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DUAL-TUBE KINEMATIC VISCOSITY TESTER WITH HOUILLON VISCOMETER

Dual-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-DT

ToronVT™ AH-DT is an automatic kinematic viscosity tester with Houillon viscometer technology, designed and manufactured in accordance with ASTM D7279 for rapid, automatic determination of kinematic viscosity in petroleum and lubricating oil products. Combining automatic precise quantification with automatic double-solvent cleaning, the ToronVT™ AH-DT delivers a complete hands-free test cycle (from sample loading through result output) with minimal operator involvement and high measurement reproducibility.

The instrument accommodates a wide range of transparent and opaque liquid samples including gasoline, diesel oil, kerosene, cutting fluid, and lubricating oil. Its dual viscometer tube configuration expands throughput and measurement span compared to single-tube instruments. Performance has fully surpassed comparable imported competing instruments.

APPLICATIONS

Dual-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-DT Applications

The ToronVT™ AH-DT Automatic Dual-Tube Kinematic Viscosity Tester with Houillon Viscometer supports routine and quality control kinematic viscosity testing across the petroleum and lubricant industry:

- Petroleum product testing: kinematic viscosity of gasoline, diesel, kerosene, and light fractions per ASTM D7279
- Lubricating oil quality control: viscosity grading verification for engine oils, gear oils, turbine oils, and hydraulic fluids
- Base oil testing: kinematic viscosity measurement for base stock qualification and blending operations
- Cutting fluid and industrial fluid testing: viscosity monitoring for metalworking and industrial process fluids

- Independent testing laboratories: automated high-throughput kinematic viscosity analysis for commercial testing services
- Research and development: reproducible kinematic viscosity data for new formulation development and fluid performance studies


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Applicable Standards

The ToronVT™ AH-DT 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
- ASTM D445: Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids
- ASTM D446: Standard Specifications and Operating Instructions for Glass Capillary Kinematic Viscometers

FEATURES

Dual-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-DT Key Features

The ToronVT™ AH-DT automatic kinematic viscosity tester with Houillon viscometer delivers a comprehensive set of performance and operational features for high-productivity petroleum testing:

- Fast Measurement Cycle: the fastest result is obtained in 1 minute. Generally, the full measurement (sampling, measuring, cleaning, drying, and result calculation) is completed in 3 to 5 minutes. The total process does not exceed 10 minutes.
- Fully Automated Operation: all measurement, cleaning, drying, calculation, and repeatability functions are fully automated and highly consistent, enabling unattended operation and reducing the dependency on operator skill.
- Broad Transparent and Opaque Sample Support: the instrument handles a full range of Newtonian liquids including gasoline, diesel oil, kerosene, cutting fluid, lubricating oil, and others — covering both transparent and opaque sample matrices in a single instrument.
- Secondary Accurate Quantification: the secondary accurate quantification function automatically controls the sample liquid column, eliminating the limitations and deviations of micro-pipette injection for improved measurement accuracy

and data quality.

- Double Automatic Solvent Cleaning with Low Solvent Consumption: the dual-solvent automatic cleaning system is fast and low-cost. A cleaning cycle consumes no more than 20 mL of cleaning fluid, minimizing reagent cost and waste solvent management burden.
- Comprehensive Auxiliary Functions: includes automatic plugging, constant calibration, temperature calibration, internal clock calibration, kinematic-to-Engler viscosity automatic conversion, and software and hardware over-temperature protection with alarm function.
- Fast Temperature Transition: the rising and cooling rate of the double-glass cylinder bath reaches 5°C per minute, enabling fast sequential testing at different target temperatures without long waiting periods between test conditions.
- Double-Glass Cylinder Bath for Uniform Temperature: the use of double-glass cylinder construction provides more uniform temperature distribution across the bath volume, improving measurement accuracy especially for lower-viscosity samples that are sensitive to temperature gradients.
- High-Precision Temperature Sensing: PT1000 high-precision temperature sensors with stable constant-temperature bath conditions achieve temperature control accuracy of 0.01°C. Even when the target temperature is below 40°C, another refrigerator can be added to extend the operating temperature range.
- Disposable Filter Compatibility and LIMS Connectivity: the instrument can be equipped with disposable filters to significantly reduce sample pretreatment requirements. Data can be transmitted to LIMS systems via the available connectivity interface.

THEORY & METHOD

Theory and Method

The ToronVT™ AH-DT operates on the Houillon viscometer pressure method as defined by ASTM D7279. A precisely controlled sample volume (0.3–1 mL) is automatically injected into the Houillon capillary viscometer tube submerged in a precision temperature-controlled bath. Optical detection sensors monitor the sample meniscus passage between calibrated

reference points, and the instrument's timing system (accurate to 0.01 s) records the capillary flow time. Kinematic viscosity is automatically calculated from flow time and the viscometer constant.

The secondary accurate quantification function precisely controls the liquid column within the viscometer, eliminating reliance on micro-pipette accuracy and the associated dosing variability. After each measurement, the double automatic solvent cleaning system purges the capillary and all sample-contact surfaces with two solvents in sequence, consuming no more than 20 mL of cleaning fluid per cycle. The rising and cooling speed of the double-glass cylinder bath reaches 5°C per minute, allowing fast temperature transitions between sequential tests at different target temperatures.

TECHNICAL SPECIFICATIONS

Dual-Tube Kinematic Viscosity Tester with Houillon Viscometer – ToronVT™ AH-DT Technical Specifications

Parameter	Specification
Model	ToronVT™ AH-DT
Standard	ASTM D7279, ASTM D445, ASTM D446
Measurement Range	0.3 – 6,000 mm^2/s; 100× measuring span for two viscometer tubes
Sample Dosage	0.3 – 1 mL
Repeatability	≤0.5%
Bath Volume	5.5 L
Total Power	≤1,200 W
Timing Accuracy	0.01 S

Parameter	Specification
Temperature Controlling Accuracy	0.01°C
Temperature Controlling Range	20 – 100°C (equipped with extra refrigerator if target temp <40°C)
Main Unit Size	455 × 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 in work environment

TORONTECH.com

TORONTECH

Torontech Inc.
251 Consumers Road, Suite 1200
Toronto, Ontario, M2J 4R3, Canada

Phone: +1 416 368 2721 | Fax: +1 416 981 7652
Email: info@torontech.com

Torontech, LLC
601 Brickell Key Drive, Suite 700
Miami, FL 33131, USA

Toll-Free: 1-866-383-7919
Email: sales@torontech.com

Torontech ME FZE
Meydan Grandstand, 6th Floor,
Meydan Road, Nad Al Sheba,
Dubai-261440, UAE

Phone: +971 488 19252
Email: me@torontech.com

USA | Canada | EU | UAE | GCC | KSA | India | Africa | Latin America | Asia