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Bio-Ultimax™ Hydraulic Fluid

AW 1000 SAE 10W40

STABILIZED™ by Renewable Lubricants

ISOGREEN CERTIFIED LUBRICANTS

"Biobased Lubricants that Perform Like Synthetics"

Bio-Ultimax™ Hydraulic Fluid AW 1000 SAE 10W40 is an ultimately biodegradable[1,] biosynthetic formula that directly replaces mineral oil based hydraulic fluids. This patented biobased product is specially designed for hydraulic driven systems that require a heavier SAE 40 viscosity for summer and passes the winter 10W viscosity for cold temperature pumpability protection (approved by Hustler Mower Engineering for their OEM specifications). It provides unsurpassed protection 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 A and B Sequences of the ASTM D-665 Turbine Oil Rust Test. Incorporating the super high viscosity index (VI) of the Stabilized* High Oleic Base Stocks (HOBS) into the formula, increases the viscosity index past synthetic levels (Energy Conserving Formulas). 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. An environmentally friendly, zinc-free additive system has also been developed that meets or exceeds high pressure pump requirements.

Bio-Ultimax™ Hydraulic Fluids have a long-term history of proven performance with over 15 years of successfully being used in a wide variety of stationary and mobile hydraulic equipment. These patented super high VI fluids have performed successfully in hydraulic systems up to 10,000 psi and in systems with ultra-fine filtration. They are designed for use in hydraulic vane, piston, and gear-type pumps that require DIN 51524 Part 2 and 3 (HLP/HVLP), Parker-Denison HF-O/T6H20C, HF-1, HF-2, Eaton-Vickers M-2950-S (35VQ-25) and I-286-S (V-104C), Rexroth, Sauer-Sundstrand, GM (LS-2), US Steel 126, 136, and 127. They also meet the requirements for ashless GL-1, GL-2, GL-3 and AGMA Non-EP gear oils in reduction units and gear sets, where they meet the viscosity ranges. They have shown to have exceptional anti-wear performance in ASTM D-4172 Four Ball Wear Tests. **Very little wear was encountered in the field studies and in accelerated pump tests using biobased formulations in Denison T-5D, Vickers 20VQ, 35VQ-25 (M-2950-S), and V-104C (ASTM D-2882), Vickers I-286-S pump stand tests at pressures and temperatures ranging from 2000 to 3000 psi and from 150^0 to 210^0 F.** Their anti-wear performance **exceeds the requirements** for GM (LS-2), US Steel 126, 136 and 127, load stage 10 in the FZG (DIN 51354), and DIN 51524 Part 2 and 3 requirements for low viscosity hydraulic and turbine oils. They may be used in reduction gears for cold temperature applications, where the OEM recommends a lighter viscosity or SAE 10W for proper channeling.

Bio-Ultimax™ 1000 SAE 10W40 Hydraulic Fluid meets the Environmental Protection Agency (EPA) 2013 Vessel General Permit (VGP) guidelines for Environmentally Acceptable Lubricants (EALs), and should be used in hydraulic systems where **LOW TOXICITY**, **BIODEGRADABILITY** and **NON-BIOACUMMULATION** properties are required. This product exceeds the acute toxicity (LC-50 / EC-50 >1000 ppm) criteria adopted by the US Fish and Wildlife Service and the US EPA. Because it meets the environmental requirements it can also be used where ISO 15380 (HEES/HETG) Hydraulic Fluids are specified. Bio-Ultimax™ Hydraulic Fluids are **ENVIRONMENTALLY ACCEPTED LUBRICANTS (EALs)** that are formulated from renewable biobased resources. We believe Earth's environmental future rests in the use of renewable materials.

[1]Ultimate Biodegradation Pw1 >60% within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants

Availability **F.O.B.: Hartville, Ohio, USA** **1 Gallon** **5 Gallon Pail** **Drum** **Totes** **Bulk**

Bio-Ultimax™ 1000 Hydraulic Fluid SAE 10W40

The test data below shows that the Bio-Ultimax™ 1000 Hydraulic Fluid provides high performance in a wide variety of stationary and transportation equipment, that operate in abroad 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 SAE 10W40 is formulated to improve performance in equipment that requires excellent anti-wear, rapid water separation and cold temperature pumpability as low as -30^{0}C.

TYPICAL SPECIFICATIONS	METHOD	**10W40**	Spec. Requirements
Specific Gravity @ 15.6°C	ASTM D-287	**0.89**	Report
Viscosity @ 40°C	ASTM D-445	**72.50**	Note 1
Viscosity @ 100°C	ASTM D-445	**14.25**	Note 1
Viscosity @ -30°C MRV TP1	ASTM D-4684	**15,000 cP**	10W= <60,000
Viscosity Index	ASTM D-2270	**206**	90 (min)
Pour Point	ASTM D-97	**-36°C**	Note 1
Flash Point (COC)	ASTM D-92	**255°C**	198°C (min)
Fire Point (COC)	ASTM D-92	**280°C**	218°C (min)
Hydrolytic Stability,	ASTM D-2619		
Copper Wt. Loss (mg)		**0.0208**	0.2
Copper Appearance		**1A**	Report
Water Layer		**3.0**	4
Foam Sequence I, II, III (10 min)	ASTM D-892	**0 Foam**	0 Foam
Rust Prevention	ASTM D-665		
Distilled Water		**Pass**	Pass
Syn. Sea Water		**Pass**	Pass
Copper Corrosion Strip 3hr @ 100°C	ASTM D-130	**1 A**	DIN 51524 2(max)
Rotary Bomb Oxidation, (minutes)	ASTM D-2272	**360**	USS 120 (min)
Oxidation Stability (Pressure Differential Scanning Calorimeter) min	ASTM D-5483 Modified	**70.0 (165°C)**	Note 2
Neutralization Number mg KOH/g	ASTM D-974	**<0.4**	1.5 (max)
Swell of Synthetic NBR-L Rubber, % (Avg.)	DIN 53538, Part 1		
Volume Change (%)		**8.0**	0 to 10
Shore A Hardness Change (%)		**-4**	0 to -7
Filterability	Denison TP 02100		
A-No Water (s) (Avg)	HF-0 Requirement	**335**	600 (max)
B-2% Water (s) (Avg)		**449**	2xA (max)
Demulsibility, ML Oil/Water/Emulsion	ASTM D-1401	**40/40/0**	40/37/3 (max)
4-Ball Wear, 1h, 167°F, 1200 RPM, 40 kg	ASTM D-4172	**0.3 – 0.4**	USS 127 0.5 (max)
FZG Test A/8,3/90	DIN 51354 Part 2	**12**	US. Steel 10 (min)
Biodegradation Classification	ASTM D-5864 OECD 301B ISO 15380	Ultimate PW1 Readily yes	Ultimate PW1 Readily
Environmentally Friendly			
USDA Biobased Tested	New Carbon	yes	meets/exceeds over 50%
Environmental Management System	ISO 14001:1996	yes	yes
Ecotoxicity LC-50 / EC-50	**EPA 560/6-82-002, 003**	meets/exceeds	meets/exceeds
Note 1 Viscosity Sufficient for Application			
Note 2 Not Required			
Product Item #		**81040**	