chart. Slide bushings which have a threaded O.D. over the end of the piston rod. Thread the bushing into the retainer until it is seated firmly against the head. The bushing-to-head O-ring, Sym. 45, serves as a torque prevailing lock.

THE SEALS ARE PRESSURE ACTUATED, SO NO FURTHER ADJUSTMENTS ARE NECESSARY.

**Retainer Bolt Torque\***  
For Cylinders with Round or Small Square Bushing Retainer

Screw Size	Torque	Torque
#10	15 in.-lbs.	17 cm-kg
1/4"	60 in.-lbs.	69 cm-kg
5/16"	10 ft.-lbs.	14 N-m
3/8"	20 ft.-lbs.	27 N-m
7/16"	35 ft.-lbs.	48 N-m

\*-0%, +5% tolerance



When replacing a bushing on a rod which is threaded to the full diameter or so shaped that it could damage the seals, a slight rotary motion of the bushing will help prevent damage. In addition, because full-diameter threads are usually supplied with the crest of the threads slightly truncated, a piece of shim stock or other thin, tough material can be wrapped around the threads to help protect the seals when they are being passed over the threads.

## Bushing Wrenches (for 3" and larger rods)

Miller's bushing design makes bushing replacement only a minute's work...and the Bushing Wrench Set makes it even simpler. A specially designed face-type bushing wrench with flared lugs slips into an exact, sure fit on the bushing, while a self-locking spanner wrench grips the bushing wrench securely. No fumbling for adjustment — no accidental scoring of the piston rod, the job is done quickly...easily...safely.

You can order the Bushing Wrench or Spanner Wrench to fit the piston rod size used in your cylinder. Six different bushing wrench sizes and two different spanners are available. When ordering additional bushing wrenches, you may not require additional spanners provided your original spanner fits the bushing wrenches you have and the additional sizes you are ordering. See chart below.

Rod Dia.	Bushing Wrench	Spanner Wrench
3	069596 0000	011677 0000
3 1/2	069597 0000	011677 0000
4	069598 0000	011678 0000
4 1/2	083877 0000	011678 0000
5	069599 0000	011678 0000
5 1/2	069600 0000	011678 0000

**Tie Rod Torque\***

Cylinder Bore Size	AV Series	
1"	2 ft.-lbs.	41 cm-kg
1 1/2"	5 ft.-lbs.	69 cm-kg
2" & 2 1/2"	11 ft.-lbs.	15 N.m
3 1/4" & 4"	25 ft.-lbs.	34 N.m
5" & 6"	60 ft.-lbs.	81 N.m
7"	90 ft.-lbs.	122 N.m
8"	110 ft.-lbs.	149 N.m
10"	150 ft.-lbs.	201 N.m
12"	172 ft.-lbs.	233 N.m
14"	275 ft.-lbs.	373 N.m

\*(-0%, +5% tolerance). When assembling the cylinder, be sure to torque the tie rods evenly using MoS2 thread and nut bearing surface lubricant.

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