

527 ECOSHIELD™ BIODEGRADABLE ROCK DRILL OIL

ISO 100 and 220

EcoShield™ Biodegradable Rock Drill Oil is a readily biodegradable, anti-wear, extreme pressure, emulsifiable, low fog generating oil that is primarily formulated to meet the lubrication requirements of pneumatically operated rock drills, drifters, jackhammers, sinkers and other air operated percussion tools and pneumatic equipment used in underground, surface mining, contractor and other industrial applications. EcoShield™ Biodegradable Rock Drill Oil is also suitable for use in percussive and rotary type tools.

EcoShield™ Biodegradable Rock Drill Oil meets the USDA definition EO 13101 for Biobased products 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 Rock Drill 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. This unique base fluid combination provides the EcoShield™ Biodegradable Rock Drill Oil with the following performance advantages:

- Excellent oxidative and thermal stability.
- 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
- Very good low temperature properties.
- High natural viscosity index.
- Very good natural lubricity.
- Low volatility characteristics.
- Very good hydrolytic stability.
- Very low foaming tendencies.

EcoShield™ Biodegradable Rock Drill Oil is blended with a balanced additive system that provides excellent chemical stability and protection against wear and corrosion. EcoShield™ Biodegradable Rock Drill Oil also contains an optimum balance of adhesive agents and emulsifiers that allows the EcoShield™ Biodegradable Rock Drill Oil's natural polarity to tenaciously adhere to and cling to the metal surfaces of the rock drill especially during atomization in the presence of moisture laden air. This further allows the EcoShield™ Biodegradable Rock Drill Oil to form a wash-off resistant lubricant coating that protects against wear and the corrosive effects of wet environments even during high speed and high temperature operating conditions.

EcoShield™ Biodegradable Rock Drill Oil atomizes readily in air line lubricators to insure effective lubricant distribution and rapid metal-wetting of all of the parts, especially closely fitted working parts of the equipment in order to maintain a continuous oil film that prevents wear and the build up of frictional heat. This property in combination with the EcoShield™ Biodegradable Rock Drill Oil's extreme pressure and anti-wear additives protects the equipment against rapid wear during heavy shock loading conditions thus resulting in longer equipment life.

FEATURES AND BENEFITS

EcoShield™ Biodegradable Rock Drill Oil provides the following performance features and benefits which assure long equipment life and minimal maintenance costs:

Features	Advantage and Potential Benefits
Excellent thermal, oxidative and chemical stability	Reduced sludge and deposit formation Prevention of the formation of gummy deposits Improved valve operation
Excellent load carrying and anti-wear protection	Reduced component wear Keeps metal surfaces from galling and welding Withstands heavy shock loads Minimization of frictional heat Lower operating temperature Elimination of erratic operation for smoother and more efficient operation Prolonged equipment life Less equipment downtime Reduced maintenance costs
High viscosity index	Provides very good lubrication at both high and low temperatures
Very good adhesive properties	Protects the metal surfaces from corrosion especially during high moisture conditions. Provides a tenacious lubricant film under all operating conditions in order to protect the system from wear.
Reliability in wet conditions	Provides a tenacious film that clings to lubricated parts Resist being washed away by trace water that may be present in the compressed air Emulsification of water and increased oil absorption on the working surfaces
Protection in wet environments	Effective lubrication in the presence of water Increased protection of critical parts from rust and corrosion in the presence of water Longer tool and drill life Increased performance

APPLICATION NOTES

EcoShield™ Biodegradable Rock Drill 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 Rock Drill Oil. The following procedure is recommended when switching over to EcoShield™ Biodegradable Rock Drill 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 Rock Drill 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 Rock Drill Oil while warm.
5. Change and replace the oil filters.
6. Fill the gear drive with EcoShield™ Biodegradable Rock Drill Oil and begin normal operation.
7. Inspect and change filters as required

EcoShield™ Biodegradable Rock Drill 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	100	220
Specific Gravity @ 60°F/15°C	0.9224	0.9588
Viscosity 40°C (ASTM D445)	103.82	226.86
Viscosity 100°C (ASTM D445)	16.86	29.36
Viscosity Index (ASTM D2270)	174	169
Flash Point °F/°C (ASTM D92)	394°/201°	410°/210°
Pour Point °F/°C (ASTM D97)	0°/-18°	15°/-9°
Copper Strip Corrosion Test (ASTM D130)	1a	1a
Four Ball E.P. Test (ASTM D2783)	400	400
Weld Point kg		
Four Ball Wear Test (ASTM D4172)	0.28	0.28
Scar diameter, mm		
Timken EP Test (ASTM D2782)	70	70
OK Load, lbs		
Rust Test (ASTM D665)		
Procedure A (Distilled Water)	Pass	Pass
Procedure B (Salt Water)	Pass	Pass
Falex EP Continuous Load (ASTM D3233) Procedure A		
Failure Load, Lbs.	2500	2500
FZG (Four Square Gear Test)(ASTM D5182;A/8.3/90)	13th	13th
Gardner Denver Film Strength Test, psi		
Ground Bearing	300,000	300,000
Chrome Plated Bearing	300,000	300,000
Sanitized Bearing	300,000	300,000
Pin Wear, mm:		
Ground Bearing	.017	.017
Chrome Plated Bearing	.013	.013
Sanitized Bearing	.013	.013
%Biodegradability Modified Sturm OECD 301B ASTM D5864	>60%	>60%
Environmental Persistence Classification US Military	PW-1	PW-1
Base Oil Aquatic Toxicity US EPA LC55 and OECD 203 Test Methods	Non-toxic	Non-toxic