

TURBOFLO™ XL PREMIUM TURBINE FLUIDS

Introduction

Petro-Canada's TURBOFLO™ XL is a premium turbine fluid designed to lubricate and cool steam and gas turbines and deliver excellent lubrication to bearings operating in severe conditions. It is formulated with Petro-Canada's ultra pure HT Severely Hydrocracked base oils and highly advanced additive technology to deliver a winning combination of enhanced oxidative and thermal stability. TURBOFLO XL demonstrates exceptional oxidative and thermal stability, which surpasses that of many competitive turbine lubricants on the market today. This in turn helps customers to reduce overall maintenance costs and helps to provide worry-free operation. TURBOFLO XL's superior performance is especially important in the severe service situations common to gas turbines. Its outstanding oxidation and thermal stability prevents fluid breakdown caused by air and high temperatures. That means:

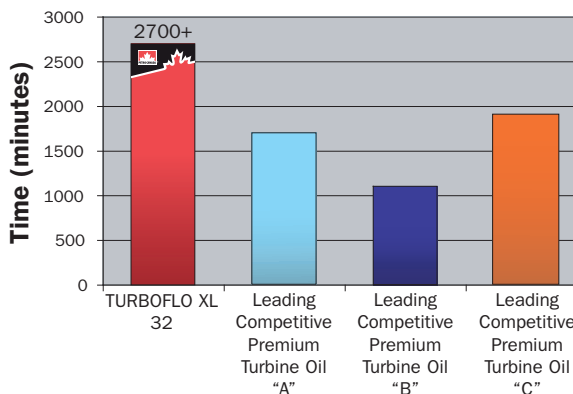
- Longer service life
- Less downtime
- Less top-ups and change-outs

TURBOFLO XL is available in 3 grades: TURBOFLO XL 32, TURBOFLO XL 46 and TURBOFLO XL 68.

Features and Benefits

- **Exceptional resistance to fluid breakdown caused by air and high temperatures**
 - Rotating Pressure Vessel Oxidation Test (RPVOT) result of 2700+ minutes, which is 40% higher than that of the leading competitive products tested
 - Topping-up an existing conventional turbine oil system provides an immediate and marked improvement in oil performance
 - Lowers operating costs by extending intervals between oil top-ups or complete change-outs

Rotating Pressure Vessel Oxidation Test (RPVOT) ASTM D2272



- **Excellent water separability**

- Mechanical Emulsion Test results exhibited the best results achieving a 5 minute separation
- Drainage of condensed water from oil coalescers and purifiers is greatly facilitated
- Condensed water meets environmental guidelines

- **Extremely rapid air and gas separation**

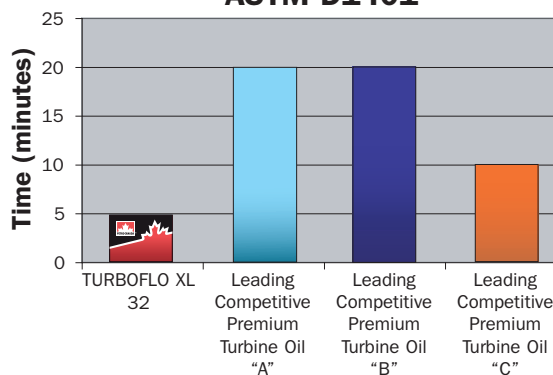
- Less fluid break down
- Improves equipment reliability

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.



Mechanical Emulsion Test ASTM D1401



Applications

TURBOFLO XL 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 above 260°C or 500°F.

Steam Turbines

TURBOFLO XL is recommended for lubricating steam turbines used for electric power generation and other industrial applications. Compared to conventional turbine oils, TURBOFLO XL delivers superior performance over the entire life of the fluid. In large power generation plants, turbine oil is used for several years until degradation of the oil causes poor water separability and low oxidation resistance (low RPVOT values). Because of TURBOFLO XL's extremely high oxidation resistance (high RPVOT values) and fast water separability, **even a partial oil replacement with TURBOFLO XL can return an entire oil system to acceptable standards.** Note: For more information please reference TURBOFLO Top-Up Study Tech Bulletin (TB1236).

TURBOFLO XL is recommended for use in large turbines (100 -1300 megawatts) coupled directly to an electric generator.

TURBOFLO XL fluids are suitable for use in steam turbines requiring the following manufacturer specifications:

General Electric	GEK 46506E
Siemens	TLV 9013 05 (non EP) (ISO 32 and 46 only)

Gas Turbines

TURBOFLO XL 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 have recognized the performance of TURBOFLO XL compared to conventional mineral oil turbine fluids.

TURBOFLO XL 46 has received **ALSTOM OEM** approval **HTGD 90117** (Lubricating and Control Oils for Turbines).

TURBOFLO XL fluids are suitable for use in gas turbines requiring the following manufacturer and industry specifications:

General Electric	GEK 32568F
Siemens	TLV 9013 05 (non-EP) (ISO 32 and 46 only)
Siemens / Westinghouse	1500 00 20, 55125Z3
Solar	ES 9-224W
ALSTOM (ABB)	HTGD 90 117 V0001X
DIN	DIN 51515
ASTM	D4304 Type I (non-EP)
JIS	K 2213 Type 2

High Temperature Bearings

TURBOFLO XL exceeds General Electric specifications for gas turbines operating with bearing ambient and sealing air temperatures above 260°C or 500°F. This demonstrates the fluid is ideal for use in high temperature applications, requiring a lubricant with high thermal and oxidative stability.

Operational Considerations

TURBOFLO XL with enhanced oxidative and thermal stability helps to provide worry-free operation and reduced 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 XL		
		32	46	68
Viscosity				
cSt @ 40°C/SUS @ 100°F	D445	33.86/175	46.39/239	68.17/353
cSt @ 100°C/SUS @ 210°F	D445	5.57/45	6.79/49	8.83/56
Viscosity Index	D2270	101	100	102
Flash Point, COC, °C/°F	D92	220/428	235/455	247/477
Acid Number, mg KOH/g	D664	0.04	0.04	0.04
Pour Point, °C/°F	D5950	-30/-22	-30/-22	-24/-11
Mechanical Emulsion @ 54°C	D1401	40-40-0 (5)	40-40-0 (15)	40-40-0 (20)
Foam Sequence I	D892	0/0	0/0	0/0
Foam Sequence II	D892	15/0	10/0	10/0
Foam Sequence III	D892	0/0	0/0	5/0
Air Release @ 50°C minutes	D3427	3	4	7
Rust Protection A&B, 24 hr	D665	Pass, Pass	Pass, Pass	Pass, Pass
Copper Corrosion 3hr @ 100°C	D130	1a	1a	1a
Rotating Pressure Vessel Oxidation Test, minutes	D2272	2700+	2700+	2700+
Turbine Oil Oxidation Stability Test, hours to 2.0 acid number increase	D943	10,000+	10,000+	10,000+
Turbine Oil Oxidation Stability Test (modified), hours	D943-modified	23,000+	23,000+	23,000+

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: **lubecsr@petrocanadalsp.com**



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