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**Bio-Ultimax™ Hydraulic Fluid**  
**AW 1000 SAE 10W40**

**STABILIZED™**  
by Renewable Lubricants

***"Biobased Lubricants that Perform Like Synthetics"***

A specially formulated, ultimately biodegradable<sup>1</sup> product designed for hydraulic driven systems that require a heavier SAE 40 viscosity for summer and fluid that passes the winter 10W viscosity for cold temperature pumpability protection (i.e.: approved by Hustler Mower Engineering for this OEM specifications). Bio-Ultimax™ Hydraulic Fluid is formulated to perform in hydraulic systems that require Anti-Wear (AW), anti-rust, anti-oxidation, anti-foam, and demulsibility properties. It is highly inhibited against moisture and rusting in both fresh and sea water and passes both A and B Sequences of the ASTM D-665 Turbine Oil Rust Test. Incorporating the super high viscosity index of the Stabilized\* High Oleic Base Stocks (HOBS) into the formula, increases the viscosity index past synthetic levels (Energy Conserving Formula). A zinc-free additive system has also been developed that is environmentally friendly and meets or exceeds pump requirements.

Bio-Ultimax™ Hydraulic Fluid is designed for use in mobile and stationary hydraulic vane, piston, and gear-type pumps and has shown exceptional anti-wear performance. **Very little wear was encountered, 0 to 25mg (Pass), in accelerated biobased tests using Denison T-5D, Vickers 20VQ, 35VQ-25 (M-2950-S), and V-104C (ASTM D-2882) pump stand tests at pressures and temperatures ranging from 2000 to 3000 psi and from 150<sup>0</sup> to 210<sup>0</sup> F.** The anti-wear performance exceeds the load stage 10 in the FZG (DIN 51354) requirements for US Steel 136, DIN 51524, and GM (LS-2). It also meets the requirements for ashless GL-3 gear oils in reduction units and gear sets where it meets the viscosity range.

The super high viscosity index of the HOBS naturally improves the thermal shear stability of the formula and increases load capacity. The HOBS's extremely low volatility increases the flash and fire safety features in the formula. It is formulated to provide seal conditioning for longer seal life and to reduce oil leakage from the system. Bio-Ultimax™ Hydraulic Fluid should be used in hydraulic systems where low toxicity and BIODEGRADABILITY properties are required. Base oils and additives in this product pass and exceed the acute toxicity (LC-50) criteria adopted by the US Fish and Wildlife Service and the US EPA. Bio-Ultimax™ Hydraulic Fluid is an ENVIRONMENTALLY RESPONSIBLE lubricant that is formulated from renewable agricultural plant resources. We believe Earth's environmental future rests in the use of renewable materials.

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.

<sup>1</sup> Ultimate Biodegradation (Pw1) within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants

Patented Product: US Patent 6,383,992, US Patent 6,534,454 with additional Pending and Foreign Patents

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**Availability   F.O.B. :Hartville, Ohio, USA   5 Gallon Pails   Drums   Bulk**

## Bio-Ultimax™ 1000 Hydraulic Fluid SAE 10W40

The test data below show that the Bio-Ultimax™ 1000 Hydraulic Fluid provides high performance in a wide variety of stationary and transportation equipment that operate in broad ranges of environmental conditions. In equipment operating outside, wear from poor cold temperature pumpability, surge loads, moisture, and dusty environments are more prominent. Bio-Ultimax™ 1000 Hydraulic Fluid is formulated to improve performance in equipment that requires excellent anti-wear, hydrolytic stability, and cold temperature pumpability as low as -30<sup>0</sup>C. In addition, the products may be used in machine tool hydraulic systems with the above Denison/Vickers pump requirements that recommend this multigrade viscosity.

TYPICAL SPECIFICATIONS	METHOD	<u>10W40</u>	Spec. Requirements
Specific Gravity @ 15.6°C API Gravity @ 15.6°C Viscosity @ 40°C Viscosity @ 100°C Viscosity @ -30°C MRV TP1  Viscosity Index	ASTM D-287 ASTM D-287 ASTM D-445 ASTM D-445 ASTM D-4684  ASTM D-2270	<b>0.894</b> <b>26.8</b> <b>72.50</b> <b>14.25</b> <b>15,000 cP</b>  <b>206</b>	Report Report Note 1 Note 1 10W= <60,000  90 (min)
Pour Point Flash Point (COC) Fire Point (COC)  Hydrolytic Stability, Copper Wt. Loss (mg) Copper Appearance Water Layer  Foam Sequence I, II, III (10 min)  Rust Prevention Distilled Water Syn. Sea Water	ASTM D-97 ASTM D-92 ASTM D-92  ASTM D-2619  ASTM D-892  ASTM D-665	<b>-36°C</b> <b>255°C</b> <b>280°C</b>  <b>0.0208</b> <b>1A</b> <b>3.0</b>  <b>0 Foam</b>  <b>Pass</b> <b>Pass</b>	Note 1 198°C (min) 218°C (min)  0.2 Report 4  0 Foam  Pass Pass
Copper Corrosion Strip 3hr @ 100°C	ASTM D-130	<b>1 B</b>	DIN 51524 2(max)
Rotary Bomb Oxidation, (minutes)  Oxidation Stability (Pressure Differential Scanning Calorimeter) min  Neutralization Number mg KOH/g  Swell of Synthetic NBR-L Rubber, % (Avg.) Volume Change (%) Shore A Hardness Change (%)  Filterability A-No Water (s) (Avg) B-2% Water (s) (Avg)  Demulsibility, ML Oil/Water/Emulsion  4-Ball Wear, 1h, 167°F, 1200 RPM, 40 kg  FZG Test	ASTM D-2272  ASTM D-5483 Modified  ASTM D-974  DIN 53538, Part 1  Denison TP 02100 HF-0 Requirement  ASTM D-1401  ASTM D-4172  DIN 51354	<b>360</b>  <b>70.0 (165°C)</b>  <b>&lt;0.4</b>  <b>8.0</b> <b>-4</b>  <b>335</b> <b>449</b>  <b>40/40/0</b>  <b>0.3 – 0.4</b>  <b>12</b>	USS 120 (min)  Note 2  1.5 (max)  0 to 10 0 to -7  600 (max) 2xA (max)  40/37/3 (max)  USS 127 0.5 (max)  US. Steel 10 (min)
<b><u>Biodegradation Classification</u></b>	ASTM D-5864	Ultimate PW1	Ultimate PW1
<b><u>Environmentally Friendly</u></b>	ISO 15380	yes	
<b><u>USDA Biobased Tested</u></b>	New Carbon	yes	meets/exceeds over 50%
<b><u>Environmental Management System</u></b>	ISO 14001:1996	yes	
<i>Note 1 Viscosity Sufficient for Application</i>			
<i>Note 2 Not Required</i>			