



CALFLO™ HTF HIGH TEMPERATURE HEAT TRANSFER FLUID

Introduction

Petro-Canada CALFLO™ HTF is a high temperature heat transfer fluid formulated to provide long service life, without compromise to environmental and workplace health & safety.

CALFLO HTF's unique chemistry starts with a blend of 99.9% pure base fluids, produced from a patented HT purity process. These crystal-clear fluids are free of impurities and aromatic compounds that can be hazardous to workplace health and safety. Utilizing more than 25 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 CALFLO HTF, a heat transfer fluid that provides high thermal efficiency, in high temperature systems, over a long and reliable service life. Yet CALFLO HTF does not raise the same objectionable odours, workplace health and safety, and environmental concerns that are problematic with synthetic aromatic compounds.

Applications

Petro-Canada CALFLO HTF is recommended for use in non pressurized, liquid phase, closed heat transfer systems operating at bulk temperatures up to 326°C (620°F), with tubeskin temperatures as high as 343°C (650°F).

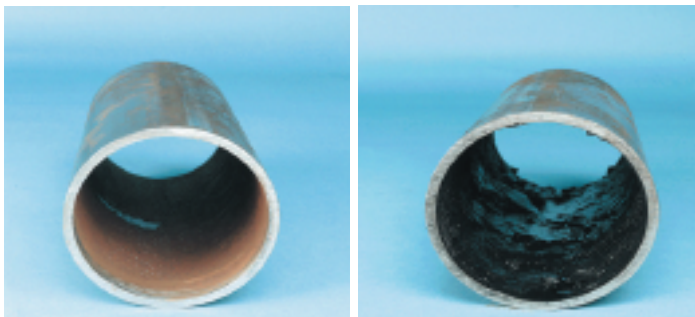
Features and Benefits

More resistant to oxidative breakdown than chemical aromatic competitive fluids.

- A fluid's resistance to oxidative breakdown is critical in heat transfer systems where incidental exposure to air may occur. Strong oxidative resistance can significantly extend fluid life, providing operational savings by reducing fluid change-out frequency and down time.
- CALFLO HTF's strong resistance to oxidative breakdown can extend fluid service life in tough working conditions where fluid exposure to air is likely or can not be avoided.
- This resistance to fluid breakdown can greatly reduce the formation of high-fouling, carbonaceous deposits that can significantly reduce heat transfer system efficiency and increase operating costs.

What is the HT difference?

Petro-Canada starts with the patented 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.



Clean systems run better, more efficiently. With some heat transfer fluids heavy coke and sludge build-up can occur. CALFLO HTF's strong oxidative stability extends fluid life and reduces system fouling.*

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

- CALFLO HTF'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.

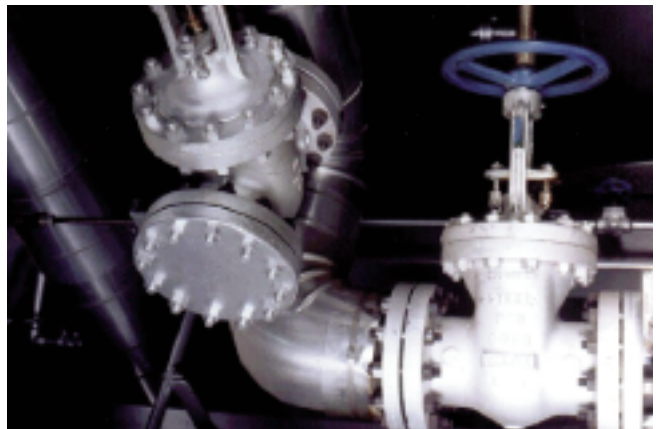
- CALFLO HTF's natural lubricating properties can also reduce maintenance costs by extending the service life of circulating pumps and other rotating parts.

No compromise to environmental and workplace health and safety.

- Unlike synthetic aromatic fluids, CALFLO HTF is virtually odourless and is not considered a toxic* substance according to OSHA (United States), WHMIS (Canada) and DPD (Europe) criteria.
- Because CALFLO HTF produces no objectionable odours and is not a respiratory or skin irritant, workplace conditions remain pleasant and safe for continuous operations.
- CALFLO HTF does NOT require special handling. Shipments and storage of CALFLO HTF do not normally require special safety permits. Empty drums used to transport CALFLO HTF are readily accepted by drum re-conditioners. In addition, used CALFLO HTF may be responsibly disposed in the following ways**:
 - Through re-sale to used oil recycling companies
 - In some jurisdictions, combined with BTU recovery systems.



Use of heat transfer fluid with a high vapour pressure can lead to heavy sludge build-up around control valves and pipe flanges.



CALFLO HTF's low vapour pressure can reduce fluid leakage and save money on system maintenance, cleaning and fluid top-up.

ENVIRONMENT, HEALTH & SAFETY CLASSIFICATION	CALFLO HTF	SYNTHETIC AROMATIC FLUID A	SYNTHETIC AROMATIC FLUID B
OSHA	✓ Non-Hazardous	✗ Hazardous	✗ Hazardous
WHMIS	✓ Non-Controlled	✗ D2B – eye/skin irritant	✗ D2B – eye/skin irritant
SARA TITLE III Hazard Categories	✓ Non-Hazardous	✗ Delayed health hazard	✗ Immediate health hazard

Operational Considerations

CALFLO HTF'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 CALFLO HTF 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 CALFLO HTF has been formulated to resist breakdown when exposed to 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 cleaning and flushing to remove all contaminants, sludge and varnish prior to recharging a system with CALFLO HTF.

Thermal Data

PROPERTY	TEMPERATURE			
	15°C (59°F)	38°C (100°F)	260°C (500°F)	316°C (600°F)
Density, kg/L (lb./ft ³)	0.869 (54.3)	0.855 (53.4)	0.714 (44.6)	0.679 (42.4)
Thermal Conductivity, W/m K (BTU/hr.°F.ft)	0.143 (0.083)	0.142 (0.082)	0.130 (0.075)	0.128 (0.074)
Heat Capacity, kJ/kg K (BTU/lb. °F)	1.89 (0.45)	1.97 (0.47)	2.69 (0.64)	2.88 (0.69)
Vapour Pressure, kPa (psia)	0.00 (0.00)	0.00 (0.00)	2.65 (0.39)	11.44 (1.64)

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

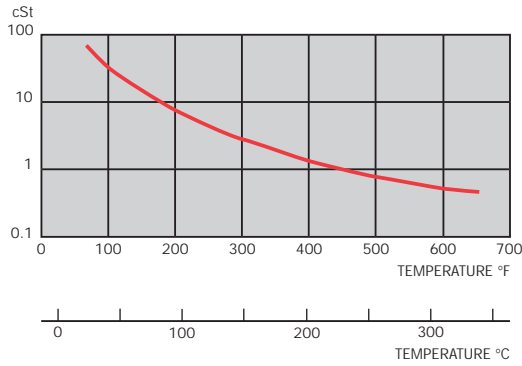
Typical Performance Data

PROPERTY	TEST METHOD	RESULTS
Colour	ASTM D1500	<0.5
Pour Point, °C (°F)	ASTM D97	-18 (0)
Flash Point, COC, °C (°F)	ASTM D92	231 (448)
Fire Point, °C (°F)	ASTM D92	245 (473)
Autoignition Temperature, °C (°F)	ASTM E659	352 (666)
Viscosity, cSt at 40° C (104°F) cSt at 100°C (212°F) cSt at 316°C (600°F)	ASTM D445	35.9 6.0 0.7
Average Molecular Weight		380
Neutralization Value, TAN, mg KOH/g	ASTM D664	<0.1
Sulfur by XRF, wt%	ASTM D4294	<0.0001
Conradson Carbon Residue, wt%	ASTM D189	0.03
Coefficient of Thermal Expansion, %/°C (%/°F)		0.0932 (0.0518)
Distillation Range, °C (°F) 10% 50% 90%	ASTM D2887	374 (705) 424 (795) 476 (889)

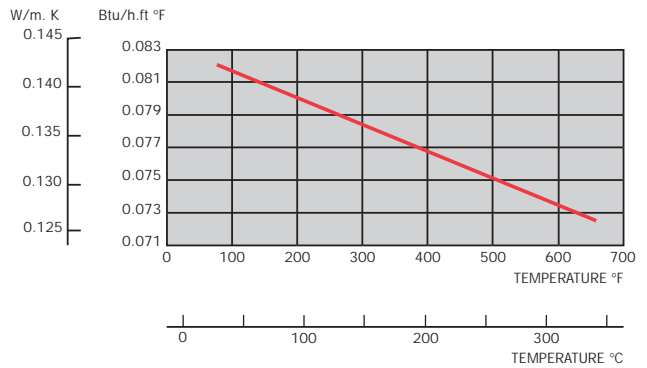
*non-toxic defines as non-controlled under WHMIS, non-hazardous under OSHA and non-dangerous under DPD.

**Any transport and disposal practice must be in compliance with federal, state, provincial and/or local laws and regulations.

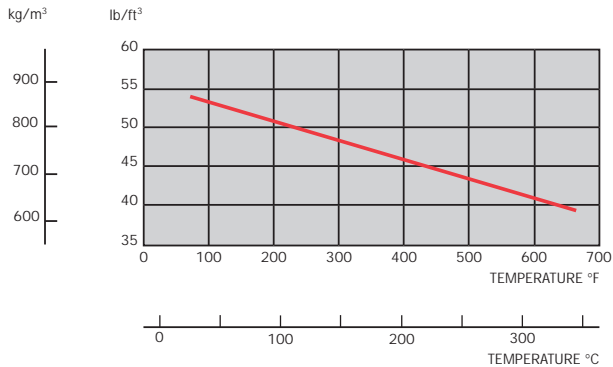
CALFLO HTF VISCOSITY



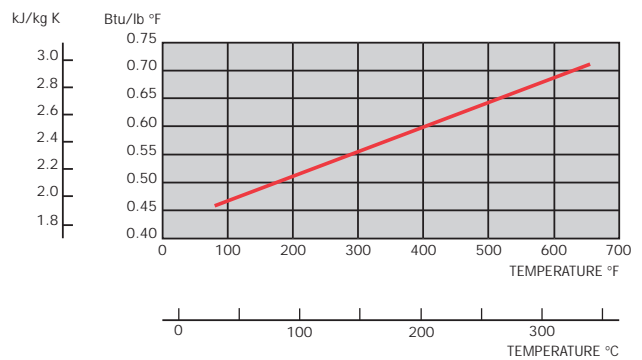
CALFLO HTF THERMAL CONDUCTIVITY



CALFLO HTF DENSITY



CALFLO HTF HEAT CAPACITY



Health and Safety

To obtain Material Safety Data Sheet (MSDS), contact one of Petro-Canada's TechData Info Lines.

TechData Info Lines

TechData sheets for Petro-Canada's Cleaning Fluid and Flushing Fluid and Technical Bulletins regarding guidelines for system cleaning, flushing, and change-out also available. If you would like to know more about Petro-Canada's CALFLO HTF Heat Transfer Fluid, or any other product in our complete line of quality lubricants, please contact us at:

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