CITGO GLYCOL FR-5046HP

Date 06/15

DESCRIPTION: CITGO Glycol FR-5046HP is a high pressure polymer thickened water-glycol fluid which provides superior fire-resistance at pressures in excess of 5,000 psi. Pump test results (see Tables 1, 2 and 3) show CITGO Glycol FR-5046HP low pump wear rates to be essentially equivalent or significantly better than phosphate esters and polyol esters. CITGO Glycol FR-5046HP, therefore, provides long pump life at high pressures, excellent fire safety plus lower cost than synthetic fluids.

QUALITIES:

Fire Protection: CITGO Glycol FR-5046HP contains sufficient water to "snuff out" ignition which could occur in hydraulic systems operating under high pressure through a sudden line rupture or fluid contact with an ignition source. Factory Mutual research tests show that thickened glycol-water fluid provides superior fire resistance compared to synthetics such as phosphate ester and polyol ester fluids.

Pump Performance: CITGO Glycol FR-5046HP imparts the necessary lubricity, corrosion protection and overall performance demanded of a high-pressure antiwear hydraulic fluid.

Higher Operating Temperature: The viscosity of CITGO Glycol FR-5046HP will not drop below pump minimum requirements even at temperatures greater than 180°F, providing greater protection where piping, cylinders and other components are exposed to high temperatures such as in steel mills applications. Bulk reservoir temperatures should still be maintained as low as possible to reduce water evaporation, preferably 135°F or less. It is important that water content be monitored and sufficient water added to maintain water content, bulk density, viscosity and fire protection within an appropriate range.

Shear Stability: CITGO Glycol FR-5046HP exhibits essentially no viscosity loss (temporary or permanent) over a wide range of shear rates. (See Table 4.)

Additional features include high viscosity index, low pour point, excellent heat transfer, antifoam properties, as well as outstanding rust and corrosion protection.

APPLICATIONS: The scope of applications for CITGO Glycol FR-5046HP include mobile equipment or stationary hydraulic systems in steel mills, foundries, die casting, power transmission plants, etc.

CITGO's Glycol FR-5046HP can also be used in equipment operating in environmentally sensitive areas. The FR-5046HP product has been shown to have a lower environmental impact than mineral oil based products. Testing of the fluid has shown that it is relatively harmless to the aquatic species commonly tested in the U.S. and Canada, additional testing has also shown that FR-5046HP is relatively harmless to terrestrial species such as earthworms and plant seedlings. CITGO Glycol FR-5046HP is readily biodegradable per OECD 301B.

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Table 1
ASTM D 2882 test results

Fluid	Wear Rate (mg/hr)
Conventional water-glycol	0.65
Phosphate ester	0.05
Polyol ester	0.10
Antiwear oil	0.24
CITGO Glycol FR-5046HP	0.10

Test Conditions: Vickers 104 Vane pump run at 1250 rpm, 2,000 psi, 100 hr. with test pass criteria of 1 mg/hr wear rate max.

Table 2
Modified Sperry
Vickers 35V25 pump test

Component	Total weight loss (mg) Actual	Recommended
Ring	20	75
Vanes	6	15

*Test Conditions: 12-Vane cartridge substituted for the 10-Vane Cartridge normally used and driven at 1,800 rpm for 49 hr.

Table 3

Sundstrand Series 22 axial-piston pump.
CITGO Glycol FR-5046HP was also evaluated in a Sundstrand Series 22 axial-piston pump using a modified water stability test. The pump was rebuilt according to Sundstrand's Bulletin 9658 specifications. Test conditions were:

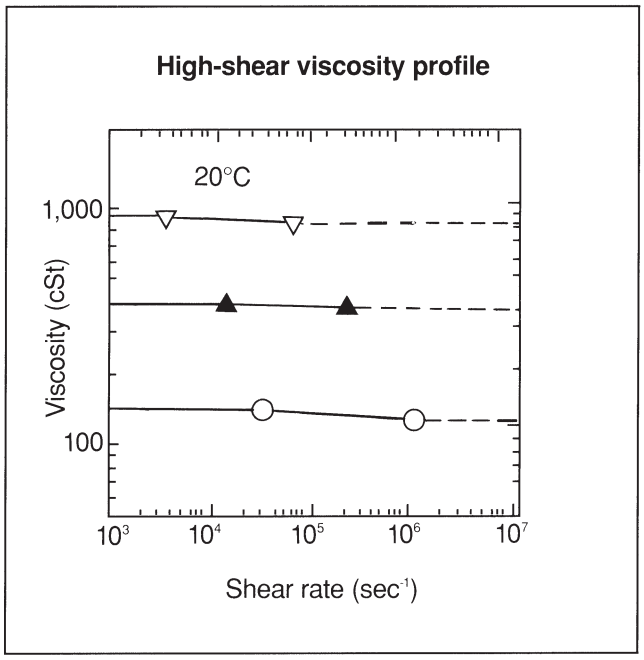
Input speed	3.100 100rpm
Load pressure	5,000 psi
Charge pressure	200 20 psi
Case pressure	40 psi max.
Stroke	1/2 of full
Reservoir temperature*	120 10°F
Loop temperature*	170 10°F
Maximum inlet vacuum	5 psi

Conditions differ from a standard test.

Test duration was 225 hours and followed the sequence: startup at 500 psi for 2 hr; break-in at 3,000 psi for 1 hr; and full load at 5,000 psi for 222 hr.

A flow degradation of 10% constitutes failure. Test data show that there was no significant flow degradation (<1%) over the full-load duration of the test. Subsequent examination of the pump components showed no significant wear or distress. These data show that high-pressure, thickened water-glycol hydraulic fluids can be used under conditions where phosphate esters and polyol esters are normally selected.

Table 4



TYPICAL PROPERTIES:

	CITGO GLYCOL FR-5046HP
Material Code	648346001
Specific Gravity (20/20°C)	1.089
Viscosity, cSt at 0°C	340
cSt at 40°C	46
cSt at 65°C	22
Viscosity Index	>210
pH	9.9
Pour Point, ASTM D 97, °C	-50
Appearance	Red
Biodegradability, Mod. Sturm Test OECD 301B, 28 days	78%

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