**UCON™ Hydrolubes**  
Converting Hydraulic Systems

**Introduction**

When converting a hydraulic system to a UCON Hydrolube, care must be taken to follow accepted engineering practices and to be as thorough as possible. Fluid contamination should be minimized, particularly contamination by excessive amounts of residual hydraulic fluids that may remain during system conversion. For best results, the hydraulic system should be dismantled and cleaned, preferably steam cleaned. However, if thorough cleaning of the hydraulic system is not possible, the following procedures may be used.

**Conversion Procedure**

1. Completely drain the hydraulic oil from the system. Particular attention should be paid to the reservoir and to pipelines, cylinders, accumulators, filters or other equipment where residual oil may be trapped.

2. Clean the system of residual sludge and deposits and remove any soft or loosened paint from the inside of the reservoir, unless the paint has been tested and found to be resistant to the softening and lifting action of the hydrolube. Steam cleaning has been very effective in many instances. The use of chlorinated metal cleaners should be avoided. Cleaning should be as complete as existing conditions will permit.

3. Remove or disconnect the filter.

4. The total flushing process may be performed with a UCON Hydrolube. The flushing procedure should be performed by operating with no load or at minimum pressure, then bringing the fluid up to normal temperature and operating all parts. Many users follow the practice of operating on the flush-fill for several hours in order to assure complete circulation and to take full advantage of the solvent and cleaning characteristics of the water / glycol hydraulic fluid.

5. Drain the warm flushing fluid as completely as possible without allowing it to settle. This fluid can be retained for further use after suspended solids have settled and residual petroleum oil has separated. With proper attention to removal of suspended contaminants, the flushing fluid can be reused in preparing other machines and hydraulic circuits for service.

6. Install new filter cartridges and replace filter elements having zinc- or calcium-plated parts with appropriate substitutes as recommended by the filter manufacturer. (See Corrosion Resistance below). Do not use a highly adsorptive filter medium, such as activated clay or Fuller’s Earth, since these filters may alter fluid composition by removing essential additives.

7. Examine pump parts and auxiliary equipment. Worn pump parts should be replaced. Leaking pipe joints should be repaired, and deteriorated gaskets, seals, and packing should be replaced in order to minimize mechanical fluid losses. Cork shaft seals should be replaced if they are present in the system.
8. Reconnect the system and tighten all joints and connections.

9. Fill the system with fresh UCON Hydrolube.

10. Operate at reduced pressure to ensure proper lubrication of the hydraulic pump, then bring up to standard operating conditions.

**Initial Operating Period**

During the first few weeks of operation, particular attention should be paid to the filters and inlet screens. They may become clogged by oil / residue sludge and deposits that have been loosened by the solvent and cleaning action of UCON Hydrolube. Such stoppage may cause pump starvation and cavitation, noisy operation, and high pump wear. Therefore, filter cartridges should be replaced and inlet screens cleaned as often as needed.

Even with the most careful cleaning procedures, a small amount of petroleum oil may remain in the system. Such small quantities of residual hydraulic oil will not interfere with performance of the hydrolube fluid, but will reduce its fire resistance, especially when the residual oil tends to collect in one part of the system, such as the reservoir or accumulators.

Hydraulic oil is lighter than the hydrolube fluid and will rise to the top of the reservoir. During the initial period of operation, periodically skim or siphon any residual oil from the surface of the fluid in the reservoir.

**Converting from Polyol Ester or Phosphate Ester Hydraulic Fluids**

When a change in the type of fire-resistant hydraulic fluids is contemplated for an industrial hydraulic system, component manufacturers and system design engineers should be consulted. Their recommendations regarding system and component modifications to better accommodate the different fluid type should be followed so that the performance of the hydraulic system can be optimized. Once this is accomplished to the user’s satisfaction, the following procedure can be used to change the system to UCON Hydrolube.

**Conversion Procedure**

1. Drain system completely while the synthetic hydraulic fluid is hot and still at operating temperature.
   Where feasible:
   - Blow down all lines with dry compressed air to remove any fluid trapped in inaccessible places.
   - Disassemble all valves and clean them thoroughly.
   - Disconnect and drain cylinders, pump and filter housing, and coolers.
   - Wipe down reservoirs.
   - Steam clean system and air dry with compressed air.

2. Reassemble the system and install clean (new) filters.

3. Flush the system with a low viscosity, ISO V.G. 22 or 32, naphthenic or aromatic-based circulating oil.
   - Use an amount of flush sufficient to cover reservoir discharge and suction lines during system operation to eliminate introduction of air into hydraulic lines.
   - Circulate at the normal operating temperature for about one hour to dissolve any fluid or deposits remaining in the system.
   - Operate the system at minimum pressure and maximum fluid velocity.
   - Activate all component parts to ensure the system is thoroughly flushed.
   - Change (clean) filters as needed.

   **Caution:** Avoid the use of halogenated solvents in cleaning hydraulic systems and components. These solvents will promote equipment corrosion.
4. Completely drain flush from system while it is still hot, following those pertinent procedures outlined in No. 1.
5. Reassemble the system and install clean (new) filters.
6. Flush the system with the UCON Hydrolube, following all the procedures outlined in No. 3. In addition:
   - Skim the surface of the hydrolube in the reservoir periodically to remove any of the synthetic fluid or deposits that may have collected there as a result of the detergent action of the hydrolube.
7. Drain the hydrolube flush while it is still hot. Steam clean the system and air dry with compressed air.
8. Replace filters.
9. Replace or repair any worn or defective equipment that would adversely affect system performance.
10. Fill the system with the operating charge of fresh UCON Hydrolube and slowly bring the equipment up to normal operating conditions.

Paint Compatibility
Most paints are incompatible with, and thus readily removed by, UCON Hydrolubes. Since hydrolubes contain liquid and vapor phase corrosion inhibitors, it is recommended that unpainted, at least on the inside, reservoirs be used. However, if painting is necessary, either paint compatibility should be determined experimentally or the paint manufacturer should be contacted for compatibility information.

Special Precautions
1. Avoid the use of halogenated solvents in cleaning hydraulic systems and components. These solvents will promote equipment corrosion.
2. It should be noted that the used seals and filters in the hydraulic system have already absorbed the previous hydraulic fluid and will exhibit very different compatibility toward UCON Hydrolube than the new seal or filter. Often, the compatibility of used seal materials toward hydrolubes is very poor resulting in subsequent system leakage, and occasionally, significant seal erosion leading to wear may result. Therefore, whenever possible, it is desirable to replace all seals and filters during hydraulic fluid conversion.
3. It is recommended that, in addition to the required analysis for water content, analysis for reserve alkalinity, viscosity, and contamination be performed on a regular basis. As a minimum, analysis should be performed immediately after conversion, then weekly for 1-2 months and finally on a quarterly basis, unless more frequent analysis is indicated for a particular system.

Corrosion Resistance
UCON Hydrolubes do not corrode common construction metals; steel, cast iron, aluminum, brass and copper in solution and steel and cast iron in the vapor phase. However, the best compatibility is achieved with stainless steel or anodized aluminum. Surface discoloration is not abnormal and accompanies the formation of the desire boundary protective layer by the additives in the fluid. Zinc, galvanized iron, or cadmium parts or plating should be avoided because of adverse effects both on the fluid and metals during prolonged contact.
Seal Compatibility
UCON Hydrolubes can be used with many of the common rubber compounds, such as Buna N, recommended and used for petroleum oils. However, Buna S and polar elastomers such as polyurethane should not be used. Most Viton, but not all, and EPDM elastomers are the most commonly recommended seal materials for UCON Hydrolubes. However, it must be noted that there are often significant variations in the materials used for compounding these elastomers. Therefore, it is advised that confirmation of compatibility be made with the seal manufacturer before use.

A certain amount of swelling is generally desirable to facilitate a good seal. However, if the seal material were to undergo a small amount of shrinkage, it is possible to use a slightly larger size seal to account for such expected shrinkage. Although both Teflon and silicone seal materials are compatible with hydrolubes, they do not swell significantly. In fact, silicone undergoes considerable shrinkage. Therefore, the hydraulic systems must be tightened sufficiently to minimize potential leakage.

The use of cork or leather dynamic seals should be avoided because of swelling induced by the water contained in the UCON Hydrolubes. These materials may be used, however, for static seals, such as stationary gaskets. Teflon back-up rings are recommended in place of leather.

Plastics Compatibility
Due to variations that can exist between plastics in the same generic family, it is important to test the compatibility of any plastic components (such as reservoir sight glass) exposed to the hydraulic fluid under end use conditions.

Product Stewardship
Dow encourages its customers and potential users to review their applications from the standpoint of human health and environmental aspects. To help ensure that Dow products are not used in ways for which they are not intended or tested, Dow personnel will assist customers in dealing with environmental and product safety considerations. Dow literature, including Material Safety Data Sheets, should be consulted prior to use.

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