



TECHNICAL DATA

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567 ECOSHIELD™ BIODEGRADABLE EP GEAR OIL

ISO 68 through 680

EcoShield™ Biodegradable EP Gear Oil is a readily biodegradable, environmentally friendly, ecologically responsive, non-toxic, thermally stable and thermally durable extreme pressure lubricant that is specially formulated for the lubrication of industrial gear drives, slide and way systems, gear stamping and machine press applications, that are subjected to heavy loading or shock loading conditions. EcoShield™ Biodegradable EP Gear Oil meets the USDA definition EO 13101 for Biobased products and . the U.S. EPA's 2013 Vessel General Permit (VGP) specifications and requirements for Environmentally Acceptable Lubricants (EAL) for marine applications where the lubricant may come into contact or interface with fresh or sea water.

EcoShield™ Biodegradable EP Gear Oil is blended from a unique combination of high oleic vegetable base oils and biodegradable synthetic polyol ester base fluids. This unique base fluid combination provides the EcoShield™ Biodegradable EP Gear Oil with the following performance advantages:

1. Excellent Oxidative and Thermal Stability.
2. Very good low temperature properties.
3. High natural viscosity index.
4. Very good natural lubricity.
5. Low volatility characteristics.
6. Very good hydrolytic stability.
7. Very low foaming tendencies.
8. Excellent demulsibility.

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Further blended into this unique combination of high oleic vegetable base fluids and the synthetic polyol ester base fluids is stocks is a highly specialized non-corrosive thermally stable and thermally durable multi-functional extreme pressure additive package that provides the EcoShield™ Biodegradable Industrial EP Oil with the following performance features:

1. Enhanced thermal and oxidation stability and durability to handle high operating temperatures.
2. Excellent extreme pressure properties to protect the gears and bearings from excessive wear and fatigue.
3. Prevention of the formation of sludge and carbon deposits that can erode seals
4. Excellent seal compatibility.
5. Enhanced protection of copper, brass and bronze components from corrosion.
6. Non-corrosivity to brass, bronze and other non-ferrous metal parts.
7. Excellent protection of components from rust and corrosion in dry conditions and in the presence of moisture.
8. Excellent resistance to water and moisture
9. Very good water separability characteristics.
10. Enhanced gear, bearing and seal cleanliness
11. Excellent resistance to foaming
12. Low phenolic content

The trend among industrial gear drive manufacturers is to operate the equipment at higher speeds, loads, power densities and increased torque. These trends have resulted in automotive and industrial gear drives being subjected to higher operating temperatures. These higher operating temperatures have resulted in today's gear lubricant's being subjected to extreme thermal stress. Therefore, it is important that a gear lubricant possess thermal stability and durability characteristics. Gear lubricants that do not possess these properties rapidly oxidize and decompose when subjected to high temperatures, resulting in the formation of sludge, varnish and carbon deposits on the gears, bearings and seals, abraded seals, premature seal hardening and brittleness, and a loss of the gear lubricant's extreme pressure additive chemistries ability to protect against excessive wear, spalling and overall distress to the gears and bearings.

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EcoShield™ Biodegradable EP Gear Oil's unique bio-based fluid combination and the thermally stable and thermally durable multi-functional extreme pressure additive package enables the EcoShield™ EP Industrial Gear Oil to resist oxidation and thermal stress at operating temperatures higher than conventional gear lubricants. This results in:

1. A vast reduction in the formation of deposits.
2. Better heat transfer
3. Excellent protection to the gears and bearings even under the most extreme thermally stressed operating conditions.
4. Less wear to the gears, bearings and seals.
5. Increased oil seal life.
6. Lower operating temperatures
7. Less energy consumption
8. Longer lubricant life
9. Less equipment downtime
10. Longer equipment life
11. Reduced maintenance costs

EcoShield™ Biodegradable EP Gear Oil meets and exceeds the following specifications and manufacturer's requirements: AGMA 9005 D-94, AGMA 9005-E02, AGMA 250.04/251.02, DIN 51517 Part 2, US Steel 224. David Brown S1.53101 Type E, DIN 51517 Part 3 (CLP), Cincinnati Machine P-47, P-50, P-53, P-59, P-63, P-74; Military Specification MIL-L-6086C, MIL-L-46017

INSTALLATION

To achieve optimum performance from biodegradable industrial gear lubes, a system should be as free of contamination as possible before charging with the final fill of these fluids. Contamination of biodegradable industrial gear lubes can have an adverse effect on their performance as gear lubricants.

To prevent biodegradable problems caused by admixtures of other fluids and contaminants, Schaeffer Mfg. recommends a flushing procedure for systems being converted to biodegradable industrial gear lubes. The degree of flushing depends on the type and condition of the system and the fluid previously used.

New Systems:

Many new systems may have an internal coating of rust preventatives or may have been run on preservative fluids before shipping. Protective coatings on individual components, such as pumps and valves, should be removed and the components cleaned.

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To prepare new systems for the biodegradable industrial gear lube, Schaeffer Mfg. recommends a six-step procedure:

Step 1 – If the system contains oil, drain as much as possible from the system. Wipe the reservoir and other accessible interior spaces with lint-free rags. Look carefully for pipe scale, weld spatter, threading compound, gasket cement, shavings, and other debris left behind after installation.

Step 2 – Replace filters, if necessary.

Step 3 – Charge the system with sufficient EcoShield™ Biodegradable EP Gear Oil to assure full circulation to all components.

Step 4 – Operate the system at normal temperatures and loads for a minimum of four hours. Monitor the differential pressure drop across the filter. A filter change may be necessary during this flush because contaminants in the system are incompatible with the EcoShield™ Biodegradable EP Gear Oil. If this is the case, change the filters and continue to operate the system at normal temperatures, but at reduced loads, until the four hours of flushing are completed.

Step 5 – Drain the system while hot and repeat Step 1. Replace filters if there are any.

Step 6 – Add the final charge of EcoShield™ Biodegradable EP Gear Oil and begin normal operation.

Conversion from E.P Type Gear Lubes:

Step 1 – Before draining systems containing wet and/or degraded automotive oils, add five-percent volume of 131 Neutra Fuel Stabilizer or 287 Food Grade Flushing Agent. Circulate under normal operating conditions for at least six hours. If the system is unusually dirty, add a ten-percent volume of 131 Neutra Fuel Stabilizer or 287 Food Grade Flushing Agent to increase the thoroughness of cleaning and to reduce cleaning time. This much solvent, however, will drastically reduce the viscosity of the oil. Operating the machine under normal load may cause rapid wear, therefore, operate under light load or no load, and monitor temperature and pressures.

Step 2 – Drain the system while hot.

Step 3 – Install new filters and clean the filter housings.

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Step 4 – Fill the system with sufficient EcoShield™ Biodegradable EP Gear Oil to assure full circulation to all components. If the system was severely contaminated, substitute 209A Moly Universal Gear Lube in the appropriate ISO viscosity grade for this phase of flushing.

Step 5 – Operate the system for not less than two hours under normal operating conditions.

(If the flushing fluid shows any sign of contamination, repeat Steps 2, 3, 4 and 5)

Step 6 – If the previous flushing charge in the system was not EcoShield™ EP Gear Oil, fill the system with just enough EcoShield™ Biodegradable EP Gear Oil for good circulation. Operate the system under normal conditions for 30 minutes. Repeat Steps 2 and 3, and then proceed to Step 7. If the previous charge was EcoShield™ Biodegradable EP Gear Oil, skip to Step 7.

Step 7 – After repeating Steps 2 and 3, fill the system with the final charge of EcoShield™ Biodegradable EP Gear Oil. Assume normal operation and monitor filters daily.

Conversion from Industrial Type R& O Gear Lubes and Circulating Oils:

Most dry industrial hydraulic and circulating oils are more compatible than automotive oils with EcoShield™ EP Gear Oil. However, the moisture level in systems previously charge with industrial hydraulic and circulating oils must be reached to as low a level as possible.

To flush these systems, operate them under normal conditions for at least four hours prior to draining. Proceed with Steps 2 through 7 described earlier under “Conversion from E.P Type Gear Oils”.

Conversion from Synthetic Oils:

Systems using synthetic oils require special consideration. Contact Schaeffer Mfg. Company for guidance.

SPILLAGE AND DISPOSAL

Depending on the contamination and/or degradation levels, small amounts of spilled or leaked EcoShield™ Biodegradable EP Gear Oil will not adversely affect ground water or the environment. For small spills on the ground uncontaminated product will be readily biodegraded by naturally occurring soil organisms when exposed to air. Nonetheless, spillage of EcoShield™ Biodegradable EP Gear Oil should be handled similarly to currently accepted methods for conventional mineral oil spills.

EcoShield™ Biodegradable EP Gear Oil does not contain hazardous substances reportable under CERCLA. Since all oil spills are reportable, even a spill of this vegetable oil-based product must be reported to the National Response Center (the US Coast Guard). Local environmental agencies should also be consulted to clarify local requirements.

Acceptable methods of disposal include use as a fuel supplement, recycling and reclamation (that is, the same disposal practices available for conventional mineral oils). Since EcoShield™ Biodegradable EP Gear Oil typically will not be a hazardous waste, additional disposal options may be available, including land farming or processing through sewage treatment facilities. If necessary, approvals are obtained from appropriate regulatory authorities.

The flushing solution may not be biodegradable therefore; it should be disposed of in an environmentally safe manner. Follow procedures used for disposing of conventional mineral oils.

Typical Properties on Next Page

Typical Properties Continued

ISO Grade	68	100	150	220	320	460	680
% Biodegradability Modified Sturm OECD 301B ASTM D-5864	>60%	>60%	>60%	>60%	>60%	>60%	>60%
Environmental Persistence Classification US Military	PW-1	PW-1	PW-1	PW-1	PW-1	PW-1	PW-1
Base Oil Aquatic Toxicity US EPA LC55 and OECD 203 Test Methods	Non-toxic	Non-toxic	Non-Toxic	Non-Toxic	Non-Toxic	Non-Toxic	Non-toxic

Packaging: 567 EcoShield™ Biodegradable EP Gear Oil is available in 420 lb. Drums, 225 lb. drums, 120 lb. Kegs,
and 40 lb. Pails.