



TORONTECH

THERMAL OXIDATION / HIGH-TEMPERATURE PERFORMANCE TESTING



Thermal Oxidation / High-Temperature Performance Testing

When fuels are subjected to high-temperature surfaces — such as heat exchangers, fuel nozzles, or combustion chamber walls — they can undergo thermal oxidation: a rapid, heat-driven decomposition that deposits carbonaceous residues, degrades fuel quality, and critically reduces system reliability. High-temperature performance testing measures a fuel's resistance to this kind of thermal degradation under carefully controlled, standardized conditions that replicate the extreme thermal environment found inside modern aircraft engines, gas turbines, and high-performance combustion systems.

The Jet Fuel Thermal Oxidation Stability (JFTOT) test is the definitive industry standard for assessing the high-temperature performance of aviation turbine fuels. Governed by ASTM D3241, the JFTOT method evaluates a fuel's tendency to form solid deposits on a heated metal tube at temperatures from 260 °C to 355 °C — simulating conditions in aircraft fuel systems where thermal oxidation is a direct safety concern. Torontech's JFTOT instrument is engineered to deliver exact compliance with ASTM D3241, providing laboratories with the precision and reliability that aviation fuel qualification demands.

APPLICATIONS

Applications

Thermal oxidation and high-temperature performance testing is critical in the following sectors:

- Aviation turbine fuel qualification: Every batch of Jet A, Jet A-1, and JP-8 fuel must pass the JFTOT (ASTM D3241) before acceptance for use in commercial and military aircraft.
- Aviation fuel blending & refinery QC: Thermal oxidation stability data guides blending decisions and confirms that finished jet fuel meets specification before shipment.
- Third-party inspection & certification: Independent inspection agencies use JFTOT data to certify aviation fuel deliveries to airports, airlines, and military operators.

- Gas turbine fuels: Industrial gas turbine operators use high-temperature performance testing to evaluate alternative and synthetic fuels for suitability in stationary power generation.
- Fuel additive development: Antioxidants and thermal stability improvers for jet fuel are screened and optimized using JFTOT-based test protocols.
- Alternative & sustainable aviation fuel (SAF) qualification: SAF and synthetic paraffinic kerosene (SPK) blends require rigorous thermal oxidation assessment before regulatory approval.
- Research institutions: Universities and aerospace research centers use JFTOT data to understand fuel thermal degradation mechanisms and develop next-generation aviation fuels.

FEATURES

Why Choose Torontech JFTOT Series for Your Aviation Fuel Testing?

Torontech's Jet Fuel Thermal Oxidation Stability Tester is the benchmark choice for aviation fuel laboratories:

- Full ASTM D3241 compliance: Every parameter — tube temperature, fuel flow rate, differential pressure measurement, and deposit rating procedure — is implemented to the exact specification of ASTM D3241 and IP 323.
- Precise thermal control: A high-stability heater maintains the critical test tube at the target temperature ± 0.5 °C throughout the entire 150-minute test, eliminating temperature-induced variability.
- Automated differential pressure monitoring: The instrument continuously logs pressure drop across the filter downstream of the heated tube, providing an objective measure of deposit severity alongside the visual tube rating.
- Digital tube rating integration: Compatible with quantitative deposit analyzer systems for objective, operator-independent deposit assessment, reducing inter-laboratory variability.
- Aviation-grade reliability: Designed for 24/7 laboratory environments with robust pump systems, high-quality wetted materials, and comprehensive self-diagnostic alerts.
- Compact laboratory footprint: Optimized bench-top design accommodates the instrument in standard petrochemical laboratory spaces without dedicated infrastructure.



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