



COAST
LUBRICANTS
INDUSTRIAL SUPPLY & LIGHTING

ECOSAFE EHC - Non-Varnishing Electrhydraulic Control Fluid

Fire Resistant (HFDU) and Readily Biodegradable (HEPG) Hydraulic Fluids



Formulated for Use in High Performance Hydraulic Systems in the Power Generation Industry



To learn more please contact us today: 250-739-0960 or email sales@coastlubricants.com

Specs



Typical Performance Properties*

Rexroth 1,100 Hour Endurance Test (2600 rpm, 85°C [185°F], 380 bar)	Pass
Brugger Value (DIN 51347)	>40 N/mm ²
Eaton Corporation (formerly Vickers) 104C Vane Pump Test, ASTM D7043 (2000 psi, 1200 rpm, 100 hours, 65°C [150°F], 7.5 gpm, 3.5 gallon sample)	<5mg total wear
Four Ball Wear, ASTM D2266 (1800 rpm, 1 hour, 75°C (167°F), 40 kg load)	0.35 mm
Four Square Gear Test (FZG) (1760 rpm, 90°C [194°F], 1600 ml sample)	Pass, all 12 stages
Eaton Corporation 35VQ25 (formerly Vickers) Industrial (I-286-S), Mobile (M-2950-S)	Pass
Turbine Oil Stability Test, ASTM D943 (95°C [203°F], iron and copper catalysts, 60 mls water) Time to 2.0 Acid Number Increase	>2,000 hours
Seal Compatibility (1,000 hours @ 100°C [212°F]) Buna-n, Viton, Polyurethane (@60°C), EPR, Butyl, PTFE	Pass
OECD Ready Biodegradability Test Method 301 B, 28 days, Requirement: >60%	70.9%

*Typical properties, not to be construed as specifications.

Typical Physical Properties*

	EcoSafe EHC-46	EcoSafe EHC-68
Viscosity @ cSt @ 40°C (100°F, SUS)	48.9 (250)	69 (350)
Viscosity @ cSt @ 100°C (210°F, SUS)	9.35 (57.5)	12.6 (69.8)
Viscosity Index	178	185
Pour Point, °C (°F)	-48 (-55)	-45 (-50)
Density (lbs/gal) @ 60°C (140°F)	8.19	8.21
FM Approved	Yes	Yes

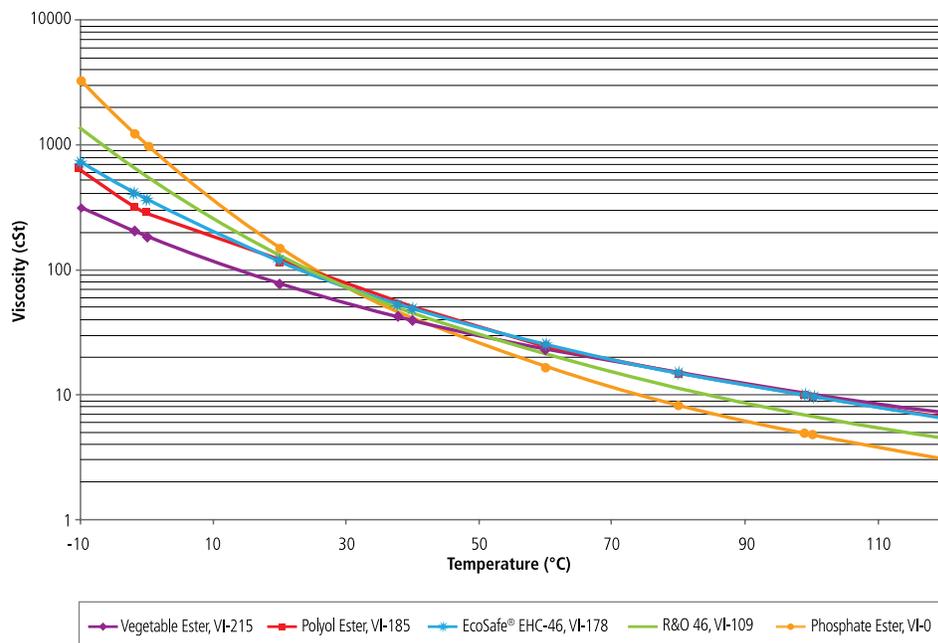
*Typical properties, not to be construed as specifications.



Superior Oxidative Stability

Results of controlled fluid tests show the superior stability of PAG-based fluids such as EcoSafe EHC fluids compared to PAOs (synthetic hydrocarbons). After 2500 hours at 120°C, the PAO produced significant deposits, which could result in operational problems in hydraulic systems. In contrast, the vial containing the PAG-based fluid was virtually free of deposits.

Kinematic Viscosity Comparison



EcoSafe® EHC

Hydraulic Fluids

A Global Source for Premium Fluids and Lubricants

Coast Lubricants & Industrial Supply provides premium industrial lubricants and metalworking fluids to a wide range of industries. Our commitment to advanced technology and personal service continues today as we set new standards for product performance and customer satisfaction.

Call On Us for Total Support

We want your experience with our products to be successful. **Coast** supports its products with a full range of sales, technical, and customer service support, including information and/or assistance to help you with product selection, handling, maintenance, and disposal. Our hydraulic fluid monitoring program is designed to enable users to maintain fluid quality while monitoring the condition of all system components. Call **Coast** today for expert fluids and lubricants support.

To Learn More Call: **250-739-0960** or email us at sales@coastlubricants.com

Ask About the Full Line of Fluids and Lubricants from ACT

- EcoSafe EHC Hydraulic Fluids for the Power Generation Industry
- EcoSafe FR Fire Resistant Hydraulic Fluids
- EcoSafe NCLR Hydraulic Fluids for Nuclear Power Stations
- UCON™ Trident™ Water Soluble Anhydrous Hydraulic Fluids
- EcoSafe TF-25 Turbine Fluid
- Neptune Gear Oils
- EcoGear Gear Oils



PRODUCT INFORMATION

CONVERTING HYDRAULIC SYSTEMS TO *EcoSafe*® EHC FLUIDS

Thoroughness and preparation must be prime considerations when changing fluids in a hydraulic system. Sufficient time, thought and care can often mean the difference between successful operation and shutdown. Your Coast Lubricants and Industrial Supply representative is trained and experienced in all aspects of hydraulic system conversion and hydraulic system compatibility.

NOTE: Avoid the use of halogenated solvents in system cleaning.

Changing from Phosphate Ester Type Fluids to EcoSafe EHC

- 1) Studies have shown phosphate ester fluids and/or phosphate ester/petroleum oil blends to be completely miscible in EcoSafe® EHC fluids.
- 2) If a 'Fullers Earth' filter is used on the phosphate ester fluid for the control of the Total Acid Number, it should be valved off and eventually removed from the system. This type of filtration is not necessary, nor recommended, for EcoSafe EHC fluids. Standard depth type filters that carry an 'absolute' rating are recommended.

Although miscible, solids are known to form upon long term mixing of phosphate ester and EcoSafe EHC fluid depending upon the condition of the phosphate ester and water content. For phosphate esters, the recommended maximum as a foreign oil contaminant is no more than 3% phosphate ester for long-term operation and before the system is considered to be converted to EcoSafe EHC. Test samples should be pulled to confirm the phosphate ester content. In converting from phosphate esters to EcoSafe EHC, the presence of phosphate ester should be acted upon without delay until tests indicate that the phosphate ester has been removed from the system.

For phosphate ester containing systems, it is recommended that the system be drained and flushed before introducing EcoSafe EHC fluids to avoid future disposal problems (i.e.: contamination by the phosphate ester fluid). This is more expensive than disposing of EcoSafe which can be waste hauled like any petroleum oil.

- 1) Completely drain and clean the system.
- 2) Drain and blowout pipelines, headers, hoses, valve stacks and manifolds with clean dry air. Manually clean reservoir. Determine compatibility of coatings inside of reservoir.
- 3) Drain pumps, accumulators, hydraulic motors and cylinders to insure removal of all fluids.
- 4) Dismantle, wash and clean strainers.
- 5) Drain & clean filter housings. Determine filter element compatibility with the EcoSafe® EHC fluid and replace or clean as necessary.

- 6) Thoroughly drain and clean coolers.
- 7) Close system and circulate, at low pressure as recommended by the component supplier, a quantity of light petroleum oil (22-46 cSt @ 40°C, 105-215 SUS @ 100°F) or EcoSafe EHC sufficient to cover pump inlet.
- 8) Repeat steps #1 through #6 until there is less than 3% phosphate ester remaining in the system as determined by lab analysis.
- 9) Close the system and refill promptly with EcoSafe® EHC fluid.
- 10) After system is in operation, inspect carefully for leakage during the next two to three weeks.

Changing from Polyol Ester type fluids to EcoSafe® EHC

- 1) Studies have shown that polyol ester fluids are incompatible with EcoSafe EHC. The anti-mist additive contained in the polyol ester becomes insoluble when EcoSafe EHC becomes the dominant fluid in the reservoir. Because of this insolubility, special care and attention should be taken when converting from polyol ester to EcoSafe EHC.
- 2) Completely drain and clean the system.
- 3) Drain and blowout pipelines, headers, hoses, valve stacks and manifolds with clean dry air. Manually clean reservoir. Determine compatibility of coatings inside of reservoir.
- 4) Drain pumps, accumulators, hydraulic motors and cylinders to insure removal of all fluids.
- 5) Dismantle, wash and clean strainers.
- 6) Drain & clean filter housings. Determine filter element compatibility with the EcoSafe® EHC fluid and replace or clean as necessary.
- 7) Thoroughly drain and clean coolers.
- 8) Close system and circulate, at low pressure as recommended by the component supplier, a quantity of light petroleum oil (22-46 cSt @ 40°C, 105-215 SUS @ 100°F) sufficient to cover pump inlet.
- 4) Repeat steps #2 through #7.
- 5) Close system and circulate, at low pressure as recommended by the component supplier, a quantity of EcoSafe® EHC fluid sufficient to cover pump inlet.
- 6) Repeat steps #2 through #7.
- 7) Close the system and refill promptly with the proper viscosity EcoSafe® EHC fluid.
- 8) After system is in operation, inspect carefully for leakage during the next two to three weeks

Changing from Petroleum Oil to EcoSafe EHC

- 1) Completely drain and clean the system. Small amounts of residual oil will not interfere with the performance of EcoSafe EHC fluids, but will reduce their fire resistance.
- 2) Drain and blowout pipelines, headers, hoses, valve stacks and manifolds with clean dry air. Manually clean reservoir. Determine compatibility of coatings inside of reservoir.
- 3) Drain pumps, accumulators, hydraulic motors and cylinders to insure removal of all fluids.

EcoSafe® EHC Hydraulic

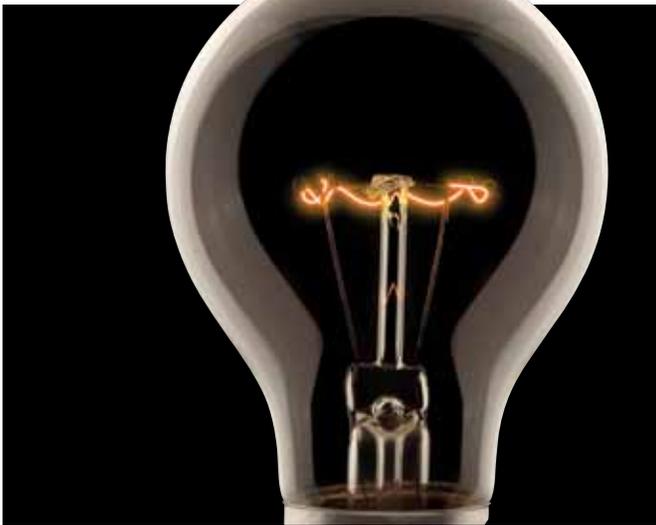
A Breakthrough in Performance and Protection In Power Generation Systems

EcoSafe® EHC fluids represent a significant advancement in fire-resistant hydraulic fluid technology. These fully synthetic, non-aqueous formulations deliver performance superior to premium anti-wear mineral oils, and offer significant performance and environmental advantages over other fluid options – including other synthetics.

EcoSafe® EHC fluids are especially formulated for electro-hydraulic control (EHC) valve service and other applications within fossil fuel power station operations, including high-pressure systems, systems with servo valves, and all robotics.

EcoSafe® EHC fluids are based on a very high VI, polyether polyol base stock combined with a patented non-metallic additive package. The high dielectric properties of EcoSafe® EHC fluids eliminate electro-chemical erosion of EHC servo-valves. Unlike phosphate and polyol ester-based fluids, they do not break down when exposed to water, minimizing potential for fluid degradation and system damage. As a result, fluid changeout intervals are extended under even the most severe operating conditions.

EcoSafe® EHC fluids are classified as FM Approved industrial fluids by Factory Mutual and meet stringent criteria for biodegradability and low toxicity.



Unmatched by Other Fluids

EcoSafe® EHC fluids do not have the drawbacks of other synthetic fluids, mineral oils and vegetable oils...

- Polyol esters (including vegetable oils, which are naturally occurring polyol esters) hydrolyze in the presence of water to form acid. Fluids with increased acidity attack hose linings and o-rings, and leach the alloy from brass components, resulting in premature component failure. Polyol esters also contain some degree of unsaturation, which reduces

Performance Advantages

Excellent Lubricity – EcoSafe® EHC fluids also offer excellent lubricity, for outstanding pump life under the most severe conditions. The fluids meet or exceed the pump performance of premium, anti-wear mineral oils, even at 5,500 psi (380 bar) operating pressure. Shear stability is excellent. Both viscosity grades earned a 12-stage rating in the FZG Gear Test, demonstrating high level protection against wear and scuffing.

Hydrolytic Stability – Unlike phosphate esters, polyol esters and vegetable oils, EcoSafe® EHC fluids will not break down and react with water, minimizing fluid degradation and acid formation that can damage and eventually destroy hydraulic pumps. No acid removal/ion exchange filters are required.

Non-Sludge or Varnish Forming – The fluids are oxidatively stable and will not degrade to form varnish or sludge, contributing to long-term system cleanliness while extending maintenance intervals and overall service life.

High Temperature Stability – EcoSafe® EHC fluids are very stable at high temperatures and resistant to thermal degradation up to 120°C (250°F).

All-Weather Service – The high viscosity indices of EcoSafe® EHC fluids enable them to handle wide temperature extremes. The fluids also have low pour points necessary for cold weather start up.

Material Compatibility – EcoSafe® EHC fluids are completely compatible with commonly used seals, hoses and metals. Detailed compatibility data is available upon request.

Easy Conversion – EcoSafe® EHC fluids are fully miscible with phosphate ester fluids and phosphate ester/petroleum oil blends, simplifying fluid conversions.

Detergency – EcoSafe® EHC fluids are natural detergents, so systems remain clean – free of staining or sticky residue.

Fire Resistance – EcoSafe® EHC fluids are classified as FM Approved industrial fluids by Factory Mutual.

Biodegradable/Low Toxicity – EcoSafe® EHC fluids are classified as “readily biodegradable” and environmental impact is low if the products are spilled. EcoSafe® EHC fluids also satisfy stringent criteria for toxicity.

EcoSafe® EHC fluids meet or surpass Bosch-Rexroth, Sauer-Danfoss, Denison, Parker, Oilgear, and Eaton (formerly Vickers) specifications.

their thermal and oxidative stability. The end result is the formation of sludge and varnish from insoluble degradation byproducts.

- Phosphate esters also hydrolyze in the presence of water. This reaction accelerates with increasing temperatures and is catalyzed by the presence of strong acids. Since this hydrolysis forms strong acids, the reaction is said to be autocatalytic. Metals such as copper, some copper alloys and lead act as pro-oxidation catalysts, which will also accelerate this reaction. Phosphate ester fluids represent a human health hazard because a major decomposition by-product is highly toxic.

PRODUCT INFORMATION

EcoSafe EHC

NON-VARNISHING, FIRE-RESISTANT & READILY BIODEGRADABLE HYDRAULIC FLUIDS

DESCRIPTION:

EcoSafe® EHC fluids are full-synthetic, non-aqueous hydraulic fluids that have passed Factory Mutual testing and are listed as Approved Industrial Fluids. These fluids can also be used in industrial, marine, and mobile equipment applications, including high-pressure systems, systems with servo valves, and all robotics. **EcoSafe EHC** fluids are formulated from very high VI (>180), polyalkylene glycols (PAG), coupled with a non-metallic additive package which provide the properties demanded by today's high performance hydraulic systems, while at the same time, satisfying the stringent criteria for biodegradability and toxicity. Both viscosity grades achieved a 12-stage rating in the FZG Gear Test demonstrating a high level of protection against wear and scuffing. **EcoSafe EHC** fluids also have excellent low temperature properties; good shear stability, and are resistant to oxidative and thermal degradation.

EcoSafe EHC fluids meet or surpass Bosch-Rexroth, Sauer-Danfoss, Denison, Parker and Eaton (formerly Vickers) specifications. Our superior chemistry and product design also offers the following benefits:

- Superior hydrolytic stability
- Superior oxidative and thermal stability
- Fully compatible and miscible with phosphate ester
- Excellent lubrication properties (outperforms anti-wear mineral oils, even at 5,000 psi / 380 bar)
- Good fire-resistance
- Longest fluid life due to stable chemistry (NO acid removal/ion exchange filters are required.)
- Excellent compatibility with commonly used seals, hoses and metals
- Superior, long-term fluid cleanliness (chemistry does not support formation of sludge or gels)
- High dielectric properties to eliminate electro-chemical erosion of EHC servo-valves

TYPICAL PHYSICAL PROPERTIES

	<u>EHC-46</u>	<u>EHC-68</u>
Viscosity @ 100 °F, SUS	220	310
@ 210 °F, SUS	53.3	65.3
Viscosity Index	185	189
Pour Point, °F	- 55	- 50
Density (lbs./gal) @ 60 °C	8.2	8.23
Flash Point, °F, COC	525	585

The PAG base oil binds up to 7500 ppm (0.75%) of water before a saturation point is reached. However, water in mineral oils start to form Free Water at approximately 200 ppm (0.02%) water.

EcoSafe and EcoGear are manufactured between 200 and 900 ppm (0.02%-0.09%) water. This is directly tied to the purchase specifications of the PAG base stock. As the fluid is used in service, significantly larger amount of water can be contained in the system without any negative impact upon the performance characteristics of the hydraulic fluid.

Ambient humidity conditions cause the water content of a PAG-based lubricating fluid to oscillate between 1000 and 4000 ppm of water in a seasonal cycle. There is over 10 years of field experience with PAG based lubricating fluids showing no long-term issues with water contents far in excess of what is recommended for mineral oil-based hydraulic fluids.

The following tests have been performed with PAG lubricating fluids where water is either part of the test or excessive amounts of water have been added:

ASTM D-665 – Standard Test Method for Rust-Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water

HF2 Denison Pump Test – TP-30283 T6C cartridge for 300 hr at 250 bar with 1% water

ASTM D-943 – Standard Test Method for Oxidation Characteristics of Inhibited Mineral Oils (TOST test)

ASTM D-4172 – Standard Test method for Wear Preventative Characteristics of Lubricating Fluid (Four-Ball Method)

Results found in the standard technical brochures for EcoSafe and EcoGear products are independent of changes in water content below the saturation point. Above the saturation point, only small decreases in the lubricating properties of the fluids have been observed.