MORRIS LUBRICANTS

SDS: 620
Issue: 03
Ref: Liqui.46

Product Information
LIQUISAFE 46

Description

Liquisafe 46 is a high quality fire resistant hydraulic fluid blended with high and low molecular weight polyalkylene glycols in a stable water solution. The formulation includes special chemical additives that inhibit the formation of rust in the system, and provide anti-wear properties equal to that of mineral hydraulic oils. This product is compatible with all seals normally found in systems designed for mineral oil, including nitrile, viton, neoprene and silicone rubbers.
The excellent shear stability and high viscosity index make Liquisafe 46 ideal for hydraulic systems subject to long term extremes of temperature and operating conditions. The low pour point of this product gives complete pump protection and smooth operation, even when starting and running equipment at temperatures below –30°C. Liquisafe 46 does not produce toxic fumes if it should accidentally come in contact with hot metals or flames.
ADVANTAGES: Excellent anti-wear performance, superior fire resistance, low toxicity, low pour point, good shear stability, good viscosity index, compatible with standard packings and seals.

Applications

Recommended for all hydraulic systems, operating in conditions where the use of a mineral oil would present a fire hazard. Typical uses include: steel mill equipment, casting shop machinery, furnace door closers, die casting machines and underground equipment. Further information on system design and recommendations when changing from petroleum hydraulic oils to LIQUISAFE can be obtained from MORRIS LUBRICANTS, Technical Service Department.

Performance Levels

British Coal No. 570/1981.
International Fluid Classification HFC

Physical Characteristics

Specific Gravity 20°C	1.076
Pour Point °C	Better than -40 °C
Viscosity @ 4 °C	275 cSt
Viscosity @ 40 °C	46cSt
pH	9.6
4 Ball Scar Diameter/ mm	0.76
Vickers vane pump test (9250hrs)	<200 mg total wear
Foam Tendency Initial	20cm ^{3}
After 10 mins	0
Typical Water Content	43%

Water based hydraulic oils are not compatible with mineral oils and the hydraulic oils and the changeover from one to another should be undertaken with care.
Full details are included under Systems Design and Materials of Construction.

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System Design and Materials Construction

System Design

To avoid excessive evaporation of water, the system should be designed in such a way that the temperature does not exceed 50 °C. Due to their high specific gravity and vapour pressure, water-glycol fluids have a higher tendency than mineral oil to produce pump cavitation. In order to overcome this, pump manufacturers normally work to the following conditions:

- Fluid speed in the pump outlet in the range of approximately 2-6 m/s.
- Inlet speed no higher that 1.5 m/s.
- The pump must not run empty or empty the intake pump.
- The dimensions of the pump inlet and outlet pipes must be those recommended by the manufacturers.
- Efficient filtration is important when using water-glycol fluids, 10 micron filters should be used, as normally recommended by the equipment manufacturers. They are normally placed in the high pressure line and in the return line to the reservoir.

Materials of Construction

PACKING AND HOSES: Natural rubber, BR, SBR, NBR (Brecon TM ex B.P. Chemicals) Q, CFM and IIR rubbers can be used as packing materials, as well as PTFE. Perbunan TM grades ex Bayer must contain the maximum proportion of acrylonitrile. Polyurethane-based elastomers, asbestos, leather and cork material packings are not suitable since the absorb water.

High pressure or maximum pressure hoses and packings with wire, cotton or synthetic fibre inserts and a coating of natural rubber or the above synthetics may be used without restrictions.

Board and paper materials should not be used for flange and cover seals. Fluid packing compounds or mastics should be used sparingly so that these do not get into the fluid circuit and lead to valve blockages.

The surface of the filters should be large enough to avoid a high pressure drop and the volumetric capacity of all filters should be such that they are able to pass at least three times the output of the pump at the operating viscosity. By-passes are not recommended in the high pressure line, and a pressure drop on excess of 3.5 bars is to be avoided.

Many types of filters are suitable for use with LIQUISAFE. Users should refer to individual manufacturer's recommendation. Insert metal mesh filters are preferred. Active clay and absorbent filters should not be used. Frequent filter changes are recommended, particularly during initial stage of the operation with LIQUISAFE.

PAINTS: Water glycol fluids, because of their solvent actions, are incompatible with conventional industrial paints. When a system is converted to LIQUISAFE all internal paints known to be adversely affected should be removed and the surface either left unpainted or treated with a coating that is resistant to water-glycol solution (e.g. epoxy resin or phenolic resin paints).

METAL: LIQUISAFE is compatible with the metals normally employed in hydraulic systems. LIQUISAFE should not be used in systems incorporating magnesium alloys, because of the reactivity with water. Zinc and cadmium plated parts should be avoided.

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LIQUISAFE 46
Change-Over Procedure

THE FOLLOWING PROCEDURE IS RECOMMENDED IN MAKING THE CHANGE-OVER FROM A PETROLEUM HYDRAULIC OIL TO "GOLDEN FILM" LIQUISAFE.

1) Drain the oil from the system completely. Particular attention should be paid to the reservoir, fluid lines, cylinders, accumulators, filters and other equipment where residual oil may be trapped.
2) Clean the system of residual sludge and deposits. Remove the paint from the inside of the reservoir unless it has been tested and found to be resistant to the softening and lifting action of LIQUISAFE. Steam cleaning has been very effective in many instances. The use of carbon tetrachloride or other chlorinated metal cleaners should be avoided.
3) Remove or disconnect the filter.
4) Flush the system with a minimum quantity of LIQUISAFE. Flush initially by operating at no load or at minimum pressure, then, bring the fluid up to normal temperature and operate all parts. Many users follow the practice of operating on the flush fill for several hours in order to ensure complete circulation. Systems previously filled with HF-D (phosphate ester) fluid should be flushed with mineral oil before proceeding as above.
5) Drain the flushing charge as completely as possible while it is still warm and without allowing it to settle. This fluid can be retained for further use after suspended solids have settled and residual petroleum has separated. With proper attention to removal of suspended contaminants, the flushing fluid can be used in preparing other machines for service.
6) If a filter is used, install and clean filter cartridge. Replace filter elements having zinc or cadmium plated parts with appropriate substitutes. Do not use a highly absorptive filter medium such as activated clay or Fullers Earth since these filters may alter fluid composition by removing essential additives.
7) Examine pump parts, O-rings, 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 minimise 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 connectors.
9) Fill the system with LIQUISAFE.
10) Operate at reduced pressure to ensure proper lubrication of the hydraulic pump, then bring up to standard operating conditions.

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