



TRACE CARBON RESIDUE TESTER

Trace Carbon Residue Tester - ToronCR™ 500

ToronCR™ 500 is a fully automatic trace carbon residue tester designed and manufactured in accordance with ASTM D4530 (Micro Carbon Residue, MCR) and equivalent international standards. The instrument measures carbon residue — the carbonaceous deposit remaining after evaporation and pyrolysis of petroleum products under controlled conditions — in the range of 0.10% to 30.0% (m/m), with results that are directly comparable to those of the Conradson Carbon Residue (CCR) method (ASTM D189).

It is also suited to the determination of carbon trace in petroleum products with residual carbon below 0.10% (m/m), specifically distillate fuel products composed of the 10% (V/V) distillation residue per the Ramsbottom method (ASTM D524). The carbon residue apparatus features a 5.6-inch 65K-color true-color touchscreen, full temperature process automation with $\pm 1^{\circ}\text{C}$ accuracy, an independent automatic cooling unit, three interchangeable sample tube configurations, and an optional automatic collection and calculation system for LIMS-integrated workflows.

APPLICATIONS

Trace Carbon Residue Tester - ToronCR™ 500 Applications

- Trace carbon residue determination in petroleum distillates, gas oils, residual fuel oils, and vacuum residues
- Micro carbon residue (MCR) testing of crude oil fractions and process streams per ASTM D4530
- Carbon trace measurement in distillate fuel products using the 10% (V/V) distillation residue method
- Conradson Carbon Residue (CCR) equivalent testing for lubricating base oils and heavy fuel oils
- Quality control in oil refineries, petrochemical plants, and fuel blending operations
- Research and development laboratories requiring precise, automated carbon residue analysis
- Standardized carbon residue apparatus testing for compliance with ASTM, ISO, and IP test methods



Standards & Compliance

- ASTM D4530: Standard Test Method for Determination of Carbon Residue (Micro Method)

FEATURES

Trace Carbon Residue Tester – ToronCR™ 500 Key Features

- Complies with ASTM D4530 and ISO 10370 for Micro Carbon Residue (MCR) testing, with results directly comparable to Conradson Carbon Residue (CCR) values per ASTM D189
- Full temperature process automation with $\pm 1^{\circ}\text{C}$ control accuracy across all process stages: standby, purge, heating, constant temperature, cooling, and end — displayed in real time on the touchscreen
- 5.6-inch 65K true-color configurable touchscreen for intuitive operation and real-time temperature curve visualization
- Independent automatic cooling unit that activates automatically during the cooling phase, significantly reducing cycle time and improving throughput
- Automatic alarm at 250°C prompting the operator to prepare for the next test, minimizing idle time between runs
- Optional automatic balance data collection and calculation system or direct integration with balance instruments; automatically collects carbon residue values and calculates repeatability
- Three interchangeable sample tube configurations: 4 mL standard tube (12 pcs, 0.10%–30.0% range); 16 mL tube (12 pcs, directly measures samples with carbon residue below 0.10%); mixed-load option (two tube types plus 9 pcs tubes for diverse sample sets)
- Integrated high-quality electric heating unit for long service life and consistent thermal performance
- Ergonomic design with hidden liquid waste collection for easy cleaning and a compact footprint
- Circuit and gas circuit compartment design for compact structure, clean layout, safe and reliable operation, and easy maintenance
- High-precision pipe heating unit providing uniform heating of the sample throughout the pyrolysis cycle
- Machine power $\leq 1500\text{ W}$ for energy-efficient laboratory operation

THEORY & METHOD

Theory and Method

The ToronCR™ 500 performs the Micro Carbon Residue (MCR) method per ASTM D4530. A weighted sample of petroleum product is placed in a standardized glass sample tube inside the instrument’s combustion chamber (diameter 87 mm × 100 mm). The chamber is purged with nitrogen to establish an inert atmosphere, then heated using electric heat pipe elements through a precisely controlled temperature program: a constant-temperature warming phase, a high-temperature pyrolysis phase at 500°C (±1°C), a controlled cooling phase, and a final ‘end’ state.

A 5.6-inch touchscreen displays the heating rate curve and real-time temperature data throughout the run, allowing the operator to verify that the instrument is in the correct process state at all times. After cooling (accelerated by the independent automatic cooling unit) the carbon trace residue remaining in the tube is weighed and expressed as a mass percentage of the original sample. Pressure within the combustion chamber is adjustable (0–393 kPa, 4 kg/cm²) and flow rate is automatically switched between 150 mL/min and 600 mL/min to match the process stage.

TECHNICAL SPECIFICATIONS

Trace Carbon Residue Tester - ToronCR™ 500 Technical Specifications

Parameter	Specification
Combustion Chamber Size	Ø 87 mm × 100 mm
Combustion Chamber Temperature	500 °C ± 1 °C
Work Temperature of Combustor	Room temperature – 500 °C
Heating Method	Electric heat pipe heating

Parameter	Specification
Pressure Adjustment Range	0 – 393 kPa (4 kg/cm ²)
Flow Adjustment Range	150 mL/min / 600 mL/min (automatic switching)
Temperature Control Accuracy	± 1 °C
Machine Power	≤ 1500 W
Main Unit Size (W × D × H)	460 × 400 × 480 mm
Voltage	AC 220 V ± 10%, 50 Hz ± 10% (110V is also available)
Relative Humidity	< 80% RH
Ambient Temperature	5 – 35 °C
Other Notes	No strong vibration, airflow, strong electromagnetic interference, or corrosive gases near instrument



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