PRODUCT INFORMATION

广州孚润 400-992-6811

A PRODUCT OF AMERICAN CHEMICAL TECHNOLOGIES, INC.

EcoSafe® FR-46, FR-68, and FR-100

Fire Resistant & Readily Biodegradable Hydraulic Fluids

DESCRIPTION:

EcoSafe® FR fluids are fully synthetic, non-aqueous hydraulic fluids that are Factory Mutual Approved industrial fluids. They can be used in industrial, marine and mobile equipment, including high-pressure systems, systems with servo valves and all robotics. **EcoSafe® FR** fluids are formulated from a very high VI, fully synthetic basestock coupled with a patented non-metallic additive package providing the properties demanded by today's high performance hydraulic systems while at the same time satisfying the stringent criteria for biodegradability and toxicity. All three viscosity grades achieved a 12-stage rating in the FZG Gear Test demonstrating a high level of protection against wear and scuffing. **EcoSafe® FR** fluids also have excellent low temperature properties, good shear stability and are resistant to oxidative and thermal degradation. **EcoSafe® FR** fluids meet or surpass Bosch-Rexroth, Sauer-Danfoss, Denison, Parker and Eaton (formerly Vickers) specifications.

Typical performance properties are listed in Table 1 with seal compatibility data appearing in Tables 2 and 3. The increased performance which **EcoSafe® FR** fluids provide results in extended pump service life with reduced downtime along with lower maintenance costs. These fluids meet, or exceed, the pump performance of premium, anti-wear mineral oils, even at the 450 bar (6,500 psi) operating pressure.

Additional bonus features include: non-sludge/varnish forming, high viscosity index, low pour point, excellent heat transfer and low foaming. Compatible with commonly used seals and hoses (Recommended: HNBR, FKM, FEPM, ECO, polyester, and urethane; Satisfactory in many applications: NBR, XNBR, EPDM, and VMQ). Compatible with common metals (Steel, Stainless steel, Brass, Bronze, and Tin).

If you want to add **EcoSafe® FR** fluids to a hydraulic system, call us and we will advise you regarding compatibility and solubility. Most "oil soluble" additives are not soluble in **EcoSafe® FR** fluids thus requiring a thorough and detailed plan prior to conversion. A separate information sheet '*Converting Hydraulic Systems to EcoSafe® FR Fluids'* is available upon request. Your American Chemical Technology representative is also trained and experienced in all aspects of conversion assistance.

STORAGE AND HANDLING:

We believe **EcoSafe® FR** fluids have a low degree of hazard when used as intended. They are stable, non-corrosive and have high flash point materials that are compatible with nearly all commonly used materials in standard hydraulic systems. As with all products of this type, we recommend that good hygiene practices be observed, including: (1) avoid prolonged skin contact, (2) provide adequate ventilation, (3) do not ingest; and that all OSHA Standards pertaining to products of this type be observed.

American Chemical Technologies, Inc.; 485 East Van Riper Road; Fowlerville, MI 48836
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PROPERTIES:

	Test Method	ESFR-46	ESFR-68	ESFR-100
Viscosity @ 40ºC	ASTM D445	50.0 cSt	68.0 cSt	100.0 cSt
Viscosity @ 100ºC	ASTM D445	9.45 cSt	12.3 cSt	17.0 cSt
Viscosity @ 100ºF	ASTM D445	255 SUS	349 SUS	507 SUS
Viscosity @ 210ºF	ASTM D445	57.3 SUS	67.5 SUS	86.1 SUS
Viscosity Index	ASTM D2270	176	181	189
Pour Point	ASTM D97	-42 °C (-44 °F)	-39 °C (-38 °F)	-34 °C (-30 °F)
Turbine Oil Stability Test	ASTM D943		>2000 hours	
Air Release	ASTM D3427			
@ 50°C		3.0 min	5.5 min	
@ 75°C				4.0 min
Density @ 15 °C	ASTM D4052	0.990 g/cm^3	0.993 g/cm^3	0.996 g/cm^3
Density @ 60 °F	ASTM D1298	8.26 lbs/gal.	8.29 lbs/gal.	8.31 lbs/gal.
Flash Point	ASTM D92	279°C (534°F)	281°C (538°F)	281°C (538°F)
Fire Point	ASTM D92	315°C (599°F)	319°C (606°F)	319°C (606°F)
Mechanical Performance				
Four-Ball Wear	ASTM D4172		0.35 mm	
Hydraulic Pump Wear Test	ASTM D7043		<10 mg Total Wear	
	ASTM D2882		1.2 and 1.7 mg's Total Wear obtained by UEC (USX Engineers & Consultants, Inc.)	
FZG Gear Test	ASTM D5182			
Pass Load Stage			12	
Environmental				
Biodegradability, 28 days	OECD 301B	90.2 %	75.1 %	60.2 %
Biodegradability, 28 days	OECD 301F		88 %	
Aquatic Toxicity				
Fish, 96 hour LC_{50} rainbow trout, Oncorhynchus mykiss	OECD 203		"practically non-toxic"	

Note: 60% biodegradation within 28 days is required to be classified as a "readily biodegradable" hydraulic fluid.

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