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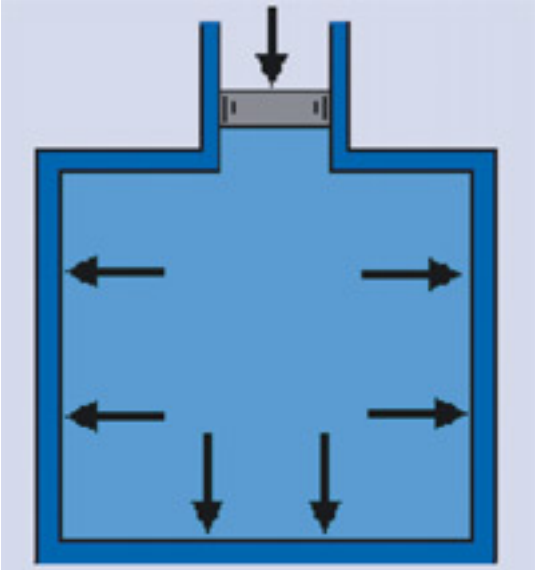
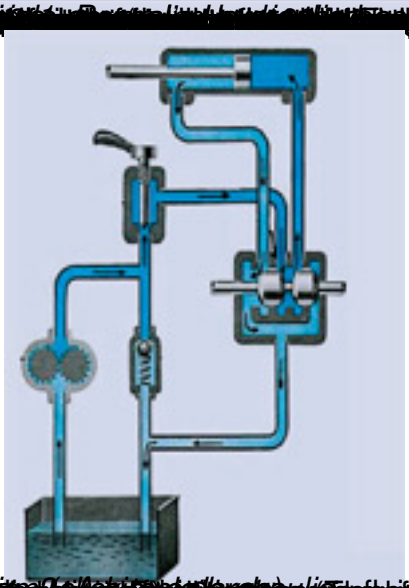
Hydraulic systems are different animals. They require special care and feeding.

This article continues our ongoing series on the important components of lubrication certification examinations administered by the Society of Tribologists and Lubrication Engineers (STLE) and the International Council for Machinery Lubrication (ICML). Please refer to this article for more information on STLE and ICML certifications.

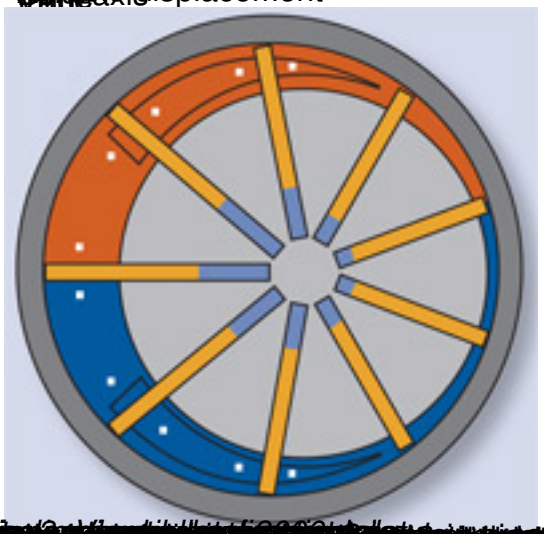
Hydraulics is defined as the transmittance of force from one point to another using the fluid as the transmitter. The advantages of hydraulics are:

- High power-to-size ratio
- Ability to achieve high variable speeds and forces
- Forces can be transmitted over long distances
- Allows large loads to be moved by small forces
- Instantly reversible
- High level of flexibility and simplicity
- High level of accuracy and control
- Reliable and maintainable





- axis displacement



Fluid Cleanliness, Hydraulic Fluids is critical to good performance both for pumps and valves.

[illegible] associated with hydraulic systems: flow, pressure-control [illegible] when smaller [illegible]

[illegible] fluids.

Table I. Eaton Industrial Pump Viscosity Requirements

Pump Type	Min./Max. Viscosity, cSt	Optimum Viscosity, cSt	Maximum Viscosity at startup, cSt
Vane	13-54	16-40	860
Axial Piston	13-54	16-40	860
Gear	6	10-43	2158

[illegible]

Table II. Troubleshooting Hydraulic Systems

Observation	Problem
Unsatisfactory oil condition	Debris in oil Oil is cloudy/white indicating air or water Dark color and burnt smell indicating oxidation
Pump noise	Cavitation Aeration
Erratic system control	Dirty oil Servo/proportional valve varnishing Damaged or worn components
Oil leakage	Defective fluid conductors, piping, tubing, hoses or fittings

[illegible]

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