TANNAS CO.
LABORATORY INSTRUMENTS

Quantum® Pro

Oxidation Tester

ASTM D2272, D2112, D4742, D7098, D942, IP229

Principle

Oxidation Stability: Test material, placed in a stainless steel pressure chamber, is exposed to oxygen at a specific test temperature and pressure. As the antioxidants are consumed, the sample reacts with the oxygen and the pressure drops.

History

Hot oil baths of varying sizes have long been used in the industry for running the Rotating Pressure Vessel Oxidation Test (RPVOT, formerly known as RBOT) and the Thin-Film Oxygen Uptake Test (TFOUT). These bath types expose the operator to hot oil fumes and odors, are prone to leak, need regular maintenance, and are generally messy and potentially hazardous to operate.

As laboratory facilities strive to improve their workplace conditions and encourage healthy environments, alternative approaches to running these tests are necessary.

Innovation

Tannas Co. sets a higher standard by eliminating the hazards and mess of hot oil baths. **The *Quantum® Pro* is the sole ASTM D2272 dry-block oxidation stability testing solution.** Our technology is simple, clean, and efficient. The *Quantum® Pro* is the latest iteration of the industry-leading instrument used for evaluating oxidation resistance over a broad range of oils and lubricants. It features several advanced capabilities that make it an even more essential tool for those in the oil and lubricant testing industry running ASTM D2272, D2112, D4742, D7098, and D942.

ASTM D2272, D2112, IP229

RPVOT: Rotating Pressure Vessel Oxidation Test

ASTM D4742, D7098

TFOUT: Thin Film Oxygen Uptake Test

ASTM D942

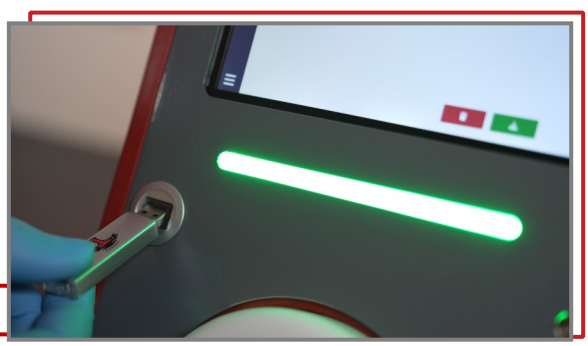
Grease Oxidation Test

Precision Testing

- Steam Turbine Oils
- New & In-Service Oils
- Insulating Oils
- Gasoline Engine Oils

Features

- Front-loading, easily accessible pressure chamber.
- Small, bench-top footprint. No laptop or PC required.
- Non-liquid 'Dry-Cylinder' sample heating — eliminates hot, hazardous, liquid bath mess and odor.
- New automated fill & purge control.
- Integrated controls & data acquisition with touchscreen interface.
- New integrated Water Calibration Device capabilities.
- Live graph of test data with onboard test data storage.
- LED lighting scheme based on the operating condition.
- Closed loop motor speed control (no speed calibration required).
- Lower power usage (20 - 30%) and heat loss than the original *Quantum®* Oxidation Tester.
- Automated test report submission over Ethernet.
- USB ports for optional transfer of records to flash drive or PC.



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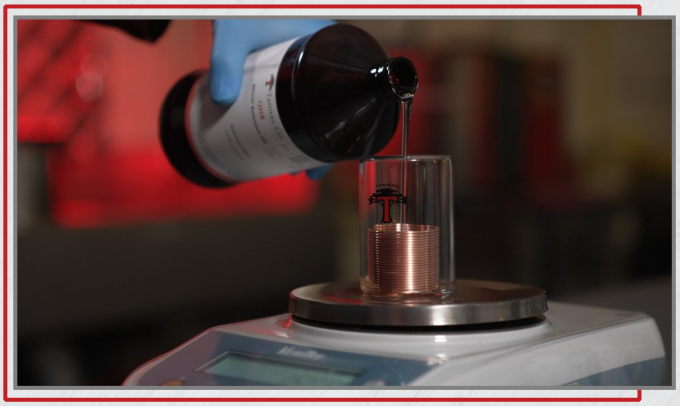
RPVOT Test - ASTM D2272 & D2112



The Rotating Pressure Vessel Oxidation Test (RPVOT, formerly RBOT) uses an oxygen-pressured vessel to evaluate the oxidation stability of new and in-service oils with water and a copper catalyst coil at 150°C for ASTM D2272 or 140°C for ASTM D2112.

An electrically heated, dry pressure chamber replaces the hot oil bath. The sample rotates axially at 100 RPM at an angle of 30° within the stationary pressure chamber by an internal magnetic drive motor.

The pressure chamber seals with a unique lid and three knurled thumb screws. The *Quantum® Pro* enables independent, on-site RPVOT, which increases productivity and efficiency, especially with the multi-unit setup.

TFOUT Test - ASTM D4742 & D7098

The Thin Film Oxidation Uptake Test (TFOUT) evaluates the oxidation stability of lubricating oils used in gasoline engine service. The test operates by reacting an oil/catalyst mixture (available exclusively from Tannas Co.) at 160°C while pressurized with oxygen. The end-of-test is measured by the oxidation induction time resulting from the depletion of the antioxidant package. The TFOUT screens formulated oils prior to engine tests and is useful for quality control of oxidation stability of re-refined oils from batch to batch.

The primary adjustments to the *Quantum® Pro* when performing the TFOUT test include a temperature setting of 160°C, a Tannas TFOUT Catalyst mixture in a small segmented dish, and a Chamber Volume Reducer (pictured here).

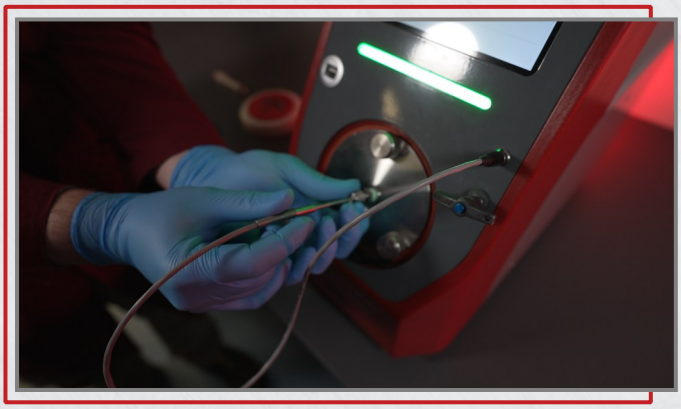
Grease Oxidation - ASTM D942

The ASTM D942 Grease Oxidation test predicts how a grease may perform in high-temperature or long-service-life applications. It requires 20 grams of a grease in five glass dishes (4 grams each) to be stacked on a metal rack and oxidized in a pressure vessel heated to 99°C and filled with oxygen at 110 psi. The test continues for a selected period (100 to 500 hours) and the subsequent decrease in oxygen pressure, as a consequence of grease oxidation, is the test result.

The primary adjustments to the *Quantum®* when performing ASTM D942 include a temperature of 99°C, grease filled glass dishes, a metal rack, and the use of a Chamber Volume Reducer.

Water Calibration Device

The integrated Water Calibration Device allows the user to calibrate the *Quantum® Pro* unit for proper sample temperature. This calibration method is the most effective way to ensure the sample temperature is accurate. Distilled water is used instead of an oil sample to ensure that no oxidation occurs during the calibration process. The test sample temperature then displays on the HMI touchscreen.



One of the other opportunities provided by the open-face, non-liquid bath design of the *Quantum® Pro* is the ability to access the sample while under the test pressure and temperature. The integrated Water Calibration Device allows researchers access to monitor the sample temperature.

Interestingly, sample temperature may vary from sample-to-sample. The Water Calibration Device will detect exothermic reactions at the transition stage of oxidation, when rapid oxidation of the sample and the associated pressure drop is sharp. Exotherms have value in identifying and understanding the relationship between type, amount, and effectiveness of oxidation inhibitors during the oxidation process.

Sample Extraction Device

The convenient front-loading pressure chamber on the *Quantum® Pro* allows easy access with the ability to extract small amounts of the sample during the test via our optional specialized Sample Extraction Device. Operators can extract a select amount of sample during the test for further analysis. The dry bath technique allows the operator to closely follow and monitor the process of oxidation with the use of different oxidation inhibitors. Only a fraction of a milliliter needs to be taken for analysis, given the sensitivity of modern analytical instruments such as the Inductively Coupled Plasma (ICP), Nuclear Magnetic Resonance Spectroscopy (NMR) and Fourier Transform Infrared Spectroscopy (FTIR).

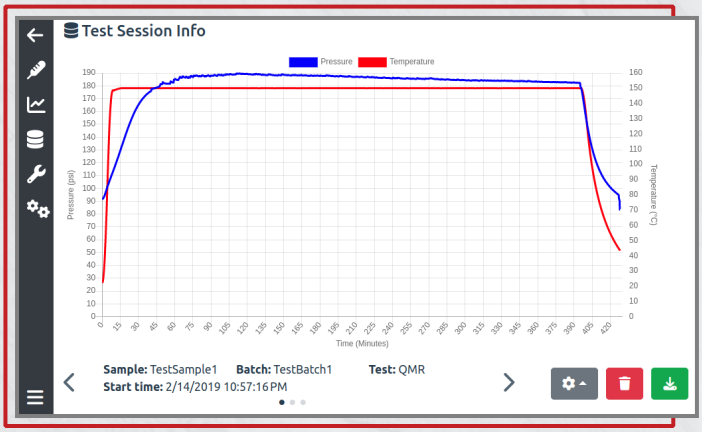
The Sample Extraction Device Assembly includes the Sample Extraction Probe, the Syringe Needle, the Syringe Valve Assembly, and the Seal Cap Assembly.

Integrated Touchscreen Software

The integrated touchscreen on the *Quantum® Pro* provides automated pressure, temperature monitoring, and endpoint detection.

End-of-test criteria can be selected by Time Duration, Pressure Drop, or Break Level. The integrated touchscreen offers real-time display, storage of analysis data, and printable results.

The touchscreen enables the operator to select between RPVOT & TFOUT testing.



Instrument & Parts

Instrument:

230000: Quantum® Pro Oxidation Tester (110 VAC)
230100: Quantum® Pro Oxidation Tester (220 VAC)

ASTM D2272 & D2112 (RPVOT):

200081: RPVOT Parts Assembly
200500: Oil Install Package (D2272 only)

ASTM D4742 & D7098 (TFOUT):

200082: TFOUT Parts Assembly

ASTM D942:

230350: ASTM D942 Parts Assembly

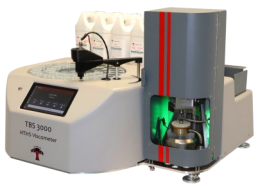
For more Quantum® Pro accessories as well as other instruments and testing supplies, visit www.tannasco.com.

Instrument Specifications

Dimensions	~23 x 50 x 41 cm (9 x 19.65 x 16 inches)
Weight	~15.9 kg (35 lbs.) approx.
Voltage	100-240 VAC, Single Phase
Frequency	50/60 Hz.
Watts	850 Watts max.
Amps	7 Amps max.
Heating Medium	Dry-Cylinder heating system - no hot oil bath
Testing Capacity	Single position stainless steel pressure vessel Designed for multi-unit alignment, each independent
Test Parameter Capabilities	Temperature: 160° ± 0.1°C recommended max. Oxygen Charge: 100 ± 0.1 psi recommended max. Vessel Rotation: Variable speed control
Output	Continuous temperature & oxygen pressure readout
Safety	Auto-Shutoff at the end of the test Current limiting fuses Over-pressure sensor & relief Over-temperature cutoff fuse CRN Approved & CE Marked Automatic fill and purge control
Shipping Weight & Dimensions	~26 kg (58 lbs.) approx. ~53 x 46 x 58 cm (21 x 18 x 23 inches) approx.

Additional TANNAS CO. Precision Laboratory Instruments

Tannas Foam Air Bath (TFAB)
- ASTM D892, D6082, D1881, D7840, IP146
- Non-liquid bath
- 24°C to 150°C range



TBS 3000 HTHS Viscometer
- ASTM D4683, D6616, CEC L-36, IP370
- High-Temperature, High-Shear (HTHS)
- 80°C, 100°C, 150°C testing

Noack S2® Volatility Test
- ASTM D5800, Procedure D, CEC L-40
- Phosphorus Volatility
- Non-Wood's metal heating system

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