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HEAVY OIL KINEMATIC VISCOSITY TESTER WITH HOUILLON VISCOMETER

Heavy Oil Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-HO

ToronVT™ AH-HO is an automatic kinematic viscosity tester with Houillon viscometer technology, specifically designed to measure the kinematic viscosity of heavy oil and residual oil in accordance with ASTM D7279. Engineered for the challenging characteristics of high-viscosity petroleum products, the instrument features fully automatic measurement, automatic double-solvent cleaning, and high-efficiency specialized washing reagent delivery — solving the longstanding difficulty of accurate and efficient kinematic viscosity measurement and cleaning for heavy oil and residual oil samples.

The ToronVT™ AH-HO delivers automatic and accurate quantification, large-volume sample handling (0.3–2 mL sample dosage), and a 5.5-liter viscometer bath volume — providing the thermal mass and solvent capacity needed for consistent results with viscous samples. Its performance has fully surpassed comparable imported instruments

APPLICATIONS

Heavy Oil Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-HO Applications

The ToronVT™ AH-HO Automatic Heavy Oil Kinematic Viscosity Tester with Houillon Viscometer is purpose-built for heavy petroleum product testing applications:

- Heavy fuel oil (HFO) and residual oil testing: kinematic viscosity measurement for marine fuels, bunker fuels, and heavy industrial residuals
- Crude oil fractions: viscosity characterization of atmospheric and vacuum residues from refinery distillation
- Petroleum refinery QC: routine viscosity testing of heavy oil streams for process monitoring and blending

- Lubricant and base oil testing: viscosity grading and quality control for high-viscosity base stocks
- Petroleum product testing laboratories: ASTM D7279-compliant kinematic viscosity analysis with minimal operator involvement
- Cutting fluid, fresh lubricating oil, in-service lubricating oil, gasoline, diesel, and kerosene: broad sample matrix coverage

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Applicable Standards

The ToronVT™ AH-HO is designed to support testing in compliance with the following international standards:

- ASTM D7279: Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids by Automated Houillon Viscometer

FEATURES

Heavy Oil Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-HO Key Features

The ToronVT™ AH-HO automatic kinematic viscosity tester with Houillon viscometer delivers a focused feature set optimized for heavy oil and residual oil testing:

- Fastest Test Speed: in fast mode, the shortest result time is 3 minutes. The full test cycle, including cleaning, is completed in 5 to 8 minutes. The complete sequence (measurement, cleaning, drying) does not exceed 15 minutes.
- Fully Automatic Operation: all measurement functions (measuring, cleaning, drying, result calculation, and repeatability analysis) are fully automated and highly consistent. The instrument handles the entire test sequence from sample loading to final result output without operator presence.
- Broad Sample Compatibility for Transparent and Opaque Fluids: the ToronVT™ H-HO accommodates the full range of transparent and opaque sample types including heavy oil, residual oil, crude oil, gasoline, diesel oil, kerosene, cutting fluid, fresh lubricating oil, and in-service lubricating oil.
- Secondary Accurate Quantification: the secondary accurate quantification function automatically controls the sample liquid column amount, eliminating the limitations and deviations of micro-pipette injection. This is especially important for heavy oil samples where standard pipetting introduces variability.

- Efficient Double-Solvent Automatic Cleaning: the dual automatic solvent cleaning system uses high-efficiency specialized washing reagent to fully clean the viscometer and injection pathways after each test. The cleaning process consumes no more than 20 mL of cleaning fluid and is completed in less than 20 mL per cycle, ensuring fast turnaround without sample carryover.
- Comprehensive Auxiliary Functions: includes automatic plugging, constant calibration, temperature calibration, calibration of the built-in real-time clock, automated kinematic-to-Engler viscosity conversion, and repetitive automatic calculation for multi-run statistics.
- Software and Hardware Dual Over-Temperature Protection: over temperature protection is implemented at both the software and hardware level with an over-temperature alarm function to prevent bath overheating and protect samples and instrument components.
- Double Bath Design: the dual bath configuration allows uniform temperature distribution. The viscometer tube can be quickly exchanged without emptying the thermostat bath, and the instrument supports disposable filter integration to reduce sample pretreatment workload.
- High-Precision Temperature Sensing: PT1000 high-accuracy temperature sensors maintain stable constant-temperature bath conditions. Temperature control accuracy is 0.01°C.
- WIFI Data Transmission and LIMS Connectivity: data can be transmitted wirelessly via WIFI to connect to LIMS systems for seamless integration into laboratory data management workflows.

THEORY & METHOD

Theory and Method

The ToronVT™ AH-HO measures kinematic viscosity using the Houillon viscometer pressure method as specified in ASTM D7279. A controlled volume of heavy oil or residual oil sample is loaded into the Houillon capillary viscometer tube submerged in a precision constant temperature bath. The instrument applies the secondary accurate quantification function to control the sample liquid column — automatically adjusting sample amount without relying on micro-pipette precision,

which is particularly important for viscous heavy oil samples where manual pipetting introduces significant variability.

After the sample reaches thermal equilibrium at the target test temperature, the capillary flow time is measured using high-precision optical detection between calibrated reference points. Kinematic viscosity is calculated from the flow time and the viscometer constant. The dual-solvent automatic cleaning system then purges the viscometer tube and injection path using two specialized solvents in sequence — ensuring that heavy oil residues are fully removed between tests, maintaining clean capillary geometry, and preventing cross-contamination between samples.

TECHNICAL SPECIFICATIONS

Heavy Oil Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-HO Technical Specifications

Parameter	Specification
Model	ToronVT™ AH-HO
Standard	ASTM D7279
Measurement Range	0.3 – 6,000 mm^2/s; measuring span of one viscosity tube is 100×
Sample Dosage	0.3 – 2 mL
Repeatability	≤0.68%
Viscometer Bath Volume	5.5 L
Total Power	≤1,200 W
Timing Accuracy	0.01 S
Temperature Controlling Accuracy	0.01°C

Parameter	Specification
Temperature Controlling Range	20 – 100°C (when target temp <40°C, extra refrigerator required)
Main Unit Size	450 × 500 × 580 mm
Voltage	AC220V ± 10%; 50Hz ± 10% (110V is also available)
Relative Humidity	<80% RH
Ambient Temperature	10 – 28°C
Other Notes	No strong vibration, airflow, strong electromagnetic interference or corrosive gases around the laboratory

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