

TECH DATA

CALFLO™ XR

HEAT TRANSFER FLUID

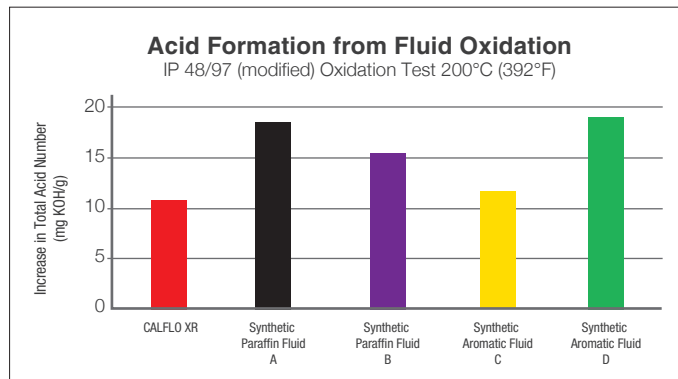
INTRODUCTION

Petro-Canada Lubricants CALFLO XR is a synthetic blend heat transfer fluid designed for use over an extended range of operating temperatures. Formulated with ultra-pure, high quality base oils and specially selected additives, CALFLO XR provides high thermal efficiency in systems operating up to 288°C (550°F) and excellent cold temperature pumpability in start-up operating conditions as low as -27°C (-17°F), with a pour point below -40°C (-40°F) to allow for low temperature dispensing from drums/totes. A breakthrough chemistry, CALFLO XR can extend fluid life longer than leading competitive fluids, lowering operating costs by reducing the frequency of fluid change-outs.

FEATURES AND BENEFITS

High thermal and oxidative stability can extend fluid life and lower operating costs

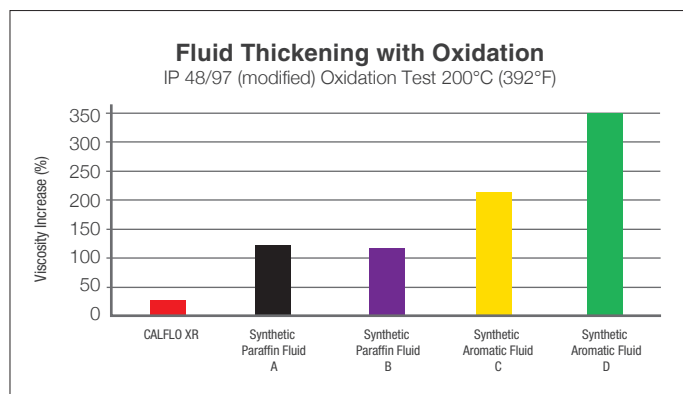
- Thermal stressing of a heat transfer fluid can cause the formation of light molecular compounds. These compounds can:
 - raise a fluid's vapour pressure, which can cause fluid leakage from control valves and pipe flanges, circulating pump cavitation and vapour locking
 - dramatically reduce a fluid's auto-ignition temperature, the lowest temperature at which a fluid will combust, without flame or spark, in the presence of oxygen
 - lower the operating temperature at which the heat transfer system can safely operate
 - necessitate a costly, premature fluid change-out
- Resistance to oxidative breakdown is critical in heat transfer systems where exposure to air is likely or cannot be avoided. Strong oxidative resistance can significantly extend fluid life, providing operational savings by reducing fluid change-out frequency and down time.



The formation of acids within a fluid is indicative of oxidation. In a severe oxidation test, CALFLO XR resists oxidation forming the lowest amount of acids in comparison with competitive synthetic paraffin and synthetic aromatic fluids that experienced significant oxidation.

High resistance to oxidative thickening

- As a fluid oxidizes, it becomes more viscous. This increase in viscosity can:
 - significantly reduce a fluid's thermal efficiency
 - make the fluid more difficult to circulate through the heat transfer system
 - result in overheating of the fluid
 - necessitate a costly, premature fluid change-out



In a severe oxidation stability test, CALFLO XR demonstrates the lowest increase in fluid viscosity, while competitive synthetic paraffin and synthetic aromatic fluids experienced significant oxidative viscosity increases:

Low vapour pressure can save on top-up costs while improving workplace safety

- Excellent low vapour pressure can reduce or eliminate fluid leakage from control valves and pipe flanges.
- Reduction or elimination of leaks provides a cleaner and safer operating environment, and results in operational savings by reducing the need for cleaning, maintenance and fluid top-up.

CALFLO XR does NOT require special handling

- Shipments and storage of CALFLO XR do not normally require special safety permits. Empty drums used to transport CALFLO XR are readily accepted by drum re-conditioners. In addition, used CALFLO XR may be responsibly disposed in the following ways¹:
 - through re-sale to used oil recycling companies
 - in jurisdictions, combined with BTU recovery systems

APPLICATIONS

CALFLO XR is recommended for use in non-pressurized, liquid phase, closed heat transfer systems operating continuously at bulk temperatures up to 288°C (550°F). Suitable for use over an extended range of operating temperatures, CALFLO XR has a low viscosity that ensures outstanding heat transfer efficiency even at moderate temperatures. Its low temperature fluidity ensures good pumpability under extreme conditions, eliminating the need for expensive heat tracing and insulation in outdoor applications with ambient temperatures down to -27°C (-17°F), with a pour point below -40°C (-40°F) to allow for low temperature dispensing from drums/totes.

OPERATIONAL CONSIDERATIONS

While CALFLO XR offers excellent low temperature pumpability allowing cold system start-up in ambient temperatures as low as -27°C (-17°F), with a pour point below -40°C (-40°F), parameters for systems operating continuously below 5°C (41°F) should be reviewed with a Petro-Canada Lubricants Technical Services Advisor to determine the suitability of the fluid in its specific operating environment.

CALFLO XR is specially formulated to provide long service life under normal operating conditions up to its maximum recommended temperature. However, actual fluid life is dependent upon system design and operating practice. Special precautions should be taken to avoid operating conditions that can shorten fluid life. These include:

- thermal shocking resulting from accelerated system temperature increases
- thermal shocking from hot spots on a system's heating coils
- continuously running above the maximum recommended operating temperature

While CALFLO XR is highly resistant to oxidative breakdown, excessive air and water contamination can reduce thermal efficiency and shorten fluid life. Inert gas blanketing of a system's expansion tank is recommended to guard against exposure to air and water and the need to change-out the fluid prematurely.

Although CALFLO XR has been formulated for high resistance to contamination from air and water, contamination with process chemicals or deteriorated residual fluids can shorten fluid life. To maximize system efficiency and fluid life, system cleaning and flushing is recommended to remove all contaminants, sludge and varnish prior to recharging a system with CALFLO XR.

¹Before conducting any transport and disposal practice check to ensure that it is in compliance with federal, state, provincial and/or local laws and regulations.

THERMAL DATA

Property	TEMPERATURE		
	15°C (59°F)	38°C (100°F)	260°C (500°F)
Density, kg/L (lb/ft³)	0.834 (52.1)	0.819 (51.1)	0.6772 (42.3)
Thermal Conductivity, W/m K (BTU/hr. °F.Ft)	0.143 (0.0824)	0.141 (0.0817)	0.131 (0.0755)
Heat Capacity, kJ/kg K (BTU/lb. °F)	1.89 (0.45)	1.96 (0.47)	2.69 (0.64)
Vapour Pressure, kPa (psia)	0.00 (0.00)	0.00 (0.00)	10.0 (1.45)

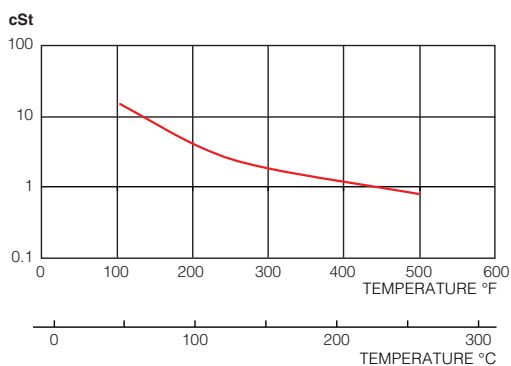
For detailed heat transfer calculations, please refer to a Petro-Canada Lubricants Technical Services Advisor.

TYPICAL PERFORMANCE DATA

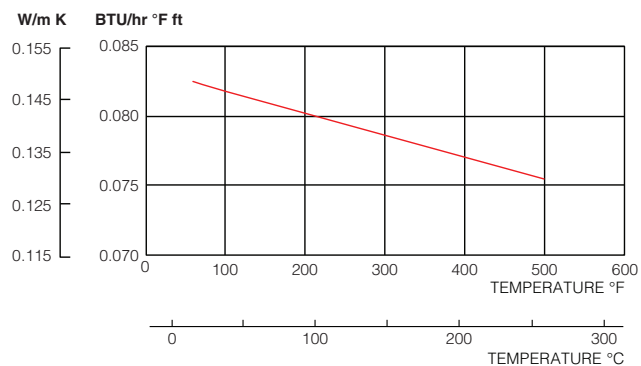
Property	Test Method	CALFLO XR
Colour	ASTM D1500	< 0.5
Pour Point, °C (°F)	ASTM D5950	< -51 (< -60)
Flash Point, COC, °C (°F)	ASTM D92	192 (377)
Fire Point, COC, °C (°F)	ASTM D92	205 (401)
Auto-ignition Temperature, °C (°F)	ASTM E659	324 (568)
Viscosity, cSt at 40°C (104°F) cSt at 100°C (212°F) cSt at 260°C (500°F)	ASTM D445	15.0 3.58 0.8
Average Molecular Weight		355
Neutralization Value, TAN, mg KOH/g	ASTM D664	<0.1
Sulfur by XRF, wt%	ASTM D4294	<0.0001
Distillation Range, °C (°F) 10% 50% 90%	ASTM D7213	329 (624) 405 (760) 462 (863)
Coefficient of Thermal Expansion, %/°C (%/°F)		0.0797 (0.0443)
Maximum Bulk Temperature °C (°F)		288 (550)
Maximum Film Temperature °C (°F)		298 (568)

The values quoted above are typical of normal production. They do not constitute a specification.

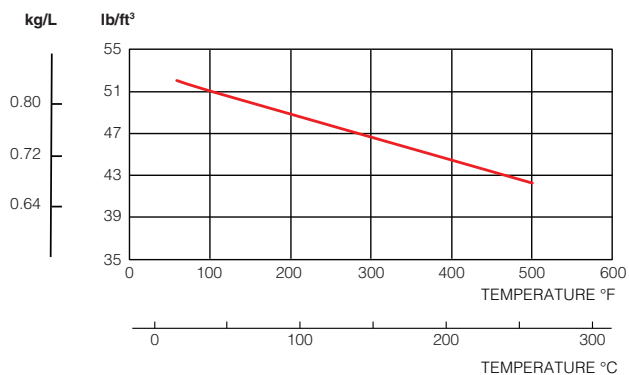
CALFLO XR Viscosity



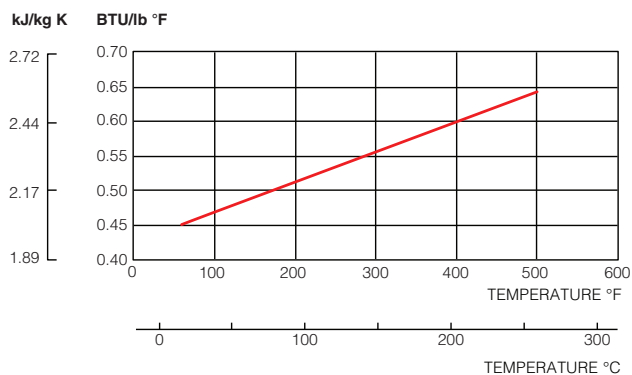
CALFLO XR Thermal Conductivity



CALFLO XR Density



CALFLO XR Heat Capacity



Learn more about us: petrocanadalubricants.com
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Committed to the disciplined operation of our business.



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