

# BIO MAX™

High-Performance Environmentally Acceptable Lubricants



***DRIVE YOUR  
BUSINESS RESPONSIBLY***



# DRIVE YOUR BUSINESS RESPONSIBLY

Since 2012, BioMax™ has been at the forefront, providing a comprehensive line of environmentally acceptable lubricants (EALs), meticulously created based on market insights and customer needs. With a global shift towards eco-conscious solutions, customers seek products that not only address their challenges but also align with responsible practices. BioMax not only outperforms other EALs, but also often surpasses the performance of traditional non-EAL lubricants. By achieving this high-performance standard without sacrificing environmental benefits, BioMax sets a new benchmark in the industry.



## TOUGH JOBS REQUIRE TOUGH SOLUTIONS

EPA 2013 VGP (Vessel General Permit) and VIDA (Vessel Incidental Discharge Act) regulations for marine vessels require the use of EALs (Environmentally Acceptable Lubricants) in all oil-to-sea interfaces. BioMax's in-house expert R&D team has developed BioMax™ EALs to meet these needs.

BioMax EALs provide excellent performance for use in sensitive environments such as thrust gears, steering gears, stern tubes and other marine, mining and industrial related services. The long life and high film strength of BioMax greatly increases equipment reliability as well as providing excellent protection in highly corrosive environments. It gains its superior performance advantage over competing oils through its powerful blend of synthetic base oils plus our proprietary Synerlec additive technology, that is proven to make bearings and equipment run smoother, cooler, quieter, longer and more efficiently.

BioMax EALs are readily biodegradable, biorenewable, non-bioaccumulative and low-toxicity, in addition to providing superior lubrication and protection for equipment.

## WHAT IS BIOMAX™?

BioMax™ lubricants are high-performance Environmentally Acceptable Lubricants (EAL) formulated with renewable, readily biodegradable synthetic base stocks and proprietary additives to provide superior lubrication and protection for equipment.

BioMax™ EAL product line is composed of environmentally friendly, synthetic, high-performance lubricants formulated for equipment operating in environmentally sensitive areas. Environmentally friendly lubricants often compromise performance and durability to meet requirements of Environmentally Acceptable Lubricants, but BioMax EAL provides uncompromised lubrication and protection for all lubricated components.

EU Ecolabel certified BioMax meets the 2013 US Environmental Protection Agency (EPA) Vessel General Permit (VGP) restriction placed on use and discharge of lubricants in oil-to-sea interfaces.

## WHAT IS VGP?

Vessel General Permit (VGP) is a regulation put in place to stop harmful lubricant discharge and its impact on U.S. waterways. The VGP regulation applies to vessels that are 79 ft. or greater in length.

## WHAT IS VIDA?

The Vessel Incidental Discharge Act (VIDA) is a U.S. EPA framework for regulating incidental discharges from commercial vessels. VIDA streamlines the patchwork of federal, state, and local requirements for the commercial vessel industry.

## WHAT IS AN EAL?

Environmentally Acceptable Lubricants (EAL) are:

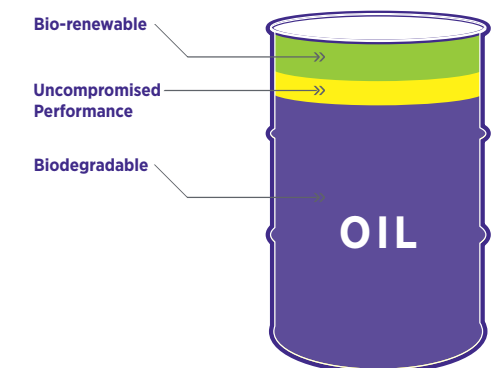
- Readily biodegradable
- Low environmental toxicity
- Non-bioaccumulative according to EU/Ecolabel 2018/1702 criteria

## FACTS ABOUT BIOMAX

- Designed for environmentally sensitive areas
- European-Ecolabel certified
- Meets US EPA VGP/VIDA requirements
- Superior performance proven over industry standard oils, competitor EAL products and verified by third party laboratories
- Outstanding corrosion protection, demulsibility and cleanliness
- Excellent hydrolytic, thermal and oxidative stability
- Exceptional antiwear, extreme pressure and film strength properties
- Wide operating temperature range
- Compatible with most common elastomers and seals

## BIOMAX EAL BENEFITS

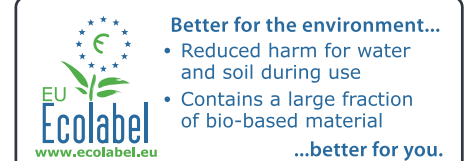
- Over 60% biodegradable with renewable raw materials
- Non-bioaccumulating and low-toxicity
- Far outperforms typical EAL fluids due to our unique base oils, outstanding additive chemistry, and superior formulation



## WHAT IS ECOLABEL?

- EU Ecolabel is a European certification for products and services which meet the highest environmental standards.
- The Ecolabel logo on BioMax guarantees “environmentally friendly” because it has met strict environmental criteria agreed by every EU member state.
- EU Ecolabel is credible, comprehensive and prominent in the industry.

**EU Ecolabel : BE/027/004**





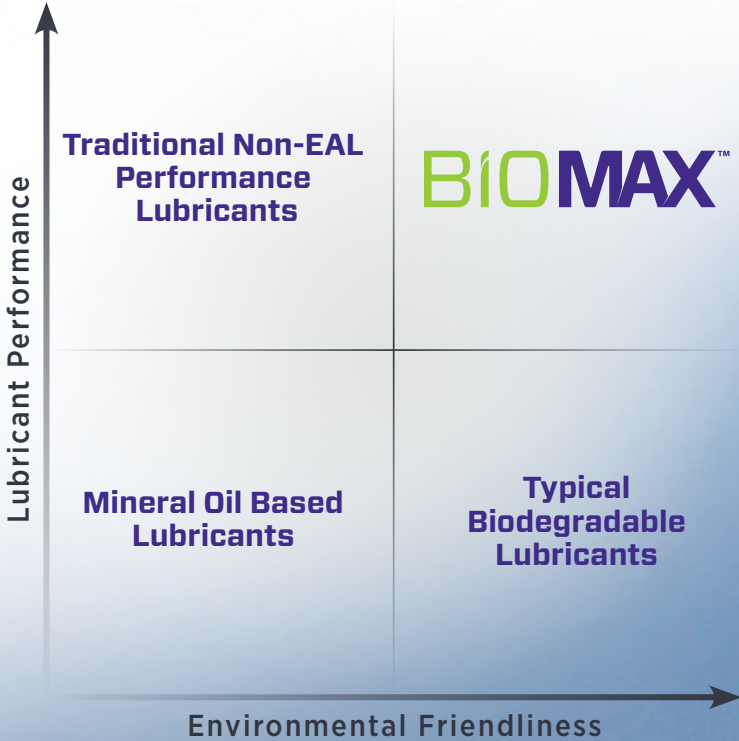
# BIOMAX™ EAL PERFORMANCE

## UNCOMPROMISED PERFORMANCE

BioMax™ lubricants meet or exceed all EAL requirements of ready biodegradability, low toxicity / bio-accumulation, and bio-renewability.



For all applications  
in environmentally  
sensitive areas.





BIOMAX™ GEAR EAL

Gear systems often operate under severe conditions, subjecting the gears to high temperatures, heavy contact and sliding loads, and start-stop shock loading. BioMax Gear EAL provides unmatched protection in these conditions for all enclosed gear systems. The superior synthetic formulation and our proprietary Synerlec® additive technology are the key to outstanding protection from contact and sliding wear, and damaging shock loads. The EU Ecolabel certification of BioMax Gear EAL guarantees superior environmental and technical standards.

BioMax Gear EAL is recommended for any enclosed gear sets requiring an environmentally acceptable lubricant. Common applications include, but are not limited to, the applications below:

APPLICATIONS

- Inland waterways & offshore marine equipment including vessel thruster, controllable pitch propellers (CPP) & deck machinery
- Wind turbine & other power generation equipment
- Construction & mining, mobile & stationary equipment
- Forestry service equipment
- Waterparks & water treatment facilities



PERFORMANCE ADVANTAGES

HIGH FILM STRENGTH

Synerlec® additive technology dramatically reduces metal-to-metal contact, friction, & wear

OUTSTANDING EP PROTECTION

Provides protection against damage due to severe operation and shock loads

EXCEPTIONAL CORROSION & RUST PROTECTION

Prevents internal damage to equipment from chemical attack

SUPERIOR THERMAL STABILITY

Very high operating temperature range (-25°C to 125°C)

ENHANCED HYDROLYTIC STABILITY

Resists breakdown and acidity due to water contamination

OUTSTANDING SYSTEM PERFORMANCE

Lowers operating temperatures and improves efficiency

REDUCED CARBON FOOTPRINT

Extended oil change intervals reduces waste, energy expenditure & CO2 production

SPECIFICATIONS & APPROVALS

- EU Ecolabel License No. BE/027/004
  - US EPA VGP (2013) and VIDA
  - AAA Propulsion (BioMax Gear 100)
- ISO 12925-1
  - DIN 51517 Part 1, 2 & 3
  - AGMA 9005-F16
- David Brown S1.53.101
  - GM LS2 EP Gear Oils
  - U.S. Steel 22

		ISO GRADE					
TYPICAL PROPERTIES*	METHOD	100	150	220	320	460	680
TYPICAL PHYSICAL PROPERTIES							
Kinematic Viscosity @ 40°C	D445	100	150	220	320	460	680
Kinematic Viscosity @ 100°C	D445	14.4	19.7	26.3	34.8	46.1	61.6
Viscosity Index	D2270	146	149	152	153	156	159
Density @ 15°C, g/ml	D4052	0.88	0.895	0.908	0.917	0.931	0.945
Demulsibility, ml/ml/ml	D1401	40/40/0	42/37/1	41/39/0	40/40/0	43/37/0	43/37/0
Copper Corrosion, 3h @ 100°C	D130	1A	1A	1A	1A	1A	1A
Rust Prevention, Dist. Water	D665A	Pass	Pass	Pass	Pass	Pass	Pass
Rust Prevention, Sea Water	D665B	Pass	Pass	Pass	Pass	Pass	Pass
Elastomer Compatibility	ISO 6072	Pass	Pass	Pass	Pass	Pass	Pass
Pour Point, °C (°F)	D97	-39 (-38)	-36 (-33)	-36 (-33)	-33 (-27)	-33 (-27)	-30 (-22)
Flash Point, °C (°F)	D92	224 (435)	242 (468)	243 (469)	254 (489)	260 (500)	267 (513)
Foam Tendency, Sequence I, II, III	D892	0/0	0/0	0/0	0/0	0/0	0/0
WEAR AND EXTREME PRESSURE PROPERTIES							
FE8 Roller Bearing Wear Test	DIN 51819-3	< 1	< 1	< 1	< 1	< 1	< 1
Four-Ball Wear, mm	D4172	0.49	0.48	0.50	0.46	0.45	0.45
Four-Ball Wear, mm (1800 rpm, 20kgf, 54C, 60 min)	D4172 Mod.	0.28	0.28	0.28	0.28	0.28	0.28
Four-Ball EP Load Wear Index	D2783	60.3	60.1	68.8	86.8	85.6	86.4
Four-Ball EP Weld Load, kg	D2783	315	315	315	315	315	315
Timken OK Load, lb	D2782	100	100	100	100	100	100
FZG gear test rig FZG test condition: A/8,3/90	D5182	> 14	> 14	> 14	> 14	> 14	> 14
ENVIRONMENTAL PROPERTIES							
Biodegradability, % (28 days)	D7373	> 60	> 60	> 60	> 60	> 60	> 60
Toxicity (Algae), mg/L	OECD 201	> 1000	> 1000	> 1000	> 1000	> 1000	> 1000
Toxicity (Daphnia), mg/L	OECD 202	> 1000	> 1000	> 1000	> 1000	> 1000	> 1000
Toxicity (Fish), mg/L	OECD 203	> 1000	> 1000	> 1000	> 1000	> 1000	> 1000
Toxicity (Bacteria Toxicity Test, mg/L)	OECD 209	> 1000	> 1000	> 1000	> 1000	> 1000	> 1000
Bioaccumulation, log POW	OECD 107	<3	<3	<3	<3	<3	<3

\*Properties are typical and may vary

BIOMAX™ HYDRAULIC EAL

Hydraulic and circulating oils are subject to ever increasing severity as operating loads and duty cycles continue to increase while equipment oil volume decreases. Increased equipment wear and thermal degradation of the oil are the result. Under these severe operating conditions, BioMax Hydraulic EAL provides enhanced lubrication and protection against wear and deposits, while helping improve system operational efficiency. The superior synthetic formulation and our proprietary Synerlec® additive technology are the key to outstanding lubrication. The EU Ecolabel certification of BioMax Gear EAL guarantees superior environmental and technical standards.

BioMax Hydraulic EAL is recommended for any hydraulic or oil circulating system requiring an environmentally friendly oil or EAL. Common applications include, but are not limited to, the applications below:

APPLICATIONS

- Inland waterways & offshore marine equipment including vessel thruster, controllable pitch propellers (CPP) & deck machinery
- Wind turbine & other power generation equipment
- Construction & mining, mobile & stationary equipment
- Forestry service equipment
- Waterparks & water treatment facilities



PERFORMANCE ADVANTAGES

HIGH FILM STRENGTH

Synerlec® additive technology dramatically reduces metal-to-metal contact, friction, & wear

OUTSTANDING WEAR PROTECTION

Provides exceptional protection against friction & wear of hydraulic components

EXCEPTIONAL CORROSION & RUST PROTECTION

Prevents internal damage to equipment from chemical attack

SUPERIOR OXIDATION & THERMAL STABILITY

Resists oil degradation & varnish formation for longer oil life

EXCELLENT DEMULSIBILITY

Rapidly separates from water, allowing free water to be drained from the system

EXCELLENT HYDROLYTIC STABILITY

Resists breakdown & acidity due to water contamination

IMPROVED SYSTEM PERFORMANCE

Lowers operating temperatures & improves efficiency

REDUCED CARBON FOOTPRINT

Extended oil change intervals reduces waste, energy expenditure & CO2 production

SPECIFICATIONS & APPROVALS

- EU Ecolabel License No. BE/027/004
- ISO 15380 category HEPR
- US EPA VGP (2013) and VIDA
- DIN 51524 Part 2
- HS Marine (BioMax Hydraulic EAL 46)
- Fives Cincinnati P-68, P-69, P-70

		ISO GRADE			
TYPICAL PROPERTIES*	METHOD	22	32	46	68
TYPICAL PHYSICAL PROPERTIES					
Viscosity	D445				
cSt @ 0°C		168.7	284.9	445.7	720.2
cSt @ 40°C		22	32	48	68
cSt @ 100°C		4.86	6.19	8.13	10.7
Viscosity Index	D2270	158	159	159	159
Density @ 15 °C, g/ml	D4052	0.908	0.859	0.869	0.863
Demulsibility, ml/ml/ml	D1401	40/40/0	42/38/0	42/38/0	42/38/0
Copper Corrosion, 3 hours @ 100°C	D130	1A	1A	1A	1A
Rust prevention, Dist. Water	D665A	Pass	Pass	Pass	Pass
Rust prevention, Sea Water	D665B	Pass	Pass	Pass	Pass
Elastomer Compatibility	ISO 6072	Pass	Pass	Pass	Pass
Pour Point, °C (°F)	D97	-63 (-81)	-60 (-76)	-60 (-76)	-45 (-49)
Flash Point, °C (°F)	D92	246 (475)	233 (451)	233 (451)	231 (448)
Foam Tendency, Seq I, II, III	D892	0/0	0/0	0/0	0/0
Air Release, 50 °C, minutes	D3427	0	<4	<7	<10
Dielectric Breakdown Voltage	D877	43	48	49	47
WEAR AND EXTREME PRESSURE PROPERTIES					
Vane Pump Wear, Ring, mg	ISO 20763	2	2	2	2
Vane Pump Wear, Vanes, mg	ISO 20763	1.5	1.5	1.5	1.5
Four-Ball Wear, mm	D4172	0.49	0.47	0.48	0.49
Four-Ball EP Load Wear Index	D2783	37.6	54.2	56.9	57.4
Four-Ball EP Weld Load, kg	D2783	200	200	250	250
FZG Gear Test, A/8,3/90	D5182	> 12	> 12	> 12	> 12
ENVIRONMENTAL PROPERTIES					
Biodegradability, % (28 days)	OECD 301B	> 60	> 60	> 60	> 60
Toxicity (Algae), mg/L	OECD 201	> 1000	> 1000	> 1000	> 1000
Toxicity (Daphnia), mg/L	OECD 202	> 1000	> 1000	> 1000	> 1000
Toxicity (Fish), mg/L	OECD 203	> 1000	> 1000	> 1000	> 1000
Toxicity (Bacteria), mg/L	OECD 209	> 1000	> 1000	> 1000	> 1000
Bioaccumulation, log POW	OECD 107	<3	<3	<3	<3

\*Properties are typical and may vary



# BIOMAX™ STERN TUBE EAL

# TYPICAL PROPERTIES

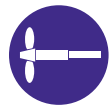
## BIOMAX™ STERN TUBE EAL

BioMax Stern Tube Oils are biodegradable, non-emulsifying, non-bioaccumulative, and minimally toxic, while still providing unmatched lubrication and wear protection for bearings and other stern tube components. Excellent seal compatibility prevents chemical damage to seals, mitigating leaks into or out of the stern tube, thus ensuring lubricant integrity and long-term protection.

The long life and noncorrosive BioMax Stern Tube Oil greatly increase reliability, efficiency as well as exceptional thermal and oxidative stability at high temperatures in highly corrosive environments. It gains its performance advantage over competing oils through its superior blend of renewable synthetic base oils plus our proprietary Synerlec® additive technology. This unique, synthetic additive technology is proven to prevent bearing failures, corrosion, rust, reduce equipment downtime, provides longevity and energy savings.

## APPLICATIONS

- Stern Tubes



## PERFORMANCE ADVANTAGES

### UNMATCHED WEAR PROTECTION

Proprietary Synerlec® additive technology provides superior film strength and protection

### LONGER OIL LIFE

Outstanding oxidation, thermal & hydrolytic stability with keep clean deposit control agents

### EXCELLENT CORROSION PROTECTION

Protects bearings, stern tube systems & surfaces exposed to seawater

### ELASTOMER COMPATIBILITY

Superior seal protection, helps elastomers maintain mechanical/physical properties & seal

### NON-EMULSIFYING

Rapidly separates from water, which can easily be drained from the bottom of oil reservoir to keep the oil dry

### IMPROVED SYSTEM PERFORMANCE

Lowers operating temperatures & improves efficiency

## SPECIFICATIONS & APPROVALS

- EU Ecolabel License No. BE/027/004
- Cedervall
- RM Propulsion
- US EPA VGP (2013) and VIDA
- KEMEL
- Wärtsilä
- AEGIR Marine
- Lagersmit

TYPICAL PROPERTIES*	METHOD	ISO GRADE	
		100	150
Viscosity	D445		
cSt @ 40°C		100	150
cSt @ 100°C		15.2	20.6
Viscosity Index	D2270	158	159
Density @ 15 °C, g/ml	D4052	0.878	0.894
Demulsibility, ml/ml/ml	D1401	40/40/0	42/38/0
Copper Corrosion, 3 hours @ 100°C	D130	1A	1A
Rust Test	D665B	Pass	Pass
Elastomer Compatibility	ISO 6072	Pass	Pass
Pour Point, °C (°F)	D97	-39 (-38)	-39 (-38)
Flash Point, °C (°F)	D92	263 (506)	267 (512)
Foam Tendency, Seq II, ml/ml	D892	0/0	0/0
Biodegradability, % (28 days)	OECD 301B	> 60	> 60
Toxicity (Algae), mg/L	OECD 201	> 1000	> 1000
Toxicity (Daphnia), mg/L	OECD 202	> 1000	> 1000
Toxicity (Fish), mg/L	OECD 203	> 1000	> 1000
Toxicity (Bacteria), mg/L	OECD 209	> 1000	> 1000
Bioaccumulation, log POW	OECD 107	<3	<3

\*Properties are typical and may vary

# BIOMAX™ MULTI-PURPOSE EP GREASE 2

# TYPICAL PROPERTIES

## BIOMAX™ MULTI-PURPOSE EP GREASE 2

BioMax calcium sulphonate grease, made from a novel, biodegradable, renewable, non-toxic, non-bioaccumulative, synthetic thickener, is formulated for equipment operating in environmentally sensitive areas, and where incidental food contact may occur, as well as other industry applications. This patentable technology provides high-performance, uncompromised protection for greased machinery while meeting environmental standards.

BioMax Multi-Purpose EP Grease delivers exceptional extreme pressure protection and anti-wear properties, high thermal and oxidative stability, and a wide operating temperature range. BioMax grease also provides excellent rust and corrosion protection, and resistance to water displacement and spray-off. This is especially critical in harsh marine environments where equipment is exposed to wet and highly corrosive conditions.

BioMax Multi-Purpose EP Grease 2 is EU Ecolabel, NSF H-1, Kosher and Halal certified. It meets US EPA VGP and 2018 VIDA, and contains no MOSH and no MOAH.

## APPLICATIONS

Plain and rolling element bearings, open gears, sliding surfaces, and other greased components operating in, but not limited to:

- Marine equipment used in inland waterways, offshore & shipping ports
- Construction & mining mobile & stationary equipment
- Forestry service equipment
- Waterparks & water treatment facilities
- Food manufacturing & pharmaceutical equipment
- Steel mills & other metal foundries
- Power generation



## PERFORMANCE ADVANTAGES

### EXCELLENT MECHANICAL STABILITY

Resists shearing & loss of consistency after prolonged rolling/working of the grease

### HIGH LOAD CARRYING CAPACITY

Provides superior protection in heavy rolling & sliding applications & against shock loads

### OUTSTANDING WATER RESISTANCE

Stays in place & resists displacement by water immersion & spray

### EXCEPTIONAL CORROSION & RUST PROTECTION

Prevents internal damage to equipment from chemical attack

### ECO-FRIENDLY

Readily biodegradable grease, with low toxicity to aquatic organisms, formulated with renewable raw materials

## SPECIFICATIONS & APPROVALS

- EU Ecolabel License No. BE/027/004
- NSF H-1 Food Grade
- Halal
- US EPA VGP (2013) and VIDA
- Kosher Pareve



TYPICAL PROPERTIES*		NLGI GRADE
		2
Thickener Type		Ca Sulfonate
Worked Penetration	D217	265
Base Oil Viscosity	D445	
cSt @ 40°C		103
cSt @ 100°C		16.4
Base Oil Viscosity Index	D2270	173
Dropping Point, °C (°F)	D2265	>300 (>572)
Oil Separation, Storage @ 25°C, %	D1742	<1.3
Oil Separation, Con. Sieve @ 100°C, %	D1648	<4.8
Water Washout, @ 79°C, %	D1264	<1.5
Roll Stability, dry, %	D1831	1.90%
Roll Stability, with water, %	D8022	1.19%
Elastomer Comp, SRE-NBR, volume %	D4289	+2
Elastomer Comp, SRE-NBR, hardness %	D4289	-1
Corrosion Prevention Test @ 52°C	D1743	Pass
Corrosion Test, 10% Syn. Sea Water	D5969	Pass
Rust Test, Emcor 3% NaCl	D6138	0,0
Rust Test, Emcor 100% Syn. Sea Water	D6138	0,1
Copper Corrosion, 24 hours @ 100°C	D4084	1A
Fretting Wear Protection, mg	D4170	<10
4-Ball Wear Test, Scar Dia., mm	D2266	<0.45
4-Ball EP Test, Weld Load, kg	D2596	620
4-Ball EP Test, Load Wear Index	D2596	105
Timken EP Test, OK Load, lb	D2509	>75
EP Properties, SRV @ 80°C, N	D5706	1,300
Useful Temperature Range, °C (°F)	D5800	-40 to 177 (-40 to 350)

\*Properties are typical and may vary



# NOTES

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# BIO MAX™

High-Performance Environmentally Acceptable Lubricants

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