

We receive a fair amount of questions regarding "Hydra-Oil", which is the oil contained in all new Hydra-Cell pumps. This article explains the various types of oil supplied by Wanner Engineering, selecting replacement oil to keep your Hydra-Cell pump operating reliably and the oil changing procedure.

Hydra-Oil is available in three basic forms, conventional, synthetic blend and fully synthetic. The oil within Hydra-Cell pumps performs three important roles:

1. lubrication of sliding and rotating components
2. dissipating heat resulting from those moving components
3. creation of hydraulic pistons to displace the diaphragms and generate flow.

Oil is thicker when cold and becomes thinner at elevated temperatures. The oils used in Hydra-Cell pumps are selected so that they satisfy their three key roles in conjunction with:

- Environment the pump is installed
- Pump head material
- Operational characteristics
- Special considerations

### Nomenclature

Most oil is described with numbers on either side of the letter "W":

# 10 W 30

The number to the left of the "W" in the example above represents the oils resistance to flow at 0°F; the number after the "W" represents the oils resistance to thinning at 212°F.

Ideally, the oil is thin enough to reduce shaft torque to begin pump shaft rotation and remains thick enough throughout its operation to ensure a protective film on the moving components. In addition to that, the viscosity needs to be within a certain range for an efficient, rapidly responding hydraulic piston.

### Environmental Considerations

If a Hydra-Cell pump is installed outdoors or indoors but without temperature control, the ambient temperature of the environment may require using a



higher or lower viscosity oil. For example, a 5W30 oil would be applicable for cold environments and a 15W50 for hot environments.

### Pump Head Materials

A Hydra-Cell "pump head" consists of its manifold and valve plate. Heat dissipates more efficiently when these components are made of non-alloys or brass, so 10W30 oil is used. Likewise, when fabricated of ductile iron, stainless steel and other alloys which do not dissipate heat as readily, 10W40 oil may be used because it will resist thinning at the expected higher oil temperatures.

Pumps using EPDM diaphragms require using special oil considered "EPDM compatible" because EPDM reacts with standard oil and other mineral oil based products.

### Operational Characteristics

The shaft speed at which the Hydra-Cell pump is operated and the duration of operation is directly related to oil temperature, so applications which are nearing the pumps maximum speed and operated continuously benefit from an oil which resists thinning at elevated temperatures. Thus even if you were using a non-alloy pump head, you might still benefit from a 10W40 or 15W50 oil. The fluid temperature does not significantly add to the oil temperature although it might affect the chosen pump size for that application (oversized to operate at a lower RPM).

### Special Considerations

Hydra-Cell pumps are sealless and the diaphragm barrier separating the process fluid and lubricating oil are typically only damaged during an upset condition (over-pressurization) or incompatibility with the fluid pumped (chemical or temperature). Some applications are very sensitive to the potential for contamination of their product and thus special oils are used. The most common example is using "food contact oil" for applications in the food, beverage and biopharmaceutical industries. We also have customers requiring water-soluble oil and oil resistant to ammonia due to their specific equipment and fugitive emissions requirements. When such specialized oils are required the viscosities of our standard Hydra-Oil can be used as a guideline for selection.

### When to use "Hydra-Oil"

Hydra-Oil has special ingredients, such as increased molybdenum, which is beneficial during the initial 100-hour break-in period of new pumps. It is perfectly acceptable to substitute commercially available oil after the break-in period. 5W30, 10W30, 10W40 and 15W50

oil is readily available and likely costs less than the Hydra-Oil version. When you have large pumps or a large number of pumps, our 2½-gallon packaging might be advantageous. Likewise, sticking with Hydra-Oil for specialty oils for food contact and EPDM compatibility ensures reliability.

### Why is important to change oil?

Metal fines, suspended within the oil due to the friction and heat of the pumping action, circulate and contribute to increased friction and heat. Heat and friction reduce the lubricity and coating effectiveness of the oil over time and thus the physical wear of the components accelerates if the oil is not periodically changed. The hydraulic end of Hydra-Cell pumps can last decades when adhering to an appropriate oil changing schedule. While components located in the hydraulic end are replaceable, they are both more complicated and expensive to replace.

### Oil Change Frequency

The installation, operation & service manual for your pump will have a recommended interval for changing your oil like the chart below:

Hours Between Oil Changes @ Various Process Fluid Temperatures				
Pressure	RPM	<90°F (32°C)	<139°F (60°C)	<180°F (82°C)
<b>Metallic Pump Head</b>				
<650 psi (45 bar)	<1200	6,000	4,500	3,000
	<1800	4,000	3,000	2,000
<1000 psi (69 bar)	<1200	4,000	3,000	2,000
	<1800	2,000	1,500	1,000
<b>Non-Metallic Pump Head</b>				
<250 psi (17 bar)	<1200	4,000	3,000	—
	<1800	2,000	1,500	—

### Oil Changing Procedure

With the pump turned off, open the drain port and let most of the oil and sediment drain out; then just close the drain port and re-fill. If your pump has a sight bottle, fill to about the bottom ¼ of the cylinder. Otherwise fill the oil to just below the entrance to the expansion chamber. The expansion chamber is atop each pump and has an oil fill cap. As oil heats-up it expands and thus this chamber enables the oil to expand without leaking from the pump.



### Oil Level Monitoring

Applications sensitive to oil leakage benefit from continuous monitoring of the oil level and that can be accomplished in several ways. The simplest and least expensive method to monitor your oil level is to use a sight bottle – if the oil cannot be seen in the

sight bottle then it is leaking into the system and either a diaphragm is damaged, the shaft seal is leaking or

the physical hydraulic housing is damaged.

A simple float switch can be added to a sight bottle with an electrical circuit completed with enough increase or decrease of the oil level.

Remote installations benefit from a monitoring kit having a Murphy SWITCHGAGE® which is similar to the functionality of a sight bottle with float switch but is not mounted to the pump and it is physically much more robust.



### Oil Cooling Systems

The typical oil temperature of a continuously running Hydra-Cell pump is 185°F - 190°F. In exceptionally hot environments and when pumping fluids at temperatures it is possible that the oil temperature increases to >200°F. Our oil cooling systems can reduce 250°F oil to 185°F based upon ambient air ≤110°F or 3 GPM of water ≤80°F. The selection of either an air based or water-based cooling system is environmentally dependent; the concept is that the pumps oil is circulated through cooling fins similar to a vehicles radiator.



Keep your Hydra-Cell pumps operating reliably for many years by ensuring regular oil changes!

The next time you have a challenging pump application reach out to us using one of our special web-based inquiry forms, send an email or call our office; we will put our experience to work for you!

Visit us at <https://fdpp.com> and let us know how we can assist you with your filtration application!

*Chris Pasquali has provided sales and engineering support for Wanner Engineering since 1991*