

## Seal Identification

### What is a Seal?

A seal is a device which prevents the escape or passage of a fluid (liquid or gas). A hydraulic cylinder seal is used to seal two surfaces under fluctuating pressure conditions.

### Hydraulic Cylinders

Hydraulic cylinders convert fluid pressure into motion that helps equipment perform different tasks. Caterpillar manufactures three cylinder designs: bolt-on head, threaded cylinder and threaded gland. Because these designs are very similar in the way they are sealed and repaired, this book makes no further attempt to address the different designs.

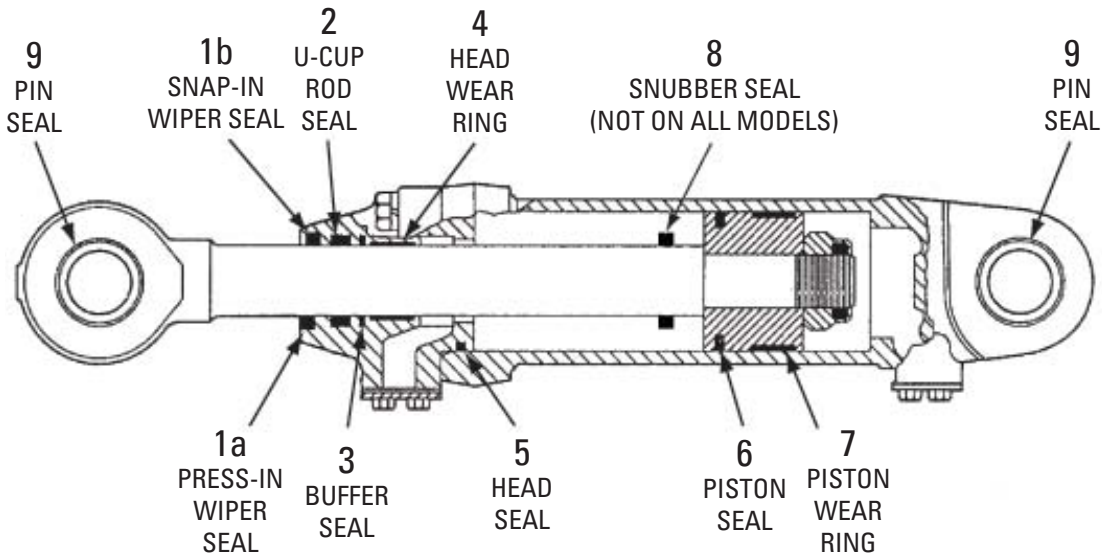
### Hydraulic Cylinder Seals

Cat® seals are available as either individual pieces or kits. Kits offer a convenience as well as a cost-savings, priced substantially below the sum of the individual pieces.

~~Cat hydraulic seals can be used on other makes of cylinders. See the "Seal Selection for Other Than Cat® Equipment" section for more details.~~

### Identifying Hydraulic Cylinder Seals

Refer to the hydraulic cylinder illustration below. The seals in this Cat® cylinder are those typically found in hydraulic cylinders.

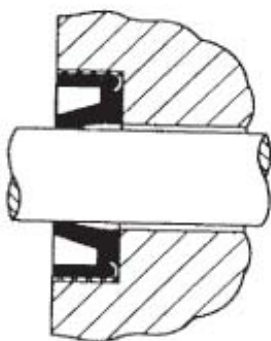


**Usage**

Use the seal pictures, cross-sections, cutaway illustrations and descriptions on the following pages to help you identify the different types of hydraulic cylinder seals.

**1a. Press-in Wiper Seal**

Prevents external contaminants from entering the system. Single-lip (the lip is the projecting rim or edge of the seal) wipers clean the rod as it retracts. Double-lip wipers clean the rod as it retracts and seals oil, eliminating “weeping” (cosmetic leakage). The double-lip wipers are secured in place with a bearing mount. These urethane wipers are metal-encased for added strength. They are often referred to as “canned” wipers (metal-encased) or “J” wipers (the metal often forms a “J” shape when viewed in the cross-section).



TYPE E  
Angled Single



TYPE F  
Scraper Single

TYPE A  
Single-lip wiper



TYPE B  
Double-lip wiper



TYPE C  
Modified



TYPE D  
Modified Single

**1b. Snap-in Wiper Seal**

Prevents external contaminants from entering the system, but used in less severe environmental conditions and lighter duty hydraulic applications than its press-in counterpart.



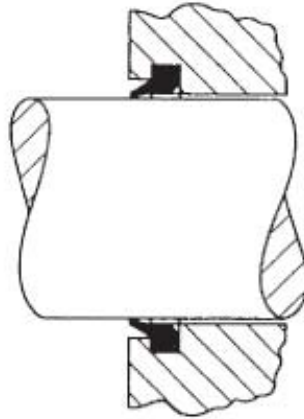
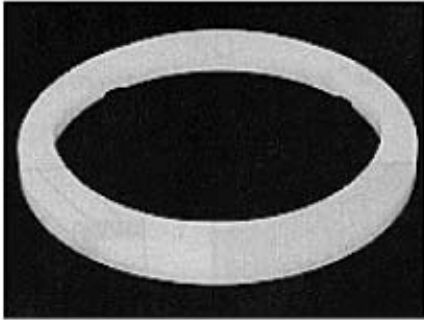
TYPE REG

## Types of Snap-in Wipers

The following various types of snap-in wipers are available for use on other makes of hydraulic cylinders.

### Type SHU

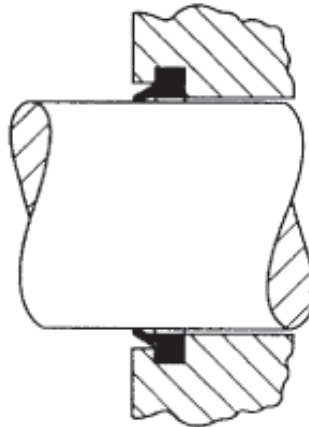
Type SHU wipers are slotted heel, universal style urethane wipers. The slotted heel acts as a relief slot to prevent a pressure trap occurring between the rod seal and the wiper. A pressure trap is excessive fluid pressure trapped between two seals.



TYPE SHU

### Type AN

Type AN wipers are a non-current design, originally made for the military (AN refers to Army/Navy). This single-lip wiper is made of urethane.



TYPE AN

### Type H and Type K

"Type H" and "Type K" wipers are double-lip, urethane wipers.

Type H and Type K (Continued)



TYPE H



TYPE K

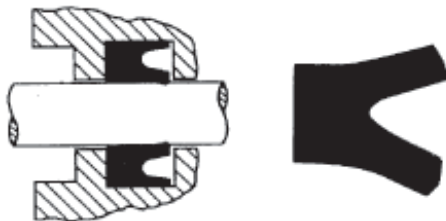
**2. U-Cup Rod Seal**

Performs as the primary rod seal. The U-Cup is made of urethane or nitrile. The nitrile U-Cup is used with a backup ring in water-glycol hydraulic systems. The backup ring prevents the seal from extruding (forced movement of a seal under pressure into the clearance between the metal parts being sealed).

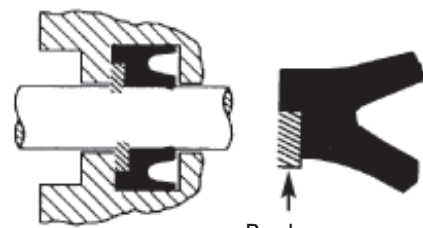
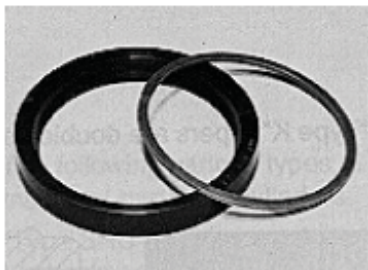
(Continued)

# Identification

## 2. U-Cup Rod Seal (Continued)

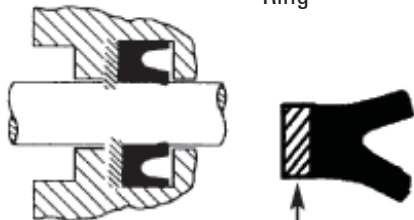


TYPE A



TYPE B

Backup Ring

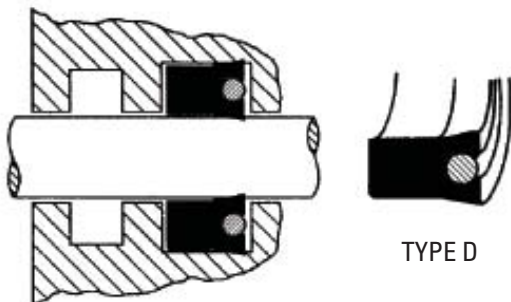


TYPE C

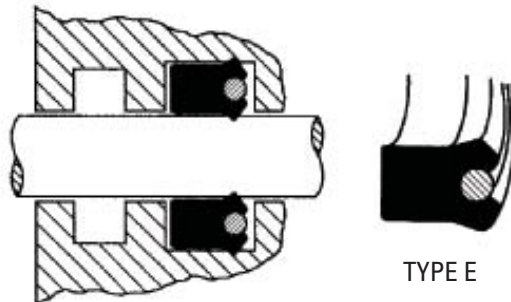
Backup Ring

## Loaded U-Cups

Loaded U-Cups are also available for use on other makes of cylinders. The Type E loaded U-Cup has a back-bevel lip for increased sealability.



TYPE D



TYPE E

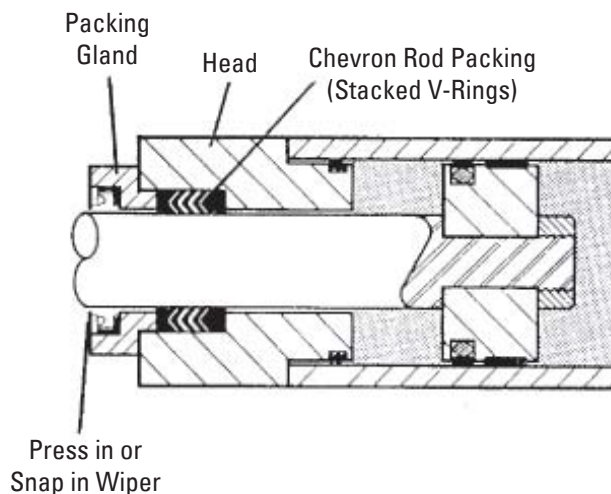
Backup Ring



TYPE F

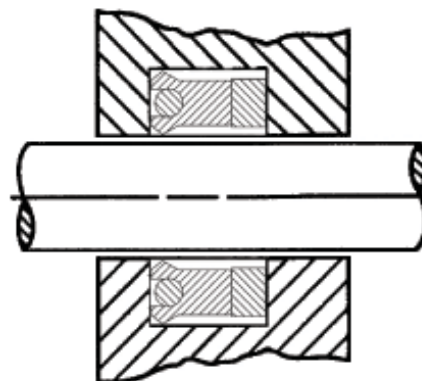
### 2a. Chevron Packing

Used as gland packing prior to the use of U-Cup seals. Made with a multi-compound material (usually cotton duck cloth and nitrile), it is often referred to as V-Packing, the shape formed by its cross-section. The end adapters can be tightened down, making the seal adjustable. Caterpillar no longer uses this seal design.



### 2b. U-Cup Seal Assembly

Designed to replace Chevron Packing. These assemblies combine U-Cup Rod Seals with spacers to fill the original Chevron Packing grooves. Both U-Cup Seal Assemblies and Chevron Packing meet the same functional sealing specifications.



### 3. Buffer Seal

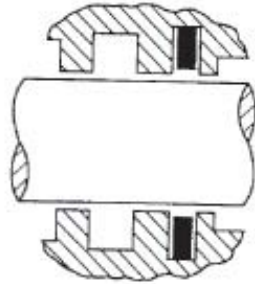
Acts as a secondary rod seal and protects the rod from sudden increases in system pressure. There are currently three types of buffer seals. Type A is a one-piece seal made of urethane. Type B is a two-piece bronze filled PTFE seal with a nitrile expander. The notched view in the cross section must face the pressure side for maximum seal performance. Type C is a two-piece urethane seal with a thermoplastic backup ring. This design allows the seal to withstand higher pressures. Type B and Type C buffer seals are designed to prevent seal extrusion and pressure trapping.

(Continued)

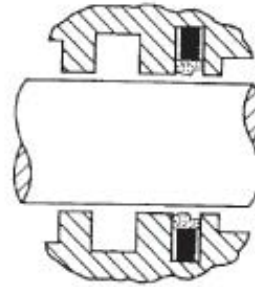
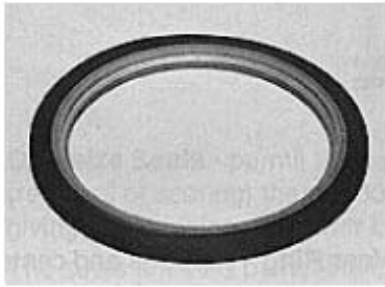


# Identification

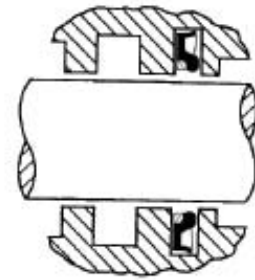
## 3. Buffer Seal (Continued)



TYPE A



TYPE B



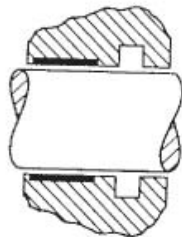
TYPE C



TYPE D

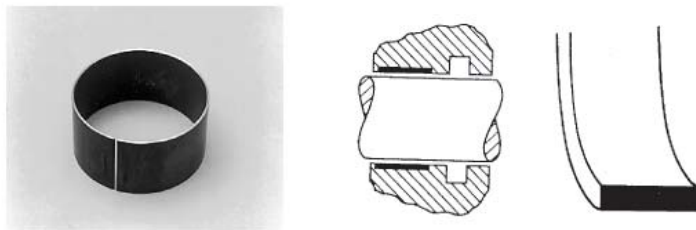
## 4. Head Wear Ring

Eliminates metal-to-metal contact between the head and rod and prevents scoring (scratching) of the rod by the head.



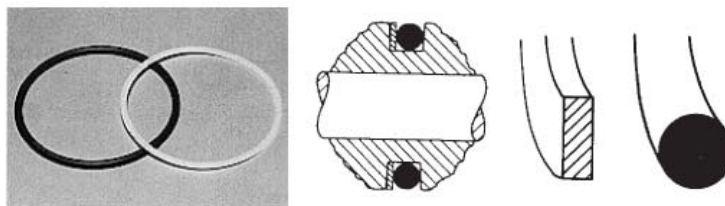
### 4a. Metal Bearing Head Wear Ring

Used instead of plastic head wear ring for some applications. The coated bearing is pressed into the cylinder group head and held in place with a split metal retaining ring. This bearing supports the hydraulic cylinder rod and prevents metal-to-metal contact between the head and the cylinder rod. This bearing can be reused as long as the coating on the ring remains intact.



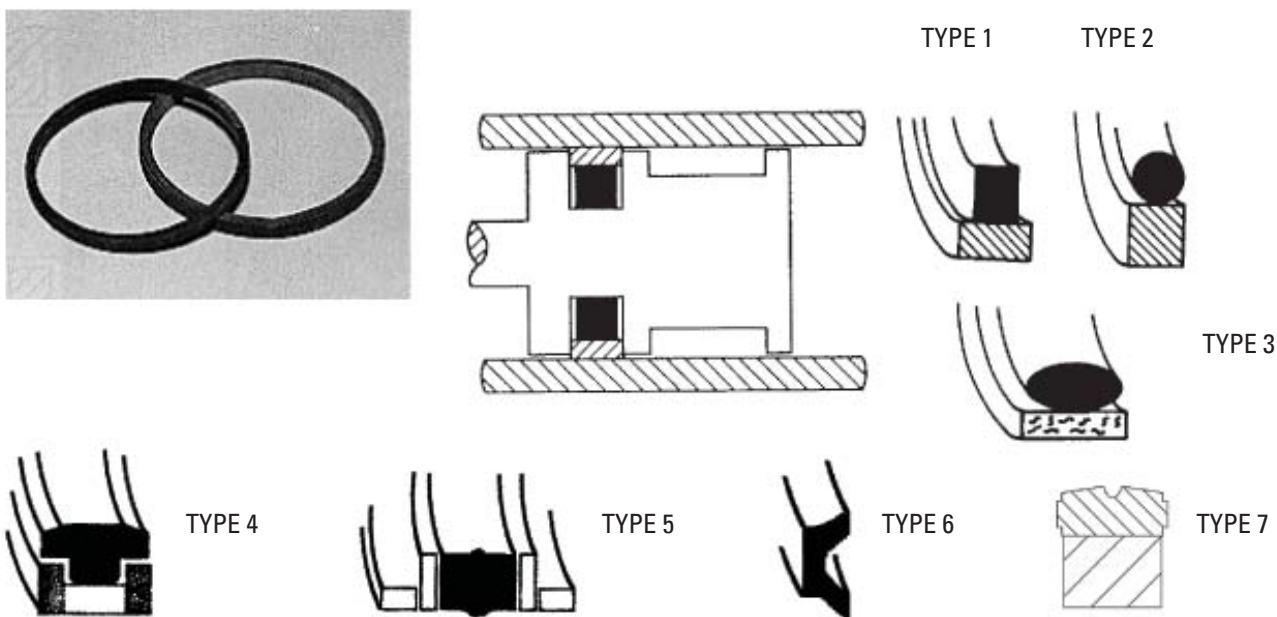
### 5. Head Seal

A two-piece seal, consisting of a nitrile O-ring and a backup ring, which seals the head to the cylinder wall.



### 6. Piston Seal

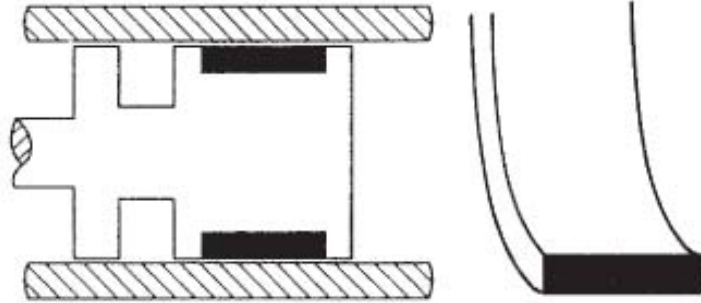
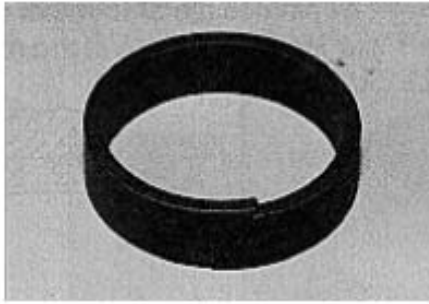
A two-piece seal, consisting of a piston ring and an expander, which prevents oil transfer between the rod end of the cylinder and the cap end. The piston seal is usually made of Teflon, with nylon available for pressures greater than 3000 psi (20,670 kPa). The various shaped expanders are nitrile. Type 4 consists of a Teflon piston ring with a nitrile rubber expander. Type 5 consists of a rubber expander surrounded by bronze filled Teflon on both sides. Type 6 is a urethane U-Cup seal used in single acting cylinders.





## 7. Piston Wear Ring

Supports and centers the piston to prevent metal-to-metal contact between the piston and the cylinder wall.



## 8. Snubber Seals



Used in some cylinder designs, in conjunction with a stop, to cushion the extension and/or retraction of the rod. The snubber seal is located between the stop and the rod.

## 9. Pin Seals



Used on either side of the rod eye and cap eye to seal the linkage pins in place. ~~Information on pin seal part numbers is not included in this guide. Please refer to SIS or the machines parts book for pin seal information.~~