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Bio-SynXtra™ Marine Hydraulic Fluids **ISO 15380 HEES, AW ISO 32, 46, 68, 100**

"Biobased Lubricants that Perform Like Synthetics"

Bio-SynXtra™ Marine Hydraulic Fluids were designed specifically to provide exceptional international Environmentally Acceptable Lubricants (EAL) performance for world-wide marine applications in international waters. They are ultimately biodegradable¹, fully saturated biosynthetic HEES formulas that meet both European EU Ecolabel** and US Environmental Protection Agency (EPA) 2013 Vessel General Permit (VGP) guidelines for EALs. These high performance hydraulic fluids are formulated to readily biodegrade and offer low toxicity in aquatic conditions. An environmentally friendly, zinc-free (ash-less) additive system has also been developed that meets or exceeds pump requirements. They can be used in a wide variety of stationary and mobile hydraulic equipment, and these fully saturated ester formulas provide excellent pump lubrication and filterability under normal and abnormal wet conditions.

Bio-SynXtra™ Marine Hydraulic Fluids directly replace petroleum based hydraulic fluids and provide exceptional performance in high and low pressure hydraulic systems that require Anti-Wear (AW), anti-rust, anti-oxidation, anti-foam, and rapid demulsibility properties. They are highly inhibited against moisture and rusting in both fresh and sea water and pass A and B Sequences of the ASTM D-665 Turbine Oil Rust Test. The high viscosity index of these biosynthetic formulas improves mechanical and thermal shear stability and provides additional fluid value at higher temperatures and pressures. The formulas provide seal conditioning for longer seal life and reduce oil leakage from the system.

Bio-SynXtra™ Marine Hydraulic Fluids provide exceptional protection in hydraulic equipment operating over a wider range of temperatures and environmental conditions. They are recommended for use in hydraulic vane, piston, and gear-type pumps that require DIN 51524 Part 2 and 3, Parker-Denison HF-O, 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 API GL-1, GL-2, GL-3, DIN 51517 Part 3, and AGMA Non-EP gear oils for bearings, reduction units, and gear sets where they meet the viscosity ranges.

Bio-SynXtra™ Marine Hydraulic Fluids are **recommended** for use with Viton fluorocarbon (FKM 2), fluorosilicone, Teflon (PTFE), Polyurethane (AU), polysulfide, Buna-N (NBR1) and Hydrogenated Nitrile Buna Rubber (HNBR). They are compatible with the same seals, filters, materials and components that are designed to operate on petroleum oil based formulations. They are **not recommended** for use where neoprene, natural rubber, and styrene-butadiene rubber (SBR, Buna S) seals are used.

Bio-SynXtra™ Marine Hydraulic Fluids meet the EPA 2013 VGP definition for 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. Bio-SynXtra™ Marine 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/Readily Biodegradation Pw1biodegradable >60% within 28 days in OECD 301B and 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. This Stabilized technology provides a high performance formula in high and low temperature applications, reducing oil thickening and deposits.

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

***Bio-SynXtra™ Marine Hydraulic Fluids are not a stocked product.
(Contact RLI for product order information).***

Bio-SynXtra™ Marine Hydraulic Fluids ISO 32, 46, 68, 100

The test data below show that the Bio-SynXtra™ Marine Hydraulic Fluids are designed to provide exceptional 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-SynXtra™ Marine Hydraulic Fluids are formulated to improve performance in equipment that requires excellent anti-wear, anti-corrosion, anti-foam, oxidation stability, rapid water separation, cold temperature pumpability and filterability.

TYPICAL SPECIFICATIONS	METHOD	ISO 32	ISO 46	ISO 68	ISO 100	Spec. Requirements
Viscosity @ 40°C	ASTM D-445	32.7	44.7	66.3	96.6	Note 1
Viscosity @ 100°C	ASTM D-445	6.2	8.3	11.3	15.3	Note 1
Viscosity @ 0°C	ASTM D-445	270 cP	366 cP	564 cP	874 cP	Note 1
Viscosity @ -20°C, Brookfield	ASTM D-2983	1470 cP	1950 cP	3100 cP	4990 cP	Note 1
Viscosity Index	ASTM D-2270	151	163	165	168	140 (min) (DIN ISO 2909)
Dielectric Strength, KV (Avg)	ASTM D-877	>40	>40	>40	>40	35 (min)
Pour Point	ASTM D-97	-48°C	-46°C	-43°C	-41°C	-39°C to -18°C (min) (DIN ISO 3016)
Flash Point	ASTM D-92	231°C	260°C	278°C	275°C	175-195°C (min) (DIN EN ISO 2592)
Water Content %	DIN EN ISO 12397	<.05	<.05	<.05	<.05	.05% (max)
Foam Sequence I, II, III	ASTM D-892	< 30/0 Foam	< 30/0 Foam	< 30/0 Foam	< 30/0 Foam	150/0, 80/0, 150/0 (DIN EN ISO 6247)
Air Release Value (minutes)	ASTM D-3427	2	2	3	4	10 (max) (DIN 51381 ISO 9120)
Rust Prevention	ASTM D-665					
Distilled Water		Pass	Pass	Pass	Pass	(DIN ISO 7120) Pass
Syn. Sea Water		Pass	Pass	Pass	Pass	Pass
Copper Corrosion, 3hr @ 100°C	ASTM D-130	1B	1B	1B	1B	DIN 51524 (2 max) (DIN EN ISO 2160)
Oxidation Dry TOST, hrs.	ASTM D-943	>7000	>7000	>6000	>5000	Note 2
Oxidation RPVOT, (minutes)	ASTM D-2272	>1000	>1000	>900	>700	USS 120 (min)
Baader Test (72 hrs @ 110°C) KV 40°C % change	DIN 51554-3	< 2	< 2	< 3	< 3	20% (max)
Demulsibility, ML Oil/Water/Emulsion	ASTM D-1401	(<10 minutes) 40/40/0	(<10 minutes) 40/40/0	(<10 minutes) 40/40/0	(<10 minutes) 40/40/0	40/37/3 (30 minutes) (DIN ISO 6614)
4-Ball Wear, 1h, 167°F, 1200 RPM, 40 kg (mm)	ASTM D-4172	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	USS 127 0.5 (max)
FZG Test A/8.3/90 Fail load stage	DIN ISO14635-1	12	12	12	12	10 (min)
V104C Vane Pump Low total wear avg. 5 to 15 mg	ASTM D-2882 ISO 20763	Pass	Pass	Pass	Pass	Ring loss 120 mg (max) Vane loss 30 mg (max)
Biodegradation Classification	ASTM D-5864 OECD 301B	Ultimate Pw1 Readily	Ultimate Pw1 Readily	Ultimate Pw1 Readily	Ultimate Pw1 Readily	Ultimate PW1 Readily
Environmentally Friendly	ISO 15380	yes	yes	yes	yes	meets/exceeds
BioPreferred	USDA Biobased	yes	yes	yes	yes	meets/exceeds
Environmental Management System	ISO 14001	yes	yes	yes	yes	meets/exceeds
Ecotoxicity LC-50/EC-50 See SDS	EPA 560/6-82- 002, 003	yes	yes	yes	yes	meets/exceeds
Vessel General Permit	US EPA VGP	yes	yes	yes	yes	meets/exceeds
Ecolabel Performance **	Europe	yes	yes	yes	yes	meets/exceeds
Product Item #		80850	80860	80870	80880	--

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Note 1 Viscosity Sufficient for Application

Note 2 Not Required

***Note ** EU Ecolabel Certification can be purchased for label branding, based on order volumes.
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