

TURBOFLO™ LOW VARNISH PREMIUM TURBINE FLUID

Introduction

Petro-Canada Lubricants' TURBOFLO™ Low Varnish (LV) is a premium turbine fluid designed to lubricate and cool steam, gas and combined cycle turbines and deliver excellent lubrication to bearings operating in severe conditions. It is formulated with Petro-Canada Lubricants' ultra pure HT Severely Hydrotreated base oils and highly advanced additive technology to deliver a winning combination of enhanced oxidative and thermal stability. TURBOFLO LV demonstrates superior oxidation life performance, and has been designed to prevent the deposition of varnish and sludge on critical surfaces in turbine systems, contributing to optimum turbine performance and reliability.

TURBOFLO LV is available in 2 grades: TURBOFLO LV 32 and TURBOFLO LV 46.

Features and Benefits

- **Excellent oxidation stability**
 - Turbine Oil Stability Test (TOST) result of 10,000+ hours, well above the 2,000 – 5,000 hour OEM specifications, indicates exceptional resistance to oil breakdown caused by air and high temperatures
 - Lowers operating costs by extending intervals between oil top-ups or complete change-outs
 - No impurities which tend to interfere with response to antioxidants
- **Excellent varnish and sludge mitigation**
 - Superior performance in the Rapid Varnish Formation Screener Test at 150°C / 302°F
 - Low insolubles weight
 - Low % viscosity increase
 - Excellent mechanical emulsion results
 - Low MPC rating
 - Low Ultra Centrifuge rating, which is considered to be an excellent indicator of varnish potential

Rapid Varnish Formation Screener Test*

Test Description

Oil is aged in a beaker in the presence of copper and steel catalyst coils, at 150°C / 302°F for 4 days. The oil is then filtered; sludge weight recorded, and viscosity, acid number, water separation, MPC Varnish and Ultra Centrifuge tests are completed.

Results After Aging	ISO 32	ISO 46
Insolubles Weight (from filter, average)	0.0856	0.1115
TAN	0.27	0.23
Viscosity @ 40°C, cSt / 104°F, cSt	33.64	45.44
% Viscosity Increase	0.03	0.46
Mechanical Emulsion at 54°C / 129°F	40-40-0(5)	40-40-0(15)
MPC Varnish (Used oil)	5.8	18.9
Ultra Centrifuge Test - Rating # (Completed at TEST OIL Lab)	2	2

- **Outstanding thermal stability**
- **Air release well below the 4 - 7 minute maximum listed in OEM specifications**
- **Low volatility**
- **High viscosity index**
- **Good response to additives**

Applications

TURBOFLO LV is a premium product designed to significantly exceed the demanding service requirements of steam and gas turbine operators. It also provides extended, corrosion-free lubrication of bearings operating in ambient temperatures up to 260°C/500°F.

Gas Turbines / Combined-Cycle Turbines

TURBOFLO LV is recommended for the lubrication of the high-speed bearings in stationary gas turbines. Major utility, pipeline and gas field recovery and co-generation operators will recognize the performance of TURBOFLO LV compared to conventional mineral oil turbine fluids, due to varnish deposit inhibiting technology that has demonstrated its potential to

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.



*REFERENCE: Modified Afton Chemical Procedure (Lube Tech No.114, April 2013)

improve operation and lower cost in gas combustion turbines.

TURBOFLO LV meets or exceeds the performance requirements of the following specifications:

- ASTM D-4304 TYPE I, TYPE III
- DIN 51515 PART 1, PART 2
- DIN 51524 PART 1
- ISO 11158 HH, HL
- ISO 808 TSA, TGA, TGB and TGSB
- GL L-TSA and GB L-TSE Part B
- GB L-TGA and GB L-TGSB
- British Standard BS 489
- General Electric GEK 32568J (ISO 32 only)
- Siemens TLV 9013 04 standard thermal stability
- Siemens TLV 9013 05 high thermal stability
- GE (formerly Alstom) HTGD 90 117
- Ansaldo Energia TG02-0171-E00000/B (ISO 46 only)

Steam Turbines

TURBOFLO LV is recommended for lubricating steam turbines used for electric power generation and other industrial applications. Compared to conventional turbine oils, TURBOFLO LV delivers superior performance over the entire life of the fluid.

Operational Considerations

TURBOFLO LV with enhanced oxidative and thermal stability, and low varnish tendencies helps to provide worry-free operation, prevent the deposition of varnish on critical surfaces (i.e. IGV valves, pencil filters, bearings, etc) and reduce cost to customers under normal recommended conditions. However, actual oil life is dependent upon system design and operating practices. No Nonsense Lubricants Warranty applies.

Typical Performance Data

PROPERTY	TEST METHOD	TURBOFLO LV	
		ISO 32	ISO 46
Viscosity @ 40°C, cSt / 104°F, cSt	ASTM D445	33.6	45.2
Viscosity @ 100°C, cSt / 212°F, cSt	ASTM D445	5.68	6.79
Viscosity Index	ASTM D2270	108	104
Total Acid Number, mg KOH/g	ASTM D664	0.08	0.08
MPC Value (after oven at 80°C / 176°F for 8 weeks)	ASTM D7843	1.3	3.9
Panel Coker, wt.(g) of varnish	Modified Method	0.0097	0.0246
Flash Point, COC, °C/°F	ASTM D92	220/428	230/446
Pour Point, °C/°F	ASTM D5950	-39/-38	-33/-27
Mechanical Emulsion @ 54°C / 129°F	ASTM D1401	41-39-0 (5)	42-38-0 (15)
Foam Sequence I	ASTM D892	0/0	10/0
Foam Sequence II	ASTM D892	0/0	10/0
Foam Sequence III	ASTM D892	0/0	0/0
Air Release @ 50°C / 122°F, min	ASTM D3427	1.2	2.4
Rust, Procedure A&B, 24 hours	ASTM D665	Pass/Pass	Pass/Pass
Copper Corrosion, 3hr @ 100°C / 212°F	ASTM D130	1a	1a
Turbine Oil Oxidation Stability Test, hours	ASTM D943	10,000+	10,000+

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

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: lubcsr@petrocanadalsp.com



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