



## TURBOFLO™ R&O TURBINE/CIRCULATING OILS

### Introduction

Petro-Canada™ Lubricants' TURBOFLO™ R&O Oils are high quality lubricants designed for use in steam and gas turbines, as well as the circulating oil systems of a wide range of industrial machinery. The TURBOFLO R&O 10 and 22 grades are also suitable for use as spindle oils.

TURBOFLO R&O Oils are formulated with Petro-Canada Lubricants' ultra-pure HT Severely Hydrotreated base oils and specially selected additives that counteract rust and oxidation. These formulations deliver reliable performance and extended service life.

Compared to conventional R&O Oils, TURBOFLO R&O Oils offer:

- Long term resistance to oil breakdown caused by air and high temperatures
- Excellent rust and corrosion protection
- Excellent water separability

### Features and Benefits

- **Extended resistance to oil breakdown caused by air and high temperatures**
  - Minimizes harmful sludge and varnish deposits, ensuring unrestricted lubricant flow and long component life
  - Extends intervals between oil changes
  - Reduces operating and maintenance costs
- **Superior rust and corrosion protection**
  - Iron and other metal components protected against water damage
- **Excellent water separability and hydrolytic stability**
  - Oil separates readily from water, without loss of performance additives
  - Separated water meets environmental guidelines

- **Improved foam and air entrainment performance**

- Ensures a lubricant film continues to protect metal surfaces
- Prevents overflowing of oil reservoirs
- Eliminates cavitation damage to circulating oil pumps
- Improves equipment reliability

### Applications

Petro-Canada Lubricants' TURBOFLO R&O Oils are designed to meet the demanding service requirements of steam and gas turbine applications. They also provide extended, corrosion-free lubrication of bearings and gears in a wide range of industrial machinery.

### Turbines

TURBOFLO R&O Oils 32, 46, 68 and Premium R&O 77 are recommended for use in many types of steam and gas turbines. These oils show an effective resistance to oxidation and will give long periods of trouble-free operation. With Turbine Oil Oxidation Stability Test (TOST) values in excess of 5000 hours, TURBOFLO R&O 32, 46, 68 and Premium R&O 77 are suitable for use in steam and gas turbines requiring the following manufacturer and industry specifications:

- General Electric . . . . . GEK 46506E (ISO 32)
- Siemens/ . . . . . 1500-00-20  
Westinghouse (ISO 32, 46, 68)
- Siemens . . . . . TLV 9013 04 (ISO 32)
- GE (formerly Alstom) . . . HTGD 90 117  
(ISO 32, 46)
- Solar . . . . . ES 9-224Y  
(ISO 32, 46)
- ASTM . . . . . D4304 Type I  
(ISO 32, 46, 68, 100)
- JIS . . . . . K 2213 Type 2  
(ISO 32, 46, 68)

### 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.



In addition, TURBOFLO Premium R&O 77 meets Naval Steam Turbine and Main Gearing Lubricant Specification: National Defense Standard C-82-001-000/SF-001, NATO Guide Specification STANAG1425, NATO Code O-240.

For turbine bearings operating above 260°C (500°F), or where a greatly extended lubricant life is desired, **Petro-Canada Lubricants'** TURBOFLO XL and TURBOFLO LV Fluids are recommended. In addition, if low varnish sludge formation are desired, TURBOFLO LV is recommended.

For geared heavy duty turbines with common gear and bearing lubrication systems, TURBOFLO EP fluids are recommended.

### **Bearings**

TURBOFLO R&O oils are suitable for use in circulating systems and bearing applications. For oil and viscosity grade selection, please refer to OEM recommendations or consult a Petro-Canada Lubricants Technical Services representative for additional information.

### **Gears**

The American Gear Manufacturers Association (AGMA) has developed gear lubricant standards for industrial machinery. TURBOFLO R&O Oils are recommended where the AGMA specifies **Inhibited, R&O** Oils. If an antiscuff (AS) lubricant is specified or if FZG fail stage minimum of 10 is required, Petro-Canada Enduratex EP oils are recommended.

## **GEAR LUBRICATION**

Gears sometimes require a heavier oil viscosity than bearings. Where oil lubricated bearings are used in conjunction with gears, the whole assembly should be lubricated with the heavier oil recommended for the gears.

<b>ISO Viscosity Grade</b>	<b>Former AGMA Grade Equivalent</b>	<b>TURBOFLO R&amp;O</b>
ISO VG 46	1	46
ISO VG 68	2	68
ISO VG 100	3	100
ISO VG 150	4	150
ISO VG 220	5	220
ISO VG 320	6	320
ISO VG 460	7	460

## Typical Performance Data

PROPERTY	TURBOFLO R&O OILS											
	TEST METHOD	R&O 10	R&O 22	R&O 32	R&O 46	R&O 68	Premium R&O 77	R&O 100	R&O 150	R&O 220	R&O 320	R&O 460
ISO Grade		10	22	32	46	68	-	100	150	220	320	460
Colour	D1500	0.5	0.5	0.5	0.5	0.5	0.5	0.5	<2.5	<3.5	<4.5	<5.0
Viscosity, cSt @ 40 °C	D445	9.8	22.1	32.0	44.4	65.0	79.3	94.3	137.1	205.5	303.2	439.5
cSt @ 100 °C		2.7	4.3	5.4	6.7	8.6	9.9	11.1	14.2	18.3	23.5	29.68
Viscosity Index	D2270	105	95	103	104	104	104	103	101	98	97	96
Flash Point, COC, °C/°F	D92	182/360	204/399	220/428	224/435	234/453	237/458	262/504	269/516	275/527	297/566	317/602
Pour Point, °C/°F	D5950	-54/-65	-39/-38	-39/-38	-36/-33	-30/-22	-36/-33	-24/-11	-30/-22	-21/-6	-18/0	-15/5
Oxidation Stability hours to 2.0 TAN	D943	5,900+	5,900+	5,000+	5,000+	5,300+	5,500+	6300+	3,500+	3,500+	2,700+	1000+
Rust Test Procedure B, 24 hours	D665	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Water Separability, 54 °C 82 °C	D1401	41-39-0(5)	41-39-0(10)	41-39-0(10)	41-39-0(15)	41-39-0(15)	40-40-0(25)	41-39-0(10)	40-40-0(10)	40-40-0(15)	41-39-0(20)	41-39-0(15)
Acid Number, mg KOH/g	D664	0.14	0.10	0.15	0.12	0.11	0.09	0.09	0.18	0.17	0.17	0.13
Operating Temperature Range <sup>1</sup>												
Bearing °C	-	-39 to 32	-19 to 55	-12 to 65	-7 to 74	0 to 84	2 to 90	5 to 94	12 to 103	17 to 111	23 to 122	28 to 131
°F	-	-37 to 90	-2 to 131	10 to 149	19 to 165	32 to 183	36 to 194	41 to 201	54 to 217	62 to 231	73 to 252	82 to 268
Gear °C								-4 to 66	2 to 75	8 to 84	13 to 92	18 to 100
°F								25 to 151	36 to 167	46 to 183	55 to 198	64 to 212

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

<sup>1</sup>Approximate temperature range is based on typical viscosity results and on minimum and maximum operating viscosity ranges of 13 - 1000 cSt (rolling element bearings) and 30 - 2200 cSt (enclosed gear systems). NOTE: These are general recommendations and end users should consult their bearing/gearbox OEM or a PCLI Technical Services representative for oil selection or when using lower ISO VG for gear lubrication.

To order product or to learn more about how Petro-Canada Lubricants can help your business visit: [lubricants.petro-canada.com](http://lubricants.petro-canada.com) or contact us at: [lubcsr@petrocanadalsp.com](mailto:lubcsr@petrocanadalsp.com)



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