



Model HP – NFPA High-Pressure Hydraulic Cylinders

Features	Advantage	Benefit
1. Heads and Caps	Square, precision-machined carbon steel to +_ .002 all sides	Assures concentricity of tube, bearing, cushion and piston rod. Chamfered grooves allow fast and easy positioning of cylinder tube over the tube seals. Can be made proximity switch ready to accept same probe-length switches at each end without spacers.
2. Cylinder Tube	Heavy wall seamless D.O.M. steel material (1020 to 1026). Precision honed to 10/15 micro inch finish and hard chrome plated .0003/.0005 thick on I.D.	Chrome Plating reduces wear on piston seals and tube I.D. surface. Hard chrome plated I.D. provides corrosion resistance and minimizes tube scoring.
3. Piston	One-piece fine grained ductile iron piston is threaded onto piston rod, torqued with a jam nut and held in place with Loctite®. Piston can be pinned onto rod as an option. Holes are drilled in each side of piston face, when U-Cups are used, to allow fluid pressure to increase the positive sealing.	Wide piston bearing surface reduces bearing loads and assures low wear and low friction to the piston seals and tube ID. An O-Ring with two Teflon backups are used to seal the piston to the rod, which prevents fluid leaks from bypassing the piston.
4. Tie Rods	Made from 100,000 psi minimum yield, stress-proof, medium carbon steel with rolled threads at each end.	Provides maximum strength for connecting cylinder mounts. Lock nuts prevent loosening in service. Accurate torquing prevents leaks at tube seals.
5. Tube Seals	90 durometer Buna-N Nitrile O-Rings are seated into grooves in both the head end and cap end covers. O-Rings are backed up with Teflon rings which effectively prevent O-Ring extrusion under pressure.	When combined with accurately torqued pre-stressed tie rods, proper O-Ring placement at the ID of the tube and confinement of the tube OD, seal extrusion and fluid leakage under pressure is prevented.
6. Rod Seal	The symmetrical loaded rod seal is made from 80 durometer Nitrile with an attached urethane anti-extrusion heel. A Delrin® retainer holds the seal in place and is positioned in a groove between the head and bearing cartridge.	Provides positive static and dynamic sealing at both low and high pressures. Anti-extrusion heel energizes sealing mechanism as pressure increases. Greater tolerance for side loading and increased stability is provided in high pressure applications.

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7. Rod Wiper

80 durometer, sharp double lip, pre-lubricated, carboxylate Nitrile seal provides additional sealing beyond rod seal. Additional materials can be used to combat various application demands, such as high heat. Severe external conditions could require the addition of a metallic rod scraper installed ahead of the rod wiper to effectively provide dual protection from the elements.

Prevents dust, dirt and grit from entering the bearing cartridge and cylinder, which significantly extends the cylinder life.

8. Piston Rod

100,000 psi minimum yield strength induction hardened and chrome plated steel with core hardness of RC 28-34. Case hardened to RC 50-55. Rod is hard chrome-plated (.0003/.0005 thick) and polished to 12/15 micro inch finish. Solid male threads contain radiused undercut.

Resists wear. All NFPA and metric rod and thread sizes, including female and studded male ends, are available with rolled threads. Provides positive connections to existing machine components. Solid male threads with radiused undercut minimize rod end breakage.

9. Bearing Cartridge

Floating, self-aligning bearing cartridge is made from grade 65-45-12 ductile iron or 660 bronze as an option. Our optional “Slip Tuff” bearing cartridge is also available for heavy side loaded applications. Cartridge is retained by cap screws and plate providing for strength and shock resistance. 90 durometer Buna-N O-Ring with Teflon backup ring on the cartridge O.D. prevents extrusion and fluid leakage around the outside of bearing cartridge.

Float condition minimizes piston rod misalignment by reducing side loading. Optional “Slip Tuff” bearing cartridge provides lubricated wear surface with hardness characteristics that significantly reduce galling and bearing cartridge failure under severe side loaded operating conditions. Easily removed for rod seal and rod wiper maintenance without requiring special tools to disassemble the cylinder.

10. Ports

NPT or SAE O-Ring ports are to be identified at time of order. Optional port sizes include flange ports, metric ports and oversized ports.

Universally adaptable to any hose or fitting.

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11. Piston Seals	<p>80 durometer, pre-lubricated, sharp lip, carboxylated Nitrile U-Cups with Teflon backup rings are standard up to and including 8” bore. Hydraulic poly pak type seals are standard for 10” bore and larger cylinders. Poly pak seals may also be used on smaller bores as an option. Other high load piston seal configurations are also optionally available, including step cut cast iron piston rings, with a T-Seal centered in between, are also available as an option.</p>	<p>Teflon backup rings prevent U-Cups from extruding and minimize leakage. Hydraulic poly pak type seals also reduce seal failure for larger bore cylinders operating under stressful conditions. The T-Seal centered between the optional cast iron rings helps prevent leakage and the probability of seal failure during high shock operating conditions. Piston sealing flexibility also exists to meet other high load destructive applications.</p>
12. Cushions	<p>Floating ductile iron rod cushion collar on head end. The cap cushion is a 660 bronze floating, check-type seal insert held captive by a retaining ring in the rear end cap. Ball checks are provided at both ends for rapid breakaway out of the cushion and the ball check screws are flush with the end caps.</p>	<p>Cushions are optional but ultimately help prevent cylinder failure, due to fatigue, resulting from the piston slamming into cylinder end caps. A reliable floating cushion system provides for smooth action and eliminates binding conditions, which can cause sudden failure.</p>
13. Cushion Adjustment Screw	<p>Steel needle valve with 90 durometer Nitrile O-Ring and Teflon backup ring. The captive adjustment screw can be locked in place and is flush with the end cap. The lock down mechanism prevents the screw from loosening due to vibration.</p>	<p>The Teflon backup ring behind the O-Ring prevents fluid leakage around the adjustment screw and helps ensure accurate fine adjustment of cushioning speed. Captive screw assures user safety.</p>
14. Optional Air Bleed System (not shown)	<p>Manual air bleed plug is located on the cylinder tube.</p>	<p>Eliminates trapped air from inside the cylinder.</p>
15. Optional Rod Cartridge Drain Back System (not shown)	<p>Drain feature is an additional groove cut into the front end of the bearing cartridge, between the rod wiper and rod seal, that drains off any accumulation of fluid between the seals. A cartridge drain port is located on the cartridge retainer plate for a user-installed drain line back to the reservoir.</p>	<p>Captures hydraulic fluid and drains it back to the reservoir. This minimizes the slow weepage of hydraulic fluid through the rod wiper onto the piston rod.</p>

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