Wagner Hydraulic Cylinder Repair

General

Allied Systems Company manufactures the hydraulic cylinders utilized on our Wagner units. Adherence to close tolerances and quality materials have resulted in maximum service life. All seal material does however have a limited service life and seal replacement procedures are as follows:

Stem Packing Replacement

NOTE: We can not over-emphasize the importance of a clean hydraulic system. Many times mechanics have been blamed for improper servicing of hydraulic components that have failed after overhaul - when the fault was contaminated oil in the hydraulic system. Before installing rebuilt hydraulic components always replace the oil if it is in question and conduct a complete system flush.

REFERENCE NUMBERS REFER TO PARTS SHOWN IN FIGURE 3

1. Remove the packing gland capscrews (12), the stem(5) and piston assembly from the cylinder barrel(8). After removal place the stem in a vise, or fixture heavy enough to hold the assembly firmly while removing the piston from the stem.

2. Loosen setscrew(16) (if there is one) and remove the piston retaining nut(15).

NOTE: All retaining nuts have a locking device for securing the nut to the piston stem.

FIGURE 1 illustrates the split nut type for large bore cylinders.

FIGURE 2 illustrates a medium bore split nut type. Small piston and rod assemblies utilize the “Nylock self locking” nut. Be certain that the setscrews in the split-nut types are loosened before nut removal.

3. Remove the piston assembly and slide the packing gland assembly off the stem. Remove the stem packing retainer(2), bushing(3) and packing(4). Wash the cylinder head thoroughly in solvent.

4. Install the new packing. Each packing kit consists of the required piston and stem packing components for one cylinder.
1) Wiper Ring
2) Retainer
3) Bushing
4) Packing (stem)
5) Stem
6) Packing Gland
7) O-Ring
8) Barrel
9) Piston Half
10) Spacer
11) Capscrew
12) Capscrew (Packing Gland)
13) O-Ring
14) Packing (2 sets)
15) Piston Retaining Nut
16) Setscrew (Large Cyl. Only)
FIGURE 4 illustrates an exploded view of a typical cylinder head assembly. Always position the lip of the chevron rings toward the pressure side, or barrel. Seal orientation also shown in Figure 3.

NOTE: Always replace the complete packing set. The male and female adaptor rings not only spread the chevron rings to hold the pressure, but also serve as a guide bushing for stem movement. Their replacement will increase the service life of the chevron rings and contact surfaces.

5. The complete packing kit should be thoroughly coated with hydraulic oil before installing.

NOTE: DO NOT USE GREASE, as some greases will not dissolve in oil and may wash off eventually accumulating in, and clogging, the return filter.

Install the stem packing(4) in the packing gland. Place the spacer bushing(3) in the head and install the retaining ring(2) and capscrews(11) just tight position. Slide the head assembly onto the piston stem. Now tighten the capscrews just tight enough to hold the retaining ring against the packing.

FIGURE 5 NOTE: Service life of the stem packing can be reduced by over-tightening the retaining ring. It is recommended that a new wiper ring, which is included in the kit, be installed each time the stem packing is replaced.

Piston packing replacement is usually determined prior to piston and stem disassembly.

FIGURE 6 illustrates the straight edge testing procedure. The lips of the chevron packing must extend beyond the adaptor rings as shown. If they are worn down to the adaptor, they must be replaced.
1. FIGURE 7 illustrates a typical piston packing set. Install a packing set on each piston half. The packing sets are reversible in that the chevron lips can point either left or right. Our hydraulic cylinders are double acting, (pressure is applied to either end of the piston), therefore, the chevron lips must point outward from the piston center, or spacer toward the pressure side. Seal orientation also shown in Figure 3.

2. Assemble the piston halves(9), spacer(10) and o-rings(13) onto the piston stem(5) and secure with piston retaining nut(15) to the torque values as follows. After the retaining nut torque is set, torque the locking setscrew(16) to 35 ft lbs, if applicable.

<table>
<thead>
<tr>
<th>STEM DIAMETER</th>
<th>TORQUE (Oiled Threads)</th>
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<tbody>
<tr>
<td>1 inch</td>
<td>490 lb/ft (664 N.m)</td>
</tr>
<tr>
<td>1 1/8 inch</td>
<td>750 lb/ft (1,016 N.m)</td>
</tr>
<tr>
<td>1 1/2 inch</td>
<td>1000 lb/ft (1,355 N.m)</td>
</tr>
<tr>
<td>1 3/4 inch &amp; larger</td>
<td>2000 lb/ft (2,710 N.m)</td>
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3. When securing the packing gland to the barrel, use the following torque values for the packing gland capscrews:

<table>
<thead>
<tr>
<th>CAPSCREW DIAMETER</th>
<th>TORQUE (Oiled Threads)</th>
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<tbody>
<tr>
<td>3/8 inch</td>
<td>28 lb/ft (38 N.m)</td>
</tr>
<tr>
<td>7/16 inch</td>
<td>45 lb/ft (61 N.m)</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>245 lb/ft (332 N.m)</td>
</tr>
<tr>
<td>1 1/4 inch</td>
<td>935 lb/ft (1,268 N.m)</td>
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FIGURE 8 illustrates a cylinder head assembly, which utilizes a lip type seal rather than chevron rings as shown in FIGURE 4. The seal consists of (2) parts, a “U” cup and an o-ring. When installing this seal, make certain that the o-ring side of the seal faces to the base end of the cylinder. The 1/2” NF retainer capscrews must be torqued to 90 lb/ft.

As pressure builds in the cylinder barrel, the o-ring loads against the “U” cup sealing lips and prevents seal distortion under pressure. This causes a dynamic seal.

The current stem packing design is a chevron type which has proven to give better service life than the “lip” type seal. The “lip” seal can be replaced with the adjustable chevron type seal at the time of rebuild if desired. Contact Allied Systems Company with the Serial number of the machine, and part number of the cylinder for details, conversion parts list, and instructions. The “lip” seal was only used in hoist and tilt cylinder applications.
Periodic Maintenance of Hoist and Tilt Hydraulic Circuit Flow Restrictors

General

Within the hoist and tilt circuits of most Wagner Heavy Lift units, there are restrictor poppets installed to prevent cylinder cavitation and control cylinder movement in case of hose or hydraulic system failure. These restrictor poppets are located at the base end of the hoist cylinders and at the stem end of the tilt cylinders. See Figures 9 and 10.

Hoist Circuit

The restrictor poppets are located within a manifold mounted directly to the base end of the hoist cylinders (see Figure 9) and by design operate to restrict the flow of oil out of the cylinder base and allow free flow of oil into the cylinder base. Periodic inspection and maintenance of this system is required due to the movement of the poppets within the manifold and the subsequent wear of the machined seating surface. Allied Systems Company recommends that each time the cylinder is resealed, a thorough inspection of the manifold and restrictor poppet is performed. If any defect is found, replacement of the part, or parts, should be initiated.

Tilt Circuit

The restrictor poppets are located at the stem end of the tilt cylinder. See Figure 10. Unlike the hoist circuit, these restrictor poppets are not installed in a manifold, but are seated against a machined area within the working port in the packing gland of the cylinder. Periodic inspection and maintenance of these restrictor poppets is equally as important as it is for the poppets used in the hoist circuit. Failure to do so can cause major component damage as well as a safety concern for operations personnel.

WARNING

Either operating the machine without these restrictor poppets or failing to make repairs to any of these components can cause severe damage to the hydraulic system as well as compromise the safety of operations personnel.