

593 ECOSHIELD™ BIODEGRADABLE NON EP GEAR OIL

ISO 150, 220, 320

EcoShield™ Biodegradable Non EP Gear Oil is a readily biodegradable, environmentally friendly, ecologically responsive, synthetic, non-toxic, thermally stable and thermally durable rust and oxidation inhibited, anti-wear lubricant. EcoShield™ Biodegradable Non EP Gear Oil is designed for use in lightly to moderately loaded gear drive, circulating oil system and bearing applications and those gear drive applications that contain internal backstops or sprag clutch mechanisms, that are operated in environmentally sensitive areas. EcoShield™ Biodegradable Non EP Gear Oil meets the USDA definition EO 13101 for bio-based products and meets and complies with the U.S. EPA's definition of an Environmentally Acceptable Lubricant as defined in Appendix A of the U.S. EPA's Vessel General Permit.

EcoShield™ Biodegradable Non EP Gear Oil is formulated from a blend of renewable hydrocarbons, hydrolytically stable, renewable, synthetic esters and a thermally stable, thermally durable multi-functional extreme pressure additive package highly specialized ashless thermally stable, multifunctional additive anti-wear package. This combination provides EcoShield™ Biodegradable Non EP Gear Oil with the following performance advantages and benefits:

- Readily biodegradable, with low ecotoxicity
- Low aquatic toxicity and non-bioaccumulative
- Very low impact to water and soil during usage in case of a spill
- Wide operating temperature range and low volatility characteristics
- A high viscosity index
- High renewability content
- Excellent lubricity
- Compatibility with mineral oils, PAO and ester synthetic base fluids
- Excellent oxidative and thermal stability.
- Low volatility characteristics.
- Very low foaming tendencies.
- Excellent demulsibility and hydrolytic stability.
- Excellent anti-wear protection and load carrying capabilities.
- Excellent rust and corrosion protection
- Extended pump and bearing life
- Excellent filterability with outstanding filter life, even in the presence of water
- Low free Phenol per EPA 420.1

EcoShield™ Biodegradable Non EP Gear Oil meets and exceeds the following specifications and manufacturer's requirements: AGMA 9005 D94, AGMA 9005-E02, AGMA 250.04/251.02, DIN 51517 Part 2, US Steel 126, 127 and 136 and AF Nor E 48-603.

APPLICATION NOTES

EcoShield™ Biodegradable Non EP Gear Oil is miscible with conventional mineral oils and polyalphaolefin synthetic base oils. The product is also miscible with vegetable base oil (HETG), synthetic ester (HTEES) and synthetic hydrocarbon (HEPR) biodegradable base fluids. It is not compatible or miscible with polyalkylene glycol base fluids. If the product is mixed with mineral or PAO synthetic base fluids the product may no longer be readily biodegradable. It is recommended that the gear drive and oil circulation system be carefully cleaned and flushed before switching to the EcoShield™ Biodegradable Non EP Gear Oil.

The following procedure is recommended when switching over to EcoShield™ Biodegradable Non EP Gear Oil:

1. Run the equipment until it is warm. Drain the previous lubricant from the gear drive
2. Replace oil filters
3. Fill the gear drive with EcoShield™ Biodegradable Non EP Gear Oil. Run the equipment for 1 to 4 hours under no load conditions in order to completely circulate the fluid
4. Thoroughly drain the EcoShield™ Biodegradable Non EP Gear Oil while warm.
5. Change and replace the oil filters.
6. Fill the gear drive with EcoShield™ Biodegradable Non EP Gear Oil and begin normal operation.
7. Inspect and change filters as required

EcoShield™ Biodegradable Non EP Gear Oil is compatible with hydrogenated nitrile (HNBR), FPM/FKM and Viton® fluoroelastomers. Depending upon the elastomer grade, the product is also compatible with nitrile (NBR) elastomers. Always check with the OEM to verify if the seal material used is compatible and acceptable for use with fluids that contain synthetic esters. Also, prior to application, Schaeffer Mfg. recommends reviewing compatibility and other influencing factors (e.g. maximum permissible water content in the oil) with the component under conditions that would be encountered in the field.

TYPICAL PROPERTIES

ISO Grade	150	220	320
Specific Gravity @ 60°F/15°C	0.9193	0.9209	0.9402
Viscosity @ 40°C, Cst (ASTM D445)	150	220	320
Viscosity @ 100°, Cst (ASTM D445)	21.06	27.14	35.5
Viscosity Index (ASTM D2270)	165	159	157
Flash Point °F/°C (ASTM D92)	442°/228°	441°/227°	421°/216°
Pour Point °F/°C(ASTM D97)	-4°/-20°	-4°/-20°	0°/-18°
Foam Test (ASTM D892) Tendency Stability, ml			
Sequence I	0/0	0/0	0/0
Sequence II	0/0	0/0	0/0
Sequence III	0/0	0/0	0/0
Total Acid Number (ASTM xD664)	0.54	0.54	0.54
Demulsibility (ASTM D1401)			
@ 130°F/54.4°C; Oil-Water-Emulsion (min)	40/40/0 (15 min)	40/40/0 (15 min)	40/40/0 (15 min)
Rust Test (ASTM D665)			
Procedure A (Distilled Water)	Pass	Pass	Pass
Procedure B (Salt Water)	Pass	Pass	Pass
Hydrolytic Stability (ASTM D2619)			
Copper Wt. Loss (mg/cm ²)	0.01	0.01	0.01
Acidity of Water, mg/KOH	0.21	0.21	0.21
Copper Strip Corrosion Test (ASTM D130)	1a	1a	1a
RV POT. Oxidative Stability (ASTM D2272)			
Minutes to fail	210	210	210
Oxidation Solubility Test (ASTM D943)			
Hours to TAN of 2	4000	4000	4000
Four Ball Wear (ASTM D4172)			
1hr/40kg/167°, Scar Diameter, mm	0.36	0.35	0.35
FZG (DIN) (5182) Load Stage	12	12	12
Thermal Stability Test (Cincinnati Millicron Method) (ASTM D2070)			
Sludge mg/100 ml	0.5	0.5	0.5

ISO Grade	150	220	320
Condition of Copper Rod	3	3	3
Condition of Iron Rod	2	2	2
Sludging Tendencies (ASTM D4310)			
Total Sludge, mg	78.1	78.1	78.1
Copper Wt. Loss, mg	20.00	20.00	20.00
Iron Wt. Loss, mg	1.10	1.10	1.10
Air Release Properties			
Time @ 50°C/122°F	0.5	0.5	0.5
Biodegradability			
% Biodegradability CEC-L-33-T-93	95%	95%	95%
% Biodegradability Modified StÜrm OECD 301B (ASTM D5864)	61%	61%	61%
Environmental Persistence Classification US Military	Pw-1	Pw-1	Pw-1
Ecotoxicity			
Fathead Minnow, 96 hours LC50, ppm	>10,000	>10,000	>10,000
Daphina Magna 48 hours, EC50, ppm	>10,000	>10,000	>10,000
	WAF	WAF	WAF
Sludge Respiration Inhibition, EC50, ppm	>10,000	>10,000	>10,000