

TURBINE OILS

GST[®] PREMIUM 32



CALTEX



CALTEX
LUBRICANTS

FORMULATED TO FIGHT
SLUDGE AND VARNISH

GST® Premium 32 Can Help Your Turbines Run Smoothly

GST Premium 32 is designed to resist the effects of sludge and varnish in gas and steam turbines.

Outstanding performance with the potential for maintenance savings.

Engineered to meet the performance requirements of MAN Diesel and Turbo, GST Premium 32 combines outstanding performance and delivers value through:

- Exceptional oxidation and thermal stability
- Excellent rust and corrosion protection
- Minimum foaming
- Rapid water separation



GST Premium 32



CHEVRON TURBINE OILS CAN HELP YOU RUN BETTER LONGER

Reach a new level of reliability with GST Premium 32 turbine oils. Contact our Chevron specialists to design a lubrication plan that, when combined with GST Premium 32 and targeted services, help your equipment continue to operate under demanding conditions.

To learn more, contact your marketer.



CHEVRONLUBRICANTS.COM/RBL

Formulated to Fight Sludge and Varnish

Both steam and gas turbines share a common goal: improve efficiency using less fuel, reduce emissions and improve reliability. The power generation industry has become larger with increasing requirements to run more efficiently. Power generation equipment demands increase the thermal loads placed on turbine oils. With this increase in thermal loads, a long oil life is imperative for a power generation operation to run smoothly. To meet the demands of increased thermal loads and long oil life, turbine oils need to possess superior thermal and oxidative stability.

Steam and gas turbine systems are designed for years of operation. The effects of sludge and varnish can affect component life and cause equipment service interruption. Equipment downtime is of major concern for operators of turbine systems. The causes of sludge and varnish formation in the lubricant in turbines are varied, but the most common cause is long-time oil aging (oxidation) at high operating temperatures (typically 60°C-120°C). Short-term oil deterioration in localized hot spots within the turbine system is also a common cause of sludge and varnish. These hot spots can be caused by deposits, overheating, insufficient bearing lubrication, micro-dieseling or electrostatic discharge from the filter media. Air and water contamination can also contribute to the formation of sludge and varnish.



CHEVRON LUBRICANTS FIELD TRIAL AT THE CHEVRON SYCAMORE COGENERATION PLANT IN BAKERSFIELD, CALIFORNIA

GST® Premium 32 was developed in 2011 to meet customers' needs for an effective product to help manage sludge and varnish build-up in their gas and steam turbines. It is currently in-service without operational issues in a GE 7EA gas turbine that operates approximately 8,000 hours annually at the Chevron Sycamore Cogeneration Plant in Bakersfield, California. The result of the Rotating Pressure Vessel Oxidation Test (RPVOT), ASTM D2272 was 43% of the new oil value (1500 minutes). This test is used to determine the oxidation stability reserve of the turbine oil.

GST® Premium 32 Provides the Answer

GST Premium 32 is uniquely formulated to meet the industry’s highest performance requirements to minimize the effects of sludge and varnish on critical turbine components. GST Premium 32 turbine oil has exceptional thermal and oxidative stability performance in Mitsubishi Hitachi Power Systems, GE, Alstom, Siemens and Solar turbines in non-g geared gas and steam turbines where extreme temperatures can be experienced. It is additionally suitable for severe service industrial applications that require a rust and oxidation inhibited (R&O) ISO 32 circulating oil with extended service capability.



Clean Filter/Filter media from servo valve control system of GE 7 EA gas turbine at Chevron Sycamore Cogeneration Plant.

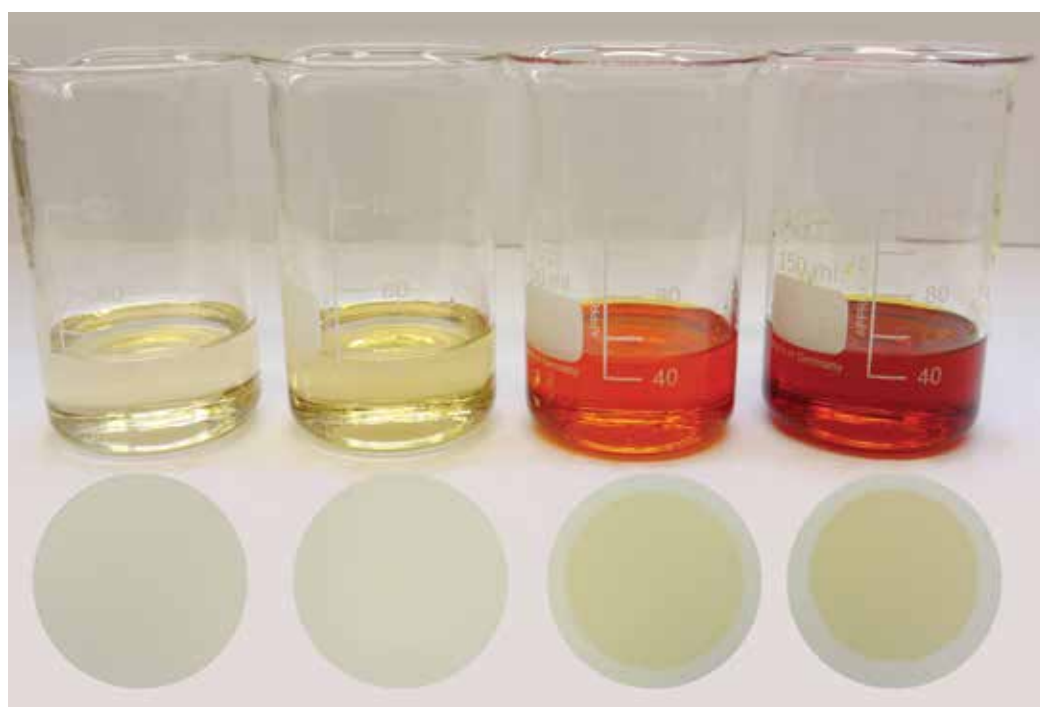
Tested to the Limits

GST Premium 32 was run in multiple tests that examined the quality of the product. These tests include the Lubricant Temperature Aging Test (LTAT), Dry TOST, and the ASTM D943 TOST Test. These assessments confirm that GST Premium 32 oil is thermally stable, has low sludge and varnish tendencies and has a longer oil life. GST Premium 32 meets over a dozen OEM requirements, which help steam and gas turbines reach their maximum capabilities.



GST® Premium Demonstrates Thermal Stability

MAN Diesel & Turbo manufactures industrial compressors and turbines. Their proprietary test, Lubricant Temperature Aging Test (LTAT), is a component of the lubricant performance requirements for use in their equipment. For most large turbine systems, high operating temperatures are the leading cause of premature turbine oil failure. The LTAT was developed to evaluate the thermal stability, varnish and sludge potential of lubricant oil at elevated operating temperatures of 120°C (248°F), 150°C (302°F) and 180°C (356°F) in a short period of time.



Reference Sample

120°C (248°F)

150°C (302°F)

180°C (356°F)

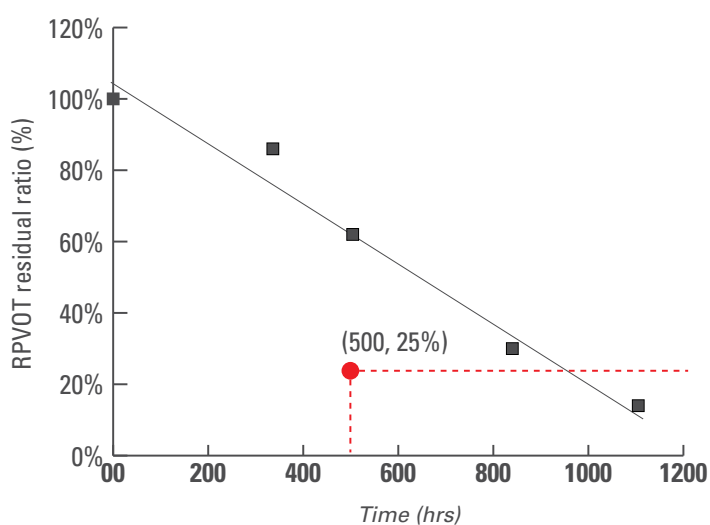
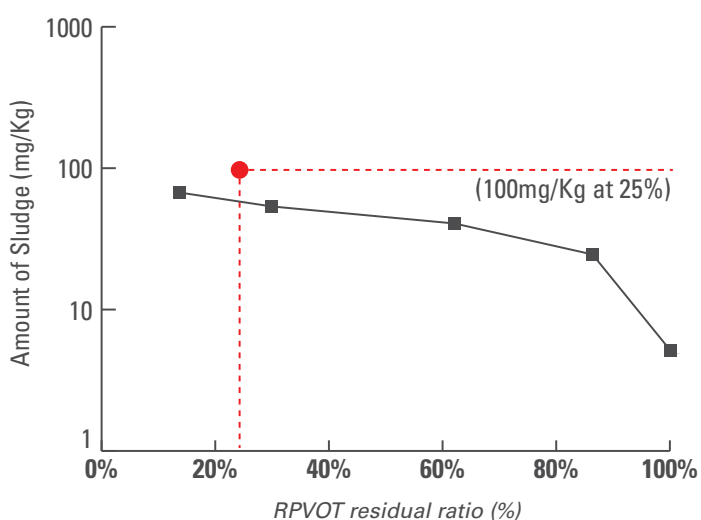
Chevron GST® Premium 32

Most conventional turbine oils show good performance when subjected to normal operating temperatures. But a conventional mineral oil will start to rapidly oxidize at temperatures above 82°C (180°F). At all three temperatures throughout the test duration, GST Premium 32 was thermally stable and showed evidence of its ability to minimize deposits. The results clearly show only slight degrees of discoloration when subjected to elevated temperatures and indicate that GST Premium 32 provides excellent resistance to sludge and varnish formation.

The Mitsubishi Hitachi Power Systems (MHPS) MS04–MA–CL002 and CL001 Specifications

MHPS has correlated low in-service deposit and sludge performance to a standard test (Dry TOST) and have incorporated this test into their turbine oil specification approval process. The MHPS turbine oil specification is the industry’s most stringent turbine oil approval. The maximum amount of sludge the test will allow is 100 mg/kg at 25% RPVOT residual. The oil must also pass the ASTM D7873 Dry TOST 25% RPVOT residual for a minimum of 500 hours. While there isn’t a singular, defined industry test to correlate a new turbine oil’s ability to protect against sludge and varnish, the ASTM D7873 Dry TOST method is viewed by many experts to be a very good indicator of sludge and varnish tendencies of a turbine oil.

DRY TOST CHART



GST® Premium 32 is approved for:

- Alstom HTGD 90117 (for non-g geared turbines)
- Mitsubishi Hitachi Power Systems MHPS MS04–MA–CL002 and CL001
- Siemens TLV 9013 04 and TLV 9013 05
- MAN Diesel & Turbo 10000494596 rev 2

GST® Premium 32 meets the requirements of:

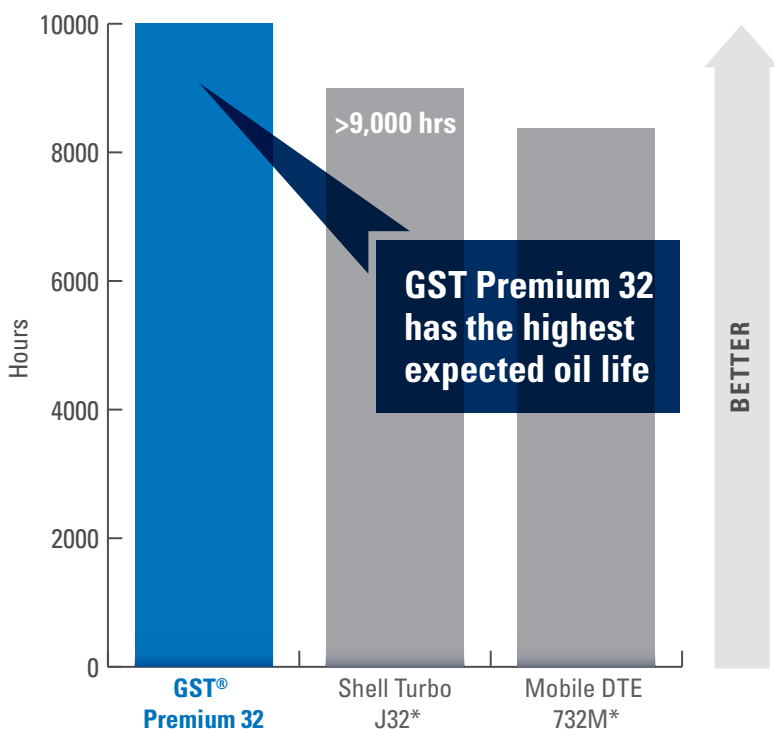
- ANSI/AGMA 9005-E02 R&O
- ASTM D 4304 Type I, III
- BS 489-1999
- China National Std GB 11120-2011 L-TSA Type A and Type B
- China National Std GB 11120-2011 L-TGA
- DIN 51515/1 and 51515/2
- General Electric GEK 28143A, GEK 28143B, GEK 32568E, GEK 32568F, GEK 32568J, GEK 46506D, GEK 46506E
- ISO 6743/5 (L-TSA, L-TGA)
- ISO 8068 L-TGA
- ISO 8068 L-TSA
- JIS K-2213 Type 2
- Siemens Industrial Turbomachinery MAT 81 21 01
- Siemens Westinghouse PD-55125Z3
- Solar ES 9-224, Class II

ASTM D943 TOST Test

The TOST test is used for turbine oils to estimate the expected oil life, especially those that are prone to water contamination, by subjecting the oil to high temperatures and introducing oxygen, water and metal catalysts to find evidence of acid formation. The D943 test procedure requires this test to be terminated at 10,000 hours. Running this test beyond 10,000 hours reduces the precision of the test results and the result should be reported as using a modified ASTM test procedure.

EXPECTED OIL LIFE

ASTM D943 STANDARD TEST METHOD FOR OXIDATION



*Data obtained from published product literature



Caltex Reliability — The RBL™ Program is our commitment of business support and reliability: Caltex's lubrication expertise combined with superior products and a tailored service program work together to help your business Run Better Longer.

A **Chevron** company product

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