

## EcoClear Hydraulic Oils

### ISO GRADES 22, 32, 46, 68, 100

#### Typical Properties

ISO Grade	22	32	46	68	100
Color, ASTM D-1500		<0.5	<0.5	<0.5	<0.5
Appearance	Water Clear	Water Clear	Water Clear	Water Clear	Water Clear
Viscosity, cSt					
At 40° C	20.51	31.71	46.5	67.2	100.0
At 100° C	4.15	5.3	6.8	8.6	11.2
Viscosity Index100	103	100	99	98	97
Flash Point, (COC) Deg F400	400	-410	415	425	450
Pour Point, Deg F-25	-35	-25	-25	-20	-5
Neut. No., ASTM D 974	0.55	0.55	0.55	0.55	0.55
Gravity, API @ 60° F	34.3	33.1	32.4	31.6	30.6
Rust Test, ASTM D 665A/B	No Rust	No Rust	No Rust	No Rust	No Rust
Emulsion Test, ASTM D-1401 (40-40-0)	10Min	10 Min	10 Min	10 Min	10 Min
Dielectric Strength, ASTM D-877	35KV	35KV	35KV	35KV	35KV
Hydraulic Stability, ASTM D-2619					
Cu mass loss, mg/c2	0.13	0.13	0.13	0.13	0.13
Oxidation Life,ASTMD-943 (H1 to 20 TAN)	+10,000	+10,000	+10,000	+10,000	+7,500

The values shown are typical of current production. Some are controlled in the manufacturing process, while others are not. All of them may vary within tolerable ranges.

EcoClear Hydraulic Oils have outstanding stability and anti-wear characteristics designed to meet the demanding requirements of most all the major manufacturers and users of hydraulic equipment located in ecologic sensitive areas. These oils are polyaromatic hydrocarbon-free, zinc-free, inherently biodegradable and distinguished by their clear appearance and clarity retention in operating systems, good rust protection, low deposit formation, rapid release of entrained air, oxidation resistance, low pour points, and good antifoam properties. All grades comply with requirement levels of the U.S. EPA LC50 test utilizing marine statistical sampling of mysidopsis-bahia shrimp, rainbow trout, and fathead minnow.

## APPLICATIONS

Recommended for critical application of vane and gear pumps operated at elevated pressure levels, i.e. in excess of 6,900 kPa or 1000 psi. For systems incorporating axial piston pumps with pressures in excess of 3500 psi, these oils can be used where the manufacturer specifies anti-wear hydraulic oils. These oils are very effective in reducing pump wear, satisfying lubrication requirements of auxiliary system components, and greatly extending the life of systems operating at high loads, speeds, and temperatures. All ISO Grades satisfy requirements of Vickers I-286-S and M-2950-S; Cincinnati Milacron specifications P-68, P69, and P-70. They meet Denison HF-0 and HF-2 requirements. They are suitable for hydraulics operating in the forest industry; dredges, cranes and other hydraulic equipment on off-shore drilling and production facilities. Dielectric strength is warranted at the origin and can be maintained providing low moisture contents are sustained and agitation under humid conditions are minimized.

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### **ECOLOGICAL DATA**

EcoClear Hydraulic Oils are formulated to be pro-environment with good performance utilizing a non-zinc/chlorine-free anti-wear additive system. The base oil used complies with those characteristics of API (American Petroleum Institute) Lubricating Oil Basestock Consortium Registration submitted to the EPA (Environmental Protective Agency) received on March 25, 2003. The data reviewed on the eco-toxicological influence on fish invertebrates and algae indicated no acute toxicity was measured in any of 20 tests. None of the results have shown evidence of acute toxicity to aquatic organisms. Eight, 7-day exposure studies using rainbow trout failed to demonstrate toxicity when tested up to a maximum concentration of 1000 mg/L applied as dispersions. Three, 96-hour tests with rainbow trout also failed to show any toxic effects when tested up to 1000 mg/L applied as dispersions. Similarly, three 96-hour tests with fathead minnows at a maximum test concentration of 100 mg/L water accommodated fractions (WAF) showed no adverse effects. Two species of aquatic invertebrates (*Daphnia Magna* and *Gammarus Sp.*) were exposed to WAF solutions up to 10,000 mg/L for 48 and 96-hours, respectively, with no adverse effects being observed.

Biodegradation rates using the modified Stum and Manometric Respirometry Testing ranged between 1.5% to 29%. Results from the manometric respirometry tests showed biodegradation rates from 31% to 50%. Biodegradation rates measured in 21-day CEC tests ranged from 13% to 79% (BP International Ltd; Exxon Biomedical Sciences, inc.; Shell Research Ltd.) Sufficient data exists to characterize the biodegradability of the base oil.

EcoClear Hydraulic Oils are formulated with an additive system characterized by the following ecotoxicological data:

96-hour LC50 Rainbow Trout = Pass at additive levels in formulation.

48-hour LC50 *Daphnia Magna* = Pass at additive levels in formulation.

Sufficient data therefore exists to characterize the ecotoxicity and biodegradability of EcoClear Hydraulic Oils.

Pinnacle Resources, inc.