

Tie Rod Support Data

Cylinders with long stroke lengths, in addition to possible "Stop Tube" requirements, may need external support between the end caps to provide the stability needed to secure tie rod fasteners without causing the cylinder tube to buckle during assembly.

The table below indicates the stroke length limits at which "Tie Rod Supports" become necessary. The stroke length given represents the cylinder "design stroke." When a Stop Tube is included, this value is the length of "effective stroke" plus the "stop tube" length.

Tie Rod Support construction details may vary with stroke length, but part dimensions will not interfere with cylinder mountings. Cylinders in bore sizes 8" thru 14" do not require the use of "Tie Rod Supports." These units generally are available with a maximum "design stroke" limit of 233."

CYLINDER STROKE LIMITS (INCHES)

Cyl. Bore	Max. Stroke No Support	Max. Stroke 1 Support	Max. Stroke 2 Supports	Max. Design Stroke
1 1/2	46	94	135	166
2	60	123	166	166
2 1/2	75	153	213	213
3 1/4	99	201	237	237
4	121	246	285	285
5	152	284	284	284
6	180	284	284	284

Cylinder Maintenance

Suggested cylinder maintenance includes the replacement of seals subject to wear under normal operating conditions and the inspection of vital rod, bearing, and tube surfaces for abnormal wear or damage resulting from misalignment, particle contamination, or accidental abuse.

When maintenance is to be performed, the cylinder should be removed to a clean work area. The unit should be disassembled as described below to replace desired seal items. When seal replacement is necessary, it is recommended that static seals be replaced along with those subject to wear. Prior to reassembly, all cylinder surfaces and replacement parts should be thoroughly cleaned and well lubricated.

ROD SEAL REPLACEMENT

1. Extend cylinder rod several inches and provide adequate support to avoid cocking the piston inside tube.
2. Inspect rod wrench flat area and remove any burrs to prevent damage to rod bearing upon its removal.
3. Remove fasteners and detach bearing retainer plate.
4. Remove bearing and support ring from front head cavity and slide off over end of piston rod.
5. Remove rod wiper, rod seal, bearing to head o-ring and back up washer (items #5 and 6). Clean and inspect inner surface of rod bearing. If finish of bore is not uniform, measure for variations in size. If wear is apparent, replace bearing in addition to seal components.
6. Lubricate replacement seals and install in bearing using care to match original assembly.
7. Clean cylinder head surface, slide bearing assembly over rod carefully to avoid seal damage in area of wrench flats, and seat into front head cavity by tapping with soft face hammer. Use care not to shear outer o-ring during assembly.
8. Reattach bearing retainer using appropriate fasteners. Torque requirements for proper reassembly are included on this page.

PISTON AND TUBE END SEAL REPLACEMENT

Standard Series "H" models are equipped with cast iron piston rings and TFE seal which normally are maintenance free due to their extended service life.

The following instructions apply to cylinders equipped with optional cup type piston seals. These instructions can also be used as a general guide if replacement of cast iron rings & TFE seal is necessary.

1. Pull cylinder rod to its fully extended position and provide adequate support to avoid cocking the piston inside tube.
 2. Remove tie rod fasteners from end of unit most convenient for service purposes.
 3. Remove rear end cap and separate front head from cylinder tube. Tubing must be supported to prevent cocking against piston during assembly.
 4. Slide piston out of cylinder tube to expose both seals. Remove packing by inserting blunt screw driver under heel section and stretching seals over face of piston.
 5. Clean piston and cylinder bore surfaces. Install new piston seals with cup form of each facing in opposite directions away from each other.
 6. Remove tube end o-rings, clean groove and pilot surfaces, and install replacement o-ring seals.
 7. Insert piston into tube by depressing lip of seal with a blunt edge tool around circumference using care not to nick or scratch seal surface.
 8. Align tube ends squarely with end cap pilots and slide together carefully to avoid shearing o-ring seals. Reattach tie rod fasteners.
 9. Hand tighten tie rod fasteners with piston rod in fully extended position. Torque gradually to recommended level by alternately tightening fasteners in a diagonal, corner crossing pattern.
 10. If cylinder size permits, push piston rod to rear of unit to check alignment. If binding occurs, loosen tie rods and repeat torquing procedure.
- Cylinders with cushions should be assembled with the front cushion fully engaged. When assembled, proper alignment will allow full rotation of rod within the cushion at each end of cylinder.
11. After reassembly is complete, the cylinder should be pressure tested to inspect operating condition and checked for leakage before being placed back in service.

Torque Specifications

When tie rod nuts are removed to perform cylinder maintenance, they must be reassembled with proper torque to secure the assembly.

To prevent twisting, attach vice grip pliers or a locking clamp to tie rod near end of unit where torque will be applied. Recommended torque values apply to lubricated threads.

CYL. BORE	1 1/2	2	2 1/2	3 1/4	4	5
Tie Rod Dia.	3/8	1/2	1/2	5/8	5/8	7/8
Torque Ft. Lbs.	22	40	62	115	150	320
CYL. BORE	6	7	8	10	12	14
Tie Rod Dia.	1	1 1/8	1 1/4	1	1	1
Torque Ft. Lbs.	460	720	850	490	530	575

Bearing retainers are secured by socket head cap screws or tie rod fasteners in different model cylinders. The chart below shows torque value applicable to various screw sizes that are used. Bearing retainer fasteners are secured with breakable bond adhesive to insure against self disassembly.

SCREW SIZE	# 10-32	1/4-28	5/16-24	3/8-24	1/2-20	5/8-18
Torque Ft. Lbs.	6.3	14	27	48	114	222