

Hydraulic Fluid and Hydraulic System Compatibility with Bio-Ultimax™ Fluids



"Bio-based Lubricants that Perform Like Synthetics"

Bio-Ultimax™ Hydraulic Fluids are compatible to hydraulic system materials and components that are designed to operate on mineral oil based and most synthetic based hydraulic fluids. In addition, they have been tested and have shown to be compatible with mineral oil based and most synthetic based fluids. Conversion procedures are much easier with Bio-Ultimax™ Hydraulic Fluids. No engineering design changes are necessary. They are compatible with the same filters, seals, hoses and accumulator bladders.

Bio-Ultimax™ Hydraulic Fluids can operate in static, mid-dynamic, and dynamic areas of hydraulic systems that contain the following materials:

Elastomer Compatibility

<u>ISO 1629</u>	<u>DESCRIPTION (Trade Names)</u>
• NBR	Medium to high nitrile rubber (Buna N, >30% acrylonitrile)
• NBR	Low nitrile rubber (Buna N, <30% acrylonitrile)
• FPM	Fluoroelastomer (Viton)
• AU	Polyurethane (Adiprene, Millathane)
• PTFE	Polytetrafluoroethylene (Teflon)
• CR	Polychloroprene (Neoprene)

Mineral Oil Based Fluid Compatibility

Bio-Ultimax™ Hydraulic Fluids have been designed to directly replace mineral oil based hydraulic fluids and improve the performance of the overall hydraulic system operation. To convert a system, simply drain and recharge. For proper biodegradability, at least 90% of the mineral oil based fluid should be removed from the system. Most of the fluid can be removed by draining the reservoir and lines. Flushing is not necessary for compatibility, but if you choose to flush, only use Bio-Ultimax™ fluids as a flushing fluid. Bio-Ultimax™ may also be used as a top fill (with compatible fluids) until the existing fluid is converted in the maintenance schedule. One of the most widely used elastomer in the industry for mineral oil based hydraulic systems is Buna-N low nitrile rubber (NBR-L).

Synthetic Based Fluid Compatibility

PAOs

Bio-Ultimax™ Hydraulic Fluids are compatible with synthetic Polyalphaolefins (PAOs) and semi-synthetic PAO and mineral oil blends. These are the most widely used synthetic lubricants in the world lubricant market and generally are formulated to meet the same hydraulic systems compatibility requirements as mineral oil based fluids.

Converting a system would require the same procedure as mineral oil based above.

Esters

Bio-Ultimax™ Hydraulic Fluids are compatible with most synthetic esters based fluids and depending on selection of esters they may be considered biodegradable. RLI's compatibility studies show polyolesters and diesters to be very compatible, however there can be compatibility problems when blending some complex ester fluids as shown in RLI's studies. Most synthetic ester based fluids have excessive seal swell on butyl and low nitrile rubber (NBR-L) and because of this, chemically resistant seals and components (NBR medium to high nitrile, FPM, and PTFE) are recommended. Bio-Ultimax™ Fluids are highly compatible with systems designed to use synthetic esters.

Water glycol (HFC) and invert emulsions (HFB)

Bio-Ultimax™ Fluids are **NOT** compatible with water based fluids. These fluids must be removed from the system by draining the reservoir and lines. Remove residual fluid by circulating and draining. Refill with Bio-Ultimax Fluid. Flush and repeat flushing until the residual is less than 1% of the system volume. Standard practice for flush and purification of hydraulic systems may be found in ASTM D 4174-89.

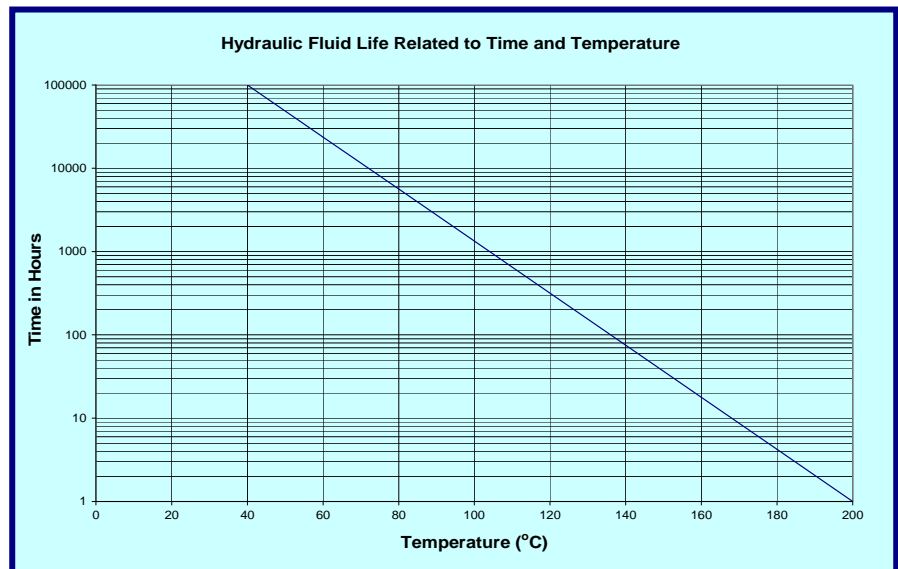
Phosphate Esters

Bio-Ultimax™ Fluids are compatible with some, but not all phosphate ester fluids. Testing is recommended before conversion. Seal compatibility should also be considered because Butyl rubber is the most compatible elastomer with phosphate esters. Butyl rubber has poor compatibility with mineral oils.

It is recommended by RLI that if there is any question about material and fluid compatibility to contact RLI's technical service. If professional high velocity oil flushing, cleaning, and filtration is required, RLI can provide compatible flushing fluids for high velocity systems. For additional information on high velocity flushing services contact PWS Motion Control, Inc. at www.pwsdirect.com or contact RLI.

Life Expectancy of Hydraulic Fluids

The logarithmic chart to the right shows the life expectancy of hydraulic fluids related to time and temperature. Bio-Ultimax Fluids are designed to meet OEM oil change requirements that recommend mineral oil based fluids. Although this chart is a good reference, it does not take into consideration other variables that can affect the life of the fluid as in moisture, dusty conditions, system design, etc. With the proper maintenance and analysis program, equipment and/or fluid life can be extended.



Professional Technical Services

RLI's technical services include hydraulic fluid system analysis and conversion recommendations. RLI recommends a program of regular hydraulic fluid analysis every 6 months or less depending on the application and system. Contact RLI for these services. RLI's goal is to provide a high performance hydraulic fluid that is safe, cost effective, and extends the life of your equipment.

STABILIZED by Renewable Lubricants* is RLI's trademark on their proprietary and patented anti-oxidant, anti-wear, and cold flow technology. High Oleic Base Stock (HOBS) are agricultural vegetable oils. This Stabilized technology allows the HOBS to perform as a high performance formula in high and low temperature applications, reducing oil thickening and deposits.

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