

946 mL – 1 U.S. Quart



bp

TURBO OIL 274

TURBINE ENGINE & ACCESSORY

Introduction

While the changing of our label for turbo oil is relatively new, our experience in lubricating turbine engines is not. In 1949 the Research Division, which was initially responsible for the development of our turbo oils, helped turn the vision of gas turbine powered flight into the reality we accept for granted today. By developing the first synthetic oil that could be used successfully in gas turbine engines, much wider fields to the aircraft designer were opened. This position of leadership has never been relinquished and you can depend on us just as you did in 1949.

BPTO 274

BP Turbo Oil (BPTO) 274 is now being used by over 50 airlines throughout the world, representing nearly two-thirds of the world's commercial requirement for 7.5 cSt turbo oils. This fact attests to the outstanding performance of this product in the engines and accessories now in service.

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Product Description

BP Turbo Oil (BPTO) 274 is a synthetic oil having a viscosity of 7.5 centistokes at 210°F and meets DEF STAN 91-98/1 (replaces British Military Specification DERD 2487). It is formulated with special synthetic base stocks into which are incorporated additives to inhibit wear, oxidation, and foaming. It provides good high temperature performance and load-carrying ability. These features provide long trouble-free performance under severe conditions. Although this is not always appreciated, synthetic oils of this type are not all identical. The performance advantages of BPTO 274 are achieved only by careful selection and balance of base stocks and additives to provide the desired performance.

Details of laboratory analyses of physical, chemical, and performance properties are provided in the Appendix. Significant performance properties are discussed below. Where detailed information on the laboratory test methods and the significance of results is desired, a member of the Exxon technical staff will be happy to provide them.

LOAD CARRYING: BPTO 274 provides load carrying ability, as measured in the IAE Gear Machine and Ryder Gear Tests, well in excess of requirements established by the engine and equipment manufacturers. Long life of bearings, gears, and other highly loaded lubricated surfaces is thus assured under normal operating conditions.

CLEANLINESS: Minimum formation of carbon, varnish or sludge deposits is one of the characteristic advantages of BPTO 274 under temperature conditions normally encountered in turboprop engines.

BULK STABILITY (resistance to physical or chemical change resulting from oxidation): The high degree of oxidation resistance of BPTO 274 permits long periods of severe operation without significant increase in viscosity or total acidity, the two principal indicators of product oxidation. The need to change oil because of oxidation effects is rare when using BPTO 274. Most users find it unnecessary to make oil changes in spite of occasional mechanical abnormalities that create unusually severe oxidizing conditions.

COMPATIBILITY: While considerable laboratory data is available to demonstrate the compatibility of BPTO 274 with metals, elastomers and other lubricants, the extensive airline experience most adequately demonstrates this property. BPTO 274 is compatible with other turbo oils meeting the same specifications to the extent that an inadvertent mixing or emergency top-off with another approved brand will not cause additive separation to occur. **However, most engine builders do not recommend indiscriminate mixing of approved oils and we agree with this principle.**

SHELF LIFE: The shelf life of BPTO 274 can extend beyond ten years when stored in original, unopened quart cans under acceptable conditions, such as away from extreme heat and moisture. Likewise, drummed product (includes 55 gallon drum and 5 gallon pails) has an expected shelf life of three years minimum. For all package styles, shelf life can be increased significantly beyond those stated above, depending upon storage conditions. Please contact your bp representative if you have any questions about product usability.

Approvals

BPTO 274 is approved for certain Rolls-Royce engines and associated accessories. The approvals listed below are current as of the time of printing; however, the respective manufacturer's manuals and service bulletins should be consulted.

ROLLS-ROYCE ENGINES

Dart: BPTO 274 is approved for use in all marks of the Dart engine (R-R Service Bulletin DA 70-4).

Gnome: BPTO 274 is approved for use in all marks of the Gnome engine (engine type certificate data sheet for each respective mark).

Orpheus: BPTO 274 is approved for use in all marks of the Orpheus engine (Bristol Siddeley letter dated January 18, 1965).

Pegasus: BPTO 274 is approved for use in all marks of the Pegasus engine (Bristol Siddeley letter dated January 18, 1965).

Proteus: BPTO 274 is approved for use in all marks of the Proteus engine (Bristol Siddeley letter dated April 14, 1967).

Tyne: BPTO 274 is approved for use in all marks of the Tyne engine (R-R letter dated October 13, 1964).

Viper: BPTO 274 is approved for use in Marks 8, 9, 11 and 22-1 (MK 22-1 is license built by Piaggio) of the Viper engine (Bristol Siddeley letter dated January 18, 1965).

ACCESSORIES

Dowty Rotal

Accessory Drive Gear Boxes: BPTO 274 is approved for use in all accessory drive gearboxes and associated components used in R-R Dart engines (Dowty Rotal Service Bulletin No. 83-58). BPTO 274 is also approved for use in Dowty Rotal accessory drive gearboxes in R-R Tyne applications.

Propeller Systems: BPTO 274 is approved for use in propeller systems associated with R-R Dart (Dowty Rotal letter dated March 25, 1965).

Hawker Siddeley Dynamics: BPTO 274 is approved for the propeller system incorporated with Tyne engines on Canadair CL-44 aircraft.

Solar: BPTO 274 is approved for use in auxiliary power unit T-62T-25 (Solar Service Document 1966C).

Pratt & Whitney Canada: BPTO 274 is approved for use in accessory gearboxes incorporated with Tyne engines on Canadair CL-44 aircraft (Pratt & Whitney Canada letter dated January 12, 1967).

Technical Service

BP provides technical service in support of its products and their performance. The two vital elements of this service consist of a highly qualified Technical Staff and a complex of Sales Service Laboratories. As the name implies, the Technical Staff maintains contact with customers, engine and airframe manufacturers, and accessory equipment manufacturers. The Sales Service Laboratories provide laboratory services to assist in used oil analyses.

TECHNICAL STAFF

The Technical Staff consists of aviation career specialists to provide service to customers and to work with major airframe and engine builders. These specialists have at their disposal the full facilities of Sales Service Laboratories and BP product research facilities. This system ensures that each individual is well informed on equipment developments, industry problems and product performance. Thus, while only one member of the Technical Staff will be the principal contact with a customer, that member will reflect the experience and knowledge of the entire organization and will have ready access to all facilities of the corporation for assistance as required on behalf of his assigned accounts. The fact that the Technical Staff is part of the headquarters of their respective organizations assures that the staff members have headquarters' authority to assist in effective handling of their assignments.

BP provides worldwide technical service in support of turbo oil customers. Service is coordinated by Air BP Lubricants from its office in Parsippany, New Jersey.

SALES SERVICE LABORATORIES

The Sales Service Laboratories are located throughout the world at BP's major refineries and blending plants. These laboratories in turn are backed up by the full facilities of BP research facilities in Naperville, Illinois.

PRODUCT SAMPLE PROCEDURES AND HANDLING

The base purpose of analyzing product samples is to assist in solving or defining a problem that may be related to the performance of the lubricant. Thus, the sample size and handling procedures may vary with the nature of the suspected problem and with the analytical techniques required for definition and solution. Experience has provided standardized procedures applicable in many instances. Details are available from a member of the Technical Staff.

Quality Control

BPTO 274 is blended in batches with each batch composed of the identical chemicals, in the same proportions, used in all previous batches. Approximately 18 tests are performed on each batch to evaluate the physical, chemical and performance characteristics of the product. Historically, the batch-to-batch variations are within the limits of test repeatability.

As each batch is prepared, a quantity of product is set aside in sealed containers. Periodically, a container is opened and tested to ensure that no change has occurred in the physical or chemical properties as a result of time. Customers can enhance the product storage stability life by using first-in, first-out inventory procedures and maintaining the oil under normal storage conditions (indoors protected from excessive heat). Within these parameters, experience has shown BPTO 274 shelf life has no effect on its performance. It is suggested that oil that has been exposed to extremes of high temperature and humidity in storage be retested.

Most important in monitoring product quality is the frequent observation of airline engines and accessories. A specialized rating system has been developed by the Technical Staff in cooperation with the product research facilities. This system provides for numerical descriptions of engine mechanical condition and lubricant performance for all critical lubricated components. By this means, the conditions of two or more engines can be compared even though they may be inspected at different times. The system thus provides a yardstick for measuring the uniformity of performance in operating engines. This method of documentation also permits an appraisal of engine mechanical condition, an evaluation of the effectiveness of mechanical modifications and a comparison of the performance of different lubricants.

Future Outlook

As documented in previous sections, BPTO 274 is providing outstanding performance, particularly in the Dart and Tyne, the most widely used Rolls-Royce turboprop engines in service today. BP will continue to make BPTO 274 available as long as the demand for 7.5 cSt oils continues to provide an equitable incentive.

Health and Safety Precautions

Health studies have shown that under normal conditions of use, turbo oil presents a low risk to human health. The major health risk from exposure to turbo oil is temporary irritation of the eyes, skin, and respiratory tract. Temporary irritation is a common hazard of most petroleum hydrocarbons and synthetic lubricants, like turbo oil. Irritation occurs when product is applied directly to the eyes, repeatedly to the skin, or when high levels of vapors or mist are inhaled. Because sensitivity to irritation can vary from person to person, direct contact with the eyes and skin, and inhalation of vapors or mist should be minimized. Prolonged and repeated skin contact with turbo oil can also cause temporary dermatitis.

Because the vapor pressure of turbo oil is very low, generation of vapor under ambient temperature conditions is unlikely. At elevated temperatures, however, product vapor may be generated at concentration levels sufficient to cause irritation, particularly in poorly ventilated areas or in confined spaces. If this occurs, or if a mist of turbo oil is generated, precautions should be taken to avoid inhaling vapor or mist at concentrations above the exposure guidelines specified on the product Material Safety Data Sheet (MSDS). Prolonged over-exposure to vapors or mist could cause headache, light-headedness, dizziness, and potentially unconsciousness, but normal conditions of use will not produce these effects.

You can protect yourself from routine turbo oil-related hazards by using appropriate engineering controls and work practices, and by wearing proper eye protection, gloves and clothing. Additional important health and safety information for this product is provided on the MSDS, which is available from your BP representative. The exposure guidelines found on the MSDS should always be followed.

Turbo oil should never be siphoned by mouth. However, if the oil is swallowed, DO NOT induce vomiting, but seek medical advice immediately to guard against the hazard of aspirating oil into the lungs. While the oil is not highly toxic when swallowed, lung aspiration can result in chemical pneumonia that may not occur for some time.

In the event of fire or leakage of product onto an extremely hot surface which causes turbo oil to burn, emission of fumes and combustion products that are potentially irritating, noxious, and toxic may occur, such as aldehydes and carbon monoxide. Take precautions to avoid and/or minimize exposure under these conditions. Use supplied oxygen if necessary.

Additional health and safety information may be obtained by writing to: Air BP Lubricants, Air BP, Maple Plaza II-1N, Six Campus Drive, Parsippany, NJ 07054.

Appendix

BPTO 274 Typical Inspections vs. DEF STAN 91-98/1 Specification (DERD 2487)

The values shown here are representative of current production. Some are controlled by manufacturing specifications, while others are not. All of them may vary within modest ranges.

SPECIFICATION TESTS	BPTO 274	DERD 2487		TEST METHOD	
		MIN.	MAX.	ASTM	IP
B.S.E.1 Bristol-Siddeley bearing rig test.....	Pass	Performance equal to ref. oil.		Part 4.1, DERD 2487	
Compatibility test.....	Pass	Data on file with M.O.D.		Part 4.2, DERD 2487	
Elastomer swell, 192 Hrs. @ 150°C in vac., % vol.	23.2	15.5	29.5	Appendix A of DERD 2487 166	
IAE-gear test					
2000 RPM, % of reference.....	101.4	100	—		
6000 RPM, % of reference.....	106.3	100	—		
Homogeneity test between -54°C and 280°C.....	Pass	No separation, etc.		Part 4.6, DERD 2487	
Shear stability, % change in viscosity @ 100°F.....	Nil		± 2	Appendix B of DERD 2487	
Thermal stability, % change in viscosity @ 100°F		—		Appendix C of DERD 2487	
After 6 hours.....	-5.9	—	-10, +20		
After 12 hours.....	-2.4	—	-10, +20		
After 18 hours.....	+1.1	—	-10, +20		
After 24 hours.....	+4.9	—	-10, +20		
Viscosity @ -40°F, cSt, (after 12 hrs. at -65°F).....	20,330		Report	Part 4.9, DERD 2487	
Volatility, 6½ hrs. @ 200°C, % loss.....	17.0		Report	D972	
Mineral acidity, mg KOH/g	Nil		Nil		1 (Method C)
Total acid number, mg KOH/g	0.15		Report	D974	139
Total alkalinity, ml 0.01N H ₂ SO ₄ /100 ml.....	Nil		Report	Appendix D of DERD 2487	
Oxidation corrosion test, 22 hrs @ 140°C				Appendix E of DERD 2487	
Cadmium plate steel, wt. change mg/cm ²	-0.04	—	± 0.2		
viscosity @ 100°F, % change.....	+3.8	—	± 5		
acidity, mg KOH/g.....	Nil	—	0.5		
Copper, wt. change mg/cm ²	Nil	—	± 0.2		
viscosity @ 100°F, % change.....	+4.3	—	± 5		
acidity, mg KOH/g.....	+0.08	—	0.5		
Flash point, °F.....	455	420	—	D92	36
Specific gravity, 60/60°F.....	0.953		Report	D1298	160
Viscosity @ -40°F, cSt (after 35 minutes).....	11,000		13,000	Part 4.9, DERD 2487	
Viscosity @ 100°F, cSt.....	36.0		38.0	D445	71
Viscosity @ 210°F, cSt.....	7.75	7.5			
OTHER TESTS					
Viscosity @ 100°C, cSt.....	7.6	—	—	D445	71
Viscosity @ 40°C, cSt.....	33.3	—	—		
Pour Point, °F.....	-75	—	—	D97	15
SOD lead corrosion, mg/in ²	-1	—	—	Fed. Test Std. 791/5321	
Foaming, 1st sequence, tendency/stability @ 5 min, ml	5/0	—	—	D892*	146*
2nd sequence, tendency/stability @ 3 min, ml.	20/0	—	—		
3rd sequence, tendency/stability @ 5 min, ml.	10/0	—	—		
Ryder gear rating, absolute lbs/in.....	3200	—	—	D1947	
Coefficient of expansion (Avg: -40 to 300°F).....	0.00081	—	—	BP test method	
Saponification Number.....	215	—	—	D94	136
Ag corrosion, 50 hrs. @ 450°F, wt change, mg/in ²	0.4	—	—	Fed. Test Std. 791/5305	
Cu corrosion, 50 hrs. @450°F, wt change, mg/in ²	0.3	—	—	Fed. Test Std. 791/5305	
Trace sediment, ml/200 ml.....	Trace	—	—	D2273*	
Specific gravity @ 60/60°F.....	0.9512	—	—	D1298	160

* Modified

Appendix

**BPTO 274 Typical Inspections vs. DEF STAN 91-98/1 Specification
(DERD 2487)**

(Cont'd)

OTHER TESTS	BPTO 274	DERD 2487		TEST METHOD	
		MIN.	MAX.	ASTM	IP
Oxidation and corrosion stability, 72 hrs. @ 347°F.				Fed. Test Std. 791/5308*	
Cu, wt. change, mg/cm ²	-1.50	—	—		
Mg, wt. change, mg/cm ²	0.00	—	—		
Al, wt. change, mg/cm ²	0.00	—	—		
Fe, wt. change, mg/cm ²	+0.02	—	—		
Ag, wt. change, mg/cm ²	+0.03	—	—		
Viscosity change @ 100°F, %	13.5	—	—		
TAN change, mg KOH/g.	-1.38	—	—		
% Oil loss	1.0	—	—		
Nitrile rubber swell, % ("H" rubber)				Fed. Test Std. 791/3604	
192 hrs. @ 302°F	23.2	—	—		
Silicone rubber swell, %				Fed. Test Std. 791/3604	
192 hrs. @ 212°F	6.7	—	—		

* Modified



Air BP

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