Renewable Lubricants, Inc.
476 Griggy Rd., P.O. Box 474
Hartville, Ohio 44632-0474
330.877.9982 Fax 330.877.2266
Web: www.renewablelube.com

Bio-SynXtra™ Super MA Fluids

Multi-Application (ISO 32, 46, 68, 100, 150, 220)

"Biobased Lubricants that Perform Like Synthetics"

Bio-SynXtra™ Super MA Fluids are super designed, biobased synthetic formulas (ISO 15380 HEPR) that exceed conventional mineral oil based turbine, circulating, compressor, gear, heat transfer, hydraulic, and many other lubricants for **multi-applications (MA)**. They are formulated with biobased synthetic esters and PAOs to provide superior oxidation stability, lubricity, anti-wear, and cold temperature performance for longer service life in modern high performance enclosed systems, (where they meet the equipment seal compatibility requirements below). Their super multi-application performance extends fluid and equipment life, and helps in reducing maintenance, oil change intervals, inventory, and cost. In addition, these ashless (zinc free) biodegradable[1] fluids provide excellent anti-wear (AW), anti-rust, anti-foam, 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 ASTM D-665 Turbine Oil Rust Test. **(Excellent for marine and mining applications where one MA fluid can be used to reduce inventory or where transportation and storage space is a concern).**

Compressors: Bio-SynXtra Super MA Fluids are formulated to provide superior lubricating qualities for most compressors, especially portable and stationary rotary compressors (screw and sliding vane), single-stage, two-stage, and multistage reciprocating compressors (water-cooled and air-cooled), centrifugal compressors, and vacuum pumps. While specific manufacturer recommendations vary, the ISO 32, 46 and 68 grades are most commonly used for rotary compressors, while higher viscosity grades are preferred for reciprocating units (meets and exceeds DIN 51506 VDL requirements).

Hydraulic & Gear: Bio-SynXtra Super MA Fluids are recommended for use in High-Pressure vane, piston, and gear-type hydraulic pumps and have shown exceptional anti-wear performance in ASTM D-4172 Four Ball Wear Test. They meet or exceed the requirements for Parker-Denison HF-O, HF-1, HF-2, Eaton-Vickers M-2950-S (35VQ-25) and I-286-S (V-104C), Rexroth, Sauer-Sundstrand, US Steel 126, 136, and 127, ISO 15380 HEPR, and DIN 51524 Part 2 and 3 (HLP/HVLP). They also meet the requirements for ashless GL-1, GL-2, GL-3, DIN 51517 Part 3, and AGMA Non-EP gear oils for reduction units, bearings, and gear sets.

Turbines: Bio-SynXtra Super MA Fluids meet or exceeds the requirements of Turbine R&O, AW Turbine R&O, EP Turbine R&O, Steam Turbine R&O and Gas Turbine R&O Oils. ISO Grades 32 and 46 provide the Class I (SHC) electrical conductivity required in ASTM D-4308 and low volatility for required ASTM-E659 Autoignition Temperature above 310^{O}C for Gas Turbines. In addition, because they are bio-synthetic they provide excellent thermal and oxidation stability exceeding the 2000 hours ASTM D-943 TOST requirement for Solar Gas Turbine. The products are zinc free and may also be used in pump systems with silver lined bearings and reduction units where original equipment manufactures (OEM) require Turbine R&O fluids. Meets or Exceeds: Westinghouse, Dresser, ABB, Fiat Aviazione, Siemens TLV901304, AFNOR NFE 48-600 HL & 48-603 HL, DIN 51515 & 51524 Part 1, U.S. Steel 120, British BS 489, GE GEK 32568F, Cincinnati Landis P-38/55/54, Brown Boveri HTGD 90117, Solar ES 9-224, Alstom HTGD 90117, and MIL-H-17672C.

Bio-SynXtra™ Super MA 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 / >1000 mg/L) criteria adopted by the US Fish and Wildlife Service and the US EPA. 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] Based on previous Biodegradability studies and ASTM D-7373 Calculations, Bio-SynXtra™ Super MA Fluids are Ultimate/Readily Biodegradable >60% within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants, and German Blue Angel CEC L-33-T-82 and CEC L-33-A-934 tests, for Readily Biodegradable >80% within 21 days.

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

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

Elastomer Compatibility: Bio-SynXtra Super MA Fluids are **recommended** for use with fluorocarbon (Viton), Teflon, fluorosilicone, polysulfide, Polyurethane (AU), Buna-N (NBR1) Hydrogenated NBR (HNBR), high nitrile Buna-N and Low nitrile Buna-N (<30%) elastomers seals.

Bio-SynXtra Super MA Fluids are **not recommended** for use where neoprene, natural rubber, and styrene-butadiene rubber (SBR, Buna S).

Benefits:

➢ Multi-application performance	➢ Lower maintenance costs
➢ Outstanding oxidation and thermal stability	➢ Extended service life
➢ Exceptionally low pour point	➢ Low varnish forming tendencies
➢ Excellent rust protection	➢ High viscosity index
➢ Excellent demulsibility	➢ Low toxicity and energy conserving
➢ Excellent antiwear properties	➢ Biodegradable

Maximum oil change intervals can be obtained through proper maintenance and RLI's oil analysis program. Under good operating conditions and oil analysis program, ISO Grades 32, 46, and 68 could extend service life up to 10,000 hours in rotary screw compressors.

(Use a Viscosity Sufficient for OEM Application)

Typical Data						
ISO Grades	**32**	**46**	**68**	**100**	**150**	**220**
AGMA Grades	**N/A**	**1**	**2**	**3**	**4**	**5**
VISCOSITIES:						
@100^{O}C., cSt. (D-445)	6.1	8.1	11.0	15.2	21.0	28
@40^{O}C., cSt. (D-445)	30.8	44.3	64.9	97.0	144.5	209
Viscosity Index (D-2270)	150	158	162	165	169	172
Flash Point, COC, ^{O}C (D-92)	236	241	247	257	262	268
Pour Point, ^{O}C (D-97)	-54	-50	-47	-45	-42	-40
Cu Corrosion 3hr @ 100^{O}C (D-130)	1A	1A	1A	1A	1A	1A
Acid Number (D-974)	0.39	0.39	0.39	0.39	0.39	0.39
4-Ball Wear, mm (D-4172)	.35	.35	.35	.35	.35	.35
4-Ball EP Weld Point (kg)	200	200	200	200	200	200
4-Ball EP Load Wear Index	45	45	45	45	45	45
FZG Test A/8.3/90 (DIN 51354 Part 2)	12	12	12	12	12	12
Demulsibility (D-1401) <10 min	40/40/0	40/40/0	40/40/0	40/40/0	40/40/0	40/40/0
Steam Demulsibility, IP 19 seconds (Avg.)	100-200	100-200	100-200	---	---	---
Foam Sequence I, II, III (D-892)	0 Foam	0 Foam	0 Foam	0 Foam	0 Foam	0 Foam
Rust Prevention (D-665 A & B)	Pass	Pass	Pass	Pass	Pass	Pass
Dielectric Strength (D-877 kV avg.)	45	45	43	40	40	40
TOST (ASTM-943 Hrs. 2.0 NNA)	12,000+	12,000+	12,000+	12,000+	12,000+	12,000+
RLI Product Item #	**82900**	**82910**	**82920**	**82930**	**82940**	**82950**