



PURITY™ FG HEAT TRANSFER FLUID

Introduction

Petro-Canada PURITY™ FG Heat Transfer Fluid is formulated to help lower operating costs by reducing the frequency of fluid change-outs in operations that require a food grade product.

PURITY FG Heat Transfer Fluid's unique chemistry starts with a blend of 99.9% crystal-clear base fluids, produced from a HT Purity Process. These crystal-clear fluids are free of impurities that can hinder performance. Utilizing more than 30 years of formulating experience, Petro-Canada fortifies these thermally stable fluids with specially selected additives to provide outstanding protection from oxidative breakdown.

The result is PURITY FG Heat Transfer Fluid, a food grade fluid that provides high thermal efficiency in systems operating up to 326 °C (620 °F). PURITY FG Heat Transfer Fluid's breakthrough chemistry can assist in extending fluid life longer than leading competitive fluids, and help lower operating costs by reducing the frequency of fluid change-outs.

Applications

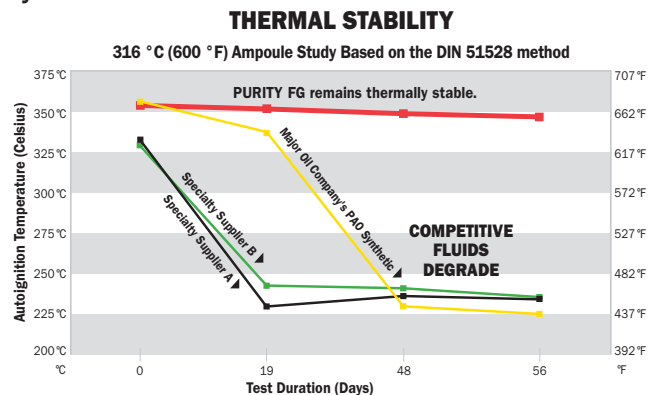
Petro-Canada PURITY FG Heat Transfer Fluid is recommended for use in non pressurized, liquid phase, closed heat transfer systems used in food processing or pharmaceutical operations with continuous bulk operating temperatures up to 326 °C (620 °F). Typical applications include central cooking facilities, drying, edible oil deodourizing and the heating of deep frying oils. PURITY FG Heat Transfer Fluid may also be used in heating baths where a virtually odourless, non-toxic* fluid is required for worker health and safety.

PURITY FG Heat Transfer Fluid's outstanding resistance to oxidative breakdown is also beneficial in food related manufacturing operations where exposure to air can not be avoided, and oxidation is the most likely form of fluid degradation. Common applications include the manufacture of plastic bottles, films and containers for the packaging of food products.

Features and Benefits

- **Higher thermal and oxidative stability than leading competitors which can help extend fluid life and lower operating costs**
 - More thermally stable than leading competitive fluids, even full synthetics
- 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 autoignition temperature, the lowest temperature that 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

In Ampoule studies, conducted at 316 °C (600 °F), PURITY FG Heat Transfer Fluid remained thermally stable and maintained its autoignition temperature throughout the 56 day test; three times longer than two leading specialty fluids and more than 20% longer than a major oil company's synthetic fluid:



- More resistant to oxidative breakdown than leading competitive fluids

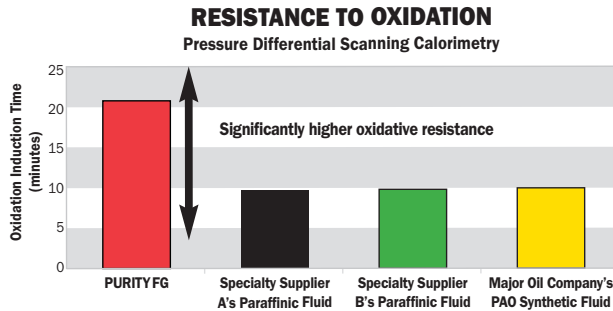
What is the HT difference?

Petro-Canada Lubricants starts with the HT purity process to produce water-white, 99.9% pure base oils. The result is a range of lubricants, specialty fluids and greases that deliver maximum performance for our customers.



A fluid's resistance to oxidative breakdown is critical in heat transfer systems where exposure to air cannot be avoided. Strong oxidative resistance can significantly extend fluid life, providing operational savings by reducing fluid change-out frequency and down time.

In severe oxidation testing, PURITY FG Heat Transfer Fluid demonstrates significantly stronger resistance to oxidation versus two leading specialty suppliers' food grade fluids and a fully synthetic food grade fluid from a major oil company:



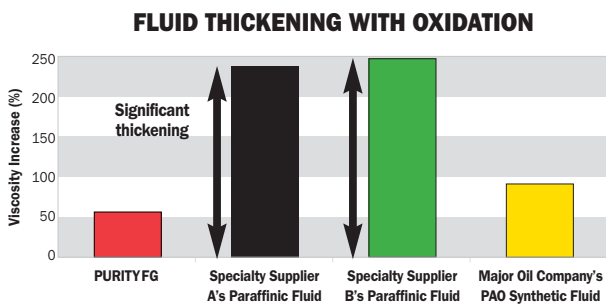
Higher resistance to oxidative thickening versus leading competitive fluids

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, PURITY FG Heat Transfer Fluid demonstrates significantly better resistance to viscosity increase versus two specialty food grade fluids, and better resistance than the synthetic food grade fluid of a major oil company supplier:

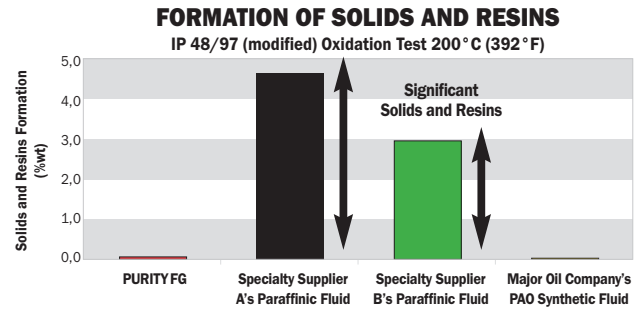
Less prone to solids and resins formation versus



leading competitive fluids

- PURITY FG Heat Transfer Fluid's resistance to oxidative fluid breakdown also minimizes the formation of deposits. These deposits can dramatically reduce a system's heat transfer efficiency, resulting in increased operating costs.

In a severe oxidation test, PURITY FG Heat Transfer Fluid demonstrates significantly better resistance to formation of solids and resins versus two leading specialty food grade fluids, and equivalent resistance to a synthetic food grade fluid of a major oil company:



- **Low vapour pressure can help on top-up costs while improving workplace safety**
 - PURITY FG Heat Transfer Fluid's 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
- **Natural lubricity extends operational savings**
 - PURITY FG Heat Transfer Fluid's natural lubricating properties can also help to reduce maintenance costs by extending the service life of circulating pumps and other rotating parts
- **Fully registered for use in and around food processing areas**
 - PURITY FG Heat Transfer Fluid also meets the highest industry purity standards and fits perfectly in HACCP (Hazard Analysis Critical Control Point) and GMP (Good Manufacturing Practice) plans:
 - HT1 registered by NSF
 - All fluid components comply with FDA 21 CFR 178.3570 "Lubricants with incidental food contact"
 - Acceptable for use in food processing facilities.
 - Certified Kosher and Pareve by Star K
 - Certified Halal by IFANCA



Nonfood Compounds
Program Listed HT1
ISO 21469 Certified

Operational Considerations

PURITY FG Heat Transfer Fluid's high thermal stability provides 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

Although PURITY FG Heat Transfer Fluid is highly resistant to oxidative breakdown, excessive air and water contamination can reduce thermal efficiency and shorten fluid life. Where practical, Petro-Canada recommends inert gas blanketing of a system's expansion tank to guard against exposure to air and water and the need to change-out the fluid prematurely. While PURITY FG Heat Transfer Fluid 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, Petro-Canada highly recommends system flushing prior to recharging with PURITY FG Heat Transfer Fluid.

Thermal Data

PROPERTY	TEMPERATURE			
	15 °C (60 °F)	38 °C (100 °F)	260 °C (500 °F)	316 °C (600 °F)
Density, kg/L (lb./ft ³)	0.868 (54.2)	0.854 (53.3)	0.716 (44.7)	0.681 (42.5)
Thermal Conductivity, W/m K (BTU/hr. °FFt)	0.138 (0.080)	0.136 (0.079)	0.124 (0.072)	0.121 (0.070)
Heat Capacity, kJ/kg K (BTU/lb. °F)	1.87 (0.45)	1.94 (0.46)	2.69 (0.64)	2.88 (0.69)
Vapour Pressure, kPa (psia)	0.00 (0.00)	0.00 (0.00)	3.01 (0.44)	14.28 (2.05)

For detailed heat transfer calculations please refer to our Engineering Assistant software which is available at no cost from your Petro-Canada representative.

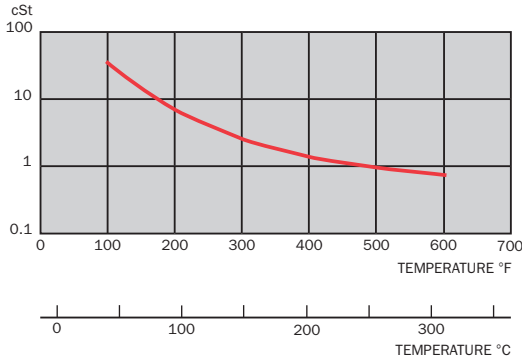
Typical Performance Data

PROPERTY	TEST METHOD	RESULTS
Colour	ASTM D1500	<0.5
Pour Point, °C (°F)	ASTM D5950	-18/0
Flash Point, COC, °C (°F)	ASTM D92	237/459
Fire Point, °C (°F)	ASTM D92	249/480
Autoignition Temperature, °C (°F)	ASTM E659	354 /669
Viscosity, cSt at 40 °C (104 °F) cSt at 100 °C (212 °F)	ASTM D445	37.1/191 5.9/45.6
Neutralization Value, TAN, mg KOH/g	ASTM D664	0.9
Coefficient of Thermal Expansion, %/°C (%/°F)		0.0915 (0.0508)
Distillation Range, °C (°F) 10% 50% 90%	ASTM D2887	 383 (721) 431 (808) 478 (892)

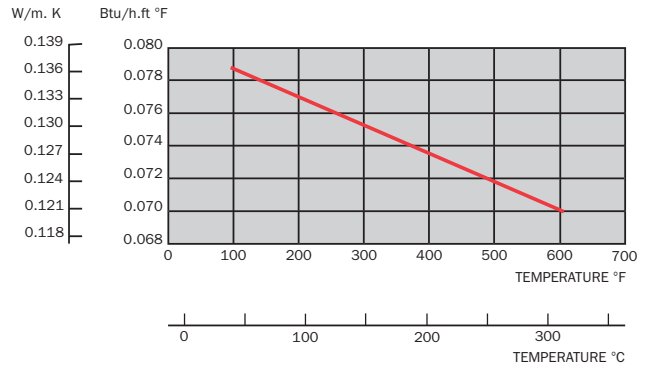
The values quoted above are typical of normal production. They do not constitute a specification.

*non-toxic defined as non-controlled under WHMIS, non-hazardous under OSHA and non-dangerous under DPD.

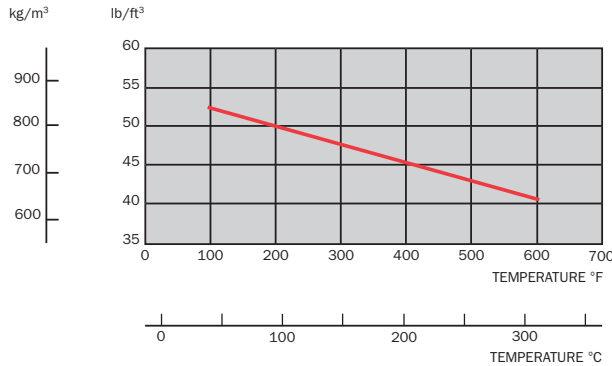
VISCOSITY



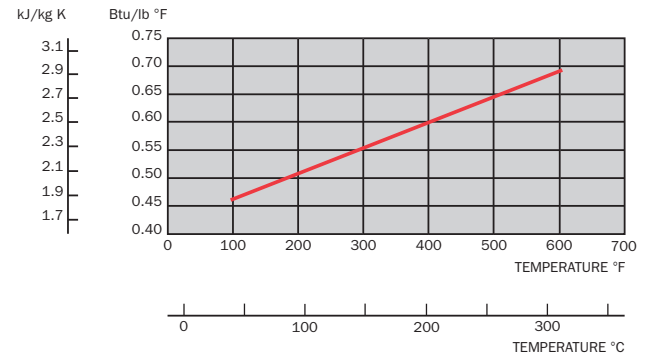
THERMAL CONDUCTIVITY



DENSITY



HEAT CAPACITY



Shelf Life: Product shelf life is 3 years from the date of manufacture when stored in sealed containers under protected storage conditions*.

* Protected storage conditions includes indoor or covered storage, protected from contamination including exposure to rain and snow, exposure to direct sunlight, exposure to extreme temperatures and high / low temperatures cycles.

To order product or to learn more about how Petro-Canada Lubricants can help your business visit: lubricants.petro-canada.com or contact us at: lubecsr@petrocanadalsp.com



IM-7877E (2015.11)

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