DURAPAC
ENGINEERED FOR RELIABILITY

Instruction Manual

Hydraulic Pole Jack System
Model – DDP Series

Maximum Operating Pressure – 10,000 psi

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This is a safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid injury or death

1.0 Product Information

DURAPAC – Hydraulic Pole Jack Systems are engineered to meet International Standards for Performance and Safety. The DDP Series Hydraulic Pole Jack System is a powerful, yet lightweight design unit for the assembly of steel poles using a slip joint design and jacking nuts.

It features lightweight aluminum 20 ton hydraulic pull cylinders, high strength steel jacking frames and a high tensile Grade 100 chain. The system can be used when the poles are horizontal or vertical, and each component is designed to be easily handled by one person. Durapac offers a range of suitable power pumps and accessories to suit.

Features:

- Durapac RAP-206 aluminum hydraulic pull cylinders with internal spring return
- High strength welded steel jacking frames
- Grade 100 RUD® VIP chain
- Choose from a range of optional power units, 115 Volt electric, battery or gasoline

The DDP-20 Kit includes:

- 2 x RAP-206 pull cylinder complete with clevis and load pin
- 2 x steel upper jacking frames
- 2 x steel lower jacking frames
- 2 x Grade 100 chain assemblies with grab hook
- Jacking bolts and studs to suit 1" UNC jacking nuts
- Operating manual including Pressure versus Load Data sheet

Special skill, knowledge and training may be required for a specific task, and the product may not be suitable for all jobs. The user must ultimately make the decision regarding suitability of the product for any given task and assume the responsibility of safety for all in the work area. Contact a Durapac representative if you are unsure of your cylinder's suitability for a particular application.

2.0 Receiving Instructions

It is recommended prior to use that an inspection be done by qualified personnel and that any missing or damaged parts, decals, warning/safety labels or signs are replaced with Durapac authorized replacement parts only. Any components that appear to be damaged in any way, are worn, leaking or operate abnormally should be removed from service immediately until such time as repairs can be made. Any components that have or are suspected to have been subject to a shock load should be removed from service immediately until inspected by a Durapac authorized service centre. Owners and operators of this equipment should be aware that the use and subsequent repair of this equipment may require specialized training and knowledge.

3.0 Safety

Save these instructions. For your safety, read and understand the information contained within. The owner and operator should understand this product and safe operating procedures before attempting to use this product. Instructions and safety information should be conveyed in the operator's native language before use of this product is authorized. Make certain that the operator thoroughly understands the inherent dangers associated with the use and misuse of the product. If any doubt exists as to the safe and proper use of this product as outlined in this factory authorized manual, remove from service immediately.

DANGER:

- To avoid personal injury, keep hands and feet away from work area during operation
- **Do NOT** handle pressurized hoses. Escaping oil under pressure can penetrate the skin causing serious injury. If oil is injected under the skin, see a doctor immediately
- Stay clear of loads supported by hydraulics. After each pull has been completed, the cylinder must always be hydraulically released
- To avoid personal injury and possible equipment damage, make sure all hydraulic components withstand the maximum pressure of 10,000 psi

WARNING:

- The operating pressure must not exceed the pressure rating of the lowest rated component in the system. Use the pressure gauge(s) in the system to monitor operating pressure. It is your window to what is happening in the system
- Always wear appropriate personal protective equipment (PPE) when operating hydraulic equipment. The operator must take precaution against injury due to failure of the tool or work piece(s)
- **Do NOT** hold or stand directly in line with any hydraulic connections while pressurizing
- **Do NOT** attempt to disconnect hydraulic connections under pressure. Release all line pressure before disconnecting hoses
- All personnel must be clear before lowering load or depressurizing the system
- **Do NOT** attempt to lift a load weighing more than the capacity of the cylinder

IMPORTANT:

- If at any stage, the safety related decals become hard to read, these must be replaced
- Minimum age of the operator must be 18 years. The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the equipment. The operator is responsible for this activity towards other persons
- **Do NOT** lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport
- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Durapac authorized service centre in your area. To protect your warranty, use only high quality hydraulic oil

CAUTION:

- **KEEP HYDRAULIC EQUIPMENT AWAY FROM FLAMES AND HEAT.** Hydraulic fluid can ignite and burn. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 150°F or higher. Protect all equipment from weld spatter
- No alteration should be made to this device

3.1 Hydraulic Pole Jack Systems

- **Do NOT** overload equipment. Overloading can cause equipment failure and possible personal injury
- **BE SURE SETUP IS STABLE BEFORE LIFTING LOAD**. Use the pulling system only as described. Do not weld or otherwise modify the cylinder to attach a base or other support
- Avoid situations where load is not directly centered on the pulling system. Off-centre loads produce considerable strain on components. In addition, the load may slip unevenly, causing potentially dangerous results
- **Never** pressurize uncoupled couplers. Only use hydraulic equipment in a coupled system

3.2 Hydraulic Hoses & Fluid Transmission Lines

- Avoid short runs of straight line tubing. Straight line runs do not provide for expansion and contraction due to pressure and/or temperature changes
- Reduce stress in tube lines. Long tubing runs should be supported. Before operating the pump, connections should be tightened securely and leak-free. Over tightening can cause premature thread failure or high pressure fittings to burst
- Should a hydraulic hose ever rupture, burst or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressure hose with your hands. The force of escaping hydraulic fluid can inflict injury
- **Do NOT** subject the hose to potential hazard such as fire, sharp objects, extreme heat or cold or heavy impact
- **Do NOT** allow the hose to kink, twist, curl, crush, cut or bend so tightly that the fluid flow within the hose is blocked or reduced. Periodically inspect the hose for wear
- Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as battery acid, creosote-impregnated objects and wet paint. Never paint a coupler or hose

FAILURE TO HEED THESE WARNINGS MAY RESULT IN PERSONAL INJURY AS WELL AS PROPERTY DAMAGE.

4.0 Hydraulic System Installation

⚠ **IMPORTANT:** Always secure threaded port connections with high grade, non-hardening pipe thread sealant. Teflon tape can be used if only one layer of tape is used and it is applied carefully, two threads back, to prevent the tape from being introduced into hydraulic system, which could cause jamming of precision-fit parts

⚠ **CAUTION: Do NOT** allow the piston rod to rotate when installing adaptors. Damage to the spring may prevent piston rod retraction

4.1 Know your pole jack system, its limitations and how it operates before attempting to use. If in doubt, contact Durapac.

4.2 Make hydraulic connections; use a pump release valve or a 3-way valve and one hose for the single-acting cylinder, per the standard supplied pump. Refer to the pump instructions for further details on pump operation.

⚠ **IMPORTANT:** Fully hand-tighten all couplers. Loose coupler connections will block the flow of oil between the pump and the cylinder

4.3 Connect the hydraulic pump outlet to the common side of the control manifold, then connect the two controlled sides to each hydraulic cylinder. Refer to the manifold instructions for further details on manifold operation.

4.4 Check all system fittings and connections to be sure they are tight and leak free.

4.5 Check oil level in reservoir before operating pump.

4.6 Remove air from the system – Position the cylinder so that the piston rod is pointed down and the cylinder is lower than the pump. Advance and retract the cylinder several times, avoiding pressure build-up. Air removal is complete when the cylinder motion is smooth.

5.0 Pulling System Installation

⚠ **IMPORTANT:** Follow the process order as outlined, failure to follow the correct order may result in failure of parts

5.1 With the hex end facing out, thread the 1" x 3.5" threaded stud into the top nut on the upper and lower pole sections. Continue until it bottoms out on the pole.

5.2 Feed a 1" flat washer over the stud and push up to the pole nut.

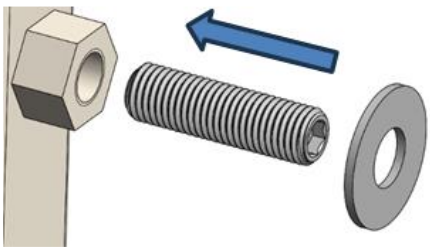


Figure 1 – Attaching the Poles

⚠ **WARNING:** Ensure studs do not protrude too far into the pole sections, such that they will impede the slip joint movement

5.3 Feed the upper and lower pulling holders over the studs. The upper has the slot for the cylinder. The lower has the round pin hole at the top.

5.3.1 While supporting the holder, secure each section by feeding a Plain (non-threaded) collar over the stud and seat the flange on the collar against the holder.

5.3.2 Hand-tighten a 1" hex nut to the stud to hold the assembly up to the pole nut. Check both upper and lower sections are secure but not tensioned.

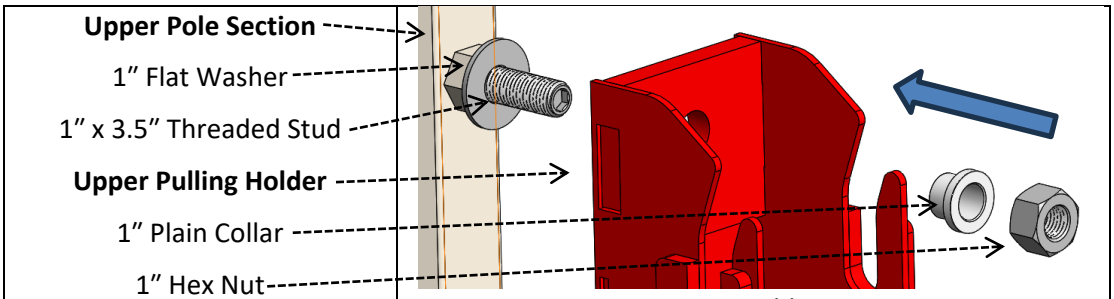


Figure 2 – Upper Holder Components

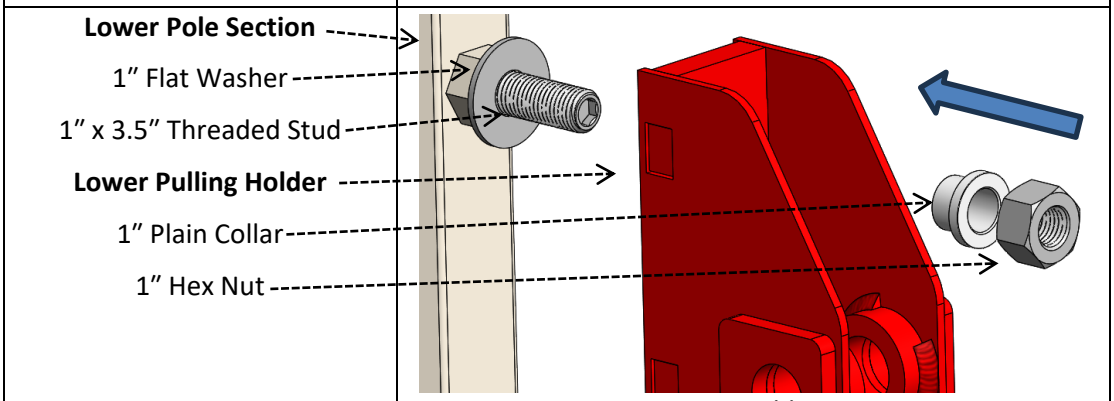


Figure 3 – Lower Holder Components

5.4 Take one pre-assembled 1" Hex Bolt, collar and washer (see Fig. 4) and align holder to allow the bolt to feed through the slot at the bottom of the upper holder.

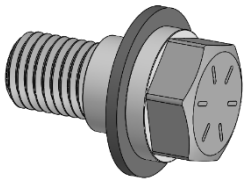


Fig. 4 – Pre-assembled Bolt

⚠ **WARNING:** Ensure studs do not protrude too far into the pole sections, such that they will impede the slip joint movement

5.5 Hold one 1" flat washer behind the holder, feed the bolt assembly through the slot and screw into the lower nut on the upper pole section.

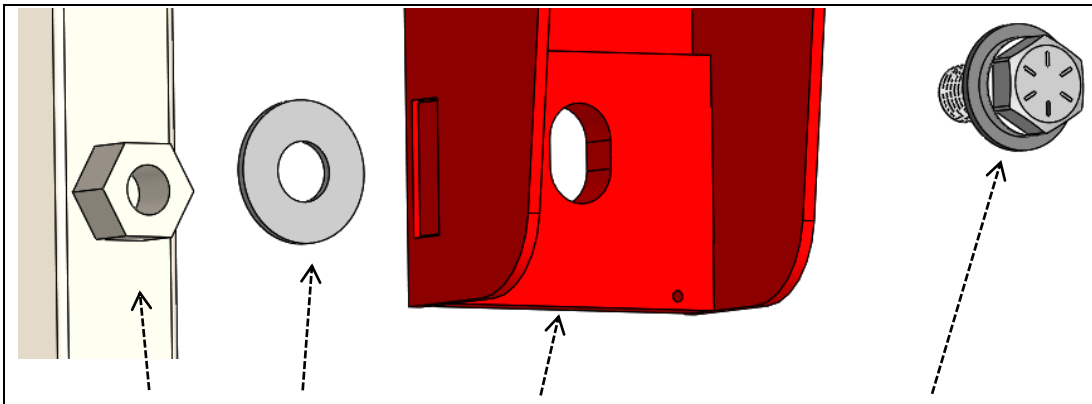


Figure 5 – Attaching Upper Section

5.6 Hold one 1" flat washer behind the holder and feed the bolt assembly through the slot and screw into the lower nut on the lower pole section.

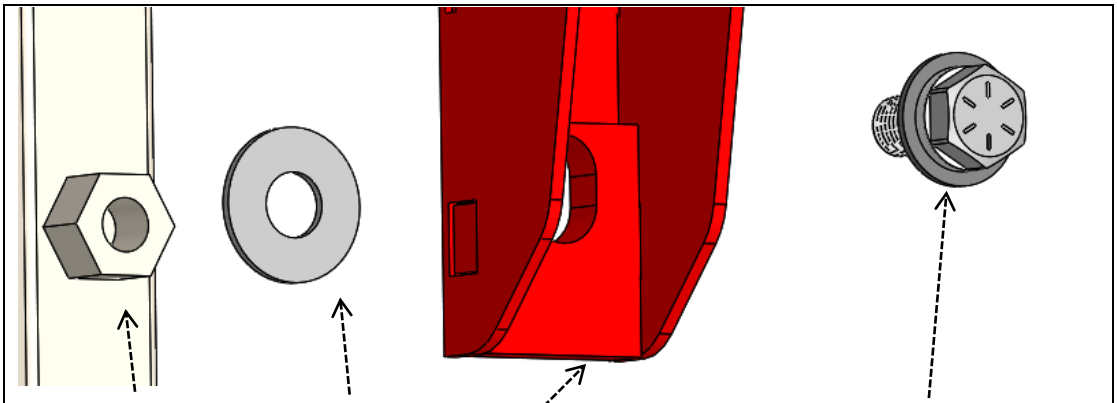


Figure 6 – Attaching Lower Section

5.7 Tighten the upper nut in each section to 100 lbs-ft (135 Nm) and the lower bolt to 100 lbs-ft (135 Nm). Then tighten the upper nut in each section to 380-450 lbs-ft (500-600 Nm) and lower bolt to 380-450 lbs-ft (500-600 Nm).

5.8 If it is not already pre-assembled, take two threaded collars onto two 1" x 2" Hex Bolts, with the flange under the bolt head, as shown in Fig. 7, thread the bolts into each side of the pull cylinder upper clevis. Tighten both to 100 lbs-ft (135 Nm).

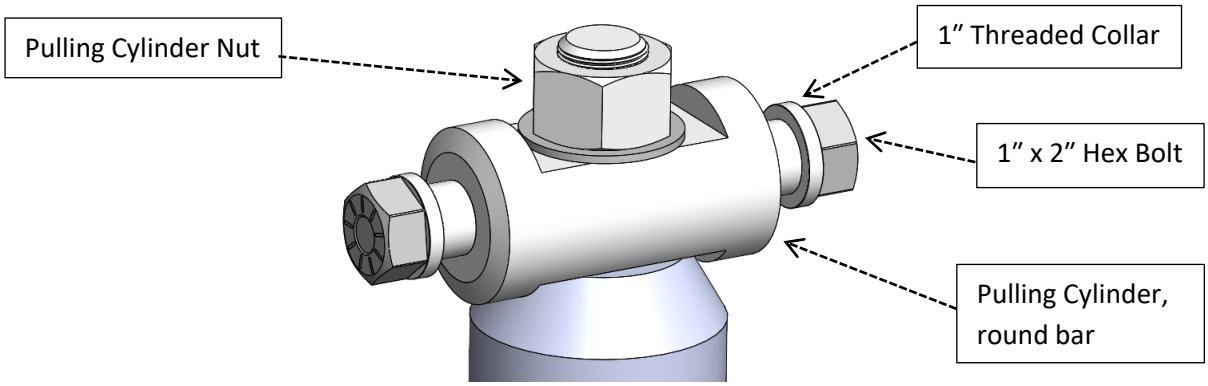


Figure 7 – Cylinder Attachments

5.9 Feed the cylinder onto the upper holder so that the collars rest into the bottom of the slots. When the cylinder pulls against the holder it will fully seat in the slots.

5.10 Check that the pulling cylinder hex nut is tight against the round bar. If not snug, tighten further.

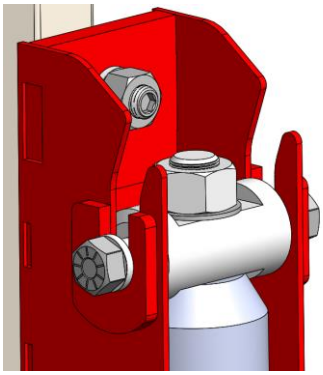


Fig. 8 – Cylinder Attachment

5.11 Remove the lynch pin and clevis pin from the pulling cylinder lower end. Then re-fit with the Chain Hook's eye captured in the holder by the pin.

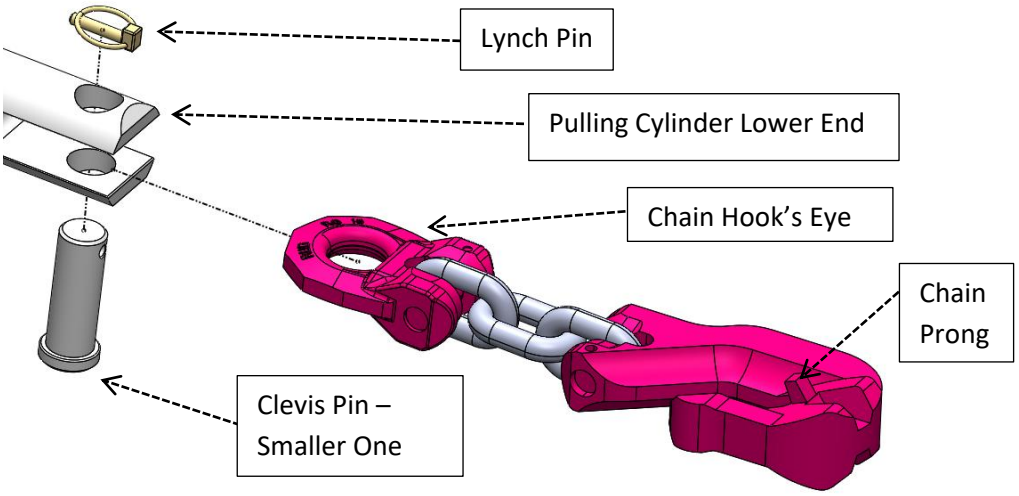


Figure 9 – Attaching Chain to Cylinder

5.12 Remove the lynch pin and clevis pin from the lower holder. Then re-fit with the running chain's eye captured in the holder by the pin.

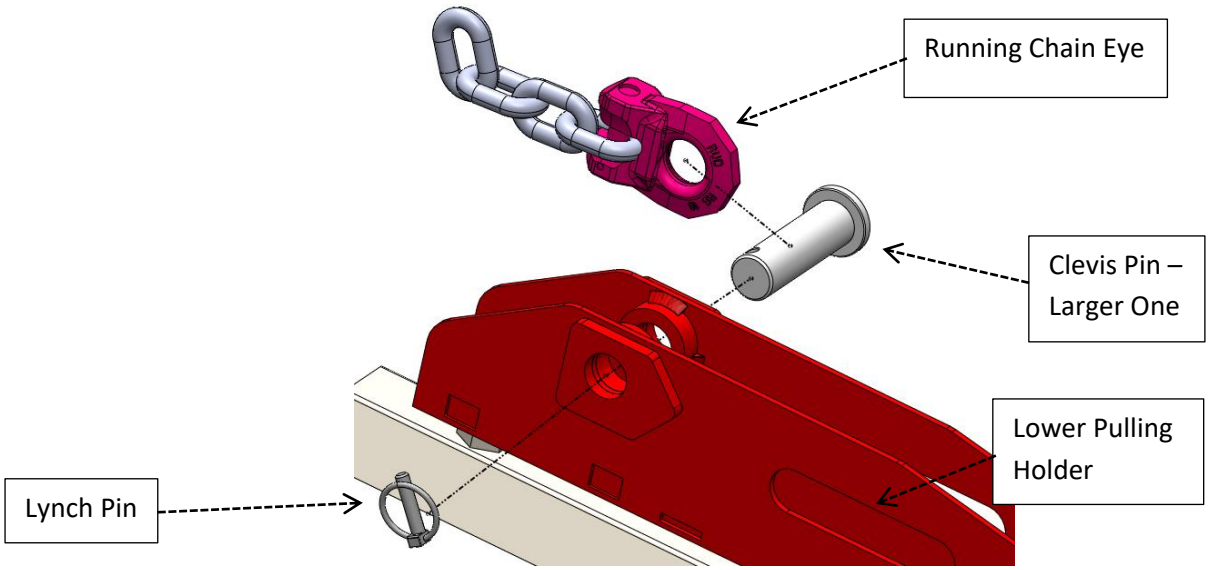


Figure 10 – Attaching Chain to Holder

5.13 Repeat steps 5.1 - 5.12 for the other side of the pole.

5.14 Fit the bolt protector plate to the bottom of both upper holders using the M6 x 10 screws provided.

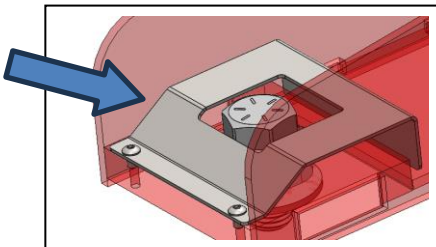


Fig. 11 – Protector Plate

5.15 Connect the hydraulic hoses to the pulling cylinders, noting all items in prior sections.

5.16 Extend each pulling cylinder to its extended position by first selecting one cylinder, then select the extend position on the pump control valve, now extend until it stops moving; repeat for other side cylinder. Check that both cylinders are evenly extended.

5.17 On both sides, hook the running chain through the hook, using the shortest available link and let it hang down, checking that the chain is fully engaged into the hook (see Fig. 12), noting the prongs (see Fig. 9) fitting inside the chain links.

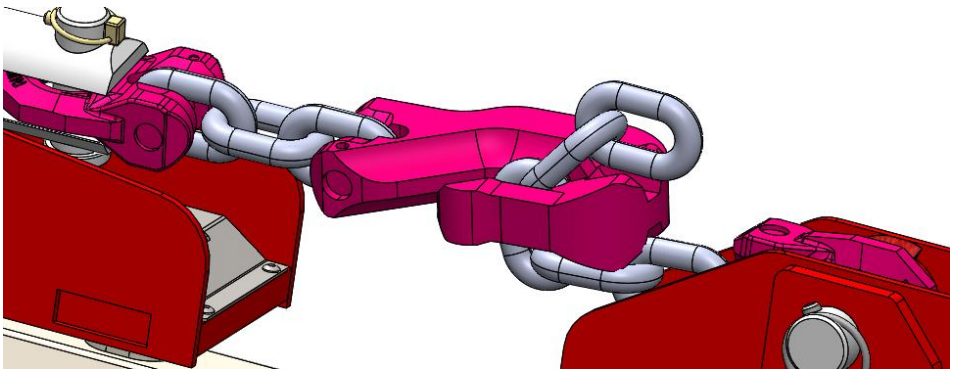


Figure 12 – Hooking the Running Chain

6.0 Operation

⚠ **IMPORTANT:** Cylinder gland nut/stop ring is designed to take the full load, to reduce cylinder wear, use less than the full stroke where possible.

For complete pump operating instructions, refer to the instruction sheet included with each pump.

To work out the pressure required for the required pulling force, refer to the table on the following page.

6.1 Advancing and retracting the cylinder

The RAP-206 cylinders have a spring return, and the speed of retraction is affected by the length of the hose and other restrictions in the line.

Shift the valve on the pump to the advance position and run the pump to advance the cylinder. To retract the cylinder, shift the valve to the retract position.

6.2 Side Load

Eliminate the presence of side load forces when using high tonnage cylinders. Side load can occur through:

6.2.1 An external load on the structure.

6.2.2 A structure misalignment, beyond that allowed for in the system.

6.2.3 Non synchronized lifting actions, ensure both needle valves are open.

6.3 Initial Pull

6.3.1 Check all components are correctly positioned and that it is safe to proceed with the pulling operation.

6.3.2 Select **both** cylinders on the control manifold, select the retract position on the pump control valve. Retract the cylinders until the desired pole position, or cylinder end of stroke is found.

Refer to the pole manufacturers specification for the desired pole finished position.

6.4 Further Pulling Increments

If further pulling is required, extend **both** cylinders, release the chains from the hooks, re-position the chains to their shortest available link and then repeat steps 5.16 - 6.3.

Note: The pole manufacturer may specify that the pulling operation is complete when the pulling system reaches its pulling limit, this limit should be a **maximum** of 10,000 psi, no greater, as observed on the included pressure gauge. If a lower pulling pressure is required, then a percentage of the maximum cylinder can be applied by calculating the pressure required.

Table of Pulling Load versus Pump Pressure:

LOAD 2 X RAP-206 COMBINED	COMBINED EFFECTIVE AREA SQUARE INCHES
	8.74
PSI	**LOAD IN POUNDS**
500	4370
1000	8740
1500	13110
2000	17480
2500	21850
3000	26220
3500	30590
4000	34960
4500	39330
5000	43700
5500	48070
6000	52440
6500	56810
7000	61180
7500	65550
8000	69920
8500	74290
9000	78660
9500	83030
10000	87400

7.0 Maintenance

IMPORTANT:

- Use only good quality hydraulic fluid. **Do NOT** use brake fluid, transmission fluid, turbine oil, motor oil, alcohol, glycerin etc. Use of anything other than good quality hydraulic oil will void warranty and damage the cylinder and application. We recommend Durapac Hydraulic Oil or equivalent
- Equipment must only be serviced by a qualified hydraulic technician. For repair service, contact your local Durapac authorized service centre
- Damage to hydraulic hoses may not be detected during visual inspections. For this reason, Durapac recommends that hydraulic hoses be replaced on a regular basis
- Tighten connections as needed. Use non-hardening pipe thread compound when servicing connections

Dirt, sand, etc. will quickly ruin any hydraulic system. Ensure that couplings are clean and free of foreign matter. After each use, clean couplings and attach dust caps.

Maintenance is required when wear or leakage is noticed. Periodically inspect all components to detect any problem that may require service and maintenance.

7.1 Check for loose connections and leaks.

7.2 Replace damaged parts immediately.

7.3 Do not exceed oil temperature above 140^{o}F.

7.4 Keep all hydraulic components clean.

7.5 Use dust caps when cylinder is disconnected from the hose. Keep entire cylinder clean to prolong cylinder life.

7.6 Wipe thoroughly clean and store cylinders upright (to prevent seal distortion) in a clean, dry environment. Avoid temperature extremes.

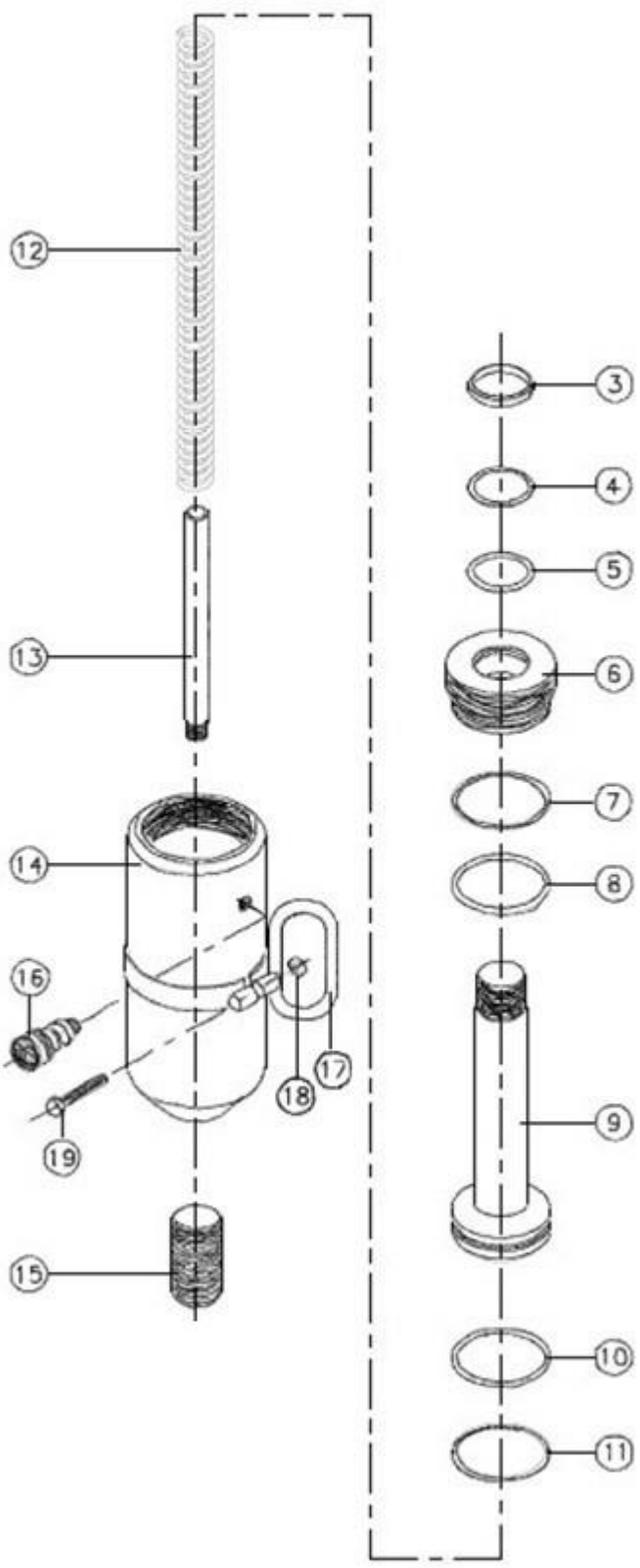
7.7 Change hydraulic oil in your system as recommended in the pump instruction sheet.

8.0 Troubleshooting

Problem	Cause	Solution
Cylinder moves but does not maintain pressure	Leaking connection	• Clean, reseal with thread sealant and tighten connection
	Leaking cylinder seals	• Replace worn seals • Check for excessive contamination or wear • Replace contaminated fluid as necessary
	Malfunctioning pump/valve	• Check pump or valve operating instructions • Repair or replace as necessary
Cylinder leaks hydraulic fluid	Worn or damaged seals	• Replace worn seals • Check for excessive contamination or wear • Replace contaminated fluid as necessary
	Loose connections	• Clean, reseal with thread sealant and tighten connection
Cylinder will not retract or retracts slower than normal	Closed pump release valve	• Open pump release valve
	Loose couplers	• Tighten couplers
	Blocked hydraulic lines	• Clean and flush lines
	Weak or broken retraction springs	• Send to a Durapac authorized service centre for repair
	Internally damaged cylinder	• Send to a Durapac authorized service centre for repair
	Pump reservoir too full	• Drain hydraulic fluid to correct level
Erratic Action	Air in system or pump cavitation	• Add fluid, bleed air and check for leaks
	External leakage	• Replace worn packings • Check for excessive contamination fluid as necessary • Replace contaminated fluid as necessary
	Sticking or binding cylinder	• Check for dirt or leaks • Check for bent, misaligned, worn parts or defective packings

Problem	Cause	Solution
Cylinder does not move	Loose couplers	• Tighten couplers
	Faulty coupler	• Verify that female coupler is not locked up (ball wedged into seat) • Replace both male and female couplers
	Improper valve position	• Close release valve or shift to new position
	Low or no hydraulic fluid in pump reservoir	• Fill and bleed the system
	Air-locked pump	• Prime pump according to pump operating instructions
	Pump not operating	• Check pump's operating instructions
	Load is above the capacity of the system	• Use the correct equipment
Cylinder extends only partially	Low or no hydraulic fluid in pump reservoir	• Fill and bleed the system
	Load is above the capacity of the system	• Use the correct equipment
	Sticking or binding cylinder	• Check for dirt or leaks • Check for bent, misaligned, worn parts or defective packings
Cylinder moves slower than normal	Loose couplers	• Tighten couplers
	Restricted hydraulic line or fitting	• Clean • Replace if damaged
	Pump not operating correctly	• Check pump's operating instructions • Repair or replace as necessary
	Low fluid level in pump reservoir	• Fill and bleed the system
	Leaking cylinder seals	• Replace worn seals • Check for excessive contamination or wear • Replace contaminated fluid as necessary

9.0 Parts Breakdown and List – Cylinder Model – RAP-206



Item	Description	Qty
3	Dust seal	1
4	Back-up ring	1
5	O-ring	1
6	Cover nut	1
7	Back-up ring	1
8	O-ring	1
9	Piston	1
10	O-ring	1
11	Back-up ring	1
12	Spring	1
13	Spring guide	1
14	Cylinder body	1
15	Link screw	1
16	Coupler	1
17	Hand grip	1
18	Hex nut	1
19	Hex bolt	1

Repair Kits are available – Serial number and model will need to be quoted when ordering parts.