



Renewable Lubricants, Inc.

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Bio-MIL-PRF-32073

Hydraulic Fluid

(ISO 15, 22, 32, 46, 68)



"Biobased Lubricants that Perform Like Synthetics"

Bio-MIL-PRF-32073 Hydraulic Fluids are ultimately biodegradable¹ biosynthetic (biobased) formulas that were designed to replace mineral oil based hydraulic fluids for environmentally sensitive areas. They have been specifically formulated to provide additional seal swell (10% to 30%) as required by MIL-PRF-32073 and ISO 15 or ISO 22 can replace obsolete specification (MIL-PRF-5606 for ground support equipment only). Bio-MIL-PRF-32073 Hydraulic Fluids are formulated to perform in hydraulic systems that require anti-wear, anti-foam, anti-rust, anti-oxidation, and demulsibility properties. They are highly inhibited against moisture and rusting in both fresh and sea water and pass 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, gives multi-grade synthetic base oil performance by boosting the viscosity index to synthetic levels. This 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. An environmentally friendly, zinc-free additive system has also been developed that meets or exceeds high pressure pump requirements.

Bio-MIL-PRF-32073 Hydraulic Fluids have been used successfully in a wide variety of stationary and mobile hydraulic equipment. These patented super high VI fluids are designed for use in hydraulic vane, piston, and gear-type pumps. 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.** Their anti-wear performance **exceeds the requirements** for US Steel 126, 136 and 127, load stage 10 in the FZG (DIN 51354).

Bio-MIL-PRF-32073 Hydraulic Fluids meet 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-BIOACCUMULATION** properties are required. They exceed the acute toxicity (LC-50 / EC-50 >1000 ppm) criteria adopted by the US Fish and Wildlife Service and the US EPA. Because they meet the environmental requirements they can also be used where ISO 15380 (HEES/HETG) Hydraulic Fluids are specified.

Bio-MIL-PRF-32073 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.

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

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.

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** **1 Gallon** **5 Gallon Pail** **Drum** **Totes** **Bulk**

Bio-MIL-PRF-32073 Hydraulic Fluid

The test data below shows that the Bio-MIL-PRF-32073 Hydraulic Fluids provide 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-MIL-PRF-32073 Hydraulic Fluids are formulated to improve performance in equipment that requires excellent anti-wear, rapid water separation and cold temperature pumpability as low as -40°C. In addition, the products may be used in machine tool hydraulic systems where higher seal swell fluids are required because of previously used MIL-Spec hydraulic Fluids.

TYPICAL SPECIFICATIONS (MIL-PRF-32073A)	ISO Grade Military Grade	ISO 15 1	ISO 22 2	ISO 32 3	ISO 46 4	ISO 68 5
Viscosity @ 40°C, cSt Viscosity @ 100°C, cSt Viscosity @ -15°C, cSt Viscosity @ -25°C, Brookfield Viscosity @ -30°C Brookfield Viscosity @ -35°C Brookfield Viscosity @ -40°C Brookfield Viscosity Index	ASTM D-445 ASTM D-445 ASTM D-445 ASTM D-2983 ASTM D-2983 ASTM D-2983 ASTM D-2983 ASTM D-2270	14.18 3.81 170 314 cP 480 cP 750 cP 1250 cP 172	21.1 5.0 330 646 cP 1020 cP 1680 cP 2800 cP 175	30.87 6.9 479 970 cP 1530 cP 2490 cP 4250 cP 189	43.8 9.67 595 1260 cP 2040 cP 201	64.1 12.5 1160 2610 cP 4800 cP 198
Pour Point Flash Point (COC)	ASTM D-97 ASTM D-92	-60°C 180°C	-52°C 205°C	-48°C 243°C	-39°C 252°C	-36°C 263°C
Foam Sequence I, II, III (10 min)	ASTM D-892	<30/0 Foam	<30/0 Foam	<30/0 Foam	<30/0 Foam	<30/0 Foam
Galvanic Corrosion	FTM 791-5322	Pass	Pass	Pass	Pass	Pass
Rust Prevention Distilled Water Syn. Sea Water	ASTM D-665	Pass Pass	Pass Pass	Pass Pass	Pass Pass	Pass Pass
Copper Corrosion Strip 3hr @ 100°C	ASTM D-130	1A	1A	1A	1A	1A
Rotary Bomb Oxidation, (minutes)	ASTM D-2272	400	400	400	400	400
Dielectric Strength (KV) (Avg)	ASTM D-877	50	45	45	45	45
Oxidation Stability, Pressure Differential Scanning Calorimeter PDSC (minutes)	ASTM D-6186 Modified	95.0 (155°C) 25.0 (180°C)	95.0 (155°C) 25.0 (180°C)	90.0 (155°C) 25.0 (180°C)	90.0 (155°C) 25.0 (180°C)	90.0 (155°C) 25.0 (180°C)
Neutralization Number mg KOH/g	ASTM D-974	<0.4	<0.4	<0.4	<0.4	<0.4
Seal Swell NBR-L, % (Avg.) Volume Change (%)	FTM-791-3603	20	20	13	13	13
Filterability A-No Water (s) (Avg) B-2% Water (s) (Avg)	Denison TP 02100 HF-0 Requirement	113 187	268 271	335 449	355 470	355 470
Demulsibility, ML Oil/Water/Emulsion	ASTM D-1401	40/ 40/ 0 (<10 minutes)	40/ 40/ 0 (<10 minutes)	40/ 40/ 0 (<10 minutes)	40/40/0 (<10 minutes)	40/40/0 (<10 minutes)
4-Ball Wear, 1h, 167°F, 1200 RPM, 40 kg	ASTM D-4172	.30-.40	.30-.40	.30-.40	.03-.40	.30-.40
FZG Test	DIN 51354	11	11	12	12	12
<u>Biodegradation Classification</u>	ASTM D-5864	Ultimate PW1	Ultimate PW1	Ultimate PW1	Ultimate PW1	Ultimate PW1
<u>Environmentally Friendly</u>	OECD 301B ISO 15380	Readily yes	Readily yes	Readily yes	Readily yes	Readily yes
<u>USDA Biobased Tested</u>	New Carbon	yes	yes	yes	yes	yes
<u>Environmental Management System</u>	ISO 14001	yes	yes	yes	yes	yes
<u>Ecotoxicity LC-50 / EC-50</u>	EPA 560/6-82-002, 003	meets/exceeds	meets/exceeds	meets/exceeds	meets/exceeds	meets/exceeds
Product Item #		81140	81150	81160	81170	81180