SINCE 1839 Schaeffer MANUFACTURING COMPANY

ISO 9001 CERTIFIED

TECHNICAL DATA

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560 ECOSHIELD™ BIODEGRADABLE SLIDE & WAY LUBE

ISO 68, 100, 220

EcoShield™ Biodegradable Slide and Way Lube is a fully formulated rust and oxidation inhibited, anti-wear, readily biodegradable, environmentally friendly, ecologically responsive, non-toxic fluid that is designed specially formulated to meet the lubrication requirements for accuracy and parts finish of machine tool horizontal, vertical and inclined slide ways, tables and feed mechanisms. EcoShield™ Biodegradable Slide and Way Lube is designed for use on a wide range of materials used for machine tool slideway surfaces including cast iron and synthetic materials. EcoShield™ Biodegradable Slide & Way Lube is especially recommended for use in machine tool applications, where exposure to water soluble or water-mixable cutting fluids exists. The use of EcoShield™ Biodegradable Slide and Way Lube will reduce stick-slip and chatter even under thin film boundary lubrication conditions thus allowing for smooth, uniform motion at design travel speeds. . EcoShield™ Biodegradable Slide & Way Lube can also be used in the lubrication of guides, rails and chain applications.

EcoShield™ Biodegradable Slide and Way Lube 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 Slide and Way Lube 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 Slide and Way Lube 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 a highly specialized ashless thermally stable, multifunctional additive anti-wear package that is designed to provide an extra margin of protection by satisfying the stringent demands of the slide ways and other lubricated components of the machine tool, while providing exceptional anti-wear and load carrying performance, outstanding thermal and oxidation stability, rust and corrosion protection and rapid water separation. This highly specialized additive package provides the EcoShield™ Biodegradable Slide & Way Lube with the following performance advantages:

1. Low frictional properties to eliminate stick-slip and chatter of slides and ways thus allowing for more accurate positioning, improved finished surface quality and improved dimensional accuracy of work-pieces.
2. Excellent anti-wear and load carrying capacity that reduces wear and increases smoothness of sliding action.
3. Excellent adhesiveness and metal wetting capabilities that resists squeeze-out wash-off by metalworking fluids and removal of the EcoShield™ Biodegradable Slide & Way Lube from critical surfaces.
4. Excellent demulsibility characteristics. EcoShield™ Biodegradable Slide & Way Lube separates rapidly and completely from water and water-extendable or water soluble coolants thereby reducing the potential for the negative effects of cross-contamination that can lead to the loss of performance and service life of both the lubricant and the coolant.
5. Excellent hydrolytic stability.
6. Enhanced compatibility with existing fluids.
7. Excellent rust and corrosion protection that extends component life and protects multi-metallurgy components
8. Excellent filterability in both wet and dry conditions.
9. Excellent protection against the formation and build-up of varnish and sludge deposits.
10. Enhanced thermal and oxidation stability.
11. Excellent machine cleanliness.
12. Excellent anti-foaming and air release properties
13. Low free Phenol per EPA 420.1.

EcoShield™ Biodegradable Slide & Way Lube meets and exceeds the following specifications and manufacturer's requirements: meets and exceeds the requirements of Cincinnati Machine P-47 (ISO 68) and P-50 (ISO 220), S.I.P. Manufacturing ISO 19378/ISO 6743-13 GA and GB and DIN CGLP.
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INSTALLATION

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

To prepare new systems for the biodegradable hydraulic fluids, 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 Slide & Way Lube 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 Slide & Way Lube. 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 Slide & Way Lube and begin normal operation.

Conversion from Conventional Slide & Way Lubes:

Step 1 – Before draining systems containing wet and/or degraded slide and way lubricants, 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.

Step 4 – Fill the system with sufficient EcoShield™ Biodegradable Slide & Way Lube to assure full circulation to all components. If the system was severely contaminated, substitute 160 Moly Slide & Way 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™ Biodegradable Slide & Way Lube, fill the system with just enough EcoShield™ Biodegradable Slide & Way Lube 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 Slide & Way Lube, skip to Step 7.

Step 7 – After repeating Steps 2 and 3, fill the system with the final charge of EcoShield™ Biodegradable Slide & Way Lube. Assume normal operation and monitor filters daily.

Conversion from Industrial Hydraulic and Circulating Oils:

Most dry industrial hydraulic and circulating oils are more compatible than automotive oils with EcoShield™ Slide & Way Lube. 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 Conventional Slide & Way Lubes”.

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 Slide & Way Lube 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 Slide & Way Lube should be handled similarly to currently accepted methods for conventional mineral oil spills.

EcoShield™ Biodegradable Slide & Way Lube l 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 Slide & Way Lube 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.

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TYPICAL PROPERTIES

ISO Grade	68	100	220
Specific Gravity @ 60°F/15°C	0.9048	0.9175	0.9209
Viscosity @ 40°C, Cst (ASTM D-445)	68	100	220
Viscosity @ 100°, Cst (ASTM D-445)	14.15	15.93	27.14
Viscosity Index (ASTM D-2270)	218	171	159
Flash Point °F/°C (ASTM D-92)	397°/203°	444°/229°	441°/227°
Pour Point °F/°C(ASTM D-92)	-20°/-29°	-20°/-29°	-15°/-26°
Foam Test (ASTM D-892)			
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 D-664)	0.54	0.54	0.54
Demulsibility (ASTM D-1401)			
@ 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 D-665)			
Procedure A (Distilled Water)	Pass	Pass	Pass
Procedure B (Salt Water)	Pass	Pass	Pass
Hydrolytic Stability (ASTM D-2619)			
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 D-130)	1a	1a	1a
Oxidative Stability (ASTM D-2272)			
RVPOT. Minutes to fail	210	210	210

Typical Properties Continued on Next Page

Typical Properties Continued

ISO Grade	68	100	220
Oxidation Solubility Test (ASTM D-943)			
Hours to TAN of 2	4000	4000	4000
Four Ball Wear (ASTM D-4172)			
1hr/40kg/167°F (75°C), Scar Diameter, mm	0.36	0.36	0.35
Four Ball EP Test (ASTM D-2783)			
Weld Point, kg	160	160	200
FZG (DIN) (5182)			
Load Stage	12	12	12
Thermal Stability Test (Cincinnati Milicron Method) (ASTM D-2070)			
Sludge mg/100 ml	0.5	0.5	0.5
Condition of Copper Rod	3	3	3
Condition of Iron Rod	2	2	2
Sludging Tendencies (ASTM D-4310)			
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	61%	61%	61%
ASTM D-5864			
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 WAF	>10,000 WAF	>10,000 WAF
Sludge Respiration Inhibition, EC50, ppm	>10,000	>10,000	>10,000

Packaging: 560 EcoShield™ Biodegradable Slide & Way Lube is available in 5 gallon pails, 30 and 55 gallon drums.