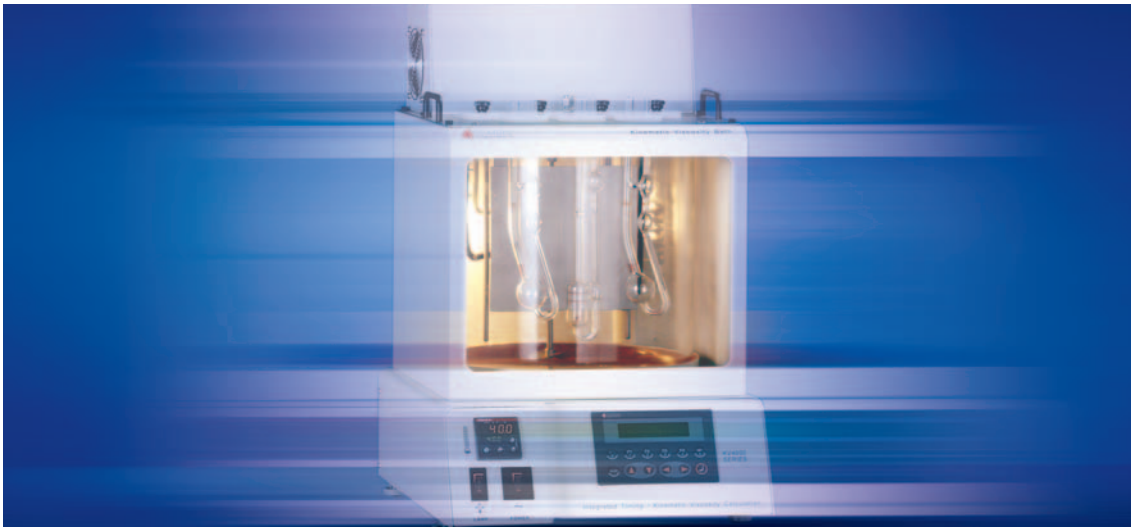
Viscosity



Kinematic Viscosity

K23702 Constant Temperature Kinematic Viscosity Bath (KV4000) - page 3

Kinematic Viscosity of Transparent and Opaque Liquids

Kinematic Viscosity of Asphalts (Bitumens)

Viscosity of Asphalts by Vacuum Capillary Viscometer

Viscosity and Viscosity Change After Standing at Low Temperature of Aircraft Turbine Lubricants

Test Method

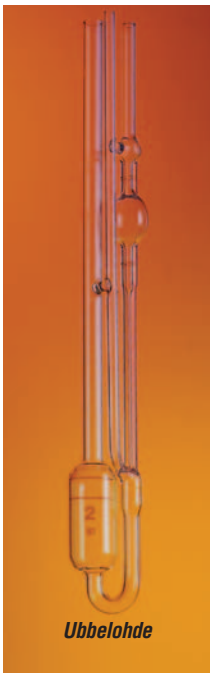
Kinematic viscosity is of primary importance in the design and selection of a wide range of petroleum products. Calibrated capillary viscometers are used to measure flow under gravity or vacuum at precisely controlled temperatures.

Kinematic Viscosity Test Equipment

- Constant temperature baths for the full range of viscosity applications, from low temperature to high temperature
- Calibrated glass capillary kinematic viscometers
- Viscosity standards
- Viscometer cleaning and drying apparatus
- Kinematic viscosity thermometers


Cannon®-Fenske Routine

Cannon®-Fenske Opaque


Ubbelohde

Viscosity Reference Standards - pages 18-19

K23376 Digital Constant Temperature Bath

KV1000 Digital Constant Temperature Kinematic Viscosity Bath

- Accommodates six capillary viscometers
- Variable temperature limit control
- Conforms to ASTM D445 and related specifications

Constant temperature bath for kinematic viscosity testing of petroleum products. Accommodates six round 2" (51mm) dia. viscometer holders. Bath temperature stabilizes within ±0.5°C (±1°F) of setting, and final adjustment to within ±0.01°C (±0.02°F) can be made. Test temperatures of up to 150°C (302°F) can be selected. Temperature limit control permits the operator to select an overtemperature cutoff point to protect against accidental overheating. Control unit includes immersion heater, circulating stirrer and temperature probe. Composition top plate rests on a 12x12" (30.5x30.5cm) or 12x18" (30.5x46cm) Pyrex™ jar. Order capillary viscometers, viscometer holders and thermometer separately.

Specifications

Conforms to the specifications of:
ASTM D445, D6074, D6158; IP 71; ISO 3104; DIN 51550; FTM 791-305; NF T 60-100
Capacity: Six (6) glass capillary viscometers
Bath Medium: water or white technical oil

Included Accessories

Port Covers, stainless steel (6)

Ordering Information

Catalog No.	Model	Electrical Requirements	Bath Depth	Bath Capacity	Dimensions diaxh,in.(cm)	Net Weight
K23376	KV1000	115V 50/60Hz, single phase 10.2A	12" (30.5 cm)	5.8 gal (22L)	13½x20 (34.6x50.8)	25 lbs (11.3kg)
K23371	KV1000		18" (46 cm)	8.9 gal (33.7L)	19½x23 (49.5x58.4)	38 lbs (17.2kg)
K23377	KV1000	220-240V 50Hz, single phase 5.3A	12" (30.5 cm)	5.8 gal (22L)	13½x20 (34.6x50.8)	25 lbs (11.3kg)
K23378	KV1000		18" (46 cm)	8.9 gal (33.7L)	19½x23 (49.5x58.4)	38 lbs (17.2kg)
K23373	KV1000	220-240V 60Hz, single phase 5.3A	12" (30.5 cm)	5.8 gal (22L)	13½x20 (34.6x50.8)	25 lbs (11.3kg)
K23374	KV1000		18" (46 cm)	8.9 gal (33.7L)	19½x23 (49.5x58.4)	38 lbs (17.2kg)

K23377-01000 Cooling Coil Assembly. Permits circulation of water or refrigerated coolant for operation at near ambient temperatures. Installs in top plate.

KV3000 and KV4000 Constant Temperature Baths with Integrated Digital Timing

- Microprocessor temperature control between ambient and 150°C (302°F)
- Integrated digital timing for easy measurement of sample efflux times
- KV4000 permits entry of viscometer constants for automatic calculation and display in viscosity units or seconds
- Dual digital displays show setpoint and actual bath temperature
- Selectable temperature scale - Fahrenheit or Celsius
- Integrated redundant overtemperature and low liquid level cut-off circuitry
- Conforms to ASTM D445, D2170 and related specifications

Constant temperature bath series with advanced temperature control circuitry and integrated timing features for convenient, accurate glass capillary viscometry determinations. Microprocessor PID circuitry assures precise, reliable temperature control within ASTM specified tolerances throughout the operating range of the bath. Simple push-button controls and dual digital displays permit easy setting and monitoring of bath temperature. Two place calibration offset capability is provided. Baths accommodate seven glass capillary viscometers of various types - see pages 10-13 for complete selection. Viewing the viscometers is made easy by glare-free fluorescent illumination inside the bath and a baffle that provides a background for easy viewing. Temperature control uniformity is assured by means of motorized stirrer which provides complete circulation without turbulence. Connection of the built-in cooling coil to tap water or a recirculating water chiller facilitates temperature control at ambient or below ambient temperatures. *Communications software (RS232, etc.) ramp-to-set, and other enhanced features are available at additional cost. Contact your Koehler representative for additional information.*

Integrated Timing Features - KV3000 incorporates seven digital timers on the front control panel for convenient timing and monitoring of the efflux interval for each viscometer. On KV4000, the user can enter the viscosity constant for each viscometer on the front LCD control/display, and then get the test result in both efflux time and viscosity units automatically after stopping each timer. All timing functions are displayed in 0.01 or 0.1 second resolution and are accurate within 0.01%.

Bath Construction and Safety Features - Bath chamber is a clear Pyrex® vessel enclosed in a polyester-epoxy finished steel housing. Top working surface has seven 2" (51mm) viscometer ports. Front viewing window assures safe, distortion-free viewing. Microprocessor temperature controller incorporates safety circuitry that interrupts power to the heaters in the event of an overtemperature condition or disconnection of the primary probe. For added safety, an adjustable redundant controller with separate sensor probe interrupts power if an overtemperature situation occurs. An integrated low-liquid sensor prevents operation of the bath if the bath liquid is not filled to the proper level, and cuts off power should it fall below during operation. Both overtemperature and low liquid level circuits will latch and prevent further operation of the bath until the fault is removed.

Dimensions lxwxh,in.(cm)
12" Kinematic Viscosity Bath:
20¼x15¼x24½ (51x39x62)
Net Weight: 78 lbs (35.5kg)
18" Kinematic Viscosity Bath:
20¼x15¼x30½ (51x39x77)
Net Weight: 90 lbs (41kg)

Bath Capacity:
12": 5.8 gal (22L)
18": 8.9 gal (33.7L)

Included Accessories
Port covers, Delrin® (7)
Thermometer holder

Software compatible, inquire with Koehler Customer Service.

K23700 Constant Temperature Kinematic Viscosity Bath (KV3000)

Specifications

Conforms to the specifications of:
ASTM D445, D2170, D6074, D6158; IP 71, 319; ISO 3104; DIN 51550; FTM 791-305; NF T 60-100
Temperature Control
Range: ambient to 150°C (302°F); sub-ambient to 10°C with external cooling
Display: 0.1°C/0.1°F resolution, calibrate to 0.01°C/0.01°F
Control accuracy and uniformity: Exceeds ASTM requirements throughout the operating range
Integrated timing
KV3000: Seven individual start/stop timers with displays to 0.01 seconds, accurate to within 0.01%
KV4000: Integrated LCD microcomputer with start/stop buttons and retention of viscometer tube constants, automatic calculation and display in viscosity units or seconds to 0.1s, within 0.01% accuracy.
Communication: RS232 port included with KV4000 (optional for KV3000)
Viscometer ports: Seven round 2" (51mm) ports
Bath Medium: Water or suitable heat transfer fluid - please refer to page 8

Ordering Information

Catalog No.	Model	Electrical Requirements	Bath Depth
K23700	KV3000	115V 50/60Hz, single phase 12.6A	12" (30.5 cm)
K23702	KV4000		
K23790	KV3000	220-240V 50/60Hz, single phase 7.2A	
K23792	KV4000		
K23706	KV3000	115V 50/60Hz, single phase 12.6A	18" (46 cm)
K23708	KV4000		
K23796	KV3000	220-240V 50/60Hz, single phase 7.2A	
K23798	KV4000		

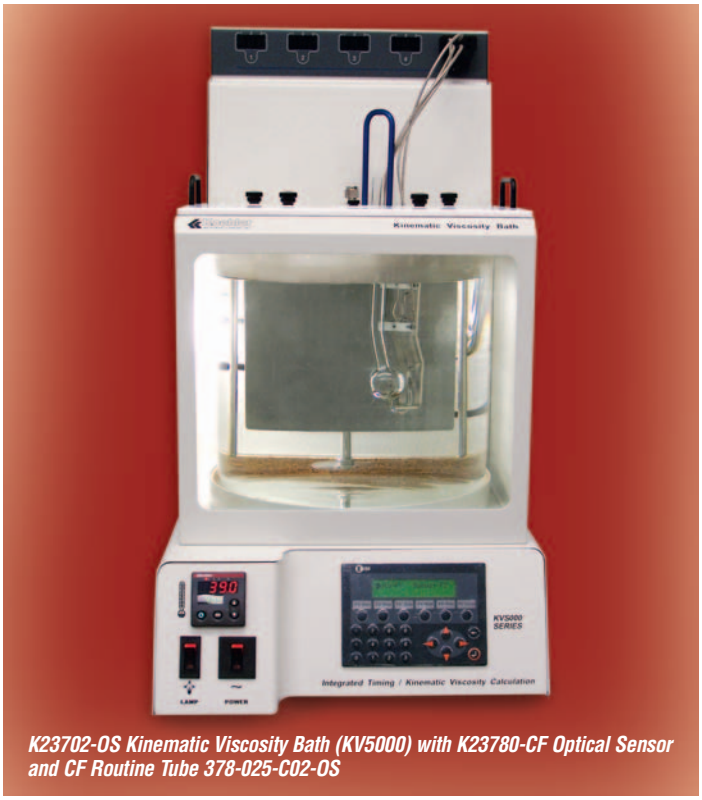
KV5000 Kinematic Viscosity Bath

Koehler KV5000 series kinematic viscosity baths with the optical flow detection system provides automatic viscosity measurements of petroleum and petrochemical products. Includes communication and power ports for each optical detection assembly, and can utilize up to five optical assemblies. Two additional positions are available for manual viscosity measurements, and all positions can be used in the manual mode. The interchangeable Ubbelohde, Cannon®Fenske, and Reverse Flow viscometer tubes are quickly installed and removed from the detection assemblies for cleaning and simple tube changes. Allows automatic viscosity measurements and results calculation without an external PC. Motorized stirrer provides complete circulation without turbulence. Microprocessor PID circuitry assures precise, reliable temperature control within ASTM specified tolerances throughout the operating range. Simple push-button controls and dual digital displays permit easy setting and monitoring of temperature. Two place calibration offset capability is provided. Built-in cooling coil facilitates temperature control at ambient or below ambient temperatures.

Viscosity Software

Software automatically downloads test data and calculates final test results from sample efflux times. Also included is a database for storing test data, determining test averages, standard deviations, and ASTM test repeatability as well as providing a method for tracking both instrument and viscometer tube calibrations.

- Complete instrument and data acquisition system exclusively designed for conducting D445, IP71 and related test methods
- Optical sensor detection system accurately measures sample flow and automatically calculates kinematic viscosity results
- Powerful software system for PC platforms operating in Windows®98 SE, 2000, NT, ME, and XP environments
- Option wireless data acquisition package available
- Automatic calculation and display of results in viscosity units or seconds
- Accommodates Ubbelohde, Cannon®Fenske, and Reverse Flow viscometers
- High accuracy temperature control with dual digital displays show setpoint and actual bath temperature with selectable scale (˚C or ˚F)
- Stand alone feature provides for automated testing without an external PC
- Integrated redundant overtemperature and low liquid level cut-off circuitry
- Software exports test data with graphs and test parameters direct to Microsoft®Excel or in ASCII file format for use with LIMS or any other spreadsheet program
- Integrated digital timing for easy measurement of sample efflux times



K23702-OS Kinematic Viscosity Bath (KV5000) with K23780-CF Optical Sensor and CF Routine Tube 378-025-C02-OS

Specifications

Conforms to the specifications of:
ASTM D445, D2170, D6074, D6158; IP 71, 319; ISO 3104; DIN 51550; FTM 791-305; NF T 60-100
Temperature range: Ambient to 150˚C (302˚F); sub-ambient to 10˚C with external cooling
Temperature display: digital with 0.1 ˚C/˚F resolution, calibrate to 0.01 ˚C/˚F
Temperature control accuracy and uniformity: Exceeds ASTM requirements

Fully Automated Viscosity and Houillon Viscosity Instruments Available, Inquire with Koehler Customer Service.

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.	Model	Description	Electrical Requirements	Order Qty
K23702-OS	KV5000	12" Kinematic Viscosity Bath	115V 50/60Hz	1
K23792-OS	KV5000	12" Kinematic Viscosity Bath	220-240V 50/60Hz	
K23708-OS	KV5000	18" Kinematic Viscosity Bath	115V 50/60Hz	
K23798-OS	KV5000	18" Kinematic Viscosity Bath	220-240V 50/60Hz	
K23780-SFW	KV5000	Kinematic Viscosity Software Package		1
K23780-WLS	KV5000	Kinematic Visosity Software Package Wireless		
K23780-CF		Optical Sensor for Cannon®Fenske viscometers		1-5
378-025-C02-OS thru **378-700-C02-OS**		Cannon®Fenske Routine Viscometers Size 25 thru 700 (Specify Size when ordering)		1-5
K23780-RF		Optical Sensor for Reverse Flow viscometers		1-5
378-025-C01-OS thru **378-700-C01-OS**		Cannon®Fenske Opaque Viscometers Size 25 thru 700 (Specify Size when ordering)		1-5
K23780-UB		Optical Sensor for Ubbelohde viscometers		1-5
378-025-C03-OS thru **378-700-C03-OS**		Ubbelohde Viscometers Size 0 thru 5 (Specify Size when ordering)		1-5

HKV3000 and HKV4000 High Temperature Baths with Integrated Digital Timing

- Microprocessor temperature control between ambient and 232°C (450°F)
- Integrated digital timing for convenient measurement of sample efflux times
- HKV4000 model permits entry of viscometer constants for automatic calculation and display in viscosity units or seconds
- Dual digital displays show setpoint and actual bath temperature
- Selectable temperature scale - Fahrenheit or Celsius
- Integrated redundant overtemperature and low liquid level cut-off circuitry
- Conforms to ASTM D445, D2170 and related specifications

High temperature baths with advanced temperature control circuitry and integrated timing features for convenient, accurate glass capillary viscometry determinations. Microprocessor PID circuitry assures precise, reliable temperature control within ASTM specified tolerances throughout the operating range of the bath. Simple push-button controls and dual digital displays permit easy setting and monitoring of bath temperature. Two place calibration offset capability is provided. Baths accommodate seven glass capillary viscometers of various types - see pages 10-13 for complete selection of viscometers and holders. Viewing the viscometers is made easy by glare-free fluorescent illumination inside the bath and a baffle that provides a background for easy viewing. Temperature control uniformity is assured by means of motorized stirrer which provides complete circulation without turbulence. Connection of the built-in cooling coil to tap water or a recirculating water chiller facilitates temperature control at ambient or below ambient temperatures. *Communications software (RS232, etc.) ramp-to-set, and other enhanced features are available at additional cost. Contact your Koehler representative for additional information.*

Integrated Timing Features - HKV3000 incorporates seven digital timers on the front control panel for convenient timing and monitoring of the efflux interval for each viscometer. On HKV4000, the user can enter the viscosity constant for each viscometer on the front control/display, and then get the test result in both efflux time and viscosity units automatically after stopping each timer. All timing functions are displayed in 0.01 or 0.1 second resolution and are accurate within 0.01%.

Bath Construction and Safety Features - Bath chamber is a clear Pyrex® vessel enclosed in an insulated polyester-epoxy finished steel housing. Top working surface has seven 2" (51mm) viscometer ports. Front viewing window assures safe, distortion-free viewing. Microprocessor temperature controller incorporates safety circuitry that interrupts power to the heaters in the event of an overtemperature condition or disconnection of the primary probe. For added safety, an adjustable redundant controller with separate sensor probe interrupts power if an overtemperature situation occurs. An integrated low-liquid sensor prevents operation of the bath if the bath liquid is not filled to the proper level and cuts off power should it fall below during operation. Both overtemperature and low liquid level circuits will latch and prevent further operation of the bath until the fault is removed.

K23802 Digital High Temperature Kinematic Viscosity Bath (HKV4000)

Specifications

Conforms to the specifications of:
ASTM D445, D2170, D6074, D6158; IP 71, 319; ISO 3104; DIN 51550; FTM 791-305; NF T 60-100
Temperature Control
Range: ambient to 232°C (450°F); sub-ambient to 10°C with external cooling
Display: 0.1°C/0.1°F resolution, calibrate to 0.01°C/0.01°F
Control accuracy and uniformity: Exceeds ASTM requirements throughout the operating range
Integrated timing
HKV3000: Seven individual start/stop timers with displays to 0.01s, accurate to within 0.01%
HKV4000: Integrated LCD microcomputer with start/stop buttons and retention of viscometer tube constants, automatic calculation and display in viscosity units or seconds to 0.1s, within 0.01% accuracy.
Communication: RS232 port included with HKV4000 (optional for HKV3000)
Viscometer ports: Seven round 2" (51mm) ports
Bath Medium: water or suitable heat transfer fluid - please refer to page 8

Included Accessories

Port covers, Delrin® (7)
Thermometer holder

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.	Model	Electrical Requirements	Bath Depth	Bath Capacity	Dimensions lxwxh,in.(cm)	Net Weight
K23800	HKV3000	115V 50/60Hz, single phase 12.7A	12" (30.5 cm)	5.8 gal (22L)	20¼x15¼x24½ (51x39x62)	84 lbs (38kg)
K23802	HKV4000					
K23890	HKV3000	220-240V 50/60Hz, single phase 7.3A				
K23892	HKV4000					

LKV3000 and LKV4000 Refrigerated Constant Temperature Baths

- Improved design with enhanced performance and safety features
- Standard –30°C (–22°F) LKV3000 model, and extended range –70°C (–94°F) LKV4000 model
- Microprocessor PID temperature control with two decimal calibration offset
- Dual digital displays show setpoint and actual bath temperature
- Selectable temperature scale - Fahrenheit or Celsius
- Conformity to ASTM D445 and related specifications

Refrigerated constant temperature bath series with improvements in operating features, safety and cabinetry. Advanced temperature control circuitry includes microprocessor PID design and two decimal calibration offset. Simple push-button controls and dual digital displays permit easy setting and monitoring of bath temperature. Baths accommodate four glass capillary viscometers using 2" (51mm) round holders (rectangular ports are available on special order) - see separate listing on pages 10-13 for complete selection of viscometers and holders. Bath medium is contained in a clear, evacuated Dewar flask, and glare-free fluorescent backlighting provides excellent visibility when working with the viscometers.

Standard and extended range models - Standard LKV3000 model operates at temperatures from ambient to –30°C (–22°F). Extended range LKV4000 model operates at temperatures as low as –70°C (–94°F). Both models exceed ASTM temperature control accuracy and uniformity requirements throughout the operating range. Air-cooled hermetic compressors provide efficient operation with the use of CFC-free refrigerants.

Bath construction and safety features - Insulated steel cabinet has an attractive polyester-epoxy finish and is mounted on adjustable leveling feet. Chemical resistant working (top) surface has four round ports for 2" (51mm) viscometer holders and one port for a thermometer holder. Front viewing window provides clear, distortion-free visibility.

Microprocessor controller incorporates circuitry that interrupts power to the heater in the event of an overtemperature condition or disconnection of the primary probe. A redundant adjustable controller and sensor probe provide added overtemperature protection, and an integrated low liquid level sensor cuts power to the heaters if the bath liquid is not filled to the proper level or falls below during operation. Both overtemperature and low liquid level circuits will latch and prevent further operation of the bath until the fault is removed.

LKV5000 Refrigerated Constant Temperature Baths with Optical Detection

Koehler LKV5000 series kinematic viscosity baths with the optical flow detection system provides automatic viscosity measurements of petroleum and petrochemical products. Includes communication and power ports for each optical detection assembly, and can utilize up to four optical assemblies. Optical sensors and viscometer tubes to be ordered separately.

K22754-OS Digital Refrigerated Kinematic Viscosity Bath

Included Accessories

Four (4) Delrin® viscometer port covers with handles
Thermometer holder

Specifications

Conforms to the specifications of:
ASTM D445, D2532, D6074, D6158; IP 71; ISO 3104; DIN 51550; FTM 791-305; NF T 60-100
Testing Capacity: Four (4) glass capillary viscometers
Viscometer Ports: Four (4) round 2" (51mm) ports
Bath Dimensions: 9½" dia x 12" deep (24x30cm)
Bath Capacity: 3.7 gal (14L)
Temperature Control:
Display: 0.1°C/0.1°F resolution, calibrate to 0.01°C/0.01°F
Control accuracy and uniformity: Exceeds ASTM requirements throughout the operating range

Dimensions lxwxh,in.(cm)
42x35x36 (107x89x91)
Net Weight: 176 lbs (80kg)

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.	Model	Temperature Range	Electrical Requirements	Net Weight	Shipping Weight
K22753	LKV3000	15 to -30°C (59 to –22°F)	115V 60Hz, Single Phase, 20.1A	176 lbs (80 kg)	300 lbs (136 kg)
K22753-OS	LKV5000	15 to -30°C (59 to –22°F)	115V 60Hz, Single Phase, 20.1A	176 lbs (80 kg)	300 lbs (136 kg)
K22754	LKV3000	15 to -30°C (59 to –22°F)	220-240V 50Hz, Single Phase, 10.6A	176 lbs (80 kg)	300 lbs (136 kg)
K22754-OS	LKV5000	15 to -30°C (59 to –22°F)	220-240V 50Hz, Single Phase, 10.6A	176 lbs (80 kg)	300 lbs (136 kg)
K22751	LKV4000	15 to -70°C (59 to –94°F)	115V 60Hz, Single Phase, 26.9A	176 lbs (80 kg)	300 lbs (136 kg)
K22751-OS	LKV5000	15 to -70°C (59 to –94°F)	115V 60Hz, Single Phase, 26.9A	176 lbs (80 kg)	300 lbs (136 kg)
K22752	LKV4000	15 to -70°C (59 to –94°F)	220-240V 50Hz, Single Phase, 14.5A	176 lbs (80 kg)	300 lbs (136 kg)
K22752-OS	LKV5000	15 to -70°C (59 to –94°F)	220-240V 50Hz, Single Phase, 14.5A	176 lbs (80 kg)	300 lbs (136 kg)

Viscometer Holders

- For use with glass capillary viscometers

Ordering Information

Viscometer Type	Round Holder Catalog No.
Cannon®-Fenske Routine Cannon®-Fenske Opaque Cannon®-Manning Semi-Micro	**K23381**
Ubbelohde	**K23382**
Cannon®-Ubbelohde Cannon®-Ubbelohde Semi-Micro *(Also - Dilution and Semi-Micro Dilution types)*	**K23384**
Cross-Arm	**K23383**
BS/IP/RF U-Tube	**K23387**
Cannon®-Manning Vacuum	**K23388**
Asphalt Institute Modified Koppers	**K23363**

High Temperature Viscometer Holders

- For use with HKV baths for temperature up to 232˚C (450˚F)

Ordering Information

Viscometer Type	Round Holder Catalog No.
Cannon®-Fenske Routine Cannon®-Fenske Opaque Cannon®-Manning Semi-Micro	**K23381-HT**
Ubbelohde	**K23382-HT**

Universal Tube Holders

Can be used interchangeably with Cannon®-Fenske, Cannon®-Manning, Cross-Arm and Ubbelohde type capillary viscometers. Choice of round (2" dia.) plastic holders or rectangular metal holders.

Ordering Information

Catalog No.	
K23351	Universal Viscometer Holder, Round
K23350	Universal Viscometer Holder, Rectangular

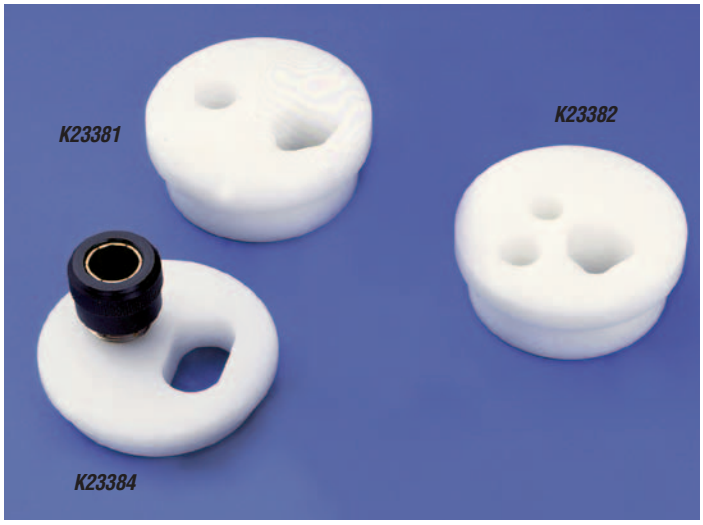
Digital Stopwatch

- Accurate to 0.0003%
- Calibration certificate traceable to NIST

Solid-state LCD digital stopwatch with a full range of features, including single action timing, cumulative split, interval split and more. Housed in a rugged high impact case with 40" (102cm) lanyard. Supplied with 4-year battery and calibration certificate traceable to NIST.

Ordering Information

Catalog No.	
K23462	Digital Stopwatch



Bath Oil

- White mineral oil for routine applications
- Silicone fluid for high temperature applications

White Mineral Oil–Highly refined white technical oil for use in constant temperature baths. Contains an oxidation inhibitor to limit clouding at higher temperatures. Suitable for use at temperatures of up to 230°F (110°C).

Silicone Fluid–Clear heat transfer fluid with high oxidation resistance and low volatility. Recommended for constant temperature bath applications above 240°F (116°C).

Specifications

	White Mineral Oil	Silicone Fluid
Nominal Viscosity	14.2-17.0 cSt @ 40°C	100 cSt @ 25°C
Minimum Flash Point	248°F (120°C)	600°F (316°C)
Specific Gravity @ 25°C	0.839-0.855	0.964

Shipped in 1 gal (3.785L) or 5 gal (18.925L) containers

Ordering Information

Catalog No.	
355-001-001	White Mineral Oil, 1 Gallon Container
355-001-003	White Mineral Oil, 5 Gallon Container
355-001-002	Silicone Heat Transfer Fluid, 1 Gallon Container
355-001-004	Silicone Heat Transfer Fluid, 5 Gallon Container

Kinematic Viscosity

Viscometer Cleaning and Drying Apparatus

- Six tube capacity
- For all types of capillary viscometers

Cleans and dries glass capillary viscometers using solvent and pressurized filtered air. Use for all types of kinematic viscometers. Cleans as many as six tubes at a time. Place tubes on solvent/air jets and open the valve for each jet. Turn selector dial to 'solvent' to rinse tubes, and then to 'air' to evaporate any remaining solvent. Use adjustable drainage rack to drain excess sample oil from tubes prior to cleaning. Drainage trough connects to a suitable waste container or chemical drain for removal of waste oil and solvent. Built-in air filter removes particles from the air stream. Available solvent tank has tubing with fittings for connection to apparatus. Requires pressurized air source (150psi maximum).

Dimensions: lxwxh,in.(cm)
without solvent tank
16x7x12½
(40.6x17.8x31.7)
Net Weight: K34000: 34 lbs (15.4kg)
K34010: 15 lbs (6.8kg)

Shipping Information:
Shipping Weight:
K34000: 44 lbs (20kg)
K34010: 18 lbs (8.2kg)
Dimensions:
K34000: 8.2 Cu. ft.
K34010: 2.6 Cu. ft.

K34010 Cleaning and Drying Apparatus

Ordering Information

Catalog No.	
K34000	Viscometer Cleaning and Drying Apparatus with Solvent Tank
K34010	Viscometer Cleaning and Drying Apparatus without Solvent Tank

Kinematic Viscosity Thermometers

Catalog No.	Thermometer	Test Temperature °F	Test Temperature °C	IP Reference
250-000-74F	ASTM 74F	–65°F	—	69F
250-000-74C	ASTM 74C	—	–53.9°C	69C
250-000-43F	ASTM 43F	–61 to –29°F	—	65F
250-000-43C	ASTM 43C	—	–51 to –34°C	65C
250-000-73F	ASTM 73F	–40°F	—	68F
250-000-73C	ASTM 73C	—	–40°C	68C
250-000-126F	ASTM 126F	–15°F	—	71F
250-000-126C	ASTM 126C	—	–26°C	71C
250-000-127C	ASTM 127C	—	–20°C	99C
250-000-72F	ASTM 72F	0°F	—	67F
250-000-72C	ASTM 72C	—	–17.8°C	67C
250-000-128F	ASTM 128F	32°F	—	33F
250-000-128C	ASTM 128C	—	0°C	33C
250-000-44F	ASTM 44F	68°F	—	29F
250-000-44C	ASTM 44C	—	20°C	29C
250-000-45F	ASTM 45F	77°F	—	30F
250-000-45C	ASTM 45C	—	25°C	30C
250-000-118F	ASTM 118F	86°F	—	—
250-000-118C	ASTM 118C	—	30°C	—

Catalog No.	Thermometer	Test Temperature °F	Test Temperature °C	IP Reference
250-000-28F	ASTM 28F	100°F	—	31F
250-000-28C	ASTM 28C	—	37.8°C	31C
250-000-120C	ASTM 120C	—	40°C	92C
250-000-46F	ASTM 46F	122°F	—	66F
250-000-46C	ASTM 46C	—	50°C	66C
250-000-29F	ASTM 29F	130°F	—	—
250-000-29C	ASTM 29C	—	54.4°C	34C
250-000-47F	ASTM 47F	140°F	—	35F
250-000-47C	ASTM 47C	—	60°C	35C
250-000-48F	ASTM 48F	180°F	—	90F
250-000-48C	ASTM 48C	—	82.2°C	90C
250-000-129F	ASTM 129F	200°F	—	36F
250-000-129C	ASTM 129C	—	93.3°C	36C
250-000-30F	ASTM 30F	210°F	—	32F
250-000-121C	ASTM 121C	—	100°C	32C
250-000-110F	ASTM 110F	275°F	—	—
250-000-110C	ASTM 110C	—	135°C	93C

Please note: ASTM D445 recommends calibrated kinematic viscosity thermometers.
Please refer to the ASTM thermometer section on pages 184 through 191.

Koehler INSTRUMENT COMPANY, INC.

Kinematic Viscosity

Calibrated Glass Capillary Kinematic Viscometers

Koehler offers a full selection of glass capillary viscometers for measuring kinematic viscosity of liquid petroleum products in accordance with ASTM D445 and related standard test methods. All types of viscometers conform to ASTM D446 and related standard specifications for glass capillary kinematic viscometers. Each viscometer is supplied with a calibration certificate, and holders should be ordered separately. Please refer to the following brief descriptions for determining which viscometer is best suited for your particular application.

Cannon®-Fenske Routine Viscometers

The Cannon®-Fenske Routine viscometer is a rugged and inexpensive viscometer that works well if the sample is transparent or translucent. Other viscometers for transparent samples in this catalog include the Cross Arm and BS/U-Tube viscometers.

Ubbelohde Viscometers

The Ubbelohde viscometer and other suspended level viscometers are used to measure transparent liquids. Unlike the Cannon®-Fenske Routine viscometer, suspended level viscometers maintain the same viscometer constant at all temperatures, advantageous when samples are to be measured at different temperatures. Other suspended level viscometers in this catalog include the BS/IP/SL, BP/IP/SL(S), and BP/IP/MSL viscometers.

Reverse Flow Viscometers

The Cannon®-Fenske Opaque, Cross Arm, and BS/IP/RF U-Tube viscometers have been designed for testing opaque liquids. These viscometers wet the timing section of the viscometer capillary only during the actual measurement and must be cleaned, dried and refilled before a repeat measurement can be made. By contrast, other viscometer types commonly used to measure transparent liquids allow the sample to be repeatedly drawn up into the capillary, permitting duplicate measurements.

Small Volume Viscometers

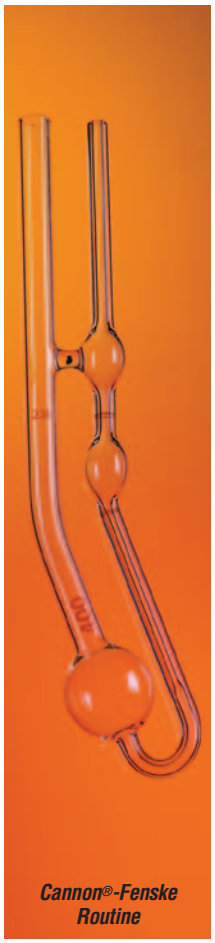
Several semi-micro viscometers have been designed which require one milliliter or less of liquid, which include the Cannon®-Manning Semi-Micro, Cannon®-Manning Semi-Micro Extra Low Charge, and Cannon®-Ubbelohde Semi-Micro viscometers.

Dilution Viscometers

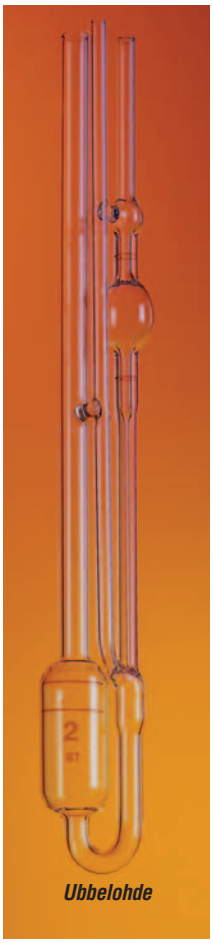
Estimates of the molecular size and shape of large polymers molecules can be obtained from kinematic viscosity measurements of dilute solutions. The Cannon®-Ubbelohde Dilution viscometer has an extra large reservoir which allows polymer solutions to be diluted several times and measures viscosities at four different shear rates. Dilute polymer solutions frequently appear to exhibit changes in kinematic viscosity when the shear rate is changed.

Vacuum Viscometers

In most glass capillary viscometers, the samples flow under gravity. When liquids are too viscous to flow readily under gravity, vacuum viscometers may be used to measure viscosity. A vacuum is applied to one end of the viscometer to pull the liquid through the capillary into the timing bulb. Koehler offers the Cannon®-Manning Vacuum, the Asphalt Institute Vacuum, and the Modified Koppers Vacuum reverse flow viscometer tubes. These vacuum viscometers require an accurately controlled vacuum regulator for proper measurement. Please refer to page 13 for information about the Koehler Vacuum Regulator.


Cannon®-Fenske Routine

Cannon®-Fenske Opaque


Ubbelohde

Cannon®-Fenske Routine

For kinematic viscosity of transparent liquids up to 100,000cSt. Requires a sample of approximately 7mL. Use with K23310 and K23350 rectangular metal holders or K23381 and K23351 round plastic holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C01	25	0.002	0.5 to 2
378-050-C01	50	0.004	0.8 to 4
378-075-C01	75	0.008	1.6 to 8
378-100-C01	100	0.015	3 to 15
378-150-C01	150	0.035	7 to 35
378-200-C01	200	0.1	20 to 100
378-300-C01	300	0.25	50 to 250
378-350-C01	350	0.5	100 to 500
378-400-C01	400	1.2	240 to 1,200
378-450-C01	450	2.5	500 to 2,500
378-500-C01	500	8.0	1,600 to 8,000
378-600-C01	600	20.0	4,000 to 20,000
378-650-C01	650	45.0	9,000 to 45,000
378-700-C01	700	100.0	20,000 to 100,000

Koehler supplies a wide range of viscosity reference standards used for calibration and verification of kinematic and dynamic viscosity test equipment. Please refer to pages 18-19 or contact Koehler Customer Service for additional information.

Kinematic Viscosity

Cannon®-Fenske Opaque

Reverse-flow viscometer for measurement of transparent and dark liquids having kinematic viscosities of up to 100,000cSt. Requires a sample of approximately 12mL. Allows timing of samples whose thin films are opaque and are thus not suitable for modified Ostwald and suspended-level type viscometers. Can be used for kinematic viscosities of asphalts by ASTM D2170 method. Use with K23310 and K23350 rectangular metal holders or K23381 and K23351 round plastic holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C02	25	0.002	0.4 to 2
378-050-C02	50	0.004	0.8 to 4
378-075-C02	75	0.008	1.6 to 8
378-100-C02	100	0.015	3 to 15
378-150-C02	150	0.035	7 to 35
378-200-C02	200	0.1	20 to 100
378-300-C02	300	0.25	50 to 250
378-350-C02	350	0.5	100 to 500
378-400-C02	400	1.2	240 to 1,200
378-450-C02	450	2.5	500 to 2,500
378-500-C02	500	8.0	1,600 to 8,000
378-600-C02	600	20.0	4,000 to 20,000
378-650-C02	650	45.0	9,000 to 45,000
378-700-C02	700	100.0	20,000 to 100,000

Ubbelohde

Suspended-level type viscometer for kinematic viscosities of transparent liquids of up to 100,000cSt. Requires a sample volume of approximately 11mL. Use with K23320 and K23350 rectangular metal holders or K23382 and K23351 round plastic holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-000-C03	0	0.001	0.3 to 1
378-00C-C03	0C	0.003	0.6 to 3
378-00B-C03	0B	0.005	1 to 5
378-001-C03	1	0.01	2 to 10
378-01C-C03	1C	0.03	6 to 30
378-01B-C03	1B	0.05	10 to 50
378-002-C03	2	0.1	20 to 100
378-02C-C03	2C	0.3	60 to 300
378-02B-C03	2B	0.5	100 to 500
378-003-C03	3	1.0	200 to 1,000
378-03C-C03	3C	3.0	600 to 3,000
378-03B-C03	3B	5.0	1,000 to 5,000
378-004-C03	4	10.0	2,000 to 10,000
378-04C-C03	4C	30.0	6,000 to 30,000
378-04B-C03	4B	50.0	10,000 to 50,000
378-005-C03	5	100.0	20,000 to 100,000

Cannon®-Ubbelohde Four-Bulb Shear Dilution

Suspended level viscometer for the measurement of intrinsic viscosity extrapolated to zero shear rate. Provides five-fold range of shear rates. Requires approximately 20mL of sample. Use with K23361 rectangular holder or K23384 round holder.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C16	25	0.002	0.5 to 2
378-050-C16	50	0.004	0.8 to 4
378-075-C16	75	0.008	1.6 to 8
378-100-C16	100	0.015	3 to 15
378-150-C16	150	0.035	7 to 35

Cannon®-Ubbelohde

Suspended level viscometer for transparent liquids. Requires approximately 11mL of sample. Use with K23361 rectangular holder or K23384 round holder.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C11	25	0.002	0.5 to 2
378-050-C11	50	0.004	0.8 to 4
378-075-C11	75	0.008	1.6 to 8
378-100-C11	100	0.015	3 to 15
378-150-C11	150	0.035	7 to 35
378-200-C11	200	0.1	20 to 100
378-300-C11	300	0.25	50 to 200
378-350-C11	350	0.5	100 to 500
378-400-C11	400	1.2	240 to 1,200
378-450-C11	450	2.5	500 to 2,500
378-500-C11	500	8.0	1,600 to 8,000
378-600-C11	600	20.0	4,000 to 20,000
378-650-C11	650	45.0	9,000 to 45,000
378-700-C11	700	100.0	20,000 to 100,000

Cannon®-Ubbelohde Dilution

Suspended level viscometer for the measurement of intrinsic viscosity of transparent liquids. Requires approximately 8mL of sample. Use with K23361 rectangular holder or K23384 round holder.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C15	25	0.002	0.5 to 2
378-050-C15	50	0.004	0.8 to 4
378-075-C15	75	0.008	1.6 to 8
378-100-C15	100	0.015	3 to 15
378-150-C15	150	0.035	7 to 35
378-200-C15	200	0.1	20 to 100
378-300-C15	300	0.25	50 to 200
378-350-C15	350	0.5	100 to 500
378-400-C15	400	1.2	240 to 1,200
378-450-C15	450	2.5	500 to 2,500
378-500-C15	500	8.0	1,600 to 8,000
378-600-C15	600	20.0	4,000 to 20,000

Cannon®-Ubbelohde Semi-Micro

For transparent liquids. Requires approximately 1.0mL of sample. Use with K23361 rectangular holder or K23384 round holder.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C12	25	0.002	0.5 to 2
378-050-C12	50	0.004	0.8 to 4
378-075-C12	75	0.008	1.6 to 8
378-100-C12	100	0.015	3 to 15
378-150-C12	150	0.035	7 to 35
378-200-C12	200	0.1	20 to 100
378-300-C12	300	0.25	50 to 200
378-350-C12	350	0.5	100 to 500
378-400-C12	400	1.2	240 to 1,200
378-450-C12	450	2.5	500 to 2,500
378-500-C12	500	8.0	1,600 to 8,000
378-600-C12	600	20.0	4,000 to 20,000

Koehler Instrument Company, Inc.

Kinematic Viscosity

Cannon®-Manning Semi-Micro

For transparent liquids. Requires a sample of approximately 1.0mL. Use with K23310 and K23350 rectangular holders or K23381 and K23351 round holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C10	25	0.002	0.5 to 2
378-050-C10	50	0.004	0.8 to 4
378-075-C10	75	0.008	1.6 to 8
378-100-C10	100	0.015	3 to 15
378-150-C10	150	0.035	7 to 35
378-200-C10	200	0.1	20 to 100
378-300-C10	300	0.25	50 to 200
378-350-C10	350	0.5	100 to 500
378-400-C10	400	1.2	240 to 1,200
378-450-C10	450	2.5	500 to 2,500
378-500-C10	500	8.0	1,600 to 8,000
378-600-C10	600	20.0	4,000 to 20,000

Cannon®-Manning Semi-Micro Extra Low Charge

For transparent liquids. Requires a sample of approximately 0.5mL. Use with K23350 rectangular holders or K23351 round holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-025-C17	25	0.002	0.5 to 2
378-050-C17	50	0.004	0.8 to 4
378-075-C17	75	0.008	1.6 to 8
378-100-C17	100	0.015	3 to 15
378-150-C17	150	0.035	7 to 35
378-200-C17	200	0.1	20 to 100
378-300-C17	300	0.25	50 to 200
378-350-C17	350	0.5	100 to 500
378-400-C17	400	1.2	240 to 1,200
378-450-C17	450	2.5	500 to 2,500
378-500-C17	500	8.0	1,600 to 8,000
378-600-C17	600	20.0	4,000 to 20,000

Cross-Arm

Reverse-flow type viscometer for transparent and dark liquids having kinematic viscosities of up to 100,000cSt. Requires a sample of approximately 1-3mL. Use with K23362 and K23350 rectangular metal holders or K23383 and K23351 round plastic holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-001-C09	1	0.003	0.6 to 3
378-002-C09	2	0.01	2 to 10
378-003-C09	3	0.03	6 to 30
378-004-C09	4	0.1	20 to 100
378-005-C09	5	0.3	60 to 300
378-006-C09	6	1.0	200 to 1,000
378-007-C09	7	3.0	600 to 3,000
378-008-C09	8	10.0	2,000 to 10,000
378-009-C09	9	30.0	6,000 to 30,000
378-010-C09	10	100.0	20,000 to 100,000

Koehler supplies a wide range of viscosity reference standards used for calibration and verification of kinematic and dynamic viscosity test equipment. Please refer to pages 18-19 or contact Koehler Customer Service for additional information.

BS/IP/RF U-Tube Opaque

Reverse-flow viscometer for opaque liquids having kinematic viscosities of up to 300,000cSt. Requires a sample of 12-25mL. Use with K23330 rectangular metal holders or K23387 round plastic holders.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-001-C08	1	0.003	0.6 to 3
378-002-C08	2	0.01	2 to 10
378-003-C08	3	0.03	6 to 30
378-004-C08	4	0.1	20 to 100
378-005-C08	5	0.3	60 to 300
378-006-C08	6	1.0	200 to 1,000
378-007-C08	7	3.0	600 to 3,000
378-008-C08	8	10.0	2,000 to 10,000
378-009-C08	9	30.0	6,000 to 30,000
378-010-C08	10	100.0	20,000 to 100,000
378-011-C08	11	300.0	18,000 to 300,000

BS/IP/RF U-Tube Transparent

U-Tube viscometer for transparent liquids having kinematic viscosities of up to 10,000cSt. Requires a sample of 7-23mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-00A-C08	A	0.003	0.9 to 3
378-00B-C08	B	0.01	2.0 to 10
378-00C-C08	C	0.03	6 to 30
378-00D-C08	D	0.1	20 to 100
378-00E-C08	E	0.3	60 to 300
378-00F-C08	F	1.0	200 to 1,000
378-00G-C08	G	3.0	600 to 3,000
378-00H-C08	H	10.0	2,000 to 10,000

BS/U/M Miniature U-Tube

Miniature U-Tube viscometer for transparent liquids having kinematic viscosities of up to 100cSt. Requires a sample of 2mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-0M1-C18	M1	0.001	0.2 to 1
378-0M2-C18	M2	0.005	1 to 5
378-0M3-C18	M3	0.015	3 to 15
378-0M4-C18	M4	0.04	8 to 40
378-0M5-C18	M5	0.1	20 to 100

Vacuum Manifold

Designed for use with Koehler capillary-type viscometer tube baths and vacuum regulator. Manifold includes seven position valves and tubing for applying vacuum or pressure as per ASTM D2171.

Ordering Information

Catalog No.	
K23467	Vacuum Manifold

Kinematic Viscosity

BS/IP/MSL Miniature Suspended Level

Miniature suspended level viscometer for transparent liquids having kinematic viscosities of up to 3,000cSt. Requires a sample of 4mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-001-C19	1	0.003	0.6 to 3
378-002-C19	2	0.01	2 to 10
378-003-C19	3	0.03	6 to 30
378-004-C19	4	0.1	20 to 100
378-005-C19	5	0.3	60 to 300
378-006-C19	6	1.0	200 to 1,000
378-007-C19	7	3.0	600 to 3,000

BS/IP/SL Suspended Level

Suspended level viscometer for transparent liquids having kinematic viscosities of up to 100,000cSt. Requires a sample of 11mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-001-C20	1	0.01	3.5 to 10
378-01A-C20	1A	0.03	6 to 30
378-002-C20	2	0.1	20 to 100
378-02A-C20	2A	0.3	60 to 300
378-003-C20	3	1.0	200 to 1,000
378-03A-C20	3A	3.0	600 to 3,000
378-004-C20	4	10.0	2,000 to 10,000
378-04A-C20	4A	30.0	6,000 to 30,000
378-005-C20	5	100.0	20,000 to 100,000

BS/IP/SL(S) Suspended Level

Shortened suspended level viscometer for transparent liquids having kinematic viscosities of up to 100,000cSt. Requires a sample of 10mL.

Catalog No.	Size	Approximate Constant, cSt/s	Kinematic Viscosity Range, cSt
378-001-C21	1	0.0008	3.5 to 10
378-002-C21	2	0.003	6 to 30
378-003-C21	3	0.01	20 to 100
378-004-C21	4	0.03	60 to 300
378-005-C21	5	0.1	200 to 1,000
378-006-C21	6	0.3	600 to 3,000
378-007-C21	7	1.0	2,000 to 10,000
378-008-C21	8	3.0	6,000 to 30,000
378-009-C21	9	10.0	20,000 to 100,000

Cannon®-Manning Vacuum

For highly viscous materials, including asphalt cement at 140°F (60°C) in accordance with ASTM D2171. Requires approximately 6mL of sample. Use with K23360 rectangular holder or K23388 round holder.

		Approximate Constant at 300mm Hg vacuum, poise/second		
Catalog No.	Size	Bulb B	Bulb C	Viscosity Range, Poise
378-004-C13	4	0.0002	0.0006	0.36 to 0.8
378-005-C13	5	0.006	0.002	0.12 to 2.4
378-006-C13	6	0.02	0.006	0.36 to 8
378-007-C13	7	0.06	0.02	1.2 to 24
378-008-C13	8	0.2	0.06	3.6 to 80
378-009-C13	9	0.6	0.2	12 to 240
378-010-C13	10	2	0.6	36 to 800
378-011-C13	11	6	2	120 to 2,400
378-012-C13	12	20	6	360 to 8,000
378-013-C13	13	60	20	1,200 to 24,000
378-014-C13	14	200	60	3,600 to 80,000

Asphalt Institute Vacuum

Similar to Cannon®-Manning Vacuum type, but with graduated capillary instead of two timing bulbs. Requires a sample of approximately 4mL. Use with K23360 rectangular holder or K23388 round holder.

		Approximate Constant at 300mm Hg vacuum, poise/second			
Catalog No.	Size	Bulb B	Bulb C	Bulb D	Viscosity Range, Poise
378-025-C14	25	2	1	0.7	42 to 800
378-050-C14	50	8	4	3	180 to 3,200
378-100-C14	100	32	16	10	600 to 12,800
378-200-C14	200	128	64	40	2,400 to 52,000
378-400-C14	400	500	250	160	9,600 to 200,000

Modified Koppers Vacuum

For highly viscous materials in accordance with ASTM D2171. Requires a sample of 2mL. Use with K23364 rectangular holder or K23363 round holder.

		Approximate Constant at 300mm Hg vacuum, poise/second			
Catalog No.	Size	Bulb B	Bulb C	Bulb D	Viscosity Range, Poise
378-025-C06	25	2	1	0.7	42 to 800
378-050-C06	50	8	4	3	180 to 3,200
378-100-C06	100	32	16	10	600 to 12,800
378-200-C06	200	128	64	40	2,400 to 52,000
378-400-C06	400	500	250	160	9,600 to 200,000

Vacuum Regulator

Vacuum Regulator

For ASTM D2171, "Viscosity of Asphalts by Vacuum Capillary Viscometers." Precisely controls vacuum from 28 to 411 mm Hg below atmospheric pressure to an accuracy of ±0.5 mm Hg. Recommended for use with Cannon®-Manning, Asphalt Institute or Modified Koppers vacuum viscometers. All solid-state—contains no mercury. Amount of vacuum is shown on digital display. Ten different units of vacuum measurement may be selected through keypad on the meter.

Ordering Information

Catalog No.	
K23463	Vacuum Regulator (vertical orientation), 115V 50/60Hz
K23464	Vacuum Regulator (vertical orientation), 220-240V 50/60Hz
K23465	Vacuum Regulator (horizontal orientation), 115V 50/60Hz
K23466	Vacuum Regulator (horizontal orientation), 220-240V 50/60Hz

Koehler INSTRUMENT COMPANY, INC.

Low Temperature Viscosity Measured by Brookfield Viscometer

K34702 Brookfield Viscosity Air Bath (BV4000)

New BV3000 Brookfield Viscosity Liquid Bath

- Permits viscosity measurements without the risk of temperature increase
- 10 sample turntable
- Mechanically refrigerated with digital indicating temperature control
- Operating range to –55°C

Constant temperature liquid bath permits testing of samples without the risk of sample temperature rise. After cooling in the air bath, the sample must be transferred to the balsa cell carrier for testing with the Brookfield viscometer. If the sample is not tested quickly, there is the risk of sample temperature rise. The Brookfield Viscosity Liquid Bath eliminates this risk by permitting the sample to be tested in a constant temperature environment. The Brookfield viscometer mounts directly on the bath and the samples are rotated into position under the spindle by means of a built-in turntable. Cooling system maintains temperature with ±0.05°C stability in the range of +10°C to –55°C. Bath temperature is displayed in digital format.

Specifications

Conforms to the specifications of: Note 7 of ASTM D2983
Sample Capacity: 10 samples
Temperature Range: +10°C to –55°C
Temperature Control Stability: ±0.05°C
Electrical Requirements:
115V 60Hz, Single Phase, 16A
220-240V 50 or 60Hz, Single Phase, 12A

Dimensions: lxwxh,in.(cm)

17x24x25(43x61x25)
Net Weight: 265 lbs (120kg)

Shipping Information

Shipping Weight: 300 lbs (136kg)
Dimensions: 13.9 Cu. ft.

Test Method

Determines the low temperature, low shear rate viscosities of gear oils, automatic transmission fluids, hydraulic oils and other fluid lubricants by use of the Brookfield viscometer.

New BV4000 Brookfield Viscosity Air Bath

- Conforms to ASTM D2983 and related specifications
- Mechanically refrigerated with digital indicating temperature control
- Operating range to –50°C
- Sixteen sample capacity

Mechanically refrigerated cold cabinet prepares samples for Brookfield viscosity determinations on petroleum lubricants. A built-in turntable rotates the samples at 4rpm per specifications. Cooling system maintains cabinet temperature within ±0.1°C at temperatures as low as –50°C. Cabinet temperature is displayed in digital format on the front panel. Cabinet accommodates sixteen (16) sample cells with cell carriers. Includes insulated cover.

Specifications

Conforms to the specifications of:
ASTM D2983; IP 267 Method A; ISO 9262; CEC-L-18A
Capacity: 16 sample cells with cell carriers
Temperature Range: +10°C to –50°C
Temperature control accuracy: ± 0.1°C
Sample Rotation: 4rpm
Electrical Requirements:
115V 60Hz, Single Phase, 16A
220-240V 50 or 60Hz, Single Phase, 12A

Dimensions: lxwxh,in.(cm)

36x28x43 (91x71x109)
Net Weight: 315 lbs (143kg)

Shipping Information

Shipping Weight: 380 lbs (172kg)
Dimensions: 38.9 Cu. ft.

Ordering Information

Catalog No.	
K34710	BV3000 Brookfield Viscosity Liquid Bath, 115V 60Hz
K34711	BV3000 Brookfield Viscosity Liquid Bath, 220-240V 50Hz
K34712	BV3000 Brookfield Viscosity Liquid Bath, 220-240V 60Hz
K34700	BV4000 Brookfield Viscosity Air Bath, 115V 60Hz
K34701	BV4000 Brookfield Viscosity Air Bath, 220-240V 50Hz
K34702	BV4000 Brookfield Viscosity Air Bath, 220-240V 60Hz

Software compatible, inquire with Koehler Customer Service.

BV5000 Programmable Brookfield Viscosity Liquid Bath

- Sample soaking and testing in a single bath, eliminating the need for an air bath and the risk of sample temperature rise during transfer
- Redesigned for improved control of sample movement and handling during testing
- Microprocessor PID temperature control duplicates the sample cooling rates in ASTM D2983
- Up to 40 cooling/testing temperature profiles can be stored in memory

Redesigned programmable baths with improved features for sample handling and testing. Bath accommodates 10 samples for Brookfield Viscosity testing. Sample cells are immersed in a liquid bath for the entire soaking and testing period, eliminating the need to transfer cells from an air bath to a liquid bath with insulated balsa wood carriers. Also eliminated is the inherent risk of sample temperature rise during transfer. The programmable microprocessor PID controller stores up to 40 temperature profiles that duplicate the sample cooling rates found in ASTM D2983. Steady state temperature accuracy and uniformity exceed ASTM requirements throughout the operating range from ambient to -55°C. Air-cooled hermetic compressors provide efficient operation with the use of CFC-free refrigerants.

The mounting position for the Brookfield Viscometer has been changed to permit easier access to the samples and viscometer controls. Cabinet has a front window and glare-free fluorescent lighting for distortion free viewing of the sample cells. Cabinet construction is polyester-epoxy finished steel with a chemical-resistant composite top surface. A removable insulated cover with handle is included. Bath rests on adjustable leveling feet. Safety features include a probe fault detection circuit in the primary temperature controller and a redundant latching controller and probe for temperature fault protection.

Specifications

Conforms to the specifications of:
ASTM D2983 - Note 1 and Appendix X3; IP 267; CEC L18A-30; ISO 9262
Sample capacity: 10 samples
Temperature control: Microprocessor PID digital-indicating programmable controller with ±0.05°C steady state stability
Operating Range: ambient to –55°C
Electrical Requirements:
220-240V 50 or 60Hz, Single Phase, 12.6A

Dimensions: lxwxh,in.(cm)
41x34x38 (104x86.5x96.5)
Net Weight: 327 lbs (148.5kg)

Shipping Information

Shipping Weight: 497 lbs (226kg)
Dimensions: 41.5 Cu. ft.

Ordering Information

Catalog No.	
K34715	BV5000 Programmable Brookfield Viscosity Liquid Bath, 220-240V 50Hz
K34716	BV5000 Programmable Brookfield Viscosity Liquid Bath, 220-240V 60Hz

Software compatible, inquire with Koehler Customer Service.

K34715 Programmable Brookfield Viscosity Liquid Bath

Accessories

Catalog No.		Order Qty
K34750	Brookfield Digital Viscometer, 115V 60Hz	1
K34751	Brookfield Digital Viscometer, 220-240V 50Hz	
K34752	Brookfield Digital Viscometer, 220-240V 60Hz	
K34760	Brookfield Programmable Viscometer, 115V 60Hz	1
K34761	Brookfield Programmable Viscometer, 220-240V 50Hz	
K34762	Brookfield Programmable Viscometer, 220-240V 60Hz	
K34706	Insulated Spindle No.4B2	1
K34707	Cell Stopper	12
K34708	Insulated Cell Carrier (for Air Bath)	1
K34709	Test Cell - Round Bottom (pack of 12)	1
K34770	Test Cell - Flat Bottom (pack of 12)	1
250-000-122C	ASTM 122C/IP94C Thermometer Range –45 to –35°C	1
250-000-123C	ASTM 123C/IP95C Thermometer Range –35 to –25°C	1
250-000-124C	ASTM 124C/IP96C Thermometer Range –25 to –15°C	1
250-000-125C	ASTM 125C/IP97C Thermometer Range –15 to –5°C	1
355-005-027	Viscosity Standard N27B Viscosities in centipoise at –40, –30, –20, –15, –10, 0°F	1
355-005-115	Viscosity Standard N115B Viscosity in centipoise at –20, –15, –10, 0, +10, 20°F	1

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Saybolt Viscosity

K21414 Saybolt Viscosity Bath (SV4000) with K21404 Auto Viscosity Timers

Ordering Information

Catalog No.		Order Qty
SV3000 Saybolt Viscosity Bath		
K21410	SV3000 Saybolt Viscosity Bath, 115V 50/60Hz	1
K21420	SV3000 Saybolt Viscosity Bath, 220-240V 50/60Hz	
SV4000 Saybolt Viscosity Bath for Automatic Viscosity Timing		
K21414	SV4000 Saybolt Viscosity Bath, 115V 50/60Hz	1
K21424	SV4000 Saybolt Viscosity Bath, 220-240V 50/60Hz	
Automatic Saybolt Viscosity Timing Sensor		
K21404	Automatic Saybolt Viscosity Timing Sensor, 115V 50/60Hz	1-4
K21494	Automatic Saybolt Viscosity Timing Sensor, 220-240V 50/60Hz *Each port can accommodate one sensor for automatic timing operation on SV4000 Saybolt Viscosity Baths.*	1-4
Accessories		
355-001-002	Silicone Heat Transfer Fluid, 1 Gallon Container	5
355-001-004	Silicone Heat Transfer Fluid, 5 Gallon Container minimum flash point 620°F (326°C)	1

Please refer to separate listing on page 8 for specifications.

Please contact Koehler Customer Service about the retrofitting of SV3000 Series Saybolt Viscosity Baths with the new K21404 Automatic Saybolt Viscosity Timing Sensors.

Software compatible, inquire with Koehler Customer Service.

Test Method

Determines the time required for 60mL of sample to flow through a calibrated orifice under precisely controlled conditions. Saybolt Universal Seconds (SUS) is the standard measurement for lubricants, insulating oils and lighter fuel grades, and Saybolt Furol Seconds (SFS) is used for heavier oils and bitumens.

SV3000 Saybolt Viscosity Bath and *New* SV4000 Saybolt Viscosity Bath for Automatic Viscosity Timing

- Microprocessor control of temperature between ambient and 240°C (464°F)
- Four tube capacity
- Dual digital displays show setpoint and actual temperature
- Selectable temperature scale - Celsius or Fahrenheit
- Automatic timing option for simplified, accurate measurement of efflux times
- Conforms to ASTM D88, D244, E102, and related specifications

Constant temperature bath with available automatic timing feature for viscosity determinations using Saybolt viscometer tubes and orifices. Microprocessor PID circuitry assures precise temperature control within ASTM specified tolerances throughout the operating range of the bath. Simple push-button controls and dual digital displays permit easy setting and monitoring of bath temperature. Two place calibration offset is provided. Accommodates four viscometers and four 60mL receiving flasks. Sliding draft shields and a chemical-resistant alignment plate facilitate handling of the flasks, and glare-free fluorescent backlighting is provided for easy viewing of the samples. *Communications software (RS232, etc.) ramp-to-set, and other enhanced features are available at additional cost. Contact your Koehler representative for additional information.*

Automatic Timing Option – At the push of a button, the automatic timer starts the sample flow, senses the 60mL end point, and digitally records and displays the efflux time in 0.1 seconds resolution with an accuracy of 0.05%. Automatic timing improves testing accuracy and convenience, eliminating the chain and cork assembly and the need to manually time each sample. Timer installation is available in any configuration from 1 to 4 positions.

Bath Construction and Safety Features – Insulated bath interior is constructed entirely of heavy gauge stainless steel. A built-in overflow pipe and drain valve simplifies filling of the bath fluid to the proper level. Chemical resistant top plate provides excellent insulation and is easily removed to allow for cleaning of the bath interior. A cooling coil for tap water or refrigerated coolant is provided for operation at near-ambient temperatures. Steel cabinet has leveling feet and a chemical resistant polyurethane-epoxy finish.

Specifications

Conforms to the specifications of:
ASTM D88, D244, E102; AASHTO T72; FTM 791-304
Capacity: 4 viscometer tubes
Temperature Range: ambient to 464°F (240°C)
Temperature Stability: ±0.05°F (±0.03°C)
Bath Capacity: 5 gal (19L)
Recommended Bath Medium: water or suitable heat transfer fluid
Electrical Requirements:
115V 50/60Hz, single phase, 12.3A
220-240V 50/60Hz, single phase, 6.4A

Included Accessories

Cleaning Plunger
Oil Strainer
Tube Nut Wrench
Port Closures
Thermometer Supports
Chained Corks
Withdrawal Tube
Orifice Wrench
Port Covers

Dimensions

lxwxh,in.(cm)
29x25x33 (74x63½x84)
Net Weight: 65 lbs (29½kg)

Shipping Information

Shipping Weight: 82 lbs (37kg)
Dimensions: 10 Cu. ft.

Saybolt Viscosity

Saybolt Viscometer Tubes and Orifices

- Conforming to ASTM D88, E102 and related specifications
- Choice of brass or stainless steel tubes

Viscometer Tubes–Precisely machined brass and stainless steel tubes meeting ASTM requirements. Tubes mount vertically in Saybolt Viscometer Baths and accommodate stainless steel orifices interchangeably. Supplied with mounting hardware.

Orifices–Stainless Steel Universal and Furol Orifices meeting ASTM specifications. Orifices insert in viscometer tubes using K22030 Orifice Wrench (supplied with viscometer baths). Also available - Kansas Road Oil Orifice (requires K22039 wrench). Universal and Furol Orifices are available with a calibration certificate.

Ordering Information

Catalog No.	
Viscometer Tubes	
K22009	Saybolt Viscometer Tube, Brass
K22309	Saybolt Viscometer Tube, Stainless Steel
Orifices	
K22010	Saybolt Universal Orifice
K22010-C/F	Saybolt Universal Orifice with calibration certificate
K22020	Furol Orifice
K22020-C/F	Saybolt Furol Orifice with calibration certificate
K22029	Kansas Road Oil Orifice
Accessories	
332-003-003	Pyrex™ Receiving Flask, 60mL for SV3000
332-003-014	Pyrex™ Receiving Flask, 60mL for SV4000
K22030	Orifice Wrench for Universal and Furol Orifices
K22039	Orifice Wrench for Kansas Road Oil Orifices
K22050	Socket Wrench
K22060	Oil Strainer
K22070	Cleaning Plunger
K22080	Displacement Ring. Insert in viscometer tube galley for bituminous materials testing. Meets ASTM E102 specifications.
K22090	Withdrawal Tube
K22011	Thermometer Support

Saybolt Viscosity Thermometers

Catalog Number	Thermometer	Test Temperature °F	Test Temperature °C	Range
250-000-17F	ASTM 17F	66 to 80°F	—	66 to 80°F
250-000-17C	ASTM 17C	—	19 to 27°C	19 to 27°C
250-000-18F	ASTM 18F	100°F	—	94 to 108°F
250-000-18C	ASTM 18C	—	34 to 42°C	34 to 42°C
250-000-19F	ASTM 19F	122 and 130°F	—	120 to 134°F
250-000-19C	ASTM 19C	—	50 and 54.4°C	49 to 57°C
250-000-20F	ASTM 20F	140°F	—	134 to 148°F
250-000-20C	ASTM 20C	—	60°C	57 to 65°C
250-000-21F	ASTM 21F	180°F	—	174 to 188°F
250-000-21C	ASTM 21C	—	82.2°C	79 to 87°C

Catalog Number	Thermometer	Test Temperature °F	Test Temperature °C	Range
250-000-22F	ASTM 22F	210°F	—	204 to 218°F
250-000-22C	ASTM 22C	—	98.9°C	95 to 103°C
250-000-77F	ASTM 77F	250°F	121°C	245 to 265°F
250-000-108F	ASTM 108F	275°F	135°C	270 to 290°F
250-000-78F	ASTM 78F	300°F	149°C	295 to 315°F
250-000-109F	ASTM 109F	325°F	163°C	320 to 340°F
250-000-79F	ASTM 79F	350°F	177°C	345 to 365°F
250-000-80F	ASTM 80F	400°F	204°C	395 to 415°F
250-000-81F	ASTM 81F	450°F	232°C	445 to 465°F

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Test apparatus for lubricants, insulating oils, and heater fuel grades:

Catalog No.		*Order Qty*
K21410	*Saybolt Viscometer Bath*	*1*
K22009	*Viscometer Tube*	*4*
K22010	*Universal Orifice*	*4*
332-003-003	*ReceivIng Flask (SV3000)*	*4*
332-003-014	*Pyrex™ Receiving Flask, 60mL for SV4000*	
355-001-001	*White Technical Oil*	*5*
250-000-17F	*Series ASTM Thermometers or*	
250-000-17C	*Series ASTM Thermometers*	

Test apparatus for bituminous materials:

Catalog No.		*Order Qty*
K21410	*Saybolt Viscometer Bath*	*1*
K22009	*Viscometer Tube*	*4*
K22020	*Furol Orifice*	*4*
K22080	*Displacement Ring*	*4*
332-003-003	*Receiving Flask (SV3000)*	*4*
332-003-014	*Pyrex™ Receiving Flask, 60mL for SV4000*	
355-001-002	*High Temperature Heat Transfer Fluid*	*5*
250-000-17F	*Series ASTM Thermometers or*	
250-000-17C	*Series ASTM Thermometers*	

Viscosity Standards

Viscosity Reference Standards

- Manufactured and certified according to ASTM D2162, the primary method for viscosity reference standards
- Supplied with an *ISO/IEC 17025 Certification Report*
- Fully compliant to ASTM and related test procedures
- Custom standards available

Koehler viscosity reference standards are used for calibration and verification of kinematic and dynamic viscosity test equipment, both manual and automatic. All viscosity standards are based upon the National Institute of Standards and Technology (NIST) value of 1.0034 cSt (Centistokes) for water at 20°C (68°F). All standards are traceable to National Standards and are manufactured and certified according to ASTM D2162, the internationally recognized *primary* method for viscosity reference standards, under *ISO/IEC 17025* guidelines. Standards are calibrated to a precision of ±0.2% for the viscosity and kinematic viscosity. Nominal or approximate values are listed in the following tables. With each standard, actual certified values for kinematic viscosity (cSt), dynamic viscosity (cP), and density (g/mL) according to ASTM D1480 are provided at each temperature point of calibration along with uncertainty measurements. Each standard is calibrated at a minimum of five temperatures and supplied in a 500mL quantity in an amber-colored bottle complete with full certification and a Material Data Safety Sheet (MSDS).

In addition to the many viscosity standards described in this catalog, we can supply custom viscosity standards made specifically to meet your individual needs including high volume supply used for Statistical Quality Check and Statistical Process Control (SQC/SPC) applications.

Viscosity Reference Standards

Viscosity Standards Conforming to ASTM Standards

		Approximate Kinematic Viscosity in mm²/s (Centistokes)								Saybolt Viscosity		
Catalog No.	Viscosity Standard	20°C 68°F	25°C 77°F	37.8°C 100°F	40°C 104°F	50°C 122°F	60°C 140°F	98.9°C 210°F	100°C 212°F	SUS 100°F	SUS 210°F	SFS 122°F
355-004-004	N.4	0.47	0.45	0.41	0.40	—	—	—	—	—	—	—
355-004-008	N.8	0.95	0.89	0.77	0.75	—	—	—	—	—	—	—
355-004-001	N1.0	1.3	1.2	1.0	0.97	—	—	—	—	—	—	—
355-002-003	S3	4.6	4.0	3.0	2.9	2.4	—	1.2	1.2	—	—	—
355-003-005	D5	7.0	6.1	—	4.2	3.4	—	—	1.5	—	—	—
355-002-006	S6	10	8.7	6.0	5.7	4.5	—	1.9	1.9	—	—	—
355-003-010	D10	14	12	8.0	7.5	5.8	—	2.3	2.3	—	—	—
355-004-010	N10	21	17	11	10	7.3	—	2.7	2.7	—	—	—
355-002-020	S20	43	34	20	18	13	—	4.0	3.9	96.6	—	—
355-004-035	N35	77	59	35	29	20	—	5.3	5.2	152.1	—	—
355-002-060	S60	165	121	60	54	35	—	7.7	7.5	281	—	—
355-004-100	N100	372	268	128	114	70	—	13	13	592	—	—
355-002-200	S200	672	468	200	181	107	—	18	17	955	88.2	—
355-003-500	D500	825	578	—	226	133	—	—	21	—	—	—
355-004-350	N350	1,255	865	371	324	186	—	28	27	—	131.5	—
355-003-103	D1000	1,689	1,151	—	418	236	—	—	32	—	—	—
355-002-600	S600	2,184	1,472	600	518	286	—	37	36	—	174	135.2
355-004-103	N1000	4,678	3,089	—	1020	542	350	—	57	—	—	—
355-002-203	S2000	8,323	5,422	2,000	1,719	889	—	87	83.3	—	405	—
355-003-503	D5000	8,800	5,700	2,150	1,850	950	—	—	88	—	—	—
355-003-752	D7500	13,296	8,609	2,681	—	1,365	—	—	118	—	—	—
355-004-403	N4000	17,889	11,470	—	3,448	1,720	850	—	137	—	—	—
355-002-803	S8000	34,931	22,383	8,000	6,710	3,317	—	—	242	—	—	—
355-004-153	N15000	79,423	49,714	—	13,994	6,650	3,000	—	406	—	—	—
355-002-304	S30000	—	84,687	28,079	23,570	11,058	—	—	628	—	—	—

Viscosity Standards

Important Information About Viscosity Standards

All Koehler certified viscosity standards are Newtonian fluids manufactured from high stability base oils and polybutenes. The standards have an expiration date on the label at least twelve months or longer from the date of purchase. With time, changes resulting from slow oxidation or loss of volatiles may occur. These changes can be minimized by storing the standard in the closed bottle at ambient laboratory temperatures and out of sunlight. The expiration date on the label is part of Koehler's program of total quality control and is intended to ensure that the standard will be utilized while the certified viscosity data remains valid.

Cold-Cranking Simulator Viscosity Standards

		Approximate Kinematic Viscosity in mPa•s (Centipoise)						
Catalog No.	Viscosity Standard	–5°C 23°F	–10°C 14°F	–15°C 5°F	–20°C –4°F	–25°C –13°F	–30°C –22°F	–35°C –31°F
355-005-010	CL10	—	—	—	—	—	—	1,700
355-005-012	CL12	—	—	—	—	800	1,600	3,200
355-005-014	CL14	—	—	—	—	1,600	3,250	7,000
355-005-016	CL16	—	—	—	—	2,500	5,500	11,000
355-005-019	CL19	—	—	—	1,800	3,500	7,400	17,000
355-005-022	CL22	—	—	1,300	2,500	5,100	11,100	—
355-005-025	CL25	—	—	1,800	3,500	7,400	17,200	—
355-005-028	CL28	—	1,200	2,500	5,000	9,300	—	—
355-005-032	CL32	—	1,800	3,500	7,300	15,900	—	—
355-005-038	CL38	—	2,900	5,800	13,000	—	—	—
355-005-048	CL48	2,300	4,500	9,500	21,000	—	—	—
355-005-060	CL60	3,700	7,400	15,600	—	—	—	—
355-005-074	CL74	6,000	11,600	—	—	—	—	—

Low Temperature Viscosity Standards

Catalog No.	Viscosity Standard	
355-005-027	N27B	Viscosities in centipoise at –40,–30, –20, –15, –10, 0°F
355-005-115	N115B	Viscosities in centipoise at –20,–15, –10, 0, +10, 20°F

High Viscosity Standards (for asphalts and polymers)

		Approximate Viscosity			Kinematic Viscosity	
Catalog No.	Viscosity Standard	20°C 68°F Centipoise	25°C 77°F Centipoise	60°C 140°F Centipoise	60°C 140°F Centistokes	135°C 275°F Centistokes
355-004-600	N600	—	1,400	140	160	12
355-004-103	N1000	—	2,000	280	350	—
355-004-203	N2000	—	4,900	380	440	26
355-004-403	N4000	—	11,000	730	850	—
355-004-803	N8000	—	20,000	1,400	1,600	—
355-004-153	N15000	—	41,000	2,600	3,000	—
355-004-304	N30000	130,000	80,000	4,700	5,400	—
355-004-623	N62000	—	200,000	13,000	—	—
355-004-154	N150000	—	420,000	24,000	—	—
355-004-194	N190000	900,000	520,000	33,000	—	—
355-004-454	N450000	—	1,600,000	100,000	—	—
355-004-275	N2700000	—	5,300,000	340,000	—	—

Koehler INSTRUMENT COMPANY, INC.

Additional Accessories

Additional equipment, materials and/or reagents are required to perform some of the test procedures in the preceding pages. Please refer to the applicable test method for further information, or contact Koehler for assistance.

Kinematic Viscosity . . . . . **Pages 2-13**

ASTM D445, D2170, D6074, D6158; IP 71, 319; ISO 3104; DIN 51550; FTM 791-305

Petroleum Ether
Chromic Acid
Petroleum Spirit
Toluene
Plumb Line or Spirit Level
Petroleum Naphtha
Xylene
Acetone
Distilled Water

Saybolt Viscosity . . . . . **Pages 16-17**

ASTM D88, D244, E102; AASHTO T72; FTM 791-304

Balance
No. 50 (300-µm) Sieve
Condenser – Water Cooled Reflex Glass-tube
Xylol
No. 20 (850-µm) Sieve
Filter Funnel
Hot Plate (E102)